

*Upgrading &
Fixing PCs*
FOR
DUMMIES[®]
7TH EDITION

by Andy Rathbone



Wiley Publishing, Inc.

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Fixing PCs*
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DUMMIES[®]
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Upgrading & Fixing PCs For Dummies®, 7th Edition

Published by
Wiley Publishing, Inc.
111 River Street
Hoboken, NJ 07030-5774

www.wiley.com

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Published by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

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Library of Congress Control Number: 2007924227

ISBN: 978-0-470-12102-3

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1



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About the Author

Andy Rathbone started geeking around with computers in 1985 when he bought a boxy CP/M Kaypro 2X with lime-green letters. Like other budding nerds, he soon began playing with null-modem adapters, dialing up computer bulletin boards, and working part-time at RadioShack.

In between playing computer games, he served as editor of the *Daily Aztec* newspaper at San Diego State University. After graduating with a comparative literature degree, he went to work for a bizarre underground coffee-table magazine that sort of disappeared.

Andy began combining his two main interests, words and computers, by selling articles to a local computer magazine. During the next few years, he started ghostwriting computer books for more-famous computer authors, as well as writing several hundred articles about computers for technoid publications like *Supercomputing Review*, *CompuServe Magazine*, *ID Systems*, *DataPro*, and *Shareware*.

In 1992, Andy and *DOS For Dummies* author/legend Dan Gookin teamed up to write *PCs For Dummies*. Andy subsequently wrote the award-winning *Windows For Dummies* series, *TiVo For Dummies*, and many other *For Dummies* books.

Today, he has more than 15 million copies of his books in print, which have been translated into more than 30 languages.

Andy lives with his most-excellent wife, Tina, and their cat in Southern California. Feel free to drop by his Web site at www.andyrathbone.com.

Dedication

To that sense of satisfaction felt when you fix it yourself.

Author's Acknowledgments

Thanks to Jean Rogers, Matt Wagner, Heidi Unger, Andy Hollandbeck, Lee Musick, and Steve Hayes.

Publisher's Acknowledgments

We're proud of this book; please send us your comments through our online registration form located at www.dummies.com/register/.

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Introduction

You're no dummy; we both know that. But something about computers often makes you feel like a dummy. And that's perfectly understandable. Unlike today's kids, you probably didn't grow up with a computer in your kindergarten class, living room, or on the palm of your hand. With this book, you'll no longer feel helpless when you're faced with a computer that refuses to work the way it should.

This book doesn't help you replace your computer's motherboard or build a PC from scratch using custom-selected parts. Plenty of more advanced titles out there can help you with those chores.

No, this book helps you with the types of upgrade and repair tasks that you're most likely to encounter today: Upgrading an older PC to run Windows Vista, for instance, and making sure that everything works correctly. Adding a larger hard drive. Upgrading that video card to satisfy the needs of Windows Vista or a new computer game. Making sure your PC's firewall is turned on and working correctly. Turning on the security option for your wireless network.

Simply put, this book discusses the most common upgrading and repair problems facing computer users today. It explains what to buy, where to plug it in, and how to make sure that your computer knows what to do with it.

What's New in This Edition?

Welcome to *Upgrading & Fixing PCs For Dummies*, rejuvenated for its seventh edition, and celebrating more than a decade in print. Aimed at people who want to upgrade to Windows Vista or spice up their computers to take advantage of today's latest technology, this book contains several helpful new chapters and updated sections:

- ✔ You'll find a full-color 16-page insert with photos depicting exactly how you're supposed to remove your PC's case, install a card, connect a new hard drive, and perform other operations described in this book.
- ✔ This book includes an updated visual Appendix that explains how to use *all* the ports on your computer and add any ports you might need.
- ✔ Chapter 17 includes a network installation guide that helps you configure a network with both wired and wireless devices.
- ✔ Chapter 20 provides details on installing or upgrading to Windows Vista — even onto a newly installed hard drive.

- ✔ Computer parts need *drivers* — special software that helps Windows understand how to talk with them. Without a proper driver, Windows Vista probably won't know how to talk to some parts of your computer. Chapter 19 contains everything you need to know about how Vista treats drivers: When you need them, where to find them, and how to install them successfully.
- ✔ Windows Vista's Home Premium edition lets you record TV shows onto your PC for later viewing or burning to DVD. The catch? Your PC needs a TV tuner, a device I explain how to buy and install in Chapter 12.
- ✔ DVD burners are the rage today, and I've explained their odd format terminology and incompatibilities in Chapter 15.

Plus, this edition continues to include the information that hundreds of thousands of people have relied on for 14 years: information about upgrading and fixing video cards, hard drives, CD/DVD drives, memory chips, monitors, modems, printers, scanners, hard drives, and other popular computer parts.

Where to Start

Jump in anywhere. Each chapter is a self-contained nugget of information, keeping you from flipping back and forth between different sections.

Chapters start by defining the buzzwords surrounding each new upgrade; they also offer tips on making hardware purchases. A step-by-step installation guide follows, complete with screen shots, color photos, or line drawings, where appropriate.

Each chapter ends with a troubleshooting guide for those awful moments: when you turn on the computer, but the new part stays turned off.

Read These Parts

If you're lucky (and your computer is fairly healthy), you don't need to read very much of this book; just skim the step-by-step instructions. But when something weird happens, this book helps you figure out what went wrong, whether it's repairable, or whether you must replace it.

Along the way, you might find helpful comments or warnings to help you out.



You find tips like this scattered throughout the book. Take a look at them first. In fact, some of these tips might spare you from having to read more than a paragraph of a computer book — a worthy feat indeed!

Don't Read These Parts

Okay, I lied a little bit. I did stick some technobabble in this book. After all, you sometimes need to decipher the language on a computer part's packaging. Luckily for you, however, I have neatly cordoned off all the technical drivel.



Any particularly odious technical details are isolated and posted with this icon so that you can avoid them easily. If a computer nerd drops by to help with your particular problem, just hand him or her this book. With this icons, the computer nerd knows exactly which sections to look for.

How This Book Is Organized

This book has six major parts. Each part is divided into several chapters. And each chapter covers a major topic, which is divided into specific sections.

The point? Well, this book's indexer sorted all the information with an extra-fine-tooth flea comb, making it easy for you to find the exact section you want when you want it. Plus, everything's cross-referenced. If you need more information about a subject, you can figure out exactly which chapter to head for.

Here are the parts and what they contain.

Part I: Boring, Basic Repairs

You find the boring, basic stuff in here. If you read the first chapter, for instance, you discover all those boring programs you can set up to make your computer *repair itself*. The other chapters cover those day-to-day parts that must be replaced: keyboards, mice, monitors, and printers. Yawn.

Part II: Beefing Up Your PC for Windows Vista, Games, and Video

Microsoft's latest version of Windows, Vista, will soon march onto most of the world's PCs. This part of the book explains how to make sure your PC's ready when Vista arrives. It explains how to find out whether your current PC can run Vista, what parts need to be replaced, and how to add Vista essentials, such as better graphics, more memory, and a larger power supply.

By the way, upgrading your PC for the graphics-intensive Vista also makes it a prime PC for playing the latest computer games.

Part III: Teaching an Old PC New Tricks

Flip here quickly for the fun stuff. Rather than focusing on the boring, necessary repairs and upgrades, this part of the book explains the luxuries. You can transform your PC into a home theater, for example, by upgrading its sound, speakers, and adding a TV tuner. Another chapter explains how to transform your camcorder footage into an edited movie, stored on an easily viewed DVD. No DVD burner yet? Another chapter explains how to choose and install a DVD burner to take advantage of Vista's new DVD-burning programs.

Part IV: Communications

Computers running Windows Vista don't like to be alone. This part of the book shows how to hook your computer up to the Internet with a dialup or broadband modem. Because many households now sport two or more computers, a chapter in this part explains how to create a home or small office network, enabling all your computers to share the same Internet connection. If you're worried about hackers breaking into your computer, head to this part to make sure Windows Vista's firewall works as it should.

Part V: Introducing Parts to Windows

If anybody's a dummy here, it's your computer. Even after you've stuck a new part in its craw, your computer often doesn't realize that the part is there. If Windows refuses to deal politely with the newly installed device, check out the chapter on finding and installing the right *driver* to make Windows behave. Turn to this part also when you're ready to upgrade to Windows Vista or install it onto a brand new hard drive.

Part VI: The Part of Tens

Some information just drifts away when it's buried deep within a chapter — or even within a long paragraph. That's why these tidbits are stacked up in lists of ten (give or take a few items). Here, you find the cheap fixes you should try first, a list of handy upgrade tools, and other fun factoids.

Icons Used in This Book

This book's most exceptional paragraphs are marked by icons — little eye-catching pictures in the margins:



This icon warns of some ugly technical information lying by the side of the road. Feel free to drive right by. The information is probably just a more complex discussion of something already explained in the chapter.



Pounce on this icon whenever you see it. Chances are that it marks a helpful paragraph worthy of a stick-on note or highlighter.



If you've forgotten what you were supposed to remember, keep an eye toward the margins for this icon.



Better be careful when you're about to do stuff marked by this icon. In fact, it warns you about dangerous activities you *shouldn't* be doing, like squirting WD-40 into your floppy drive.



Not everybody is rushing off to buy Vista, and this book doesn't forget Windows XP owners. This icon alerts you to instructions particularly applicable to the Windows XP holdouts.



This icon flags areas of special importance to Windows Vista owners. After all, everybody uses Windows Vista these days — or at least that's what the newspaper inserts say.



Laptops aren't nearly as upgradeable as desktop PCs. This icon alerts laptop owners to the laptop parts that *are* upgradeable.

Auto mechanics can find the most helpful sections in their manuals by just looking for the greasiest pages. So by all means, draw your own icons next to the stuff you find particularly helpful. Scrawl in some of your own observations as well.

Where to Go from Here

If you're clamoring for more basic information on Windows, check out one of my *Windows For Dummies* books, published by Wiley Publishing. They come in several flavors, including Vista, XP, Me, 98, 95, and earlier.

Also, be sure to check my Web site at www.andyrathbone.com. It contains a complete and updated list of all the Internet sites mentioned in this book, collected for your point 'n click convenience. Any corrections, heaven forbid, appear there, as well.

Ready to go? Then grab this book and a screwdriver. Your computer is ready whenever you are. Good luck.

Part I

Boring, Basic Repairs

The 5th Wave

By Rich Tennant



"I bought a software program that should help us monitor and control our spending habits, and while I was there, I picked up a few new games, a couple of screen savers, 4 new mousepads, this nifty pullout keyboard cradle..."

In this part . . .

This part of the book doesn't cover those exciting new toys that make you whip out the credit card. You don't find wireless network cards, digital cameras, home theater computers, or DVD burners in this part. No, this part of the book covers the boring, basic computer things that you *have* to do. And sometimes repeatedly.

The first chapter explains how to find out exactly what's inside your PC — how much memory it has, for example. It walks you through making sure your computer's System Restore and Windows Update features work correctly, for instance, so that Windows can keep itself running smoothly.

Spilled a Coke on the keyboard? Keyboards are covered here, as well as mice, monitors, and printers. Except for adding two monitors to a single PC (Chapter 3), nothing new and exciting has happened with these types of parts for quite some time. But chances are that this is the stuff you'll find yourself needing to fix or replace the most often.

And if you've just walked home with a new Windows Vista PC, check out Chapter 5: It explains how to move your files, bookmarks, and program settings off your old PC and onto your new one.

Chapter 1

Start Here First

In This Chapter

- ▶ Knowing when to upgrade
 - ▶ Knowing when you shouldn't upgrade
 - ▶ Finding out what's inside your computer
 - ▶ Using Windows Update
 - ▶ Using System Restore
-

You picked up this book for any of several reasons. You might be eyeing the power-hungry Windows Vista, Microsoft's newest version of Windows, and want to upgrade your PC's video to meet Vista's stringent needs. Perhaps one of your PC's parts died, and you're looking to replace it with a better one. Or maybe your PC simply needs some fine-tuning. Whatever your reason, this is the right chapter to read first.

This chapter explains what Windows expects out of a PC and how to replace the outdated parts that no longer work. It explains how to know what parts currently live inside your computer's case, so you can see if your computer meets those fine-print System Requirements listed on the side of many software boxes.

And for the fix-it folks, this chapter points out where Windows Vista and Windows XP have the power to repair themselves — if those powers are turned on and running correctly, that is. You find complete instructions on making sure those self-healing abilities are up to snuff.



Any time you're not sure what plugs in where, check out this book's Appendix. It's a visual directory of all your computer's ports and the plugs and gadgets that fit into them.

Determining When to Upgrade

Your computer usually tells you when it wants an upgrade. Some warning signals are subtle, others more obvious. At worst, they can be downright annoying.

In any case, keep track of the following when you're deciding whether it's time to open the wallet and grab the toolbox:



- ✓ **When your operating system demands it:** Everybody's using Vista, the latest version of Windows. (Or at least that's what the folks at Microsoft say.) If you've caught the "latest and the greatest" fever, it's easy to find out if your computer is up to snuff; Microsoft lists Vista's System Requirements at www.windowsvista.com, and I dissect them in Chapter 6.
- ✓ **When you keep waiting for your PC to catch up:** You press a key and wait. And wait. When you're working faster than your PC, give your PC a boost with some extra memory and maybe a faster video card. (Of course, if you want a bigger and faster hard drive too, it might be time to throw in the towel and buy a new computer.)
- ✓ **When you can't afford a new computer:** When a new PC's out of your price range, upgrade your PC one part at a time. Add that memory now, for example, and then add a new hard drive with your holiday bonus. Time each purchase to match the lowest prices. When you finally buy a new computer, save costs by salvaging your old computer's monitor and recently added parts.
- ✓ **When you want a new part in a hurry:** Computer repair shops aren't nearly as slow as stereo repair shops. Still, do you *really* want to wait four days for some tech head to install that hot new video card — especially when you have a nagging suspicion that you could do it yourself in less than 15 minutes?
- ✓ **When there's no room for new software:** When your hard drive constantly spits up Disk Full messages, you have three options:
 - Uninstall programs you no longer use and copy unneeded files to CDs or DVDs.
 - Replace your PC's hard drive with a larger one or add a second internal hard drive.
 - Buy a removable drive to serve as a parking garage for files and programs. Most external drives plug into your PC's USB port, a chore as simple as plugging in a mouse.
- ✓ **When you're afraid to open the case:** Fear of opening your computer's case is no longer an excuse to put off upgrades. Many new computer parts now live on the *outside* of the computer. You find external CD-ROM drives and burners, hard drives, floppy drives, memory card readers, sound boxes, and much more. None of these devices require popping open the case to install them.

Determining When You Shouldn't Upgrade

Sometimes, you shouldn't upgrade your own computer. Keep your hands off during any of the following circumstances:



- ✓ **When a computer part breaks while under warranty:** If your computer is under warranty, let the manufacturer fix it. In fact, trying to fix or replace a part sometimes voids the warranty on the rest of your computer. Some manufacturers void the warranty if you simply open your computer's case. Read the warranty's fine print before touching anything.

Keep track of your warranty expiration date; it's usually listed on your sales receipt. Lost it? Some manufacturers (Gateway, Dell, and a few others) provide access to your warranty information through their Web sites, as described in Chapter 22.

- ✓ **On a Friday:** Never try to install a new computer part on a Friday afternoon. When you discover that the widget needs a *left* bracket, too, many shops will be closed, leaving you with a desktop full of detached parts until Monday morning.
- ✓ **When you're working on a deadline:** Just like kitchen remodeling, computer upgrading and repairing occasionally takes twice as long as you originally planned. Some parts install in a few minutes, but always allow yourself a little leeway.
- ✓ **If your computer is old:** Not all computers can be upgraded. If you bought your PC before 2001, you're pouring money into a sinking ship.



Before upgrading a computer, check these numbers: Add the cost of needed parts (more memory, a bigger hard drive, a faster video card and/or monitor, a DVD burner, networking card, and updated software) and compare it with the cost of a new computer. Chances are, a new computer costs much less. Plus, it already comes with Windows Vista and parts guaranteed to be compatible.

Finding Out What Parts Your Computer Has

Computers come in a wide variety of makes and models pieced together with parts made by variety of manufacturers. So how do you know who made what part?

Luckily, Windows takes pity on its users and tells you exactly what parts lurk inside your computer's case — if you know how to ask it politely. The first step is finding out your Windows version, your PC's Central Processor Unit (CPU), and its amount of Random Access Memory (RAM).

And why should you care, you might ask, shifting impatiently in your chair? Because when you buy computer software or parts, the box's fine print lists the System Requirements, followed by lots of details about what your computer must have to use the software or part. If your computer doesn't meet those detailed requirements, the software or part won't work very well — if at all — on your computer.

To add insult to injury, many stores don't let you return software — even if it won't run on your computer. Some stores even refuse to accept *unopened* software. Check your store's return policy before opening your wallet.

Locating your version of Windows, CPU, and RAM

Windows comes in many different versions, each with its own set of requirements, problems, and personalities. Luckily, all versions reveal their version numbers when you follow this simple step.

1. Right-click the Computer or My Computer icon on your desktop and choose Properties.

If you don't see the Computer or My Computer icon on the desktop, click the Start menu, and then right-click the Computer or My Computer icon.

In both Windows Vista (see Figure 1-1) and Windows XP (see Figure 1-2), that step reveals basic information about your PC's power.

- **Windows version:** Chances are yours says Windows XP Home, Windows XP Professional, Windows Vista Home Basic, Windows Vista Home Premium, or Windows Vista Ultimate.
- **CPU:** Short for Central Processing Unit, this big chip drives your entire PC. Windows lists the chip's model and speed.
- **RAM:** Short for Random Access Memory, these upgradeable chips enable Windows to open many programs at once without lagging.

That's it — a one-step guide to seeing your PC's most important parts, and how well they match the requirements listed on a box of software.



✓ If you'd rather not write down all that system information, you can print what's on your screen by following these steps:

Press the PrtScrn key, open Paint, paste the screen into a new image by pressing Ctrl+V, and then send it to your printer by choosing File, and then Print. That gives you a quick reference guide to take to the store when shopping for software or a new PC.

- ✓ Vista lists the PC's Windows User Experience in Figure 1-1, which rates how well your PC runs Windows Vista. Click the User Experience Index to see ratings on each of your PC's parts, a quick way to see what parts need upgrading. (The higher the rating number, the better the part's rating.)

Figure 1-1:
This PC runs
Windows
Vista's
Ultimate
version on a
3 GHz Intel
Pentium 4
with 1022MB
of RAM.

