



**Model Number MT5634ZPW-PCI**  
**Owner's Manual**



Owner's Manual  
82078500 Revision A  
#MT5634ZPW - PCI

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## Chapter 1 - Introduction and Description

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## Congratulations

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

The MultiModemZPW-PCI is an internal, half-length, fax modem card that can be plugged into any PCI expansion slot. Your MultiModemZPW-PCI incorporates a new modem technology called *K56flex™*, that enables Internet connections at data rates up to 56K bps over standard telephone lines. *K56flex* technology is able to propel data downstream from the Internet to your computer at speeds of up to 56K bps. Upstream transmission, mostly keystroke and mouse commands from your computer to the central site, continue to flow at the conventional data rate of 33.6K bps.

Your MultiModemZPW-PCI offers interactive automatic dialing, as well as command mode option configuration. You may store four command line/telephone numbers, of up to 40 characters each, in the modem's nonvolatile memory. The modem 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 (DAA's).

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

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

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

## General features include:

- Compliance with major ITU-T, TIA, and EIA international standards to ensure compatibility with other modems.
- Distinguishes data, fax, and voice calls.
- Caller ID to identify your caller's phone number (available on U.S. products).
- Easy Windows 95 Plug-and-Play (PnP) installation.
- Compliance with the V.80 standard, allowing video conferencing over analog telephone lines with any H.324 video phone system.

## Data

- Supports K56flex™ for data transmission speeds up to 56Kbps, while maintaining compatibility with lower-speed modems.  
Note the K56flex standard asymmetrically transfers data--client downloads at speeds up to 56K bps, client uploads at speeds up to 33.6K bps.
- Supports the enhanced ITU-T V.34 standard, with data transmission speeds to 33.6K bps, while also maintaining compatibility with lower-speed modems.
- Supports 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.
- Redial, pulse (rotary) and touch-tone dial.
- Dial tone and busy signal detection for reliable call-progress detection.
- Plug and Play (*PnP*) serial support.
- Flash upgradable.
- Compatibility with the standard AT command set used by most communication programs.
- Stores up to four 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 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 Corp.™, the Peripheral Component Interconnect (PCI) bus used by your MT5634ZPW-PCI provides high performance that 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 66MHz, and bandwidth of 264Mbs.

### **What is in Your Modem Package?**

Your MultiModemZPW-PCI package should contain the following items:

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

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

## How to Use This Manual

### **Chapter 1: Introduction and Description**

This chapter introduces the MT5634ZPW-PCI, briefly describing its features and package contents. It also describes the typographic conventions used in this manual.

### **Chapter 2: Installing Your Modem**

This chapter describes first 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. This chapter also describes several tests you can make 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 who are new to online communications concepts.

### **Chapter 3: Configuring Your Communications Software**

This chapter helps you get the most from your modem by describing how to configure communications software written for Windows 95.

### **Chapter 4: Controlling Your Modem**

This chapter contains concise descriptions of the AT commands that control your modem; its S-registers, which affect how the commands work; and its result codes, which provide you and your software with operational feedback.

### **Chapter 5: Solving Problems**

This chapter describes some common problems you may run into with your modem, and how to solve them.

### **Chapter 6: Warranty, Service, and Technical Support**

This chapter contains the terms of your warranty and describes how to get help from Multi-Tech Systems for problems you cannot resolve yourself. It includes our technical support phone number, and how to access us through our BBS, the Internet, CompuServe, and our fax-back service.

#### **Appendices**

Appendix A: Regulatory Compliance

Appendix B: Technical Specifications

Appendix C: ASCII Conversion Chart

## Typographic Conventions

This manual uses the following typographic conventions:

<b>You type this</b>	Text entered by you is shown in <b>boldface</b> . Spell the entry exactly as shown, using upper and/or lower case type. However, when you see <b>&lt;CR&gt;</b> , press the ENTER key; do not spell it as shown.
<b><i>AT command</i></b>	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 non-literal 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

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# Introduction

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

## What You'll Need

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

### Multi-Tech Supplies

- One MultiModemZPW-PCI internal fax modem card
- One MultiModemZPW-PCI Drivers disk
- One telephone cable
- Communications software
- This MultiModemZPW-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 (recommended 16 MB of available RAM)
- 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 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

Installation of the MultiModemZPW-PCI consists of three steps: (1) installation of the modem in the computer; (2) connection of the modem to the telephone line and, optionally, to an external speaker and microphone; and (3) installation of the modem's drivers.

## Sound Card Considerations

If you want speakerphone functions along with 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 3rd party sound card, perform the following steps:

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 MultiModemZPW-PCI and the other end into the "LINE IN " jack of the sound card. This lets 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 two 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 will only occur 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 the microphone and speakers far enough apart from each other to eliminate feedback. Plug the connector of both microphones into the "MIC IN" jack of both the SoundCard and the MultiModemZPW-PCI.

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## Install the MultiModemZPW-PCI into the Computer

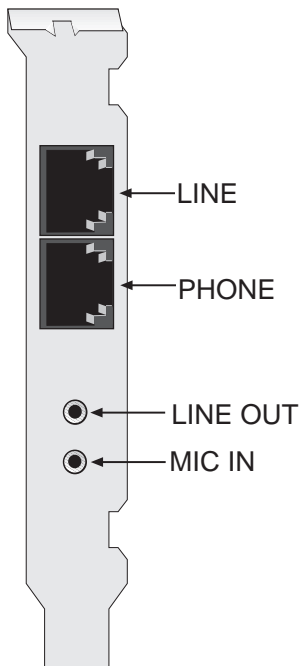
Installation of the MultiModemZPW-PCI requires you to open your computer. Please consult the computer manual in addition to the following instructions:

1. Turn off the computer and unplug it. Failure to do so may result in damage to both the MultiModemZPW-PCI and the computer. Do not turn the computer on 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 slot. Remove the expansion slot cover and save the retaining screw.
4. Before handling the MultiModemZPW-PCI, discharge any static in your body by touching a piece of grounded metal such as a water faucet. Carefully remove the MultiModemZPW-PCI from its anti-static bag, handling it only by the mounting bracket and edges. Do not touch the gold-plated connectors along the bottom edge.
5. Placing the MultiModemZPW-PCI directly above the PCI slot, gently but firmly push it into the connector until the card's retaining bracket is flush against the computer chassis.
6. With the screw you saved in step 3, fasten the retaining bracket to the computer chassis.
7. Replace the cover of the computer.

