Z DX MultiModem™

MT5600ZDX
Data/Fax Modem

MT5600ZDXV
Voice/Data/Fax Modem

User Guide

MultiTech®
Systems

User Guide
Model MT5600ZDX / MT5600ZDXV
PN S0000134 Revision E

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Revision	Date	Description
A	01/14/97	Manual released
B	09/15/98	Added #V, Class 2 fax, and V.90 information
C	01/22/01	Added descriptions of more AT commands, FCC Part 15 regulations, and installation in Linux operating systems
D	06/18/02	Added Plug-&-Play instructions, revised warranty, regulatory info, and technical specifications
E	02/15/05	Remove the AT commands chapter, substitute the AT Commands Reference Guide, and remove reference to v.25bis

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Patents

This device is covered by one or more of the following patents: 6,219,708; 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; D374,222; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; D355,658; 5,355,365; 5,309,562; 5,301,274. Other patents pending.

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Chapter 1: Introduction

Introduction

Congratulations on your purchase of the MultiModemZDX or the MultiModemZDXV modem. You have acquired one of the finest intelligent data/fax or voice/data/fax modems available today from one of the world's oldest modem manufacturers: Multi-Tech Systems, Inc. This manual will help you install, configure, test, and use your modem.

Product Description

The MultiModemZDX and MultiModemZDXV modems incorporate the V.90 protocol, which enables Internet connections at data rates up to 56K bps over standard phone lines. These protocols are able to send data downstream to your computer at high speeds by taking advantage of the fact that data on the phone network normally is converted from digital to analog only once before it reaches your modem. Upstream transmissions and transmissions between client modems have a maximum data rate of 33.6K bps. Line conditions may cause modems to connect at speeds lower than the stated data rate maximums.

The MultiModemZDX and MultiModemZDXV modems offer interactive automatic dialing and command mode configuration. You can store four command lines or phone numbers of up to 31 characters each in the modem's nonvolatile memory. The modem pulse-dials or tone-dials, and recognizes dial tones and busy signals for reliable call-progress detection. It can also detect AT&T calling card tones. It is FCC-registered for connection to phone networks without notification to the phone company.

Features

Data Features

- Supports automatic fallback to slower speeds in noisy line conditions, and fall forward to faster speeds as conditions improve.

- Can autodial, redial, pulse (rotary) and touch-tone dial.

- Detects dial tones and busy signals for reliable call-progress detection.

- Compatible with the standard AT command set used by most communication programs.

- Supports the H.324 protocol (videophone ready).

- Supports Plug and Play (PnP).

- Routes voice, data, or fax calls on a single phone line using distinctive rings.

- Can be flash upgraded.

Voice Features (Model ZDXV only)

- Supports full-duplex speakerphone. Can record and play back answering machine messages using optional microphone and speaker.

- Supports telephone answering machine (TAM) including voice mail control, record/playback, and call screening with the included communications program.

Software Considerations for the MT5600ZDXV: You will need data communications (datacomm) software, fax communications software, and an appropriate application to access the Personal Voice Mail features of the MT5600ZDXV. You will need Microsoft Windows 95 or higher to run these programs. Then you can use the MT5600ZDXV to:
- speed dial
- mute a phone call
- place a call on hold
- forward or transfer a call
- three-way or conference call
- fax from any Windows application
- record phone conversations

PhoneTools Communications Software Features

Included on the CD with your modem is a communications program. After installing this program, you can:

- Upload and download data files.

- Send faxes at preset times.

- Upload and download data files.

- Store incoming voice messages and faxes.

- Retrieve stored messages, faxes, and phone numbers (phone number retrieval requires Caller ID service from your phone company).

- Print a received fax.

For detailed information about operating your modem under the included communications program, refer to the CD containing the User Guide.

What's In Your Modem Package?

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

- An MT5600ZDX data/fax modem or an MT5600ZDXV voice/data/fax modem

- A DC power transformer

- One RJ11 phone cable

- A printed *Quick Start Guide*

- A system CD containing modem drivers, this User Guide, a communications software package (PhoneTools) and other software.

- A CD containing a communications program and other programs.

- Four vinyl gripper feet for the bottom of the modem
- Brochure with warranty registration card

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, or the Internet).

Chapter 2: Installation

Introduction

This chapter shows you step-by-step how to set up your Multi-Tech modem, test it, and make your first calls.

What You Will Need

Before starting, make sure you have everything you will need.

We supply

✔ An MT5600ZDX data/fax modem or a MT5600ZDXV voice/data/fax modem

✔ A DC power transformer

✔ One RJ11 phone cable

✔ A printed *Quick Start Guide*

✔ An system CD containing modem drivers, this User Guide, a communications software package (PhoneTools) and other software programs

✔ Four vinyl gripper feet for the bottom of the modem

You supply

✔ A computer with an available serial port. The processor speed should be at least 75 MHz in order to take full advantage of the ZDXV's telephony features.

✔ A shielded RS232 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 phone jack

✔ (Optional) If you want speakerphone functions along with the ability to record sound or .WAV files through the sound card at the same time, you will need:

  • One stereo PC microphone

  • One stereo male to male patch cord

  • One sound card

  • Speakers

Safety Warnings

  • Use this product only with UL- and CUL-listed computers.

  • Never install phone wiring during a lightning storm.

  • Never install a phone jack in a wet location unless the jack is specifically designed for wet locations.

  • Never touch uninsulated phone wires or terminals unless the phone line has been disconnected at the network interface.

  • Use caution when installing or modifying phone lines.

  • Avoid using a phone (other than a cordless type) during an electrical storm; there is a risk of electrical shock from lightning.

  • Do not use a phone in the vicinity of a gas leak.

  • To reduce the risk of fire, use only 26 AWG or larger telephone line cord.

