



# Model MT5634ZBA Model MT5634ZBAV

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**Data/Fax Modem  
Data/Fax/Voice Modem**

**User Guide**



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

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

Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

**FAX WARNING:** 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 your fax software manual for setup details.



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# Owner's Manual

Models MT5634ZBA and MT5634ZBAV

P/N 88301900 Revision A (3/2/98)

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## Record of Revisions

<i>Revision</i>	<i>Date</i>	<i>Description</i>
A	3/2/98	Manual released.

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## Notice

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

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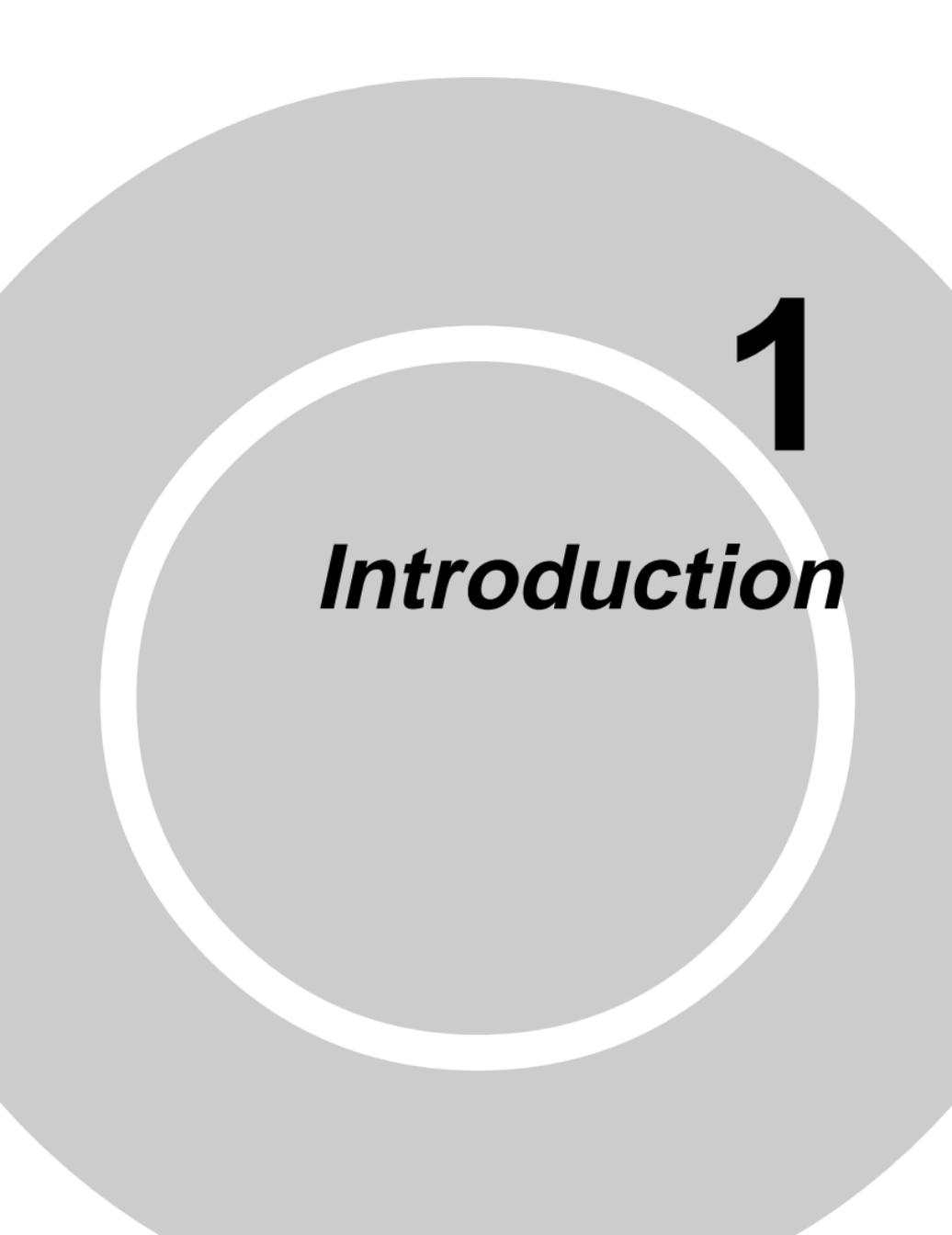
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**1**

***Introduction***



### Introduction

Welcome to the world of data communications. You have acquired one of the finest intelligent data and fax modems available today from one of America's oldest and most respected modem manufacturers: Multi-Tech Systems, Inc. This owner's manual will help you install, configure, test and use your modem.

### Product Description

The MT5634ZBA and MT5634ZBAV modems incorporate *K56flex*<sup>™</sup> technology, which enables Internet connections at data rates up to 53K bps\* over standard telephone lines. K56flex technology is able to send data downstream from the Internet to your computer at these speeds because data on the telephone network typically is converted from digital to analog only once before it reaches your modem. Upstream transmissions, and transmissions between client modems, are limited to data rates of 33.6K bps, as are downstream transmissions that are converted more than once on the telephone network.

K56flex is an interim standard. However, because Multi-Tech's K56flex modems are flash-upgradeable, they can easily be upgraded to the new ITU-T V.90 56K bps standard when it becomes available.

Both modems are Plug and Play-capable, with interactive automatic dialing and command mode configuration. In standard mode, you can store up to four command lines or telephone numbers of up to 40 characters each in the modems' nonvolatile memory. In callback security mode, you can store up to 30 passwords and dialing strings. The modems pulse- or tone-dial, and recognize dial tones and busy signals for reliable call-progress detection. The modems can detect AT&T calling

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

card tones. They also have DTR dialing, Caller ID, remote configuration, callback security, two-wire leased-line, and 11-bit capabilities, and incorporate self-resetting lightning protection. Serial port speeds can be set to 230,400 bps. They are both FCC-registered for connection without notification to the telephone company.

Both are full-duplex intelligent modems with V.42 error correction, V.42bis data compression, and V.17 (14,400 bps), Class 1 and 2, Group 3 fax capabilities.

In addition to the preceding features, the MT5634ZBAV modem provides support for answering machine and voice mail applications.

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

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

- One MT5634ZBA or MT5634ZBAV modem
- One DC power supply
- One set of four plastic feet
- Two sets of Velcro fasteners
- One modular telephone cable
- This *Owner's Manual*
- Trio data, fax, and voice software

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

### Related Manuals

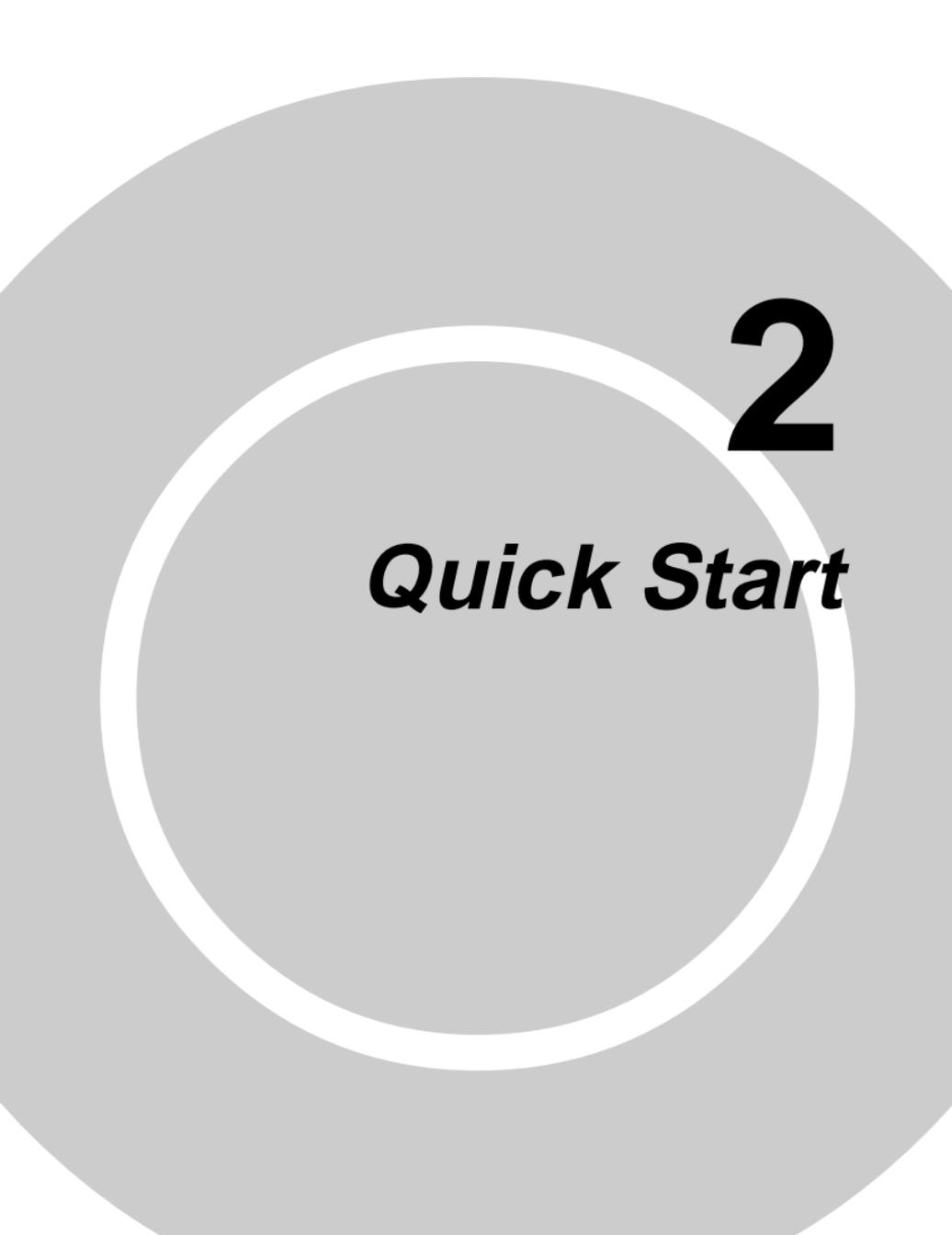
The following manuals are available on request.

82039200 *Voice +V Commands Developer's Kit*

82076200 *MT56XX Fax Class 1 Developer's Guide*

82006501 *TR29.2 (Proposed) Class 2 Fax Command Reference Manual*





**2**

***Quick Start***



### Introduction

We know you are eager to get your Multi-Tech fax modem up and running, so we'll skip the features for now, and show you step-by-step how to set it up, check it out, and make your first calls.

### What You Will Need

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

#### ***We supply***

- ✓ An MT5634ZBA or MT5634ZBAV data/fax modem
- ✓ A DC power supply module
- ✓ One set of four plastic feet
- ✓ Two sets of hook-and-loop fasteners
- ✓ One modular telephone cable
- ✓ Trio communications software
- ✓ A *Quick Start Guide*
- ✓ This *User Guide* on disk
- ✓ An installation disk

#### ***You supply***

- ✓ A computer with an unused serial port
- ✓ A shielded RS-232 serial cable with a male DB-25 connector on one end and a connector to match your computer's serial port on the other end
- ✓ A nearby AC power outlet
- ✓ A nearby telephone line jack
- ✓ An optional PC stereo microphone (MT5634ZBAV only)
- ✓ An optional headset, amplified speaker, or sound card with speakers (MT5634ZBAV only)

- ✓ For connecting to the sound card, an optional male-to-male stereo patch cord with 1/8-inch mini plugs (MT5634ZBAV only)

If you are new to computers, see Chapter 3, “Features,” for more information about the required equipment.

## **Safety Warnings**

- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm; there may be a remote risk of electrical shock from lightning.
- Do not use a telephone in the vicinity of a gas leak.

### Step 1: Assemble the Modem

The only assembly required is to mount the feet on the bottom of the modem. Simply peel the four self-adhesive plastic feet off the backing strip and press them into the recesses on the bottom of the modem. Alternately, or additionally, you can use the included self-adhesive hook-and-loop patches to mount the modem to a vertical surface or to keep it from being dislodged on a horizontal surface. If you use the hook-and-loop patches, we recommend that you mount them where they will not obscure the labels or screws on the bottom of the modem.

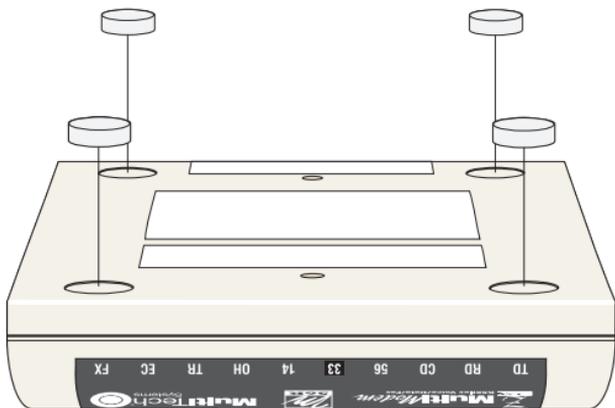


Figure 2-1. Mounting the feet.

### **Step 2: Change the Internal Jumpers**

Skip this step unless

- you have an MT5634ZBAV and intend to add a monophonic external speaker. (This step is not required for stereo speakers.)
- you intend to use your modem on a leased line.

If either case applies, you must open the modem and move one or more jumpers on the modem's printed circuit board.

---

**Caution:** The circuit board can be harmed by static electricity. Before you open the case, touch a grounded object such as a water faucet to discharge any static electricity in your body, then touch the metal shell of the modem's RS232 connector to ensure that there is no voltage difference between you and the modem.

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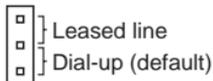
**Warning:** The following procedure must be performed by authorized service personnel.

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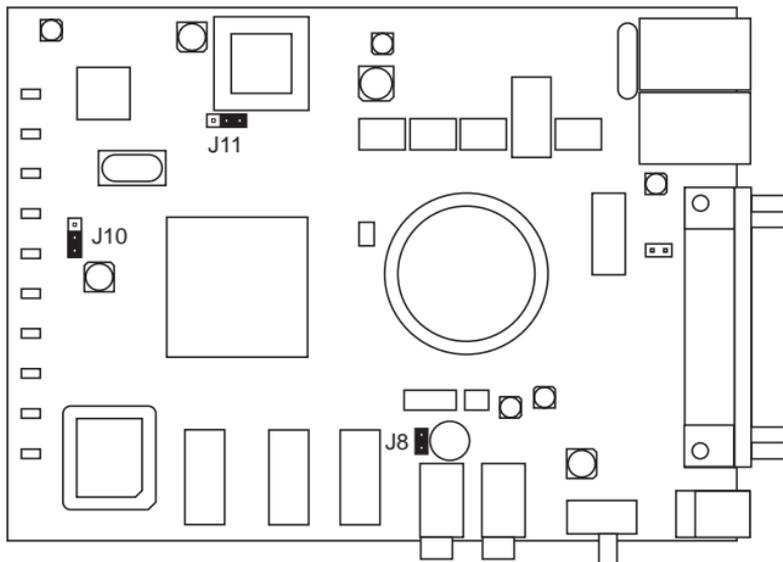
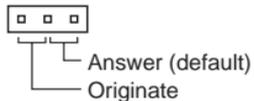
### ***Opening the Modem***

1. If the modem is connected, turn it off and remove all connecting cables, including power and line cables.
2. Turn the modem over.
3. On the bottom of the modem are two screws that hold the case together. Remove both screws and set them aside.
4. Turn the modem over again.
5. Remove the top part of the modem case.
6. To close the modem, reverse steps 1–5.

