



Model MT5634ZPX-PCI

Internal Data /Fax Modem

Owner's Manual

Owner's Manual
MT5634ZPX -PCI
82092100, Revision A

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Contents

Chapter 1—Introduction and Description

Congratulations	6
Features	7
Peripheral Component Interconnect (PCI)	8
V.90 Support/Functions	9
What is in Your Modem Package?	10
How to Use This Manual	11
Typographic Conventions	12

Chapter 2—Installation

Introduction	14
What You'll Need	14
Safety Warnings	15
Installation Overview	15
Configuring the MultiModem ZPX-PCI	16
Installing the MultiModemZPX-PCI	17
External Connections	18
Installing Drivers	19
Verifying Configuration	19
To Remove Previous Modem from Windows 95	21
Is Your MultiModemZPX-PCI Ready for Use?	21
Operating Your MultiModemZPX-PCI	22
Simple Operation	22
Software Configuration	23
Testing Data Functions	23
Testing FAX Functions	25
Testing Voice Function	26
MultiModemZPX-PCI's Speakerphone Test	27
Configuring Communications Software	28

Chapter 3—AT Commands, S-Registers, and Result Codes

Introduction	34
AT Commands	34
S-Registers	45
Result Codes	49

Chapter 4—Troubleshooting

Introduction	52
Initial Checklist	52
Common Problems	53
The modem does not respond to commands	53
The modem dials but cannot make a connection	55
The modem disconnects while online	56
The modem cannot connect when answering	57
File transfer appears slower than it should	57
Data is being lost	58
There are garbage characters on the monitor	58
Fax and data software won't run at the same time	58

Chapter 5—Warranty, Service, and Tech Support/BBS

Introduction	60
Limited Warranty	60
Online Warranty Registration	61
Technical Support	62
Recording Modem Information	62
Service	63
The Multi-Tech BBS	64
About CompuServe	66
About the Internet	66
About the Multi-Tech Fax-Back Service	66

Appendix

Appendix A: Regulatory Compliance	68
Appendix B: Technical Specifications	76
Appendix C: ASCII Conversion Chart	80
Appendix D: FLASHWINFlash Upgrade	81

Index

.....	84
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Chapter 1—Introduction and Description



Congratulations on your purchase of one of the finest internal data/fax/voice modems available today—the MultiModemZPX-PCI™ from Multi-Tech Systems.

The MultiModemZPX-PCI is an internal, half-length, fax modem card that can be plugged into any PCI slot. Your MultiModemZPX-PCI incorporates V.90/K56flex™ modem technology, which enables Internet connections at data rates up to 56 Kbps over standard telephone lines. V.90/K56flex technology is able to propel data downstream from the Internet to your computer at speeds of up to 56 Kbps because data is digitally encoded instead of modulated. Upstream transmission, mostly keystroke and mouse commands from your computer to the central site, continues to flow at the conventional data rate of 33.6 Kbps.

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

Your MultiModemZPX-PCI offers interactive automatic dialing, as well as command mode option configuration. You can store two command line/telephone numbers, of up to 40 characters each, in the modem's nonvolatile memory. The modem pulse or tone dials and recognizes dial tones and busy signals for reliable call-progress detection. The modem can detect AT&T calling card tones. It is FCC-Registered for connection to telephone networks without any Data Access Arrangements (DAAs).

The MultiModemZPX-PCI is a full-featured internal data/fax/voice modem designed for Pentium computers in Windows Plug and Play™ environments.

This owner's manual will help you to install, configure, use, and troubleshoot your modem.

Features

- Compliance with major ITU-T, TIA, and EIA international standards to ensure compatibility with other modems
- Distinguishes data, fax, and voice calls
- Easy Windows 95 Plug and Play (PnP)
- Compliance with the V.80 standard, allowing video conferencing over analog telephone lines with any H.324 video phone system

Data

- Supports V.90/K56flex™ for data transmission speeds up to 56 Kbps while maintaining compatibility with lower-speed modems

Note: The V.90/K56flex standard asymmetrically transfers data—client downloads at speeds up to 56 Kbps; client uploads at speeds up to 33.6 Kbps.

- Supports the enhanced ITU-T V.34 standard with data transmission speeds to 33.6 Kbps while also maintaining compatibility with lower-speed modems
- Supports V.90/K56flex speeds plus 33.6K, 31.2K, 28.8K, 26.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9.6K, 7.2K, 4.8K, 2.4K, 1.2K, and 0–300 bps.
- Automatic fallback to slower speeds in noisy line conditions and fall-forward to faster speeds as conditions improve (line quality monitoring)
- ITU V.42 LAP-M and MNP Class 3 and 4 error correction
- ITU V.42bis (4-to-1) and MNP 5 (2-to-1) data compression
- H.324 compliant (videophone ready)
- Automatic disabling of compression when transferring already compressed files
- Autodial, redial, pulse (rotary), and touch-tone dial
- Dial tone and busy signal detection for reliable call-progress detection
- Distinctive ring support to route voice, data, or fax calls on a single phone line
- Plug and Play (PnP) serial support

- FlashROM upgradable
- Compatibility with the standard AT command set used by most communication programs
- Stores up to two telephone numbers

Fax

- Supports V.17, Group 3 fax communication standards, allowing it to communicate with other fax modems as well as with fax machines
- Responds to Class 1 and Class 2 fax commands, enabling it to exchange editable and encrypted faxes with other Windows 95 computers
- Sends and receives faxes from your computer at 14,400 bps, 9600 bps, 7200 bps, 4800 bps, 2400 bps, or 300 bps

Voice

- Full duplex speakerphone support with adjustable speaker volume control; can record and play back answering machine messages using optional microphone and speaker
- Remote/local telephone answering machine (TAM) capabilities include voice mail control, record/playback, and call screening
- Supports the TIA/EIA IS-101 AT+V voice command set.

Peripheral Component Interconnect (PCI)

First developed by companies such as Intel™, AT&T™ and Digital Equipment Corporation™, the Peripheral Component Interconnect (PCI) bus used by your MT5634ZPX-PCI provides high performance and is easy to use. Because PCI devices contain registers with the device information required for configuration, full auto configuration of PCI Local Bus add-in boards and components is supported. Performance factors include a bus data path of 64 bits, clock speeds of 66 MHz, and bandwidth of 264 Mbs.

V.90 Support/Functions

V.90 is the ITU designation for what formerly was called V.pcm. V.90 replaces K56flex and other proprietary solutions for PCM connections. Dual-mode client modem code will be important until all central-site digital modems are upgraded to V.90 and all interoperability problems are resolved. Until that time, the Dual-mode client code provides reliable connections in K56flex mode to the central-site modems currently deployed. V.90 functions/features include:

- V.90/K56flex A-law and μ -law support
- New downstream data rates (S-Register S38)
- Optional V.8bis sequence
- V.90 Mode Selection (S-Register S109) support
- Auto-rate speeds to 50,666 (downstream) support
- Automatic adapting to digital loss and robbed-bit signaling
- New V.90 rate result codes

Downstream Rates

Where K56flex provided rates of 32,000 to 56,000 in 2,000 bps increments, V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps.

Upstream Data Rates

Upstream V.90 data rates are 4800 to 33600 bps in 2400 bps increments.

Optional V.8bis Sequence

The V.8bis sequence that precedes K56flex connections is optional for V.90. Dual-mode servers indicate this capability using V.8bis. Dual-mode clients complete the V.8bis exchange and then proceed to either the K56flex mode or V.90 mode. V.90-only clients can skip the V.8bis exchange as a way to shorten the startup time.

Auto-rate Speeds

Auto-rate speeds to 50,666 Kbps are supported for downstream transfers.

Digital Loss and Robbed-bit Signaling Auto Adapt

Version 4.09 code supports the modem's ability to automatically adapt to digital loss and robbed-bit signaling on a PSTN connection.

What is in Your Modem Package?

Your MultiModemZPX-PCI package should contain:

- One MultiModemZPX-PCI internal fax modem card
- One MultiModemZPX-PCI drivers disk
- One telephone cable
- Communications software
- One brochure with a warranty card
- This MultiModemZPX-PCI Owner's Manual

If any one of these items is missing, please contact Multi-Tech Systems or your dealer/distributor.

How to Use This Manual

Chapter 1: Introduction and Description. Introduces the MT5634ZPX-PCI, briefly describing features and package contents. It also details the typographic conventions used in this manual.

Chapter 2: Installing Your Modem. Describes how to install the modem in your computer and connect it to a telephone, telephone line, microphone, and speaker. It also describes how to install the modem's drivers in Windows 95. In this chapter are several tests to confirm that your installation is working correctly. The tests, which include step-by-step instructions for downloading a file and sending a fax, also serve as minitutorials for those new to online communications concepts.

Chapter 3: Controlling Your Modem. Contains descriptions of the AT commands that control your modem, S-registers that affect how the commands work, and result codes that provide you with operational feedback.

Chapter 4: Troubleshooting. Describes common problems you may have with your modem and how to solve them.

Chapter 5: Warranty, Service, and Technical Support. Contains terms of your warranty and describes how to get help from Multi-Tech Systems for problems you cannot resolve. It includes our technical support phone number and how to access us through our BBS, the Internet, CompuServe, and our fax-back service.

Appendix

Appendix A: Regulatory Information

Appendix B: Technical Specifications

Appendix C: ASCII Conversion Chart

Appendix D: FLASHWIN Upgrade Procedures

Typographic Conventions

This manual uses the following typographic conventions:

You type this	Text entered by you is shown in boldface . Spell the entry exactly as shown, using upper and/or lower case type. However, when you see <cr> , press the ENTER key; do not spell it as shown.
<i>AT command</i>	Bold, italicized type is used for an AT or S-register command but only when we do not intend you to type it.
<i>Screen message</i>	Italics are used for screen messages in addition to conventional uses, such as book and manual titles.
KEYBOARD KEY	Names of keyboard keys are shown in all caps (e.g., BACKSPACE).
<Function Key>	Angle brackets indicate a nonliteral entry. For example, <cr> represents the carriage return character that is sent by the key labeled Enter on most keyboards.
D:\PATH\FILENAME	File name and/or path. In the following example, a request for a file path is indicated as: <p style="text-align: center;">D:\PATH\FILENAME</p> D is the drive and PATH is the full directory path where the file is found.
ENTER, <CR>	Instructs you to press the Return, Enter, or Carriage Return key (depending on how your keyboard is marked).
ALT+X, CTRL+X	Instructs you to hold down the ALT or CTRL key while you press the key represented by X.
0, O	Please note the difference between a zero and the letter O. This is a zero: 0. This is a capital O: O.