Connecting the Modem to Your System

Connections for the MT5600ZDX

Turn off your computer. Placing the modem in a convenient location, connect it to your computer's serial port, to the phone line, to AC power, and to your phone.
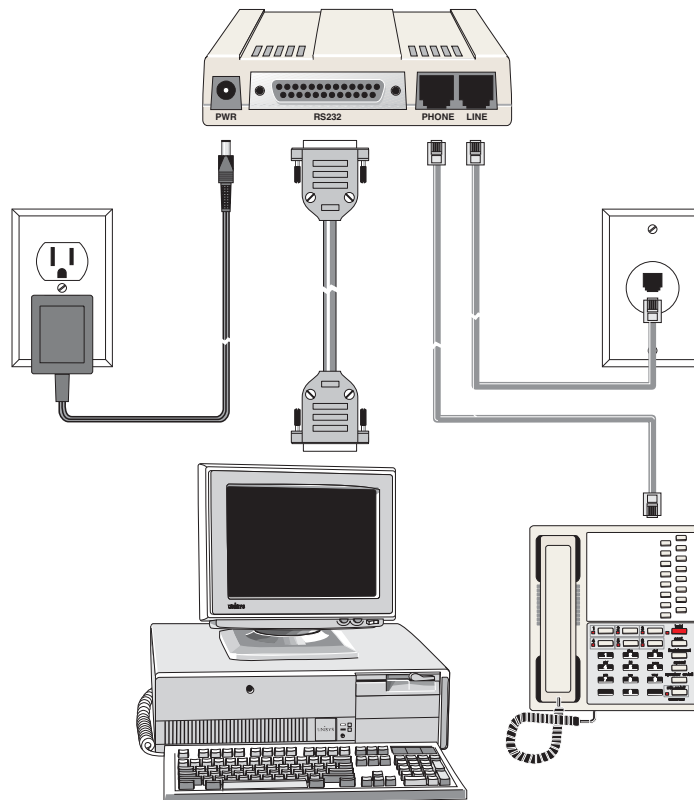
Figure 2–1. MT5600ZDX Connections.

1. Connect the Modem to Your PC (RS-232 Connection)

Plug one end of the RS-232 serial cable into the RS-232 connector on the modem, and plug the other end into a serial port connector on your computer, such as COM1 or COM2. You supply the RS-232 cable.

2. Connect the Modem to the Phone Jack (Line Connection)

Plug one end of the phone cable into the modem's LINE jack and the other end into a phone wall jack. The phone cable is included with your modem.

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.

3. (Optional) Connect the Modem to the Phone

For voice-only calls, plug a phone into the modem's PHONE jack.

4. Connect the Modem to the AC Power Outlet

Plug the DC power transformer into an AC power outlet or power strip. Plug the DC power transformer into the POWER jack on the modem.

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

A Note About Power Connection, Surge Protectors, and Lightning

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

Power-On Test

Test the modem by turning it on (an on-off switch is located on the side panel). When you apply power, the modem performs a diagnostic self-test. The 56 indicator lights; and if a terminal program is running, the TR indicator also lights. 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 5, *Troubleshooting*.

Note: The Federal Communications Commission (FCC) and Industry Canada impose certain restrictions on equipment connected to public phone systems. For more information, see Appendix A.

Using Your Modem

Right now the modem is set up for the most typical user application, that is, the modem is set to make dial-up calls to remote installations where the calls are answered automatically. Therefore, you shouldn't need to change the current default configuration.
You will likely use your data communications software to:

- Launch a data communications session through a set of modem configurations which you select and then associate with a target phone number. Once you have created, saved, and named this set of information according to your connection needs and your data communications software's conventions, the software then simplifies your dialing. You need not reconfigure the modem nor run the risk of mistakenly keying-in incorrect information, or
- Enter terminal mode, where you can issue **AT** commands .

Connections for the MT5600ZDXV
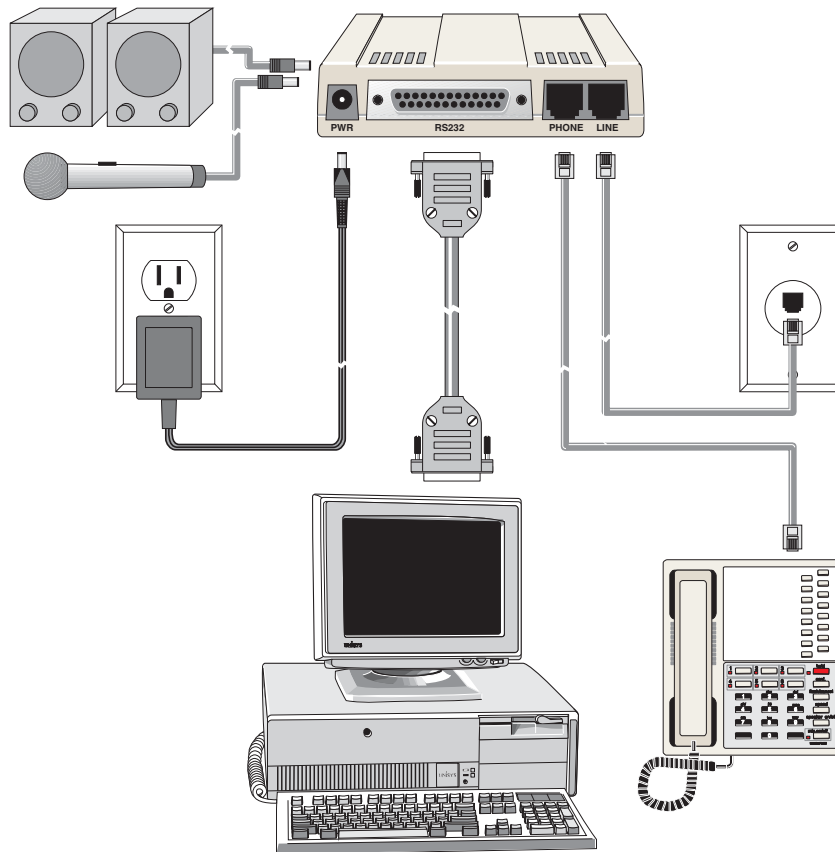
Figure 2–2.   MT5600ZDXV Connections

1. Follow All of the Connection Directions for the MT5600ZDX

The add these steps:

2. Connect the Microphone

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.