### J10 Dial-Up/Leased Line



### J11 Originate/Answer



### J8 Speaker Mode

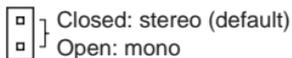


Figure 2-2. Internal jumpers (MT5634ZBAV).

### ***Changing the Speaker Jumper***

The speaker jumper (J8) is next to the external speaker jack (see Figure 2-2).

- To use the MT5634ZBAV modem with a monophonic external speaker, remove the jumper plug from the J8 jumper pins. You can store it by placing it on one jumper pin.
- To use the MT5634ZBAV modem with a stereo speaker or sound card, place the jumper plug on both pins of the J8 jumper. This is the factory default position.

### ***Changing the Dial-Up/Leased-Line Jumpers***

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

- To use the modem on a leased line, move the J10 jumper plug from the default dial-up position to the leased line position.
- To make the modem the originating modem on the leased line, move the J11 jumper plug to the originate position.
- To make the modem the answering modem on the leased line, leave the J11 jumper plug in the factory default answer position.

### Step 3: Connect the Modem to Your System

Placing the modem in a convenient location, connect it to your computer's serial port, to the telephone line, to AC power, and, optionally, to your telephone (UK and international models do not have a telephone jack). If yours is an MT5634ZBAV model, you can also optionally connect it to a microphone and a speaker or sound card.

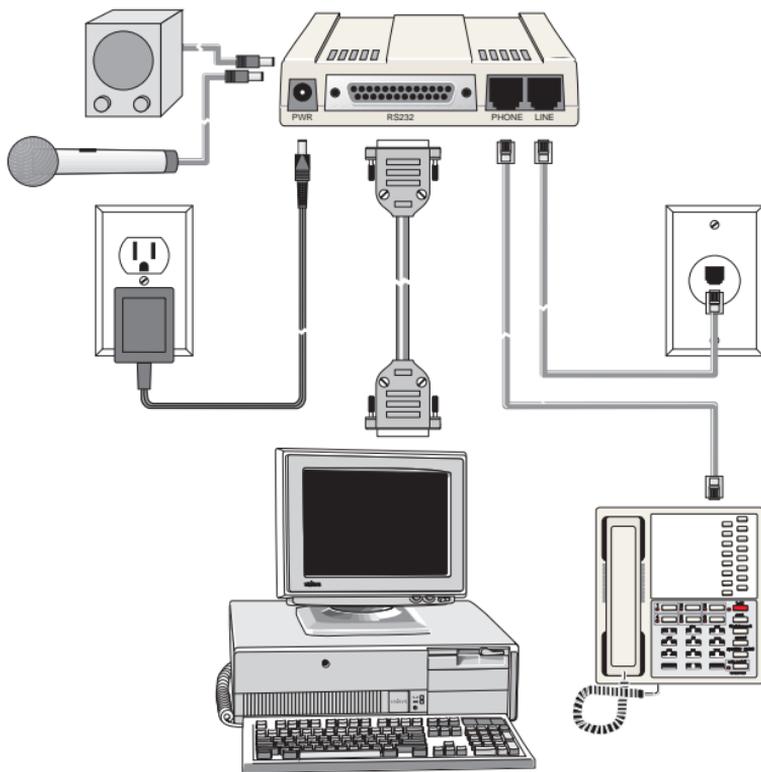


Figure 2-3. Modem connections.

### ***RS232 Connection***

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

### ***Line Connection***

Plug one end of the phone cable into the modem's LINE jack, and the other end into a phone line wall jack.

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

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

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### ***Phone Connection***

For voice-only calls, you can optionally plug a telephone into the modem's PHONE jack. The UK and international models do not have a PHONE jack.

### ***Microphone Connection (MT5634ZBAV only)***

For voice mail or speakerphone applications, plug an unamplified microphone into the MIC jack on the side of the modem. The microphone should have a stereo 1/8-inch mini plug. Do not use a monophonic microphone.

### ***Speaker Connection (MT5634ZBAV only)***

For speakerphone or voicemail applications, use a 1/8-inch-plug male-to-male stereo patch cord to connect the SPKR jack on the side of the modem to the LINE IN jack on your sound card.

If you do not have a sound card, you can plug an amplified speaker directly into the SPKR jack.

### ***Power Connection***

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

---

**Note:** Use only the power supply supplied with the modem. Use of any other power supply will void the warranty and could damage the modem.

---

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

Test the modem by turning it on (a power on/off switch is located on the right side). When you apply power, the modem performs a diagnostic self-test, indicated by several indicators flashing for a second or two, after which the 56 indicator should light. If this does not happen, check that the power switch is on, the power supply is solidly connected, and the AC outlet is live. If these measures do not work, see Chapter 7, "Solving Problems."

### **Step 4: Install the Modem in Windows**

If you are using Windows 95 or Windows NT 4.0, you must install the modem in the operating system. (If you are using another operating system, you can skip this step.)

#### ***Adding the Modem to Windows 95 or NT***

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

---

**Note:** If Windows cannot find a modem, your modem may be turned off, it may be plugged into the wrong connector on your computer, or the serial cable may be faulty. See “None of the LEDs Light When the Modem Is Turned On” and “The Modem Does Not Respond to Commands” in Chapter 7, “Solving Problems.”

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4. If Windows identifies your modem correctly as a MultiModem MT5634ZBA, click **Next** to install the modem. After the modem is installed, click **Finish** to exit.
5. If Windows cannot identify your modem (for instance, if it identifies your modem as a “Standard Modem”), click **Change**. A dialog box with a list of manufacturers and a list of modems appears.
6. Insert your modem’s setup disk into your floppy drive and click **Have Disk**.

7. Windows 95 only: In the **Install from Disk** dialog box, select the drive the installation disk is in and click **OK**.
8. A list of modems appears. Select your modem from the list and click **Next**.
9. Windows NT 4.0 only: Click **Next** again.
10. Windows installs and configures the modem.
11. Click **Finish** to exit.

### ***Removing Your Old Modem from Windows 95 or NT***

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

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

### Step 5: Install and Configure Your Software

You must have communications software installed in your computer to use your Multi-Tech modem. If you wish to use communications software that is already installed, you should reconfigure it for your new modem; otherwise, install the data and fax communications software provided with the modem.

1. Turn on your computer and run your communications software.
2. Find the dialog box or menu that lets you specify your modem. (In Windows Terminal select **Settings | Modem Commands**; in HyperTerminal select **File | Properties | Phone Number**; in ProComm Plus for Windows select **Window | Setup | Advanced**; and in Trio select **View | Datacomm | Communications | Setup | Modem | Select from List**.)
3. Choose your modem from the software's modem list. If it isn't listed, choose a generic modem and modify the settings as necessary.
4. Change the modem initialization string, if necessary. The factory default configuration works well for most purposes. To load the factory default configuration, use **AT&F**. To load a custom configuration that was saved using the **&W** command, use **ATZ**. Note that the **Z** command must be in a command string by itself. For a Macintosh, the initialization string should include the **&D0** command. If you do not want the modem to always answer the phone, add **S0=0** to the string. To use Caller ID with the modem, add **S0=2** to the string (Caller ID information is sent between the first and second rings, so the phone must ring at least twice before the modem picks up the line). Depending on the software, you might have to end the string with a carriage return character (**^M**).

**Note:** To change the modem's default configuration, type new commands in the software's terminal window, adding the **&W** command to store them in the modem's nonvolatile memory. For instance, to create a default configuration for a Macintosh computer that turns off autoanswer, type **AT&F&D0S0=0&W**. The new configuration loads automatically whenever the modem is turned on or receives the **ATZ** command.

---

5. Select the port the modem is connected to (normally COM1 or COM2).
6. Select your serial port speed. This can be labeled "maximum speed," "DTE bps," or "baud rate." Ideally, if you use data compression, you should set your serial port baud rate to four times the modem's maximum transmission speed or faster; however, few files can be compressed enough to require speeds that high, and not all serial ports can handle speeds that high. Set the serial port baud rate to 115,200 bps if your computer has a high speed serial port with a 16550AFN UART or equivalent and Windows 95 or NT 4.0, or set it to 57,600 bps if it has Windows 3.1x. If you have an older computer with a 14550 UART, set it to 19,200 bps. Older Macintosh computers can use a serial port baud rate of 57,600 bps; newer ones can use a serial port baud rate of 115,200 bps or 230,400 bps.

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

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

### Step 6: Call the Multi-Tech BBS

Test the modem's data functions by calling the Multi-Tech bulletin board system (BBS) and downloading REGISTER.DOC, if you have Microsoft Word 6.0 or 7.0, or REGISTER.TXT if you do not.

#### *Windows 95 HyperTerminal*

1. Click **Start**; then choose **Programs, Accessories, and HyperTerminal**.
2. Start HyperTerminal by double-clicking on the Hypertrm icon. HyperTerminal asks for the name of the connection.
3. Type **Multi-Tech BBS** in the **Name** box and click **OK**.
4. In North America, type **800** in the **Area code** box and **392-2432** in the **Phone number** box. Local and international users, type **612** in the **Area code** box and **785-3702** in the **Phone number** box.
5. Verify that your modem is selected in the **Connect using** box, then click **OK**.
6. In the **Connect** dialog box, click **Dialing Properties**.
7. Make any necessary changes in the **Where I am** and the **How I dial from this location** boxes. If you must dial 9 to access an outside line, you should type **9** in both the local and the long distance boxes unless your phone system has a special requirement.
8. Click **OK**, then click **Dial**. You will know you have reached a modem by the harsh sounds of the modem handshake.
9. When the BBS welcome screen appears in the HyperTerminal window, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.

## ***User Guide***

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10. Press ENTER until the main menu appears. From the main menu you have access to two areas: the Files Menu and News. For help with menu commands, type ?.
11. In the Main Menu, type **F** and press ENTER to access the Files Menu, then type **D** and press ENTER to download.
12. At the prompt, if you have Microsoft Word 6.0 or later, type **register.doc** and press ENTER twice. If you do not have Microsoft Word, type **register.txt** and press ENTER twice.
13. Answer **Y** or **N** to the automatic logoff question.
14. Type **Z** and press ENTER to select the Zmodem transfer protocol.
15. The download begins automatically. As the file is copied to the HyperTerminal folder, a dialog box reports on the progress of the download. If the download fails, your baud rate may be set too high. Log off, set the COM port baud rate lower, and call again.
16. To log off the BBS if you answered **N** in step 13, press ENTER, type **G** for “good-bye,” and press ENTER twice more.
17. In the HyperTerminal window, click **File**, then click **Save** to save the HyperTerminal connection description.

## ***Windows Terminal***

1. Open the Accessories program group and double-click on the Terminal icon.
2. Select the **Settings** menu and make the following changes:  
*Phone Number:* Type **1-800-392-2432** if you are in North America, or type an overseas access code and **612-785-3702** if you are outside North America.  
*Communications:* Select the COM port the modem is connected to and change the following: **Baud rate to 19200; Flow control to Hardware;** and **Carrier Detect to checked.**

*Modem Commands:* Select **MultiTech**. If you must dial 9 to get an outside line, type **ATDT9**, in the **Dial prefix** box (include the comma).

3. Click **File**, then click **Save**, and save as **multibbs.trm**.
4. Click **Phone**, then click **Dial** to dial the BBS. You will know you have reached a modem by the harsh sounds of the modem handshake.
5. When the BBS welcome screen appears in the HyperTerminal window, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
6. Press ENTER until the main menu appears. From the main menu you have access to two areas: the Files Menu and News. For help with menu commands, type **?**.
7. In the Main Menu, type **F** and press ENTER to access the Files Menu, then type **D** and press ENTER to download.
8. At the prompt, if you have Microsoft Word 6.0 or later, type **register.doc** and press ENTER twice. If you do not have Microsoft Word, type **register.txt** and press ENTER twice.
9. Answer **Y** or **N** to the automatic logoff question.
10. Type **X** and press ENTER to select the Xmodem transfer protocol.
11. To begin the download in Terminal, click **Transfers**, then click **Receive binary file**. Next, select the destination directory, type the file name (**register.doc** or **register.txt**), and click **OK**. If the download fails, your baud rate may be set too high. Log off, set the COM port baud rate lower, and call again.
12. To log off the BBS if you answered **N** in step 9, press ENTER, type **G** for "good-bye," then press ENTER twice again.

### Step 7: Send a Fax

To test your modem's fax capabilities, send the completed registration file that you downloaded in "Step 5: Call the Multi-Tech BBS" to Multi-Tech or to a fax machine in your office. The following procedure uses the Microsoft Fax application that is included with Windows 95 or later. If you do not have Microsoft Fax, you can send the file using the fax software included with the modem.

Microsoft Fax is installed in Windows 95 as part of the Microsoft Exchange option. You can use Microsoft Fax either as a stand-alone fax program or to fax from within another application. In the following procedure you will test your fax modem by running Microsoft Fax as a stand-alone fax program.

1. Depending on which version of the registration file you downloaded, use either Microsoft Word or NotePad to open the registration file.
2. Fill out the registration form.
3. Save the file and exit Word or NotePad.
4. Select **Start | Programs | Accessories | Fax | Compose new fax**.
5. The **Compose New Fax** wizard appears. Click **Next**.
6. If you are sending the registration form to your own fax machine or to another fax modem in your office, type the destination name and phone number in the **To** and **Fax #** boxes.

If you are sending the registration form to our offices, type **Multi-Tech Systems** in the **To** box, and **612 785-9874** in the **Fax #** boxes.

7. Click **Add to list**, then click **Next**.
8. Pick a cover page, then click **Next**.
9. Type a subject line (e.g., **MT5634ZBAV registration**) and a note to go on the cover page, then click **Next**.

10. Click **Add file**. In the **Open a file to attach** dialog box, select the registration file and click **Open**. The registration file is added to the **Files to send** list box.
11. Click **Next**, then click **Finish**.
12. Microsoft Fax opens the registration file in Word or NotePad, prints it to the Rendering System, then dials the recipient and sends the fax.
13. Exit Microsoft Fax when the **Status** dialog box says the fax has been successfully sent.

### Other Ways to Access Microsoft Fax

- In a Windows 3.1x or Windows 95 application, select **Print** from the **File** menu, then select **Microsoft Fax** as the default printer.
- In a Windows 95 application, select **Send** from the **File** menu.
- In Microsoft Exchange, select **Compose**, then select **New fax**.

### **Step 8: Test the MT5634ZBAV Voice Circuits**

There are several tests that you can perform to verify the voice circuits of the MT5634ZBAV. Try the answering machine test first; if that doesn't work, and if you have a microphone and speaker connected to the MT5634ZBAV, try the loopback and speakerphone tests, which do not require special software.

#### ***Voice Mail Test***

Test the MT5634ZBAV's voice function by using the included software to set up the MT5634ZBAV for voice mail. Have an acquaintance call and leave a message, then play it back.

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

#### ***Loopback Test***

1. Connect a microphone and speaker to the MT5634ZBAV. To avoid feedback, make sure the microphone and speaker are well separated; better yet, use a headphone instead of a speaker.
2. Select **Start**, point to **Programs**, point to **Accessories**, and click **HyperTerminal**.
3. Double-click on the Multi-Tech BBS icon you created in "Step 5: 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.