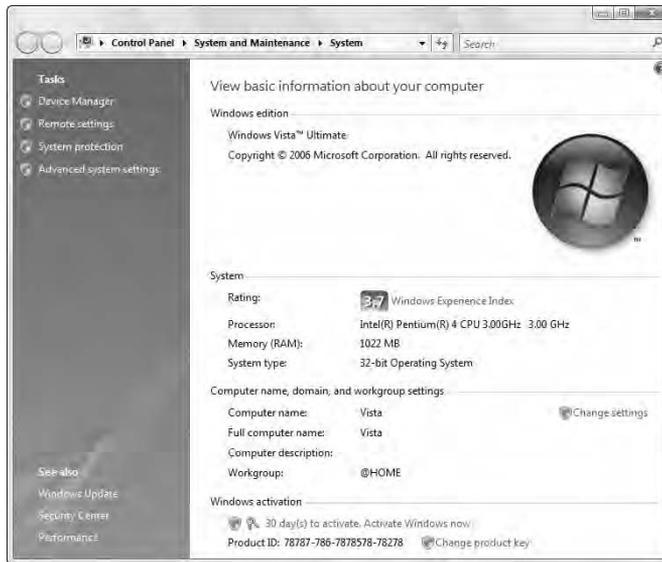


Figure 1-2:
This PC runs
Windows
XP's
Professional
version on a
3.40 GHz
Intel
Pentium 4
CPU with
1GB of RAM.



Identifying the parts inside your computer

The big three — Windows version, CPU, and RAM — usually have the most influence on which software and parts your computer can handle. But sometimes you need more detailed information — your video card's driver version, for instance, or your DVD drive's make and model.

Windows burps up this type of information when you push a little deeper, as described in the following steps:

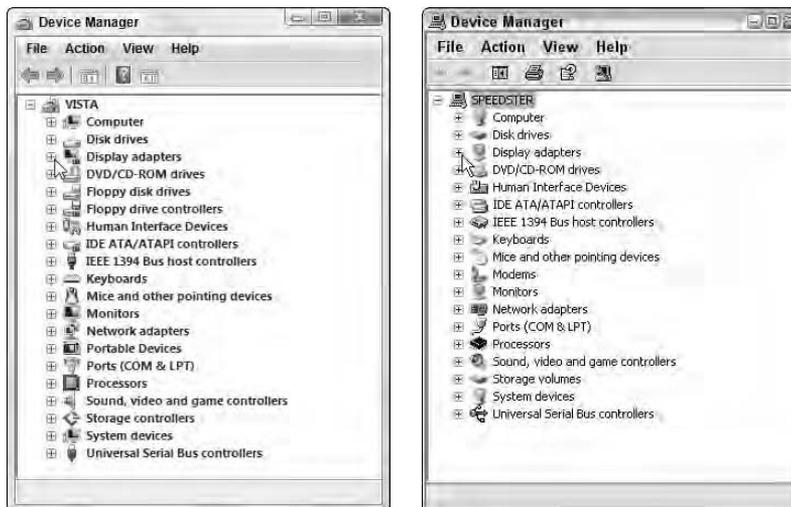
1. Right-click the Computer or My Computer icon and choose Properties.

Windows Vista's Computer icon and Windows XP's My Computer icon live on the Start menu. (You might also have the Computer/My Computer icon on your desktop.) Choosing Properties unleashes the System Properties dialog box, as shown earlier in Figure 1-1 (Vista) and Figure 1-2 (Windows XP).

2. In Vista, click Device Manager in the Tasks pane along the window's left. In Windows XP, click the Hardware tab, and then click the Device Manager button.

No matter which version of Windows you're using, the Device Manager dialog box jumps to the screen, as shown in Figure 1-3, displaying your computer's parts.

Figure 1-3: Click the plus sign next to Display Adapters to see your computer's video card model.



3. To see the make and model of a specific part, click the plus sign next to its name.

For instance, to see what type of video card sits inside your PC, click the plus sign next to Display Adapters — a Windows term for a PC's video circuitry. Windows shows your video card's model and manufacturer, invaluable information when the part stops working.

When a particular part stops working, look for its make and model in the Device Manager. Then head to the manufacturer's Web site and download that part's latest driver, a chore covered in Chapter 19.

Please! Before You Do Anything Else!

Wouldn't it be nice to push a button and have Windows fix itself? Well, you can. That is, if you make sure you've set up the two things that I describe next. Sit up straight and plow onward.

Turning On Windows Update

Bored youngsters work late nights probing Windows to locate programming problems. When they discover a new problem, they write a *virus* or *worm* (a small, malicious program meant to do damage, such as erasing important files) to take advantage of it. These hooligans release the virus, and it begins damaging people's computers as it spreads worldwide. (Remember that virus that infected your computer when you merely *opened* an e-mail?)

When hackers uncover a new *security exploit*, as they're called, Microsoft programmers scratch their heads and wonder what's wrong with today's youth. Then they release a special piece of software to fix the problem. But before your computer can find and install that special tool, usually called a *patch* or *update*, you need Windows Update.

The Microsoft Windows Update program automatically scans your computer to see if it's vulnerable to any newly found security problems. If so, the program automatically grabs the patch that cures them.

Microsoft released a patch to fix that ugly mail preview virus a long time ago. Because many people don't know about Windows Update, their computers remain vulnerable.



The Windows Update Web site (www.windowsupdate.com) organizes patches into several categories. Always install the ones in the Critical category, as they contain patches for security problems. You needn't install updates from any other categories unless you think they'll correct problems you're currently experiencing with your PC.

Here's how to make sure Windows' Windows Update feature automatically grabs any new patches so that you may install them:

1. Open Windows Security Center.

Windows Vista: Click the Start button and choose Control Panel⇨Security⇨Security Center.

Windows XP: Choose Control Panel and open Security Center. Windows Security Center opens in both versions.

2. In Vista, if Automatic Updating is turned off, click Change Settings.

In Windows XP, simply click Turn on Automatic Updates, and you're done. If you're running Windows Vista, move to Step 3.

3. Choose Install Updates Automatically (Recommended).

In Vista, you might need to click the Continue button in a permission screen to turn on Automatic updating.

In both Windows versions, these steps tell Windows to automatically visit the Windows Update site whenever you're online. (It does this in the background.) When your computer finds a new security fix, it downloads the software and either installs it automatically, or it places a little pop-up window near your clock, reminding you to install your new patch.



- ✓ Even if you're using Windows' automated Windows Update program, feel free to visit the Windows Update Web site on your own. Sometimes Windows waits a few days before checking the site, leaving your computer open to the latest problems.
- ✓ In the Recommended Updates section, Windows Update sometimes offers to check for patches on other Microsoft programs on your PC. Take it up on its offer to keep them patched, as well.

Making sure System Restore is working

System Restore, built into Windows Vista and Windows XP, often works miracles for problematic computers. If your computer suddenly stops working correctly, System Restore often enables you to bring your computer back to a time when everything worked fine.

When it's working correctly, System Restore automatically creates restore points that save important settings when Windows is up and running smoothly. The more restore points you have available, the further back in time you can travel to find a place when your computer was running strong and lean.

To make sure System Restore's running — or to fix it if it's not working correctly — follow these steps:

1. **Click the Start button, right-click the Computer or My Computer icon, and choose Properties.**

The Device Manger dialog box, shown earlier in Figure 1-1 (Vista) and Figure 1-2 (XP), appears.

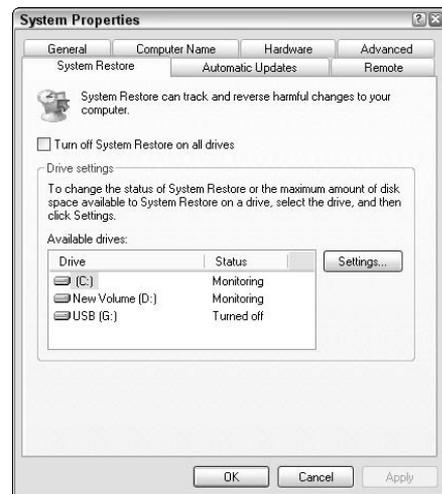
2. **Open the System Properties dialog box.**

Windows Vista: Click System Protection in the Tasks pane along the window's left side.

Windows XP: Click the System Restore tab.

The System Properties dialog box, shown in Figure 1-4, opens to show System Restore's settings. The figure shows the settings for Windows Vista (left) and Windows XP (right).

Figure 1-4:
In Windows Vista (left), System Restore is working correctly on drives with check marks next to them. In Windows XP (right), System Restore is working correctly on drives displaying the word Monitoring next to them.



3. Make sure System Restore is turned on.

Windows Vista: Make sure a check mark appears next to the first drive on the list. For example, Figure 1-4 (left) shows a check mark next to the words Local Disk (C:) (System). Vista also lists the date of the last Restore Point. Vista automatically turns off System Restore if your hard drive falls below 300MB of storage space. (That's when it's time to upgrade to a larger hard drive.)

Windows XP: Look for the word *Monitoring* next to each drive, as shown in Figure 1-4 (right). If you don't see the word *Monitoring*, System Restore is turned off. To turn it back on, check these things:

- Make sure that there's no check mark in the box next to the Turn Off System Restore on All Drives option. If there is, click the box to remove the check mark.
- If System Restore says that your hard drive is too full to create any Restore Points, it's time for housecleaning: You need at least 200MB of free space for System Restore to work. Open My Computer from the Start menu, and then right-click your C drive and choose Properties. Click the Disk Cleanup button on the General tab and follow the instructions to make Windows delete any unnecessary files — including old Restore Points, if you check that box.

If you're itching to run System Restore right now, flip ahead to Chapter 23 for the rundown.

Chapter 2

Keyboards, Mice, and Joysticks

In This Chapter

- ▶ Understanding keyboards, mice, and game controllers
 - ▶ Replacing keyboards, mice, and game controllers on new and old computers
 - ▶ Configuring wireless keyboards, mice, and game controllers
 - ▶ Repairing keyboards, mice, and game controllers
-

You push them, and they prod your computer into doing something. This chapter deals with the ultimate push/prodders: the keyboard and the mouse. Because that stuff grows boring pretty darn quickly, you find game controllers (game pads and joysticks) served up at the end of this chapter.

Updating Your Keyboard

Talk about moving parts — most keyboards have more than 100 of 'em, moving up and down hundreds of times during the day.

Keyboards don't die very often, but when they start to go, the problem is easy enough to diagnose. A few keys start to stickkkk or stop working altogether. And when almost any type of liquid hits a keyboard, every key stops working at the same time.

This section explains the types of keyboards on the market, where each plugs in, which works best in different situations, and how to fix them when they're heading down the wrong road.

Understanding keyboard buzzwords

For years, keyboards remained the simplest part of your computer. They mimicked the typewriter's keyboard that had served so well over the years. With the advent of wireless keyboards, numeric keypads, and other dedicated keys, that's unfortunately no longer the case. Today's keyboards have never been more complicated.

Here's a list of the buzzwords to decipher when diagnosing your keyboard's problems — or pitching it and buying a new one.



Standard 101 key: Most keyboards today sport at least 101 keys, including the usual typewriter layout, a numeric keypad along the right, and a row of function keys (F1, F2, and so on) along the top. The standard keyboard even includes a few keys added by Microsoft — most importantly, the Windows key. Shown in the margin, the Windows key offers quick access to Windows commands, as described in Table 2-1.

Table 2-1 Windows Key Shortcuts	
<i>To Do This</i>	<i>Press This</i>
Display Windows Help	<Windows Key>+F1
Display the Start menu	<Windows Key>
Display Windows Explorer	<Windows Key>+E
Find files	<Windows Key>+F
Minimize or restore all windows	<Windows Key>+D
View System window	<Windows Key>+Pause/Break
Lock PC	<Windows Key>+L

Gaming/multimedia/multifunction keyboard: Some companies figure that 101 keys aren't enough. So they stuff their own specialized keys along the keyboard's top or sides. Often devoted to single jobs, some keys simply change the volume or skip to the CD's next song. Gaming keyboards offer programmable keys: One key press lets you open a chat window in *World of Warcraft*, for example.

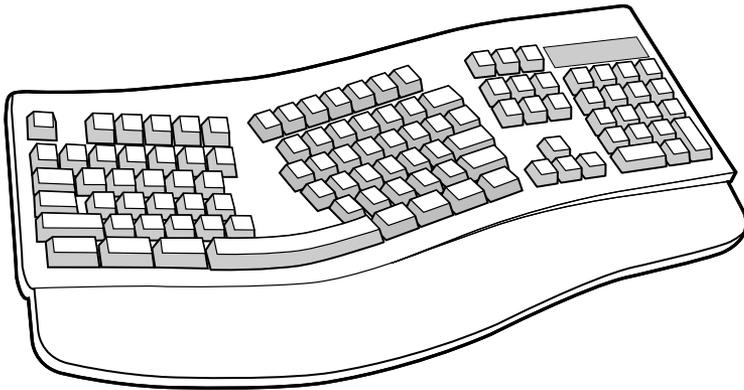


Specialized keyboard keys require special drivers. Those specialized keys won't work until you install the keyboard's bundled software.

USB versus PS/2: These words describe the plug on the end of a keyboard's cord. The newest keyboards sport USB (Universal Serial Bus) connectors, ready to slide into your PC's rectangular USB port. Older keyboards use round, PS/2-style connectors. All PCs work with either type. The PS/2 keyboards work better for troubleshooting (Chapter 21), but only USB keyboards can be plugged in and unplugged while your PC's turned on — if that matters to you.

Ergonomic keyboards: Ergonomic keyboards like the one shown in Figure 2-1 resemble a thick boomerang. Some folks say the shape helps them spend hours on the keyboard; others find it awkward and gimmicky. Most computer stores offer display models, so definitely try before you buy.

Figure 2-1:
Some folks
love the
Microsoft
Natural
keyboard;
others
hate it.



Wireless: Wireless keyboards bear no cords, making for tidy desktops. Most come in two parts: the keyboard and a receiving unit, which plugs into your PC's USB port. Unfortunately, they're battery hogs.



Media Center keyboard/mouse/remote: Windows Vista now comes with Windows Media Center, software which automatically records and plays back TV shows. To keep you rested firmly on the couch across from the TV, several companies offer special remote controls and wireless keyboards for channel changing and living room Web surfing.

Most of these new Media Center keyboards, remotes, and mice use Bluetooth, the same wireless technology that links cell phones with headsets. Because few PCs come with Bluetooth, most of these come with a tiny Bluetooth receiver that pushes into your PC's USB port.

Installing a new keyboard

Difficulty level: Easy

Tools you need: One hand; possibly a flashlight if your PC is in a dark spot

Cost: From \$15 for a basic, no-frills keyboard, to \$100 or more for elaborate ergonomic and wireless models



Stuff to watch out for: Look at the connector on the end of your old keyboard and buy one that matches it. Keyboards with round connectors on the ends of their cables, like the one in the margin, are known as PS/2-style keyboards. Keyboards with rectangular connectors are USB keyboards.



Look for a USB keyboard that's bundled with a *PS/2 adapter* — a tiny gadget that plugs into a USB connector to give it a PS/2 connector. That lets you plug the keyboard into either type of port.



Although some USB keyboards sport an extra USB port or two on the side, those USB ports aren't *powered* — they work only with small, low-power gadgets such as tiny USB flash drives. They won't charge an iPod or any other device that draws power through the USB port.



Don't buy a keyboard without typing on the display model at the store. You'll work closely with that keyboard for years to come, so don't pick one that feels too hard, too spongy, or just plain unfriendly.

To install a new keyboard, follow these steps:

1. Save your current work, close your programs, and turn off your computer.

Don't ever unplug your PS/2 keyboard when the PC is turned on. Your computer might freeze and not recognize a new keyboard. (If your PC's frozen, its mouse can still click the Start button to restart your PC.)

You don't need to turn off your PC to install a new USB keyboard.

2. Remove your old keyboard by pulling the cable's plug from its socket on your computer.

When you're unplugging any type of cord, pull on the plug, not the cord, to save the cord a little wear and tear.

Examine the end of the cord. (The Appendix explains connectors in detail.) A rectangular plug with a pitchfork symbol on it is a USB plug. A smaller, round plug is an older-style, PS/2 plug.

3. Buy a replacement keyboard.

Buy one that fits your computer, either USB or PS/2. If a keyboard says it works with both types of ports, it's a USB keyboard with a tiny adapter. To plug it into the PS/2 port, slip the adapter onto the USB plug.

Bought a wireless keyboard? Insert its batteries before plugging it in.

4. Carefully insert the new keyboard's plug into the correct port.

USB: These slide in pretty easily. Doesn't fit? Turn over the plug and try again, as it fits only one way. If the USB keyboard is wireless, plug its receiver into the USB port.

PS/2: This plug fits only one way, so you need to match up the pins in the plug with the notches of the port. Most PCs have two PS/2 ports, one for the mouse and the other for the keyboard. They won't do any harm plugged into the wrong port, but they won't work until pushed into the right port. Push firmly until it's all the way in.



5. Turn your computer back on.

If the computer doesn't complain and your new keyboard works, your computer found the keyboard and liked it.

6. Install your keyboard's software, if required.

Some fancier keyboards use special drivers or installation software to set up their specialized keys. Insert the CD and run the Setup program, if necessary, to install it.

Or, if Windows asks for drivers after you turn on your computer, insert the CD into your drive and click OK. (Plenty of information about drivers awaits in Chapter 19.)

7. Adjust your keyboard's settings in Windows.

Choose Control Panel from the Start menu and continue with the instructions for your operating system that follow:

Windows Vista: Open the Hardware and Sound area, and double-click the Keyboard icon.

Windows XP: Open the Printers and Other Hardware area, and double-click the Keyboard icon.

The Keyboards area lets you change options such as a key's repeat rate — how long it waits before repeating when you hold down a letter. Your keyboard's manufacturer might have tossed in a few options for your specific model, as well.



- ✓ If a PS/2 keyboard connector's little pins become bent, they won't fit into the hole, no matter how hard you push. A little care and needle-nose pliers should set things straight.
- ✓ Using a wireless keyboard? Plug the keyboard's receiver unit into your computer, just as if it were the keyboard itself. Check the batteries in your wireless keyboard and install any required software; the receiver should pick up its signals right away. A few models use infrared signals, requiring a clear line of sight between the keyboard and receiver. The majority use radio waves — you can put the receiver anywhere nearby. Some wireless keyboards also have a button you must push before being recognized by the receiver.



A wrist pad — a piece of foam or a gel-filled pad that your wrists rest on as you type — sometimes helps deter typing soreness or carpal tunnel syndrome. To see whether you can benefit from one, make a test model from a thin, rolled-up magazine taped shut. Put it along the front of the keyboard and see whether your arms feel better when the magazine lifts your wrists slightly.