3. Connect the Speaker

For speakerphone or voice mail 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 your sound card does not have a LINE IN jack, use its MIC jack. The stereo male-to-male patch cord can be purchased at a local PC retail store.

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

Installing the Modem Driver

If you use Windows 98/Me/NT/2000/Xp, you must install the modem driver as described here. If you use another operating system, see the User Guide. When operating the modem under Windows 98/Me/2000/Xp, the modem driver can be installed by using the Plug-and-Play feature. Follow the 4-step procedure below. For Windows NT, which does not support Plug-and-Play, follow the 8-step procedure on the next page.

Modem Driver Installation for Windows 98/Me/2000/Xp

1. Make sure your modem is connected properly, and then turn on your computer. Windows should detect your new modem and open the **Install New Modem** wizard.

   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 the "Troubleshooting" chapter of the User Guide.

2. Insert the system CD-ROM, and then click **OK**.

3. Windows installs and configures the modem.

4. Click **Finish** to exit.

Modem Driver Installation for Windows NT

1. Make sure your modem is connected properly, and then turn on your computer. Windows should detect your new modem and open the **Install New Modem** wizard.

   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 the "Troubleshooting" chapter of the User Guide.

2. In the **Install New Modem** wizard, select **Don't detect my modem; I will select it from a list**, and then click **Next**. A dialog box with a list of manufacturers and a list of modem models appears.

3. Insert the system CD-ROM and then click **Have Disk**.

4. In the **Install from Disk** dialog box, select the drive that the CD is in, and then click **OK**.

5. A list of modems appears. Select your modem and click **Next**.

6. Select the port that the modem is connected to, and then click **Next**.

7. Windows installs and configures the modem.

8. Click **Finish** to exit.

Removing an Old Modem Driver

When your new modem replaces another modem, the old modem driver remains in Windows, and the old modem driver is still selected in HyperTerminal and other Windows applications. Though you can change the application connection descriptions one at a time, it is easier to force the Windows applications to use the new modem by removing the old modem driver 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** dialog box.

3. In the list box, select the old modem.

4. Click **Remove**, and then click **Close**.

5. The next time you dial a HyperTerminal connection, it will select your new modem and ask you to confirm the selection.

Loading Data Communications Software

MultiTech includes a data communications software package on the product CD shipped with your modem. In general, however, the modem will work with most data communications software packages. Data communications software gives the user access to lower-level commands that govern (at a detailed technical level) how the modem operates, that is, how the modem handles incoming and outgoing data streams, etc.

Load the software as you would any Windows application program. During installation under Windows NT/2000/Xp, an advisory screen may appear saying "FAX capture driver installation" and causing a delay in the installation. Be aware that this is normal and the installation process has not failed or stalled. Simply wait a few moments until this screen disappears.

Installing Your Data Communications Software

Data communications software is designed to send and receive messages. Multi-Tech includes a data communications program with your modem. However, the modem will work with any data communications software. To install the data communications software provided with this modem, insert the CD into the CD-ROM drive. The software will then install automatically if you have Windows 98/2000 or Windows NT 4.0.

For other operating systems, insert the CD into your CD-ROM drive, click the **Start** button, and then click **Run**. Type **D:\setup.exe**, and then click **OK**. If your CD-ROM drive uses a different drive letter, type that letter in place of D. The setup wizard on the CD guides you through the installation.

Note: Data communications software running in a Windows operating system normally do not have to be configured since they use the Plug and Play configuration supplied by the Windows modem driver. Data communications software running in DOS or other operating systems may need to be manually configured. See Chapter 3, Advanced Options.

Connecting to the Internet

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

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

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

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

Sending a Fax

With your data communications software, you can use your modem to send and receive faxes directly from your computer. The following steps show you how to fax a document directly from a Windows application without opening the data communications program.

1. Create a document in a Windows application, such as Word, a graphics editor, or a spreadsheet. Keep the application and the document open, and select **Print** from the **File** menu.

2. Select **CAPTURE FAX BVRP** as the printer driver, and then click **OK**. The **Send Fax** wizard appears.

3. In the **Recipient** section, type the required information or extract it from the Phone Book by clicking this icon.

4. In the **Template** section, optionally select a cover page and type a cover message.

5. Select the document to be sent. The default file when sending from within a Windows application is **Capture.dgr**.

6. Select the date and time to send the document, if you do not want to send it immediately.

7. Click **Finish** to start the transmission.

About the LED Indicators

The modem has ten LED indicators on the front panel that indicate status and activity:

Figure 2–3. Front panel

TR   **Transmit Data**

Flashes when the modem is transmitting data to another modem.

RD   **Receive Data**

Flashes when the modem is receiving data from another modem.

CD   **Carrier Detect**

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 (56,000–28,000 bps)**

Lights whenever the modem is set for or connects using either the K56flex or the V.90 protocol. The actual connection speed depends on the ISP server capabilities and line conditions.

28 **V.34 Mode**

Lights when the modem in connected in V.34 mode.

14 **V.32 bis**

Lights when the modem is connected in V.32 bis mode.

OH **Off-Hook**

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**

Lights when a communication program is using the modem. It means the modem is ready for an outgoing or incoming call. It goes off when the communication program disconnects the serial port. When it goes off, a connected modem will disconnect.

EC **Error Correction**

Lights when the modem is set for V.42 error correction. It flashes on and off when data compression is activated.

FX **Fax**

Lights when the modem is connected in fax mode.

Note: When you turn on the modem, the **56** indicator lights; and if a terminal program is running, the TR indicator also lights. After a call, the indicator for the connection's speed protocol remains lit until another call is made or the modem is reset. On reset the 56 indicator lights again.