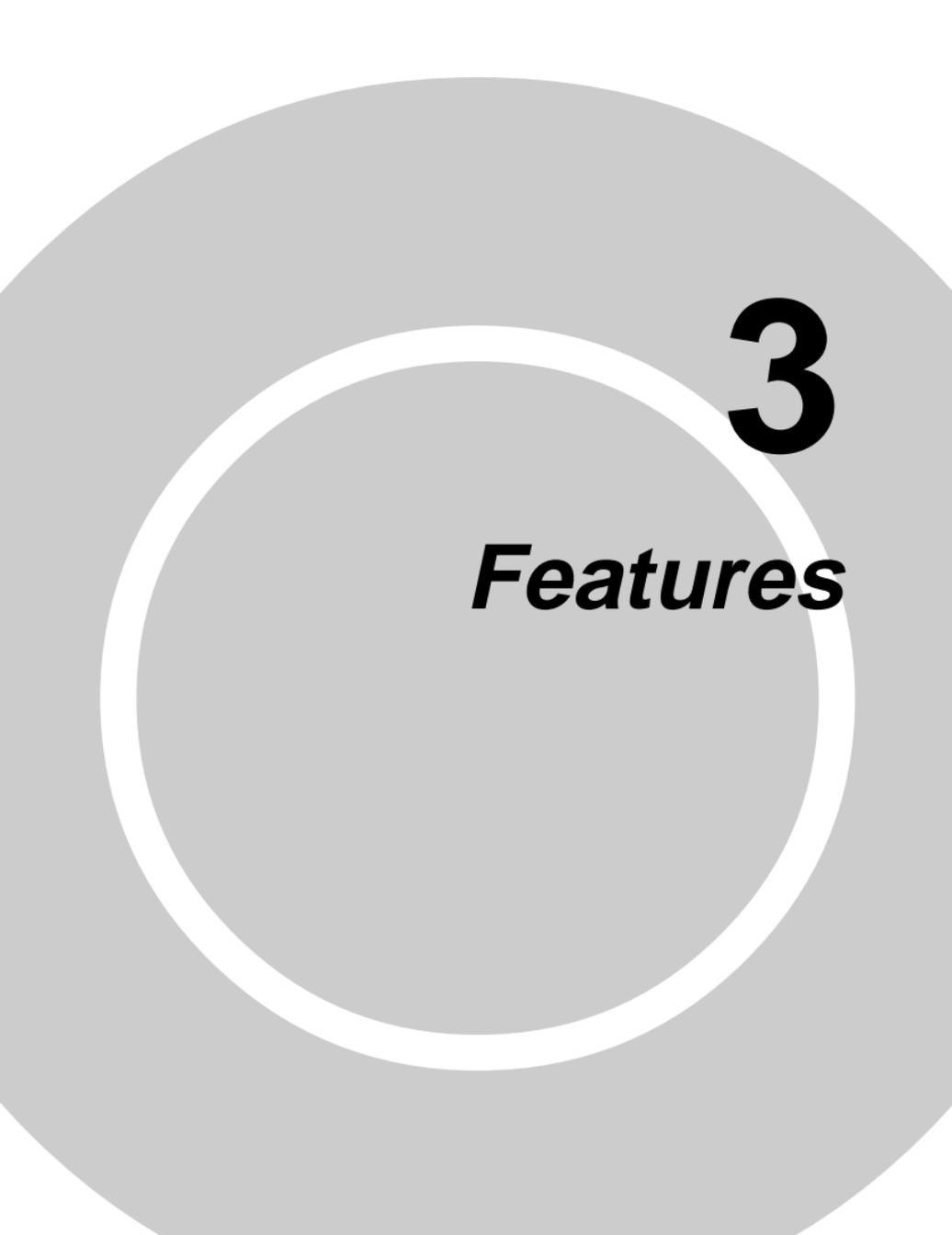
### ***Speakerphone Test***

1. Connect a microphone and speaker to the MT5634ZBAV.
2. Select **Start**, point to **Programs**, point to **Accessories**, and click **HyperTerminal**.
3. Double-click on the Multi-Tech BBS icon you created in “Step 5: 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** (for xxxxxxx substitute a telephone number)
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.

### References

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

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



**3**

***Features***



## What Can You Do with Your Modem?

Your Multi-Tech MultiModem is the gateway to the exciting world of telecommunications.

You can use it to access commercial online information services such as CompuServe, America Online, Genie, and Prodigy. These services provide access to databases, encyclopedias, stock reports, news, weather, and shopping. They provide electronic mail (e-mail) links to subscribers of the same and other services. Public message areas called forums allow subscribers to trade information and opinions on a vast array of topics from A to Z, while vendor forums provide hardware and software support from Multi-Tech and other manufacturers. Online services also allow you to upload and download computer programs, data files, and updated software such as video and printer drivers.

Your modem can also connect you to the Internet, an international computer network of universities, libraries, businesses, and government agencies. Like the commercial online services, the Internet provides e-mail services, public message areas, and access to information and software, much of it easily accessed through the World Wide Web.

Other uses include direct links to colleagues with modems, to banks, and to service bureaus. You can also telecommute with your fax modem—work at home while communicating with the office by modem or fax.

And of course, you can use your modem to exchange faxes with any fax machine in the world, enabling you to communicate quickly with businesses and organizations that do not have direct modem communications.

If you have the MT5634ZBAV model, you can also use your modem with voice mail and speakerphone applications.

### **Features**

- Compliance with major ITU-T, TIA, and EIA international standards to ensure compatibility with other modems.
- DTMF tone detection Distinguishes data, fax, or voice calls (MT5634ZBAV only) with software packages supporting these features.
- Caller ID capability can identify a caller's phone number (available only on U.S. products).
- Serial port speeds to 230,400 bps.
- Limited warranty: Ten years (USA, UK, Canada, and Mexico)  
Five years (all other countries)

### ***Data***

- Supports the K56flex™ standard for data transmission speeds up to 56K bps while maintaining compatibility with lower-speed modems.
- Can be flash-upgraded to the ITU-T V.90 56K bps standard (when available).
- Supports the enhanced ITU-T V.34 standard, with data transmission speeds to 33.6K bps.
- Supports asynchronous data rates at 56K, 33.6K, 31.2K, 28.8K, 26.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9600, 4800, 2400, 1200, and 300 bps.
- Supports automatic fallback to slower speeds in noisy line conditions, and fall-forward to faster speeds as conditions improve.
- ITU-T V.42 LAP-M and MNP Class 3 and 4 error correction.
- ITU-T V.42bis (4-to-1) and MNP 5 (2-to-1) data compression.
- Automatically disables data compression when transferring already-compressed files.
- Autodial, redial, pulse (rotary) and touch-tone dial.
- Dial tone and busy signal detection for reliable call-progress reporting.

- Compatible with the standard AT command set used by most communication programs.
- Supports the ITU-T V.80 standard for H.324 video conferencing.

### ***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 EIA/TIA Class 1 and 2 fax commands, enabling it to exchange editable and encrypted faxes with 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 (MT5634ZBAV only)***

- 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.

### **Required Equipment**

In addition to the contents of your modem package, you need the following equipment.

#### ***Computer***

Your modem can be connected to any computer with an RS-232/V.24 serial port, such as most PCs. It can also be connected to the RS-422 serial ports on Apple Macintosh computers.

To use the modem at its highest speeds, a PC must have either of the following:

- A serial port with a 16550AFN UART
- A Multi-Tech ISI (Intelligent Serial Interface) card, such as the ISI551 (single port), ISI552 (dual port), or ISI608 (8 ports)

These devices can handle serial port rates up to 115,200 bps, which is sufficient for all uploads and most 56K downloads. For downloading highly compressible files at 56K speeds, however, your serial port should be capable of speeds to 230,400 bps.

#### ***Serial Cable***

To connect the modem to your computer, you must provide a shielded serial cable, obtainable at computer stores and many office supply stores. The cable should have a male DB-25 connector at the modem end. For PCs, the other end may have a male DB-25 connector or a female DB-9 connector, depending on your particular computer and whether you are using the COM1 or the COM2 serial port.

Most Macintosh computers require a round, 8-pin, mini-DIN connector. The Macintosh serial cable should be wired for hardware flow control.

### ***Telephone Line***

You must have a telephone line with jack (connector) that accepts the cable that comes with the modem. If you do not have a telephone jack near your computer, you should install one before proceeding.

In North America, do-it-yourself telephone extension kits and accessories are available wherever telephones are sold. You may also hire an independent contractor or your local telephone company to install an extension. If you want a separate line for your fax modem, you must contact your telephone company.

### ***Communications Software***

To operate your modem, you must have data communications (data-comm) and fax communications software (included with the modem). Data communications software simplifies control of the modem by guiding you through the process of selecting your serial port, your port speed, and other variables, and then storing your settings, including frequently called phone numbers, so they can be recalled with the stroke of a key or the click of a mouse. Data communications software must be set up, or configured, before you can use it.

### Connections

To use your modem, you must connect it to your computer (“RS232”), to a telephone line (“LINE”), and to a power source (“PWR”). The North American model can also be connected directly to a telephone set (“PHONE”).



Figure 3-1. Power and communications connectors.

For voice mail or speakerphone use, the MT5634ZBAV model can optionally be connected to a microphone and an external speaker.

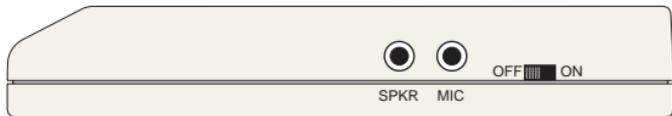


Figure 3-2. MT5634ZBAV speaker and microphone connectors.

### ***Connecting to the Computer (“RS232”)***

Using a matching serial cable, connect the RS232 connector on the modem to one of the serial port connectors on the back of your computer. On a PC, there are usually two serial ports named “COM1” and “COM2.” COM1 typically uses a DB-9 connector, whereas COM2 may use a DB-25 connector. Most Apple Macintosh computers use round mini-DIN-8 connectors for the serial ports. Choose the one marked with the icon of a telephone; the Macintosh gives priority to that port and will not interrupt your communications link. Be sure to tighten the mounting screws on the DB connectors.

### ***Connecting to the Telephone Line (“LINE”)***

Plug one end of the cable provided with the modem into the telephone jack in your home or office. Plug the other end into the LINE jack on the modem.

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

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

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### ***Connecting to a Telephone Set (“PHONE”)***

If you wish to connect a telephone to the same line as the modem, you can plug it into the modem’s PHONE jack. This connector is provided as a convenience; you can also connect your telephone to a duplex jack inserted into your wall jack. U.K. and international models do not have a PHONE jack.

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**Note:** The PHONE jack is not interchangeable with the LINE jack; do not plug the telephone into the LINE jack or the line cable into the PHONE jack.

---

### ***Connecting to a Microphone (“MIC”)***

To use the MT5634ZBAV modem for speakerphone or voice mail applications, plug a microphone into the MIC jack of the modem. The micro-

## ***User Guide***

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phone should have a 1/8-inch stereo plug and should not be amplified. Do not use a microphone with a mono jack

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**Note:** To avoid feedback, place the microphone away from your speakers.

---

### ***Connecting to a Speaker (“SPKR”)***

To use the MT5634ZBAV modem for speakerphone or voice mail applications, plug an amplified speaker with a 1/8-inch stereo plug into the SPKR jack of the modem. If you use a mono speaker, you must change the speaker mode jumper as described in Chapter 2.

### ***Connecting to a Sound Card (“SPKR”)***

If a sound card and speakers are installed in your system, you can connect the SPKR jack of the modem to the LINE IN jack of the sound card. Use a male-to-male stereo patch cord with 1/8-inch plugs.

### ***Connecting to Power (“PWR”)***

Low voltage DC power is supplied to the modem through a modular power supply included with the modem. Plug the power supply module into a convenient AC power outlet or surge protector. Plug the connector on the other end of the power cord into the PWR jack on the modem. A power ON/OFF switch is located on the right side of the modem.

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**Note:** Use only the power supply supplied with the modem. Use of any other power supply will void the warranty and could damage the modem.

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As soon as you apply power to the modem, it will perform a diagnostic self-test, indicated by the speed LEDs flashing in sequence for approximately two seconds, after which the 56 indicator should light. If this

does not happen, check that the power switch is on, the power supply is solidly connected, and the AC outlet is live.

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

Your modem has self-resetting lightning protection to protect it from electrical spikes on the telephone line. Nonetheless, power surges and other transient voltages on power lines, such as those caused by lightning strikes, can damage or destroy your modem. Therefore, we recommend that you plug the modem into a surge protector rather than directly into a wall outlet, preferably a surge protector that provides protection against electrical spikes on the telephone line as well as on the power line. Note that not even a surge protector can guard against damage from a nearby lightning strike. During an electrical storm, your safest course is to unplug your computer equipment from both the power outlet and the telephone line.

### Front Panel

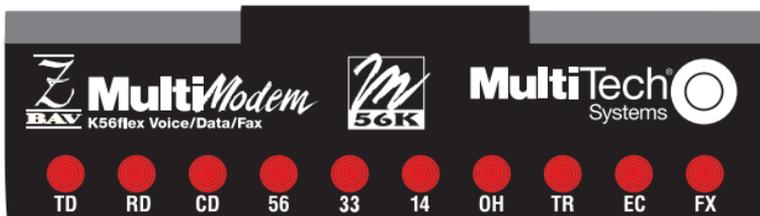


Figure 3-3. Front panel

The MT5634ZBA has ten LED indicators on the front panel that indicate status, configuration, and activity:

- TD Transmit Data.** The TD LED flashes when the modem is transmitting data to another modem. The state of the LED matches the TD circuit on pin 2 of the RS-232C/V.24 interface.
- RD Receive Data.** The RD LED flashes when the modem is receiving data from another modem. The state of the LED matches that of the RD circuit on pin 3 of the RS-232C/V.24 interface.
- CD Carrier Detect.** The CD LED lights when the modem detects a valid carrier signal from another modem. It is on when the modem is communicating with the other modem and off when the link is broken.
- 56 56K Mode (56,000–32,000 bps).** The 56 LED lights whenever the modem connects to an ISP server in K56flex or V.PCM mode. The actual connection speed depends on server capabilities and line conditions.
- 33 V.34 Mode (33,600–16,800 bps).** The 33 LED lights whenever the modem connects in V.34 mode.
- 14 V.32bis Mode (14,400 bps–).** The 14 LED lights whenever the modem connects in V.32bis mode.

**Note:** Although the modem can connect at lower than V.32bis speeds, no speed indicator lights during the connection.

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- OH Off-Hook.** The OH LED lights when the modem is off-hook, which occurs when the modem is dialing, online, or answering a call. The LED flashes when the modem pulse-dials.
- TR Terminal Ready.** The TR LED lights when a datacomm program initializes the modem. It means the modem is ready for an outgoing or incoming call. It goes off when the datacomm program disconnects the COM port. When it goes off, a connected modem will disconnect. The state of the TR LED matches that of the DTR circuit on pin 20 of the RS-232C/V.24 interface.
- EC Error Correction (V.42).** The EC LED lights continuously when the modem is in V.42 error correction mode, and blinks when compression is activated.
- FX Fax.** The FX LED lights when the modem is in fax mode.

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**Note:** When you turn on the modem, the speed lights flash briefly as the modem does a self-test, then the LED for the default modem baud rate lights. The default rate for the modem is 56K bps unless you select and store another baud rate. After a call, the LEDs for the connection's baud rate remain lit until another call is made or the modem is reset. If you connect at a rate under 14,400 bps, all speed LEDs remain off after the connection is broken, even though the modem is still turned on.