## External Connections

The MultiModemZPW-PCI communicates over public switched telephone network lines. Use the modular telephone cable provided with the modem to connect the MultiModemZPW-PCI to your telephone wall jack. If you do not have a standard modular wall jack near your computer, you should 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 wish, you can use a microphone and speaker with the MultiModemZPW-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 MultiModemZPW-PCI's LINE jack.
2. Plug the other end of the phone cable into a working wall jack.
3. If you wish to connect a telephone to your modem, plug the telephone's line cable into the MultiModemZPW-PCI's PHONE jack.
4. If you wish to use a microphone and/or speaker with the MultiModemZPW-PCI, connect a microphone by inserting the microphone plug into the modem's MIC IN jack.
5. To connect a speaker or headphone, insert the speaker or headphone plug into the modem's LINE OUT jack.

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## Installing Drivers

1. Plug in and turn on your computer. As your computer boots, it automatically detects the MultiModemZPW-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" (the default selection). Then click the OK button. The Install from Disk window appears.
3. Insert the MultiModemZPW-PCI Drivers disk into your computer's floppy drive, select the drive letter (A:\ is the default), and click on the OK button. The computer installs the software drivers needed to communicate with your MultiModemZPW-PCI, then displays the Windows 95 desktop.
4. Installation of the MultiModemZPW-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.

## Is Your MultiModemZPW-PCI Ready for Use?

If you're an experienced modem user, you may simply want to check your modem's settings for data compression, error correction, and so on. You may find that you can get moving quite quickly if you just issue the **AT&V<cr>** command. This command lists how your modem is currently configured, the stored (user) profiles, and the 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.

## Verifying Configuration

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

1. Click on the *Start* button, point to *Settings*, click on *Control Panel*, and double-click on the *System* icon.
2. When the *System Properties* sheet appears, click on the *Device Manager* tab. A list of device types appears.
3. Double-click on "Modem" for a list of modems installed in your computer.
4. Double-click on "Multi-Tech MT5634ZPW-PCI." The Modem Properties sheet for your particular MultiModemZPW-PCI model appears.
5. Click on 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 on the *Start* button, click on *Help*, and then search the Help index for the Hardware Conflict Troubleshooter.
6. Exit the *System Properties* sheet.
7. In *Control Panel*, double-click on the *Modems* icon.
8. When the *Modems Properties* sheet appears, click on the *Diagnostics* tab. A list of ports and the devices installed on them appears.
9. Click on the COM port the Multi-Tech MT5634ZPW-PCI is installed on, then click on the More Info button to make sure Windows 95 can communicate with the modem. Clicking on the More Info button causes Windows 95 to send commands to and receive responses from the modem, and to display information about the modem's COM port.

10. Write down the modem's port, interrupt, address, and highest speed. You will need this information to set up any "legacy" (non-Windows 95) communications software you install.  
  
Port: COM\_\_ Interrupt:\_\_\_\_\_ Address:\_\_\_\_\_  
Speed:\_\_\_\_\_
11. Click on the *General* tab. Select the Multi-Tech MT5634ZPW-PCI and click on the *Properties* button to review the modem's default communications settings. Do not change any settings unless you have special requirements.
12. Click on the *Dialing Properties* button and review your dialing settings. If you must 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.
13. Exit the *Modems Properties* sheet.

### **How to Remove Your Old Modem from Windows 95**

If your MultiModemZPW-PCI replaces another modem, the old modem installation remains in Windows even after you install the new modem, and the old modem is still 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 MultiModemZPW-PCI by removing the old modem installation from Windows.

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

## Operating Your MultiModemZPW-PCI

You control your MultiModemZPW-PCI by issuing **AT** commands and setting S-Registers. Right now your MultiModemZPW-PCI is set up for the most typical user application, that is, as a traditional modem set to make a dial-up call to a remote installation where the call is answered automatically; therefore, you shouldn't need to change the current default configuration. (If however, you know that your application does not follow this profile, please refer to Chapter 3 for AT Commands and S-Registers.)

In operating your MultiModemZPW-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 to
- launch a datacomm session through a set of modem configurations which you select and then associate with a target telephone number. Once you have created, saved, and named this set of information according to your connection needs and your datacomm software's conventions, the software then simplifies your dialing because you needn't reconfigure your modem, nor run the risk of mistakenly keying-in incorrect information.

Either way, you need to understand 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 may enter these commands with either upper- or lower-case characters. Once you're in terminal mode, enter **AT** followed by **<CR>** to check whether your modem is operational. If everything's fine, your modem will respond *OK*.



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## Simple Operations

You can dial by using the **ATD** command and the phone number of the modem with which you wish to connect, e.g., **ATD6127853500**. Your modem will dial the number; a “scrambling” noise is heard as the modem negotiates the kind of connection it can make, and once the modems have settled on a common connection, a connect message on your computer’s video is displayed. To hang up a call, enter **+++ATH<CR>**. Your modem will return on hook. Your video now displays *OK*, signifying that your modem is ready for your next command.

## Software Configuration

Communications software must be configured to work with the MultiModemZPW-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. By this method, initialization strings that correspond to a particular modem type can be selected to operate optimally with the software it is utilizing.

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✉: Refer to your respective software manual for further information on your communications software.

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Other software programs require you 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 optimally with the software it is utilizing.

## Testing the MultiModemZPW-PCI's Data Functions

Test the modem's data functions by using HyperTerminal to call the Multi-Tech Bulletin Board System (BBS) and download a file.

**Note:** If this will be your first time calling the Multi-Tech BBS, refer to Chapter 5 for instructions on logging in as a new user.