Chapter 2—Installation



Introduction

This chapter describes how to install the MultiModemZPX-PCI into your computer and the MultiModemZPX-PCI drivers into Windows 95.

What You'll Need

Before you start, make sure you have everything you need:

Multi-Tech supplies

- One MultiModemZPX-PCI internal fax modem card
- One MultiModemZPX-PCI drivers disk
- One telephone cable
- Communications software
- This MultiModemZPX-PCI Owner's Manual

You supply

- A 100-MHz or faster Pentium PC. We recommend a 166-MHz or faster PC for video conferencing.
- Windows 95 installed
- A 3.5-inch floppy disk drive
- An empty PCI expansion slot
- Tools to open your computer
- The computer's manual
- A nearby telephone line jack
- An external speaker or headphone (optional)
- An external microphone (optional)

Safety Warnings

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- This product is to be used with *UL* and *CUL* listed computers.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
- Do not use a telephone in the vicinity of a gas leak.

Installation Overview

Installing the MultiModemZPX-PCI consists of three steps:

1. Installing the modem in the computer
2. Connecting the modem to the telephone line and, optionally, to an external speaker and microphone
3. Installing the modem's drivers

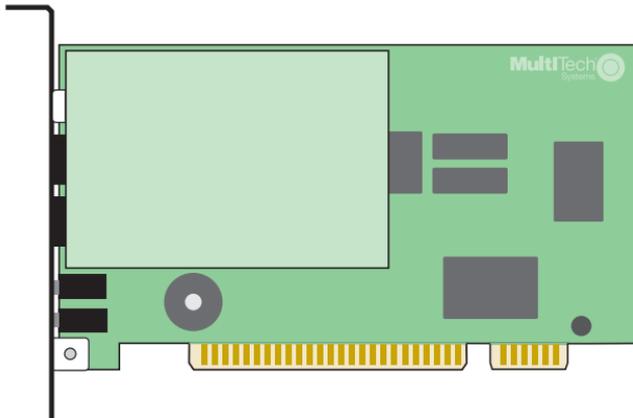


Figure 2-1. MultiModemZPX-PCI

Configuring the MultiModem ZPX-PCI

Windows 95 Plug and Play

Unlike an external modem, the MultiModemZPX-PCI contains its own serial port. When Windows 95 detects the MultiModemZPX-PCI, it assigns the next available COM port number to it. Since COM1 through COM4 are standard serial ports in Windows computers, Windows 95 typically assigns COM5 to the modem's serial port. Windows 95 also assigns the a port address and interrupt request (IRQ) number. 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.

Sound Card Considerations

If you want speakerphone functions and the ability to record sound or .WAV files through the sound card at the same time, you need:

- Two stereo PC microphones
- One stereo male-to-male patch cord
- One sound card and optional speakers

To connect a third party sound card:

1. Obtain a stereo male-to-male patch cord (can be purchased at a local PC retail store).
2. Place one end of a stereo male-to-male patch cord into the LINE OUT jack of the MultiModemZPX-PCI and the other end into the LINE IN jack of the sound card. This allows you to hear the activity of the modem whether it is originating or answering a call or playing a recorded message using the bundled Trio software.
3. Place the stereo microphones (do not use mono microphones) far enough apart from each other to eliminate feedback (e.g., one on each side of the monitor). Feedback occurs if the microphones are too close to each other. Make sure speakers are amplified with power source being either a battery or AC outlet.
4. Place microphone and speakers far enough apart from each other to eliminate feedback. Plug connector of both microphones into the MIC IN jack of the SoundCard and the MultiModemZPX-PCI.

Installing the MultiModemZPX-PCI

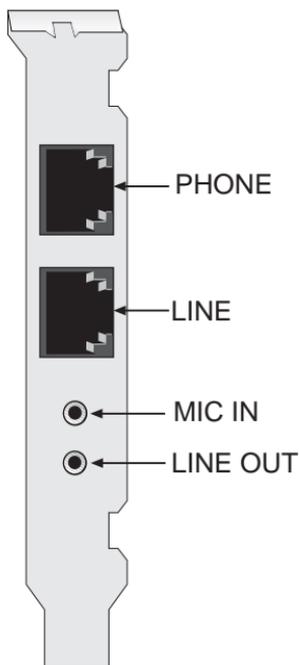
Installing the MultiModemZPX-PCI requires you to open your computer. Please consult your computer manual in addition to the following instructions:

1. Turn off the computer and unplug it. Failure to do so may result in damage to both the MultiModemZPX-PCI 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-PCI, discharge static in your body by touching a metal piece of the computer chassis. Carefully remove the MultiModemZPX-PCI 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-PCI 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.

External Connections

The MultiModemZPX-PCI communicates over public-switched telephone network lines. Use the modular telephone cable provided with the modem to connect the MultiModemZPX-PCI to your telephone wall jack. If you don't have a standard modular wall jack near your computer, install one or have one installed for you by your telephone company. In the U.S., installation kits and adapters are available wherever telephones are sold.

If you want, you can use a microphone and speaker with the MultiModemZPX-PCI. The microphone can be used for recording answering machine messages or for speakerphone use. The speaker can be used for playing back messages or for speakerphone use.



1. Plug one end of the supplied modular telephone cable into the LINE jack.
2. Plug the other end of the phone cable into a working wall jack.
3. To connect a telephone to your modem, plug the telephone's line cable into the PHONE jack.
4. To use a microphone and/or speaker with the modem, insert the microphone plug into the MIC IN jack.
5. To connect a speaker or headphone, insert the speaker or headphone plug into the LINE OUT jack.

Installing Drivers

1. Plug in and turn on your computer. As your computer boots, it automatically detects the MultiModemZPX-PCI, and the **New Hardware Found** dialog box appears.
2. In the **New Hardware Found** dialog box, select **Driver from disk provided by hardware manufacturer** (default selection). Then click **OK**. The **Install from Disk** dialog box appears.
3. Insert the MultiModemZPX-PCI Drivers diskette into the computer's drive, select the drive letter (A:\ is the default), and click **OK**. The computer installs the software drivers needed to communicate with your MultiModemZPX-PCI and then displays the Windows 95 desktop.
4. Installation of the MultiModemZPX-PCI is complete. If you plan to use the provided communications software, install it now according to the instructions provided in your corresponding software manual.

Verifying Configuration

Windows 95 Plug and Play

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

1. Click **Start, Settings, Control Panel**, and then 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** for a list of modems installed in your computer.
4. Double-click **Multi-Tech MT5634ZPX-PCI**. The **Modem Properties** dialog box for your MultiModemZPX-PCI model 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 the devices installed on them appears.
8. Click the COM port where the Multi-Tech MT5634ZPX-PCI is installed. Then click **More Info** to make sure Windows 95 can communicate with the modem. Clicking **More Info** causes Windows 95 to send commands to and receive responses from the modem and to display 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 set up any *legacy* (nonWindows 95) communications software you install.
Port: COM _____ Interrupt: _____ Address: _____
Speed: _____
10. Click the **General** tab. Select **Multi-Tech MT5634ZPX-PCI** 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 it to prevent it from interrupting a data or fax transmission. When finished, click **OK** to exit the **Modems Properties** dialog box..

To Remove Previous Modem from Windows 95

If your MultiModemZPX-PCI replaces another modem, the previous modem installation remains in Windows even after you install the new modem, and the old modem is selected in HyperTerminal and other Windows 95 applications. Although you can change the application connection descriptions one at a time, it is easier to force Windows 95 applications to use the MultiModemZPX-PCI by removing the previous modem installation from Windows.

1. Select **Start**, **Settings**, and then **Control Panel**.
2. Double-click the **Modems** icon to open the **Modems Properties** dialog box.
3. In the list box, select the old modem.
4. Click **Remove** and then click **Close**.
5. The next time you dial a HyperTerminal connection, it selects your new modem and asks you to confirm the selection.

Is Your MultiModemZPX-PCI Ready for Use?

If you're an experienced modem user, you may want only to check your modem's settings for data compression, error correction, and so on. You may find you can get moving quite quickly if you just issue the **AT&V<cr>** command. This command lists how your modem currently is configured, the stored (user) profiles, and the first four stored telephone numbers. If you come across a setting you're unsure of, refer to Chapter 3 of this manual for AT command and S-register explanations and defaults.

If you're a novice, please continue to the next sections of this chapter.

Operating Your MultiModemZPX-PCI

You control your MultiModemZPX-PCI by issuing **AT** commands and setting S-registers. Since your MultiModemZPX-PCI is set up for typical user application—traditional modem set to make a dial-up call to a remote installation where the call is answered automatically—you shouldn't need to change the current default configuration. (If you know your application does not follow this profile, refer to Chapter 3 for AT commands and S-registers.)

In operating your MultiModemZPX-PCI, it is likely that you will use your data communications software to either:

- Enter *terminal* mode, where you can *speak most directly* to the modem by issuing AT commands, or
- Launch a data communications session through a set of modem configurations that you select and then associate with a target telephone number. Once you create, save, and name this set of information according to your connection needs and your datacomm software's conventions, the software simplifies dialing because you don't have to reconfigure the modem nor have the risk of typing incorrect information.

Either way, be aware that an AT command is the method by which your modem is controlled and must therefore prefix nearly all commands. AT stands for attention and alerts the modem that a command follows. You can enter AT commands with uppercase or lowercase characters. Once you're in terminal mode, enter **AT** followed by **<cr>** to check whether your modem is operational. If everything is fine, your modem responds **OK**.