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# 4

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



### AT Commands

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

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

To send AT commands to the modem you must use a communications program, such as the HyperTerminal applet in Windows 95 and NT 4.0, or the communications program included with your modem. You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem, e.g., to turn autoanswer on or off.

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

## ***User Guide***

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

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

### **AT Command Summary**

Command:	<b>AT</b>	<b>Attention Code</b>
Values:		n/a
Description:		The attention code precedes all command lines except <b>A/</b> , <b>A:</b> , and escape sequences.
Command:	<b>ENTER</b>	<b>Key</b>
Values:		n/a
Description:		Press the ENTER (RETURN) key to execute most commands.
Command:	<b>A</b>	<b>Answer</b>
Values:		n/a
Description:		Answer call before final ring.

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

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Command:	<b>A/</b>	<b>Repeat Last Command</b>
Values:		n/a
Description:		Repeat the last command string. Do not precede this command with <b>AT</b> . Do not press ENTER to execute.
Command:	<b>Bn</b>	<b>Communication Standard Setting</b>
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 <b>B3</b> ).
	B3	Deselect V.23 reverse channel (same as <b>B2</b> ).
	B15	Select V.21 when the modem is at 300 bps.
	B16	Select Bell 103J when the modem is at 300 bps.
Command:	<b>Cn</b>	<b>Carrier Control</b>
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:	<b>Ds</b>	<b>Dial</b>
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 <b>L</b> , <b>P</b> , <b>T</b> , <b>V</b> , <b>W</b> , <b>S</b> , comma (,), semicolon (;), <b>!</b> , <b>@</b> , <b>^</b> and <b>\$</b> 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.)
- ,** 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.
- ^** Disable data calling tone transmission.
- \$** Detect AT&T call card “bong” tone. The character should follow the phone number and precede the user’s call card number:  
**ATDT1028806127853500\$123456789**

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

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

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Command:	<b>En</b>	<b>Echo Command Mode Characters</b>
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:	<b>Fn</b>	<b>Echo Online Data Characters</b>
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:	<b>Hn</b>	<b>Hook Control</b>
Values:		$n = 0$ or $1$
Default:		$0$
Description:	H0	Go on-hook (hang up).
	H1	Go off-hook (make the phone line busy).
Command:	<b>In</b>	<b>Information Request</b>
Values:		$n = 0-5, 9, 11$
Default:		None
Description:	I0	Display default speed and controller firmware version.
	I1	Calculate and display ROM checksum (e.g., <i>12AB</i> ).
	I2	Check ROM and verify the checksum, displaying <i>OK</i> or <i>ERROR</i> .
	I3	Display default speed and controller firmware version.
	I4	Display firmware version for data pump (e.g., <i>94</i> ).
	I5	Display the board ID: software version, hardware version, and country ID

- I9 Display the country code (e.g., *NA Ver. 1*).
- I11 Display diagnostic information for the last modem connection, such as DSP and firmware version, link type, line speed, serial speed, type of error correction/data compression, number of past retrains, etc.

Command: **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.

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

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Command:	<b>On</b>	<b>Return Online to Data Mode</b>
Values:		0, 1, 3
Default:		None
Description:	00	Exit online command mode and return to data mode (see <b>+++AT&lt;CR&gt;</b> escape sequence ).
	01	Issue a retrain and return to online data mode.
	03	Issue a rate renegotiation and return to data mode.
Command:	<b>P</b>	<b>Pulse Dialing</b>
Values:		P, T
Default:		T
Description:		Configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a <b>T</b> command or dial modifier is received.
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.
	Q2	Returns an <i>OK</i> for backward compatibility with some software.
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. E.g., <b>S0=1</b> .

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Command:	<b>Sr?</b>	<b>Read Register Value</b>
Values:		$r =$ S-register number
Default:		None
Description:		Read value of register $Sr$ and display it in 3-digit decimal form. E.g., <b>S2?</b> gives the response <i>043</i> .
Command:	<b>T</b>	<b>Tone Dialing</b>
Values:		P, T
Default:		T
Description:		Configures the modem for DTMF (touch-tone) dialing. Dialed digits are tone dialed until a <b>P</b> command or dial modifier is received.
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>Wn</b>	<b>Result Code Options</b>
Values:		$n = 0, 1,$ or $2$
Default:		2
Description:	W0	CONNECT result code reports serial port speed, disables protocol result codes.
	W1	CONNECT result code reports serial port speed, enables protocol result codes.
	W2	CONNECT result code reports line speed, enables protocol result codes.
Command:	<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.

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

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- X1 Extended result codes (e.g., *CONNECT 46000 V42bis*); does not look for dial tone or busy signal.
- X2 Extended result codes with *NO DIALTONE*; does not look for busy signal.
- X3 Extended result codes with *BUSY*; does not look for dial tone.
- X4 Extended result codes with *NO DIALTONE* and *BUSY*.
- X5 Extended result codes with *NO DIALTONE* and *BUSY*.
- X6 Extended result codes with *NO DIALTONE* and *BUSY*.
- X7 Basic result codes with *NO DIALTONE* and *BUSY*.

Command: **Yn Long Space Disconnect**

Values:  $n = 0$

Default: 0

- Description:
- Y0 Disable sending or responding to long space break signal on disconnect.
  - Y1 Enable sending or responding to long space break signal on disconnect. (Not supported.)

Command: **Zn Modem Reset**

Values:  $n = 0$  or 1

Default: None

- Description:
- Z0 Reset modem to profile saved by the last **&W** command.
  - Z1 Same as **Z0**.

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Command: **&Bn V.32 Auto Retrain**

Values:  $n = 1$

Default: 1

Description: &B0 Disable V.32 auto retrain. (Not supported.)  
&B1 Enable V.32 auto retrain.

Command: **&Cn Data Carrier Detect (DCD) Control**

Values:  $n = 0$  or  $1$

Default: 1

Description: &C0 Forces the DCD circuit to be always high.  
&C1 DCD goes high when the remote modem's carrier signal is detected, and goes low when the carrier signal is not detected.

Command: **&Dn Data Terminal Ready (DTR) Control**

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

Default: 2

Description: &D0 Modem ignores the true status of the DTR signal and responds as if it is always on.  
&D1 If DTR drops while in online data mode, the modem enters command mode, issues an *OK*, and remains connected.  
&D2 If DTR drops while in online data mode, the modem hangs up. If the signal is not present, the modem will not answer or dial.  
&D3 If DTR drops, the modem hangs up and resets as if an **ATZ** command were issued.

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

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

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

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

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

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

Command: **&Mn** **Communications Mode**  
Values:  $n = 0$   
Defaults: 0  
Description: &M0 Asynchronous mode.  
&M1 Not supported—responds *ERROR*.

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Command: **&Qn** **Asynchronous Communications Mode**  
Values:  $n = 0, 5, 6, 8, \text{ or } 9$   
Default: 5  
Description: &Q0 Asynchronous with data buffering. Same as **IN0**.  
&Q5 Error control with data buffering. Same as **IN3**.  
&Q6 Asynchronous with data buffering. Same as **IN0**.  
&Q8 MNP error control mode. If MNP error control is not established, the modem falls back according to the setting in **S36**.  
&Q9 V.42 or MNP error control mode. If neither error control is established, the modem falls back according to the setting in **S36**.

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

Command: **&Tn** **V.54 Test Commands**  
Values:  $n = 0, 1, 3 \text{ or } 6$   
Default: None  
Description: &T0 Abort. Stop any test in progress.  
&T1 Local analog loopback test.  
&T3 Local digital loopback test.  
&T6 Remote digital loopback test.

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

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

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

Command: **&Yn** **Select Stored Configuration for Hard Reset**  
Values:  $n = 0$   
Default: 0  
Description: **&Y0** Select stored configuration 0 on power-up. (For backward compatibility with some software.)  
**&Y1** Not supported—responds *ERROR*.

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**Command: &Zy=x Store Dialing Command**

**Values:**  $y = 0-3$  (callback security disabled) or  $0-29$  (callback security enabled)  
 $x =$  Dialing command

**Default:** None

**Description:** Stores dialing command  $x$  in memory location  $y$ . Dial the stored number using the command **ATDS=y**. See also the **#CBSn** command. For callback security options, see Chapter 6.

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

**Values:** n/a

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

**Command: \An Select Maximum MNP Block Size**

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

**Default:** 3

**Description:** \A0 64-character maximum.  
\A1 128-character maximum.  
\A2 192-character maximum.  
\A3 256-character maximum.

**Command: \Bn Transmit Break**

**Values:**  $n = 0-9$  in 100 ms units

**Default:** 3

**Description:** In non-error-correction mode only, sends a break signal of the specified length to a remote modem. Works in conjunction with the **IK** command.

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

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Command: **\Gn Modem Port Flow Control**

Values:  $n = 0$

Default: 0

Description: \G0 Returns an *OK* for backward compatibility with some software.

\G1 Not supported—responds *ERROR*.

Command: **\Jn Data Buffer Control**

Values:  $n = 0$

Default: 0

Description: \J0 Enable data buffer—serial port speed is independent of connect speed.

\J1 Disable data buffer—serial port speed is forced to the line speed.

Command: **\Kn Break Control**

Values:  $n = 0-5$

Default: 5

Description: Controls the response of the modem to a break received from the computer, the remote modem, or the **IB** command. The response is different for each of three different states.

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

\K0 Enter online command mode, no break sent to the remote modem.

\K1 Clear data buffers and send break to the remote modem.

\K2 Same as **\K0**.

\K3 Send break immediately to the remote modem .

\K4 Same as **\K0**.

\K5 Send break to the remote modem in sequence with the transmitted data.

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

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

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

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

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

Values:  $n = 0-5$ , or 7

Default: 3

- Description:
- \N0 Non-error correction mode with data buffering (buffer mode; same as **&Q6**).
  - \N1 Direct mode.
  - \N2 MNP reliable mode. If the modem cannot make an MNP connection, it disconnects.
  - \N3 V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 error correction mode, then in MNP mode, and finally in non-error-correction (buffer) mode with continued operation.

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

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\N4	V.42 reliable mode. If the modem cannot make a V.42 connection, it disconnects.
\N5	V.42, MNP, or non-error correction (same as <b>\W3</b> ).
\N7	V.42, MNP, or non-error correction (same as <b>\W3</b> ).

Command: **\Qn Flow Control Selection**

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

Default: 3

Description:

\Q0	Disable flow control (same as <b>&amp;K0</b> ).
\Q1	XON/XOFF software flow control (same as <b>&amp;K4</b> ).
\Q2	CTS-only flow control. Not supported.
\Q3	RTS/CTS hardware flow control (same as <b>&amp;K3</b> ).

Command: **\Tn Inactivity Timer**

Values:  $n = 0, 1\text{--}255$

Default: 0

Description: \Tn Sets the time (in minutes) after the last character is sent or received that the modem waits before disconnecting. A value of zero disables the timer. Applies only in buffer mode.

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

Command: **\Wn Protocol Result Code**

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

Default: 1

Description:

\W0	Disable the appending of the protocol result code to the DCE speed.
\W1	Enable the appending of the protocol result code to the DCE speed.
\W2	Same as <b>\W1</b> .

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

Values:  $n = 0$  or  $1$

Defaults:  $0$

Description: \X0 Modem responds to and discards XON/XOFF characters.

\X1 Modem responds to and passes XON/XOFF characters.

Command: **-Cn** **Data Calling Tone**

Values:  $n = 0$  or  $1$

Defaults:  $0$

Description: -C0 Disable V.25 data calling tone to deny remote data/fax/voice discrimination.

-C1 Enable V.25 data calling tone to allow remote data/fax/voice discrimination.

Command: **%B** **View Numbers in Blacklist**

Values: *n/a*

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

Command: **%Cn** **Data Compression Control**

Values:  $n = 0$  or  $1$

Default:  $1$

Description: %C0 Disable V.42bis/MNP 5 data compression.

%C1 Enable V.42bis/MNP 5 data compression.

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Command: **%DCn AT Command Control**  
Values:  $n = 0$  or  $1$   
Default:  $0$   
Description: %DC0 The modem responds to AT commands.  
              %DC1 The modem ignores AT commands.

**Note:** The modem will respond to **AT%DC** for 10 seconds after power-up.

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

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

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

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

Values: *n* = 6

Default: None

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

**AT+ES=?** shows the only allowed value.

**AT+ES?** shows the current value.

Command: **#CBAn Callback Attempts**

Values: *n* = 1–255

Default: 4

Description: Sets the number of callback attempts that are allowed after passwords have been exchanged between modems.

Command: **#CBDn Callback Delay**

Values: *n* = 0–255

Default: 15

Description: Sets the length of time (in seconds) that the modem waits before calling back the remote modem.

Command: **#CBF? Callback Failed Attempts Display**

Values: n/a

Default: n/a

Description: Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command.

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

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Command: **#CBFR** **Callback Failed Attempts Reset**

Values: n/a

Default: n/a

Description: Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory.

Command: **#CBIn** **Local Callback Inactivity Timer**

Values:  $n = 1-255$

Default: 20

Description: Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again.

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

Values:  $y = 0-29$

$x =$  password

Defaults: None

Description: Sets the callback security password for the  $y$  memory location. The password must have 6 to 10 characters, and cannot include the  $+$  or  $-$  characters.

Command: **#CBPn** **Callback Parity**

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

Default: 0

Description: Sets parity for the callback security messages.

#CBP0 No parity.

#CBP1 Odd parity.

#CBP2 Even parity.

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Command: **#CBRy** **Callback Security Reset**

Values:  $y = 0-29$

Default: None

Description: Clears the password and phone number in the  $y$  memory location.

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

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

Default: 0

Description: #CBS0 Disable callback security.  
#CBS1 Enable local and remote callback security.  
#CBS2 Enable remote callback security only.  
#CBS3 Disable callback security until local hangup or reset.

Command: **#Pn** **Set 11-bit Parity**

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

Default: 2

Description: #P0 No parity.  
#P1 Odd parity.  
#P2 Even parity.

Command: **#Sx** **Enter Setup Password**

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

Default: MTSMODEM

Description: Enters the remote configuration setup password.

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

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

Default: MTSMODEM

Description: Stores a new remote configuration setup password.

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

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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<CR> Remote Configuration Escape Sequence**

Values: n/a

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

### S-Registers

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

<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>	1 ring	0, 1–255	1	Sets the number of rings until the modem answers. <b>ATS0=0</b> disables autoanswer completely.
<b>S1</b>	1 ring	0–255	0	Counts the rings that have occurred.
<b>S2</b>	decimal	0–127 128–255	43 (+)	Sets ASCII code for the escape sequence character. Values greater than 127 disable escape.
<b>S3</b>	decimal	0–127	13 (^M)	Sets the ASCII code for the carriage return character.
<b>S4</b>	decimal	0–127	10 (^J)	Sets the ASCII code for the line feed character.
<b>S5</b>	decimal	0–32 33–127	8 (^H)	Sets the ASCII code for the backspace character. Values greater than 32 disable backspace.
<b>S6</b>	seconds	2–65*	2*	Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number.

\* These values may be different outside North America.

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<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>S7</b>	seconds	1–255*	50*	Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier.
<b>S8</b>	seconds	0–65	2	Sets the length of a pause caused by a comma character in a dialing command.
<b>S9</b>	decimal	0, 1–127	37 (%)	Sets ASCII code for remote configuration escape character. <b>S9=0</b> disables remote configuration.
<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, 1–255	0	Sets the length of time that the modem waits before disconnecting when no data is sent or received. A value of zero disables the timer. See also the <b>IT</b> 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.

