

56K Owner's Manual

56Kbps/V.34 Data with 14.4Kbps Fax

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Contents

INTRODUCTION.....	5
WHAT YOU NEED TO USE YOUR FAXMODEM	6
DOCUMENTATION CONVENTIONS	7
CHAPTER 1 INSTALLATION.....	8
INSTALLING AN EXTERNAL FAXMODEM	8
INSTALLING AN INTERNAL FAXMODEM	12
<i>Installing an Internal Card in Your Computer</i>	12
SETTING UP YOUR FAXMODEM FOR WINDOWS 95	15
PROBLEMS WITH PLUG AND PLAY SETUP	16
<i>Using the Hardware Conflict Wizard</i>	16
<i>Changing the COM settings in BIOS</i>	17
SETTING UP YOUR INTERNAL FAXMODEM WITH SOFTWARE UNDER WINDOWS 3.1 OR 3.11	19
<i>A Note About IRQs and Conflicts</i>	20
SETTING UP YOUR INTERNAL FAXMODEM WITH JUMPERS	22
<i>For MS-DOS Users</i>	22
<i>For Windows 3.1 or 3.11 Users</i>	23
<i>For Windows NT Users</i>	23
CHAPTER 2 USING THE FAXMODEM	25
USING FAX AND DATA COMMUNICATIONS SOFTWARE	25
<i>Tips for Selecting Setup Options</i>	25
INITIALIZATION STRINGS.....	26
USING AT COMMANDS	27
RETURNING TO THE FACTORY SETTINGS	29
CHAPTER 3 PROBLEMS AND SOLUTIONS	30
GENERAL TROUBLESHOOTING	31
ECHO TROUBLESHOOTING	34
DIAL TROUBLESHOOTING.....	34
ON-LINE TROUBLESHOOTING.....	35
APPENDIX A: 56K - QUESTIONS & ANSWERS	40
APPENDIX B: PRODUCT SUMMARY	42
APPENDIX C: PRODUCT SPECIFICATIONS	44

APPENDIX D: JUMPER SETTINGS FOR INTERNAL MODEMS.....	45
JUMPER BLOCK LOCATIONS	45
FOR WINDOWS 95 USERS	46
FOR WINDOWS NT AND OTHER NON-PNP USERS	46
PORT AND IRQ SETTINGS	47
APPENDIX E: AT COMMANDS.....	48
APPENDIX F: S REGISTERS.....	55
APPENDIX G: RESULT CODES	59
APPENDIX H: REGULATORY INFORMATION.....	62
FCC PART 68 TELECOMMUNICATIONS STATEMENT.....	62
INDUSTRY CANADA ATTACHMENT	63
CANADIAN EMISSIONS STATEMENT	64
INDEX	65

Introduction

Congratulations! Your 56K Faxmodem is a powerful, flexible tool that will help you manage your communications, work more efficiently, and present a polished and professional image at home or at the office.

This product includes high-speed data and fax capability with the ability to receive data from compatible central sites at speeds up to 56 Kbps, and even higher rates using data compression.

As discussed in Appendix A, your faxmodem's ability to achieve speeds above 33,600 bps depends on your calling a compatible central site such as a compatible Internet Service Provider (ISP), online service, or corporate network. It also depends on the characteristics of the phone line connecting your modem to the local telephone office.

Your 56K Faxmodem can also perform as a top-of-the-line V.34 data and fax modem, operating at speeds up to 33.6 Kbps.

This manual is primarily an installation, troubleshooting, and reference guide. Once you have successfully installed the modem in your IBM PC-compatible computer, software controls virtually all access to the fax and data product features.

While many data communications features can be controlled using AT commands and S registers, there is rarely any reason to do so. The software shipped with this product allows you to change your modem's configuration and to control the communications features easily.

Summaries of AT commands and S registers have been included in this manual primarily for programmers and in the interest of tradition and completeness.

The use of AT commands and S registers is neither required nor recommended for the average user.

This owner's manual is organized as follows:

Introduction (this section) lists the items you will need to use the modem.

Installation (Chapter 1) explains how to install the modem.

Using the Faxmodem (Chapter 2) provides tips for setting up your software.

Problems and Solutions (Chapter 3) provides information to assist you if you have problems.

The Appendixes provide additional information for a number of topics including tables that summarize AT commands and S registers.

Follow the **Quick Start** guide's instructions for quick installation of the hardware and software that is included with this product. If you have questions that are not answered in the **Quick Start** guide, follow the instructions provided with your fax and data communications software to install and use those programs.

What You Need to Use Your Faxmodem

Make sure that you have received the following items:

- Faxmodem
- Phone cord
- Power adapter (for external models only)
- Fax and data communications software on floppy disks. These floppies also contain some helpful installation utilities for non-Plug and Play systems.

To use the faxmodem, you also need the following:

- For internal models, a computer with an available IBM PC-compatible 16-bit ISA or EISA Bus slot.
- For external models, an available serial port (also called an RS-232 port, COM port, or modem port).

- A serial cable with hardware flow control (external model only).
- A telephone line connection (typically, a wall-mounted telephone jack or socket) that lets you plug in a single-line telephone.
- A tool, if necessary, for removing and putting back the computer cover (internal model only). (See your computer's manual.)

Documentation Conventions

- In this manual we may use the terms "faxmodem," "modem," and "product" interchangeably. Occasionally you may find that other manuals use the term "modem board" or "card" to refer to the modem.
- Commands and command examples described in this guide appear in bold type. For example: To reset the modem, type **ATZ** and press **Enter**.
- Occasionally we insert spaces between commands to make a command line easier to read. You can type the command line with or without spaces between commands as long as the command line does not exceed 40 characters.
- "**0**" in a command line indicates the number zero, not the letter "O".

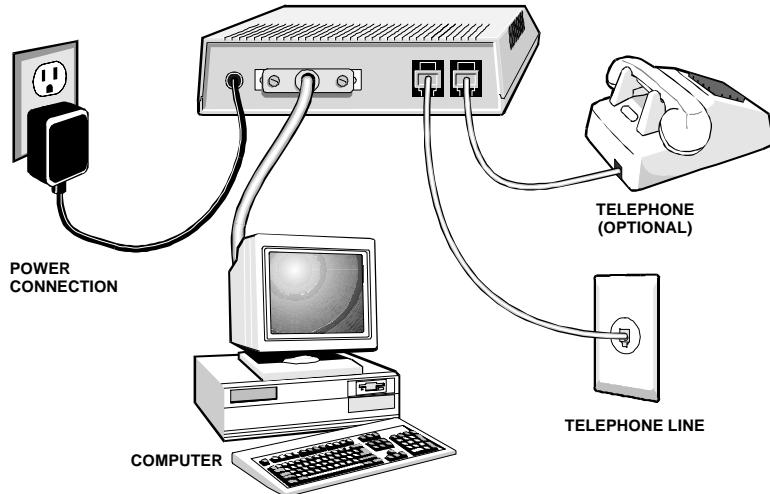
Chapter 1 Installation

This chapter explains how to install external and internal faxmodems.

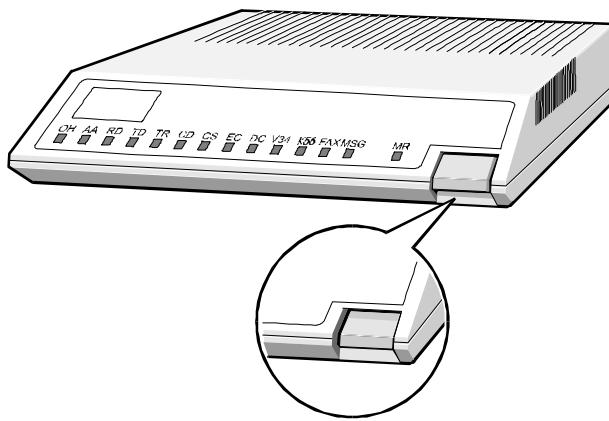
Installing an External Faxmodem

To connect the external faxmodem

- 1 Turn off the computer.**
- 2 Connect the faxmodem-to-computer cable.** Plug one end of the cable into the wide connector on the back of the faxmodem. Plug the other end into the serial port in the back of your computer.
- 3 Connect the telephone cord.** Plug one end of the cord provided with the modem into the **PHONE LINE** jack on the back of the faxmodem. Plug the other end into the telephone line connection (typically mounted on a wall), just as you would a standard telephone. You can plug a telephone into the faxmodem's other jack, marked **PHONE**. The faxmodem works with or without a telephone connected to it.
- 4 Connect the power adapter.** Plug one end of the power adapter into the back of the faxmodem. Plug the other end into an available electrical outlet. You can leave the power adapter plugged in when you are not using the faxmodem.



- 5** Turn the computer back on.
- 6** Turn the faxmodem on by pushing in the power button on the front, as shown in the illustration below.



The modem performs a brief self-test.

After the self-test, the front panel status lights or LEDs show the faxmodem's current state. The **MR** light should be on, which shows the faxmodem is ready for use.

Now you can install your fax and data communications software. Follow the instructions provided with the enclosed software, and turn to Chapter 2.

Summary of the Indicator Lights (external modems only)

Light	Description
OH (Off Hook)	Lights when the faxmodem is off hook.
AA (Auto-Answer)	Blinks on or off when detecting incoming ring.
RD (Receive Data)	Light flashes when data is sent from the faxmodem to your computer or other serial device. At high speeds light may appear on.
TD (Transmit Data)	Flashes whenever data or commands are transmitted from the serial port of your computer or other device to the faxmodem.
TR (Terminal Ready)	Lights when the computer is ready to send or receive data. Indicates the status of the DTR signal from the terminal or computer. NOTE: This light does not work on a Mac, because the Mac uses its control line for hardware flow control.
CD (Carrier Detect)	Lights when the Data Carrier Detect (DCD) signal from the faxmodem to the computer is on.
CS (Clear to Send)	Lights when the faxmodem can accept data from the computer. The light will turn off when the faxmodem is set for flow control (AT command &K3) and the faxmodem's data buffer is full, preventing data flow from the computer.
EC (Error Correction)	Lights when sending data using V.42 or MNP 4 error correction.
DC (Data Compression)	Lights when using V.42bis or MNP 5 data compression.
V.34	Lights when operating in V.34 mode.
K56	Lights when communicating in K56Flex™ mode.
FAX	Lights when fax connection has been made to a remote faxmodem.
MSG	Used by some software products. Lights when faxes are waiting.
MR (Modem Ready)	Lights when the faxmodem is turned on. Flashes when the faxmodem is in self-test mode.