Simple Operation

You can dial by using the **ATD** command and the phone number of the modem you want to connect with, e.g., **ATD6127853500**. Your modem dials the number and makes a *scrambling* noise as the modem negotiates the kind of connection it can make. Once the modems settle on a common connection, a connect message on your computer's video displays. To hang up, enter **+++ATH0<cr>**. The modem hangs up and your video displays **OK**, signifying it is ready for another command.

Software Configuration

Communications software must be configured to work with the MultiModemZPX-PCI, your computer, and the remote system it is calling. Fortunately, most communications programs make the process easy by providing a default initialization string to your modem as well as defaults for most of the other required parameters. Some software programs allow you to select your modem type from a menu. With this method, initialization strings that correspond to a particular modem type can be selected to operate optimally with the software the modem is using.

***Note:** Refer to your respective software manuals for further information on your communications software.*

Other software programs require you to enter an initialization string in the software modem setup screen. If this is the requirement in your software application, enter the following command string to initialize your modem: **AT&F<cr>**. This setting configures your modem to operate with defaults set at the factory. These settings work well with most software packages.

Testing Data Functions

You can test the MultiModemZPX-PCI's data functions by using HyperTerminal to call the Multi-Tech Bulletin Board System (BBS) and to download a file.

1. Select **Start, Programs, Accessories**, and then **HyperTerminal**.
2. Start HyperTerminal by double-clicking the Hyperterm icon. HyperTerminal asks for the name of the connection.
3. Type **Multi-Tech BBS** in the **Name** text box and click **OK**.
4. In North America, type **800** in the **Area Code** box and **392-2432** in the **Phone Number** box. Local and international users, type **612** in the **Area Code** box and **785-3702** in the **Phone Number** box.
5. Verify that the appropriate model number (e.g., Multi-Tech MT5634ZPX-PCI) for the modem is selected in the **Connect Using** drop-down list box. Then click **OK**.

6. In the **Connect** dialog box, click **Dialing Properties**.
7. Make any necessary changes in the **Where I Am** and the **How I Dial from This Location** boxes. If you are required to dial 9 to access an outside line, type **9** in both the local and the long distance boxes unless your phone system has a special requirement.
8. Click **OK** and then click **Dial**. If you have a speaker connected to the MultiModemZPX-PCI, you know you have reached another modem by the harsh sounds of the modem handshake.
9. At the prompts, type your first name, last name, and password. Then press ENTER. If you are a first time caller, the BBS asks if your name is spelled correctly. If you answer yes, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
10. Press ENTER until the Main Menu appears. In the Main Menu you have access to two areas: the Files Menu and News.
11. Type **F** to access the Files Menu; then type **L** twice. (If you don't type the second **L**, you list *all* of the files on the BBS.)
12. To mark the file areas you want to examine, type its list number and press ENTER.
13. Type **L** to list all the files in the selected file area. (Type **C** to go forward in the file list and **P** to go back.)
14. To mark files for download: type **M** and press ENTER. Then type the list numbers of the files and press ENTER again.
15. Type **D**. A list of the files you marked appears. Type **D** again to start the download process.
16. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
17. If you select Zmodem, the file transfers automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)
18. When the download is complete, type ENTER to return to the File Menu.
19. To exit the BBs, type **G** and press ENTER.

Testing FAX Functions

Test your modem's fax capabilities by sending a fax to Multi-Tech or to a fax machine in your office.

Microsoft Fax is installed in Windows 95 as part of the Microsoft Exchange option. You can use Microsoft Fax to fax from within an application, such as a word processor, or to act as a stand-alone fax program. In the following procedure you run Microsoft Fax as a stand-alone fax program.

1. Click **Start, Programs, Accessories**, and then **WordPad**.
2. Create a message in **WordPad**, for example: **This is a test of the MultiModemZPX-PCI's fax capabilities**.
3. Save the file as **ZPXTTest.doc** and exit **WordPad**.
4. Click **Start, Programs, Accessories, Fax**, and then **Compose New Fax**.
5. The **Compose New Fax** wizard appears. Click **Next**.
6. To send the file to your own fax machine or to another fax modem in your office, type the destination name and phone number in the **To** and **Fax #** boxes.
7. Click **Add to List**; then click **Next**.
8. Select a cover page; then click **Next**.
9. Type a subject line (e.g., **MultiModemZPX-PCI Fax Test**) and a note to go on the cover page; then click **Next**.
10. Click **Add File**. In the **Open a File to Attach** dialog box, select **ZPX Test.doc** and click **Open**. The ZPX Test.doc file is added to the **Files to Send** list box.
11. Click **Next**; then click **Finish**.
12. Microsoft Fax opens the ZPX Test.doc file in WordPad, prints it to the Rendering System, dials the recipient, and then sends the fax.
13. Exit Microsoft Fax when the **Status** dialog box displays that the fax was sent successfully.

Other Ways to Access Microsoft Fax

- In Windows 95, select **File**, **Print** and select Microsoft Fax as the default printer.
- In a Windows 95 application, select **File** and then **Send**.
- In Microsoft Exchange, select **Compose** and then **New Fax**.

Testing Voice Function

There are several tests you can perform to verify the MultiModemZPX-PCI's voice circuits. Try the answering machine test first. If that doesn't work and you have a microphone and speaker connected to the MultiModemZPX-PCI, try the loopback and speakerphone tests, which can test the modem's voice circuits without special software.

MultiModemZPX-PCI's Answering Machine Test

Test the MultiModemZPX-PCI's voice function by using the included software to set up the MultiModemZPX-PCI as a telephone answering machine. Have a friend call and leave a message; then play it back.

Loopback Testing

1. Connect a microphone and speaker to the MultiModemZPX-PCI. To avoid feedback, make sure the microphone and speaker are not placed too close to each other. For best results, use a headphone instead of a speaker. If using a headphone, be sure to reduce the headphone volume (if available) before starting.
2. Click **Start**, **Programs**, **Accessories**, and then **HyperTerminal**.
3. Double-click the **Multi-Tech BBS**. HyperTerminal starts with the **Connect** dialog box open.
4. Click **Cancel** in the **Connect** dialog box.

5. To loop back input from the microphone to the speaker, type **AT&&S** and press ENTER in the HyperTerminal terminal window.
6. Speak into the microphone; you should hear your voice on the speaker or headphone.
7. To reset the modem, type **ATZ** and press ENTER .

MultiModemZPX-PCI's Speakerphone Test

1. Connect a microphone and speaker to the MultiModemZPX-PCI.
2. Click **Start, Programs, Accessories**, and then **HyperTerminal**.
3. Double-click the **Multi-Tech BBS** icon. HyperTerminal starts with the **Connect** dialog box open.
4. Click **Cancel** in the **Connect** dialog box.
5. In the HyperTerminal terminal window, type
AT+FCLASS=8
AT+VLS=7
ATDTxxxxxxx (dials the phone number xxxxxxxx)
6. Speak into the microphone to talk to the person on the other end of the line and listen over the speaker.
7. To hang up, type **ATH** and press ENTER.
8. To reset the modem, type **ATZ** and press ENTER.

Configuring Communications Software

Communications software must be customized, or *configured*, to make it work with your computer's serial port and modem, to meet the requirements of the system on the other end of a connection, and to meet your own requirements.

Windows 95 makes configuration easy for Windows 95 compliant communications software. The modem and port, for the most part, are configured automatically when the modem's drivers are installed in Windows. The communications software then uses the Windows 95 supplied configuration when it dials out.

However, nonPnP systems as well as *legacy* programs—those designed for earlier operating systems(nonPnP)—must be configured individually.

This chapter helps you make configuration choices specific to the MultiModemZPX-PCI. For help with other configuration choices, refer to the software's manual or online Help. Generally, your best course is to accept the software's default values.

1. Turn on your computer and run your communications software.
2. Locate the dialog box or menu that allows you to specify your modem.
 - In HyperTerminal, select **File, Properties**, and then **Phone Number**.
 - In ProComm Plus for Windows, select **Window, Setup**, and then **Advanced**.
 - In MultiExpress Terminal for Windows, select **Setup, Terminal**, and then **Modem**.)
3. If you are using legacy software or if you have more than one modem installed, choose the appropriate model number for the modem (e.g., Multi-Tech MT5634ZPX-PCI) from the software's modem list. If your model number isn't listed, choose a generic modem of the same speed as yours, e.g., a generic V.34 or 33600 bps modem and rename it Multi-Tech MT5634ZPX-PCI.

4. If your legacy software doesn't have the correct modem initialization string, you must change it. **AT&F^M**, which selects the modem's factory default settings, works well for most connections. (^M is the code for the carriage return character that sends the string to the modem.)

If you need extra time to make a connection, add **S7=60** to the string like this: **AT&FS7=60^M**.

For CompuServe, the initialization string is **AT&F\N0^M**. If you use CompuServe's WinCIM software, change the initialization string to **AT&F\N0\Q1^M** for compatibility with WinCIM's software flow control. Change the error correction string to **\N7%C0** and the data compression string to **\N7%C1**. If you want the modem to always answer the phone, add **S0=1** to the initialization string.

***Note:** To change the modem's default initialization string, type the new commands in the software's terminal window, adding the command **&W** to store the new commands in the modem's nonvolatile memory, e.g., **AT&FS0=1&W**. You then can simplify your initialization string to **ATZ^M**.*

5. If you are using legacy software, select the port where the modem is connected (normally, COM5).
6. For maximum throughput when using data compression, set the serial port baud rate, or DTE rate, to 115,200 bps. (In Windows 95, select **Start, Settings, Control Panel, Modems**, and then **Properties**.)
7. If your legacy software has an autobaud selection, make sure it is disabled. Autobaud is for older modems and can cause problems if enabled.
8. If the software allows you to edit the no-connect messages (**NO CARRIER, BUSY, NO ANSWER, NO DIALTONE**), make sure there is no space between **DIAL** and **TONE** in **NO DIALTONE**.

9. If you are required to dial 9 to get an outside line, edit the dialing prefix to include a 9 and a comma, e.g., **ATDT9**, (the comma inserts a pause before dialing the next digit).