Fixing keyboard problems

Although it's tempting to throw out the keyboard and grab a new one at the first sign of evil, you can fix some problems. This section walks you through some simple, do-it-yourself repairs. If these fixes don't work, buy a new keyboard. It's almost always cheaper to buy a new one than to repair an old one.

Fixing the Keyboard Not Found error

Chances are that your keyboard's cord isn't plugged all the way into its socket. (And pressing F1 won't do anything, no matter what the message on-screen says.) Fumble around in the back of your computer until you find the keyboard's cable. Push it into its socket a little harder.



After you fasten the keyboard's cable more securely, you might need to push your computer's Reset button. Some computers look for keyboards only once — and that's when they're first turned on. The Reset button forces the computer to take a second look. Or, if there's no Reset button, turn off your computer, wait 30 seconds, and turn it back on again.

Also, make sure that nothing is sitting on any of the keys — such as the corner of a book, or a small furry animal. If any of the keys are pressed when you first turn on the computer, the computer assumes the keyboard is broken.

Still doesn't work? If you're using a wireless keyboard, check the batteries or make sure the keyboard is within range of its receiver.

If your keyboard *still* doesn't work, check to see whether something might have been spilled on it. (See the following section.)

Cleaning up spills on your keyboard

Your keyboard is probably a goner if you spilled prune juice or coffee on it. But here's the Emergency Keyboard Preservation Procedure: Save your work if possible, turn off your computer, and unplug the keyboard.

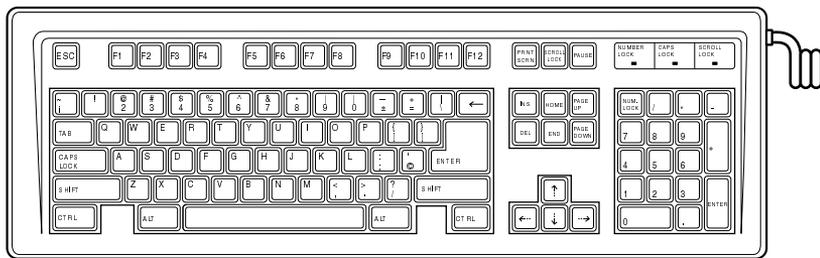
With a sponge, wipe off all the spilled stuff you can find. Then sit there and feel foolish for the 24 hours or so that it takes for the keyboard to dry in the sun or a warm room.

If you spill only water, your keyboard might still work the next day. But if you spill anything containing sugar — soda pop, coffee, margaritas, prune juice, Tang — you probably coated the inside of your keyboard with sticky gunk. This gunk then attracts dust and grime, and your keyboard starts a slow decline and dies sooner or later, depending on the tragedy level of the spill.

Luckily, new keyboards are pretty cheap, ranging from the \$15 specials to the \$100 deluxe wireless models.

- ✔ If you have lots of spare time and little spare change, pry off all the keycaps one by one with a small screwdriver. (Don't bother trying to remove the spacebar because it has too many gizmos holding it on.) When the keys are off, sponge off any stray gunk, dry off the moisture, and try to put all the keycaps back in their right locations. (Figure 2-2 might help.)
- ✔ Some people report success (and sometimes odd stares) by immediately taking their wet keyboard to the gas station and squirting it with air from the tire pump to loosen debris. Other people have successfully used a hair dryer. If you're lucky enough to have a can of compressed air on hand, use that.
- ✔ Wait at least 24 hours before giving up on your keyboard. You can salvage many wet keyboards, but only after they are *completely* dry.

Figure 2-2:
Use this replacement guide to help you replace keys you've removed to clean the keyboard.



Don't give up hope too early. Erik writes in from Portugal with an old college story about a basketball player who borrowed his computer to play video games. Unfortunately, the sportster knocked a cup of spit and tobacco juice onto the keyboard. Figuring he had nothing to lose, Erik rinsed off the keyboard at the nearby gym's shower and towed it off. When the keyboard dried, Erik plugged it in, and the machine rose from the dead.

Replacing keys on your keyboard

If your rapidly moving fingers have worn off the printed letters, you've probably already memorized all the locations. But if you still want labels, salvage the keycaps from a dead keyboard or ask your local computer store if it sells replacement keycaps. (The Key Connection at www.customkeys.com sells them online, as well as thin plastic keyboard covers for clumsy, caffeinated gamers.)



The legacy of USB and you

Normally, Windows Vista and XP recognize USB keyboards without problem. But when troubleshooting, sometimes you're not running Windows normally. You might be running disk utilities, or editing your PC's BIOS (Basic Input-Output System), which is a collection of hardware settings. If your USB keyboard stops working during these times, the fix is to change a setting in your PC's BIOS by following these steps:

Warning: Choosing the wrong settings on your computer's BIOS can cause serious problems. When in doubt, choose Exit Without Saving Changes and start over.

1. **Shut down your computer.**
2. **Connect a PS/2 keyboard to your computer.**
3. **Turn on your computer and enter System Setup before Windows starts.**

Computers use different ways of accessing their BIOS settings. Watch the screen when you turn on your computer. It often says,

Press F1 for Setup, or something similar. Press that key quickly to enter your BIOS settings area.

4. **Find the USB Legacy Support setting, usually on the Advanced menu.**
5. **Select USB Legacy Support and change the setting to Enabled.**

Please don't fiddle with anything else, no matter how tempting. And if you should yield, write down the setting you changed. Even System Restore can't save you when you change your BIOS settings.

6. **Choose Save the Settings and exit the BIOS, quickly.**

No USB Legacy Support setting? Stick with a PS/2 keyboard and mouse, or a USB keyboard with a PS/2 adapter attached. (Most computer and office supply stores sell inexpensive adapters.) They both work fine.



If you give up and buy a replacement keyboard, coat the new keyboard's keycaps with a thin layer of clear nail polish. That often helps protect the lettering from finger damage, extending the key caps' lives.

Making Way for a New Mouse

Mice all tackle the same computing chore. When you nudge your mouse, a little arrow called a *mouse pointer* moves on your computer's screen. By pointing the arrow at buttons on the screen and pushing buttons on the mouse, you "push" the buttons on the screen.

For years, all mice looked like a beige bar of soap with two buttons and a long tail. Now, mice come in many varieties and colors. Both Microsoft and Logitech each sell more than 20 different models.

Understanding mouse buzzwords

When mice burst into the PC world in the early '80s, Macintosh models had one button. PC models came with two buttons. Then somebody introduced a three-button mouse for PCs, and the world went wild. Today, zillions of mouse models try to separate you from your money.

Here's a handy translation for the Language of the Mouse.

Mouse ball: A little rubber ball rests in the belly of a mouse; when you move the mouse, you also roll the little ball. The movement of the ball tells the computer the direction and speed to move the on-screen pointer. Ball mice work best on a mousepad, a rubbery surface that clings to the rolling ball as it moves, giving it the best accuracy. Ball mice have mostly given way to optical mice, described next.

Optical: Optical mice ditch the ball/roller mechanics for a small glowing light and a sensor. As you move the mouse, the optical sensor takes little snapshots of your illuminated desk, hundreds of times each second. By comparing differences between snapshots, the mouse knows how fast and far you're moving it, and it updates the pointer accordingly. An optical mouse still requires a mousepad over glass or shiny laminate desktops, as the reflections confuse the sensor.

Trackball: Trackballs are, in essence, upside-down mice. Rather than roll the ball around your tabletop, you roll the ball directly with your fingertips. They're popular with laptops, although some desktop keyboards also include trackballs for convenience.



The early laptops aboard the space shuttle *Discovery* used the Microsoft Ballpoint trackball. The trackball clipped to the laptop's edge to keep it from floating away.

TrackPoint/AccuPoint: Found on some laptops, this pointing device looks like a pencil eraser protruding from the middle of your keyboard. Nudge the little joystick with a fingertip to move the mouse pointer. Desktop keyboards have been slow to embrace the technology.

Touchpads: Found on many laptops, this square pad lets you move the cursor by dragging your finger across its surface. If you love your laptop's touchpad, pick one up for your desktop: External touchpads plug into a USB port. (Trivia: Windows calls a touchpad a "Human Interface Device.")

Scroll wheel: This little wheel protrudes from the mouse's back, usually between the two buttons. Spin the wheel with your index finger, and your computer scrolls up or down the on-screen page, accordingly. Push down on the wheel to make it click; most scroll wheel mice let you program the wheel click to do just about anything you want.

Wireless: Wireless mice work just like their keyboard counterparts; in fact, some share the same receiving unit, which plugs into your computer's USB or mouse PS/2 port. The mouse sends signals to the receiver, which sends them to your computer. You can find more information about wireless technology in this chapter's "Updating Your Keyboard" section.

PS/2: An older mouse comes with a PS/2-style connector, which still works fine. Just don't ever unplug the mouse while the computer is turned on, or the mouse will stop working — even after you frantically plug it back in. (Restart the computer, and the mouse will begin working again.)

Installing or replacing a USB or PS/2 mouse

Difficulty level: Easy to Medium, depending on your computer's setup

Tools you need: One hand; possibly a flashlight

Cost: Anywhere from \$10 to \$100

Stuff to watch out for: If you're buying a fancy mouse for your Windows Vista computer, visit the manufacturer's Web site to see if it offers downloadable Windows Vista drivers. (You rarely find up-to-date drivers in a new product's box.)

A mouse comes with its own software, if needed, and cord. You needn't buy any extras. And Windows can use pretty much any old PS/2-style mouse. Just plug it in, turn on your computer, and Windows knows it's there.

To replace or add a mouse, follow these steps:

1. Turn off your computer.

Be sure to exit any of your currently running programs first.

2. Examine where you currently plug in your mouse (and buy a replacement mouse that uses the same type of plug).



USB: Most computers come with several of these squat, rectangular ports.

PS/2: Most desktop computers have two of these small, round, black ports, one with a little mouse icon and the other with a little keyboard. Feel free to upgrade to a USB variety, if your computer has a spare USB port.

3. Push the plug from the new mouse into the correct port on your computer.



USB: These slide on in pretty easily. Doesn't work? Turn it over. USB connectors fit only one way.



PS/2: Use the small, round PS/2 connector with the little mouse icon next to it; the adjacent keyboard port won't work. Make sure the notches and pins line up and push firmly until it's all the way in.

4. Run the mouse's installation program, if necessary.

Windows usually provides a basic driver for your newly installed mouse. To use the mouse's fancier features, though, stick its CD into your drive. If the installation program doesn't start automatically, browse the drive's contents for a program named Setup to start things rolling.

- ✓ Mouse cord isn't long enough? You can find extension cables for USB and PS/2 mice at most office supply and electronics stores.
- ✓ Some mice plug into either the USB or PS/2 ports. Plug them into the PS/2 port unless the USB port offers additional features.
- ✓ You might want to disable your laptop's touchpad or TrackPoint after plugging in a mouse, especially if you keep touching it accidentally. This task varies with different laptops, unfortunately. Sometimes the touchpad's Disable setting appears in the Control Panel's Mouse area. Other times, it's located in the PC's BIOS, a settings area described in this chapter's "The legacy of USB and you" sidebar.
- ✓ Left-handed users can switch their mouse buttons through the Buttons tab in the Control Panel's Mouse area:
 - *Windows Vista:* Click Start⇨Control Panel⇨Hardware and Sound⇨Mouse.
 - *Windows XP:* Click Start⇨Control Panel⇨Printers and Other Hardware⇨Mouse.



Fixing mouse problems



If your mouse just died, here's the magic set of keystrokes to shut down Windows in a gentle way, without reaching for your computer's Off button.

Press your Windows key (or press Ctrl+Esc). Then press the right-arrow key three times and press the letter U.



Press your Windows key (or press Ctrl+Esc). Press U. When the Turn Off Computer menu appears, press U.

If your mouse isn't completely dead, though, these fixes might revive it.

Cleaning your mouse to fix a jerky cursor

If your cursor is jumpy when you move your mouse, you probably need to clean your mouse. If you're using an optical mouse, use some screen wipes to clean the shiny lens on its undersurface. A pair of tweezers can remove a stuck cat hair or small fiber that's confusing the sensor.

Mechanical mice occasionally need their balls removed and gunk scraped from the rollers by following these steps:

- 1. Turn the mouse upside down and remove the little square or round plastic plate that holds the ball in place.**

You usually find an arrow indicating which way to turn a round plate or which way to push a square plate.

- 2. Turn the mouse right-side up, and let the mouse ball fall into your hand.**

Two things fall out: the plate holding the ball in place and the ball itself.

- 3. Set the plate aside and pick all the hair and crud off the mouse ball. Remove any other dirt and debris from the mouse's ball cavity, too.**

If you have a Q-tip and some rubbing alcohol handy (or even some mild soap and warm water), wipe any crud off the little rollers inside the mouse's ball cavity. Roll the little rollers around with your finger to make sure that there's no stubborn crud you can't see hiding on the sides.

Mouse balls give off a very disappointing bounce. Don't waste too much time trying to play with them.

- 4. Drop the mouse ball back inside the mouse and replace the plate. Turn or push the plate until the mouse ball is locked in place.**

This cleaning chore cures most jerky mouse cursor problems. However, the mouse ball stays only as clean as your desk. Computer users with cats or shaggy beards might have to pluck stray hairs from their mouse ball frequently.

Telling your computer how to find your mouse

If your computer doesn't seem to recognize your mouse, make sure that the mouse is plugged in firmly. Grope around until you're sure that the plug on the end of its cable fits snugly into the little socket on the back of your computer. Plugged in tight?

If so, reboot your computer. Check the batteries on a wireless mouse and make sure the receiving unit is pushed firmly in place. As a last resort, try installing newer drivers (explained in Chapter 19).

Fixing a wireless mouse that's acting strangely

If your wireless mouse is acting funny, try replacing the batteries. Some batteries fit in the mouse's receiving unit as well as the mouse itself.

An infrared wireless mouse needs a clean line of sight between itself and its *receiving unit*, the thing that plugs into your computer. But because that clean line of sight is probably the only clean spot on your desk, that's the first place you might tend to set down books and junk mail. Try moving your books and junk mail out of the way to calm down the mouse.

Other wireless mice use radio signals. These mice don't need to point in any particular direction. (Except for the battery drawer, unfortunately. These little critters feast on batteries.)

Weird Tales Department: One woman wrote to me that she kept seeing *two* mouse pointers on the screen. The problem? Her ailing wireless mouse was sending a ghost image, similar to the one you see on a TV screen with a bad signal.

Upgrading Joysticks and Game Controllers

Many computer games make do just fine with the keyboard and mouse. Keyboards can handle both online chats and direction: Resting the fingers on the W, A, S, and D keys often lets you tell the PC whether you're moving up, left, down, or right, respectively. That leaves the mouse free for shooting or other activities.

But for advanced gaming, many people prefer dedicated game controllers, described in this section.

Understanding game controller buzzwords

Easy to install, most game controllers come with a flat, rectangular plug that fits directly into your USB port. Here are a few terms you encounter when shopping or reading software boxes:



USB port: Most game controllers plug into the USB port. If your PC lacks a front-mounted USB port, pick up a *USB hub* — a small, USB-port-filled box with a cable that plugs into your PC's awkwardly placed USB port.



Game port: Very few controllers still plug into a PC's game port, so many PCs no longer come with the 15-hole port, shown in the margin. If you find yourself needing a game port, examine your computer's sound card, where you plug in the PC's speakers. Many sound cards still come with game ports because musicians use them for plugging in their MIDI instruments.

Joystick/game pad: Joysticks hail from the older school of gaming and use a movable stick for controlling on-screen action. Game pads skip the joystick in favor of a flat surface and many buttons. Some controllers combine both: a joystick surrounded by buttons.

Analog: Analog game controllers measure the direction the joystick moves on a scale of 0 to 255. They send the number to the game, which interprets the joystick's direction and speed, moving the machine gun accordingly.

Digital: Digital models, by contrast, work on an on/off basis. Most simply inform the game which of nine directions the joystick is moved: top, top-right corner, right, bottom-right corner, bottom, and so on. The ninth direction? Centered, meaning it's not being moved at all. Game pads, with their many on/off buttons, usually hail from the digital camp.

Both types of controllers have their advantages and problems. Analog controllers can drift, requiring calibration. Their moving parts might wear out. Digital controllers offer more accurate control, but more limited direction movements.

Different games work better with different types of joystick, so your best bet is to own one analog and one digital model. If possible, try out a friend's controller before you buy. Although some game controllers support both digital and analog modes, they don't always do that very well.



Some games work better with one kind of game controller over another, and not all controllers work with every game. Serious gamers acquire a serious collection of controllers.

Calibrate: Game controllers all have their own particular feel. When you tell the computer to calibrate the controller, the computer measures the device's movements and corrects its settings to allow smoother and more accurate game play.

Installing a game controller



Windows XP and Vista recognize most controllers as soon as you slide the plug into the USB port. Remember, the plugs fit in only one way. If it doesn't fit, turn it over and try again.

If you're using an old-school game port, push the joystick's plug into the joystick port on the back of your computer.

Fixing game controller problems

Computer games cause the most grief for technical support people. Games push a PC to its limits, and game programmers often tweak the PC to make it work slightly faster.

Because angry gamers can be difficult to placate, many game controller manufacturers provide detailed Web sites explaining how to troubleshoot problems. Often what works for one game doesn't work for the next. Look for the specific game on the site and tweak your settings accordingly.

For the best results, see which game controller your favorite games support, and then buy that game controller.

Solving USB game controller problems

Sometimes games don't recognize a USB game controller or know which one to use for which game; other controllers need periodic calibrating. To access Windows' limited settings for game controllers, follow these steps:

- 1. Quit your current game, and choose Control Panel from the Start menu.**

The Control Panel, Windows' collection of switches and settings, rises to the screen.

- 2. Double-click the Game Controllers icon.**

Windows Vista: The Game Controllers icon lives in the Hardware and Sound category.

Windows XP: Hides the icon in the Printers and Other Hardware category.

- 3. Choose your default game controller and access your particular controller's settings.**

Click your controller and choose Properties to access its settings.

Chapter 3

Replacing a Monitor, Adding a Second One, or Connecting to a TV

In This Chapter

- ▶ Understanding video vocabulary
 - ▶ Upgrading to an LCD flat-panel monitor
 - ▶ Understanding digital connectors
 - ▶ Installing one or two monitors to a PC
 - ▶ Matching monitors with video cards
 - ▶ Fixing monitors that don't turn on
 - ▶ Eliminating weird monitor noises
-

Most computer terms sound dreadfully ho-hum: *high density*. *Device driver*. *Video adapter*. Yawn.