Installing an Internal Faxmodem



CAUTION

Do not handle any internal modem card when the phone line is plugged into it. The voltages present when the line is ringing are potentially harmful.

If you ever need to remove the card from your computer for any reason, simply remove the phone line from the internal card before handling it.

IMPORTANT NOTICE

If you use Windows 95

As it comes from the factory, your internal faxmodem is Plug and Play compatible with Windows 95. You don't need to move any jumpers on the board.

If you use Windows 3.1 or 3.11

We recommend that you set up your faxmodem with jumpers by skipping to page 22 before continuing with step 1 below. You also may choose to set up this faxmodem using the software procedure beginning on page 19, but this may cause problems if you have another software-configured card in your computer. If you still want to use software configuration, continue with step 1 below.

If you use Windows NT or MS-DOS

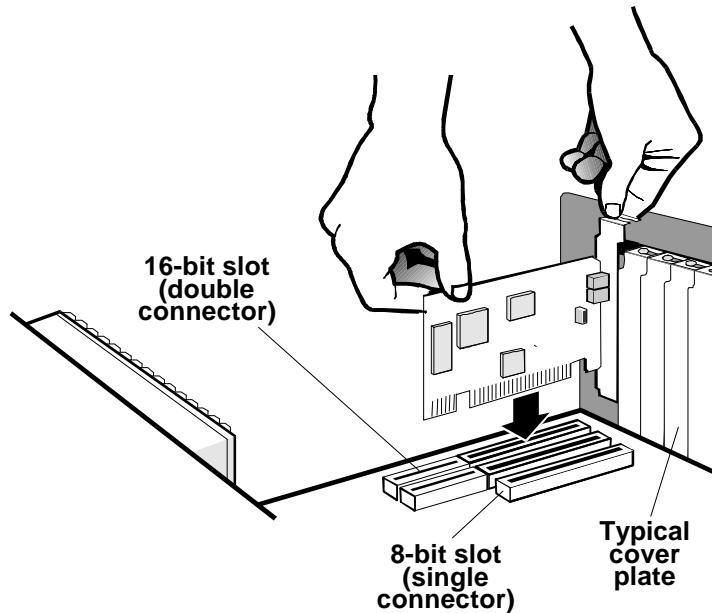
To configure the card for use with a Windows NT Server or Workstation, you must set one or more jumpers before installation. Skip to **For Windows NT Users**, page 23, before continuing with step 1 below.

Installing an Internal Card in Your Computer

- 1 Before you start the hardware installation, turn your computer off and unplug it.** Don't plug it back in or turn it on until you complete the faxmodem

hardware installation. Remember, your computer should be located near a phone jack.

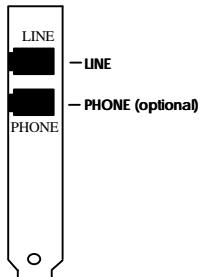
- 2** **Take the cover off your computer.** This is a little different for every computer. If you are not familiar with the procedure, consult your computer's manual for more detailed instructions.
- 3** **Locate an available 16-bit slot** (see the illustration below).
Note that the faxmodem has two sections of gold connecting fingers. A 16-bit slot has double connectors to match the fingers.
- 4** **Unscrew and remove the metal cover plate** on the rear of the computer that lines up with the 16-bit slot. This plate is similar to the bracket on the faxmodem.
Put the plate and screw aside.
- 5** **Plug the faxmodem firmly into the 16-bit slot.** Be sure that the bracket is lined up properly, then screw the bracket into the computer with the screw you removed with the cover plate.



6 Replace the computer cover.

7 Connect the telephone cord.
Plug one end of the phone cord into the jack marked **LINE**. Plug the other end into a phone jack (where you would normally connect a phone).

You can also plug a regular telephone into the jack marked **PHONE**. The telephone shares the phone line with the fax-modem and works as a normal telephone when the faxmodem is not in use.



8 Plug in your computer and turn it on.

9 If you set up your modem using jumpers (all MS-DOS and most Windows 3.1 and 3.11 users), your modem is installed and you can move on to Chapter 2. **If you are running Windows NT**, return to page

24. **If you are running the Windows 95**, proceed to the next section.

Setting Up Your Faxmodem for Windows 95

If you are running Windows 95, your faxmodem is automatically detected by the Plug and Play feature of the Windows 95 operating system. Follow the procedure below to complete your faxmodem setup.

- 1** **Restart your computer.** As the Windows 95 operating system boots up, it displays a **New Hardware Found** dialog box on your screen for a few seconds with the identifier name (**Internal 56K Faxmodem (PNP)** or something similar) of your faxmodem.
- 2** In the **New Hardware Found** dialog box, you have three choices for installing a “driver.” The default choice is for the driver to be installed from a disk provided by the hardware manufacturer. **Highlight this selection if it's not already highlighted and click OK.**
- 3** Win95 displays an **Install from Disk** dialog box. It lists **A:** as the default drive.
Make sure that correct drive is designated in the dialog box (A: is probably correct). Insert the **COMit** Disk in the drive and click **OK**.
Windows 95 auto-detects the correct files and copies them.
- 4** Windows 95 continues its startup procedure. Once the system is completely booted up, you should determine what COM port your faxmodem is set to. To do this, double-click the **My Computer** icon. When the **My Computer** window opens, double-click the **Control Panel** icon. Inside the **Control Panel** window, double-click the **Modems** icon. In the **Modems Properties** dialog box, select this product, which should be listed as a modem found by the system. Then click **Properties**. Your faxmodem's properties are listed in a **Properties** dialog box. In the **Port** box, it lists your **Communications Port** and then, in parentheses, the COM number.

Make a note of this port setting and write it in the **Important Information** table in the Quick Start (or in some other easy-to-find place). The COM port information is important because you will be asked to set the COM port when you configure your software applications.

If you've encountered no problems, your modem is installed and you can move on to Chapter 2. If you are having problems, continue below.

Problems with Plug and Play Setup

If this setup doesn't proceed properly, read and perform the following steps before calling Tech Support.

Using the Hardware Conflict Wizard

Windows 95, with its Plug and Play feature, is a major improvement over previous versions of Windows. But under some circumstances, Plug and Play may not resolve all installation problems.

For example, if you have a lot of optional hardware installed in your computer, you can still encounter a problem installing your modem. Conflicts may arise when you have a sound card installed, or a graphics tablet, a second printer, or a combination of these. The problem is insufficient COM port and interrupt (IRQ) resources.

The Windows 95 Help system has an excellent tool (called a "wizard") for thoroughly diagnosing and solving many of your problems. To use this procedure, do the following:

- 1** Double-click the **My Computer** icon on your desktop.
The system displays the **My Computer** window.
- 2** Choose the **Help Topics** command in the **Help** menu.
Windows 95 displays the **Windows Help** dialog box.
- 3** Select the **Index** tab.

- 4** Type:

plug

Windows Help automatically scrolls to **Plug and Play hardware**.

- 5** Under the topic **Plug and Play hardware**, select **troubleshooting**.
- 6** Click the **Display** button.
Windows Help displays the Hardware Conflict Troubleshooter.
- 7** Follow the instructions for determining if there is a hardware conflict and resolving the conflict.

This should cure your problem. If it does, **your faxmodem hardware is installed!** Remember to write down your COM port and IRQ settings. Turn to Chapter 2 to learn about using your modem with fax/data software.

If you still have problems, it probably means that although you are running Windows 95, which supports Plug and Play, you may have an older computer that is not completely compatible with this feature. Try the steps in the next section.

Changing the COM settings in BIOS

This procedure is a little more difficult than the previous one, but with the help of your computer's documentation you should be able to clear up any remaining problems.

In your computer's documentation, find the section on the **BIOS Setup** program. (BIOS stands for Basic Input/Output System.)

- 1** Shut down your computer and restart it.
- 2** Enter the **BIOS Setup** program, as described in your computer's documentation, and disable COM2.
NOTE: Some computers may not use the BIOS settings to control the COM ports. Check your computer's documentation to see if you have to reset the computer's jumpers or switches instead.

- 3** Write down and save the new COM port and IRQ settings and exit Setup.
The BIOS automatically reboots your computer.
- 4** In Windows 95, choose **Control Panel** from the **Settings** command in the **Start** menu.
- 5** Double-click the **System** icon.
- 6** Click the **Device Manager** tab.
- 7** Find the **Ports (COM & LPT)** device and click the **+** sign.
This expands the device list under **Ports**.
- 8** Select Communications Port (COM2).
- 9** Click the Remove button in the Device Manager window.
This removes the device currently assigned to COM2.
- 10** When Windows 95 displays the **Confirm Device Removal** warning, Click **OK**.
- 11** Double-click **Modem** in the **Device Manager** window.
- 12** Double-click the **Faxmodem** icon for your model.
- 13** Click the **Resources** tab.
- 14** Uncheck the **Use automatic settings** checkbox.
- 15** Scroll through the **Basic configuration** options until you find the one that displays the **Input/Output Range 02F8 - 02FF** and **Interrupt Request 03**.



- 16** This is COM2. The **Conflicting device list** box should say **No conflicts**. If there are conflicts, call Tech Support.
- 17** If there are no conflicts, close the **Modem Properties** window, **System Properties** window, and **Control Panel** window by clicking OK for each.
- 18** Restart Windows 95.
If Windows finds your other serial port, it may try to assign the port to COM2, but won't be able to because your faxmodem is already using that system resource.
If you are successful at this point, you can move on to Chapter 2.