Chapter 3: Advanced Options

Introduction

Like any modem, your Multi-Tech modem operates only under the control of a communications program, such as the communications software package (PhoneTools) included with the modem. It also operates under other general-purpose data communication programs, such as Windows Terminal and HyperTerminal. For information on how to use the modem with the communications program of your choice, please refer to the documentation provided with the data communications program.

An experienced modem user can configure the program's software to change the way the software interacts with a modem and configure the modem to change the way it operates.

Configuring Your Communications Software

For Windows 95/98/2000 and Windows NT:
Communication programs designed for these operating systems normally do not need to be manually configured, since they use the Plug and Play configuration of the Windows modem driver.

For DOS and Other Operating Systems:
Communication programs designed for DOS and other operating systems, however, may need to be manually configured to work with your modem. Though each communications program is different, the following procedure should work with most of them.

1. Turn on your computer and run your communications program.

2. Find the dialog box or menu that lets you select your modem. (In Windows Terminal select **Settings** | **Modem Commands**; in HyperTerminal select **File** | **Properties** | **Phone Number**; and in the communications program select **Configure** | **General Configuration** | **Communication** | **Change Modem**.

3. Choose your modem from the program's modem list. If it isn't listed, choose a generic modem and modify the settings as necessary.

4. Change the modem initialization string, if necessary. The factory default configuration works well for most purposes. To load the factory default configuration, use **AT&F**. To load a custom configuration that was saved using the *&W* command, use **ATZ**. Note that the *Z* command must be in a command string by itself. For a Macintosh, the initialization string should include the *&D0* command. If you do not want the modem to always answer the phone, add **S0=0** to the string. To use Caller ID with the modem, add **S0=2** to the string (Caller ID information is sent between the first and second rings, so the phone must ring at least twice before the modem picks up the line). Depending on the software, you might have to end the string with a carriage return character (**^M**).

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

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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

   • Set it to 57,600 bps if it has Windows 3.1x. If you have an older computer with a 14550 UART, set it to 19,200 bps.

   • Older Macintosh computers can use a serial port baud rate of 57,600 bps; newer ones can use a serial port baud rate of 115,200 bps or 230,400 bps.

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

7. If the communication program has an autobaud selection, make sure it is disabled. Autobaud applies only to older modems, and can cause problems if enabled.

8. If the program allows you to edit the no-connect messages (*NO CARRIER, BUSY, NO ANSWER, NO DIALTONE*), make sure there is no space between *DIAL* and *TONE* in *NO DIALTONE.*

9. Refer to the program manual or online help for other configuration choices. In most cases you can accept the default values.

Configuring Your Modem

Your modem normally is configured through Windows or through the communication program you are using. The default settings work best for most purposes. However, you also can configure your modem by sending **AT** commands to the modem. See Chapter 4 for **AT** commands.

Chapter 4: AT Commands

Introduction

AT commands and Fax commands for the MT5600ZDX/ZDXV are published in a separate Reference Guide included on the MT5600ZDX/ZDXV CD and posted on the Multi-Tech Web site.

Chapter 5: Troubleshooting

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, check the list of troubleshooting procedures before calling Multi-Tech.

- 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 56 indicator and the terminal turn on. 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 the modem on by turning on a power strip.

✔ If the modem is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.

✔ Make sure the transformer module is firmly connected to the modem and to the wall outlet or power strip.

✔ If the power strip is on and the modem switch is on, try moving the transformer module to another outlet on the power strip.

✔ Test that the outlet is live by plugging another device, such as a lamp, into it.

✔ The modem or the DC power transformer may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem or the DC power transformer may be defective. Call Technical Support for assistance.

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

The Modem Does Not Respond to Commands

✔ Make sure the modem is plugged in and turned on. (See "None of the Indicators Light.")

✔ Make sure you are issuing the modem commands from the data communications program, either manually in terminal mode or automatically by configuring the software. (You cannot send commands to the modem from the DOS prompt.)

✔ Make sure you are in terminal mode in your data communications program, then type **AT** and press ENTER. If you get an *OK* response from your modem, your connections are good and the problem likely is in the connection setup in your communications program.

✔ Try resetting your modem by turning it off and on. If you are using DOS or Windows 3.1 communications program, 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 program. Make sure you have done whatever is necessary in your software to make a port connection. Not all communication programs connect to the COM port automatically. Some connect when the software loads and remain connected until the program terminates. Others can disconnect without exiting the program. The modem's TR indicator lights to show that the software has taken control of the modem through the COM port.

✔ Your communications program 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 program is configured correctly, and you still don't get an *OK*, the fault might be in the serial cable. Make sure it is firmly connected at both ends.

✔ Is this the first time you have used the cable? If so, it may not be wired correctly. Check the cable description on the packaging to make sure the cable is the right one for your computer.

✔ Peripheral expansion cards, such as sound and game cards, might include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communication port. Be sure to disable any unused ports.

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

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

Windows 9x and 2000: Right-click on My Computer, select **Properties** from the menu, click on the **Device Manager** tab, double-click on **Ports**, then double-click on the communication port your modem is connected to. In the port's **Properties** sheet, click on the **Resources** tab to see the port's input/output range and interrupt request. If another device is using the same address range or IRQ, it appears in the **Conflicting Device List**. Uncheck **Use automatic settings** to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device; refer to the device's documentation.

Windows NT 4.0: To look for address or IRQ conflicts, click Start, Programs, Administrative Tools (Common), and Windows NT Diagnostics. In the **Windows NT Diagnostics** dialog box, click the **Resources** tab to see which input/output ranges and interrupt requests are in use. If you need to open your computer to change switches or jumpers on the conflicting device; refer to the device's documentation.

✔ The serial port might be defective. If you have another serial port, install the modem on it, change the COM port setting in your software, and try again.