Similarly, to turn off call waiting for the duration of the call, insert the disabling code used in your area, e.g., **ATDT*70**. If you are using Windows 95-compliant software, make these changes in the **How I dial from this location** box of **Dialing Properties**.

*Note: *70 is used only in the United States.*

Remote Configuration

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

Basic Procedure

Use these steps for connections established by the local or by the remote Multi-Tech modem.

1. Establish a data connection with a remote MT5634ZPX-PCI modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password. Then press ENTER. Example: **%%%ATMTSMODEM<cr>**. You have four attempts to enter the password correctly before being disconnected. If the password is correct, the remote modem responds with **OK**.
3. You now can send AT commands to configure the remote modem.
4. When you finish configuring the remote modem, save the new configuration by typing **AT&W0<cr>**. Then type **ATO<cr>** to exit remote configuration. You can then break the connection in the normal way.

***CAUTION:** Hanging up while you are in remote configuration mode can lock up the remote modem.*

Setup

Multi-Tech modems are shipped with a default setup password (MTSMODEM). For security measures, you should change the password and possibly also the remote configuration escape character.

New password: _____

New remote configuration escape character: _____

Changing the Setup Password

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Syyyyyy** if you have replaced the MTSMODEM password with yyyyyy) 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=yyyyyy**, where yyyyyy stands for the password, and press ENTER. The password can include any keyboard character and must be one to eight characters long. The modem responds with **OK**.
4. The new password is saved automatically. You now can enter more AT commands or exit the data communications program. The next time you remotely configure the modem you must use the new setup password.

***Note:** You can only change the setup password locally; you cannot do it remotely. Also, passwords are case sensitive. The next time you enter the password, it must be in the same case as you set it up.*

Changing the Remote Escape Character

To increase security, you can change a remote modem's remote configuration escape character. 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—but if you do this remotely, you won't be able to change it back remotely!

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

Notes:

1. Additional documents are available in Portable Document Format (PDF) files at http://www.multitech.com/support/manuals/_IDCfiles/manuals.idc.
You can download the Acrobat Reader to view PDF files (you may want to bookmark <http://www.adobe.com/prodindex/acrobat/readstep.html> before following the “download” link).
2. For files with a .ZIP extension, you can download PKUNZIP.EXE to extract the zipped files from <ftp://ftp.multitech.com/Utilities/PKUNZIP.EXE>.
3. Using your favorite Web browser, go to <http://www.multitech.com/support/V.90upgrades.htm> for additional information on ITU V.90 support on other Multi-Tech products.



Chapter 3—AT Commands, S-Registers, and Result Codes

Introduction

This chapter lists and summarizes AT commands for the Multi-Tech's MT5634ZPX-PCI. For detailed AT command information, download ZPXHELP.EXE from the Multi-Tech BBS (see *Multi-Tech BBS* in Chapter 5).

AT Commands

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

Values: n/a

Description: Puts the modem in command mode while remaining online. Type **+++AT** and press ENTER. (Only **AT**, **ATH**, and **ATH0** are valid.) The **+++ATH<cr>** or **+++ATH0<cr>** can be used to hang up a modem connection.

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 key to execute most commands.

Command: **\$** **Detect AT&T's call card tone**

Values: n/a

Description: This symbol placed in dialing string enables the modem to detect AT&T's *call card* tones to access user's calling card when originating an online connection:

ATDT1028806127853500\$123456789

(access/phone number) (credit card number)

Command: **A** **Answer**

Values: n/a

Description: Answer an incoming call before the final ring.

Command: **A/** **Repeat Last Command**

Values: n/a

Description: Repeat the last command string. Do not precede this command with **AT**. Do not press ENTER to execute.

3 AT Commands, Result Codes, and S-Registers

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:	Cn	Carrier Control
Values:		$n = 1$
Default:		1
Description:	C0	Transmit carrier always off. (Not supported.)
	C1	Normal transmit carrier switching (included for backward compatibility with some software).
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 , V , W , S , comma (,), semicolon (;), ! , @ , ^ and \$ dial string modifiers.
		<i>Dial string modifiers:</i>
	L	Redial last number. (Must be placed immediately after ATD .)
	P	Pulse-dial following numbers in command .
	T	Tone-dial following numbers in command (default).
	V	Switch to speakerphone mode and dial the following number. Use ATH command to hang up.
	W	Wait for a new dial tone before continuing to dial. (X2 , X4 , X5 , X6 , or X7 must be selected.)
	S	Dial a telephone number previously stored using the &Zn=x command (see &Zn=x command for further information). The range of n is 0-3.
	,	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 ringback, then 5 seconds of silence, before processing next part of command. If silence is not detected, the modem returns a NO ANSWER code.

\$ AT&T's *call card* tones detection.

^ Disable data calling tone transmission.

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

Values: *n* = 0–3

Default: none

Description: Dial a number previously stored in directory number *n* by the **&Z*n*=*x*** command .

Example: **ATDS=3**

Command: **E*n*** **Echo Command Mode Characters**

Values: *n* = 0 or 1

Default: 1

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

E1 Do echo keyboard input to the terminal.

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

Values: *n* = 1

Default: 1

Description: F0 Enable online data character echo. (Not supported.)

F1 Disable 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 Go on-hook to hang up.

H1 Go off-hook to make the phone line busy.

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

Values: *n* = 0–4, 9, 11

Default: None

Description: I0 Display default speed and controller firmware version.

I1 Calculate and display ROM checksum (e.g., *I2AB*).

I2 Check ROM and verify the checksum, displaying *OK* or *ERROR*.

I3 Display default speed and controller firmware version.

3 AT Commands, Result Codes, and S-Registers

- I4 Display firmware version for data pump (e.g., 94).
- I9 Display country code (e.g., *NA Ver. 1*).
- I11 Display Diagnostic Information for the last Modem Connection (i.e., DSP and Firmware version, Link Type, Line Speed, Serial Speed, Type of Error Correction/Data Compression, Number of past Retrans, etc.)

Command: **Ln** **Monitor Speaker Volume**

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

Default: 2

Description: L0 Select low volume.

L1 Select low volume.

L2 Select medium volume.

L3 Select high volume.

Command: **Mn** **Monitor Speaker Mode**

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

Default: 1

Description: N0 Modem performs handshake only at communication standard specified by S37 and the **B** command.

N1 Modem begins handshake at communication standard specified by S37 and the **B** command. During handshake, fallback to a lower speed can occur.

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

Values: $0, 1, 3$

Default: None

Description: O0 Exit online command mode and return to data mode.

O1 Issue a retrain and return to online data mode.

O3 Issue a rate renegotiation and return to data mode.

Command:	Qn	Result Codes Enable/Disable
Values:		$n = 0$ or 1
Default:		0
Description:	Q0	Enable result codes.
	Q1	Disable result codes.
Command:	Sr=n	Set Register Value
Values:		$r =$ S-register number; n varies
Default:		None
Description:		Set value of register Sr to value of n , where n is entered in decimal format.
Command:	Sr?	Read Register Value
Values:		$r =$ S-register number
Default:		None
Description:		Read value of register Sr and display value in 3-digit decimal form.
Command:	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:	Xn	Result Code Selection
Values:		$n = 0-7$
Default:		4
Description:	X0	Basic result codes (<i>e.g.</i> , <i>CONNECT</i>); does not look for dial tone or busy signal.
	X1	Extended result codes (<i>CONNECT 56000 V42bis</i> , <i>CONNECT 33600 V42bis</i> , etc.); 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> .

3 AT Commands, Result Codes, and S-Registers

Command:	Yn	Long Space Disconnect
Values:		$n = 0$
Default:		0
Description:	Y0	Disable sending or responding to long space break signal on disconnect.
	Y1	Enable sending or responding to long space break signal on disconnect. (Not supported.)
Command:	Zn	Modem Reset
Values:		$n = 0$ or 1
Default:		None
Description:	Z0	Reset modem to profile saved by the last &W command.
	Z1	Same as Z0.
Command:	&Bn	V.32 Auto Retrain
Values:		$n = 1$
Default:		1
Description:	&B0	Disable V.32 auto retrain. (Not supported.)
	&B1	Enable V.32 auto retrain.
Command:	&Cn	Data Carrier Detect (DCD) Control
Values:		$n = 0$ or 1
Default:		1
Description:	&C0	Force Data Carrier Detect signal high.
	&C1	Let Data Carrier Detect follow carrier signal.
Command:	&Dn	Data Terminal Ready (DTR) Control
Values:		$n = 0, 1, 2,$ or 3
Default:		2
Description:	&D0	Modem ignores DTR signal.
	&D1	When DTR drops while in online data mode, the modem enters command mode, issues an OK, and remains connected.
	&D2	When DTR drops while in online data mode, the modem hangs up.
	&D3	When DTR drops, the modem hangs up and resets as if an ATZ command were issued.

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

Command: **&Gn** **V.22bis Guard Tone Control**
Values: $n = 0, 1, \text{ or } 2$
Default: 0
Description: &G0 Disable guard tone.
 &G1 Enable 550 Hz guard tone.
 &G2 Enable 1800 Hz guard tone.

Note: The &G command is not used in North America.

Command: **&Jn** **Auxiliary Relay Control**
Values: $n = 0$
Default: 0
Description: &J0 The auxiliary relay is never closed.
 &J1 Not supported—responds ERROR.

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

Command: **&Mn** **Communications Mode**
Values: $n = 0$
Defaults: 0
Description: &M0 Asynchronous mode.
 &M1 Reserved—responds ERROR.

Command: **&Qn** **Asynchronous Communications Mode**
Values: $n = 0, 5, \text{ or } 6$
Defaults: 5
Description: &Q0 Asynchronous with data buffering. Same as $\backslash N0$.
 &Q5 Error control with data buffering. Same as $\backslash N3$.
 &Q6 Asynchronous with data buffering. Same as $\backslash N0$.