Setting Up Your Internal Faxmodem with Software Under Windows 3.1 or 3.11

As discussed on page 12, most Windows 3.1 or 3.11 users are better off using jumpers to set up their internal faxmodem. The following instructions are for users who want to use software to configure their modem.

To run the SETPORT utility from your DOS prompt go to the Program Manager, then go to the **File** menu and click **Close**. Then follow these steps:

- 1** Insert the disk labeled COMit Disk 1 in your floppy drive.
- 2** From the DOS prompt, type **A:** (or the drive letter of the correct drive) and press **Enter**. At the **A:** prompt, type **cd setport** and press **Enter**. This opens the SETPORT directory.
This directory contains utilities that help you configure your faxmodem's COM port and IRQ settings.
- 3** Type **setport 3** and press **Enter**. The program tries to set up the faxmodem on COM 3. In almost all circumstances, **setport 3** successfully sets the modem to COM3 and a free IRQ, usually 12 or 11.
Once the program finds a free IRQ, it tries to communicate with the faxmodem using these settings. If successful, the program asks if you want it to automati-

cally modify your AUTOEXEC.BAT and SYSTEM.INI files.

We strongly recommend that you answer **Yes** to these prompts; otherwise, you will need to run the SETPORT utility each time you use your modem.

If unsuccessful, the software checks more IRQs until it finds one that works. The software checks the following IRQs in order: 12, 11, 15, 10, 7, and 5.

If you don't get an error message at this point and your computer does not start behaving erratically, skip to step 5; your faxmodem hardware is installed.

If you do have a problem, continue below.

4

Repeat step 3, but use COM 4 (i.e., type **setport 4** and press **Enter**). If COM 4 results in an error message, try COM 1 and then COM 2.

Even if SETPORT is successful, you may still run into a conflict with another peripheral, such as a mouse, a video card, or a sound card. This happens because SETPORT is unable to tell that a particular IRQ setting is already assigned to another device if that device is not being used at the time. If you get erratic behavior, such as inconsistent modem performance or a piece of hardware that stops working even though it worked before, read the next section, **A Note About IRQs and Conflicts**, for suggestions.

5

Write down the COM port and IRQ setting of your faxmodem in the Important Information page in the Quick Start, or some other easy-to-find place. The information is important because you may need to use it in setting up your software applications.

If you are successful at this point, you can move on to Chapter 2.

A Note About IRQs and Conflicts

While SETPORT.BAT and PORTWIZ.EXE do their best to configure your faxmodem on a free IRQ, it is possible that some of your other hardware is also configured to use that IRQ. That is why the programs first try to query the IRQs least likely to be used by your system.

In the unusual event that PORTWIZ configures your faxmodem to use a COM port/IRQ combination that conflicts with other hardware, either the faxmodem or the other hardware won't work properly. If that happens, you can run PORTWIZ by itself to try other COM port/IRQ combinations.

SETPORT copies PORTWIZ into the root directory (usually C:\) the first time you run it. After that, you can run PORTWIZ from the DOS prompt. You can specify a COM port and IRQ for PORTWIZ to try; the command format is:

portwiz <COM port hex address><IRQ number(s)></w>

where the COM port hex addresses are:

COM1 3f8 COM2 2f8 COM3 3e8 COM4 2e8

and /w activates the Wizard mode, in which PORTWIZ edits the AUTOEXEC.BAT and SYSTEM.INI files for you.

Examples:

1. To configure the faxmodem for COM4 and IRQ10, type:

portwiz 2e8 10

and press **Enter**. If this combination works, then put this line in your AUTOEXEC.BAT file and remember to edit the [386Enh] section of your SYSTEM.INI file as well. Add the lines:

**COM3Base=2e8h
COM3Irq=10**

You do not need to reboot in order to start using your faxmodem immediately in either DOS or Windows.

2. To configure the faxmodem to the same COM port and IRQ, but have PORTWIZ edit your AUTOEXEC.BAT and SYSTEM.INI files for you, type:

portwiz 2e8 10 /w

and press **Enter**. The /w activates the Wizard mode, which handles the file changes automatically.

3. If you are unsure of which IRQ to use, you can instruct PORTWIZ to try a series of IRQs in sequence. Use only IRQs 12, 11, 15, 10, 7, and 5 in that order. You may specify any or all of them in this example. You also may use the /w switch to activate the Wizard mode.

To set the faxmodem to COM 2 and test IRQs 12, 11, 7, and 5 in the Wizard mode, type:

portwiz 2f8 12 11 7 5 /w

and press **Enter**. Note there are no commas, but the spaces are required.

4. If you type:

portwiz

and press **Enter** without typing any arguments, PORTWIZ displays a list of instructions on the screen.

Setting Up Your Internal Faxmodem with Jumpers

This section is not appropriate for Windows 95 users. MS-DOS, Windows 3.1 or 3.11, and Windows NT users should read the appropriate instructions below.

For MS-DOS Users

If you are replacing an existing modem, remove the old one and check its jumpers for COM port and IRQ settings. (See your computer's documentation if you need help opening your computer and removing boards.) Write the settings down on the **Important Information** page in the back of your Quick Start.

Proceed to page 46 in Appendix D. Set the jumpers using the old modem's COM port and IRQ, and return to **Installing an Internal Card in Your Computer** on page 12.

If this is the first modem installed in your computer, use the ZPORTS utility to suggest a COM port and IRQ:

- 1** Insert the COMit disk in your floppy drive.
- 2** From the DOS prompt, type **A:** (or the drive letter of the correct drive) and press **Enter**.
- 3** Type:
zports
and press **Enter**.

ZPORTS searches for free resources and reports them to you on the screen. Write them down on the **Important Information** page in the back of your Quick Start. Proceed to Appendix D and set the jumpers. Then return to **Installing an Internal Card in Your Computer** on page 12.

For Windows 3.1 or 3.11 Users

If you are replacing an existing modem, remove the old one and check its jumpers for COM port and IRQ settings. (See your computer's documentation if you need help opening your computer and removing boards.) Write the settings down on the **Important Information** page in the back of your Quick Start.

Proceed to page 46 in Appendix D. Set the jumpers using the old modem's COM port and IRQ, and return to **Installing an Internal Card in Your Computer** on page 12.

If this is the first modem installed in your computer, use the ZPORTS utility to suggest a COM port and IRQ:

- 1** Insert the COMit disk in your floppy drive.
- 2** Exit Windows. From the DOS prompt, type **A:** (or the drive letter of the correct drive) and press **Enter**.
- 3** Type:
zports

and press **Enter**.

ZPORTS searches for free resources and reports them to you on the screen. Write them down on the **Important Information** page in the back of your Quick Start. Proceed to Appendix D, set the jumpers, and return to the actual installation of your faxmodem on page 12.

For Windows NT Users

Since Windows NT Workstation and Server do not support Plug and Play, you must set jumpers for a COM port and IRQ as described below.

- 1** If you are installing a first or additional modem and not replacing an existing one, you need to add a port using the **Ports** Control Panel. To do this, open the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click the **Ports** icon. Click **Add** and follow the screen prompts. Write down the port and IRQ numbers. Skip to step 4.
- 2** If you are replacing a modem, uninstall the existing modem using the **Modems** Control Panel. To do this, open the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click the **Modems** icon. Select the modem to be removed and click **Remove**. Follow the screen prompts.
- 3** Check the COM port configuration in the **Ports** Control Panel. Click **Settings** and **Advanced**. Write down the port and IRQ numbers.
- 4** Set the jumpers on your internal faxmodem as described in Appendix D, using the port and IRQ numbers from step 1 or step 3.
- 5** Install the faxmodem as described described in **Installing an Internal Card in Your Computer** on page 12. When you've finished and restarted your computer, return to this page.
- 6** Open the **Modems** Control Panel again and click **Add**. In the **Install New Modem** dialog box, check **Don't detect my modem; I will select it from a list**.
- 7** In the next dialog box, click **Have Disk**. Insert the COMit disk in your floppy drive.
- 8** Click **OK**. Windows autodetects the correct files. Follow the screen prompts and finish the installation.

Chapter 2 Using the Faxmodem

This chapter provides tips for setting up your communications software and using the modem. Just remember that you will not get 56K performance unless the modem at the other end also supports 56K speeds. (You can still use the modem at 33.6K or 28.8K, depending on the other modem.)

After you set up your software, you are ready to start using your faxmodem. The best way to get familiar with your software is to learn by doing. Get started! Try dialing a bulletin board or online service, or try calling a friend with a modem and transferring a file. Send a fax and have someone send one back to you.

Using Fax and Data Communications Software

See the Quick Start guide or the instructions included with your software for information about how to install and use the programs included with this product. If you run into difficulty with configuration, it may be helpful to read "Tips for Selecting Setup Options" below.

As explained earlier, software programs are designed as a simple, user-friendly interface that makes it easy to use the many features your faxmodem offers. However, first the software must identify the modem and its special capabilities. Many software programs identify the product automatically and configure themselves for the correct operating settings.

Installing your software takes you through a series of setup options. With virtually all commercially available software, selecting the correct description of the product during installation means that you can accept all of the default settings that the software suggests.