But the engineers had apparently just returned from a science-fiction flick when they started coming up with monitor terms: *Electron gun!* *Cathode ray!* *Liquid crystal!*

This chapter talks about the thing everybody stares at and puts stick-on notes all over — the computer monitor. It explains how to upgrade to a nicer, larger monitor — or even connect two of them to your PC to double your desktop. It explains how to connect your PC to your TV set for the ultimate gaming experience.

Along the way, I toss in a few digestible tidbits about your *video card*, that almighty gadget responsible for pitching everything onto your monitor.

Understanding Monitor Buzzwords

Your PC's video circuits send images to your monitor, where you can see the action. Because monitors and your PC's video circuits (known as *video cards* or *display adapters*) work as a team, this chapter's stuffed with twice as many bothersome buzzwords than usual. When you shop for either a monitor or video card, these words show up on newspaper ads, showroom signs, and the fine print of product boxes.

This section deciphers the terms surrounding the monitors and their plugs, ports, and cables.

Monitor buzzwords

Monitors come in two types, each described below.

- ✓ **LCD:** The most popular monitor today, LCD (*Liquid Crystal Display*) monitors look much like large laptop screens mounted on a stand. LCD monitors, like the one shown in Figure 3-1, are also called *flat-panel* monitors.
- ✓ **CRT:** Fading fast from the marketplace, CRT (*Cathode Ray Tube*), shown in Figure 3-2, monitors resemble small (but expensive) TV sets. Although some CRT monitors call themselves “flat screen,” that merely means their glass screens are relatively flat. They're not flat *panel* monitors, an honor belonging only to LCD monitors.
- ✓ **TV set:** TV sets are designed for moving images, not text, so they make lousy computer monitors. Their low resolution can barely display an icon. So, why bother hooking up a PC to a TV? Because their large screens excel at showing digital photos, movies, computer games, or TV shows recorded in Windows Vista's new Media Center. (Computer monitors make great TV sets, though, especially widescreen LCD monitors, described next.)
- ✓ **Widescreen:** Just like the movie theaters, these LCD monitors boast a wide screen, making for more realistic movie viewing. (If you've upgraded your PC with a TV tuner, described in Chapter 12, you can watch *The Simpsons* reruns in a corner of your extra-large desktop.) Some widescreen monitors can even be turned upright on their stand, letting you see an entire page on-screen, not just a choice between the page's top or bottom half.

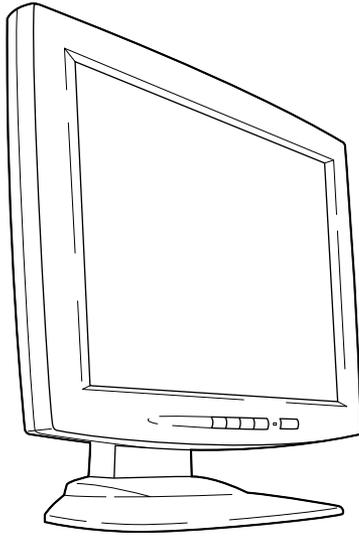


Figure 3-1:
LCD
monitors
look slim
and hip on
any desktop.

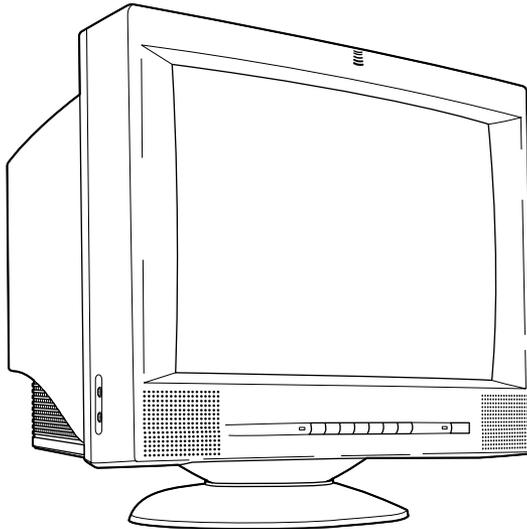


Figure 3-2:
By compar-
ison, old-
school CRT
monitors
seem boring
and bulky.



Neither Windows Vista nor Windows XP supports swiveling widescreen monitors. That requires software made for your PC's video card. If your swivel monitor displays your desktop only sideways — not vertically — drop by your video card manufacturer's Web site and download the latest drivers (a chore covered in Chapter 19). You might need to upgrade your video card to match your new swiveling monitor.

If you're sold on those cool, flat LCD monitors, don't forget these important points:

- ✔ LCD monitors cost more to create than CRT monitors, so some manufacturers cut corners in quality, shipping some with a handful of dead pixels that don't light up or that display the wrong colors. Manufacturers rarely cover dead pixels under the monitor's warranty, leaving you stuck with them. Check the return policy before buying.
- ✔ Check the connector on the LCD monitor's cable, as some connectors are digital, others are analog. The analog ones often plug directly into standard VGA video cards found on almost all PCs. The digital ones require a video card with a special connector like the one shown in the margin.
- ✔ Technically, *all* LCD monitors are digital. However, some use a built-in digital-to-analog converter that transforms an analog signal into the required digital one. The converter built in to LCD monitors labeled as *analog* or *analog/digital* lets them plug into regular VGA cards.

Shopping buzzwords

Much as a sticker on a new car's side window breaks down the car's features into a few words, monitors sum up their features with these buzzwords:

- ✔ **Screen size:** A diagonal measurement from one corner of a monitor to the other. Don't be fooled, though: A TV-style monitor's screen size *includes* the plastic surrounding its edge; an LCD monitor's size measures the actual screen you see. That's why a 17-inch LCD monitor will have more usable space than a 17-inch CRT monitor.
- ✔ **Pixel:** A single, little, square dot on your screen. Computer pictures are merely collections of thousands of little, colored dots. You need to know about pixels mostly in connection with *dot pitch*.
- ✔ **Dot pitch:** The distance between pixel dots on-screen. The smaller the dot pitch, the clearer the picture. Magic number: Buy a monitor with a dot pitch at .28 or smaller.
- ✔ **Resolution:** Your monitor stacks pixels across the screen in a grid, like tiny bottles in a wine rack. The more rows and columns your monitor and video card can display, the higher its *resolution* and the more images you can crowd onto your screen. Resolution is adjustable through the Windows' Control Panel, so choose the highest available resolution that still reads comfortably.

A 1024-x-768 monitor displays a maximum of 1024 columns x 768 rows of pixels. If your video card can display at a higher resolution, such as 1280 x 1024, the monitor still displays a maximum of only 1024 x 768 pixels.
- ✔ **Video mode:** A combination of resolution and color. Most cards and monitors display several different modes. For example, some cards can display Windows in 800-x-600 resolution with zillions (32-bit) of colors. Or you can switch to 800-x-600 resolution with fewer (16-bit) colors. Your video mode depends largely on your personal preference and the type of computing you're currently doing.

Here's how to adjust the resolution and color in Windows Vista and Windows XP:

Windows Vista: Right-click a blank part of your desktop and choose Personalize from the pop-up menu. Choose Display Settings from the Personalization Appearance and Sounds window, and adjust the resolution with the sliding control. You can also choose the color from that page's Colors drop-down box.

Windows XP: Right-click a blank part of your desktop and choose Properties from the pop-up menu. Click the Settings tab in the Display Properties dialog box, and adjust the resolution with the sliding control. You can also choose the color from that page's Color Quality drop-down box.

- ✓ **Refresh rate:** How fast your CRT monitor and card can repaint a picture. The bigger the refresh rate number, the less flicker you

see on the CRT's screen. You rarely want more than 60 or 80 hertz (Hz).

Windows Vista and Windows XP let you adjust the refresh rate in slightly different ways:

Windows Vista: Right-click a blank part of your desktop and choose Personalize from the pop-up menu. Choose Display Settings from the Personalization Appearance and Sounds window, click that page's Advanced Settings button, and click the Monitor tab. Then choose one of the refresh rates listed in the Screen Refresh Rate drop-down list.

Windows XP: Right-click a blank part of your desktop and choose Properties from the pop-up menu. Click the Settings tab in the Display Properties dialog box, click the Advanced button, and click the Monitor tab. Then choose one of the refresh rates listed in the Screen Refresh Rate drop-down list.

The plugs and ports

Monitors come in two types, analog or digital, and you can tell which type of monitor you have by ogling the plug at the end of its cord. (Monitors with two cords are both analog *and* digital.) The plug on the end of that cord must fit into the video port on the back of your PC or TV, if you're using your TV as a monitor.

Here are the plugs and ports you're likely to find on your monitor and TV:



- ✓ **Analog (VGA):** The most common ports found on PCs and monitors, these look like the ones shown in the margin. They're also called VGA (*Video Graphics Array*) ports, and most monitors can plug into them.



- ✓ **Digital (DVI):** Digital monitors plug into special DVI (*Digital Video Interface*) ports, which resemble the one shown in the margin. Many digital monitors come with both VGA and DVI ports, letting you connect whichever one fits into your PC's video port or cable. Some high-quality TV sets have this port, as well, for connecting to a PC.



If your monitor can plug into either a digital (DVI) or an analog (VGA) port, plug it into your PC's DVI port for the sharpest picture. If your PC's video card doesn't have a DVI port, plug the monitor into the VGA port, instead. (You can also upgrade your video card, which I explain in Chapter 7, for a sharper picture.)



Some monitors don't come with any cable, but offer two ports, VGA and DVI. That lets you buy whichever type of cable that fits with your PC's video port. (DVI cables cost about twice as much as VGA cables, but the sharper picture is worth it.)

Installing One or Two Monitors to a PC or Laptop

Difficulty: Easy

Tools you need: A screwdriver

Cost: Anywhere from \$150 to \$2,000

Stuff to watch out for: Monitors display only what your PC's video card sends it, so make sure that the card and monitor can communicate. A flat-panel LCD monitor with digital *and* analog inputs will connect with the widest variety of cards. Similarly, video cards with both a VGA port *and* a DVI port support the widest variety of monitors.

Connecting a second monitor to your PC

Hooking up a second monitor to your PC takes two steps: Plug the second monitor into a second video port on your PC, and then tell Windows about your second monitor. Specifically, you must tell Windows which monitor is *default*, meaning which of the two monitors should display your Start button and taskbar:

Windows Vista: Right-click a blank part of the desktop and choose Personalize. Then choose Display Settings, click the picture of your default monitor, choose This Is My Main Monitor, and then click OK.

Windows XP: Right-click a blank part of the desktop, choose Properties and click the Settings tab. Select the Extend My Windows Desktop onto this Monitor check box, and then click OK.

Some newer video cards come with two video ports, making adding a second monitor a snap: Plug one monitor into each port. But if your video card doesn't have two ports, your only solution is to buy and install a second video card or upgrade to a video card with two ports, one for each monitor.

I explain how to install a video card in Chapter 7.



Some manufacturers test your patience by claiming their monitor has a *15-pin mini D-SUB connector*. That's a fancy term for *VGA plug*. The most common plug, it connects to nearly every PC and laptop.

If you're installing a new video card along with your new monitor, flip to Chapter 7 first for instructions on installing the card. After the new card rests inside your PC, head back here to hook up the monitor.

To install a new monitor, perform the following steps:

1. Shut down Windows, turn off your computer, and unplug your old monitor.

Unplug your old monitor's power cord from the wall before you unplug the monitor's video cable from its little port on the back of your computer's case.

2. Remove the old monitor from your desktop.

Don't throw your old monitor into the trash can because monitors contain noxious chemicals. Check Chapter 5 for tips on finding recycling programs.

3. Remove the new monitor or monitors from the box.

Some monitors come with different cables and adapters for different video card connectors.

4. Place the monitor on your desk and connect a cable between the monitor's port and the matching port on your PC.

The cable should fit into only one port on both your PC and your monitor. If the cable doesn't fit right, you're either trying to plug it into the wrong port, or your monitor isn't compatible with your PC. If the monitor's not compatible, you need to upgrade your PC's video card to match your monitor, a chore tackled in Chapter 7.

If you have one of those cool swivel stands, leave a little slack on the cables so that you don't pull a cable loose when turning the monitor.

5. Plug the monitor's power cord into the wall outlet or a power strip.

6. Turn on your monitor and then turn on your computer.

Can you see words on the screen as the computer spews its opening remarks? If so, you're done. Hurrah! If it doesn't work, however, go through some of the fixes in the section, "Fixing Your Monitor" later in this chapter.



If you bought a fancy monitor with speakers, cameras, or other goodies, you have to perform two more tricks: Plug the cords from the speakers or camera into their ports in the back of your computer. (The Appendix shows pictures of all your PC's ports and what plugs into them.) Then, if Windows doesn't recognize your new monitor's special features, you probably have to install the drivers that came on the CD that came with the monitor. (Your monitor *did* come with a CD, didn't it?) Either way, Chapter 19 can help out.



Watching Your PC on a TV

When connecting a PC to a TV, success depends on your PC, not your TV. Unfortunately, not all PCs can send video to a TV. To see if your TV and PC can become friends, look on the back of both your TV and your PC, specifically the spot where your monitor currently plugs into your PC. You need to find a matching pair of any of these jacks on both your PC and your TV:



✓ **S-Video:** This appears on high-quality TV sets and some PCs, and carries a very good picture. By connecting an S-Video cable between the two ports, your PC can send high-quality video to the TV.



✓ **RCA:** Found on most TV sets and some PCs, this sends lower-quality video to the TV. If you spot one, connect an RCA cable between the yellow RCA port on the TV and the PC's RCA port.



✓ **DVI:** Many HDTV sets come with a DVI port — the same one found on most LCD monitors and PCs. That makes the connection as easy as with an LCD monitor: Just connect a DVI cable between your PC's DVI port and the HDTV set. (You might need to unplug your PC's monitor when you plug in the TV.)

When you've found matching ports on both your PC and TV, I explain how to connect the two and adjust the settings in the "Connecting Your PC's Video to a TV" section of Chapter 12.

Fixing Your Monitor

Can you fix the old one? Probably not. Nobody takes apart monitors these days and repairs them. You might be able to solve the following problems, though.



Monitors not only attract your attention, but they also attract dust. Thick, furry layers of dust that coat your monitor on a weekly basis. Clean your monitor regularly as follows:

✓ **For CRT monitors:** Spray a glass cleaner onto a soft cloth (not on the monitor itself) and wipe away the dust. Keep the cleaner out of the monitor's vents.

✓ **For LCD monitors (and laptop screens):** Don't use any ethyl alcohol or ammonia-based cleaners on these types of screens. Those types of harsh cleaners can yellow the screen over time. A slightly damp soft cloth towel does the trick for me with no ill effects. (This book's editor, Jean Rogers, avoids moisture problems by cleaning with dry static wipes.)

Fixing a monitor that doesn't turn on

If your monitor doesn't turn on, check to make sure that your monitor is plugged in. Actually, your monitor has four plugs that you need to check:

- ✓ Check to make sure that you plugged the power cord securely into the wall or power strip and make sure that your power strip is turned on.
- ✓ Wiggle the connection where the monitor's video cable plugs into the back of your computer.
- ✓ Check where the video cord plugs into the back of your monitor. Some cords aren't built into the monitor, leading to loose connections. Push the cord hard to make sure that it's plugged in tight.
- ✓ Check where the power cord leads to the back of your monitor. Like video cables, some power cords plug into the monitor.

Finally, make sure your monitor's power button is turned on. Some monitors don't turn themselves back on after a power outage.

Checking a monitor that makes weird noises

Almost all monitors make little *popping* sounds when first turned on or while warming up. That's nothing to worry about. But after they're turned on, they're never supposed to whine or buzz.



Monitors are usually one of the quietest parts of your PC. If your monitor ever starts making noise, something is wrong. If those noises are ever accompanied by an odd smell, don't wait for smoke: Turn off your monitor immediately.

If you install a new video card and the monitor screams, the card is trying to make the monitor do something cruel and unnatural. Chances are that the two aren't compatible. Before giving up, try changing the *refresh rate* of your monitor, a task I explain in this chapter's sidebar, "Shopping Buzzwords." (Look in that sidebar's "refresh rate" section.)

Chapter 4

Choosing a New Printer

In This Chapter

- ▶ Understanding printer terms
 - ▶ Refilling ink cartridges
 - ▶ Curing blotchy pages
 - ▶ Fixing spacing problems
 - ▶ Fixing paper jams
-

Windows Vista makes installing a printer easier than ever. Plug in a new USB printer, and Windows automatically recognizes it, installs the driver, and introduces the printer to all your programs. At least, that's the way it's supposed to work.

And if Windows greets your printer with a puzzled stare, it's still fairly easy to inform Windows of your printer's brand name and model. After dispensing with those formalities, Windows plays gracious host once again, spreading the printer's name and settings to all Windows programs that drop by.

Yep, printers are easier than ever to install. Now, today's printing problems center on those *little* things. You know, when the margins run off the side of the page, the angry letter to the phone company prints out with odd birthmarks, or the printer runs out of ink — and you don't have another ink cartridge handy.

When your printed pages look funny — or the paper won't even come out of the printer — this is the chapter you want.

Understanding Printer Buzzwords

Like most computer toys, printers come with their own secret vocabulary. The first few entries here describe the most common types of printers sold

today. The second set describes more esoteric words found in printing menus and the printer's dreaded technical specifications area.

Commonly encountered printer breeds

You encounter the following types of printers most often when you're shopping. You're almost certain to find yourself choosing among inkjet, laser, photo, and "all-in-one" printers.

Inkjet: Popular for their low price and high quality, inkjet printers (shown in Figure 4-1) squirt ink onto a page, creating surprisingly realistic images in color or black and white. Although the printers come cheap, their expensive ink cartridges wear out much faster than the typewriter ribbons of yesteryear. For low-to-medium level work and digital photography, these versatile printers often provide the best buy for the buck.

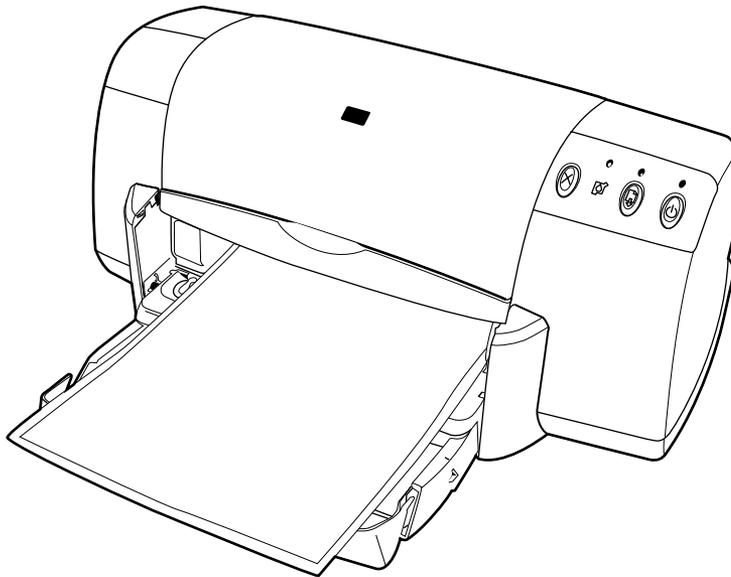


Figure 4-1:
Inkjet
printers
handle
photos as
well as
regular
printing
chores.