3 AT Commands, Result Codes, and S-Registers

Command:	&Sn	Data Set Ready (DSR) Control
Values:		$n = 0$ or 1
Default:		0
Description:	&S0	Force DSR high (on).
	&S1	Let DSR follow CD.
Command:	&Tn	Self-Test Commands
Values:		$n = 0, 1, 3$ or 6
Default:		None
Description:	&T0	Abort. Stop any test in progress.
	&T1	Local analog loop test.
	&T3	Local digital loopback test.
	&T6	Remote digital loopback test.
Command:	&V	View Current Configuration
Values:		n/a
Description:		Displays the active modem settings.
Command:	&Wn	Store Current Configuration
Values:		$n = 0$
Default:		None
Description:	&W0	Store active modem settings in NVRAM; load them at power-on or following the ATZ command instead of loading the factory defaults from ROM.
Command:	&Yn	Select Stored Configuration for Hard Reset
Values:		$n = 0$
Default:		0
Description:	&Y0	Select stored configuration 0 on power-up. (For backward compatibility with some software.)
	&Y1	Not supported—responds ERROR.
Command:	&Zn=x	Store Telephone Number
Values:		$n = 0, 1, 2,$ or 3 $x =$ Dialing string
Default:		None
Description:		Stores telephone dial string x in memory location n . Dial the stored number using the command ATDS=n .

Command:	\Gn	Modem Port Flow Control
Values:		$n = 0$
Default:		0
Description:	\G0	Returns an <i>OK</i> for backward compatibility with some software.
	\G1	Not supported—responds ERROR.
Command:	\Jn	Data Buffer Control
Values:		$n = 0$
Default:		0
Description:	\J0	Enable data buffer—serial port speed is independent of connect speed.
	\J1	Not supported—responds ERROR.
Command:	\Kn	Set Break Control
Values:		$n = 5$
Default:		5
Description:	\K5	Modem sends break signal received from the DTE to the remote modem.
Command:	\Nn	Error Correction Mode Selection
Values:		$n = 0-5$, or 7
Default:		3
Description:	\N0	Non-error correction mode with data buffering (same as &Q6).
	\N1	Direct mode.
	\N2	MNP reliable mode.
	\N3	V.42/MNP auto-reliable mode.
	\N4	V.42 reliable mode.
	\N5	V.42, MNP, or non-error correction (same as \N3).
	\N7	V.42, MNP, or non-error correction (same as \N3).
Command:	\Qn	Local Flow Control Selection
Values:		$n = 0, 1$, or 3
Default:		3
Description:	\Q0	Disable flow control (same as &K0).
	\Q1	XON/XOFF software flow control (same as &K4).
	\Q2	CTS-only flow control. Not supported—responds ERROR.
	\Q3	RTS/CTS hardware flow control (same as &K3).

3 AT Commands, Result Codes, and S-Registers

Command:	\Tn	Inactivity Timer
Values:		<i>n</i> = 0–255
Default:		0
Description:	\Tn	Inactivity timer setting contingent on either \T value or S-Register S30 value (e.g., AT\T45&W0<cr> configures in parallel ATS30=45&W0<cr>) and vice versa.
Command:	\Vn	Protocol Result Code
Values:		<i>n</i> = 0 or 1
Default:		1
Description:	\V0	Disable protocol result code appended to DCE speed.
	\V1	Enable protocol result code appended to DCE speed.
Command:	\Xn	XON/XOFF Pass-Through
Values:		<i>n</i> = 0 or 1
Defaults:		0
Description:	\X0	Respond to and discard XON/XOFF characters.
	\X1	Not supported—responds ERROR.
Command:	-Cn	Data Calling Tone
Values:		<i>n</i> = 0 or 1
Defaults:		0
Description:	-C0	Disable V.25 data calling tone.
	-C1	Enable V.25 data calling tone.
Command:	%B	View Numbers in Blacklist
Values:		n/a
Description:		If blacklisting is in effect, this command 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	Data Compression Control
Values:		<i>n</i> = 0 or 1
Default:		1
Description:	%C0	Disable V.42bis/MNP 5 data compression.
	%C1	Enable V.42bis/MNP 5 data compression.

Command: **+ES=6 Enable Synchronous Buffered Mode**

Values: n/a

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 correction mode is overridden by any of the following commands: **&F**, **&M**, **&Q**, and **\N**. **+ES = ?** shows the only allowed value.

Command: **&&S Speaker Codec Loopback**

Values: n/a

Description: Provides a loopback from the microphone to the speaker.
For testing and debugging only.

S-Registers

S-registers generally affect how the AT commands perform. You can read or alter the contents of an S-register by using the S command (see *AT Commands*).

Register	Unit	Range	Default	Description
S0	rings	0, 1–255	0	Sets the number of rings before the modem answers. ATS0=0 disables auto-answer completely.
S1	rings	0–255	0	Counts the number of rings that have occurred.
S2	decimal	0–127 128–255	43 (+)	Sets ASCII code for the escape character. Values greater than 127 disable the escape sequence.
S3	decimal	0–127	13 (^M)	Sets ASCII code for the carriage return character.
S4	decimal	0–127	10 (^J)	Sets ASCII code for the line feed character.
S5	decimal	0–32 33–127	8 (^H)	Sets ASCII code for the backspace character. Values greater than 32 disable the backspace character.
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	0–65	2	Sets the length of a pause caused by a comma character in a dialing command.
S10	100 ms	1–254	20	Sets how long a carrier signal must be lost before the modem disconnects.

Note: These values may be different outside North America.

Register	Unit	Range	Default	Description
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	0–255	0	S30 specifies the length of time (in minutes) that the modem waits before disconnecting when no data is sent or received. This function is applicable only to buffer mode. (Also see \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	{0,2}, {1,3} {4,6}, {5,7}	N/A	This register specifies the action to take in the event of negotiation failure when error control is selected. (See S48.)
S37	decimal	0–19	0	S37 sets the maximum V.34 <i>upstream</i> speed that the modem attempts to connect. 0 = maximum negotiated modem speed 1 = reserved 2 = 1200/75 bps 3 = 300 bps 4 = reserved 5 = 1200 bps 6 = 2400 bps 7 = 4800 bps 8 = 7200 bps 9 = 9600 bps 10 = 12000 bps 11 = 14400 bps 12 = 16800 bps 13 = 19200 bps 14 = 21600 bps 15 = 24000 bps 16 = 26400 bps 17 = 28800 bps 18 = 31200 bps 19 = 33600 bps

3 AT Commands, Result Codes, and S-Registers

Register	Unit	Range	Default	Description
S38	decimal	0–14	1	Sets maximum 56K <i>downstream</i> speed that the modem attempts to connect. Where K56flex provided rates of 32,000 to 56,000 in 2,000 bps increments. V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps. 0 = V.90/56Kflex disabled 1 = V.90/56Kflex enabled with automatic speed selection maximum negotiated modem speed enabled 2 = 29,333 3 = 30,666 4 = 32,000 5 = 33,333 6 = 34,666 7 = 36,000 8 = 37,333 9 = 38,666 10 = 40,000 11 = 41,333 12 = 42,666 13 = 44,000 14 = 45,333 15 = 46,666 16 = 48,000 17 = 49,333 18 = 50,666 19 = 52,000 20 = 53,333 21 = 54,666 22 = 56,000
S42	decimal	0–1	1	Enables/disables the 56K auto rate. Retrain and fallback are disabled in data mode. 0 = disable; 1 = enable.
S43	decimal	0–1	1	<i>For testing and debugging only.</i> Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.

Register	Unit	Range	Default	Description										
S48	decimal	7 or 128	7	The chart below lists the S36 and S48 configuration settings necessary to negotiate certain types of connections.										
				<table border="0"> <tr> <td>S48=7</td> <td>S28=128</td> </tr> <tr> <td>S36=0,2</td> <td>LAPM or Hangup</td> </tr> <tr> <td>S36=1,3</td> <td>LAPM or Async</td> </tr> <tr> <td>S35=4,6</td> <td>LAPM, MNP, or Hangup</td> </tr> <tr> <td>S36=5,7</td> <td>LAPM, MNP, or Async</td> </tr> </table>	S48=7	S28=128	S36=0,2	LAPM or Hangup	S36=1,3	LAPM or Async	S35=4,6	LAPM, MNP, or Hangup	S36=5,7	LAPM, MNP, or Async
S48=7	S28=128													
S36=0,2	LAPM or Hangup													
S36=1,3	LAPM or Async													
S35=4,6	LAPM, MNP, or Hangup													
S36=5,7	LAPM, MNP, or Async													
S89	seconds	0, 5–255	60	Sets the length of time in the off-line command mode before the modem goes into standby mode. A value of zero prevents standby mode; a value of 1–4 sets the value to 5.										
S108	decimal	0-3, 6,7	6	Selects the digital loss if using the modem thru a PBX line. Default value is -6dB loss, the value used when calling from a typical POTS line long distance.										
S109		0, 1, 2		<p>Sets one of three 56K operating modes: K56flex mode, V.90 mode, or Auto-mode.</p> <ul style="list-style-type: none"> 0 V.90 disabled 1 K56flex or V.90 (Dual-mode enabled) 2 V.90 only (K56flex disabled). Forces V.90 connections for testing purposes, etc. 										

Result Codes

In command mode the MultiModemZPX-PCI sends *result codes* to your computer to provide you with ongoing information during dialing and connection. The following table shows the available result codes.