Tips for Selecting Setup Options

In setting up some older software programs, you may be asked to enter certain information. Most programs have default settings that are correct for use with this modem, and there is no need to change them. However, you should be aware of the following items:

- If you are asked to select the “modem type” from a menu, and you don’t see this modem listed by name on the menu, select the most descriptive name such as **Zoom K56Flex modem**, **Rockwell Based K56Flex modem**, **Hayes-compatible 56K modem** (with or without a specific speed), or generic **Class 1 Modem**. The more generic the type you choose, the less likely that the software will let you use some of the fax-modem’s advanced features, but the modem will perform basic communications and fax functions.
- In the dialing directory, **all entries should be set to the highest possible baud rate**. All communications between the computer and the modem take place at this higher speed, independent of the modem-to-modem speed. The modem auto-negotiates the highest speed connection between itself and the other modem.
- If there is a section of your software called “Terminal Settings,” make sure that **Hardware Flow Control (RTS/CTS)** is **ON** (or **YES**). This is necessary in order for V.42bis file transfers to work.
- Set **auto baud detect** to **OFF** (or **NO**).
- If your fax software gives you the option of selecting **Class 1 or Class 2 fax** drivers, select Class 1. The modem supports Class 1 only.
- Finally, some programs ask **“Send init if CD high?”**, which you should set to **YES**. Otherwise, the modem may not receive the proper initialization string.

Initialization Strings

An initialization string is a group of AT command settings that are sent to the faxmodem as soon as you start up the software. The software determines which commands go

into the initialization string based on the device you select during installation. The commands remain in effect throughout the communications session, unless the software sends other commands to override them.

The software uses other AT command strings for other purposes. For example, when you make a call, the software inserts AT commands in a *dial string* before the phone number you are calling. You typically can use the AT command strings that are provided with the software.

It is sometimes necessary to add other AT commands to the strings as suggested in the section **Tips for Selecting Setup Options** above and in Chapter 3. For a table of AT commands, see Appendix E.

- If your software suggests an initialization string for this modem, you should use it. If this modem is not listed by your software and no initialization string is suggested, use the following initialization string:

AT &F

NOTE: If you are familiar with AT commands and you save any settings in the modem's nonvolatile memory using the modem's **&W0** or **&W1** command, remove the **&F** from the initialization string. Otherwise, the contents of the initialization string overrides the saved settings.

- If the software does not provide a dial string, use **ATDT** if your phone line uses tone dialing (as most do), **ATDP** if the line uses pulse dialing.
- If your telephone service includes Call Waiting that you can temporarily suspend by pressing *70, include **ATDT*70**, in the dial string. (**NOTE:** Be sure to type the comma). (For pulse dialing, use **ATDT1170**, as the dial string.) For more information about handling Call Waiting contact your telephone company.

Using AT Commands

While using your software and modem you rarely, if ever, need to send AT commands directly to the modem. How-

ever, if you need to enter AT commands you must do so from the software's terminal mode.

To use AT commands in terminal mode

1. **Start your data communications program.**
2. **Change to terminal mode** (also called command, local, direct, or dumb mode).
3. **Type in the AT command you need and press Enter.**

When you finish, you can return to the data communications program's standard user interface. See the program's documentation if you need help.

Returning to the Factory Settings

To return to the factory default settings for the modem, in terminal mode, type **AT &F** and press **Enter**.

Chapter 3 Problems and Solutions

If your modem is not working, please read this chapter and the communications software documentation carefully.

For installation problems, see Chapter 1, **Installation**.

This chapter covers four categories: general troubleshooting, echo troubleshooting, dial troubleshooting, and on-line troubleshooting.

For help with this problem...	See page...
Your modem seems to install under Windows 95, but Windows later can't find it.	31
You have two faxmodems installed and neither of them works.	31
The software can't find the modem and the modem does not respond to AT commands.	31
The modem takes too long to hang up at the end of a call.	32
The modem fails to execute an AT command line.	32
No response appears after executing a command.	32
You receive an ERROR response.	33
You encounter other communications problems.	33
The modem speaker volume is too high or too low.	33
Each character appears twice on the screen or no characters appear at all during data mode.	34
The modem does not automatically dial a call when you send a Dial command line.	34
The modem can connect to some modems, but not to others.	35
The modem disconnects while communicating with a remote system.	37
The modem does not make a data connection.	37

continued on the next page...

For help with this problem...	See page...
You receive bursts of errors occasionally, but otherwise data quality is good.	37
Random errors occur in transmitted data.	38
Data is missing.	38
Data appears garbled on the screen.	38
The modem works fine when you are not using data compression, but the compression features are inoperative.	38

General Troubleshooting

Problem: Your modem seems to install under Windows 95, but Windows later can't find it.

Solution: If your computer has a built-in modem on the motherboard, Windows 95 may reinstall it the next time you start up. If you have this problem, consult your computer's documentation or call your computer's manufacturer to get instructions on how to disable the built-in modem.

Problem: You have two faxmodems installed and neither of them works.

Solution: It is currently not possible to run two or more internal Plug and Play faxmodems in Windows 3.1 or 3.11. One internal and one external will work, however.

Problem: The software can't find the modem and the modem does not respond to AT commands.
(The following comments apply to many other problems, as well.)

Solution: The most common error with modems is that the communications software is not configured for the same COM port as the modem. Check which COM port the modem is using. Make sure that the software's COM port setting matches the modem's COM port setting.

Problem: The modem takes too long to hang up at the end of a call.

Solution: Your modem may not be receiving the required initialization string, which should include the &C1 setting, from your software.

In your software, make sure you have selected your modem. If not, select it and exit and restart your communications software. If you still have problems, add &C1 to the initialization string and exit and restart the software. (See "Tips for Selecting Setup Options" in Chapter 2.)

Problem: You type an AT command line and press Enter, but your modem fails to execute the command line.

Solution: Be sure you type **AT** at the beginning of the command line.

Make sure the communications software is configured for the same COM port as your modem. For example, if the modem is configured for COM4, the software should be configured for COM4.

Be sure your modem is not in data mode when you type the command. Use the escape character sequence to switch to terminal mode. (The default escape sequence is to wait at least one second, type +++, and wait another second or more.)

Problem: No response appears after executing a command.

Solution: If you typed a command but did not receive an **OK** response from your modem:

Make sure the communications software and modem are configured for the same COM port.

The **E0** and **Q1** commands may be in effect, disabling echo and responses. Verify this with the **&V** command. To enable echo and responses type **AT E1 Q0** and press Enter.

Be sure your modem is in terminal mode and not in data mode when you type the command.

Problem: You receive an ERROR response when trying to execute a command.

Solution: Check whether you typed the command correctly.

Check whether the command is a valid one.

Be sure your command line contains fewer than 40 characters.

Problem: You encounter other communications problems with your modem.

Solution: Check that your communications software has been set up properly. Recheck the initialization string and dial string specified in your software manual. Remember that commands in the initialization string are sent to the modem each time you start your software and override the settings stored in the modem's nonvolatile memory.

On IBM PC-compatible computers, memory-resident (TSR) programs can cause a variety of problems for some fax software programs. Try starting up your computer without them. Examples of TSRs include antivirus programs, screen savers, and data protection software.

Problem: The modem speaker volume is too low or too high.

Solution: If the software allows you to control the volume, make sure the speaker is enabled and set to a comfortable volume.

If the software does not have speaker settings, add one of the AT commands listed below to the initialization string:

- L1** for low volume
- L2** for medium volume
- L3** for highest volume

For example, if you want the volume low and the software uses the initialization string **AT &F** change it to **AT &F L1**.

Echo Troubleshooting

Problem: **Each character you type appears twice or no characters appear at all during data mode.**

Solution: Make sure that your software is in full-duplex mode when you make a call. If the remote modem is not also in full duplex mode, change to terminal mode, type **AT E0** and press **Enter**. Then turn on your communications software's local echo. Your software now echoes commands during terminal mode and any typing performed during data mode.

Dial Troubleshooting

Problem: **The modem does not automatically dial a call when you send a Dial command.**

Solution: Make sure the modem speaker is turned on in your software so that you can hear dialing sounds. Also make sure that the phone line is plugged in.

Make sure that you are dialing a valid phone number, including any required dial prefixes.

If you are using tone dialing on a line that requires pulse dialing, the line may not be able to accept tone-dialed calls. Select Pulse dialing in your software or include the **P** command in place of **T** in your Dial command line to specify pulse dialing.

Make sure software dialing prefix is **ATDT** (for tone dialing) or **ATDP** (for pulse dialing).

Make sure your communications software and modem are configured for the same COM port.

Make sure your modem has hung up from the previous call. Select Hang Up in your software; or change to terminal mode, wait one second, type **ATH** and press Enter to hang up the modem.

On-line Troubleshooting

Problem: The modem can connect to some modems, but not to others.

Solution: If a remote modem does not respond because of the extended negotiation process, you may have to disable part or all of the negotiation process. In the following table, "protocol" means error correction and data compression. Note that the first two lines in the table are likely to be the most valuable.

NOTE: In the command strings shown in the table that follows, the character after "N" is zero, not the letter "O."

To force the different communication speeds...	Type these commands and press Enter
Negotiate speed and protocol (default setting)	AT &F
Negotiate speed only, do not use protocol	AT \N0
Connect at 56000 bps (V.34)	AT +MS=56
Connect at 33600 bps (V.34)	AT +MS=11
Connect at 14400 bps (V.32bis)	AT +MS=10
Connect at 9600 bps (V.32)	AT +MS=9
Connect at 2400 bps (V.22bis)	AT +MS=2
Connect at 1200 bps (V.22)	AT +MS=1
Connect at 1200 bps, no protocol	AT \N0 +MS=1
To force Protocol...	AT \N3
To force no Protocol...	AT \N0

NOTE 1: You may find it necessary or helpful to include S95=44 in your initialization string. This enables the responses CARRIER (telephone line speed) and PROTOCOL, as well as CONNECT (faxmodem-to-computer speed).

NOTE 2: Some software allows these commands to be added to the list of dial prefixes.

There are other configurations that can be forced as well. If you need to select a particular configuration, use the AT command strings shown below. You can always return to the modem's default configuration by typing **AT &F** and pressing the Enter key, but remember that if you do that, the modem will not have received the commands in your software's initialization string, as it normally would. Using the ATZ command overcomes this problem if you have saved all of your setup parameters in nonvolatile memory. (To save setup parameters in nonvolatile memory in AT terminal mode: Type **AT**, followed by the parameter settings you choose, followed by **&W0** or **&W1**, and press **Enter**. For example, if you type **AT &C1 &D2 &W0** and press **Enter**, the **&C1** and **&D2** parameter settings are stored in Profile 0. See Appendix E for the table of AT commands.)