1. Have your modem's serial number handy; you will need it to gain full access to the BBS.
2. Select *Start, Programs, Accessories, HyperTerminal*.
3. Start HyperTerminal by double-clicking on the Hypertrm icon. HyperTerminal asks for the name of the connection.
4. Type **Multi-Tech BBS** in the Name text box, and click OK.
5. 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.
6. Verify that the appropriate model number for the MultiModemZPW-PCI (example:"Multi-Tech MT5634ZPW-PCI") is selected in the Connect Using drop-down list box, then click OK.
7. In the Connect dialog box, click *Dialing Properties*.
8. Make any necessary changes in the Where I Am and the How I Dial from This Location boxes. If you must dial 9 to access an outside line, you should type **9** in both the local and the long distance boxes unless your phone system has a special requirement.
9. Click *OK*, then click Dial. If you have a speaker connected to the MultiModemZPW-PCI, you will know you have reached another modem by the harsh sounds of the modem handshake.

10. From the Main Menu, type **F** to access the Files Menu, then type **D**.
11. Enter the name of the file you wish to download from the BBS.
12. If a password is required, enter the password.
13. Answer **Y** or **N** to the automatic logoff question.
14. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
15. If you select Zmodem, the transfer will begin 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.)

### **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** twice. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark the file areas you would like to examine by typing each file area's list number and a RETURN.
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. Mark one or more files for download by entering **M**, the list numbers of the files, and a RETURN
5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.
6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself.
8. When the download is complete, enter **S** to return to the File Menu.

## Testing the MultiModemZPW-PCI's FAX Functions

Test your modem's fax capabilities by sending a fax 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 will run Microsoft Fax as a stand-alone fax program.

1. Select *Start, Programs, Accessories, WordPad*.
2. Create a message in WordPad, e.g., "This is a test of the MultiModemZPW-PCI's fax capabilities."
3. Save the file as "ZPW-PCI Test.doc" and exit WordPad.
4. Select *Start, Programs, Accessories, Fax, Compose New Fax*.
5. The Compose New Fax wizard appears. Click *Next*.
6. If you wish 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. Pick a cover page, then click *Next*.
9. Type a subject line (e.g., **MultiModemZPW-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 "ZPW-PCI Test.doc," and click *Open*. The ZPW-PCI Test.doc file is added to the Files to Send list box.

11. Click *Next*, then click *Finish*.
12. Microsoft Fax opens the ZPW-PCI Test.doc file in WordPad and prints it to the Rendering System, then dials the recipient and sends the fax.
13. Exit Microsoft Fax when the Status dialog box says the fax has been successfully sent.

## Other Ways to Access Microsoft Fax

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

## Testing the MultiModemZPW-PCI's Voice Function

There are several tests you can perform to verify the MultiModemZPW-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 MultiModemZPW-PCI, try the loopback and speakerphone tests, which can test the modem's voice circuits without special software.

## MultiModemZPW-PCI's Answering Machine Test

Test the MultiModemZPW-PCI's voice function by using the included software to set up the MultiModemZPW-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 MultiModemZPW-PCI. To avoid feedback, make sure the microphone and speaker are well separated; for best results, use a headphone instead of a speaker (make sure volume is turned down).
2. Select *Start, Programs, Accessories, HyperTerminal*.
3. Double-click on the Multi-Tech BBS icon you created in "Step 2: Call the Multi-Tech BBS." HyperTerminal starts with the Connect dialog box open.
4. Click Cancel in the Connect dialog box.
5. In the HyperTerminal terminal window, type **AT&&S** and press ENTER. This command causes input from the microphone to be looped back to the speaker.
6. Speak into the microphone; you should hear your voice on the speaker or headphone.
7. Type **ATZ** and press ENTER to reset the modem.

## MultiModemZPW-PCI's Speakerphone Test

1. Connect a microphone and speaker to the MultiModemZPW-PCI.
2. Select *Start, Programs, Accessories, HyperTerminal*.
3. Double-click on the Multi-Tech BBS icon you created in "Step 2: Call the Multi-Tech BBS." 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. Type **ATH** and press ENTER to hang up.
8. Type **ATZ** and press ENTER to reset the modem.







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



## Introduction

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 are, for the most part, 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.

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

## Configuring Communications Software

1. Turn on your computer and run your communications software.
2. Find the dialog box or menu that lets you specify your modem. (In HyperTerminal, select File, Properties, Phone Number; in ProComm Plus for Windows, select Window, Setup, Advanced; and in MultiExpress Terminal for Windows, select Setup, Terminal, Modem.)
3. If you are using legacy software, or if you have more than one modem installed, choose the appropriate model number for the MultiModemZPW-PCI (e.g., Multi-Tech MT5634ZPW-PCI ) from the software's modem list. If your model number isn't listed, choose a generic modem of the same speed as yours, i.e., a generic V.34 or 33600 bps modem, and rename it "Multi-Tech MT5634ZPW-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 should be **AT&FN0^M**. If you use CompuServe's WinCIM software, change the initialization string to **AT&FN0Q1^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.

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☒: 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 can then simplify your initialization string to **ATZ^M**.

---

5. If you are using legacy software, select the port the modem is connected to (normally, COM3).
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, Properties.)
7. If your legacy software has an autobaud selection, make sure it is disabled. Autobaud is for much 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 must 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 the Dialing Properties sheet.

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☒: **\*70** is only used in the United States.

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## AT Commands

This section summarizes your modem's AT commands. For detailed information on the commands, download ZPW-PCIHELP.EXE from the Multi-Tech BBS (see "Call the Multi-Tech BBS" in Chapter 3).

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

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

Values:                    n/a

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

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 on-line connection--

**ATDT**1028806127853500**\$**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.

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.

*Dial string modifiers:*

**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 **&Zn=x** command .  
Example: **ATDS=3**

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

Command: **Fn** **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: **Hn** **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: **In**      **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., "12AB").  
                 I2      Check ROM and verify the checksum, displaying *OK*  
                            or *ERROR*.  
                 I3      Display default speed and controller firmware version.  
                 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:             $n = 0, 1, 2, \text{ or } 3$   
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:             $n = 0, 1, 2, \text{ or } 3$   
Default:            1  
Description: M0      Speaker always off.  
                 M1      Speaker on until carrier signal detected.  
                 M2      Speaker always on when modem is off-hook.  
                 M3      Speaker on until carrier is detected, except while  
                            dialing.