<i>Terse</i>	<i>Verbose</i>	<i>Description</i>
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER detected	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
70*	CONNECT 32000	Connected at 32000 bps
60*	CONNECT 33600	Connected at 33600 bps
71*	CONNECT 34000	Connected at 34000 bps
72*	CONNECT 36000	Connected at 36000 bps
73*	CONNECT 38000	Connected at 38000 bps
74*	CONNECT 40000	Connected at 40000 bps
75*	CONNECT 42000	Connected at 42000 bps
76*	CONNECT 44000	Connected at 44000 bps

Terse	Verbose	Description
77*	CONNECT 46000	Connected at 46000 bps
78*	CONNECT 48000	Connected at 48000 bps
79*	CONNECT 50000	Connected at 50000 bps
80*	CONNECT 52000	Connected at 52000 bps
81*	CONNECT 54000	Connected at 54000 bps
82*	CONNECT 56000	Connected at 56000 bps
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full
100	CONNECT 28000	Connected at 28000 bps
101	CONNECT 29333	Connected at 29333 bps
102	CONNECT 30666	Connected at 30666 bps
103	CONNECT 33333	Connected at 33333 bps
104	CONNECT 34666	Connected at 34666 bps
105	CONNECT 37333	Connected at 37333 bps
106	CONNECT 38666	Connected at 38666 bps
107	CONNECT 41333	Connected at 41333 bps
108	CONNECT 42666	Connected at 42666 bps
109	CONNECT 45333	Connected at 45333 bps
110	CONNECT 46666	Connected at 46666 bps
111	CONNECT 49333	Connected at 49333 bps
112	CONNECT 50666	Connected at 50666 bps
113	CONNECT 53333	Connected at 53333 bps
114	CONNECT 54666	Connected at 54666 bps

* *EC* is added to these Result Codes when the extended Result Codes configuration option is enabled. *EC* is replaced by one of the following codes, 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).



Chapter 4—Troubleshooting

Introduction

This chapter covers common problems you may have with your modem and how to solve them. Your MultiModemZPX-PCI 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. Begin with the checklist (below) to make sure all hardware is connected properly. Then review the common problems for recommendations on what to change.

Initial Checklist

Always begin with the following checklist to make sure all hardware is properly connected and that the modem is set up properly.

- Make sure you are running the Microsoft Windows 95 or Windows 98 operating system. This modem will not run properly with other operating systems.
- Make sure the COM port you chose during setup matches the COM port set in your communications software. See Chapter 2.
- Check that the phone cord between the modem's LINE jack and the wall jack is undamaged and firmly connected to both.
- If you connected a telephone to your modem, check that the phone cord between the modem's PHONE jack and the telephone is undamaged and firmly connected to both.
- If you connected a microphone to your modem, check the connection of the microphone plug to the modem's MIC IN jack.
- If you connected speakers to your modem, check the connection of the speaker plug to the modem's LINE OUT jack.
- Retry whatever action was not working.
- If it still does not work, check the following section for a description and possible solution of your problem.
- If you don't find your problem listed in this chapter, see Chapter 5 to learn how to reach our technical support technicians via our toll-free telephone number, the Internet, or CompuServe. Don't forget to fill out the information in *Recording Modem Information* in Chapter 5 before contacting a technical support technician.

Common Problems

You may encounter the following problems:

- The modem does not respond to commands.
- The modem dials but is unable to make a connection.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer appears slower than it should be.
- Data is being lost.
- There are garbage characters on the monitor.
- Fax and communications software won't run at the same time.

If you experience problems, please check the following possibilities before calling Technical Support (see Chapter 5).

The modem does not respond to commands

- Make sure you are in terminal mode in your data communications program; then type **AT** and press ENTER. If you get an *OK* response, your connections are good. The problem likely is in the connection description in your communications software.
- Reset your modem by sending it an **ATZ** or **AT&F** command in terminal mode. If using legacy software (software designed for an older operating system), make sure the initialization string includes **&F** as the first command to cancel any *leftover* commands that could interfere with the modem's operation.
- If you don't get an *OK*, the problem may still be in the communications software. Make sure you have done whatever necessary in your software to make a port connection. 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 can disconnect without exiting the program. If this is the case, try issuing the software's connection command. Also, if more than one communications program is open, they can conflict with each other. Make sure all other communications programs are closed and then try again.

- If using legacy software, the COM port setting may not match the COM port that Windows 95 assigned. Compare the COM port setting in your software to the COM port reported in the *Diagnostics* tab of the Modem's *Properties* sheet. (Select *Start, Settings, Control Panel, Modems*, and then *Diagnostics*.)
- Another expansion card such as a bus mouse or sound card may be using the same COM port, memory address, or interrupt request (IRQ) as your modem. On the Windows 95 desktop, right-click *My Computer* and select *Properties, Device Manager, and Ports*. Then double-click the port where your modem is connected.

In the port's *Properties* sheet, click the *Resources* tab to view the port's Input/Output range and Interrupt Request. If another device is using the same address range or IRQ, it appears in the *Conflicting Device List*. Resources are assigned at power up by the computer's BIOS. Windows cannot change these resources. 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 so the conflict is resolved. If you need to change switches or jumpers on the conflicting device, refer to the device's documentation.

- The modem may be defective. If you have another MultiModemZPX-PCI, try swapping modems. If the problem goes away, the first modem possibly is defective. Call Technical Support for assistance (see Chapter 5).

The modem dials but cannot make a connection

Several reasons why the MultiModemZPX-PCI fails to make a connection 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.

Narrow the list of possibilities by using extended result codes. If you disabled the modem's extended result codes, enable them by entering **ATV1X4** in the terminal window and pressing 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 may 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 may be installed behind a company phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem may not recognize the dial tone and may treat it as an error. Check your PBX manual to see if you can change the internal dial tone. If you can't, change your modem's initialization string to include **X3**, which makes the modem ignore dial tones.

- If the modem reports *BUSY*, the other number may be busy. Try again later. *BUSY* also may indicate that **9** was not added to the phone number (if required to dial 9 for an outside line).

If you are required to 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. It inserts a pause before the number is dialed. For example, to change the dial

prefix in MultiExpress Terminal, select *Setup* and *Modem*. Then select the modem type you are using and type the new prefix in the *Dial Prefix* box.

To change it for Windows 95 software, select *Start, Settings, Control Panel*, and then *Modems*. In the *Modems Properties* sheet, select the appropriate modem model number (e.g., Multi-Tech MT5634ZPX-PCI), click *Dialing Properties* and type **9** in the local and long distance boxes in the *How I dial from this location* box.

- If the modem reports *NO ANSWER*, the other system has failed to answer, or you may 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 may have dialed a wrong number, and a person answered instead of a computer. Or, you may have dialed the correct number, but the other computer or software was turned off or faulty. Check the number and try again or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call; the modems may be having problems negotiating due to modem incompatibilities or line noise. Try connecting at a lower speed by setting register S37 to a lower rate (e.g., by typing **ATS37=11** in the terminal window and pressing ENTER) and then calling again.

The modem disconnects while online

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

You can disable call waiting automatically by including the disabling code in the modem's dial prefix (e.g., **ATDT*70**,—note the comma, which inserts a pause before the telephone number is dialed). For example, to change the dial prefix in MultiExpress Terminal, select *Setup* and *Modem*. Then select the modem type you are using and type the new prefix in the *Dial Prefix* box. To change it for Windows

95 software, select *Start, Settings, Control Panel*, and then *Modems*. In the *Modems Properties* sheet, select *Multi-Tech MT5634ZPX-PCI*, click *Dialing Properties*. Check *This location has call waiting* and select the correct code for your phone service.

Note: **70 is used only in the United States.*

- 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 for the modem only.
- Check for loose connections between the modem and the telephone jack.
- You may have a poor connection because of line conditions, or the problem may have originated on the other end of the line. Try again.
- If you were online with a BBS or commercial online service, it may have hung up 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

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

File transfer appears slower than it should

- If you are using a slow transfer protocol, such as Xmodem or Kermit, try Zmodem or Ymodem/G instead.
- Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.
- Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.

Data is being lost

- If you are using data compression, be sure the serial port baud rate is set to a minimum of four times the data rate.
- Make sure the flow control method you selected in software matches the method selected in the modem. If you are using CompuServe's WinCIM software, you must set the modem for XON/OFF flow control (see Chapter 2 for the CompuServe initialization string).
- Try entering the **&V** (View Parameters) command, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable.

There are garbage characters on the monitor

- Your computer and the remote computer may be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communications software.
- You may be experiencing line noise. Enable error correction if it is disabled. Or, hang up and call again; you may get a better connection.
- At speeds above 2400 bps, the remote modem may not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)
- Try entering the **&V** (View Parameters) command, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable.

Fax and data software won't run at the same time

- You can have Windows 95 compliant data and fax communication applications open at the same time, but they cannot use the same modem at the same time. Make sure no other application is online when you try to dial out. If you are using legacy communications software with Windows 95, you may get a message that another application is occupying the device even when no call is in progress. Close any open legacy communications programs and try again.



Chapter 5—Warranty, Service, and Tech Support/BBS

Introduction

This chapter begins with the terms of your modem's warranty. Carefully read the next section, *Tech Support*, if you have questions or problems with your modem. It includes technical support telephone numbers, space for recording your modem information, and an explanation of how to send in your modem should you require service. The final sections explain how to use our bulletin board service (BBS) and get information and support through CompuServe, the Internet, and our fax-back service.

Limited Warranty

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

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

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

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

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

Online Warranty Registration

To register your Multi-Tech product online, click the following link:

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

Technical Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, please call (800) 972-2439 (USA and Canada) or (612) 785-3500 (local and international). Record modem information in the spaces provided below and have it available when you call. If your modem requires service, the tech support specialist will guide you on how to send in your modem.

Recording Modem Information

Record the following information on your Multi-Tech modem. This helps Tech Support in answering your questions.

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. The software versions are printed on the diskette labels. Type **ATI1<cr>** in terminal mode to display the modem firmware version.

Note the status of your modem in the space provided before calling tech support. This includes screen messages, diagnostic test results, problems with a specific application, etc.

Service

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

Send modems that require repairs to the following address:

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

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

The Multi-Tech BBS

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

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

To log on to the Multi-Tech BBS

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

To Download a file

If you know the file name

1. From the Main Menu, type **F** to access the Files Menu; then type **D**.
2. Enter the name of the file you want to download from the BBS.
3. If a password is required, enter the password.
4. Answer **Y** or **N** to the automatic logoff question.
5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).

6. If you select Zmodem, the transfer begins automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most datacomm programs, the PAGE DOWN key initiates the download.)
7. When the download is complete, press ENTER to return to the File Menu.
8. To exit the BBS, type **G** and press ENTER.

If you don't know the file name

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

About CompuServe

In addition to the BBS, Multi-Tech provides support through CompuServe's Modem Vendor Forum (GO MODEMVEN) under GO MULTITECH. You can also download manuals, Help files, drivers, Microsoft Mail scripts, and product tips and descriptions from the forum's Multi-Tech library. Refer to your CompuServe documentation for special operating procedures.