To force...	Type these commands and press Enter
MNP5/MNP4 operation	AT \N5
LAPM only	AT \N4
MNP4 only	AT \N5 %C0
MNP 10 operation	AT -K1 -SEC=1
"Normal" operation (The fax-modem will communicate without any error correction or data compression, but will retain speed buffering and auto-speed negotiation. It should not be confused with the "standard" configuration.)	AT \NO

Problem: Your modem disconnects while communicating with a remote system.

Solution: The remote system has hung up.

The telephone line disrupted your call. If your telephone service includes Call Waiting, turn it off if possible before making modem calls. Ask your telephone company if you can temporarily disable Call Waiting by pressing *70, or another code. If so, include *70, (the comma is part of the code) or the other code as a prefix with the telephone numbers in the software's dialing directory. Or you can add *70, or the correct code to the dial string (be sure to include the comma). Note that this helps with outgoing but not incoming calls.

Problem: Your modem does not make a connection.

Solution: If your modem places calls but never makes a connection, make sure you are dialing the right number.

The remote modem may be turned off.

Problem: You receive bursts of errors occasionally, but otherwise data quality is good.

Solution: The connection may have been established on poor-quality or noisy telephone lines. Hang up and place the call again to try to obtain a better connection.

Someone may be picking up an extension connected to the line that your modem is using. If the modem is sharing a telephone line with other telephones, inform the other users when you will be making a data call.

Your telephone line may have a Call Waiting feature and a call is being received. See Call Waiting discussion above.

Problem: Random errors occur or data is missing in transmitted data.

Solution: Use the MNP or V.42 protocol if the remote modem supports one of these protocols. See the table on page 36 for more information.

Select a lower baud rate in your communications software and place the call again.

If both modems are using the MNP or V.42 protocol, the only way this can occur is if your modem and communications software are not using the appropriate flow control. Configure your communications software for RTS/CTS (hardware) flow control. Your computer will now pause for the transmission to be stored.

Problem: Data appears garbled on the screen.

Solution: Your communications software character setup (start bit, data bits, stop bits, and parity bit) does not match that of the remote system. Check your settings against those used by the remote system and make sure they match. Pay particular attention to the parity setting, as this is the most common difference among systems. You should normally use 8 data bits, NO parity, and 1 stop bit (8, NONE, 1). The second most common setting is 7 data bits, EVEN parity, and 1 stop bit (7, EVEN, 1).

Problem: Your modem doesn't seem to be compressing the data.

Solution: The compression features are on by default, but check the following:

Your software needs to use a streaming protocol, such as Ymodem-G or Zmodem. Xmodem and Ymodem are not adequate for compression.

Your software must be set up so that your modem is using hardware flow control (RTS/CTS ON).

To get maximum data throughput, you can use a computer-to-modem speed of 230,400 bps (if your COM port can support this speed); set this for each entry in the dialing directory.

Be aware that many files downloaded from bulletin boards have already been compressed. In general, your modem will not be able to further compress such files.

Appendix A: 56K - Questions & Answers

Q: What is 56K?

A: 56K is a high-speed data technology that lets you receive data from a compatible Internet Service Provider (ISP), online service, or corporate LAN over standard phone lines at uncompressed speeds up to 56 Kbps, roughly twice as fast as a conventional analog modem. Data going in the other direction is transmitted at normal modem speeds up to 33.6 Kbps.

When 56K is not supported or a 56K connection cannot be established for any reason, the 56K FaxModem works like a regular 33.6 Kbps faxmodem.

Q: Why can't I use the 56K FaxModem to send data at 56 Kbps?

A: Sending 56 Kbps requires special equipment connected to digital phone lines (like ISDN or T-1). The 56K FaxModem is optimized for browsing the Internet and World Wide Web or downloading information from a "central site" like an ISP, online service, or corporate network.

Q: Does the 56K FaxModem support a 56 Kbps standard?

A: There is currently no approved international standard for 56 Kbps data communications over analog lines. However, the *K56Flex* standard is a joint development of Rockwell and Lucent Technologies (formerly AT&T), two of the largest suppliers of modem technology in the world, and is being supported by over 100 modem companies, the majority of central site equipment providers, and over 300 Internet Service Providers and online services. The competing approach, *x2™*, has far less support.

No one can commit to compatibility or upgradeability with a final standard that does not exist yet. Even so-called

“software-upgradeable” modems may lack the appropriate hardware to meet final requirements. To ensure its continuing viability, Rockwell and Lucent have committed to making any international standard 56K products compatible with *K56Flex*.

Q: How do I know if my ISP or online service is supporting *K56Flex*?

A: Many ISPs and online service providers use Rockwell technology exclusively and most others use mixed technology that includes Rockwell. Therefore the likelihood is that *K56Flex* will be supported at some point by your service provider. Of course, some providers will implement 56K technology faster than others. The best way to determine whether you can use 56K is to ask your service provider. Remember to make sure that they are supporting the *K56Flex* standard.

Q: How can I tell whether my local phone line lets me benefit from 56K technology?

A: 56K provides speeds significantly higher than 33,600 bps for over 80% of local phone lines. There are two ways to tell whether 56K is likely to work for you. If you have a V.34 modem and regularly connect at speeds of 21,600 bps or higher, 56K will likely work for you. If you are 3½ miles or less from the telephone switching office, as are most city and suburban phone lines, you will also be likely to benefit from a 56K modem.* Some rural phones may be further away, making 56K communication unreliable or impossible.

* To determine your approximate distance from your telephone switching office (also called “central office”), you should call your local telephone company service representative (the number is in your phone book). Give them your phone number and ask them for the address of the central switching office that handles your calls. Then look up the address on a local map and estimate the distance between your location and the “central office.” If it’s less than 3½ miles, your phone line probably supports 56K technology. If it’s more than 3½ miles, it probably doesn’t.

Appendix B: Product Summary

This modem hardware supports the following standards, functions, and features:

Data speeds:

- 56,000 bps receive/33,600 send with K56Flex
- 300 to 33,600 bps full-duplex with international standards
- Data throughput up to 230,400 bps using compression

Data Standards:

- K56Flex, V.34, V.32bis, V.32, V.23, V.22bis, V.22 A/B, V.22, V.21, Bell 212A, and Bell 103 protocols
- V.42, MNP® 2–4, and MNP 10 error correction
- V.42bis and MNP 5 data compression
- MNP 10ECT™ enhanced cellular performance
- H.324 compliant (videophone-ready)

Fax speeds:

- 2400 to 14,400 send/receive fax

Fax Standards:

- V.33, V.29, V.17, V.27ter, and V.21 channel 2
- Class 1, Group 3 fax

Approvals:

- FCC Part 15b and Part 68 Telecommunications approval; Industry Canada Emissions and Telecommunications approval; UL Recognized (internal); UL Listed (external)

Features :

- “Plug and Play” compatible and software configurable
- Jumper selectable for Windows NT and other non-Plug and Play computers (internal model)
- Buffered 16550 UART to reduce PC interrupts and boost performance (internal model)
- Auto-negotiation of highest mutually supported level of error correction, data compression, and modem speed

- Auto fallback/fall forward on initial connection and during call
- Compatible with AT commands and S registers
- Line quality monitoring and auto-retrain
- Flow control and speed buffering
- Automatic terminal-to-modem speed sensing to 230,400 bps
- Auto-dial/auto-answer
- Tone, pulse, and adaptive dialing
- Automatic self diagnostics
- Digital and analog loop-back diagnostics
- Automatic adaptive equalization
- Nonvolatile RAM for storage of up to four 30-digit telephone numbers and alternate configurations
- Automatic gain control
- Inactivity timer (when set, hangs up if no data in programmable time from 1 to 42 minutes)
- Call progress tone decoding - busy, ring, dial tone
- Calling tone detection for both fax and data
- Distinctive Ring support
- Dual RJ-11 telephone jacks - one for phone line, one for optional phone
- Telephone cable with RJ-11 connectors
- Power adapter (external model)

Appendix C: Product Specifications

Internal

Configuration	Internal Card
Jacks	Two RJ-11 telephone
Size	2.70"(W) x 5.40"(L)
Height	0.75" maximum from top of board

Electrical Specifications:

Power Consumption:	1.5 Watts typical
---------------------------	-------------------

Performance Specifications:

Transmit Signal Level (Nominal)	-10 ± 1 dBm
Transmit Frequency Tolerance	± 0.01 percent
Receive Signal Level	-9 dBm to -43 dBm
Receive Frequency Tolerance	± 7 Hz

External

Configuration	External standalone
Jacks	Two RJ-11 telephone
Size	5.25" (W) x 6.50"(L)
Height	1.50"

Electrical Specifications:

Power Consumption:	1.5 Watts typical
---------------------------	-------------------

Power Cube	9 VDC, 600 mA UL and CSA Approved
-------------------	--------------------------------------

Fuse	2A fuse (not user-replaceable)
-------------	--------------------------------

Performance Specifications:

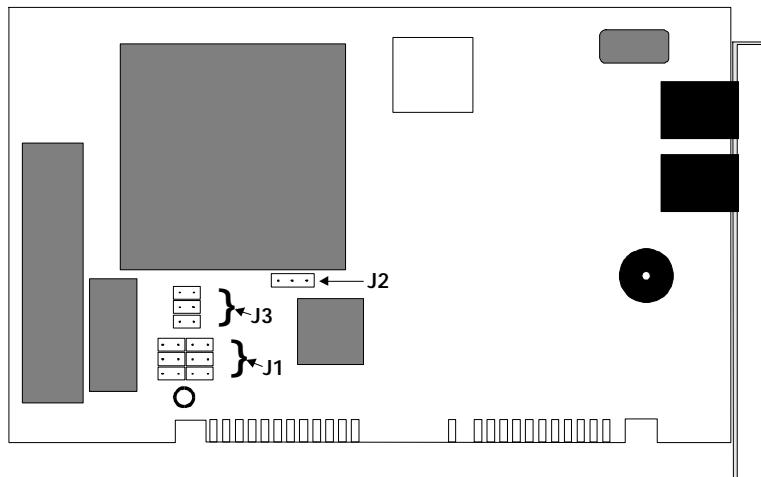
Transmit Signal Level (Nominal)	-10 ± 1 dBm
Transmit Frequency Tolerance	± 0.01 percent
Receive Signal Level	-9 dBm to -43 dBm
Receive Frequency Tolerance	± 7 Hz

Appendix D: Jumper Settings for Internal Modems

Internal 56K Faxmodems have jumpers that give you hardware control of the faxmodem's COM port, address, and the IRQ used by the port. The factory default settings are correct for users of Windows 95, where Plug and Play makes it unnecessary to move the jumpers.