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



Command:	<b>O</b>	<b>Return Online to Data Mode</b>
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:	<b>Qn</b>	<b>Result Codes Enable/Disable</b>
Values:		$n = 0$ or $1$
Default:		0
Description:	Q0	Enable result codes.
	Q1	Disable result codes.
Command:	<b>Sr=n</b>	<b>Set Register Value</b>
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:	<b>Sr?</b>	<b>Read Register Value</b>
Values:		$r =$ S-register number
Default:		None
Description:		Read value of register $Sr$ and display value in 3-digit decimal form.
Command:	<b>Vn</b>	<b>Result Code Format</b>
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:	<b>Xn</b>	<b>Result Code Selection</b>
Values:		$n = 0-7$
Default:		4
Description:	X0	Basic result codes (e.g., <i>CONNECT</i> ); does not look for dial tone or busy signal.
	X1	Extended result codes ( <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> .
Command:	<b>Yn</b>	<b>Long Space Disconnect</b>
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:	<b>Zn</b>	<b>Modem Reset</b>
Values:		$n = 0$ or $1$
Default:		None
Description:	Z0	Reset modem to profile saved by the last <b>&amp;W</b> command.
	Z1	Same as Z0.
Command:	<b>&amp;Bn</b>	<b>V.32 Auto Retrain</b>
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:  $n = 0, 1,$  or  $2$   
Default:  $0$   
Description: &G0 Disable guard tone.  
&G1 Enable 550 Hz guard tone.  
&G2 Enable 1800 Hz guard tone.

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

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

Command:	<b>&amp;Kn</b>	<b>Local Flow Control Selection</b>
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:	<b>&amp;Mn</b>	<b>Communications Mode</b>
Values:		$n = 0$
Defaults:		0
Description:	&M0	Asynchronous mode.
	&M1	Reserved—responds ERROR.
Command:	<b>&amp;Qn</b>	<b>Asynchronous Communications Mode</b>
Values:		$n = 0, 5, \text{ or } 6$
Defaults:		5
Description:	&Q0	Asynchronous with data buffering. Same as <b>IW0</b> .
	&Q5	Error control with data buffering. Same as <b>IW3</b> .
	&Q6	Asynchronous with data buffering. Same as <b>IW0</b> .
Command:	<b>&amp;Sn</b>	<b>Data Set Ready (DSR) Control</b>
Values:		$n = 0 \text{ or } 1$
Default:		0
Description:	&S0	Force DSR high (on).
	&S1	Let DSR follow CD.
Command:	<b>&amp;Tn</b>	<b>Self-Test Commands</b>
Values:		$n = 0, 1, 3 \text{ or } 6$
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:	<b>&amp;V</b>	<b>View Current Configuration</b>
Values:		n/a
Description:		Displays the active modem settings.

Command:	<b>&amp;Wn</b>	<b>Store Current Configuration</b>
Values:		$n = 0$
Default:		None
Description:	&W0	Store active modem settings in NVRAM; load them at power-on or following the <b>ATZ</b> command instead of loading the factory defaults from ROM.
Command:	<b>&amp;Yn</b>	<b>Select Stored Configuration for Hard Reset</b>
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:	<b>&amp;Zn=x</b>	<b>Store Telephone Number</b>
Values:		$n = 0, 1, 2, \text{ or } 3$ $x =$ Dialing string
Default:		None
Description:		Stores telephone dial string $x$ in memory location $n$ . Dial the stored number using the command <b>ATDS=n</b> .
Command:	<b>\Gn</b>	<b>Modem Port Flow Control</b>
Values:		$n = 0$
Default:		0
Description:	\G0	Returns an <i>OK</i> for backward compatibility with some software.
	\G1	Not supported—responds ERROR.
Command:	<b>\Jn</b>	<b>Data Buffer Control</b>
Values:		$n = 0$
Default:		0
Description:	\J0	Enable data buffer—serial port speed is independent of connect speed.
	\J1	Not supported—responds ERROR.
Command:	<b>\Kn</b>	<b>Set Break Control</b>
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 **\W3**).

\N7 V.42, MNP, or non-error correction (same as **\W3**).

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**).

Command: **\Tn Inactivity Timer**

Values:  $n = 0-255$

Default: n/a

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: **\Wn Protocol Result Code**

Values:  $n = 0$  or 1

Default: 1

Description: \W0 Disable protocol result code appended to DCE speed.

\W1 Enable protocol result code appended to DCE speed.

Command: **\Xn XON/XOFF Pass-Through**

Values:  $n = 0$  or 1

Defaults: 0

Description: \X0 Respond to and discard XON/XOFF characters.

\X1 Not supported—responds ERROR.

Command:	<b>-Cn</b>	<b>Data Calling Tone</b>
Values:		$n = 0$ or $1$
Defaults:		$0$
Description:	-C0	Disable V.25 data calling tone.
	-C1	Enable V.25 data calling tone.
Command:	<b>%B</b>	<b>View Numbers in Blacklist</b>
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:	<b>%Cn</b>	<b>Data Compression Control</b>
Values:		$n = 0$ or $1$
Default:		$1$
Description:	%C0	Disable V.42bis/MNP 5 data compression.
	%C1	Enable V.42bis/MNP 5 data compression.
Command:	<b>+ES=6</b>	<b>Enable Synchronous Buffered Mode</b>
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: <b>&amp;F</b> , <b>&amp;M</b> , <b>&amp;Q</b> , and <b>IN</b> . <b>+ES = ?</b> shows the only allowed value.
Command:	<b>&amp;&amp;S</b>	<b>Speaker Codec Loopback</b>
Values:		n/a
Description:		Provides a loopback from the microphone to the speaker. <i>For testing and debugging only.</i>
Command:	<b>%T94</b>	<b>Testing External RAM</b>
Values:		n/a
Description:		This command is used for testing the external RAM. Enter <b>AT%T94&lt;cr&gt;</b> to determine the status of external RAM. The response you should receive will be either "FAIL" or "PASS"

**Command: %T125 Testing DSP 56K Code Version/Checksum**  
Values: n/a  
Description: Entering AT%T125<cr> tests the DSP56K code version and checksum running in external RAM. Upon issuing this command the user may then issue AT14<cr> to get DSP version or ATI1<cr> to get DSP checksum in RAM.  
Entering AT%T124<cr> tests the DSP56K code version and checksum running in internal ROM. Upon issuing this command the user may then issue AT14<cr> to get DSP version or ATI1<cr> to get DSP checksum in ROM.