\* These values may be different outside North America.

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<u>Register</u>	<u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>
<b>S36</b>	decimal	0–7	7	Specifies the action to take in the event of a negotiation failure when error control is selected. (See <b>S48</b> .)
<b>S37</b>	decimal	0–19	0	Sets the maximum V.34 “upstream” speed at which the modem attempts to connect.  0 = maximum modem speed 1 = reserved 2 = 1200/75 bps 3 = 300 bps 4 = reserved 5 = 1200 bps 6 = 2400 bps 7 = 4800 bps 8 = 7200 bps 9 = 9600 bps 10 = 12000 bps 11 = 14400 bps 12 = 16800 bps 13 = 19200 bps 14 = 21600 bps 15 = 24000 bps 16 = 26400 bps 17 = 28800 bps 18 = 31200 bps 19 = 33600 bps

## **4 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>S38</b>	decimal	0–14	1	<p>Sets the maximum 56K “downstream” speed at which the modem attempts to connect. The default maximum speed is 56K bps.</p> <p>0 = 56K disabled 1 = 56K enabled with automatic speed selection at maximum modem speed 2 = 32000 bps 3 = 34000 bps 4 = 36000 bps 5 = 38000 bps 6 = 40000 bps 7 = 42000 bps 8 = 44000 bps 9 = 46000 bps 10 = 48000 bps 11 = 50000 bps 12 = 52000 bps 13 = 54000 bps 14 = 56000 bps</p>
<b>S42</b>	decimal	0–1	1	<p>Enables/disables the 56K auto rate. When 56K auto is disabled, fallback to V.34 is also disabled. 0 = disable; 1 = enable.</p>
<b>S43</b>	decimal	0–1	1	<p><i>For testing and debugging only.</i> Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.</p>

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<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>S48</b>	decimal	7 or 128	7	Enables (7) or disables (128) LAPM negotiation. The following table lists the <b>S36</b> and <b>S48</b> configuration settings for certain types of connections.

	S48=7	S48=128
S36=0, 2	LAPM or hangup	Do not use
S36=1, 3	LAPM or async	Async
S36=4, 6	LAPM, MNP, or hangup	MNP or hangup
S36=5, 7	LAPM, MNP, or aysnc	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 56K digital loss if using the modem thru a PBX line. The default value is -6 dB loss, the value used when calling from a typical POTS line long distance.  0 = -0 dB digital loss, no robbed-bit signaling 1 = -3 dB PBX digital loss 2 = -2 dB digital loss 3 = -3 dB digital loss 6 = -6 dB digital loss 7 = -0 dB digital loss with robbed-bit signaling

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

### **Result Codes**

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

<b><u>Terse</u></b>	<b><u>Verbose</u></b>	<b><u>Description</u></b>
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5	* CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10	* CONNECT 2400	Connected at 2400 bps
11	* CONNECT 4800	Connected at 4800 bps
12	* CONNECT 9600	Connected at 9600 bps
13	* CONNECT 14400	Connected at 14400 bps
14	* CONNECT 19200	Connected at 19200 bps
24	* CONNECT 7200	Connected at 7200 bps
25	* CONNECT 12000	Connected at 12000 bps
26	* CONNECT 16800	Connected at 16800 bps
40	* CONNECT 300	Connected at 300 bps
55	* CONNECT 21600	Connected at 21600 bps
56	* CONNECT 24000	Connected at 24000 bps
57	* CONNECT 26400	Connected at 26400 bps
58	* CONNECT 28800	Connected at 28800 bps
59	* CONNECT 31200	Connected at 31200 bps
60	* CONNECT 33600	Connected at 33600 bps
70	* CONNECT 32000	Connected at 32000 bps, 56K rate
71	* CONNECT 34000	Connected at 34000 bps, 56K rate
72	* CONNECT 36000	Connected at 36000 bps, 56K rate

## User Guide

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<b><i>Terse</i></b>		<b><i>Verbose</i></b>	<b><i>Description</i></b>
73	*	CONNECT 38000	Connected at 38000 bps, 56K rate
74	*	CONNECT 40000	Connected at 40000 bps, 56K rate
75	*	CONNECT 42000	Connected at 42000 bps, 56K rate
76	*	CONNECT 44000	Connected at 44000 bps, 56K rate
77	*	CONNECT 46000	Connected at 46000 bps, 56K rate
78	*	CONNECT 48000	Connected at 48000 bps, 56K rate
79	*	CONNECT 50000	Connected at 50000 bps, 56K rate
80	*	CONNECT 52000	Connected at 52000 bps, 56K rate
81	*	CONNECT 54000	Connected at 54000 bps, 56K rate
82	*	CONNECT 56000	Connected at 56000 bps, 56K rate
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:

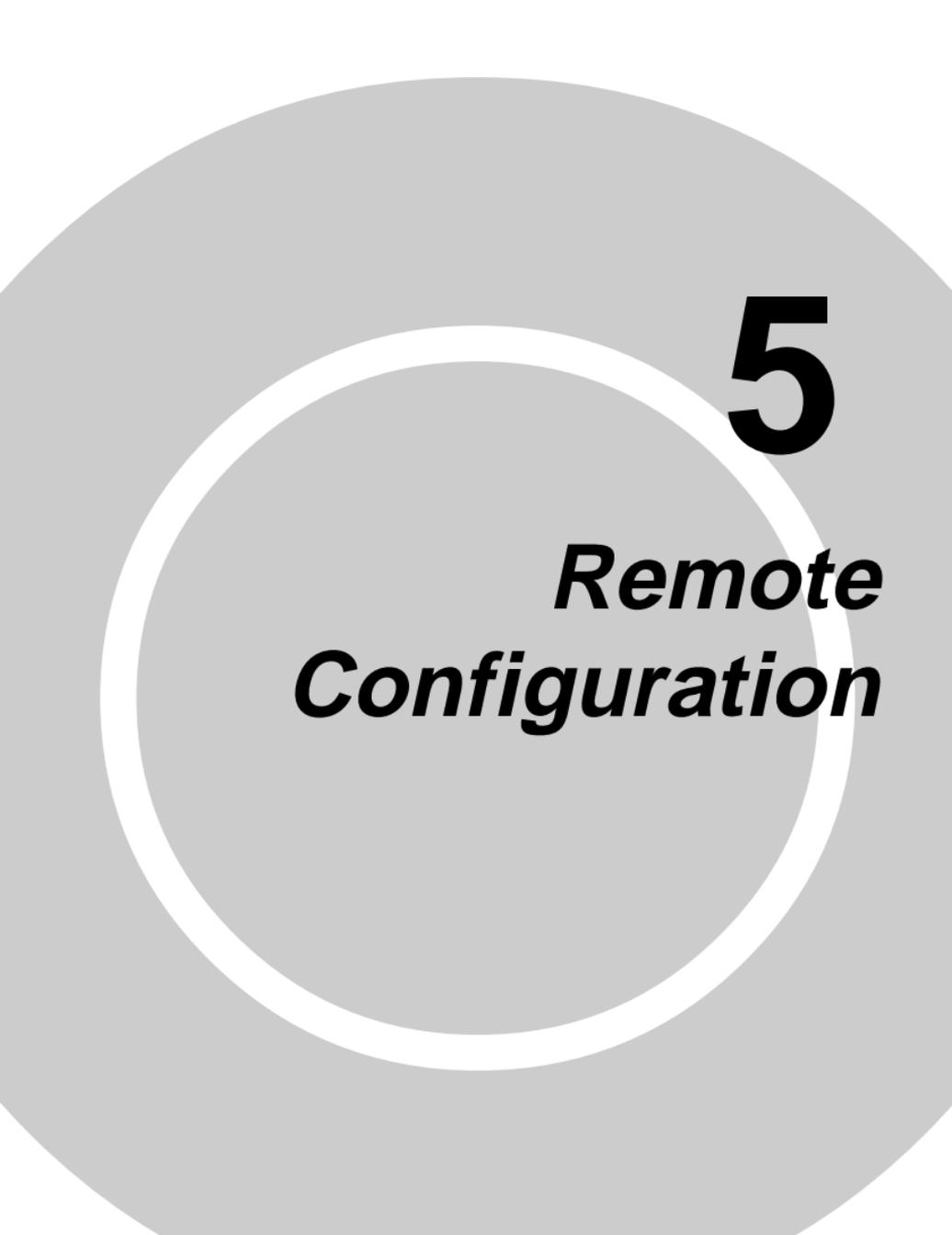
*V42bis* —V.42 error control (LAP-M) and V.42bis data compression

*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).



**5**

***Remote  
Configuration***



### Introduction

Remote configuration is a network management tool that allows you to configure modems anywhere in your network from one location. With password-protected remote configuration, you can issue AT commands to a remote MT5634ZBA or MT5634ZBAV modem for maintenance or troubleshooting as if you were on-site.

### Basic Procedure

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

1. Establish a data connection with a remote MT5634ZBA or MT5634ZBAV modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and press ENTER. Example: **%%%ATMTSMODEM<CR>**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with  
  
**OK**
3. You can now send AT commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0<CR>**, then type **ATO<CR>** to exit remote configuration. You can then break the connection in the normal way.

---

**CAUTION:** If you hang up while you are in remote configuration mode, it may lock up the remote modem.

---

### **Setup**

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

#### ***Changing the Setup Password***

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

---

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

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

To increase security, you can change a remote modem's remote configuration escape character. The remote configuration escape character is stored in register **S9**. The factory default is 37, which is the ASCII code for the percent character (%). Setting **S9** to 0 (zero) disables remote configuration entirely—but if you do this remotely, you won't be able to change it back remotely!

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





**6**

***Callback  
Security***



### **Introduction**

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

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

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

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

### **Setup Procedures**

Your modem was shipped with a default setup password (MTSMO-DEM). The same password is used for both callback security and remote configuration (Chapter 5). Because anyone who has access to this manual has access to the default password, you should change the password during your initial setup.

### To Change the Setup Password

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxxx** if you have replaced the MTSMODEM password with xxxxxxxx) and press ENTER. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. To change the password, type **AT#S=xxxxxxxx**, where xxxxxxxx stands for the password, and press ENTER. The password can include any keyboard character, and can be up to eight characters long. The modem responds with **OK**.
4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem you must use the new password.

---

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

---

### To Turn Callback Security On and Off

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

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#Sxxxxxxxx**, where xxxxxxxx is your password, and press ENTER. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. Type one of the following commands:

- To turn off callback security, type **AT#CBS0** and press ENTER. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and the stored dialing command locations 0–3 become available.
- To turn on both local and remote callback security, type **AT#CBS1** and press ENTER. With local security turned on, you must enter the setup password before you can enter any AT command except the **AT**, **ATIn**, and **AT#Sxxxxxxx** commands. For a description of remote callback security, see the following paragraph.
- To turn on remote callback security only, type **AT#CBS2** and press ENTER. With remote callback security turned on, each caller is asked to enter a password, is called back, and then is asked to enter the password again before a connection can be made. Also, dialing command locations 0–3, for use with the **DS=y** dialing command, are replaced by callback dialing command locations 0–29.
- To temporarily disable callback security if the modem is set to **#CBS1** or **#CBS2** (for instance, to call another modem), type **AT#CBS3** and press ENTER. The modem returns to its original setting when you issue the hangup command (**+++ATH**) or the modem is reset. Note that if a remote modem breaks the connection, callback security remains disabled.

### ***To Set the Parity of the Callback Security Messages***

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

1. Open a data communications program such as HyperTerminal.

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2. In the terminal window, type **AT#Sxxxxxxx**, where xxxxxxxx is your password, and press ENTER. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. The default parity value for your modem is no parity (**AT#CBP0**). To change the modem's prompt messages to use even parity, type **AT#CBP2** and press ENTER. For odd parity, type **AT#CBP1** and press ENTER.
4. To store the new parity value, type **AT&W** and press ENTER.

### To Assign Callback Passwords and Phone Numbers

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#Sxxxxxxx**, where xxxxxxxx is your password, and press ENTER. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. Enable callback security by typing **AT#CBS1** or **AT#CBS2** and pressing ENTER.
4. To store a callback password for the first callback memory location, type **AT#CBN0xxxxxxx**, where xxxxxxxx is the first password, and press ENTER. The password must be unique, must be six to eight characters, in length, and must not contain a + or - character.
5. To store a callback password for the second callback memory location, type **AT#CBN1xxxxxxx**, where xxxxxxxx is the second password, and press ENTER. Note that the memory location number in the command is incremented by one.
6. Repeat as many times as necessary, up to memory location 29, until all passwords have been entered.
7. To store a callback phone number in the first memory location, type **AT&Z0=[+][-]ATxxxxxxx[??]**, where xxxxxxxx is the dialing

string, and press ENTER. The phone number must be preceded by **DT**, for tone dialing, or **DP**, for pulse dialing. The dialing string can also include other AT commands. Example: **AT&Z0=+-ATM0DT5551212**. Up to 35 characters can be used. The +, -, and ??? characters are optional:

- + Number entry. Add if you want a mobile caller to be able to enter his current phone number for callback.
- Direct connection. Add if you want a caller to be able to choose to connect directly without being called back.

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

8. To store a callback phone number in the second memory location, type **AT&Z1=[+][-]ATxxxxxxx[,??]**, where xxxxxxxx is the dialing string, and press ENTER. Note that the memory location number in the command is incremented by one.
9. Repeat as many times as necessary, through memory location 29, until all dialing strings have been entered.
10. To review your entries, type **AT&V** and press ENTER.

### **Calling Procedures**

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

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

---

#### ***Password-Only Callback***

Use this procedure when calling from a fixed location.

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:

**Password>**

3. Type the password corresponding to the phone number for your modem and press ENTER. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears and the modems disconnect:

**OK Disconnecting**

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

**Password>**

7. Type the same password that you used to initiate the call. You have three attempts to enter the password or be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:

**OK Connecting**

### ***Number-Entry Callback***

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

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem..
2. When the connection is established, the callback modem responds with the following message:

**Password>**

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

---

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

---

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

**OK Disconnecting**

5. After the delay specified by the **#CBDn** command, the callback modem calls the number that you entered after the + character. If the

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callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.

6. After the modems reconnect, the following message reappears:

**Password>**

7. Type the same password that you used to initiate the call. You have three attempts to enter the password or be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:

**OK Connecting**

### ***Extension-Entry Callback***

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

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem..
2. When the connection is established, the callback modem responds with the following message:

**Password>**

3. Type an extension-entry password, press the plus key (+), type the extension to call back to, and press ENTER You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears and the modems disconnect:

**OK Disconnecting**

5. After the delay specified by the **#CBDn** command, the callback modem calls the extension that you entered after the **+** character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.
6. After the modems reconnect, the following message reappears:

**Password>**

7. Type the same password that you used to initiate the call. You have three attempts to enter the password or be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:

**OK Connecting**

### ***Direct Connection***

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

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem..
2. When the connection is established, the callback modem responds with the following message:

**Password>**

3. Type a direct connection password, press the **-** key, and press **ENTER**. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears and the modems establish a working connection:

**OK Connecting**

### Callback Security Commands

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

Command: **#CBA*n*** **Callback Attempts**

Values: *n* = 1–255

Default: 4

Description: Sets the number of callback attempts that are allowed after passwords have been exchanged between modems. This command can be entered after the setup password has been entered and callback security is enabled.