Jumper Block Locations

This illustration shows the locations of jumper blocks J1, J2, and J3 referred to in the rest of this appendix.



Use jumper blocks 1 and 3 to manually set COM ports and IRQs. Use jumper block 2 to select between hardware COM port assignment and software COM port assignment.

- **Windows 95-based computers**, which support Plug and Play, can use software COM port assignment.
- **Windows 3.1- or 3.11-based computers** normally should use hardware COM port assignment, although

software configuration is possible, as discussed in the **IMPORTANT NOTICE** on page 12.

- **Windows NT and other non-Plug and Play computers** should use hardware COM port assignment.

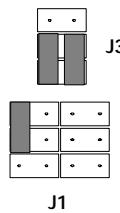
For Windows 95 Users

We strongly recommend that you let Plug and Play configure your faxmodem for you. At J2, the jumper should be in the default position, over the right and center pins:



J2

The jumper on J1 also should be in the default position, in the top-left corner. (It doesn't matter where the jumpers are at J3.)



If you want to set the port and IRQ manually, move the jumper at J2 to the left and follow the instructions in **Port and IRQ Settings** on page 47.

For Windows NT and Other Non-PnP Users

First follow the instructions beginning on page 22.

Setting Up Your Internal Faxmodem with Jumpers.

Then make sure the J2 jumper is over the left and center pins. This disables the Plug and Play feature on the board:

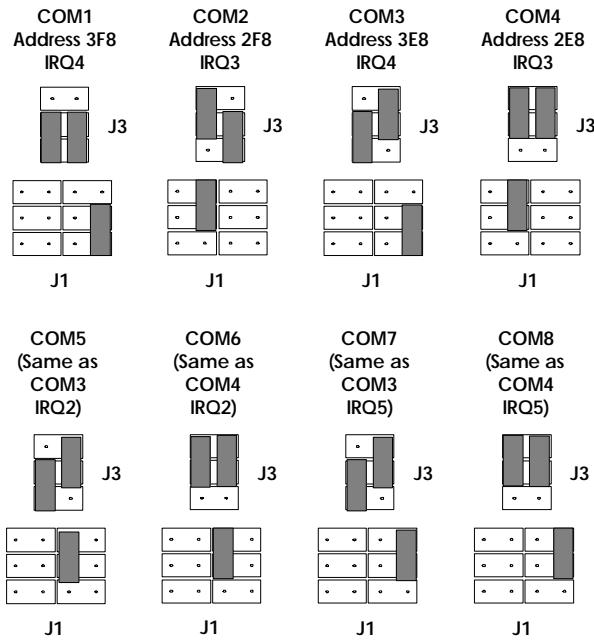


J2

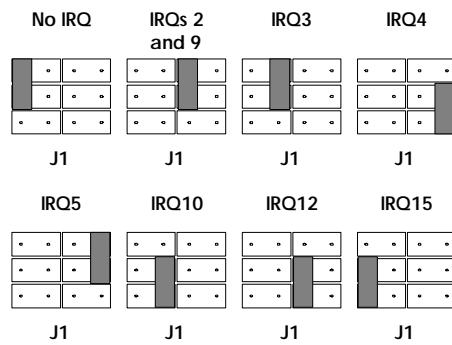
Set the COM port and IRQ jumpers according to the instructions in **Port and IRQ Settings** below. Check your Windows Help files and documentation for instructions on determining available resources.

Port and IRQ Settings

If you are using hardware jumpers as discussed above, use one of the following jumper combinations to set COM1 through COM8:



The following summary of the available interrupt settings is noted for your convenience.



Appendix E: AT Commands

AT commands communicate directly with the modem when it is in command mode. This appendix is a quick reference for experienced modem users. We do not recommend that you use AT commands unless you are familiar with them. It is possible to disable your faxmodem inadvertently.

To summarize AT command syntax:

- Multiple commands can be strung together in one line.
- Command lines cannot exceed 40 upper- or lower-case characters. (Do not mix upper- and lower-case.) The modem ignores space and hyphen characters.
- Command lines must start with AT and end with a carriage return (Return or Enter).
- A missing command parameter is assumed to be a zero. For example, ATH is the same as ATH0.
- **A/** on a line by itself without a carriage return causes the modem to repeat the previous command.

To switch to AT command mode from data mode, wait at least one second, type +++ (the default escape characters), and wait at least one second before entering other characters. After the OK message from the modem, you can enter AT commands. To return to data mode, type **ATO** and press Return (or Enter).

Bold indicates the default setting. (Not all commands have defaults.)

Command	Function
d	
A	Answers incoming call immediately
B0	Uses V.22 connection at 1200 bps
B1	Uses Bell 212A connection at 1200 bps
Dn	Dials telephone number <i>n</i> <i>You can combine D with one or more of the following modifiers:</i>
L	Redials last number
P	Uses pulse dialing
T	Uses tone dialing
R	Command accepted but not acted upon.
S=(0-3)	Dial one of 4 numbers stored with &Zn

!	Goes on hook (time specified in S29)
W	Waits for dial tone

Command	Function
@	Waits for at least 5 seconds of silence
&	Waits for credit card dialing tone (bong tone)
,	Pauses during dial as specified in register S8 (default: 2 sec.)
;	Returns to command mode after dialing (put after dial string)
^	Turn on calling tone (data only)
E0	Command characters not echoed
E1	Command characters echoed
H0	Forces modem to hang up
H1	Forces modem off-hook
I0	Returns product code (for example: 33600)
I1	Returns ROM checksum
I2	Computes checksum, compares with value in ROM, and returns OK or ERROR
I3	Returns firmware revision code
I4	Returns modem identifier string
I5	Returns country code
I6	Returns data pump model and revision code
I98	Returns modem features description
I99	Returns modem features in hex bitmap
L1	Low speaker volume
L2	Medium speaker volume
L3	Highest speaker volume
M0	Speaker always off
M1	Speaker on until carrier detected
M2	Speaker always on
M3	Speaker off during dialing, then on until carrier
N0	Disables auto-mode (automatic modulation negotiation); uses connection speed specified in S37. (Equivalent to +MS <automode> set to 0.)
N1	Enables auto-mode (Equivalent to +MS <automode> set to 1.)
O0	Enters data mode

O1	Enters data mode and retrains modem to phone line conditions
P	Pulse dialing until T command
Q0	Enables responses to computer (DTE)
Q1	Disables responses to computer

Command	Function
d	
<i>Sn</i>	Establishes S-register <i>n</i> as the default register
<i>Sn=v</i>	Sets register <i>n</i> to value <i>v</i>
<i>Sn?</i>	Returns the value of register <i>n</i>
T	Tone dialing until P command
V0	Send numeric (terse) responses
V1	Send word (verbose) responses
W0	Reports DTE (computer-to-modem) speed only
W1	Reports DCE (modem-to-modem) speed, error correction protocol, and DTE speed
W2	Reports DCE (modem-to-modem) speed only
X0	Sends OK, CONNECT, RING, NO CARRIER, ERROR and NO ANSWER.
X1	Sends X0 messages and CONNECT speed
X2	Sends X1 messages and NO DIALTONE.
X3	Sends X1 messages and BUSY
X4	Sends all responses
Y0	Disables long space disconnect
Y1	Enables long space disconnect; with error correction, hangs up after 1.6 second signal break; without error correction, sends 4 second space before hanging up
Z0	Resets modem to profile 0. (See &W0.)
Z1	Resets modem to profile 1. (See &W1.)
&C0	Forces RLSD (DCD) on
&C1	RLSD (DCD) follows remote carrier
&D0	DTR is assumed on. Allows operation with DTEs that do not provide DTR signal.
&D1	Modem interprets DTR drop as if it received the escape sequence. Returns to command mode without disconnecting.
&D2	DTR drop causes modem to hang up. Auto-answer is inhibited
&D3	DTR drop causes modem to do soft reset. &Y setting determines which profile is loaded.
&F	Loads factory profile
&G0	Disables guard tone

&G1	Disables guard tone
&G2	Enables 1800 Hz guard tone
&K0	Disables flow control
&K3	Enables RTS/CTS (hardware) flow control
&K4	Enables XON/XOFF flow control
&K5	XON/XOFF with passthrough
&K6	Enables both RTS/CTS and XON/XOFF flow control