## 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").

<b><i>Register</i></b>	<b><i>Unit</i></b>	<b><i>Range</i></b>	<b><i>Default</i></b>	<b><i>Description</i></b>
<b>S0</b>	rings	0, 1–255	0	Sets the number of rings before the modem answers. <b>ATS0=0</b> disables auto-answer completely.
<b>S1</b>	rings	0–255	0	Counts the number of rings that have occurred.
<b>S2</b>	decimal	0–127 128–255	43 (+)	Sets ASCII code for the escape character. Values greater than 127 disable the escape sequence.
<b>S3</b>	decimal	0–127	13 (^M)	Sets ASCII code for the carriage return character.
<b>S4</b>	decimal	0–127	10 (^J)	Sets ASCII code for the line feed character.
<b>S5</b>	decimal	0–32 33–127	8 (^H)	Sets ASCII code for the backspace character. Values greater than 32 disable the backspace character.

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\* These values may be different outside North America.

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

<b><u>Register</u></b>	<b><u>Unit</u></b>	<b><u>Range</u></b>	<b><u>Default</u></b>	<b><u>Description</u></b>
<b>S6</b>	seconds	2–65*	2*	Sets the time the modem will wait after it goes off-hook before it begins to dial the telephone number.
<b>S7</b>	seconds	1–255*	50*	Sets the time the modem will wait for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier.
<b>S8</b>	seconds	0–65	2	Sets the length of a pause caused by a comma character in a dialing command.
<b>S10</b>	100 ms	1–254	20	Sets how long a carrier signal must be lost before the modem disconnects.
<b>S11</b>	1 ms	50–150*	95*	Sets spacing and duration of dialing tones.
<b>S28</b>	decimal	0, 1–255	1	0 disables, 1–255 enables V.34 modulation.
<b>S30</b>	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 only applicable to buffer mode. (Also see \T command.)
<b>S35</b>	decimal	0–1	0	0 disables, 1 enables the V.25 data calling tone, which allows remote data/fax/voice discrimination.
<b>S36</b>	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.)

<b><u>Register</u></b>	<b><u>Unit</u></b>	<b><u>Range</u></b>	<b><u>Default</u></b>	<b><u>Description</u></b>
<b>S37</b>	decimal	0–19	0	<p>S37 sets the maximum V.34 "up-stream" speed that the modem attempts to connect.</p> <p>0 = maximum negotiated modem speed</p> <p>1 = reserved</p> <p>2 = 1200/75 bps</p> <p>3 = 300 bps</p> <p>4 = reserved</p> <p>5 = 1200 bps</p> <p>6 = 2400 bps</p> <p>7 = 4800 bps</p> <p>8 = 7200 bps</p> <p>9 = 9600 bps</p> <p>10 = 12000 bps</p> <p>11 = 14400 bps</p> <p>12 = 16800 bps</p> <p>13 = 19200 bps</p> <p>14 = 21600 bps</p> <p>15 = 24000 bps</p> <p>16 = 26400 bps</p> <p>17 = 28800 bps</p> <p>18 = 31200 bps</p> <p>19 = 33600 bps</p>
<b>S38</b>	decimal	0–14	1	<p>Sets the maximum 56K "down-stream" speed that the modem attempts to connect.</p> <p>0 = 56K Disabled</p> <p>1 = 56K Enabled with automatic speed selectionmaximum negotiated modem speed enabled</p> <p>2 = 32000 bps</p> <p>3 = 34000 bps</p> <p>4 = 36000</p> <p>5 = 38000 bps</p> <p>6 = 40000 bps</p> <p>7 = 42000 bps</p> <p>8 = 44000 bps</p> <p>9 = 46000 bps</p> <p>10 = 48000 bps</p> <p>11 = 50000 bps</p> <p>12 = 52000 bps</p> <p>13 = 54000 bps</p> <p>14 = 56000 bps</p>

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

<b>Register</b>	<b>Unit</b>	<b>Range</b>	<b>Default</b>	<b>Description</b>
<b>S42</b>	decimal	0–1	1	Enables/disables the 56K auto rate. Retrain and fallback are disabled in data mode. 0 = disable; 1 = enable.
<b>S43</b>	decimal	0–1	1	<i>For testing and debugging only.</i> Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.
<b>S48</b>	decimal	7 or 128	7	The following chart lists the S36 and S48 configuration settings necessary to negotiate certain types of connections.

	<b>S48=7</b>	<b>S48=128</b>
<b>S36=0,2</b>	LAPM or Hangup	Do not Use
<b>S36=1,3</b>	LAPM or Async	Async
<b>S36=4,6</b>	LAPM, MNP, or Hangup	MNP or Hangup
<b>S36=5,7</b>	LAPM, MNP, or Async	MNP or Async

<b>S89</b>	seconds	0, 5–255	10	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.
<b>S108</b>	decimal	0-3, 6,7	6	Selects the digital loss if using the modem thru a PBX line. The default value is -6dB loss, the value used when calling from a typical POTS line long distance.

## Result Codes

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

<u>Terse</u>	<u>Verbose</u>	<u>Description</u>
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5*	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
26*	CONNECT 16800	Connected at 16800 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
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

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

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<u>Terse</u>	<u>Verbose</u>	<u>Description</u>
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

\* *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

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# Introduction

This chapter covers some common problems you may run into with your modem and how to solve them. Your MultiModemZPW-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. Always begin with the initial checklist to make sure all hardware is properly connected. 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 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 Chapters 2 and 3.
- 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 do not find your problem listed in the next section, see Chapter 7 for information on how to reach one of 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 7 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 7).