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

The Modem Dials But Cannot Connect

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

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

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

✔ If the modem reports *NO DIALTONE*, check that the modem's phone line cable is connected to both the modem's LINE jack (not the PHONE jack) and the phone wall jack. If the cable looks secure, try replacing it. If that doesn't work, the problem might be in your building's phone installation. To test the building

installation, plug a phone into your modem's phone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a corporate phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone and might treat it as an error. Check your PBX manual to see if you can change the internal dial tone; if you can't, change your modem's initialization string to replace **X4** with **X3**, which will cause the modem to ignore dial tones (note, however, that **X3** is not allowed in some countries, such as France and Spain).

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

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

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

✔ If the modem reports *NO ANSWER*, the other system has failed to go off-hook, or you might have dialed a wrong number. Check the number.

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

The Modem Disconnects While Online

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

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

✔ If you have extension phones on the same line as your modem, you or someone else can interrupt the connection by picking up another phone. If this is a frequent problem, disconnect the extension phones before using the modem, or install another phone line especially for the modem.

✔ Check for loose connections between the modem and the computer, the phone 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

✔ The default DTR Control command (**&D2**) inhibits autoanswer. To enable autoanswer, change the DTR Control to **&D0,** and make sure **&Q0, &Q1, &Q5,** or **&Q6** is also set. For more information, see the **&D** command in Chapter 4. For information on changing the modem's default configuration, see Chapter 3.

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

File Transfer Is Slower Than It Should Be

✔ You might have an older UART. For best throughput, install a 16550AFN UART or a Multi-Tech ISI serial port card. See the "Advanced Options" chapter for information on how to identify your UART.

✔ If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, COMM.DRV, to take full advantage of the UART's speed.

✔ If you are using a slow transfer protocol, such as Xmodem, try Zmodem or Ymodem/G instead.

✔ Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.

✔ Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.

✔ Does your Internet service provider (ISP) use the same 56K protocol as your modem? The default setting of your modem is to connect using either the K56flex or the V.90 protocol, depending on which one the ISP modem is using. If your ISP uses the X2 protocol, the maximum speed you will be able to connect at is 33,600 bps. Check with your ISP to see which protocols it supports, and check the Multi-Tech Web site for the latest developments in V.90.

✔ Try entering the **&V1** command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

Data Is Being Lost

✔ If you are using data compression and a high speed serial port, set the serial port baud rate to four times the data rate.

✔ Your UART might not be reliable at serial port speeds over 9600 bps or 19,200 bps. Turn off data compression, reset your serial port speed to a lower rate, or replace your serial port with a faster one.

✔ Make sure the flow control method you selected in software matches the method selected in the modem. If you are using the modem with a Macintosh, you might have the wrong cable for hardware flow control.

✔ If you are running under Windows 3.1 and have a 16550AFN UART, you might need to turn on the 16550's data buffers and/or replace the Windows serial driver, COMM.DRV.

✔ Try entering the **&V1** command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

There Are Garbage Characters on the Monitor

✔ Your computer and the remote computer might be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communications program.

✔ You might be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you might get a better connection the second time.

✔ At speeds above 2400 bps, the remote modem might not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)

✔ Try entering the **&V1** command to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

The Modem Doesn't Work with Caller ID

✔ Caller ID information is transmitted between the first and second rings, so if autoanswer is turned off (**S0=0**) or if the modem is set to answer after only one ring (**S0=1**), the modem will not receive Caller ID information. Check your initialization string, and if necessary change it to set the modem to answer after the second ring (**S0=2**).

✔ Make sure that you have Caller ID service from your telephone company.

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

✔ Communication devices can be accessed by only one application at a time. Under DOS or Windows 3.1x, you can run either your fax software or your data communications program, but not both at the same time, unless you have a special communication device management application. In Windows 95, 98, and NT 4.0, you can have data and fax communication programs open at the same time, but they cannot use the same modem at the same time.

Appendixes

Appendix A: Regulatory Compliance

Note: Each regulation may not apply to every version of the MultiModemZDX.

FCC Part 15

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

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

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

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

Industry Canada

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

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

FCC Part 68 Telecom

1. This equipment complies with part 68 of the Federal Communications Commission Rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number. This information must be provided to the telephone company.

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

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

4. The ringer equivalence number (REN) is used to determine the number of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all, areas the sum of the RENs should not exceed 5.0. To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the local telephone company.

5. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

6. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.

7. If trouble is experienced with this equipment (the model of which is indicated below) please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have repairs made. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

8. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.

9. This equipment should not be used on party lines or coin lines.

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

11. This product is labeled with the following information:

Manufacturer:	Multi-Tech Systems, Inc.
Trade Name:	MultiModem
Model Number:	MT5600ZDX, MT5600ZDXe, MT5600ZDXV, or MT5600ZDXVe
FCC Registration No:	AU7USA-24713-M5-E
Ringer Equivalence No:	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
	U.S.A.
	(763) 785-3500
	(763) 785-9874 Fax

Fax Branding Statement

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

- Date and time the message is sent

- Identification of the business or other entity, or other individual sending the message

- Telephone number of the sending machine or such business, other entity, or individual

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

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

Canadian Limitations Notice

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

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

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

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

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

International Modem Restrictions

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

EMC, Safety, and R&TTE Directive Compliance

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

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

  and

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

  and

- Council Directive 1999/5/EC of 9 March on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

New Zealand Telecom Warning Notice

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

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

2. Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.

3. This modem shall not be used in any manner which could constitute a nuisance to other Telecom customers.

4. This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing.

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

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

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

6. This equipment may not provide for the effective hand-over of a call to another device connected to the same line.

7. Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:

For repeat calls to the same number:

- There shall be no more than 10 call attempts to the same number within any 30-minute period for any single manual call initiation, and

- The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.