Command: **#CBD*n*** **Callback Delay**

Values: *n* = 0–255

Default: 15

Description: Sets the length of time (in seconds) that the modem waits before calling back the remote modem. This command can be entered after the setup password has been entered and callback security is enabled.

Command: **#CBF?** **Callback Failed Attempts Display**

Values: *n/a*

Default: *n/a*

Description: Displays the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command. This command can be entered after the setup password has been entered and callback security is enabled.

**Command: #CBFR    Callback Failed Attempts Reset**

Values:            n/a

Default:          n/a

Description:      Resets the number of failed callback password attempts to 0. It does not reset the number stored in nonvolatile memory. This command can be entered after the setup password has been entered and callback security is enabled.

**Command: #CBIn    Local Callback Inactivity Timer**

Values:             $n = 1-255$

Default:          20

Description:      Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again. This command can be entered after the setup password has been entered and callback security has been enabled for local/remote operation (**#CBS1**)

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

Values:             $y = 0-29$

$x =$  password (6–10 characters)

Defaults:          None

Description:      Sets the callback security password for the  $y$  memory location. The password must be 6–10 characters in length and cannot include the  $+$  or  $-$  characters. This command can be entered after the setup password has been entered and callback security is enabled.

Command: **#CBPn Callback Parity**

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

Default: 0

Description: Sets parity for the callback security messages. The parity of the messages should match the parity of the computer the modem is attached to. This command can be entered after the setup password has been entered and callback security is enabled.

#CBP0 No parity.

#CBP1 Odd parity.

#CBP2 Even parity.

Command: **#CBRy Callback Security Reset**

Values:  $y = 00\text{--}29$

Default: None

Description: Deletes the password and phone number from the  $yy$  memory location. This command can be entered after the setup password has been entered and callback security is enabled.

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

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

Default: 0

Description: Enables or disables callback security options. When callback security is enabled, phone number memory locations 0–4, used for quick dialing and DTR dialing, become unavailable and are replaced by callback security memory locations 0–29. The phone number memory locations and their contents are restored when callback security is disabled.

- #CBS0 Disables callback security. With this command, the modem connects as if it did not have callback security. This command can be entered after the setup password has been entered.
- #CBS1 Enables local and remote callback security. Local callback security requires that the setup password be entered to use the AT command set. The only AT commands that are available without the setup password are **AT**, **ATI**, and **AT#Sx**. For the remote callback security description, see the **#CBS2** description. This command can be entered after the setup password has been entered.
- #CBS2 Enables remote callback security only. When remote callback security is enabled, the modem waits for a call, challenges the remote modem, calls back the remote modem, and challenges the remote modem again. Local security is disabled, allowing calls to be made from the modem without entering the setup password. This command can be entered after the setup password has been entered.
- #CBS3 Temporarily disables callback security if either **#CBS1** or **#CBS2** is enabled. Callback security remains disabled until the hangup command (**+++ATH**) is executed locally or the modem is reset. This command can be entered after the setup password has been entered.

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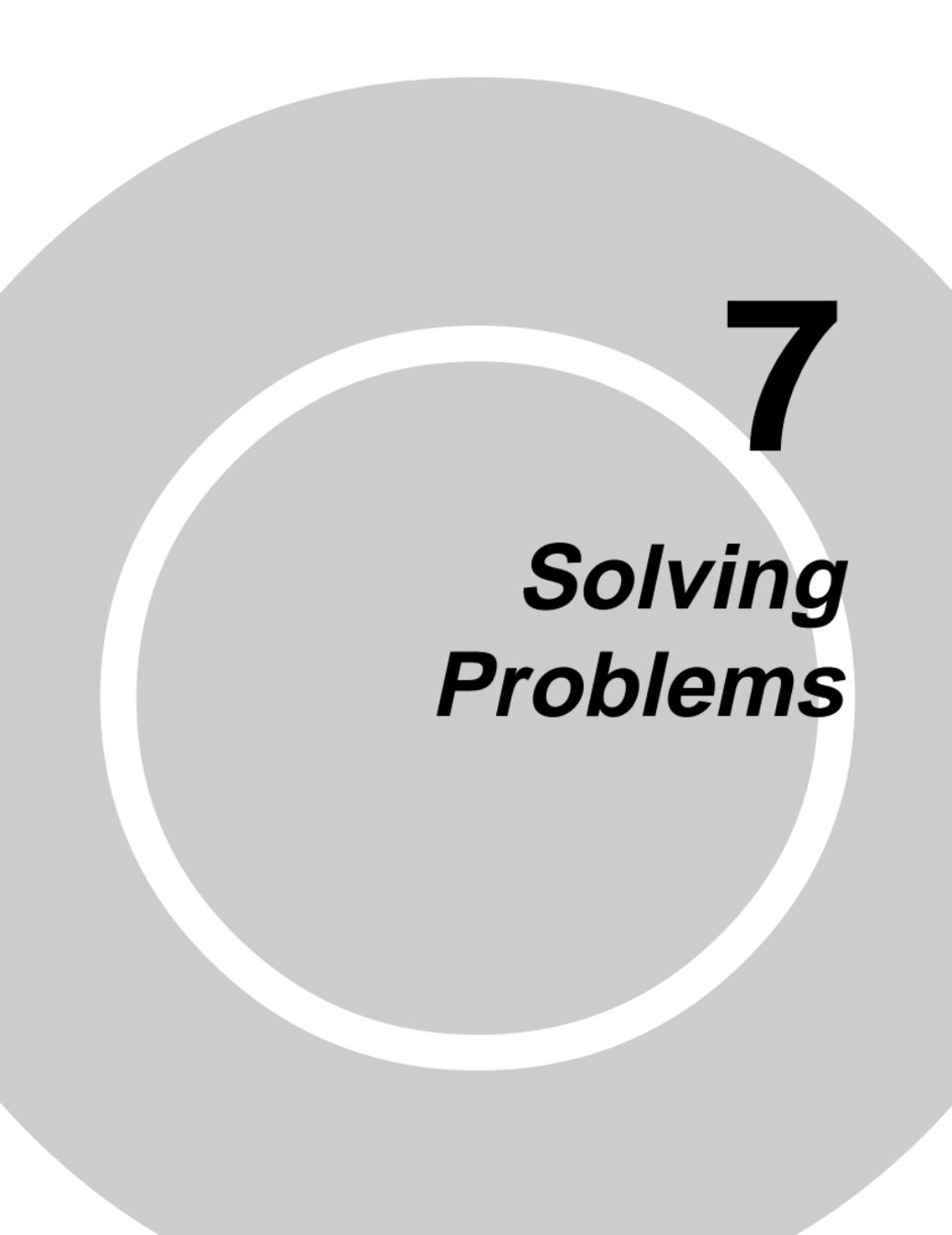
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- Command:** **#Sx**      **Enter Setup Password**  
**Values:**            x= password (1–8 characters, case sensitive)  
**Default:**            MTSMODEM  
**Description:**        Enters the password used for callback security and remote configuration setup. This command allows the use of all callback security commands.
- Command:** **#S=x**      **Store Setup Password**  
**Values:**            x= password (1–8 characters, case sensitive)  
**Default:**            MTSMODEM  
**Description:**        Stores a new password for callback security and remote configuration setup.
- Command:** **&V**        **Display Current Settings**  
**Values:**            n/a  
**Description:**        Displays the modem's active settings, including the telephone numbers stored in nonvolatile memory and the security settings, if enabled. If the setup password has been entered, the passwords are also displayed.
- Command:** **&Zy=[+][-]x[,???**      **Store Dialing Command**  
**Values:**            y = 0–29 (callback security enabled)  
                          x = Dialing command string  
**Default:**            None  
**Description:**        Stores dialing command x in memory location y. The command string must begin with **AT** and can have up to 35 characters. The telephone number in the command must be preceded by **D**, **DT**, or **DP**. Example: **AT&Z0=+-ATM0D5551212,???**. During a call, if the + or - character is not entered after the password, the modem will call back the stored number. This command can be entered

only after the setup password has been entered and callback security is enabled.

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





**7**

***Solving  
Problems***



### Introduction

Your modem was thoroughly tested at the factory before it was shipped. If you are unable to make a successful connection, or if you experience data loss or garbled characters during your connection, it is possible that the modem is defective. However, it is more likely that the source of your problem lies elsewhere. The following symptoms are typical of problems you might encounter:

- None of the LEDs light when the modem is on.
- The modem does not respond to commands.
- The modem dials but is unable to make a connection.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer is slower than it should be.
- Data is being lost.
- There are garbage characters on the monitor.
- The modem doesn't work with Caller ID.
- Fax and data software can't run at the same time.

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

### None of the Indicators Light

When you turn on the modem, the LED indicators on the front panel should flash briefly as the modem runs a self-test. If the LEDs remain off, the modem is probably not receiving power.

- ✓ Make sure the modem's power switch is on, especially if you normally turn on the modem by turning on a power strip.

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- ✓ If the power supply is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.
- ✓ Make sure the power supply module is firmly connected to the modem and to the wall outlet or power strip.
- ✓ If the power strip is on and the modem switch is on, try moving the modem power supply to another outlet on the power strip.
- ✓ Test that the outlet is live by plugging a lamp into it.
- ✓ The modem or power supply may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem or power supply may be defective. Call Tech Support for assistance.

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**CAUTION:** Do not under any circumstances replace the power supply module with one designed for another product, as it can damage the modem and void your warranty.

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## The Modem Does Not Respond to Commands

- ✓ Make sure the modem is plugged in and turned on. (See “None of the Indicators Light.”)
- ✓ Make sure you are issuing the modem commands from the data communications software, either manually in terminal mode or automatically by configuring the software. (You cannot send commands to the modem from the DOS prompt.)
- ✓ Make sure you are in terminal mode in your data communications program, then type **AT** and press ENTER. If you get an *OK* response, your connections are good and the problem likely is in the connection setup in your communications software.

- ✓ Try resetting your modem by turning it off and on. If you are using DOS or Windows 3.1 communications software, make sure the initialization string includes **&F** as the first command, to cancel any “leftover” command that could affect the modem’s operation.
- ✓ If you don’t get an *OK*, the problem may still be in the communications software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communications programs connect to the COM port automatically. Some connect when the software loads and remain connected until the program terminates. Others can disconnect without exiting the program. The modem’s TR indicator lights to show that the software has taken control of the modem through the COM port.
- ✓ Your communications software settings may not match the physical port the modem is connected to. The serial cable might be plugged into the wrong connector—check your computer documentation to make sure. Or you might have selected a COM port in your software other than the one the modem is physically connected to—compare the settings in your software to the physical connection.
- ✓ If the modem is on, the cable is plugged into the correct port, the communications software is configured correctly, and you still don’t get an *OK*, the fault might be in the serial cable. Make sure it is firmly connected at both ends.
- ✓ Is this the first time you have used the cable? If so, it may not be wired correctly. Check the cable description on the packaging to make sure the cable is the right one for your computer.
- ✓ Peripheral expansion cards, such as sound and game cards, might include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communications port. Be sure to disable any unused ports.

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

To change a port address or IRQ in Windows 3.1x, double-click the Control Panel icon, then the Ports icon. Click on the port you want to change, click **Settings**, click **Advanced**, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

If you use Windows 95, right-click on My Computer, select **Properties** from the menu, click on the **Device Manager** tab, double-click on **Ports**, then double-click on the 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 open your computer to change switches or jumpers on the conflicting device; refer to the device's documentation.

- ✓ The serial port might be defective. If you have another serial port, install the modem on it, change the COM port setting in your software, and try again.
- ✓ The modem might be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem is possibly defective. Call Tech Support for assistance (see Appendix D).

### The Modem Dials But Cannot Connect

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

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

You can narrow the list of possibilities by using extended result codes. Extended result codes are enabled by default. If they have been disabled, enter **ATV1X4** and press ENTER while in terminal mode, or include **V1X4** in the modem's initialization string. 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 might be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a company phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone and might treat it as an error. Check your PBX manual to see if you can change the internal dial tone; if you can't, change your modem's initialization string to replace **X4** with **X3**, which will cause the modem to ignore dial tones (note, however, that **X3** is not allowed in some countries, such as France and Spain).

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

If you must dial **9** to get an outside line, the easiest way to dial it automatically is to include it in the modem's dial prefix, e.g., **ATDT9**,. Note the comma, which inserts a pause before the number is dialed. By inserting **9**, into the dial prefix, you do not have to include it in each directory entry.

To change the dial prefix in Windows 95 HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, and type **9** in the local and long distance boxes in **How I dial from this location**.

- ✓ If the modem reports **NO ANSWER**, the other system has failed to go off-hook, or you might have dialed a wrong number. Check the number.
- ✓ If the modem reports **NO CARRIER**, the phone was answered at the other end, but no connection was made. You might have dialed a wrong number, and a person answered instead of a computer, or you might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call, and the modems might be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.

### The Modem Disconnects While Online

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

You can automatically disable Call Waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT\*70**,—note the comma, which inserts a pause before the number is dialed). To change the dial prefix in Windows Terminal, select **Settings | Modem Commands**. To change it in Windows 95 HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, check **This location has Call Waiting**, and select the correct code for your phone service.

- ✓ If you have extension phones on the same line as your modem, you or someone else can interrupt the connection by picking up another phone. If this is a frequent problem, disconnect the extension phones before using the modem, or install another phone line especially for the modem.
- ✓ Check for loose connections between the modem and the computer, the telephone jack, and AC power.
- ✓ You might have had a poor connection because of line conditions or the problem might have originated on the other end of the line. Try again.
- ✓ If you were online with a BBS or an online service like CompuServe, it might have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

### The Modem Cannot Connect When Answering

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

### File Transfer Is Slower Than It Should Be

- ✓ You might have an older UART. For best throughput, install a 16550AFN UART or a Multi-Tech ISI serial port card. See the "Quick Start" chapter for information on how to identify your UART.
- ✓ If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, COMM.DRV, to take full advantage of the UART's speed.
- ✓ If you are using a slow transfer protocol, such as Xmodem 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.
- ✓ Try entering the **I11** command in online mode to display diagnostic information, making a screen print of the diagnostics listing, and checking for parameters that might be unacceptable (number of re-trains, round trip delay, etc.).

### Data Is Being Lost

- ✓ If you are using data compression and a high speed serial port, set the serial port baud rate to four times the data rate.
- ✓ Your UART might not be reliable at serial port speeds over 9600 bps or 19,200 bps. Turn off data compression, reset your serial port speed to a lower rate, or replace your serial port with a faster one.
- ✓ Make sure the flow control method you selected in software matches the method selected in the modem. If you have a Macintosh, you might have the wrong cable for hardware flow control.
- ✓ If you are running under Windows 3.1 and have a 16550AFN UART, you might need to turn on the 16550's data buffers and/or replace the Windows serial driver, COMM.DRV.
- ✓ Try entering the **I11** ommand in online mode to display diagnostic information, making a screen print of the diagnostics listing, and checking for parameters that might be unacceptable (number of re-trains, round trip delay, etc.).