Laser: Laser printers might sound dangerous, but these printers (shown in Figure 4-2) use technology similar to their ho-hum equivalent, copy machines; they sear images into the paper with toner. Black-and-white laser printers cost a little more than inkjet printers; double that price for color laser printers. Although laser printers can't print digital photos, they're cheaper in the long run for general office paperwork.



Figure 4-2:
Laser
printers
provide
better quality
than inkjet
printers but
at higher
prices.

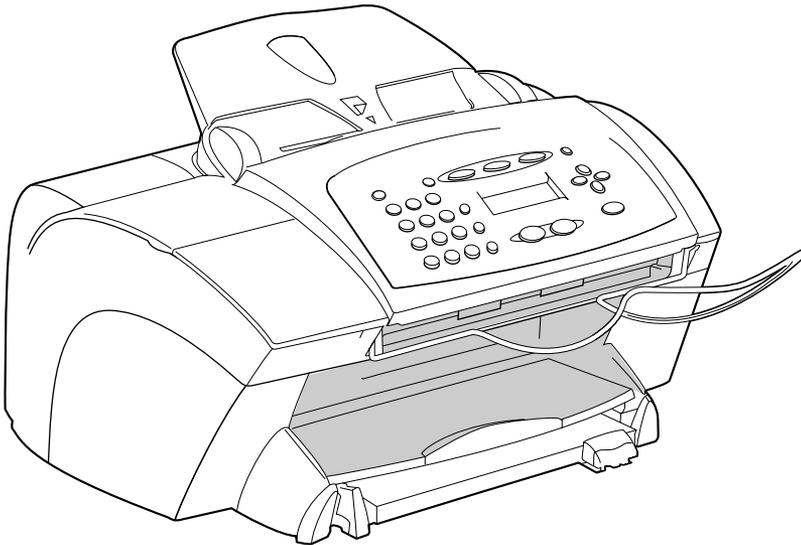


Laser printers are *supposed* to heat up. That's why you shouldn't keep dust covers on laser printers when they're running. If you don't allow for plenty of air ventilation, your laser printer might overheat. After you're through using your laser printer, let it cool off; then put on the dust cover to keep out lint and small insects.

All-in-one (AIO): Popular with small offices, this type of printer combines a laser or inkjet printer, copy machine, scanner, and a fax machine into one compact package. (Sorry, no coffee maker.) The quality of all-in-one machines has risen dramatically in the past few years. As shown in Figure 4-3, they're great for small, one-person offices; they're not so great when you want to spread the equipment around. They're also a drag because if one component stops working — the scanner, for example — you've lost your copier and fax machine, as well.

Photo Printer: Many color inkjet printers do a fair job at printing digital photos, but photo printers contain extra colors, letting them print with more finesse. Some photo printers print directly from your camera's memory card, letting you print without firing up your PC. Photo printers work best as a second printer, keeping you from wasting your expensive ink on shopping lists, schoolwork, and Web pages.

Figure 4-3: This all-in-one printer combines an inkjet printer, a scanner, a fax machine, and a copy machine into one package.



If you're a digital photography enthusiast and you're considering buying a photo printer, keep the following tips in mind:

- ✓ Pick up some photo-quality or glossy inkjet paper. It's not cheap, but it makes all the difference when printing photos. (Check out the section, "Choosing the right paper," later in this chapter for more on choosing paper.)
- ✓ Although they offer the utmost convenience, photo printers can't compete with professional developers for both quality and price. Drop by your local photo developer with a memory card or CD full of photos and compare the difference.
- ✓ Because of printing costs, the vast majority of pictures taken with digital cameras never see print. To share them with friends, consider posting them on one of the Internet's many photo-sharing Web sites, like Flickr (www.flickr.com). You can find similar sites by searching for the words *photo sharing* on Google (www.google.com).



The Sweet Art (www.sweetart.com) company in Lenexa, Kansas, sells a printer that prints digital images onto cakes and cookies using edible food coloring.

Awkward printer terms

These terms often appear on a printer's box, in advertisements, or when you're trying to figure out the software's menu.

Pages Per Minute (PPM): The number of pages a printer can squirt out in one minute. Careful, though: That's when you're printing the *same* page over and over. When you're printing a series of several different pages, as required by most printing jobs, the PPM rate drops considerably.

Dots per inch (dpi): The number of dots a printer can pack into one square inch. The more dots per inch, the better your printed stuff looks. Photographers looking to print high-quality photos want printers with at least 2880 horizontal x 720 vertical dpi. (Some photo printers fudge it, though, and still look good with less dpi.) Compare the same photo printed on several printers before buying. (A 360 dpi color printer works fine for printing party invitations, birthday cards, and Web pages.)



Parallel and USB ports: For years, all printers attached to a standard printer port (also known as a *parallel port*) on your PC. Today, many plug straight into the USB port. (The Appendix contains a pictorial reference on ports and plugs.)

Driver: Software that tells Windows how to talk to your printer. Because different printers come with different features, they almost always require custom drivers. When you're printer shopping, make sure that the printer you choose comes with drivers written specifically for Windows Vista or your current version of Windows. (Check out Chapter 19 for more information about drivers.)

Point size: The size of a single letter. This word uses a bigger point size than this word.

Typeface: Describes a letter's distinctive design style. *Courier* is a different typeface than *Times New Roman*.

Font: A typeface of a certain size and characteristic. For example, *Times New Roman* is a typeface, and **Times New Roman Bold** and *Times New Roman Italic* are different fonts within that typeface family.

Cartridge: Expensive, replaceable plastic boxes inside printers that hold ink or other chemicals used for printing. Inkjet printers use ink cartridges, as shown in Figure 4-4; laser printers require toner cartridges. Keep several cartridges on hand because printers consume them quickly. Most color printers have two or more cartridges, one for black ink and the other(s) for color inks.

Portable Document Format (PDF): A special file containing a printable picture of a document, often a manual or form. PDF files require the freebie Adobe Acrobat Reader program for viewing.



To view information stored as a PDF file, download a freebie version of Adobe Acrobat Reader from www.adobe.com. To create your own PDF files, buy Adobe Acrobat's *full* version from the same Web site.



Figure 4-4:
A Hewlett
Packard
inkjet
cartridge.

PostScript or Encapsulated PostScript (EPS): The Adobe Systems Incorporated programming language that describes images to printers.

PostScript Printers: Mostly used by design professionals, these expensive printers can read PostScript files directly and print them to exacting standards. NonPostScript printers rely on software interpreters or drivers to translate PostScript files into something printable.

Installing a Printer

Difficulty level: Easy

Tools you need: One hand and installation software

Cost: Anywhere from \$100 to \$2,500

Stuff to watch out for: When you're shopping for a printer, compare the same letter and/or photo printed from several different printers. For example, one printer might be better for photos but lousy for letters. Other printers might be just the opposite. Consider your personal printing needs and compare several printers that meet those needs before making a final decision.

No matter what kind of printer you choose, you might have to buy a printer cable, as many printers don't include one. Check the box to see if you have a *parallel* or *USB* printer, and choose the correct cable accordingly. (The Appendix offers solutions if your computer lacks enough USB ports to accommodate your new printer.)



Before you install a USB printer, be sure to read the installation instructions. Some USB peripherals prefer that you install their Windows drivers *before* you plug them in and turn them on.

To install a printer, follow these steps:

1. Remove the new printer and accessories from the box and install its software, if necessary.

Remove the printer's cover and extricate any packaging from inside the printer. Many printers come taped up and with cardboard or plastic holders to protect moving parts during shipping. Check the manual to be sure you've located and removed them all. Also, make sure that you can account for any installation CDs, cables, paper, and cartridges that came with the printer.

2. Find the printer cable and the appropriate ports on your computer and printer, and then connect the cable between them.

- a. First, plug the cable into your PC. It fits into one of these two ports, both of which I describe in detail in this book's Appendix:



Parallel port: The parallel port looks the same on any PC, no matter what era, model, or manufacturer.

USB port: This rectangular hole looks like no other on your PC.

- b. Next, plug the cable's other end into your printer. Your printer probably has one of these two ports:

Centronics: Resembling a robot's mouth, this connector accepts the other end of the cable that's plugged into your PC's parallel port. (Unlike *USB cables*, which use the same type of plug on each end, *parallel cables* end in different plugs.)

USB: Slide the plug into the printer's USB port, the hole with the pitchfork symbol next to it. (Some printers accept the larger, square type of USB port.)

3. Plug in the printer, turn it on, and install the printer's cartridge or cartridges.

- *Inkjet*: Pull off the plastic strip that protects the cartridge's ink nozzles and electrical contacts. Before you may install the cartridge, most inkjet printers must be turned on, so their cartridge-bearing arm slides out of its hiding place. Finally, raise the printer's cover and check the manual for your model's exact cartridge-installation instructions.

Done? Close the cover and turn off the printer.

- *Laser*: Be careful here, as spills are messy. Rock the new toner cartridge (shown in Figure 4-5) back and forth gently to loosen the toner and spread it around evenly inside. When you've evenly distributed the toner, gently remove the plastic protective strip from the cartridge. Avoid tipping the cartridge, as toner sometimes spills out. Check the manual for your model's exact cartridge installation instructions.

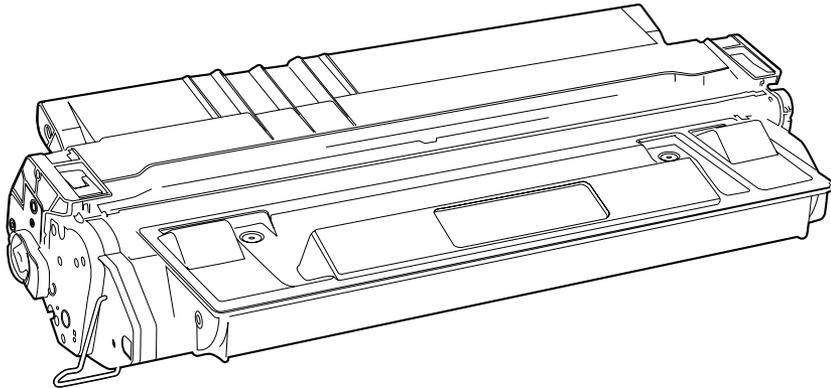


Figure 4-5:
A toner
cartridge
for a laser
printer.

4. Add paper.

Add about 25 sheets of plain old office paper because you don't want to waste your expensive photo paper on the first few test runs you make. When you're ready to add better paper, read the section later in this chapter, "Choosing the right paper."

Some printers make you attach trays to hold incoming or outgoing paper. Always rustle the paper to get some air between the pages before placing it in the tray. That reduces paper jams and expletives.



5. Turn on your monitor and PC, if you'd turned them off.

As your PC awakens, Windows notices that you've attached a new printer. Give Windows time to sniff your printer thoroughly and add the printer's name to your programs' printer menus.

- Many printers come with special drivers and fancy programs. Install them now, with the printer turned on, if the printer's manual didn't require you to install them before you plug in the printer for the first time.
- Windows usually offers to print a test page when it notices a newly plugged in printer. Take it up on its offer, as the test page will contain information important to tech support people should things not go well.



Fixing Common Printer Problems

No matter how carefully it's installed, sometimes the printer just doesn't work right. These sections show how to fix the most common problems you might encounter during your printer's lifespan.

Replacing an inkjet printer is often more cost-effective than repairing it, unfortunately. The more expensive laser printers, by contrast, require servicing to ensure a long lifespan. Some printers simply need to be cleaned in the right places, so get an estimate on repairs before giving up.

All-in-one printers vary widely in price and quality, so there's no clear answer about the cost-effectiveness of repairing versus replacing. When in doubt, get an estimate.



To test whether it's your computer or your printer that's acting up, plug the printer into a friend's computer or laptop or test it on a computer at work. (Have a coworker blindfold the network administrator first.) If the printer doesn't work with other computers, either, your printer is dead. If it works fine everywhere else, your computer is the culprit. Try installing a new driver, a task covered in Chapter 19.



Reuse your paper when things don't print correctly. Place it in your printer tray so that the printer can use the blank side. Don't use scrap paper for important stuff, of course, but it's great for printing tests, drafts, or things nobody else will see.

Fixing a printer that doesn't print anything

Are you *sure* that the printer is turned on, plugged in to the wall, and a cable connects it securely to your computer?

Check to see whether the printer's little power light beams merrily. If not, plug a lamp into the outlet to make sure that the outlet works. If the lamp works in the outlet where your printer doesn't, the printer is most likely suffering from a blown power supply. Head for the printer repair shop for an estimate.

If the printer's power light comes on, though, keep reading.

- ✔ Does the printer have paper? Is the paper jammed somewhere? Some printers have a little readout or blinking light that announces a paper jam when the paper is stuck. With other printers, you have to ogle the paper supply yourself.
- ✔ Do you have a switch box that enables two computers to connect to one printer? Check to make sure that the switch box is switched to the right computer. While you're there, give the cables a push to make sure that they're firmly attached. Still doesn't work? Try connecting the printer directly; some printers don't work correctly with a switch box.
- ✔ Sometimes the problem lies with the printer's driver. It's fairly easy to make sure that your printer is using the most up-to-date driver, and it's all explained in Chapter 19. (That chapter also explains how Windows can return to your older driver if your new driver makes things even worse.)
- ✔ Windows comes with drivers for most printers, but they often lean toward the generic, meaning that they don't support a printer's more advanced features. Upgrading to the manufacturer's current printer driver that's written for your particular model often fixes major problems.

How two computers can share one printer

Many folks solve the problem of having two computers and one printer with an *A/B switch box*. The printer plugs into the box's printer port. One computer plugs into the box's A port, and the other computer plugs into its B port. (Before shopping, check your printer's manual to make sure it works with a switch box.)

When you want to print from one computer, flip the switch to A. When you want to print from the other computer, flip the switch to B. Or better

yet, look for a switch box with *automatic* sensing. Those fancier boxes sense where the information comes from, and automatically route the incoming page to the printer.

A *network* — a group of connected computers described in Chapter 17 — enables all the computers to share a single printer, or each other's printers. Before buying an expensive A/B switch, check out Chapter 17, as networks are easier than ever to set up inexpensively.

Playing the replacement ink cartridge quilt game

Printer cartridges wear out all too quickly. Color printers are the worst culprits, as each cartridge often contains several colors, each color in its own separate tube. When one color is used up, the printer usually considers the entire cartridge to be empty, even if the other tubes still contain some colored ink.

Those expensive replacement cartridges create huge business opportunities, and manufacturers practically give away the printers in the hopes of making back the money on the cartridges. Cartridges are easy to find. In an emergency, local drugstores often carry replacement cartridges for the most popular printers. Office supply stores offer lower prices and a larger selection. Internet outlets carry the lowest prices and widest selection.

Now, the problem: Printer manufacturers say to buy *only* their Official Manufacturer-Approved Cartridges. Unfortunately, these official cartridges often cost more than twice as much as the compatible cartridges sold by competing manufacturers.

To add another layer to the confusion, people selling refill kits, like the one in Figure 4-6, say that *everybody* is saving money by refilling their empty cartridges. Which cartridges should you buy?



Figure 4-6:
Many companies sell refill kits to extend the life of inkjet cartridges.

When you're deciding how to handle the situation, weigh the following facts, and then come to your own conclusion. There's no right or wrong answer here; different folks have different needs.



- ✓ Some manufacturers patent their ink chemicals, ensuring that any replacements created by competing manufacturers have colors that differ slightly. Some people notice the difference in color, drying time, and print longevity. Others don't have any problems.
- ✓ Quality varies among different manufacturers. Don't give up on all generic cartridges because of one bad experience.
- ✓ When something goes wrong with a compatible or refilled cartridge, it often leaves a nagging question: "Did this happen because I didn't use the manufacturer's cartridges?"
- ✓ Official replacement cartridges usually cost from \$10 to \$50 or more. Refilling an empty cartridge costs anywhere from \$1 to \$5.
- ✓ Refilling cartridges is messy. It involves filling syringes with ink, injecting the ink into the cartridges' sealed chambers, and then placing tape over the broken seals. Wear gloves or buy refilled cartridges online. Injecting any air causes problems. And you must buy the right ink to match your cartridges.
- ✓ Cartridges can be refilled only a certain number of times because they're designed to work only once. You must decide when your cartridge is past the point of no return. Lower print quality often signals that the end is near. Leaking cartridges signal that the end is already here.
- ✓ Check your printer's warranty carefully. Refilling cartridges might not void your warranty, but most warranties don't cover any damage caused by refilling.
- ✓ If you find yourself buying black ink cartridges often, consider buying a laser printer, as its cost-per-page is much lower.

Installing a new toner or ink cartridge

Printers need ink or toner to place images onto a page. When your pages start to look blotchy or faint, you probably need a new cartridge.

Various printers work differently, but here's the general rundown:

1. Turn off the printer and open its cover.

Printers usually have a hood-release type of latch that pops up the cover. You might need to remove the paper tray first.



If your laser printer has been turned on, let it cool off for 15 minutes. Laser printers get hot enough inside to brand a steer. The parts that seem hot *are* hot, and they can burn your fingers.

2. Pull out the old cartridge.

The cartridge usually slides straight out. While the cartridge is out, wipe away any dust or dirt you see inside the printer. The printer's manual tells you the most appropriate places to clean. A little rubbing alcohol on a soft rag usually works well. Check your printer's manual first to make sure that alcohol won't damage any parts inside.



Color printers usually come with two ink cartridges, one for black and the other for colored ink. Because they're often completely enclosed in black plastic, they're usually labeled to avoid confusion. If you're in doubt, the smaller cartridge probably holds the black ink.

3. Slide in the new cartridge.

Before sliding in a laser printer's toner cartridge (refer to Figure 4-5), gently rock it back and forth to evenly distribute the toner that lurks inside. Don't turn the cartridge upside down or completely on one end.

Some toner cartridges have a protective plastic strip you must remove before you install the cartridge. Better check your printer's instruction manual on this one.