For automatic calls to different numbers:

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

For automatically answered incoming calls:

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

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

South African Notice

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

Appendix B: Technical Specifications

The MultiModemZDX modem meets the following specifications:

Trade Name	MultiModemZDX™
Model Number	MT5600ZDX, MT5600ZDXe, MT5600ZDXV, and MT5600ZDXVe
Client-to-Server Data Rates	V.90 speeds when accessing a V.90 server (actual speed depends on server capabilities and line conditions)*
Client-to-Client Data Rates	33,600; 31,200; 28,800; 26,400; 24,000; 21,600; 19,200; 16,800; 14,400; 12,000; 9600; 7200; 4800; 2400; 1200; 0-300 bps
Fax Data Rates	14,400; 9600; 7200; 4800; 2400; 300 bps
Data Format	Serial, binary, asynchronous
Commands	AT, TIA/EIA TR.29, Class 2
Command Buffer	60 characters
Modem Compatibility	ITU-T V.90, V.42, V.42bis, V.34, V.34bis, V.32, V.32bis, V.32terbo, V.22, V.22bis, V.21 & V.23 in international versions, Bell 212A and 103/113
Fax Compatibility	ITU-T Group 3, Class 1 and 2, T.30, T.4, V.29, V.27ter, V.21, V.17, and TIA/EIA TR29.2
Error Correction	ITU-T V.42 (LAP-M or MNP 3 and 4)
Data Compression	ITU-T V.42bis (4:1 throughput), MNP 5 (2:1 throughput)
Speed Conversion	Serial port data rates adjustable to 300; 1200; 2400; 4800; 9600; 19,200; 38,400; 57,600; 115,200; and 230,400 bps
Mode of Operation	Fax online modes, full duplex over dial-up, AT command mode
Flow Control	XON/XOFF (software), RTS/CTS (hardware)
Intelligent Features	Plug and play, AT command compatible, autodial, redial, repeat dial, pulse or tone dial, dial pauses, auto answer, caller ID, adaptive line probing; automatic symbol and carrier frequency during start-up, retrain and rate renegotiation, DTMF detection, call status display, auto-parity and data rate selection, keyboard-controlled modem options, non-volatile memory, storage of up to four command strings or telephone numbers up to 31 characters each

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

Data Modulation	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; 34,000; 38,000; 46,000, 54,000 and
	      56,000 bps

Fax Modulation	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
Carrier Frequencies *V.34*	1600, 1646, 1680, 1800, 1829, 1867, 1920, 1959, 2000 Hz
Carrier Frequencies *V.32, V.32bis, V.32terbo*	1800 Hz

Carrier Frequencies
  V.22,V.22bis or
  Bell 212A Standard
  (2400 &1200 bps)
	Transmit originate: 1200 Hz
	Transmit answer: 2400 Hz
	Receive originate: 2400 Hz
	Receive answer: 1200 Hz

Carrier Frequencies
  V.23 (1200 bps)
	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

Carrier Frequencies
  V.21 (0-300 bps)
	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

Carrier Frequencies
  Bell 103/113
  (0–300 bps)
	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

Fax Carrier
Frequencies
	V.21 Ch2 (half duplex):
	       1650 Hz mark, 1850 Hz space for transmit originate
	       1650 Hz mark, 1850 Hz space for transmit answer
	V.27ter: 1800 Hz originate/answer
	V.29 QAM: 1800 Hz originate/answer
	V.17 TCM: 1800 Hz originate/answer

Transmission Level	-11 dBm or -12 dBm (dial-up; -11 or -12 determined by country)
Frequency Stability	±0.01%
Receiver Sensitivity	-43 dBm under worst-case conditions
AGC Dynamic Range	43 dB
Interface	RS-232C/V.24/V.28
Connectors	DB25F RS-232C connector, one RJ-11 phone jack, power connector
Cables	One modular telephone cable (USA); country-specific cord for UK and International models; one 9-pin to 25-pin serial cable for UK and International models; external power transformer and cord
	Note: Any cables connected to the computer should be shielded to reduce interference.
Diagnostics	Power-on self test, local analog loop, local digital loop, remote digital loop
Indicators	LEDs for Transmit Data, Receive Data, Carrier Detect, various speed indicators, Off Hook, Terminal Ready, Error Correction, and Fax
Speaker	1-inch speaker for call progress monitoring
Speaker and Microphone Jacks	MultiModemZDXV and MultiModemZDXVe
Manual Controls	Power switch
Operating Temperature	Temperature range 0°–50°C (32°–120°F); humidity range 20–90% (non-condensing)
Power Requirement	115 VAC, 60 Hz, 16 W; 230V/50 Hz optional (international)
Power Consumption	5 Watts
Dimensions	cm: 14.8 long × 10.8 wide × 2.6 high inches: 5.7 long × 4.25 wide × 1.15 high
Weight	grams: 224 ounces: 8
Limited Warranty	10 years

Appendix C: Loopback Tests

Introduction

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

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

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

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

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

Note: All loopback tests should be run at 9600 bps without error correction.

Local Analog Loopback Test (V.54 Loop 3)

In this test, data from your computer or terminal is sent to your modem's transmitter, converted into analog form, looped back to the modem's receiver, converted into digital form, and then sent to your monitor for verification. No connection to the phone line is required.
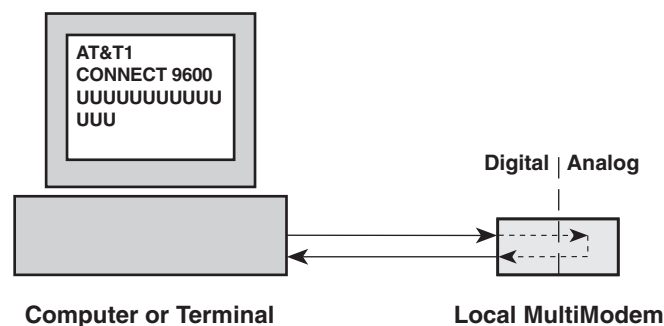
Figure C–1. Local analog loopback test.