### There Are Garbage Characters on the Monitor

- ✓ Your computer and the remote computer might be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communications software.
- ✓ You might be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you might get a better connection the second time.
- ✓ At speeds above 2400 bps, the remote modem might not use the same transmission or error correction standards as your modem. Try

connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)

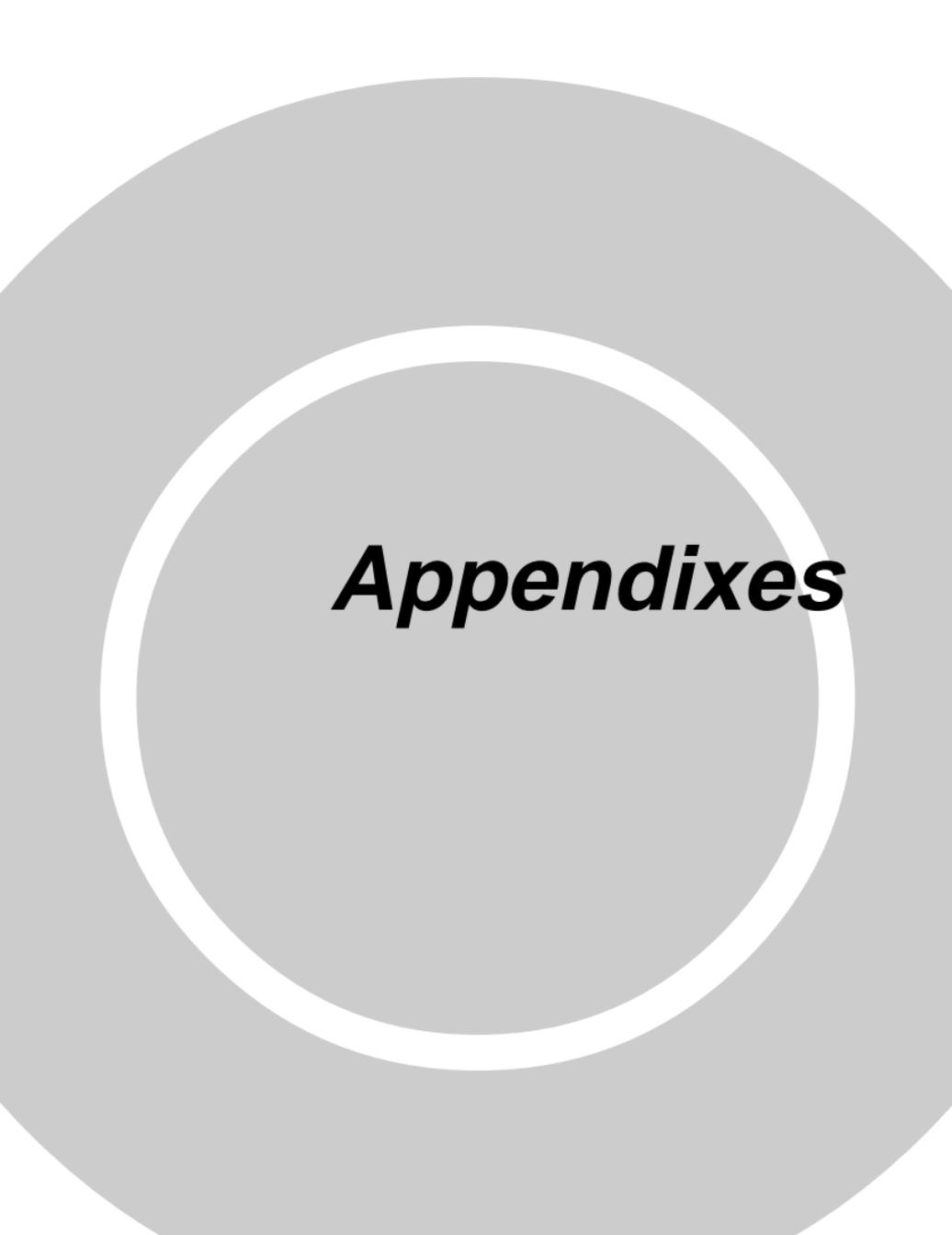
- ✓ Try entering the **I11** ommand in online mode to display diagnostic information, making a screen print of the diagnostics listing, and checking for parameters that might be unacceptable (number of re-trains, round trip delay, etc.).

### **The Modem Doesn't Work with Caller ID**

- ✓ Caller ID information is transmitted between the first and second rings, so if autoanswer is turned off (**S0=0**) or if the modem is set to answer after only one ring (**S0=1**), the modem will not receive Caller ID information. Check your initialization string, and if necessary change it to set the modem to answer after the second ring (**S0=2**).
- ✓ Make sure that you have Caller ID service from your telephone company.

### **Fax and Data Software Can't Run at the Same Time**

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



***Appendixes***



## **Appendix A: Regulatory Compliance**

### **FCC 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. The suitable USOC jack (Universal Service Order Code connecting arrangement) for this equipment is shown below. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.

An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. See installation instructions for details.

3. The ringer equivalence number (REN) is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs 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 RENs should not exceed five (5.0). To learn the number of devices that may be connected to the line, 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 you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

## ***User Guide***

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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 trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
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 the 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.
Model Number:	MT5634ZBA or MT5634ZBAV
FCC Registration No:	AU7USA-24713-M5-E
Ringer Equivalence:	0.3B
Modular Jack (USOC):	RJ11C or RJ11W (single line)
Service Center in USA:	Multi-Tech Systems, Inc. 2205 Woodale Drive Mounds View, MN 55112 (800) 328-9717 (612) 785-3500 (612) 785-9874 FAX

### Canadian Limitations Notice

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

Before installing this equipment, users should insure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized 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 insure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

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

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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.

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in ICES-003 of Industry Canada.

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.

### **FCC Fax Update**

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 your fax software manual for setup details.

### Compliance with BABT Requirements

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

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**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.

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Telephones that connect to the external socket must be approved for direct connection to the Public Switched Telephone Network (PSTN).

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
- Automatic storage of last number dialed
- Tone detection-busy
- Auto clear from the originating end
- DTR dialing
- Modem
- PBX timed break register recall

Any other usage will invalidate the approval of the apparatus if, as a result, it then ceases to comply with the standards against which approval was granted.

### **European Low Voltage Directive**

When correctly installed, 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 that are capable of connecting to other apparatus are defined as SELV. To ensure conformity with EN60950, ensure that these ports are only connected to ports of the same type on other apparatus.

The main power source shall be installed near to the equipment and shall be easily accessible. The plug that connects the apparatus to the mains power supply must be fitted with a 5A fuse that complies with BS1362.

### **EMC and Safety Compliance**

 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 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 permissible 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	<i>see table below</i>	—

<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.

**Warning:** 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.

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### **Use of Supplied Power Transformer**

The power transformer supplied with the modem is the only one that should be used. Use of any other transformer could cause damage to the modem.

### **For Voice Modems**

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

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**Warning:** For safety reasons, only connect AUSTEL permitted or AUSTEL certified equipment.

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

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

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

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

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### **Use of Supplied Power Transformer**

The power transformer supplied with the modem is the only one that should be used. Use of any other transformer could cause damage to the modem.



# Appendix B: Technical Specifications

Your MultiModemZBA or MultiModemZBAV fax modem meets the following specifications:

<b>Trade Name</b>	MultiModemZBA™ or MultiModemZBAV™
<b>Model Number</b>	MT5634ZBA or MT5634ZBAV
<b>Client-to-Server</b>	K56flex speeds when accessing an ISP type
<b>Data Rates</b>	K56flex server (actual speed depends on server capabilities and line conditions) *
<b>Client-to-Client</b>	33,600, 31,200, 28,800, 26,400, 24,000, 21,600,
<b>Data Rates</b>	19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
<b>Fax Data Rates</b>	14,400, 9600, 7200, 4800, 2400, 300 bps
<b>Data Format</b>	Serial, binary, asynchronous
<b>Modem Compatibility</b>	K56flex; ITU-T V.34 enhanced, V.34, V.32terbo, V.32bis, V.32, V.22bis, V.22; Bell 212A and 103/113; ITU-T V.29, V.42, V.42bis; ITU-T V.21 & V.23 in international versions
<b>Fax Compatibility</b>	ITU-T Group 3, Class 1 and 2, T.4, T.30, V.21, V.27ter, V.29, V.17, and TIA/EIA TR29.2
<b>Voice Compatibility</b>	TIA/EIA IS-101 (MT5634ZBAV only)
<b>Video Compatibility</b>	ITU-T V.80 for H.324 video conferencing

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

## **User Guide**

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<b>Error Correction</b>	ITU-T V.42 (LAP-M or MNP 3–4)
<b>Data Compression</b>	ITU-T V.42bis (4:1 throughput), MNP 5 (2:1 throughput)
<b>Speed Conversion</b>	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200, and 230,400 bps
<b>Mode of Operation</b>	Fax online modes; full duplex over dial-up lines; AT and AT+V command modes supporting answering machine and voice mail functions (MT5634ZBAV only)
<b>Flow Control</b>	XON/XOFF (software), RTS/CTS (hardware)
<b>Intelligent Features</b>	Plug and play; fully AT command compatible; autodial, redial, repeat dial; pulse or tone dial; dial pauses; auto answer; caller ID; EIA extended automode; adaptive line probing; automatic symbol and carrier frequency during start-up, retrain, and rate renegotiation; DTMF detection; call status display, auto-parity and data rate selections; keyboard-controlled modem options; non-volatile memory; on-screen displays for modem option parameters; command lines of up to 40 characters each; help menus; remote configuration; DTR dialing; callback security; 11-bit support.
<b>Command Buffer</b>	40 characters
<b>Data Modulation</b>	FSK at 300 bps, PSK at 1200 bps, QAM at 2400, 4800, and 9600 bps (non-trellis), QAM with trellis-coded modulation (TCM) at 9600, 12,000, 14,400, 16,800, 19,200, 21,600, 24,000, 26,400, 28,800, 31,200, 33,600, and 56,000 bps

## ***B Technical Specifications***

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<b><i>Fax Modulation</i></b>	V.21 CH2 FSK at 300 bps (half duplex) V.27ter DPSK at 4800 and 2400 bps V.29 QAM at 9600 and 7200 bps V.17TCM at 14400, 12000, 9600, and 7200 bps
<b><i>Carrier Frequencies ITU-T V.34</i></b>	1600, 1646, 1680, 1800, 1829, 1867, 1920, 1959, 2000 Hz
<b><i>Carrier Frequencies AT&amp;T V.32 terbo/ ITU-T V.32bis/V.32</i></b>	1800 Hz
<b><i>Carrier Frequencies V.22bis/V.22 or Bell 212A Standard (2400 &amp; 1200 bps)</i></b>	Transmit originate: 1200 Hz Transmit answer: 2400 Hz Receive originate: 2400 Hz Receive answer: 1200 Hz
<b><i>Carrier Frequencies ITU-T V.23 (1200 bps)</i></b>	Transmit originate: 390 Hz mark 450 Hz space Receive originate: 1300 Hz mark 2100 Hz space Transmit answer: 1300 Hz mark 2100 Hz space Receive answer: 390 Hz mark 450 Hz space
<b><i>Carrier Frequencies ITU-T V.21 (0–300 bps)</i></b>	Transmit originate: 980 Hz mark 1180 Hz space Receive originate: 1650 Hz mark 1850 Hz space Transmit answer: 1650 Hz mark 1850 Hz space Receive answer: 980 Hz mark 1180 Hz space

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<b>Carrier Frequencies</b> <b>Bell 103/113</b> <b>(0–300 bps)</b>	Transmit originate: 1270 Hz mark 1070 Hz space Receive originate: 2225 Hz mark 2025 Hz space Transmit answer: 2225 Hz mark 2025 Hz space Receive answer: 1270 Hz mark 1070 Hz space
<b>Fax Carrier</b> <b>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: 1800 Hz originate/answer V.17 TCM: 1800 Hz originate/answer
<b>Voice Compression</b> <b>and Sampling Rate</b> <b>(MT5634ZBAV only)</b>	PCM 128, 8000 Hz, or IMA ADPCM, 8000 Hz, (selectable via +V commands). Note that your computer system should have a processing speed of at least 75 MHz to take full advantage of the telephony features of this product.
<b>Transmit Level</b>	-11 dBm (dial-up)
<b>Frequency Stability</b>	±0.01%
<b>Receiver Sensitivity</b>	-43 dBm under worst-case conditions
<b>AGC Dynamic Range</b>	43 dB
<b>Interface</b>	EIA RS-232C/ITU-T V.24/V.28
<b>Connectors</b>	DB25 RS-232C connector; two RJ-11 phone jacks (one RJ-11 jack on UK and international modems), power jack; 1/8-inch stereo speaker jack and microphone jack on ZBAV model.

## ***B Technical Specifications***

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<b><i>Cables</i></b>	One 14-foot RJ-11 phone cable (USA); country-specific cord for UK and International models; external power transformer and cord
	<hr/> <b>Note:</b> Any cables connected to the computer should be shielded to reduce interference. <hr/>
<b><i>Diagnostics</i></b>	Power-on self test, local analog loop, local digital loop, remote digital loop.
<b><i>Indicators</i></b>	LEDs for Transmit Data, Receive Data, Carrier Detect, 56K bps, 33.6K bps, 14.4K bps, Off Hook, Terminal Ready, Error Correction, Fax.
<b><i>Speaker</i></b>	Command-controlled 2-inch speaker for call progress monitoring.
<b><i>Manual Control</i></b>	ON/OFF power switch
<b><i>Environmental</i></b>	Temperature range 0°–50°C (32°–120°F); humidity range 20–90% (non-condensing)
<b><i>Power Requirements</i></b>	100–130VAC, 50/60 Hz, 5 W; two-prong outlet-mounted transformer (included); 230V/50 Hz optional (international)
<b><i>Power Consumption</i></b>	9 VDC, 300 mA maximum transformer output
<b><i>Dimensions</i></b>	10.8 cm wide x 14.8 cm long x 2.9 cm high (4.25" x 5.8" x 1.15")
<b><i>Weight</i></b>	224 g (8 oz)
<b><i>Limited Warranty</i></b>	10 years in the U.S.A., U.K., Canada, and Mexico; 5 years elsewhere



## Appendix C: Loopback Tests

### Introduction

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

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

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

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

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

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

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### Local Analog Loopback Test (V.54 Loop 3)

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

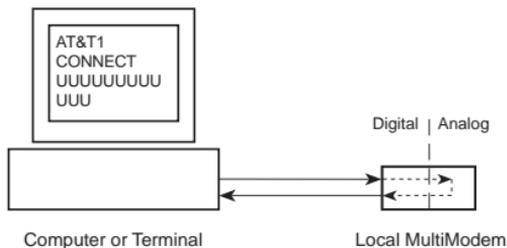


Figure C-1. Local analog loopback test.

### Test procedure

1. Connect the modem to your computer. Using your communication program, set the desired baud rate and go into terminal mode.
2. Type **AT&T1** and press ENTER. This places your modem in analog loopback mode in the originate mode. A *CONNECT* message should appear on your display. The modem is now out of command mode and in a pseudo-online mode.
3. Note that the CD LED is on. If you are set for 14,400 bps or higher, a speed LED should be on. If the CD LED is not on, there is a defect in your modem.
4. Enter characters from your keyboard. For this test, typing multiple uppercase *U* characters is a good way to send an alternating test pattern of binary ones and zeros. The characters entered should be

displayed on your monitor. The TD and RD LEDs should flash when a character is entered.

- To exit the test, type the escape sequence **+++AT** and press ENTER. This puts the modem in online command mode. Then type either **AT&T** or **ATH** to return to command mode.
- Your modem passes this test if the data received on your monitor are the same as the data entered from your keyboard. If different data appear on your monitor, your modem is probably causing the problem, though it could also be your computer. If your modem passes this test, but you are receiving errors while on line, the remote modem or the phone line could be at fault.