4. When the new cartridge snaps in place, close the printer's cover and turn it back on.

You might need to put the paper tray back on the printer.

5. Run your printer's software, if it has any.

Some inkjet printers, for example, come with software that aligns a newly installed cartridge. The software prints several coded designs, and then asks you to examine them and choose the best-looking ones. The printer then knows the best way to print.

- ✔ You should check your laser printer's manual for mention of any fuser pads or corona wires that need to be changed or cleaned when you replace the toner cartridge.
- ✔ New toner cartridges are sometimes blotchy for the first few pages, so don't print any résumés right off the bat.
- ✔ If you run into trouble, take the printer to the repair shop for an opinion. The printer probably needs a good cleaning anyway.

Fixing printing smears and blotches

When you begin seeing smears or blotches on your printouts, start diagnosing the problem by checking the toner or inkjet cartridge. Many inkjet printers let you check cartridge ink levels directly from Windows; you can also perform tests for nozzle clogs, print head cleaning, and alignment.

To see if your printer offers these options, follow these steps:

1. Open the list of all printers attached to your PC.

Windows Vista: Click the Start button, open Control Panel, select the Hardware and Sound category, and then choose Printers.

The list of printers includes Vista's phantom Microsoft XPS Document Writer. (It's not a real printer.)

Windows XP: Click the Start button, open Control Panel, choose the Printers and Other Hardware category, and finally select View Installed Printers or Fax Printers.



2. Right-click your printer's icon and choose Properties.

The Properties window appears.

3. Click the Printing Preferences button.

A window appears, as shown in Figure 4-7. In this case, it shows the levels of ink left in the printer's black and color cartridges. My printer currently has plenty of color ink (\$29.95 per cartridge). The black ink (\$24.99) is still half full.

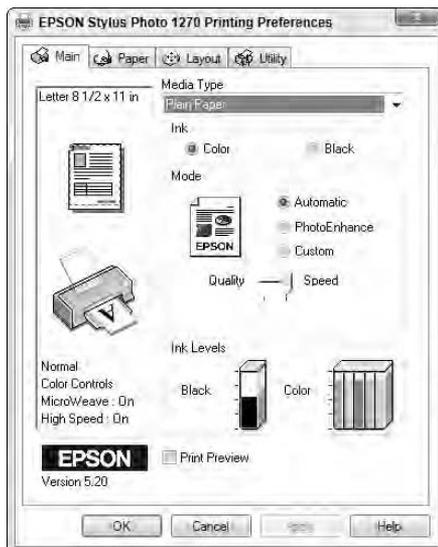


Figure 4-7: Some printers let you check the cartridge's ink level directly from Windows.

4. Click the Utility tab.

Not all printers offer this tab; your particular printer might offer a different menu option for testing your printer for clogged nozzles and other problems.

5. Run your printer's built-in diagnostics.

Look for a test that checks the nozzles for clogging, as that's the number-one cause for print quality problems. If the test proves positive, look for a head cleaning utility to fix it. Head alignment tests make sure the cartridge is seated properly.



- ✓ If your printer has built-in utilities, keep fiddling around in the printer's Properties window until you find it. Or you can dig out the manual, just to make sure your printer *does* include those utilities and to find out exactly where they're located. Check the printer's front panel, as well, as they might be hidden there.
- ✓ Don't clean the nozzles unless you notice something wrong with your printer's quality. It wastes ink (and often several sheets of paper).

Laser printers often require poking, prodding, cleaning, and billing by a professional. The next few paragraphs describe some laser-printer-specific problems and how to fix them.

Black streaks: This problem can mean that you need a new photoconductor — a big, expensive thingy inside the laser printer. You might get lucky and discover that the repair shop can just clean the photoconductor to bring your laser printer back to life. Or maybe you just need a new toner cartridge — an increasing number of printers now put the photoconductor inside the cartridge. If your photoconductor is done for good, get a repair estimate to compare with the cost of a new printer.

Faded print: You probably need a new toner cartridge. Before buying a new one, try this tip:



When your print looks faded, your printer is probably running out of toner. Open the lid to the laser printer and look for a big black plastic thing. Pull it straight out, and then gently rock it back and forth. (**Warning:** Don't turn the cartridge upside down unless you want to make an incredible mess!) Then slide the cartridge back in the same way. This procedure sometimes lets your laser printer squeeze out a few dozen extra pages.

Creased paper: Keep paper stored in a dry place and not in a corner of the garage or near the coffee machine. Moist paper can crease as it runs through a laser printer.



A Tupperware lasagna container makes a great paper storage container for sealing out air, cockroaches, and moths.

Choosing the right paper

Inexpensive yet powerful, color inkjet printers spit out some incredibly beautiful color pictures, provided you use the right paper. When you use ordinary office paper, the paper's fibers soak up the ink. Usually, that means that ink bleeds and blurs. On specially designed (and especially expensive) color inkjet paper, the colors stay put, creating a crisp image that looks almost as if it was created by a standard film camera and processed at a photo-processing lab.

Some paper comes with its application listed right on the packaging: Premium Inkjet Paper, for instance. Others aren't nearly as clear. Here are some papers required for different applications:

- ✓ **Junk:** Always keep a supply of cheap or scrap paper for running printer tests, printing quick drafts, making grocery lists, and printing other things not intended for others. You can always use the other side of paper from botched print jobs, as well.
- ✓ **Legal:** Created mainly for boring legal documents, these longer sheets of paper measure 8½ x 14 inches instead of the standard 8½ x 11 inches.
- ✓ **Letter quality:** The words *premium* or *bright white* are the clues for this higher-quality paper that's good for nearly everything.
- ✓ **Photos:** You can print photos on nearly any paper, but only waste your ink on the good stuff: special paper bearing the word *photo*. Insert this paper into the paper tray carefully so that the printer uses the glossy side. Also, look for a loading support sheet to place beneath some photo papers; it helps the paper glide smoothly off the tray and into the printer.

Matte photo paper works well for brochures and newsletters, where the glossy look isn't necessary.
- ✓ **Labels:** I love the Avery Wizard for printing Avery labels with Microsoft Word. Available at www.avery.com, the free, downloadable software places preconfigured templates in Word for nearly every size of Avery label. Just type your information into the template for your label, slide the labels into the printer, and the information prints neatly onto the individual labels. (Avery's Web site also carries templates for Avery business cards, CD labels, mailing labels, dividers, greeting cards, and more.)
- ✓ **Transparencies:** For overhead presentations, buy special transparent plastic sheets designed to be used with your type of printer.



Be sure to buy paper specifically designed for your type of printer: inkjet or laser. Laser printers use heat to fuse the ink onto the paper, so they require paper designed to hold up to the heat.

Keeping the print from running off the page

Sometimes an image or document refuses to align itself onto a single page: The printer cuts off lines or images along the right side. To avoid this problem, always use a program's Print Preview mode before you actually print the page. The computer displays a picture of the paper with your image or text printed on it. If the image doesn't fit onto the page, try these things to fix the problem:

- ✓ **Switch to Landscape mode:** Printers usually print onto paper in Portrait mode: The paper is positioned vertically. If you're printing a spreadsheet or something that extends off to the right, look for a place in the Preferences or Page Setup area to switch from Portrait to Landscape mode. Then the printer prints the information horizontally, like a landscape. (Get it? *Landscape?*)
- ✓ **Reduce to fit page:** Some printers and programs offer an option to shrink the image so that it fits onto the page. This works nicely for photos, but not so well for things with lots of fine print. Give it a test on cheap paper or the back of your page that didn't print correctly.
- ✓ **Use templates:** Avery and other manufacturers offer free templates from their Web sites. By calling up the template in your software and printing in the templates boxes, your program positions the text perfectly on the page. It works great for labels, greeting cards, certificates, and other hard-to-configure spots.
- ✓ **Change margins:** Use your program's Page Setup area and make sure you've set the margins to within a half-inch of the paper's edge. You might need to move out the right margin until everything fits.

Fixing paper jams

Sounds like you need to get your printer cleaned by a professional. In the meantime, open the printer's top and carefully remove the offending sheet of paper. Keep your eyes peeled for little shreds of paper that might be getting caught in the printer's gears.



When you're adding paper, hold the paper stack loosely at the bottom, and flick the top edges as though they were one of those little flip-page cartoons. This loosens up the paper and makes it flow through the feeder easier.



Never run labels through a laser printer unless the labels' box specifically states that it's okay. The heat inside the printer can make the labels fall off inside the printer and gum up the works. Inkjets handle labels okay.

Keeping your printer happy

Your printer generally prefers Authorized Service Technicians with white coats to perform repairs. Feel free to perform any of the appropriate tasks listed next, however, to keep your printer happy:

- ✓ **Download the latest software and drivers.** When your printer is acting too weirdly to ignore, head to your printer manufacturer's Web site and download the latest drivers and software. Sometimes the two come in one package. Other times the *driver* enables Windows to communicate with your printer when sending pages; the *software* is a utility program that allows you to adjust your printer's settings.
- ✓ **Run your printer's software.** Some printers come with troubleshooting programs (occasionally built right into their drivers) that offer suggestions when things go wrong. They also align your printer whenever you replace the ink cartridges, carefully ensuring optimal quality.



Turn off your printer when you're not using it. Inkjet printers, especially, should be turned off when they're not being used. The heat tends to dry the cartridges, shortening their lives.



Don't unplug your inkjet printer to turn it off. Always use the on/off switch. The switch ensures that the cartridges slide back to their home positions, keeping them from drying out or becoming clogged.

Chapter 5

Moving from the Old PC to the New One

In This Chapter

- ▶ Using the Files and Settings Transfer Wizard
 - ▶ Migrating by using a home network or portable hard drive
 - ▶ Transferring from an old computer to a new one
 - ▶ Migrating by using a direct cable connection, a network, or CDs
-

Moving to a new house might be a lot of work, but the process takes just a few logical steps. You grab everything you want from the old house, toss it in the moving truck, and unload it at the new place. And the stuff you *don't* want goes to family, friends, charity, the neighbors, the curb, and the dumpster — usually in that order.

Moving to your new Windows Vista computer, by contrast, isn't as clear-cut. For one thing, who can possibly find everything that's important on their old Windows XP computer? The My Documents folder is a natural place to start packing, but what about *other* things you use? Your list of favorite Web sites in Internet Explorer, for example? Your e-mail addresses, mail account settings, and Outlook Express messages? How about all the other settings you've painstakingly set up in your favorite programs?

Windows XP's solution, the Files and Settings Transfer Wizard, only lets you move things to another Windows XP computer, so it can't help you move things to your new Vista PC. Windows Vista's equivalent, Windows Easy Transfer, handles that job, and this chapter explains how to put it to work.

Understanding File Transfer Buzzwords

After years of intense brow furrowing, Microsoft realized that Windows owners often purchase new computers. And those people need a quick and easy way to migrate all Windows' convoluted settings — as well as all their files — from their old computers to their new ones.

Windows Vista helps you make the move as painless as possible. Here's the type of language you hear tossed about by the moving crew:

Windows Easy Transfer: The backbone of the moving process, this program enables you to choose what files, settings, and folders to transfer, and how to transfer them. When you've made your desires known, the wizard carries out your request, copying everything you've selected over to the new computer. Unfortunately, the program doesn't work with Windows Me and Windows 98, only Windows XP, Windows 2000, or from another Windows Vista PC.

Transfer: The wizard doesn't really *move* your desired files and settings from your old computer into your new one. The transfer process only *copies* them, leaving the originals on your old computer. Before disposing of your old PC, be sure to delete your personal information, a chore I tackle in the sidebar, "Can't I just throw the darn thing away?"

Can't I just throw the darn thing away?

Several years ago, many organizations accepted donations of old PCs. Charities are more reluctant to accept PCs today, however, for several reasons. First, most old PCs cost more to refurbish than to buy new. Second, many states now consider PCs to be hazardous waste, making their disposal more costly.

So what do you do with all this stuff? Here are some ways to safely dispose of old computers and parts, either through recycling or donation programs. Also, when you buy your new computer, ask your dealer about any recycling programs.

Before getting rid of your old PC, buy a data destruction program, available in the Utilities section of most computer stores. These specially designed programs fill up your hard drive with random characters, wiping out your files in the process. Formatting the hard drive isn't enough to thwart dedicated thieves. Only a data destruction program can keep potential thieves away from your passwords, financial records, and other information commonly found on PCs.

Here are a few options for disposing of an unwanted PC:

IBM's PC Recycling Service

www.ibm.com/ibm/environment/products/pcrservice.shtml

IBM accepts any manufacturer's PCs (including monitors, printers, and peripherals) from consumers and businesses. (The program costs \$29.99, including shipping.) IBM's worldwide program saves anything refurbishable for philanthropic organizations and recycles or safely disposes of the rest. It's a great way to kick your karma points up a few notches.

Dell's Recycling

www.dell.com/recycle

Buy a Dell PC, and Dell will recycle your old PC for free, regardless of its manufacturer. The company also recycles any old Dell PCs or products for free.

Freecycle

www.freecycle.org

A grassroots, community-based mailing list, Freecycle lets you post items you no longer want in the hopes somebody else will pick them up for free and give them a new life. Students, hobbyists, and repair technicians might still find some value in your old PC.

Settings: This refers to any changes you make to a program: Entering your e-mail address into a mail program, for example, or telling Internet Explorer how to connect to the Internet. Windows Easy Transfer copies settings from many of your old computer's programs to the programs on your new computer. It doesn't copy the actual programs, mind you. You still need to install those on your new computer. But the wizard saves you from tweaking those programs' settings to make them work the way they worked before.

Preparing to Move into Your New PC

Like any other moving day, Windows Easy Transfer's success depends on your preparation. Instead of rummaging for boxes and duct tape, you must do these two things to prepare the move:

- ✓ Choose how to transfer the information between PCs
- ✓ Install your *old* PC's programs onto your *new* PC

The next two sections explain each topic in more detail.

Choosing how to transfer your old information

PCs are very good at copying things, much to the concern of the entertainment industry. For example, Windows Easy Transfer offers *four* different ways to copy your old PC's information onto your new PC. Each method works at a different speed and level of difficulty. You must choose one of these four:

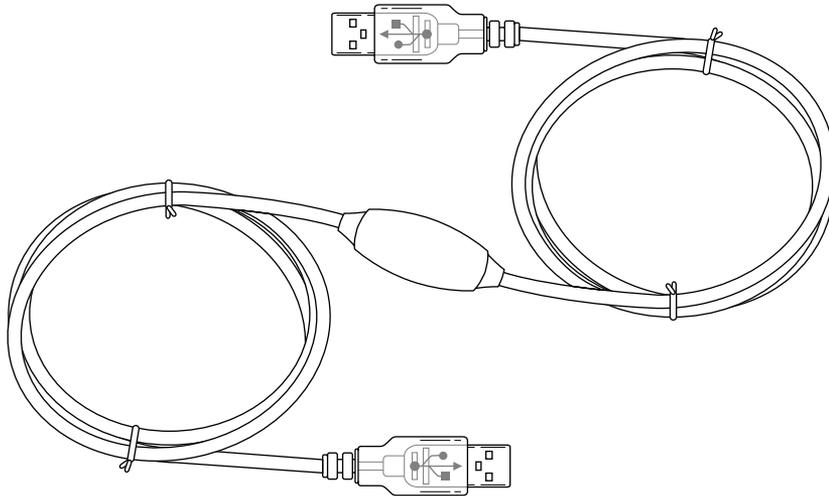
- ✓ **Windows Easy Transfer Cable:** Every PC comes with a handful of USB ports, so an "Easy Transfer Cable" is the fastest and simplest solution. Often sold in stores as Easy Link, Direct Link, USB Bridge, or simply Linking USB cable, this special cable resembles a regular USB cable that's swallowed a mouse: The cable bulges in the middle, as shown in Figure 5-1. These cables cost less than \$30 at most electronics stores or online.
- ✓ **Network:** If you've already created a network between your new and old PCs, Vista can transfer your information that way. Creating a network requires *much* more work than plugging in an Easy Transfer cable, but I tackle the job of linking your PCs into a network in Chapter 17.
- ✓ **DVDs or CDs:** If both PCs have CD or DVD burners, you can transfer information by burning boatloads of discs. But be prepared for a *long* evening's work feeding discs to your PCs. Unless you're transferring a handful of files, this method is your slowest and most labor-intensive option.



✓ **Portable hard drive:** Costing between \$100 and \$200, a portable hard drive works well for transferring information from one PC to another. Most portable drives plug into both a wall outlet and your PC's USB port. (An empty iPod will work as a portable hard drive, in a pinch, if you already know how to store files on it.) 512 MB or larger Flash drives, those little memory sticks, also work for small transfers.

When your PCs live more than a cable's reach apart, a portable hard drive is your best transfer option. Choose one that's almost as large as the hard drive inside your PC. After transferring the files, put the portable hard drive to work backing up your files each night, an extremely prudent task I describe in Chapter 9.

Figure 5-1:
Different from regular USB cables, a Windows Easy Transfer USB cable bulges in the middle.



Installing your old PC's programs onto your new PC

Although Windows Vista transfers your PC's data and settings, it doesn't copy the *programs* themselves. You must install all of your old PC's programs onto your new PC the old way — by installing them with their installation CDs or downloading their installation programs. And you need to install those programs *before* running the Easy Transfer program. That way, the programs will be ready to accept their incoming settings.

To install the old programs, dig out their installation CDs and any copy protection codes you might need to reenter. The codes are usually printed on the CD itself, the CD's packaging, or a sticker on the program's manual. (If you purchased a program online, you might be able to retrieve the copy-protection code from the manufacturer's Web site.)

Copying Windows Easy Transfer to your old PC

Copying Windows Easy Transfer onto your Windows XP PC is fairly easy — if your PC has a DVD drive, that is. Insert Windows Vista's installation DVD into your Windows XP PC's DVD drive. At the opening screen, choose Transfer Files and Settings from Another Computer, and Windows Easy Transfer hops onto the screen.

But if your decrepit Windows XP PC lacks a DVD drive or you lack a Vista DVD, install the Windows Easy Transfer program by following these steps:

1. Open Windows Easy Transfer on your Vista PC and click Next at the program's opening screen.

Click Start, choose All Programs, click Accessories, click System Tools, and click Windows Easy Transfer. If asked, click Close All to close any currently running programs.

2. Choose Start a New Transfer.

Vista asks whether you're running the program on your new PC or your old one.

3. Choose My New Computer.

Vista asks whether you have an Easy Transfer cable.

4. Choose No, Show Me More Options.

Choose this counterintuitive option even if you *do* have a Windows Easy Transfer cable.

5. Choose No, I Need to Install It Now.

Vista offers to copy the Windows Easy Transfer program to a CD, USB flash drive, external hard drive, or shared network folder.