Test Procedure

1. Connect the modem to your computer. Using your communication program, set the desired baud rate and go into terminal mode.

2. Type **AT** and press ENTER; you should get an *OK* message. Type **AT\N** and press ENTER to disable error correction.

3. Type **AT&T1** and press ENTER. This places your modem in analog loopback mode in the originate mode. A *CONNECT* message should appear on your display. The modem is now out of command mode and in a pseudo-online mode.

4. Note that the CD indicator is on. If it is not on, there could be a problem with your modem.

5. Enter characters from your keyboard. For this test, typing multiple uppercase *U* characters is a good way to send an alternating test pattern of binary ones and zeros. The characters entered should be displayed on your monitor.

6. To exit the test, type the escape sequence **+++AT** and press ENTER. This puts the modem in online command mode. Then type either **AT&T** or **ATH** to return to command mode.

7. Your modem passes this test if the data received on your monitor is the same as the data entered from your keyboard. If different data appears 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.
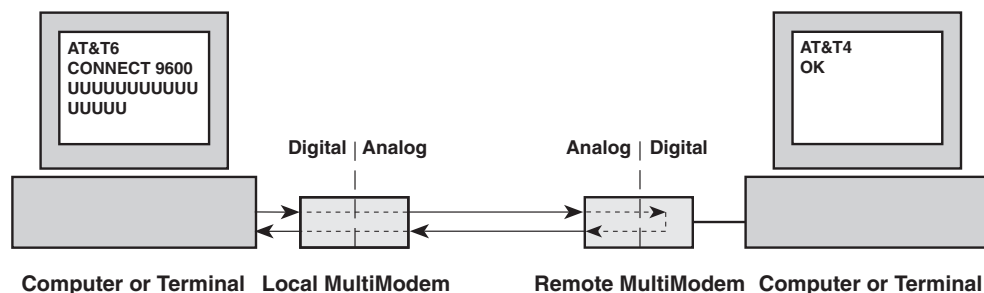
Figure C–2. Remote digital loopback test.

Test Procedure

1. Arrange to have **&T4** set on the remote test modem. This command enables the remote modem to respond to an **&T6** request for a remote digital loopback test from the local modem.

2. Open your communications software and go into terminal mode. Type **AT** and press ENTER; you should get an *OK* message. Type **AT\N** and press ENTER to disable error correction. Type **AT+MS=9,1,9600,9600** and press Enter to set the local modem to V.32 mode at 9600 bps.

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.
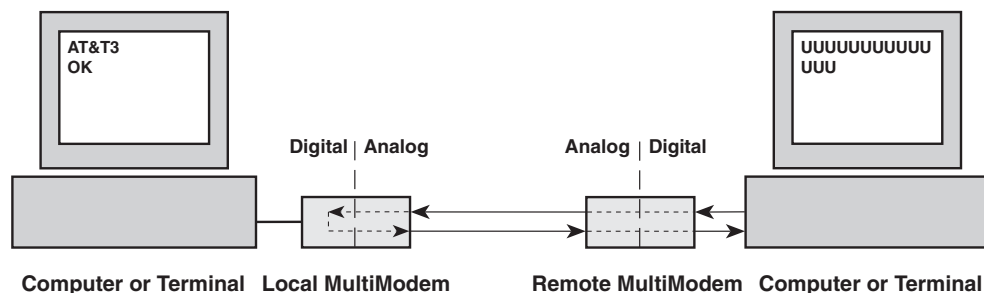
Figure C–3. Local digital loopback test.

Test Procedure

1. Open your communications software and go into terminal mode. Type **AT** and press ENTER; you should get an *OK* message. Type **AT\N** and press ENTER to disable error correction. Type **AT+MS=9,1,9600,9600** and press Enter to set the local modem to V.32 mode at 9600 bps.

2. Dial the remote modem and establish your online connection.

3. Type the escape sequence **+++AT** and press ENTER to bring your modem into online command mode.

4. Type **AT&T3** and press ENTER. Once you receive an *OK* message from your modem (if responses are enabled), your modem is placed in digital loopback mode.

5. Have someone enter data from the remote keyboard. For this test, typing multiple uppercase *U* characters is a good way to send an alternating test pattern of binary ones and zeros. The data received by your modem enters its analog receiver, is converted to digital data, is reconverted into analog, and then is transmitted back to the remote modem. Your modem passes this test if the data received on the remote monitor is the same as the data entered from the remote keyboard.

6. To exit the test, turn off the modem.

Appendix D: Warranty, Service, and Technical Support

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 proof of purchase is not provided, ten years from the date of shipment.

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

This warranty does not apply to any products that have been damaged by lightning storms, water, or power surges, or which 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.

Repair Procedures for U.S. and Canadian Customers

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

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

A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS.

Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

For out of warranty repair charges, go to *www.multitech.com/documents/warranties*

Extended two-year overnight replacement service agreements are available for selected products. Please call MTS at (888) 288-5470, extension 5308 or visit our web site at

http://www.multitech.com/programs/orc/ for details on rates and coverage's.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at (800) 972-2439 or email tsupport@multitech.com. Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (800) 328-9717 or (763) 717-5631, or email mtsrepair@multitech.com.

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

Repair Procedures for International Customers (Outside U.S.A. and Canada)

Your original point of purchase Reseller may offer the quickest and most economical repair option for your Multi-Tech product. You may also contact any Multi-Tech sales office for information about the nearest distributor or other repair service for your Multi-Tech product.

http://www.multitech.com/COMPANY/offices/DEFAULT.ASP

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

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you or email tsupport@multitech.com. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at

+(763) 717-5631 in the U.S.A., or email mtsrepair@multitech.com.