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

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

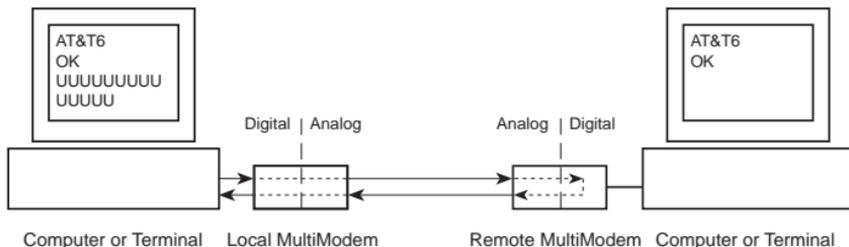


Figure C-2. Remote digital loopback test.

### Test procedure

1. Arrange to have **&T6** set on the remote test modem.
2. Open your communications software and go into terminal mode. Type **AT** and press ENTER; you should get an *OK* message. Type **ATN** and press ENTER to disable error correction.
3. Dial the remote modem and establish your online connection.
4. Type the escape sequence **+++AT** and press ENTER to bring your modem into online command mode.
5. Type **AT&T6** and press ENTER. The local modem responds to this command by transmitting an unscrambled marking signal, which causes the remote modem to place itself in digital loopback mode. Then the local modem exits online command mode and enters data mode.
6. Enter data from your keyboard. For this test, typing multiple uppercase *U* characters is a good way to send an alternating test pattern of binary ones and zeroes. Data received by the remote modem enters its analog receiver, is converted to digital data, is reconverted into analog, and then is transmitted back to your modem. Your modem passes this test if the data received on your monitor is the same as the data entered from your keyboard.
7. To exit the test, type the escape sequence **+++AT** and press ENTER. This puts the modem in online command mode. The modem should respond with an *OK* message. If you wish to stay on line with the remote modem for normal data transmission, type **AT&T** and press ENTER to exit the test, then type **ATO** and press ENTER to return on line. If you wish to terminate the call, type **ATH** and press ENTER to hang up.

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

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

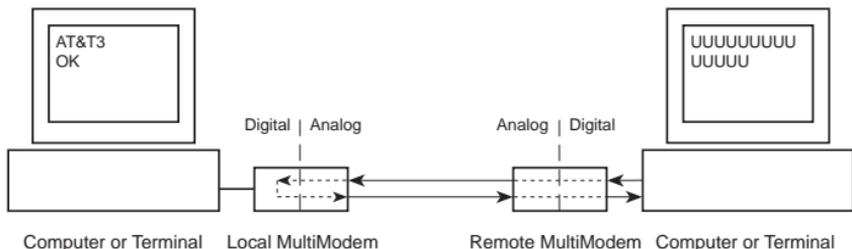


Figure C-3. Local digital loopback test

#### Test procedure

1. Open your communications software and go into terminal mode. Type **AT** and press ENTER; you should get an *OK* message. Type **ATN** and press ENTER to disable error correction.
2. Dial the remote modem and establish your online connection.
3. Type the escape sequence **+++AT** and press ENTER to bring your modem into online command mode.
4. Type **AT&T3** and press ENTER. Once you receive an *OK* message from your modem (if responses are enabled), your modem is placed in digital loopback mode.

5. Have someone enter data from the remote keyboard. For this test, typing multiple uppercase *U* characters is a good way to send an alternating test pattern of binary ones and zeros. The data received by your modem enters its analog receiver, is converted to digital data, is reconverted into analog, and then is transmitted back to the remote modem. Your modem passes this test if the data received on the remote monitor is the same as the data entered from the remote keyboard.
6. To exit the test, type the escape sequence **+++AT** and press ENTER. This puts the modem in online command mode. The modem should respond with an *OK* message. If you wish to stay on line with the remote modem for normal data transmission, type **AT&T** and press ENTER to exit the test, then type **ATO** and press ENTER to return on line. If you wish to terminate the call, type **ATH** and press ENTER to hang up.

## **Appendix D: Warranty, Service, and Technical Support**

### **Limited Warranty**

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

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

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

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

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

### **Service**

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

Please send modems that require 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.

### **Technical Support**

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

### **Online Warranty Registration**

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

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

### **The Multi-Tech BBS**

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

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

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

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

### ***To Download a File***

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

1. From the Main Menu, type **F** to access the Files Menu, then type **D**.
2. Enter the name of the file you 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.)
7. When the download is complete, press ENTER to return to the File Menu.
8. To exit the BBS, type **G** and press ENTER.

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

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L**, press ENTER, then type **L** and press ENTER again. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark each file area you would like to examine by typing its list number and pressing ENTER.
3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list and **P** to go back.
4. To mark one or more files for download, type **M**, press ENTER, type the list numbers of the files, and press ENTER again.

## ***D Warranty, Service, and Technical Support***

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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 most data communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, press ENTER to return to the File Menu.
9. To exit the BBS, type **G** and press ENTER.

### **About the Internet**

Multi-Tech is a commercial provider on the Internet, and we retrieve e-mail messages from the following mailboxes on a periodic basis:

<a href="mailto:tsupport@multitech.com"><i>tsupport@multitech.com</i></a>	Technical Support
<a href="mailto:mtsmktg@multitech.com"><i>mtsmktg@multitech.com</i></a>	Marketing Dept.
<a href="mailto:mtssales@multitech.com"><i>mtssales@multitech.com</i></a>	Sales Dept.
<a href="mailto:international@multitech.com"><i>international@multitech.com</i></a>	International Marketing & Sales
<a href="mailto:writers@multitech.com"><i>writers@multitech.com</i></a>	Publications Dept.

Multi-Tech's presence includes a Web site at

[\*http://www.multitech.com\*](http://www.multitech.com)

and an ftp site at

[\*ftp://ftp.multitech.com\*](ftp://ftp.multitech.com)

The ftp server mirrors the Multi-Tech BBS files.

### **About CompuServe**

In addition to the BBS, Multi-Tech provides support through CompuServe's Modem Vendor Forum (GO MODEMVEN) under GO MULTI-TECH. Refer to your CompuServe documentation for special operating procedures.

### **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: \_\_\_\_\_.

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 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.

# Appendix E: Upgrade Procedures

## Introduction

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

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

## Upgrade Overview

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

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

### **Step 1: Identify the Modem Firmware**

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

1. Run your favorite terminal program. If you are using Windows 95 or Windows NT, you can use HyperTerminal. If you are using Windows 3.11, you can use Windows Terminal.
2. In the program's terminal window, type **AT&F**. Even if you cannot see the **AT&F** command on your screen, be sure to type it completely and then press ENTER.
3. Now type **ATI** and record your results. The model number and firmware version should appear as shown below.

```
LT K56FLEX 1.1 MT5634ZBAV Serial Data/Fax/Voice  
Modem Version 4.07a
```

### **Step 2: Identify the Current Firmware Version**

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

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

1. Using your favorite Web browser, go to <http://www.multitech.com/support/firmware.htm>.
2. Scroll down to the table with your modem model number (non-USA firmware must be obtained directly from the [ftp site](#) or BBS at this time).
3. Look at the Current Revision number for your modem.

4. If the Current Revision number matches the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has the current firmware version and does not need to be updated.
5. If the Current Revision number is larger than the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has an older firmware version. Continue with “Step 3: Download the Upgrade File.”

### ***Multi-Tech BBS***

1. Run your favorite terminal program and dial in to the Multi-Tech BBS at 800-392-2432 (North America) or 612-785-3702 (local and international). If you followed the download test in the “Quick Start” chapter, your terminal program should already be configured for the Multi-Tech BBS.
2. When the BBS welcome screen appears, type your first name, last name, and password following the prompts. If you are a first-time caller, the BBS asks if your name is spelled correctly. If you answer **Y**, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
3. Press **ENTER** until the main menu appears. From the main menu you have access to two areas: the Files Menu and News. For help with menu commands, type **?**.
4. In the Main Menu, type **F** and press **ENTER** to access the Files Menu.
5. In the Files Menu, type **L** and press **ENTER**, then type **L** and press **ENTER** again. A two-column list of file areas appears.
6. Press **ENTER** until the modem firmware area for your country is listed.

## ***User Guide***

---

7. Type the number of the modem firmware area for your country and press ENTER.
8. Type **L** and press ENTER to list the files in the selected area.
9. Press ENTER until your modem model number appears.
10. Look at the version number for your modem.
11. If the version number matches the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has the current firmware version and does not need to be updated.
12. If the version number is larger than the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has an older firmware version. Continue with “Step 3: Download the Upgrade File.”

### **Step 3: Download the Upgrade File**

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

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

#### ***Multi-Tech BBS***

1. If you have not already found the upgrade file for your modem on the Multi-Tech BBS, follow the procedure in “Step 2: Identify the Current Firmware.”

2. Type the number of the upgrade file for your modem and press ENTER.
3. Type **D** and press ENTER to list the file to be downloaded.
4. If the correct file is listed, press ENTER; otherwise use the **Q** command to return to the previous menu.
5. Type **Z** and press ENTER to select the Zmodem transfer protocol.
6. The download begins automatically. As the file is copied to your hard disk, a dialog box reports on the progress of the download.
7. To log off the BBS, press ENTER, type **G** for “good-bye,” and press ENTER twice more.

### **Step 4: Extract the Upgrade Files**

1. Move the downloaded upgrade file to a temporary directory or folder on your hard disk.
2. The file is a self-extracting archive. Extract the files by typing the upgrade file name in DOS or double-clicking it in Windows. The extracted files include a .HEX file, which contains the upgrade data, and one flash program each for DOS, Windows 3.1/95, and Windows NT.

### **Step 5: Clear Your Stored Parameters**

Before you flash your modem it is important that you issue the **AT&W1Z** command to it to clear out any stored parameters. You should also record the parameters that are currently stored in your modem so you can reprogram it after flashing.

1. Run your favorite terminal program. If you are using Windows 95 or Windows NT, you can use HyperTerminal. If you are using Windows 3.11, you can use Windows Terminal.
2. In the program's terminal window, type **AT&V** and press ENTER to list your modem's current parameters.
3. Record your parameters by saving the screens and sending them to your printer.
4. Type **AT&W1Z** and press ENTER to clear your stored parameters and reset your modem to factory default.
5. Close the terminal program.

### **Step 6: Upgrade the Modem's Firmware**

Use one of the flash programs that you extracted to upgrade your modem. There are three flash programs: DOSFLASH.ZIP for DOS or Windows 3.1, FLASHWIN for Windows 3.1 or Windows 95, and FLASHNT for Windows 95 or Windows NT 4.0.

#### ***DOSFLASH***

1. Copy DOSFLASH.ZIP and the downloaded .HEX file to a temporary directory.
2. Unzip DOSFLASH.ZIP.
3. To upgrade the modem, run DOSFLASH by using the command **dflash10 x y**, in which *x* is the number of the port the modem is connected to and *y* is the IRQ number for the port. The IRQ number is optional if you are using the standard IRQ number for the port. For example, if your modem is connected to COM2, and COM2 has IRQ 3 assigned to it, which is standard for that port, type either **dflash10 2** or **dflash10 2 3**.

### FLASHWIN

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

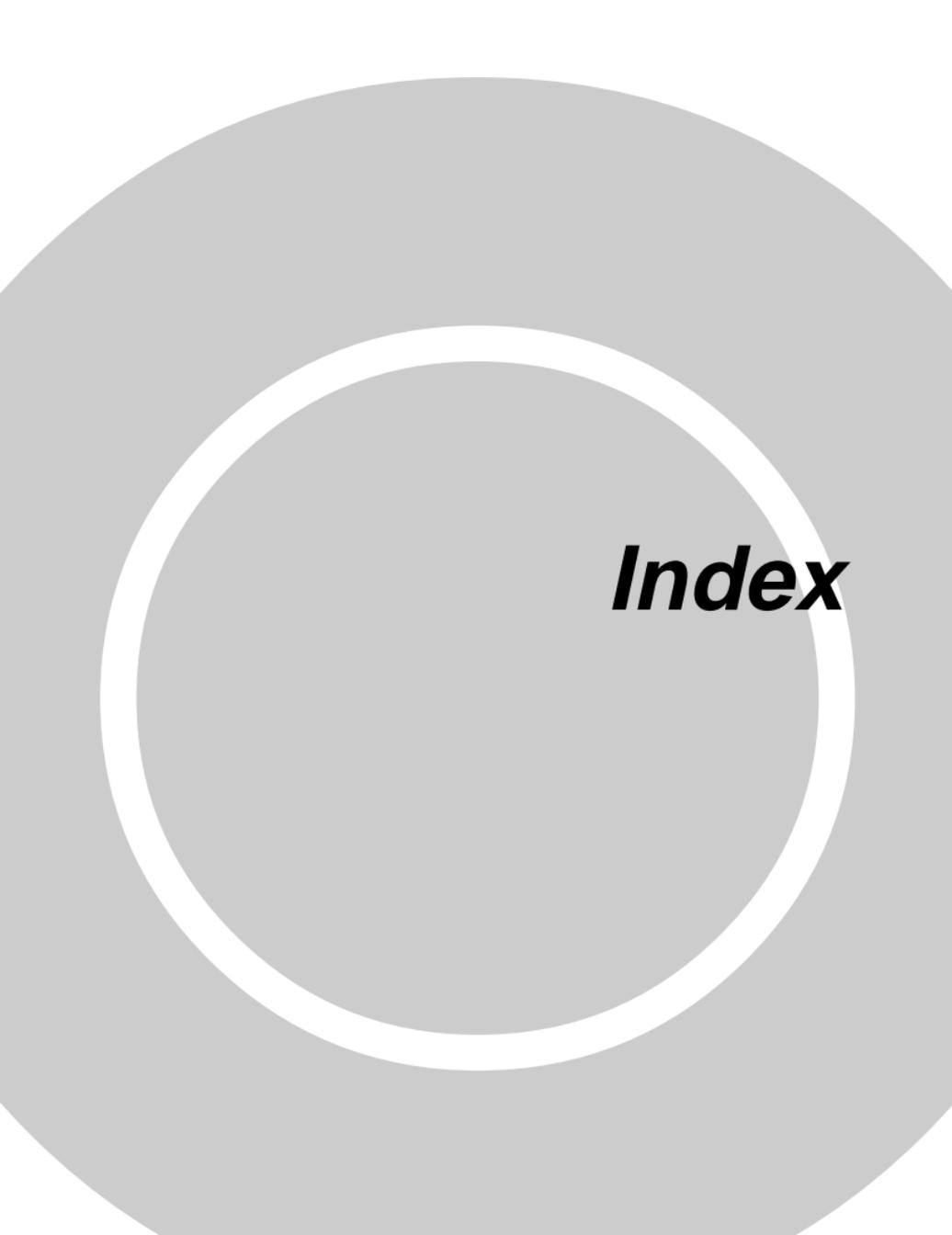
### FLASHNT

1. Copy FLASHNT.ZIP and the downloaded .HEX file to a temporary directory.
2. Unzip FLASHNT.ZIP.
3. Run FLASHNT.EXE by double-clicking on its icon or file name.
4. Select the COM port your modem is on and the speed that you want to program at. The default is 57,600 bps.
5. Verify that the selected firmware file (\*.HEX) is the correct one. If necessary, use the **Browse** button to find the correct file.
6. Click **Finish** to begin upgrading your modem.
7. When the flash upgrade is complete, the message *Flash Loader has completed* appears.

8. Close the program.

### **Step 7: Restore Your Parameters**

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



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