6. Make your choice, and Vista creates a copy of the program to run on your old PC.

Vista stores the program in a folder named MigWiz. To run the program on your Windows XP PC, navigate to the MigWiz folder, open it, and double-click the program's cryptic name: migwiz or migwiz.exe.



Be sure to run the program's update command, if it has one. That tells it to connect with the Internet and install any updates or patches released since your purchase.

Transferring Information between Two PCs with Windows Easy Transfer

Depending on how you plan to transfer your files, Windows Easy Transfer works in just a few steps or a lengthy string of steps. But no matter how you choose to transfer the files, you'll move through these three basic procedures:

1. You tell the program how to transfer your information, be it through a single cable, a larger network, or on discs.

2. You tell Vista what information to collect from your old PC — everything from your user account? From *everybody's* user accounts?
3. You tell Vista which pieces of information should go into which user account.

After dispensing with those details, the program gets to work, grabbing everything you've chosen from your old PC and stuffing it into the appropriate places inside your new Vista PC.

The steps in this section describe how to make Windows Easy Transfer shuffle the information from your old PC to your new Vista PC.



Windows Easy Transfer requires an Administrator account. If you're stuck with a lowly Limited account, you won't be able to copy any files. And although some of the program's choices might seem confusing, don't fret: If you make the wrong choice, you can return to the previous screen by clicking the blue arrow in the window's top-left corner.



By far, the easiest way to transfer information between two PCs is with a Windows Easy Transfer Cable. It's cheap, built for the job, and limits your work to a few short decisions.

1. Start both PCs and log on to each PC.

If you plan to transfer information through a USB Easy Transfer Cable, install the Easy Transfer Cable's bundled software onto your Windows XP PC now.

Those particular cables are new to Windows XP, and the software lets Windows XP figure out how to use them. (Don't install the Easy Transfer Cable's bundled program on your Vista PC, as Vista already knows how to use a USB Easy Transfer Cable.)

2. Run Windows Easy Transfer on your Windows XP PC, and click Next.

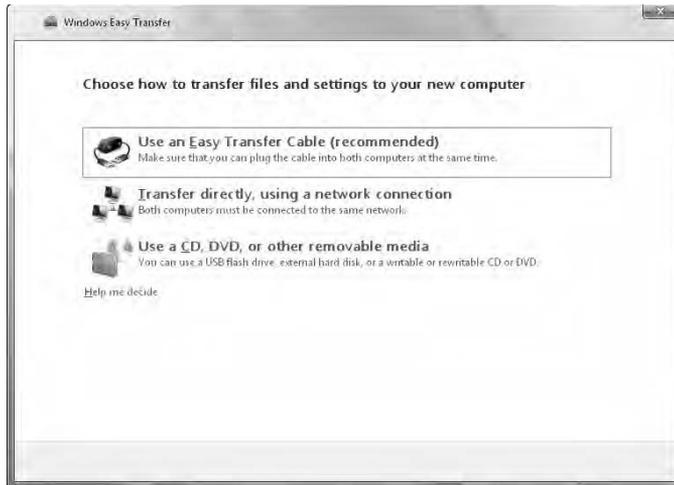
Insert Windows Vista's installation DVD into your Windows XP PC's DVD drive. At the opening screen, load the program by choosing Transfer Files and Settings from Another Computer.

No DVD drive on your Windows XP PC? Then read this chapter's sidebar, "Copying Windows Easy Transfer to your old PC." It explains how to copy the program to your old PC.

3. On your Windows XP PC, choose how to transfer files and settings to your new Vista PC.

The Easy Transfer program offers three options, as shown in Figure 5-2:

Figure 5-2:
Choose how
to copy files
and settings
from your
old PC
to your
new PC.



- *Use an Easy Transfer Cable (Recommended).* If you choose this quick 'n' easy option, connect the Easy Transfer Cable between USB ports on your Windows XP PC and your Windows Vista PC. When Windows Easy Transfer opens automatically on your Windows Vista PC, jump *way* ahead to Step 11.
- *Transfer Directly, Using a Network Connection.* If you choose to transfer through your PC's network, move to Step 5.
- *Use a CD, DVD, or Other Removable Media.* If you choose this option, move to the next step.

4. Choose how to transfer your files and settings.

The program offers three options:

- *CD or DVD:* This option works if your old PC can burn CDs or DVDs *and* your new PC has a CD or DVD drive for reading them. Be prepared to spend a long evening in front of both PCs, though, copying discs and feeding them to your new PC.
- *USB Flash Drive:* Much quicker than CDs or DVDs, USB flash drives work for transferring smaller files. If you have lots of digital photos or other large files, though, be prepared to shuffle information back and forth with the flash drive.
- *External Hard Disk or Network Location:* External hard disks (also called *portable hard drives*) plug into your PC's USB port to give it a big dose of storage space. They're your fastest and most reliable choice. If both PCs can connect to the same network location — a Public or Shared Documents folder on a third PC — you might choose that option, as well.

After making your choice, choose the drive letter of your CD/DVD burner, USB flash drive, external hard disk, or the path to your network location, and then create an optional password to keep your information secure. (You'll need to reenter that password on your Windows Vista PC to access the information.) Click Next and jump to Step 11.

5. Choose how to transfer files and settings over a network.

The program offers two options:

- *Use a Network Connection:* The most likely choice for small home networks, this option pipes the information straight from your Windows XP PC to your Windows Vista PC. If you choose this one, move to Step 6.
- *Copy to and from a Network Location:* Choose this option for more esoteric networks where your PCs can't communicate directly, but they can both access the same location on the network. If you choose this, select the network location, choose an optional password, and move to Step 11.

6. Choose whether or not you have a Windows Easy Transfer key.

Choose No, I Need a Key and then write down the key on a piece of paper. You'll need to enter that key later on your Vista PC. (Vista's *very* security conscious.)

7. Move to your Windows Vista PC, run Windows Easy Transfer, and click Next.

Just as with Windows XP, Windows Vista lets only Administrator account holders use Windows Easy Transfer.

Vista's Easy Transfer program asks whether you want to start a new transfer or continue one that's in progress.

8. Choose Continue a Transfer in Progress.

The program asks whether the computers are connected to a network.

9. Choose Yes, I'll Transfer Files and Settings Over the Network.

Vista might ask permission to let the Easy Transfer Program connect through your firewall. Click Yes to overcome this security hurdle. The program then asks you to type your Easy Transfer Key.

10. Type the key you received in Step 6, click Next, and return to your Windows XP PC.

Don't have the key? It's still displayed on the monitor of your Windows XP computer. Type the key, and click Next. Vista connects to your Windows XP PC.

Then return to your Windows XP PC and move to Step 11.

11. On your Windows XP PC, choose which accounts and information to transfer to the new Vista PC.

Windows Easy Transfer offers three ways to transfer your old PC's information, as shown in Figure 5-3:



Figure 5-3:
Choose
which
information
to move
to your
new PC.

- *All User Accounts, Files, and Settings*: The best and simplest option for families moving to a newer PC, this option transfers information from every user account to the new PC.
- *Only My User Account, Files, and Settings*: This choice copies only information from your *own* user account. This option works well if you shared a PC with others, but now want to move your information to your own shiny new laptop or new PC.
- *Advanced Options*: Tossed in for the techies, this option lets you pick and choose exactly which files and settings to move. Today's PCs contain an overwhelming amount of files and settings, so it's not for the faint of heart.

If you're piping your information into your Windows Vista PC through an Easy Connect cable or network cable, sit down at your new Vista PC and jump to Step 16.

But if you're transferring your information in the other, more labor-intensive methods, move to the next step.

12. Review your selected files and settings and click Transfer.

The program lists all your selected files and settings, as shown in Figure 5-4. Note the size of your transfer, listed above the Transfer button. Click Customize to jump back to Step 11 for further fiddling; otherwise, click Transfer to keep the ball rolling.

Figure 5-4:
Click
Transfer to
copy all your
selected
files and
settings.



Vista begins gathering your old PC's information with your chosen method:

- *Direct Network Connection:* If you chose this method, jump to Step 17.
- *CDs or DVDs:* Vista leads you through burning discs on your old PC to insert, in order, into your new PC. As you create each disc, write a number (CD1, CD2, CD3 . . .) on its printed side with a felt-tip pen.
- *Drive:* Insert your portable hard drive or flash drive, if necessary, to store your precious data.
- *Network Location:* The program begins moving the information to the network location for your Vista PC to grab it.

When your PC finishes stashing that last bit of information, move to the next step to copy it all to your new PC.

13. Go to your new Vista PC, open Windows Easy Transfer, and click Next at the opening screen.

If the program complains about any open programs, choose Close All to close them. The program then asks whether it should Start a New Transfer or Continue a Transfer in Progress.

14. Choose Continue a Transfer in Progress.

Vista asks whether you're transferring the files through a network.

15. Choose No, I've Copied Files and Settings to a CD, DVD, or Other Removable Media.

Vista asks where you've stored the incoming files.

16. Choose the location of the disc or drive containing the files and click Next.

Tell the program the incoming files' exact location: the letter of your CD or DVD drive, for example, the drive letter of your USB flash drive or external hard drive, or, if you've saved the information someplace on a network, the path to the network location.

Enter your password, if you password-protected the files.

When you make your choice, Vista immediately begins looking in that spot to make sure that the information's there.

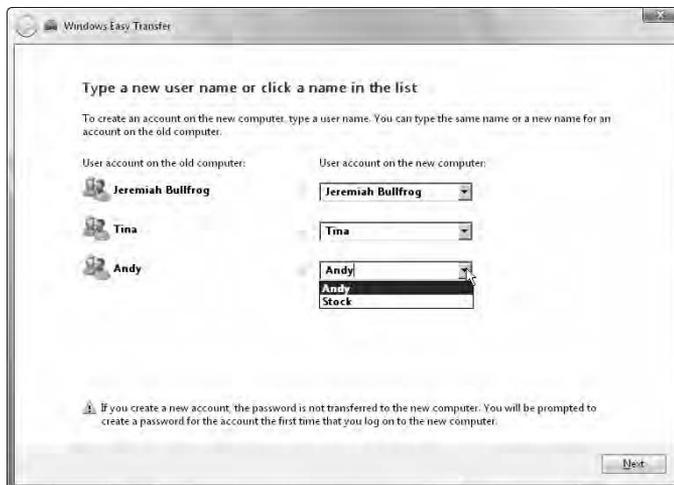
If you choose CDs or DVDs, Vista leads you through inserting CDs or DVDs, in order, into your new PC. If you're using a flash drive, Vista leads you through collecting information on the old PC and shuffling it to the new one. (You might need to take several trips.)

17. Choose names for the transferred accounts and click Next.

Vista needs to know where to put the incoming user account information. The window lists the names of the incoming user accounts on the left, and the PC's existing user accounts on the right, as shown in Figure 5-5. That leaves you three possible scenarios:

- *Same user account names:* If you've used the same user account names on both your old and new PCs, this step is easy: Vista automatically lines up the accounts on the two PCs so that they go to the right places.

Figure 5-5:
Match the existing user account on the left with its new destination on the right.



- *Different user account names:* If some or all account names are *different* on both PCs, tell Vista which information goes into which account. Use the drop-down menus to match up the old PC's user account name with the new user account names on the new PC.
- *New user account names:* To transfer a user account's files to a brand-new account, type that new account name into the top of the adjacent drop-down menu. The Easy Transfer program creates that new account on your new Vista PC.

18. Review your selected files and, depending on your transfer option, click Next or Transfer.

Vista begins copying your chosen information into your new PC, creating new accounts as needed. Depending on the amount of information, your transfer method, and your PCs' processing power, the job can take from minutes to several hours.

The program ends by summing up all the information it moved, leaving you wondering how you'd ever get by without it.



If you transferred your information with CDs or DVDs, stash the discs in a safe place so they can serve as emergency backups. If some disaster befouls your new PC, you'll at least have your old PC's information safe.

Part II

Beefing Up Your PC for Windows Vista, Games, and Video

The 5th Wave

By Rich Tennant



“Well, the first level of Windows Vista security seems good—I can’t get the shrink-wrapping off.”

In this part . . .

Vista's the latest version of Windows, and this part of the book helps you get your PC in shape for Microsoft's most powerful Windows version yet.

You start by finding out whether your old PC's able to run Vista at all and where its weak spots lie. The subsequent chapters each tackle those weak spots.

For example, one chapter explains how to meet Vista's biggest demand: a powerful new video card. It walks you through choosing the right card, putting it in the right slot inside your PC, and fine-tuning its picture.

The next two chapters show how to add more memory and a larger hard drive — perhaps even a second one — to your PC.

After beefing up your PC's power, it might be time for another upgrade covered here: your power supply. All those new parts might overwhelm your old one.

Chapter 6

Discovering How Well Your PC Will Run Windows Vista

In This Chapter

- ▶ Understanding Vista's hardware requirements
 - ▶ Running Vista's Upgrade Advisor
 - ▶ Identifying parts that need upgrading
 - ▶ Buying the right parts from the right place
-

If your current PC is less than two years old and already runs Windows XP, your PC should be able to run Vista with only a few upgrades. The problem is finding out exactly which ones.

To make things easier, Microsoft offers the Vista Upgrade Advisor, a freebie program offered for download on Microsoft's Windows Vista Web site. The program probes your PC, examines its parts and programs, and lists exactly what items will and won't work under Vista.

This chapter explains how to find and run Vista's Upgrade Advisor, understand its advice, and buy the right parts for your PC from the best vendors.

Understanding Vista's Hardware Requirements

Although Microsoft released Vista in early 2007, Microsoft didn't design Vista to run perfectly on the current crop of PCs. Instead, Microsoft's engineers envisioned the PCs we'll all be running a year or two down the road and designed Vista around those powerhouses. Indeed, some Vista features support parts that weren't even available when Vista's boxes first hit the store shelves.

To help you see what Vista expects out of a PC, Table 6-1 lists the bare minimum of oomph your PC needs to run Vista, as well as what it needs to run Vista *well*.

Table 6-1 Vista's System Requirements	
<i>Microsoft's Recommended Requirements</i>	<i>What You Really Need</i>
Processor running at 800MHz or faster	1 GHz or faster
512MB memory (RAM)	1GB memory
DirectX 9 compatible with 32 MB of video memory	128MB video memory (Video RAM) and DirectX 9 compatible
At least 20GB hard drive with 15GB free	At least 40GB hard drive with 15GB free
DVD drive	DVD burner

Vista comes in several versions, each with its own slightly different requirements. Table 6-2 explains the extra parts to consider if you want to run everything Vista has to offer.

Table 6-2 Requirements for Vista's Programs	
<i>The Part</i>	<i>The Vista Feature</i>
TV tuner	Vista's Media Center
DVD burner	DVD Maker
Hybrid hard drive	Windows ReadyDrive

Running Vista's Upgrade Advisor

Windows Vista comes in four main versions: Home, Home Premium, Business, and Ultimate. And each of those four versions requires slightly different things from your PC. To help you choose the right version for your PC, Microsoft's Windows Vista Upgrade Advisor lets you see how well Vista will run for each of those four versions.

The program displays a list of problems — perhaps your PC needs more hard disk space or memory, or some of your computer's parts need Vista-compatible drivers. Then the Windows Vista Upgrade Advisor finishes up with a list of tasks you must perform both before and after slipping that Vista installation DVD into your PC's drive.

Follow these steps to install the Windows Vista Upgrade Advisor, find out its recommendations, and understand what they mean to your particular PC.

1. Download and install Microsoft's Windows Vista Upgrade Advisor software.



Download the software from Microsoft's Web site at www.microsoft.com/windowsvista/getready/upgradeadvisor and save it onto your PC. Double-click the program's icon, shown in the margin, to install it onto your PC. Let it leave a shortcut icon on your desktop for easy loading.

During installation, don't be surprised if the program asks to download some additional Microsoft programs in order to carry out its mission.

2. Start the Upgrade Advisor program.



Double-click the Windows Vista Upgrade Advisor program icon (shown in the margin), and the program appears on the screen, as shown in Figure 6-1.

Figure 6-1: Vista's free Upgrade Advisor program tells you whether your PC can handle Windows Vista.



3. Plug in and turn on all your PC's accessories, and then click Start Scan.

Plug them *all* in: Your printer, MP3 player, scanner, external hard drive, webcam, microphone, speakers, PDA, cell phone, and anything else you can find. Make sure everything's turned on so the Upgrade Advisor program can find them all.

The program takes a few minutes to scan your PC and identify its parts and software. Then it heads for the Internet to check its database, seeing if they'll play nicely with Vista.

4. When the scan completes, click the **See Details** button to view the program's recommendations.

When it's through scanning, the Upgrade Advisor recommends one of Vista's four main versions for your particular PC. The Upgrade Advisor usually recommends Vista's Business version on PCs running Windows XP Professional; if you're running Windows XP Home Edition, the advisor usually recommends Vista's Home Premium version.

But no matter which version the Upgrade Advisor initially recommends for your PC, the dirt's in the three See Details buttons, shown along the window's bottom in Figure 6-2. There, the advisor spells out exactly how your PC fared in these categories:

- **System Requirements:** Here, Vista lists the items you need to add, upgrade, or replace in order to run a particular version of Vista. If the advisor recommended Vista Home Premium, for instance, the Upgrade Advisor will check to see if your PC has a Vista-compatible TV tuner.

Figure 6-2:
Click the Show Details buttons in each category to see how well your PC will handle that particular version of Vista.



- **Devices:** In this category, Vista lists your PC's parts that don't work with Vista. These parts usually don't need to be replaced, however. Instead, you can make them work by finding and installing a Vista-compatible *driver* — tech talk for a certain type of software. I cover finding and installing Vista-compatible drivers in Chapter 19.



If the Upgrade Advisor program says you need updated drivers for your *network adapter*, *modem*, or *wireless network card*, find and download those drivers while you're still running Windows XP. Then burn them to a CD. Later, after you upgrade to Vista, Vista can install those drivers from your handy CD. That extra legwork on your part lets Vista connect to the Internet immediately.

- **Programs:** This category lists any programs that won't run under Vista. Visit the program manufacturer's Web site to see whether they offer free upgrades or force you to buy new Vista-compatible versions.

The Upgrade Advisor usually finds a few problems or incompatibilities with every PC. Don't be surprised to see some flagged items.

5. Click other Vista versions you're interested in running.

Although the Upgrade Advisor initially recommends one version for your PC, you're certainly not limited to that version. Click any of the other Vista versions listed along the window's left, shown in Figure 6-2, to see how your PC would fare with Ultimate, Home Premium, Business, or Home Basic. Each version requires slightly different things from a PC; Vista Ultimate is the most demanding, and Vista Home Basic isn't very picky at all.