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

Online Warranty Registration

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

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

Replacement Parts

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

Mail: SupplyNet, Inc.
               613 Corporate Way
               Valley Cottage, NY 10989

Phone: 800- 826-0279

Fax: 914-267-2420

Email: *info@thesupplynet.com*

Internet: *http://www.thesupplynet.com*

Technical Support

Multi-Tech Systems has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, please call 800 972-2439 (USA and Canada) or 763 785-3500 (international and local). Please have modem information available. You can also contact Technical Support by e-mail at the following addresses:

U.S., Canada, and Europe: *support@multitech.com*

France: *support@multitech.fr*

India: *support@multitechindia.com*

U.K.: *support@multitech.co.uk*

Recording Modem Information

Complete the following information about your Multi-Tech modem before calling Technical Support.

Modem Model No.:_____

Modem Serial No.:_____

The model and serial numbers are printed on the bottom of the modem.

Note the status of the modem before calling Technical Support. The status includes information about LED indicators, screen messages, diagnostic test results, problems with a specific application, etc.

Internet Sites

Multi-Tech has a Web site at:
http://www.multitech.com

and an ftp site at:
ftp://ftp.multitech.com

Appendix E: Upgrading the Modem

Introduction

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

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

Upgrade Overview

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

1. Identify the model number and firmware version of your modem.

2. Identify the current version of the firmware at the Multi-Tech Web site. 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 or not you should update it.

1. Run your favorite terminal program. If you are using Windows 95, 98, 2000 or Windows NT, you can use HyperTerminal. If you are using Windows 3.1, 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. If the modem does not respond with *OK*, repeat the **AT&F** command.

3. Now type **ATI3** and record your results. The firmware version should appear first in the response, which should look **similar** to the following:

   `V2.300G-V90_2M_DLS`

Step 2: Identify the Current Firmware Version

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

1. Using your favorite Web browser, go to http://www.multitech.com/support/ MultiModemZDX/firmware.asp.

2. Scroll down the table to your modem model number.

3. Look at the firmware version number for your modem.

4. If the firmware version number matches the firmware version number found in "Step 1: Identify the Modem Firmware," your modem has the current firmware version, and does not need to be updated.

5. If the firmware version number is greater than the firmware version number found in "Step 1: Identify the Modem Firmware," your modem has an older firmware version. Continue with "Step 3: Download the Upgrade File."

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

Step 3: Download the Upgrade File

1. If you are not already at the MultiModemZDX firmware page of the Multi-Tech Web site, follow the procedure in "Step 2: Identify the Current Firmware."

2. Download the upgrade file for your modem by clicking its name, and save the file in a temporary folder on your hard disk.

3. In the same section of the Web page, download the Flash Wizard utility for your operating system by clicking it, and save it in the same folder.

Step 4: Extract the Upgrade Files

1. Install the Flash Wizard utility by double-clicking the file name in Windows Explorer.

2. Extract the upgrade files by double-clicking the file name. The extracted files include a .HEX file, which contains the upgrade data, and a Readme file.

3. Copy the upgrade .HEX file into the Flash Wizard folder, which, in a default installation, is at C:\Program Files\MultiTech Systems\Flash Wizard\.

Step 5: Clear Your Stored Parameters

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

1. Run your favorite terminal program. If you are using Windows 95, 98, 2000, or Windows NT, you can use HyperTerminal.

2. In the program's terminal window, type **AT&V** and press ENTER to list your modem's current parameters.

3. Record your parameters by saving the screens and sending them to your printer.

4. Type **AT&F** and press ENTER to clear your stored parameters and reset your modem to factory default.

5. Close the terminal program.

Step 6: Upgrade the Modem's Firmware

Before you begin the following procedure, read the README.TXT file extracted from the upgrade archive file. Note the file name for the boot code (e.g., 2MBPFL11.S37) and the file name for the new firmware (e.g., BkQg300G.hex).

Warning: Never install an older version of firmware over a newer version. Doing so will destroy the Flash PROM! If the Flash PROM is destroyed, the modem must be sent in for repair.

---

1. Run Flash Wizard by double-clicking its icon or file name, or by selecting it from the Start menu. The **Identifying Devices** dialog box is displayed as Flash Wizard locates and identifies the devices connected to your system.

   Note: If the message *ERROR: No valid devices detected* is displayed, verify that the device is powered on and that all cables are correctly and securely attached.

   ---

2. Click the modem to be upgraded, and then click **Next** to proceed.

3. Select the port to be upgraded from the **Port** list, select the appropriate .HEX file from the **Hex File** list, and then click **Next** to continue.

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

   ---

4. The **Progress** dialog box appears, showing a status bar that indicates the progress of the upgrade.

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

   ---

8. When the flash upgrade is complete, the message *Programming Complete* appears. Click **Next** to continue.

9. The **Results** dialog box appears next. Click **Finish** to exit Flash Wizard.

Step 7: Restore Your Parameters

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

Appendix F: Installing a Modem in Linux

Introduction

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

Standard Linux Serial Port Definitions

Port	Linux Port
Com 1	ttyS0
Com 2	ttyS1
Com 3	ttyS2
Com 4	ttyS3

Installation

Connect the external modem to an available serial port.

Setup

This section describes how to make sure Linux can talk to the modem and be able to dial up to the Internet.

Using the terminal program Minicom to verify operation

1. At the command prompt, type **minicom –s** and press ENTER.

2. Select **Serial port setup** and press ENTER.

3. From **Serial port setup**, use the A key to access **Serial Device**, and then press ENTER.

4. Press ESC.

5. You are now in the Minicom terminal. Type **AT** and press ENTER. The screen should display **OK** to verify the operation. Alternately, dial a phone number to verify line operation

6. To leave Minicom, press CTRL + A, and then press Z.

7. On the help menu, press X to exit.

Using the modem to call the Internet

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

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

Calling the ISP

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

That's basically it. Linux can use different programs and desktops depending on who made the Linux operating system and what version it is. The above procedures use the most commonly installed components of Red Hat 6.2. More details can be found in in the Linux OS owner's manual.

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

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