Command	Function
d	
&M0	Selects asynchronous mode (&Q0)
&P0	Make/break dial ratio of 39/61 at 10 pps
&P1, &P2, &P3	Commands accepted, but not acted upon.
&Q0	Selects direct asynchronous mode (no error correction or speed buffering)
&Q5	Modem negotiates error-correcting connection
&Q6	Selects asynchronous mode with speed buffering (no error correction)
&S0	Forces Data Set Ready (DSR) on continuously
&S1	DSR active after answer tone detected and inactive after carrier loss
<i>For engineering testing only</i>	
&T0	Ends test in progress
&T1	Starts local analog loopback test
&T2	Returns error
&T3	Starts local digital loopback test
&T4	Responds to remote modem request for digital loopback
&T5	Ignores remote modem request for digital loopback
&T6	Requests remote digital loopback without self-test
&T7	Same as &T6 with self-test
&T8	Starts local analog loopback with self-test
&V	Displays the current (active) and stored profiles, and stored numbers
&W0	Saves active configuration as profile 0
&W1	Saves active configuration as profile 1
&Y0	Modem uses profile 0 on powerup. (See &W0.)
&Y1	Modem uses profile 1 on powerup. (See &W1.)
&Zn=x	Stores telephone number (up to 35 digits) x in nonvolatile memory location n (0-3)
%C0	Disable data compression
%C1	Enable MNP5 compression
%C2	Enable V.42bis compression
%C3	Enables both MNP5 and V.42bis compression
%E0	Disables line-quality monitoring and auto-retraining
%E1	Enables monitoring and retraining
%E2	Enables monitoring and fallback/fall forward
%E3	Enables monitoring, retraining, and fast hang up
%L	Reports received signal level in -dBm
%Q	Reports line signal quality
\A0	64-character maximum MNP block size
\A1	128-character maximum MNP block size
\A2	192-character maximum MNP block size
\A3	256-character maximum MNP block size
\Bn	In non-error correction mode, transmits line break to remote modem in 100 ms units (1-9 with 3 as default)
\G0	Disables XON/XOFF (modem-to-modem) flow control

\G1	Enables XON/XOFF (modem-to-modem) flow control		
Command	Function		
d			
\Kn	Defines break type		
\N0	Normal data link with speed buffering; no error correction		
\N1	Selects serial interface; same as &Q0		
\N2	Selects reliable (error correction) mode (first LAPM, then MNP)		
\N3	Selects auto-reliable mode (LAPM, MNP, Normal)		
\N4	LAPM error correction only		
\N5	MNP error correction only		
\V=0	Disables Single Line Connect Message		
\V=1	Enables Single Line Connect Message, where the format is: CONNECT <DTE speed></Modulation></Protocol></Compression></Line speed>		
-SDR=0	Disables Distinctive Ring.	Ring Type	Cadence
-SDR=1	Enables Type 1	1	2 sec. ON, 4 sec. OFF
-SDR=2	Enables Type 2	2	0.8 sec. ON, 0.4 sec. OFF
-SDR=3	Enables Type 1 & 2		0.8 sec. ON, 0.4 sec. OFF
-SDR=4	Enables Type 3		0.4 sec. ON, 0.2 sec. OFF
-SDR=5	Enables Type 1 & 3		0.4 sec. ON, 0.2 sec. OFF
-SDR=6	Enables Type 2 & 3	3	0.4 sec. ON, 0.2 sec. OFF
-SDR=7	Enables Type 1, 2, & 3		0.8 sec. ON, 0.4 sec. OFF
SSR0	Disables Distinctive Ring.		
SSR2	Enables Distinctive Ring. Cadences are: A = 2 seconds on, 4 seconds off B = 0.8 sec. ON, 0.4 sec. OFF; 0.8 sec. ON, 4 sec. OFF D = 0.4 sec. ON, 0.2 sec. OFF; 0.4 sec. ON, 0.2 sec. OFF; 0.8 sec. ON, 4 sec. OFF or D = 0.3 sec. ON, 0.2 sec. OFF; 1 sec. ON, 0.2 sec. OFF; 0.3 sec. ON, 4 sec. OFF		
-K0	Disables V.42 LAPM to MNP10 conversion		
-K1	Enables V.42 LAPM to MNP10 conversion		
-K2	Enables V.42 LAPM to MNP10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection		
-Q0	Disables MNP 10 fallback to 2400 bps		
-Q1	Enables MNP 10 fallback to 2400 bps		
-SEC=0	Disables MNP10-EC operation		
-SEC=1	Enables MNP10-EC operation		
:E0	Disables V.32 compromise equalizer		

:E1	Enables V.32 compromise equalizer
------------	--

Command	Function
d	+MS=<mod>[.<automode>],<min_rate>],<max_rate>]]] See NOTE .
	Selects modulation; optionally enables or disables automatic modulation negotiation with the remote modem or faxmodem; optionally sets minimum and/or maximum rates
<mod>	Selects Possible Rates (bps): modulation:
0	V.21 300
1	V.22 1200
2	V.22 bis 2400, 1200
3	V.23 1200
9	V.32 9600, 4800
10	V.32 bis 14400, 12000, 9600, 7200, 4800
11	V.34 33600, 31200, 28800, 26400, 24000, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400
56	K56Flex 56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 3600, 34000, 32000 (downstream speed only)
64	Bell 103 300
69	Bell 212 1200
[.<auto-mode>]	Enables or disables automatic modulation negotiation with the remote modem.
0	Disables (Equivalent to NO command.)
1	Enables (Equivalent to N1 command.)
[.<min-rate>]	See "Possible Rates (bps)" above. Default: 300 bps
[.<max-rate>]	See "Possible Rates (bps)" above. Default: 33600 bps

NOTE: Use a comma (,) to separate optional subparameters. For example:

+MS=11,1,300,28800 (+MS command with the default settings). Subparameters that you do not enter remain at their current value. (Type a comma only to skip a subparameter or carriage return to skip the last subparameter) For example: +MS=,0, <Enter> disables auto mode and keeps all other settings at their current value.

Appendix F: S Registers

This appendix summarizes S registers. You can change the setting of an S register using an AT command. For example, **ATS6=4**. The appendix assumes you are already familiar with how to reset S registers.

Register	Range/Value	Default	Function
S0	0-255 rings	0	Number of rings to auto-answer
S1	0-255 rings	0	Counts incoming rings
S2	0-255 ASCII	43	Escape character
S3	0-127 ASCII	13	Carriage return character
S4	0-127 ASCII	10	Line feed character
S5	0-255 ASCII	8	Backspace character
S6	2-255 seconds	2	Dial tone wait time before blind dialing
S7	1-255 seconds	50	Remote carrier wait time
S8	0-255 seconds	2	Comma pause time
S9	1-255 100 ms	6	Carrier detect response time
S10	1-255 100 ms	14	Delay between carrier loss and hang up
S11	50-255 1 ms	95	Tone duration in DTMF dialing
S12	0-255 20 ms	50	Escape code guard time
S13			RESERVED
S14			BIT MAPPED OPTIONS
S15			RESERVED
S16			TEST MODE BIT MAPPED OPTIONS
S17			RESERVED
S18	0-255 seconds	0	Modem test timer
S19-20			RESERVED
S21			V.24 BIT MAPPED OPTIONS
S22			SPEAKER BIT MAPPED OPTIONS
S23			BIT MAPPED OPTIONS
S24	0-255 seconds	0	Sleep inactivity timer
S25	0-255 10 ms	5	Data Terminal Ready delay
S26	0-255 10 ms	1	RTS-to-CTS delay
S27			BIT MAPPED OPTIONS
S28			BIT MAPPED OPTIONS
S29	0-255 10 ms	70	Flash dial modifier time
S30	0-255 10 seconds	0 (disabled)	Inactivity time before hang up

Register	Range/Value	Default	Function
S31			BIT MAPPED OPTIONS
S32	0-255 ASCII	17	XON character
S33	0-255 ASCII	19	XOFF character
S34-35			RESERVED
S36	0, 3, 4, 7	7	LAPM failure control
	0		Modem disconnects
	3		Modem stays on line and establishes a Normal mode (speed buffering) connection.
	4		Attempts MNP connection; if fails, disconnects
	7		Attempts MNP connection; if fails, establishes a Normal mode (speed buffering) connection.
S37	0-12	0	Desired DTE connection speed
	0		Attempt automode connection (F0)
	1-3		Attempt to connect at 300 bps (F1)
	4		Reserved
	5		Attempt to connect at 1200 bps (F4)
	6		Attempt to connect at 2400 bps (F5)
	7		Attempt to connect at 75 bps send/ 1200 bps receive V.23 (F3)
	8		Attempt to connect at 4800 bps (F6)
	9		Attempt to connect at 9600 bps (F8)
	10		Attempt to connect at 12000 bps (F9)
	11		Attempt to connect at 14000 bps (F10)
	12		Attempt to connect at 7200 bps (F7)

S38	0-255 seconds	20	Delay before forced disconnect
-----	---------------	----	--------------------------------

Register	Range/Value	Default	Function
S39	0-6	3	FLOW CONTROL
	0		No flow control
	3		RTS/CTS (&K3)
	4		XON/XOFF
	5		Transparent XON (&K5)
	6		Both methods (&K6)
S40-41			BIT MAPPED OPTIONS
S42-45			RESERVED
S46	136 or 138	138	Data compression selection
	136		Error correction with no compression
	138		Error correction and compression
S48	0, 7, or 128	7	V.42 negotiation action
	0		No negotiation; bypass detection and negotiation phases; proceed with LAPM
	7		Negotiation
	128		No negotiation; bypass detection and negotiation phases; proceed with S36 fallback action
			RESERVED
S82	3, 7, or 128	128	Break handling options
	3		Break immediate; data integrity maintained ahead of and after break
	7		Break immediate; data at time of break destroyed
	128		Break in sequence with any transmitted data; data integrity maintained ahead of and after break

Register	Range/Value	Default	Function
S86	0, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	none	Call failure reason code
	0		Normal disconnect, no error
	4		Loss of carrier
	5		V.42 negotiation failed to detect error correction modem at remote end
	6		No response to feature negotiation
	7		This modem is asynch only; remote modem is synch only
	8		No framing technique in common
	9		Modems could not find a common protocol
	10		Bad response to feature negotiation
	11		No synch information from remote modem
	12		Remote modem initiated a normal disconnect
	13		Remote modem does not respond after 10 message re-transmissions
	14		Protocol violation
S95	Add numbers below for desired messages:	0	Extended result codes
	0		CONNECT gives computer-to-modem (DTE) speed
	1		CONNECT gives DCE speed
	2		/ARQ after CONNECT if error correction is active
	4		CARRIER message
	8		PROTOCOL message
	32		COMPRESSION message

Appendix G: Result Codes

The table of results codes below indicates the verification messages that the modem generates depending on the currently active Xn option. The default setting is X4. To select short form messages, enter the command AT V0. To select long form messages, enter the command AT V1. The default setting is V1.