About the Internet

Multi-Tech is a commercial provider on the Internet. We retrieve email messages from the our customers on a periodic basis. If you refer to receive technical support via the Internet, contact Tech Support at the following address:

http://www.multitech.com/_forms/email_tech_support.htm

Multi-Tech's web site is located at: *<http://www.multitech.com>*

An ftp site is located at: *<ftp://ftp.multitech.com>*

The ftp server mirrors the Multi-Tech BBS.

About the Multi-Tech Fax-Back Service

Multi-Tech's fax-back system provides 24-hour access to sales, marketing, and technical literature. Dial (612) 717-5888, follow the voice prompts, and document number 10 for a catalog of available documents. For convenience, have your fax number handy:

From the catalog, you can order newsletters, white papers, press releases, etc. from the sales and marketing index (pages 1–4) or order basic modem operation and troubleshooting guides from the technical support and engineering index. To order, enter the FB Doc. number of the literature you want to receive.



Appendix



Appendix A: Regulatory Compliance

FCC Regulations for Telephone Line Interconnection

1. This equipment complies with Part 68 of the Federal Communications Commission (FCC) 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. As indicated below, the suitable jack (Universal Service Order Code connecting arrangement) for this equipment is shown. 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. 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 isn't practical, the telephone company will notify the customer 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.
5. 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.
6. 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 equipment is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

7. 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.
8. If so required, this equipment is hearing-aid compatible.

Manufacturer:	Multi-Tech Systems, Inc.
Trade name:	MultiModemZPX-PCI
Model Number:	MT5634ZPX
FCC Registration Number:	AU7USA-32234-M5-E
Ringer Equivalence:	0.4B
Modular Jack (USOC):	RJ-11C or RJ-11W (single line)
Service Center in U.S.A.:	Multi-Tech Systems Inc. 2205 Woodale Drive Mounds View, MN 55112 (800) 328-9717 (612) 785-3500 (612) 785-9874 FAX

Fax Branding Statement

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

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

This information is to appear in a margin at the top or bottom of each transmitted page 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 of 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 five.

Notice: The Industry Canada label identifies certificated equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department 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.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

NOTE: This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, 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.
- Connect the equipment into an outlet on a circuit different from that of 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 is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including 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 this equipment.

Product Safety Compliance

Approved for connection to telecommunications system specified in the instructions for use subject to the conditions set out in them.

Warning: Interconnection directly, or by way of other apparatus, of ports marked *SAFETY WARNING see instructions for use* with ports marked or not so marked may produce hazardous conditions on the network. Advice should be obtained from a competent engineer before such a connection is made.

It is a condition of approval that the power required by the host and the total of all adapter cards installed within the host environment, together with any auxiliary apparatus, does not exceed the power specification as stated in the Technical Reference Material of the host apparatus.

The power requirements for the ZPX are:

Modem operating voltages: +12 VDC, -12 VDC, +5 VDC

Modem power consumption: 1.2 Watts

In order to maintain the independent approval of this card, it is essential that when other option cards are introduced which use or generate a hazardous voltage, the minimum creepages and clearances specified in the following table are maintained. A hazardous voltage is one which exceeds 42.4 VAC peak or 50 VDC. If you have any doubt, seek advice from a competent engineer before installing other adapters into the host equipment.

The equipment must be installed such that with the exception of connection to the host, clearance and creepage distances shown in the following table are maintained between the card and any other assemblies which use or generate a voltage shown in that table. The larger the distance shown in brackets applies where the local environment within the host is subject to conductive pollution or dry nonconductive pollution, which could become conductive due to condensation. Failure to maintain these minimum distances would invalidate approval.

Clearance (mm)	Creepage (mm)	Voltage used or Generated by Host or other Cards
2.0	2.4 (3.8)	Up to 50 V rms or Vdc
2.6	3.0 (4.8)	Up to 25 V rms or Vdc
4.0	5.0 (8.0)	Up to 250 V rms or Vdc
4.0	6.4 (10.0)	Up to 400 V rms or Vdc

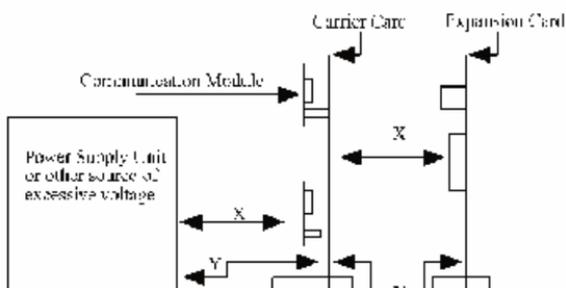


Figure A-1. Creepage and Clearance Distances.

Except at the edge connector, which plugs into the host's expansion slot, clearance distance (Xmm) and creepage distance (Ymm), as given in the above table, must be maintained between the communication card and any assemblies which use or generate hazardous voltage.

This apparatus has been approved for the use of the following:

- Auto-calling
- Loop disconnect and MF dialing
- Phone number storage and retrieval by a predetermined code
- Operation in the absence of proceed indication
- Detection of initial and secondary proceed indication
- Automatic storage of last number dialed
- Tone detection-busy
- Auto clear from the originating end
- DTR dialing
- Modem
- PBX timed break register recall

European Low Voltage Directive

When correctly installed and maintained, the modem will present no hazard to the user. When correctly installed the modem will be connected to the PSTN or a PW and to a Data Terminal Equipment (DTE), whose modem connections comply with ITU-T recommendation V.28. The DTE connections are therefore taken to be safe voltages (less than ± 30 volts).

Ports which are capable of connecting to other apparatus are defined as SELV. To ensure conformity with EN41003, ensure that these ports are only connected to ports of the same type on other apparatus.

Protection Against Contact with TNV Circuit (Internal PC Cards)

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 Terminal Directive Compliance

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

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility.

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits:

and

Council Directive 98/13/EC of 12 March 1998 on the approximation of the laws of Member States concerning telecommunications terminal and Satellite earth station equipment.

New Zealand Modem Warning Notice

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

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

WARNING NOTICE: No “111” or other calls can be made from this device during a mains power failure.

Appendix B: Technical Specifications

<i>Trade Name</i>	MultiModemZPX-PCI
<i>Model Numbers</i>	MT5634ZPX-PCI
<i>Client-to-Server Data Rates</i>	V.90/K56flex* speeds when accessing an ISP-type V.90/K56flex server (actual speed depend on server capabilities and line conditions)
<i>Client-to-Client Data Rates</i>	Enhanced V.34 speeds to 33,600 plus 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
<i>Fax Rates</i>	14,400, 12,000, 9600, 7200, 4800, 2400, and 300 bps
<i>Data Format</i>	Serial, binary, asynchronous
<i>Data Compatibility</i>	V.90/K56flex, ITU V.34 extended, V.34, ITU V.32bis, V.32, V.22bis, V.21, V.22, V.23; Bell 212 and 103; ITU V.42, V.42bis
<i>Fax Compatibility</i>	ITU Group 3, T.4, T.30, V.21, V.27ter, V.29, V.17, and TIA/EIA 578 Class 1, Class 2
<i>Voice Compatibility</i>	TIA/EIA IS-101, H.324 (V.8, V.25ter), V.80
<i>Voice Mode Sampling</i>	Up to 44.100 kHz (down-sampled to 11.025 kHz)
<i>Error Correction</i>	ITU V.42 (LAP-M and MNP Classes 2–4)
<i>Data Compression</i>	ITU V.42bis (4:1 compression) and MNP 5 (2:1 compression)
<i>Speed Detection</i>	Automatic speed detection and switching between available speeds

*Although V.90/K56flex technology is capable of downloads of up to 56 Kbps, FCC regulations currently restrict ISP modems to downloads of 53 Kbps.

<i>Fallback</i>	In adverse line conditions, the modem falls back from its current operating speed to the next reliable slower speed in 2400 bps decrements (V.34 mode). If conditions improve, the modem falls forward to the fastest reliable speed in 2400 bps increments. In V.90/K56flex mode, modem falls back and falls forward in increments of 2000 bps.
<i>Modes of Operation</i>	Full-duplex operation over dial-up lines, automatic dialing, automatic or manual answer.
<i>Flow Control</i>	Software (XON/XOFF), hardware (RTS/CTS)
<i>Intelligent Features</i>	Fully AT command compatible, autodial, redial, pulse or tone dial, dial pauses, call status display, auto-parity and data rate selection, keyboard-controlled modem options, and nonvolatile memory and on-screen displays for modem parameters.
<i>Command Buffer</i>	40 characters
<i>Data Modulations</i>	FSK at 300 bps, DPSK at 1200 bps, QAM at 2400, 4800, and 9600 bps (non-trellis), QAM with trellis-coded modulation (TCM) at 9600, 12,000, 14,400, 16,800, 19,200, 21,600, 24,000, 26,400, 28,800, 31,200, 33,600 and 56,000 bps
<i>Fax Modulations</i>	V.21 CH2: FSK at 300 bps V.27ter: DPSK at 4800 and 2400 bps V.29: QAM at 9600 and 7200 bps V.17: TCM at 14400, 12000, 9600, and 7200 bps
<i>Carrier Frequencies: V.34/V.90/K56flex</i>	1600, 1646, 1680, 1800, 1829, 1867, 1920, 1959, 2000 Hz
<i>Carrier Frequencies:</i>	1800 Hz

V.32terbo/V.32bis/V.32

Carrier Frequencies:	Transmit Originate:	1200 Hz
ITU-T V.22bis/V.22 or	Transmit Answer:	2400 Hz
Bell 212A Standard	Receive Originate:	2400 Hz
(2400 & 1200 bps)	Receive Answer:	1200 Hz

Carrier Frequencies:	Transmit Originate:	1270 Hz mark
Bell 103		1070 Hz space
(300 bps)	Transmit Answer:	2225 Hz mark
		2025 Hz space
	Receive Originate:	2225 Hz mark
		2025 Hz space
	Receive Answer:	1270 Hz mark
		1070 Hz space