## 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 and the problem likely is in the connection description in your communications software.
- Try resetting your modem by sending it an **ATZ** or **AT&F** command in terminal mode. If you are 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 is necessary in your software to make a port connection. Most legacy communications programs connect to the COM port when the software loads, and remain connected until the program terminates. Some, however, can disconnect without exiting the program; if you have one of these, 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 you are using legacy software, its COM port setting may not match the COM port Windows 95 assigned to the modem. Compare the COM port setting in your software to the COM port reported in the Diagnostics tab of the Modems Properties sheet. (Select Start, Settings, Control Panel, Modems, Diagnostics.)
- Another expansion card, such as a bus mouse or sound card, might be using the same COM port, memory address, or interrupt request (IRQ) as your modem. On the Windows 95 desktop, right-click on My Computer, select Properties, Device Manager, and Ports, then double-click on the

Communications Port your modem is connected to. In the port's Properties sheet, click on the Resources tab to see the port's Input/Output range and Interrupt Request. If another device is using the same address range or IRQ, it will appear in the Conflicting Device List. Uncheck Use Automatic Settings to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to change switches or jumpers on the conflicting device; refer to the device's documentation.

- The modem may be defective. If you have another MultiModemZPW-PCI, try swapping modems. If the problem goes away, the first modem is possibly defective. Call Technical Support for assistance (see Chapter 7).

## The Modem Dials But Cannot Make a Connection

There can be several reasons the MultiModemZPW-PCI fails to make a connection. Possibilities include

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

You can narrow the list of possibilities by using extended result codes. If you have disabled the modem's extended result codes, re-enable them by entering **ATV1X4** in the terminal window and pressing ENTER. When you dial again, the modem will report 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 will cause the modem to ignore dial tones. (Note, however, that **X3** is not allowed in some countries, such as France and Spain.)

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

If you must dial **9** to get an outside line, the easiest way to dial it automatically using legacy software is to include it in the modem's dial prefix, e.g., **ATDT9**,. Note the comma, which inserts a pause before the number is dialed. For example, to change the dial prefix in MultiExpress Terminal, select Setup, 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, Modems. In the Modems Properties sheet, select the appropriate MultiModemZPW-PCI model number (e.g., Multi-Tech MT5634ZPW-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 might have dialed a wrong number. Check the number.
- If the modem reports **NO CARRIER**, the phone was answered at the other end, but no connection was made. You might have dialed a wrong number, and a person answered instead of a computer, or you might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call, and the modems may be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed 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 automatically disable call waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT\*70,—** note the comma, which inserts a pause before the telephone number is dialed). For example, to change the dial prefix in MultiExpress Terminal, select Setup, 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, Modems. In the Modems Properties sheet, select the Multi-Tech MT5634ZPW-PCI, click Dialing Properties, check "This location has call waiting," and select the correct code for your phone service.

**Note:** **\*70** is only used 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 especially for the modem.
- 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 a commercial online service, it may have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

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## 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 Be

- 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 4 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 might not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)
- Try entering the **&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

- Although you can have Windows 95-compliant data and fax communication applications open at the same time, 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 Technical Support



### Introduction

This chapter begins with the terms of your modem's warranty. Read carefully the next section, "Tech Support," if you have questions or problems with your modem. It includes the 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 three 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.

### 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). Please 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

Please record the following information on your Multi-Tech modem. This will help Tech Support in answering your questions.

*Modem model no.:* \_\_\_\_\_

*Modem serial no.:* \_\_\_\_\_

*Modem firmware version:* \_\_\_\_\_

*Drivers software version:* \_\_\_\_\_

*Datacomm software version:* \_\_\_\_\_

*FAX software version:* \_\_\_\_\_

*Other software version:* \_\_\_\_\_

*COM port no.:* \_\_\_\_\_

*IRQ setting:* \_\_\_\_\_

The modem model and serial numbers are silkscreened on your modem. The software versions are printed on the diskette labels. Type **ATI4**<CR> in terminal mode to display the modem firmware version.

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

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### 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 may send your modem to our Mounds View factory in the USA. A modem that is shipped to us from outside the USA must have a Returned Materials Authorization (RMA) and shipping instructions. To return a modem for repair from inside the USA, no RMA is required; simply send it to us freight prepaid. Include a description of the problem, return billing and shipping addresses, a check or purchase order for out-of-warranty repairs, and, if possible the name of the technical support specialist you spoke to.

Please 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

Multi-Tech maintains a bulletin board system (BBS) for its customers. Information available from the BBS includes new product information, product upgrade data, and problem-solving tips. There is also a message service that lets you request additional information. The phone number for the Multi-Tech BBS is (800) 392-2432 (USA and Canada) or (612) 785-3702 (local and international).

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).

### Logging on to the Multi-Tech BBS

To log on to the Multi-Tech BBS, perform the following steps:

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 will ask if your name is spelled correctly. If you answer yes, a questionnaire will appear. 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 three main areas: the Files Menu, the Message Menu, and Bulletins. For help on menu commands, type ?.

### Downloading 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 wish 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 will begin 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.)

#### 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** twice. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark the file areas you would like to examine by typing each file area's 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. Mark one or more files for download by entering **M**, the list numbers of the files, and pressing ENTER.
5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.

6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself. (In MEWTERM and many other communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, enter **S** to return to the File Menu.

## Reading a Message

When you log on, the BBS will tell you if you have a personal message (mail). At the prompt *Would you like to read it now?*, type **R** to read the message. This is the only point at which you can read your mail, since you cannot read any messages from the Message Menu.

## Leaving a Message

The Multi-Tech BBS has no public discussion area. To leave a personal message, select the Message Menu by typing **M** at the Main Menu. Type **E**, then press ENTER to select the Sysop conference. Enter the name of the recipient (or "Sysop"), the subject, and the message text. Press ESCAPE to finish, then type **S** to save the message and exit. To abort the message at any point, leave any of the fields blank and press ENTER.