A check in a column indicates that the message is generated by the modem when you have chosen the value shown at the top of the column with AT Xn command. If the column is blank, the modem does not generate a message for that X option. A “1” or “3” after a check mark indicates the less explicit message that the modem generates for that option. For example, if the modem is set for long form messages, the value of Xn is X0, and the computer-to-modem speed is 1200 bps, the modem generates the message “CONNECT” and not “CONNECT 1200”.

Short Form	Long Form	n Value in AT Xn Command				
		0	1	2	3	4
0	OK	☒	☒	☒	☒	☒
1	CONNECT	☒	☒	☒	☒	☒
2	RING	☒	☒	☒	☒	☒
3	NO CARRIER	☒	☒	☒	☒	☒
4	ERROR	☒	☒	☒	☒	☒
5	CONNECT 1200	☒ ¹	☒	☒	☒	☒
6	NO DIALTONE	☒ ¹	☒ ³	☒	☒	☒
7	BUSY	☒ ³	☒ ³	☒ ³	☒	☒
8	NO ANSWER	☒	☒	☒	☒	☒
9	CONNECT 0600	☒ ¹	☒	☒	☒	☒
10	CONNECT 2400	☒ ¹	☒	☒	☒	☒
11	CONNECT 4800	☒ ¹	☒	☒	☒	☒
12	CONNECT 9600	☒ ¹	☒	☒	☒	☒
13	CONNECT 7200	☒ ¹	☒	☒	☒	☒
14	CONNECT 12000	☒ ¹	☒	☒	☒	☒
15	CONNECT 14400	☒ ¹	☒	☒	☒	☒
16	CONNECT 19200	☒ ¹	☒	☒	☒	☒

17	CONNECT 38400	■1	■	■	■	■
18	CONNECT 57600	■1	■	■	■	■

Short Form	Long Form	n Value in ATXn				
		0	1	2	3	4
19	CONNECT 115200	■1	■	■	■	■
20	CONNECT 234000	■1	■	■	■	■
22	CONNECT 75TX/1200RX	■1	■	■	■	■
23	CONNECT 1200TX/75RX	■1	■	■	■	■
33	FAX	■	■	■	■	■
35	DATA	■	■	■	■	■
40	CARRIER 300					■
44	CARRIER 1200/75					■
45	CARRIER 75/1200					■
46	CARRIER 1200					■
47	CARRIER 2400					■
48	CARRIER 4800					■
49	CARRIER 7200					■
50	CARRIER 9600					■
51	CARRIER 12000					■
52	CARRIER 14400					■
54	CARRIER 19200					■
55	CARRIER 21600					■
56	CARRIER 24000					■
57	CARRIER 26400					■
58	CARRIER 28800					■
59	CONNECT 16800	■1	■	■	■	■
61	CONNECT 21600	■1	■	■	■	■
62	CONNECT 24000	■1	■	■	■	■
63	CONNECT 26400	■1	■	■	■	■
64	CONNECT 28800	■1	■	■	■	■
66	COMPRESSION: CLASS 5					■
67	COMPRESSION: V.42 bis					■
69	COMPRESSION: NONE					■
70	PROTOCOL: NONE					■
77	PROTOCOL: LAPM					■
78	CARRIER 31200					■

79	CARRIER 33600					
80	PROTOCOL: ALT					
84	CONNECT 33600	▀1	▀	▀	▀	▀
91	CONNECT 31200	▀1	▀	▀	▀	▀

Short Form	Long Form	n Value in ATXn				
		0	1	2	3	4
150	CARRIER 32000					▀
151	CARRIER 34000					▀
152	CARRIER 36000					▀
153	CARRIER 38000					▀
154	CARRIER 40000					▀
155	CARRIER 42000					▀
156	CARRIER 44000					▀
157	CARRIER 46000					▀
158	CARRIER 48000					▀
159	CARRIER 50000					▀
160	CARRIER 52000					▀
161	CARRIER 54000					▀
162	CARRIER 56000					▀
165	CONNECT 32000	▀1	▀	▀	▀	▀
166	CONNECT 34000	▀1	▀	▀	▀	▀
167	CONNECT 36000	▀1	▀	▀	▀	▀
168	CONNECT 38000	▀1	▀	▀	▀	▀
169	CONNECT 40000	▀1	▀	▀	▀	▀
170	CONNECT 42000	▀1	▀	▀	▀	▀
171	CONNECT 44000	▀1	▀	▀	▀	▀
172	CONNECT 46000	▀1	▀	▀	▀	▀
173	CONNECT 48000	▀1	▀	▀	▀	▀
174	CONNECT 50000	▀1	▀	▀	▀	▀
175	CONNECT 52000	▀1	▀	▀	▀	▀
176	CONNECT 54000	▀1	▀	▀	▀	▀
177	CONNECT 56000	▀1	▀	▀	▀	▀
+F4	+FCERROR	▀	▀	▀	▀	▀

Appendix H: Regulatory Information

FCC Part 68 Telecommunications Statement

The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network. This device is registered with the Federal Communications Commission (FCC) for direct connection to the telephone line using a standardized RJ11C telephone jack. This device complies with the Part 15, Subpart B, and Part 68 requirements of the FCC rules.

The telephone company may make changes in its technical operations and procedures; if such changes affect the compatibility or use of the device, the telephone company is required to give adequate notice of the changes.

If the telephone company requests information on what equipment is connected to the line, inform them of:

- a) *The telephone number that this unit is connected to,*
- b) *The ringer equivalence number [0.8B, internal model; 0.4B, external model],*
- c) *The USOC jack required [RJ11C], and*
- d) *The FCC Registration Number.*

Items (b) and (d) are indicated on the label attached to the bracket. The ringer equivalence number is used to determine how many devices can be connected to your telephone line. In most cases, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

If this device should malfunction, it may also cause harm to the telephone network; Should this occur, this device should be disconnected from the network until the source of the problem can be determined and repair has

been made. If a device which harms the network is not removed, the telephone company may temporarily disconnect service.

In the event of equipment malfunction, all repairs should be performed at an authorized repair facility. It is the responsibility of users requiring service to report the need for service to such a facility. Service facilities are listed on the product's warranty flyer.

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 telephone fax machine unless such message clearly contains in a margin at the top or bottom of each transmitted page, or on the first page of the transmission, the date and time sent, the identification of the business, entity, or individual sending the message, and the telephone number of the sending machine. In order to program this information into your fax machine, refer to your faxmodem software documentation for information on enabling fax branding.

Industry Canada Attachment

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

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telephone 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. For locations of the authorized service facilities, please see the product's warranty card. 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 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 electrical inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) assigned to each terminal device helps to prevent overloading. You can use any combination of devices subject only to the requirement that the sum of the RENs of all devices on any one line should not exceed 5 (5.0). If too many devices are attached, they may not ring properly.

The Ringer Equivalence Number for your internal modem is 0.8B.

The Ringer Equivalence Number for your external modem is 0.4B.

Canadian Emissions Statement

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

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

Index

5

56K, 36

A

AA light (external model),
10
Answer options
auto-answer, 33
AT commands, 25
no response, 28, 29
table of, 44
Auto baud detect, 24

B

Basic Input/Output System
(BIOS), 16

C

Cable requirements, 5
Call progress tone
decoding, 39
CD light (external model),
10
Characters do not appear
on screen, 31
CS light (external model),
10

D

Data communications
software
configuration, 28
using, 23
Data compression
communicating without,
33
DC light (external model),
10
Default settings, 42
returning to, 26

E

Dial string, 25, 30
Dial troubleshooting, 31

EC light (external model),
10
Echo troubleshooting, 31–
30
Error correction
communicating without,
33
ERROR response, 30
Escape character sequence,
29

F

Factory settings
returning to, 26
Fax light (external model),
10
Fax software
configuration, 28
using, 23
Fax speed selection, 38
Faxmodem
installing external, 8
Features, 38
Flow control
RTS/CTS, 34

G

Gain control, 39

H

Hang up, 31
Hardware flow control
(RTS/CTS), 24

I

IBM PC-compatible
computers, 30

Initialization string, 24, 30
Initializing the modem, 23
Installation, 8
Installing
 external faxmodem, 8
 internal faxmodem, 11
IRQ conflicts, 19

J

Jumper block locations, 41

K

K56 light (external model),
 10
K56Flex, 36

L

LEDs (external model only),
 10
Lights (external model only),
 10

M

Modem
 connection to remote
 modem, 32-37
 initialization strings, 24,
 25
 using communications
 software, 23
MR light (external model),
 10

N

Nonvolatile memory, 30

O

OH light (external model),
 10
On-line troubleshooting,
 32-37

P

Plug and Play (PNP), 13

problems with, 14
PORTWIZ utility, 18, 19
Problems, 27. *See also* your
 communications software
 documentation
Product Summary, 38
Protocols supported, 38

R

RD light (external model),
 10
Regulatory information, 57
Result codes, 54

S

S Registers, 50
SETPORT utility, 17
Speaker volume, 30
Specifications, 40
Starting the modem, 23

T

TD light (external model),
 10
Telephone cord, 13
TR light (external model), 10

U

UART, 38

V

V.22A/B, 38
V.22bis, 38
V.32, 38
V.32bis, 38
V.34, 38
V.34 light (external model),
 10

W

Windows 3.1 or 3.11, 11,
 41
Windows 95, 11, 13, 41, 42
Windows NT, 11, 22, 42

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