Fax Carrier Frequencies	V.21 CH2 (half duplex):
	1650 Hz mark, 1850 Hz space for Transmit Originate;
	1650 Hz mark, 1850 Hz space for Transmit Answer
	V.27ter: 1800 Hz Originate/Answer
	V.29 QAM: 1700 Hz Originate/Answer
	V.17 TCM: 1800 Hz Originate/Answer

Diagnostics	Power-on self-test (POST) and local analog loop
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Transmit Level	-10dB
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Frequency Stability	±0.01%
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Receiver Sensitivity	-43 dB under worst-case conditions
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AGC Dynamic Range	43 dB
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Serial Interface	ITU-T V.24/V.28
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Bus Type	PCI Local Bus Rev.2.1
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<i>Connectors</i>	Two RJ-11 phone jacks and two plugs for microphone, and speakers
<i>Cables</i>	One RJ-11 phone cable
<i>Environmental</i>	Temperature range 0° to 50° C (32° to 120° F), humidity range 20–90% (non-condensing)
<i>Power Requirements</i>	150 mA @ 5 VDC; 5 mA @ ±12 VDC
<i>Dimensions</i>	0.7" W × 4.8" H × 5.8" L 1.8 cm × 12.2 cm × 14.7 cm
<i>Limited Warranty</i>	10 years

Appendix C: ASCII Conversion Chart

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

NUL Null, or all zeros
 SOH Start of Header
 STX Start of Text
 ETX End of Text
 EOT End of Transmission
 ENQ Enquiry
 ACK Acknowledge
 BEL Bell or Alarm
 BS Backspace
 HT Horizontal Tab
 LF Line Feed

VT Vertical Tab
 FF Form Feed
 CR Carriage Return
 SO Shift Out
 SI Shift In
 DLE Data Link Escape
 DC1 Device Control 1
 DC2 Device Control 2
 DC3 Device Control 3
 DC4 Device Control 4
 NAK Negative Acknowledge

SYN Sync.
 ETB End Transmission Block
 CAN Cancel
 EM End of Medium
 SUB Substitute
 ESC Escape
 FS File Separator
 GS Group Separator
 RS Record Separator
 US Unit Separator
 DEL Delete

Appendix D: FLASHWINFlash Upgrade

Introduction

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

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

FLASHWIN

1. Copy FLASHWIN.ZIP and the downloaded .HEX file to a temporary directory.
2. After unzipping FLASHWIN.ZIP, run FLASHWIN by double-clicking on its icon or file name.
3. Select the COM port your modem is on and the speed at which you want to program.
4. Enter the name and path of the *.HEX file you want to load into the modem.
5. After you verify your selections, click **Perform Flash** to load the firmware into the modem.
6. When **Loading Status** reaches 100%, the modem is upgraded and you can close FLASHWIN.

Your modem is now updated. You can now open your terminal program to reprogram your modem parameters, if necessary, or to confirm the update by typing **ATI** in the terminal window.



Index

Index

A

answering machine
 capabilities , 8
 test , 26
ASCII codes , 80
AT commands , 8
 #S , 31
 #S= , 31
 %B , 43
 %C , 43
 &&S , 44
 &B , 39
 &C , 39
 &D , 39
 &F , 40
 &G , 40
 &J , 40
 &K , 40
 &M , 40
 &Q , 40
 &S , 41
 &T , 41
 &V , 41
 &W , 30, 32, 41
 &Y , 41
 &Z= , 41
 +++AT<CR> , 34
 +ES= , 44
 -C , 43
 \G , 42
 \J , 42
 \K , 42
 \N , 42
 \Q , 42
 \V , 43
 \X , 43
A , 34
A/ , 34
AT , 34

B , 35
C , 35
E , 36
F , 36
H , 36
I , 62
L , 37
M , 37
N , 37
O , 30, 32, 37
Q , 38
S= , 38
S? , 38
V , 38
X , 38, 55
Y , 39
Z , 39

AT&T

 call card tones , 34, 36
attention code , 34
Auto-answer , 45

B

backspace character , 45
BBS
 Multi-Tech , 64–81
 timeout , 57
Bell 212A mode , 35
blacklist , 43
break signal , 42

C

call waiting , 30, 56
carriage return character , 45
COM port installation , 19
comma pause , 45
commands
 Answer , 34
 Async Communications Mode , 40
 Auxiliary Relay Control , 40
 Carrier Control , 35
 Communication Standard , 35

- Communications Mode , 40
 - Data Buffer Control , 42
 - Data Calling Tone , 43
 - Data Compression Control , 43
 - DCD Control , 39
 - Dial , 35
 - Dial Stored Telephone Number , 36
 - DSR Control , 41
 - DTR Control , 39
 - Echo Command Mode Characters , 36
 - Echo Online Data Characters , 36
 - Enable Synchronous Buffered Mode , 44
 - Error Correction Mode Selection , 42
 - Hook Control , 36
 - Information Request , 36
 - Load Factory Default Settings , 40
 - Local Flow Control Selection , 40, 42
 - Long Space Disconnect , 39
 - Modem Port Flow Control , 42
 - Modem Reset , 39
 - Modulation Handshake , 37
 - Monitor Speaker Mode , 37
 - Protocol Result Code , 43
 - Read Register Value , 38
 - Result Code Format , 38
 - Result Code Selection , 38
 - Result Codes Enable/Disable , 38
 - Return Online to Data Mode , 37
 - Select Stored Configuration , 41
 - Self-Test , 41
 - Set Break Control , 42
 - Set Register Value , 38
 - Speaker Codec Loopback , 44
 - Store Current Configuration , 41
 - Store Telephone Number , 41
 - V.22bis Guard Tone , 40
 - V.32 Auto Retrain , 39
 - View Current Configuration , 41
 - View Numbers in Blacklist , 43
 - XON/XOFF Pass-Through , 43
 - CompuServe , 58, 66
 - configuration
 - selecting , 41
 - storing , 41
 - viewing , 41
 - configuring
 - communications software , 28–81
 - conflicting device list , 20
 - connect messages , 29, 49
 - connectors
 - LINE , 18
 - MIC IN , 18
 - PHONE , 18
 - Contents, package , 8
- D**
- data , 7
 - data buffering , 40
 - data compression , 7
 - data features , 7
 - data mode , 37
 - data rates (bps) , 76
 - default settings , 40
 - detect AT&T call card tone , 34
 - device conflict
 - resolving , 54
 - dialing tones , 46
 - disconnect delay , 45
- E**
- enable/disable V25 data calling tone (S35) , 46
 - ENTER key , 34
 - error correction , 7
 - escape character , 45
 - escape sequence , 34

F

- fall-forward , 7
- fallback , 7, 37
- fax , 58
 - command set , 8
 - features , 8
 - transmission speeds , 8
- fax-back service , 66
- FCC Regulations , 68–81
- firmware
 - upgrading , 81
- flash memory , 81
- FLASHWIN , 81
- flow control , 40, 42, 58

G

- guard tone , 40

H

- H.324 , 44
- handshake , 37
- hanging up , 36
- hangup delay , 45
- headphone , 18

I

- inactivity timer , 43
- inactivity timer (S30) , 46
- initialization strings , 29
- Installation
 - requirements , 14
- installation , 15
 - hardware , 14–81
 - Windows 95 drivers , 19
- Internet , 66
- IRQ , 16

L

- line feed character , 45
- loopback test , 26

M

- manual conventions , 12
- maximum dial rate (S37) , 46
- Microsoft Fax , 25, 26
 - accessing , 26
- MNP 5 data compression , 7, 43, 57
- MNP error correction , 7, 42
- Multi-Tech
 - fax-back service , 66
- Multi-Tech BBS , 64–81
- MultiModemZPX
 - operation , 22

O

- on-hook/off-hook , 36
- online command mode , 37
- outside line
 - dialing , 30

P

- package contents , 8
- pause
 - dialing , 45
- phone line connection , 18
- Plug-and-Play , 7
- port address , 16
- product safety compliance , 72–81

R

- remote configuration , 30
 - escape character , 31
- removing
 - previous modem from Windows 95 , 21
- repeat last command , 34
- resetting the modem , 39, 40
- result codes , 43, 55
 - table , 49
- retrain , 39
- rings
 - number of , 45

S

- S-registers , 45–81
 - reading , 38
 - S0 , 45
 - S1 , 45
 - S10 , 45
 - S11 , 46
 - S2 , 45
 - S28 , 46
 - S3 , 45
 - S37 , 56
 - S4 , 45
 - S5 , 45
 - S6 , 45
 - S7 , 45
 - S8 , 45
 - S9 , 31
 - setting , 38
- safety , 15
- safety warnings , 15
- serial port baud rate , 29
- service , 63
- setup password , 31
- simple operations , 22
- software
 - configuration , 23, 28–81
- Software User License Agreement , 61
- sound card , 21
- speaker
 - controlling , 37
- speakerphone , 8, 26, 27
- specifications , 76
- speed conversion (data buffer) , 40, 42
- speed, transmission
 - fax , 8
- static electricity precautions , 17
- storing
 - current configuration , 29
 - telephone numbers , 8, 41
- synchronous buffered mode , 44

T

- technical specifications , 76
- technical support , 62, 66
- telephone cable , 18
- telephone numbers
 - storing , 8
- testing
 - data functions , 23
 - fax functions , 25
 - voice functions , 26
- tones
 - dialing , 46
- troubleshooting , 20
- typographic conventions , 12

U

- upgrading the modem , 81

V

- V.22 mode , 35
- V.25 , 43
- V.34 modulation , 46
- V.42 error correction , 42
- V.42 error correction , 7
- V.42bis data compression , 7, 43
- V.90
 - support
 - V.8bis sequence , 9
- video , 44
- voice
 - command set , 8
 - features , 8

W

- wait before dialing , 45
- wait for carrier , 45
- warranty , 60
- WinCIM , 58

Windows 95 drivers , 19
 installing , 19
 removing , 21
World Wide Web , 66

X

Xmodem , 57

Y

Ymodem/G , 57

Z

Zmodem , 57