## Bulletins

When you log on, the BBS will ask if you would like to view the bulletin menu. The bulletins are menu-driven; to read a bulletin, enter its number. You can also access the bulletins by typing **B** at the Main Menu.



### 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, and we retrieve e-mail messages from the following mailboxes on a daily basis:

*mtsmktg@multitech.com*      Marketing Dept.

*mtssales@multitech.com*      Sales Dept.

*international@multitech.com*      International Marketing & Sales

*writers@multitech.com*      Publications Dept.

If you prefer to receive support via the internet, you can contact Tech support via e-mail at:

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

Multi-Tech's presence includes a Web site at:

<http://www.multitech.com>

and an ftp site at:

<ftp://ftp.multitech.com>

## About the Multi-Tech Fax-Back Service

Multi-Tech's fax-back system provides 24-hour access to sales, marketing, and technical literature for customers in the U.S.A. Dial (612) 717-5888, follow the voice prompts, and enter the document number for either the Sales and Marketing catalog or the Technical Support catalog of documents. For convenience, write your fax number in the following space:

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From the Sales and Marketing catalog, you can request to have newsletters, white papers, press releases, brochures, and other marketing literature faxed to you. From the Technical Support catalog, you can request basic modem operation information and troubleshooting guides. With either catalog, simply enter the FB Doc. number of the literature you wish to receive.



## Appendices

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## 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 and ringer equivalence number (REN). If requested, 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.

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 which is Part 68 compliant. See installation instructions for details.

3. The ringer equivalence number (REN) is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.
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. This equipment cannot be used on public coin service provided by the telephone company. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)
9. If so required, this equipment is hearing-aid compatible.

Manufacturer:	Multi-Tech Systems, Inc.
Trade name:	MultiModemZPW-PCI
Model Number:	MT5634ZPW-PCI
FCC Registration Number:	AU7USA-32234-M5-E
Ringer Equivalence:	0.4B
Modular Jack (USOC):	RJ11C or RJ11W (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

**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.

**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.

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via a telephone fax machine unless such message clearly contains in a margin at the top or bottom of each page or the first page of the transmission, the date and time it is sent and an identification of the business or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity, or individual. See the cover page of your fax software manual for setup details.

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.

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## 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 a interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5.

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

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

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.

### Ringer Equivalence Number

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



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## Compliance with BABT Requirements

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 ZPW-PCI are:

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

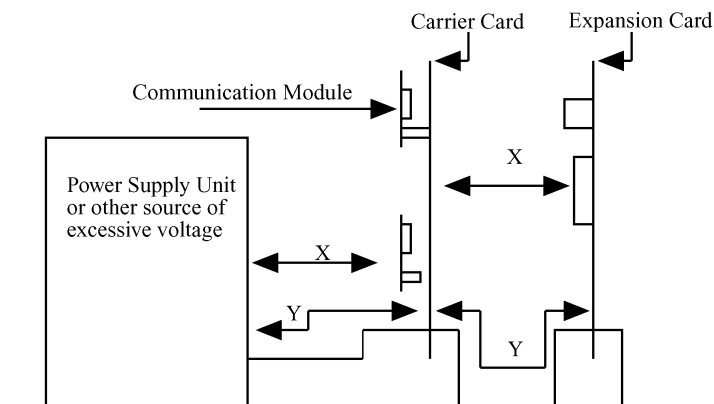
Modem power consumption: 1.2 Watts

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 Vrms or Vdc
2.6	3.0 (4.8)	Up to 125 Vrms or Vdc
4.0	5.0 (8.0)	Up to 250 Vrms or Vdc
4.0	6.4 (10.0)	Up to 300 Vrms or Vdc



**Figure A-1. Creepage and Clearance Distances.**

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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 facilities:

- 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
- 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  $\pm 30$  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.

## **Compliance with BS6305 Clause 6.2, BS6320 Clause 7.2, and BAPT/SITS/82/ 005S/D**

- a. The modem is suitable for connection to the public switched telephone network (PSTN) provided by British Telecommunications plc or Kingston Communications (Hull) plc. Circuit supply by British Communications, Mercury Communication, or Hull City Council. Only direct exchange lines may be used, not shared service.
- b. The modem is suitable for household, office, and similar general indoor use. It is not suitable for use as an extension to a payphone.
- c. BT lines supplied must support either loop disconnect or multifrequency tone signalling.
- d. REN (Ringer Equivalence Number):

The REN value of a unit is calculated from  $3/n$  where  $n$  is the total number of units which can be connected in parallel which will still cause the standard bell (as defined in BS6305 Appendix D) to ring.

REN values of less than 0.3 cannot be assigned.

$$\text{REN} = 1$$

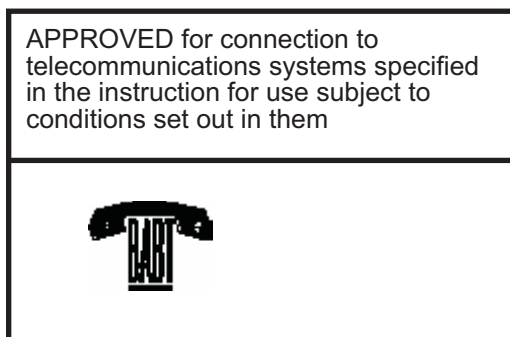
If a telephone or other device is connected in parallel with the modem, the combined REN must not exceed 4. A BT-supplied telephone may be assumed to have REN of 1.0 unless otherwise noted.

The approval of this modem for connection to the British Telecom public switched telephone network is **INVALIDATED** if the apparatus is subject to any modification in any material way not authorized by BAPT or if it is used with or connected to:

- i. internal software that has not been formally accepted by BABT.
- ii. external control software or external control apparatus which cause the operation of the modem associated call setup equipment to contravene the requirements of the standard set out in BABT/SITS/82/005S/D.

All other apparatus connected to this modem and thereby connected directly or indirectly to the British Telecom public switched telephone network must be approved apparatus as defined in Section 22 of the British Telecommunications Act 1984.

The Approval Label is as follows:



The REN number for this apparatus is 1.

## **Compliance with BS6789: Section 3.1 and Part 2**

- a. The modem is not capable of allowing Auto Call using '999' or other PABX emergency numbers.
- b. Modes other than modes 1, 2, or 3 should not be used on the BT PSTN. This modem is a mode 1 device.
- c. Users are advised to check the numbers entered during the Auto Call set up phase prior to dialing.
- d. The user should not issue any sequence of commands to the modem which would cause the modem to exceed the maximum allowable pause of 8 seconds from the time the modem goes off hook until dialing begins.
- e. For correct operation of the call progress monitor, the power has to be properly connected and switched on.

## **Compliance with BS6328 Part 1**

- a. The modem is not suitable for use on circuits with British Telecommunications signaling at a normal frequency of 2280 Hz.
- b. The modem does not require signaling or otherwise employ the frequency range dc to 200 Hz.
- c. The modem does not require dc from the Private Circuit for correct operation. The modem may be damaged if connected, in a private circuit mode, to a circuit supplying dc current (the maximum permissible direct current is zero amps).

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## European Community Directives (CE)

The CE mark is affixed to the enclosed MultiTech 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;

both amended by

Council Directive 93/68/EEC of 22 July 1993 on the harmonization of CE marking requirements.

## Australian and New Zealand Modem Warning Notice

### *Australian Modem Warning Notice*

Modems connected to the Australian telecommunications network must have a valid AUSTEL permit. This modem has been specifically configured to ensure compliance with AUSTEL Standards. The following commands can affect compliance and must not be set outside the acceptable range.

### *Modem Commands:*

<u>Command</u>	<u>Default</u>	<u>Permissible Range</u>
A:	-	Do not use
ATB	B0	Do not change
AT&G	&G2	Do not change
AT&P	&P1	Do not change
ATSn	see table below	

<u>S-Register</u>	<u>Default</u>	<u>Permissible Range</u>
S6	4	2 - 5

### *Call Attempts/Retries:*

Applications software shall be configured so that no more than 3 attempts are made to establish a connection to a given number (Note: if the modem can detect service tones, up to 10 attempts can be made). There must be at least 2 seconds between call attempts. If the call sequence is unsuccessful, there shall be a delay of at least 30 minutes before attempting to call the number again.



Failure to set the modem, and any communications software used with the modem, to the values shown above will result in the modem being operated in a non-compliant manner. Consequently, there would be no permit in force for this equipment, and the Telecommunications Act 1991 prescribes a penalty of \$12,000 for the connection of non-permitted equipment.

### ***For Voice Modems:***

“Distortion may be generated because of low bit rate voice, and reduced voice quality may result.”

**“WARNING:** For safety reasons, only connect AUSTEL permitted or AUSTEL certified equipment.”

Refer to the applicable MultiModemII Owner’s Manual for additional information.

### **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 render the AUSTEL permit void.”

### ***New Zealand Telecom Warning Notice***

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

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

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

## Appendix B: Technical Specifications

<b>Trade Name</b>	MultiModemZPW-PCI
<b>Model Numbers</b>	MT5634ZPW-PCI
<b>Client-to-Server Data Rates</b>	<input checked="" type="checkbox"/> K56flex speeds when accessing an ISP-type K56flex server (actual speed depend on server capabilities and line conditions)
<b>Client-to-Client Data Rates</b>	K56flex speeds, plus 33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
<b>Fax Rates</b>	14,400, 12,000, 9600, 7200, 4800, 2400, and 300 bps
<b>Data Format</b>	Serial, binary, asynchronous
<b>Data Compatibility</b>	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
<b>Fax Compatibility</b>	ITU Group 3, T.4, T.30, V.21, V.27ter, V.29, V.17, and TIA/EIA 578 Class 1
<b>Voice Compatibility</b>	TIA/EIA IS-101, H.324 (V.8, V.25ter) and V.80
<b>Voice Mode Sampling</b>	Up to 44.100 kHz (down-sampled to 11.025 kHz)

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Although K56flex technology is capable of downloads of up to 56K bps, FCC regulations currently restrict ISP modems to downloads of 53K bps.

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<b>Error Correction</b>	ITU V.42 (LAP-M and MNP Classes 2–4)
<b>Data Compression</b>	ITU V.42bis (4:1 compression) and MNP 5 (2:1 compression)
<b>Speed Detection</b>	Automatic speed detection and switching between available speeds
<b>Fallback</b>	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 K56flex mode, modem falls back and falls forward in increments of 2000 bps.
<b>Modes of Operation</b>	Full-duplex operation over dial-up lines; automatic dialing; automatic or manual answer.
<b>Flow Control</b>	Software (XON/XOFF), hardware (RTS/CTS)
<b>Intelligent Features</b>	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.

<b>Command Buffer</b>	40 characters
<b>Data Modulations</b>	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 (PCM)
<b>Fax Modulations</b>	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
<b>Carrier Frequencies:</b>	1600, 1646, 1680, 1800, 1829, 1867, 1920,
<b>V.34/K56flex</b>	1959, 2000 Hz
<b>Carrier Frequencies:</b>	1800 Hz
<b>V.32terbo/V.32bis/V.32</b>	
<b>Carrier Frequencies:</b>	Transmit Originate: 1200 Hz
<b>ITU-T V.22bis/V.22 or</b>	Transmit Answer: 2400 Hz
<b>Bell 212A Standard</b>	Receive Originate: 2400 Hz
<b>(2400 &amp; 1200 bps)</b>	Receive Answer: 1200 Hz
<b>Carrier Frequencies:</b>	Transmit Originate: 1270 Hz mark
<b>Bell 103</b>	1070 Hz space
<b>(300 bps)</b>	Transmit Answer: 2225 Hz mark
	2025 Hz space
	Receive Originate: 2225 Hz mark
	2025 Hz space
	Receive Answer: 1270 Hz mark
	1070 Hz space

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