Although Vista Home Basic works fine for basic Web browsing and word processing, most people will want Vista Home Premium, with its built-in photo editor, DVD slide-show creator, and digital video recorder. Be sure to see how well your PC runs that version.

6. Create a printout of your PC's Tasks page.

After clicking one of the See Details buttons, shown in Figure 6-2, click the Task List, shown in Figure 6-3, to see what you need to do to run that Vista version on your PC.

At the top of the Task List in Figure 6-3, the program shows my PC's current configuration — that's what my PC *has*, not what it needs. Below that, the program lists things I need to do before installing that particular Vista version. Usually, the suggestions start by saying to run Windows Update, which often finds drivers for the parts listed in the Devices category. You may need to uninstall some incompatible programs, as well, before upgrading to Vista.

Be sure to click the Print Task List link in the top right corner. (See Figure 6-3.) That creates a handy list of everything you need to upgrade or fix before installing Vista.



Figure 6-3:
For each Vista version, the Task List explains what your PC needs to run that version.

Understanding Parts That Need Upgrading

Although Microsoft's charts and tables spell out exactly what your PC needs to run Vista and its many programs, some of the Upgrade Advisor's recommendations sound more like techtalk than advice. Here's the breakdown on the specific items the Upgrade Advisor flags most often.

TV tuner card/TV output

Microsoft's hoping that Vista will sneak into your living room. Unlike Windows XP, Vista comes with a built-in *digital video recorder* – a device that automatically records your favorite TV shows so you can watch them later. Vista records TV shows through its *Windows Media Center* software. (Don't confuse Media Center with *Windows Media Player*, the music and video playing software Windows has had for years.)

Before Media Center can record your TV shows, it needs a TV tuner to grab specific shows. The best TV tuners come on little cards that fit inside your PC. If you're not ready to pop open your PC's case, buy a TV tuner that plugs into one of your PC's USB ports.

When Vista says you need a TV tuner card, it also says you also need a *TV output* — a port for you to pipe your PC's video into your TV set. Luckily, most TV tuners include TV output, so you needn't worry about this one. (I cover TV tuners, TV output, and connecting your PC to your TV set in Chapter 12.)



Only Vista *Home Premium* or Vista *Ultimate* include Windows Media Center; the other Vista versions leave it out.

CPU (Central Processing Unit)

This one's a make or break deal. If the Upgrade Advisor says your CPU isn't powerful enough to run Vista, you're stuck. A CPU is often the most expensive part of a PC. When your CPU needs upgrading, many of your PC's other parts should probably be replaced, too, to bring your PC up to speed. Buying a new PC is usually less expensive.

When shopping for a new PC, make sure it's either running Vista or has a Microsoft-approved "Windows Vista Capable" or "Windows Vista Premium Ready" sticker. The budget models may run Vista *slowly*, but Vista *will* still run.

DVD or DVD R/W (Digital Video Disk Read/Write)

Vista comes on a DVD, so your PC needs a DVD drive simply to install Vista. But if you're aiming to store information or movies onto your *own* DVDs, make sure your DVD drive can also write to DVDs.

Most DVD drives sold today can write as well as read from DVDs. Installing a DVD R/W drive is a fairly simple and inexpensive upgrade I cover in Chapter 15.

RAM (Random Access Memory)

If Vista says your PC needs more memory, there's some good news: Memory is fairly inexpensive. Unfortunately, installing memory requires opening your PC's case — there's no way around that one. Once you've popped open the case, though, installing memory is fairly simple. I describe how to buy and install the right type of memory for your PC in Chapter 8.



Don't confuse *system* memory with *graphics* memory, as they're two different things. Your PC's graphics adapter, described in the next section, needs its own memory to create graphics. Shadows must be calculated, curves must be smoothed, all as quickly as possible.

Graphics adapter

Your PC's graphics adapter translates Vista's numbers into pictures that it displays onto your monitor as your Windows desktop. Chances are your current monitor will still work fine with Vista. The problem is your PC's graphics adapter, often called a *video card*.

Your PC can display graphics either of two ways:



✓ **Onboard video:** Inexpensive computers drop the price tag by tossing a few inexpensive graphics chips inside your PC. Onboard video works fine for word processing and office work, but it doesn't pack enough oomph for graphics-intensive programs: PC games, movie making, and much of Windows Vista.

Affixed to your PC's motherboard, onboard video chips usually share some of your PC's RAM, keeping the PC's price low.

✓ **Video card:** More expensive computers devote a large amount of power entirely to graphics. Video cards are separate boards that push into a slot inside your PC. Video cards come with their own circuits, memory, and cooling systems. All those things drive their price upwards from \$50 to several hundred dollars. Sliding a video card into your PC lets you upgrade your PC's graphics as far as your wallet extends.

To see whether your PC has onboard video or a video card, look at where your monitor's cord plugs into your PC. If the cord plugs in next to ports for your speakers, USB gadgets, and printer, your PC has *onboard video*. If it plugs in a more isolated port that lives on a long silver strip, your PC has a *video card*. I explain how to upgrade your PC's video card in Chapter 7.

Hard drive

Vista installs on any hard drive that has at least 15GB of free space. But if that's all the room your hard drive has left, don't bother installing Vista. You need room for your programs and files, as well. Even 100GB of space can fill up fairly quickly, especially if you're saving lots of digital photos, music, or movies.

When upgrading, buy the largest hard drive you can afford. And if you don't want to install one inside your PC's case, buy an external hard drive that plugs into one of your PC's USB ports. I cover hard drives in Chapter 9.

Choosing the Right Parts from the Right Place

When your PC needs a new or replacement part, you're left with two problems. You need to choose a particular brand and model, and you need to decide where to buy it for the best price.

There's no right or wrong answer for either dilemma, so this section explores how to narrow your choices to arrive at a decision that works for your budget and time frame.

Choosing the right brand and model

There's no "perfect" or "best" part. And even if there was such a thing, the fast pace of technology guarantees that a better part will replace it within a few months. So instead of spending your time looking for that mythical best part, look for one that simply meets your current needs. Here's how to narrow your choices.

- ✔ **Ask the opinions of others.** Start by asking your tech-savvy friends what they recommend. No tech-savvy friends? Then drop by online shopping sites like Amazon (www.amazon.com) and Newegg (www.newegg.com) and read the reviews left by other customers. You might not understand everything somebody says about a particular item. But you'll be able to stay away from the lemons, and that's half the battle.
- ✔ **Check your budget.** The newest and most powerful items command a premium price, but their price drops a few months later, when the more powerful replacement enters the market. Instead of buying the latest and greatest, buy what *was* the latest and greatest a few months ago.
- ✔ **Read professional reviews.** Lots of computer magazines and Web sites review new parts when they come out. Pick up a copy of *PC World* magazine, for instance, or drop by its Web site (www.pcworld.com) to read reviews. Tom's Hardware (www.tomshardware.com) also reviews products regularly.

As you read the reviews, keep in mind which brands receive consistently bad reviews. Then, when faced with a dizzying array of choices on the store shelves, you'll know which brands to avoid.

Buying locally versus buying online

When you need something immediately, buy locally. You'll pay a higher price than shopping online, but you'll have the part in your hands as soon as you drive to the store. You'll pay a premium price, but the extra cost lets you buy something quickly, with all its packaging, and without any shipping charges. And if the part's defective or you've purchased the wrong one, you can return it for a refund fairly easily.

When you're in no particular hurry, though, buy your parts online. Instead of choosing from a shelf or two of items, you can browse quickly through dozens of stores, all with large inventories, with prices that beat what you'll find locally.

Don't shop online by price alone, though, or you may face shipping delays or outright scams. Instead, find an online vendor you can trust and stick with them. Before ordering, check the shipping charges and return policies, as well.

Chapter 7

Beefing Up Your PC's Video

In This Chapter

- ▶ Discovering what graphics circuitry is inside your PC
 - ▶ Understanding your PC's cards and slots
 - ▶ Understanding PCI, AGP, and PCI-Express cards
 - ▶ Installing a new card
 - ▶ Repairing cards that aren't working
-

When engineers sat down at their poker table many years ago to design computers, they decided on a quick and easy way to add and upgrade them. Upgrades would come on *cards*, they decreed. To upgrade the computer, owners simply slide the card into one of several standard-sized slots built into every computer. Simple.

And today, that's still how you upgrade your PC's video: You slide a card into a slot inside your PC. This chapter covers that specific task in minute detail:

- ✓ Finding out what type of video slot lives inside your PC
- ✓ Buying a more powerful video card to match that slot
- ✓ Pushing the card into that slot

Dig in.

Understanding Video Buzzwords

Few parts inside your PC generate as many buzzwords as its *video* — the circuits that create the visuals you see on your monitor. Here's the rundown on the fine print you'll see living on computer sales sheets, requirement lists, and boxes lining the store shelves.

Video card: The most powerful (and expensive) video circuitry lives on a little *card*. Cards are small replaceable circuit boards that slip into slots inside your PC. By adding or replacing a card inside your PC, you can upgrade its video fairly easily.

Video slot: One of three specially designed slots built to accept a video card. Video cards come in three types, and each fits into a slightly different video slot.

Video memory: This memory is dedicated entirely to your PC's video circuits — nothing else inside your PC can borrow any of it. The more detail the video card can display, the more memory it needs to create the images. Vista runs best with at least 256MB of video memory.



Don't confuse *video* memory with your *computer's* memory. Video memory comes with the video card to help it generate and display pictures. Your PC's regular memory is filled with your programs and files.

Driver: A piece of software that lets Windows talk to your hardware — in this case, your video card. Without the right driver, your part won't work properly. Chapter 19 covers drivers in excruciating detail.

Port: A computer buzzword for *connector*, this is one of many little stubs on your PC where you plug in cables. The plug on the end of your monitor's cable must match your PC's video port.

TV Out Port: This sends a signal not to your PC monitor, but to a regular TV set.



VGA (Video Graphics Array) port: Created in the mid-'80s, this early standard for displaying graphics lives on today. Most PCs come with a VGA port, and most monitors still plug into them. (VGA ports are almost always blue.)



Digital video port: A newer type of video port, this sends numbers to a flat-panel monitor, which displays them as pictures. (To keep things simple, many flat-panel monitors also plug into VGA ports.)

DirectX: Software that programmers use to create advanced visual tricks with video circuitry. Many games use DirectX to display three-dimensional fire-breathing dragons and other spectacular effects. Vista requires video that can handle DirectX version 9, known as *DirectX 9c*.

Discovering What Video Circuitry Is inside Your PC

Microsoft refers to video circuits as *video display adapters*, but the rest of the world usually calls them *video cards*. Video cards can plug into either of three

different types of slots, so your first job is to find out which video slot lives inside your PC.

You may need to open your PC's case, a simple chore explained on the Cheat Sheet in the front of this book. After you're inside your PC's case, look at Figure 7-1: It shows the motherboard, the flat bed of circuitry that lives inside your PC. Everything inside your PC attaches to the motherboard, including the video card. (See Color Plates 8 and 9 in the color insert pages in this book for labeled photos of motherboards.)

The rest of this section explains the types of video you find in PCs today and how to figure out exactly which one lives inside your PC.

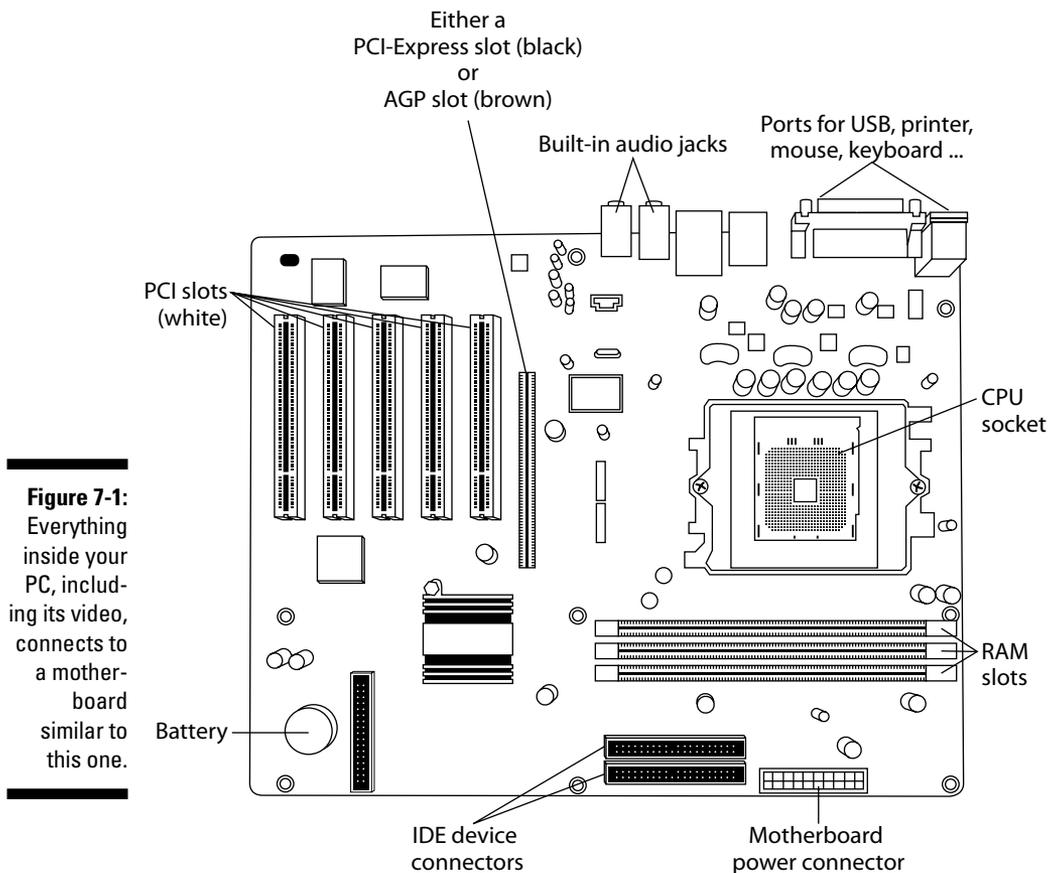


Figure 7-1: Everything inside your PC, including its video, connects to a motherboard similar to this one.

Onboard video

Older, cheaper, and less powerful computers come with *onboard video*. That term means the video circuits live directly on your PC's *motherboard*, the large flat platter inside your PC that all the computer's other parts connect to. The video has been reduced to a few low-power chips and tossed onto the motherboard.

Look where your monitor's cable plugs into your PC, as shown in Figure 7-2. If the cable plugs in near where your mouse and keyboard plug in, your PC is cursed with onboard video.

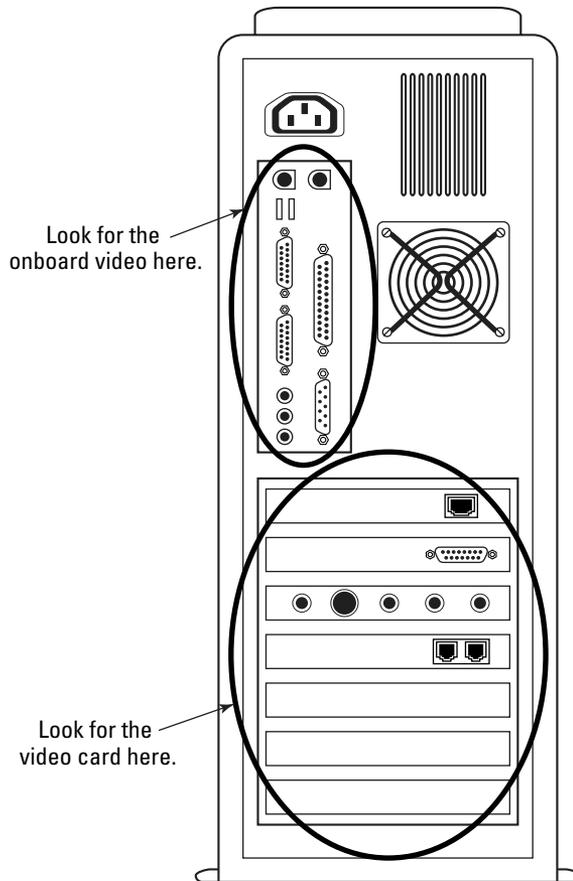


Figure 7-2:
PCs with onboard video have their monitors plug in near the top; PCs with video cards have their monitors plug into a port on a silver strip along the middle or bottom.

Onboard video can be upgraded by slipping a video card into the PC's unused video slot. The next section explains how to see which type of video slot lives inside your PC so you can slip the right type of video card into it.



Almost all laptops come with onboard video. Unfortunately, none of them have a video slot. That means you can't upgrade their video, nor can most laptops access Vista's most graphics-intensive features. Contact your laptop's manufacturer to see if they support video upgrades for your model, but don't be surprised when they say no.

Video cards

More powerful (and more expensive) PCs don't bother with the slow onboard video described in the previous section. Instead, they rely on a *video card* — a circuit-filled card that slides into a matching slot inside your PC.

To see whether your computer has a video card, look where the monitor's cable plugs into your PC. If the cable plugs into a port on a long strip that's relatively far away from where your mouse and keyboard plug in, as shown in Figure 7-2, your PC has a video card.

The hard part is narrowing down which type of slot your video card fits into. All PCs come with at least one of these three types of slots that accept video cards: PCI, AGP, or PCI-Express. Upgrading the PC is as simple as sliding the right card into the right slot.

The rest of this section explains these three types of slots and cards and how to figure out which type of card you need for your PC.

PCI (Peripheral Component Interconnect)

The slowest and oldest of the three types of slots that accept video, PCI slots sit in a row on your PC's motherboard. Most PCs come with three to five PCI slots, shown earlier in Figure 7-1. (Figure 7-3 shows a close-up of a PCI card slipping into a PCI slot.) Most PCs sold before the late 1990s came with a video card in one of their PCI slots.



Quick identifier: PCI slots sit together in an evenly spaced row of three or more. They're almost always white, and every PC has several PCI slots. PCI slots accept many breeds of cards, including modems, TV tuners, network adapters, and more, so don't be surprised to see a few other cards plugged in nearby. For easy identification of a PCI card, turn to Color Plate 14 in this book's color insert. The photo shows a PCI card and its dimensions. You can see several white PCI slots in Color Plates 17 and 18.

Upgrade options: Vista's arrival has spawned a new flow of PCI video cards to capture the older-PC market. You should find a Vista-compatible replacement fairly easily. But if your PC has an AGP or PCI-Express slot, both described next, upgrade to one of those type of cards, instead: They're *much* faster.

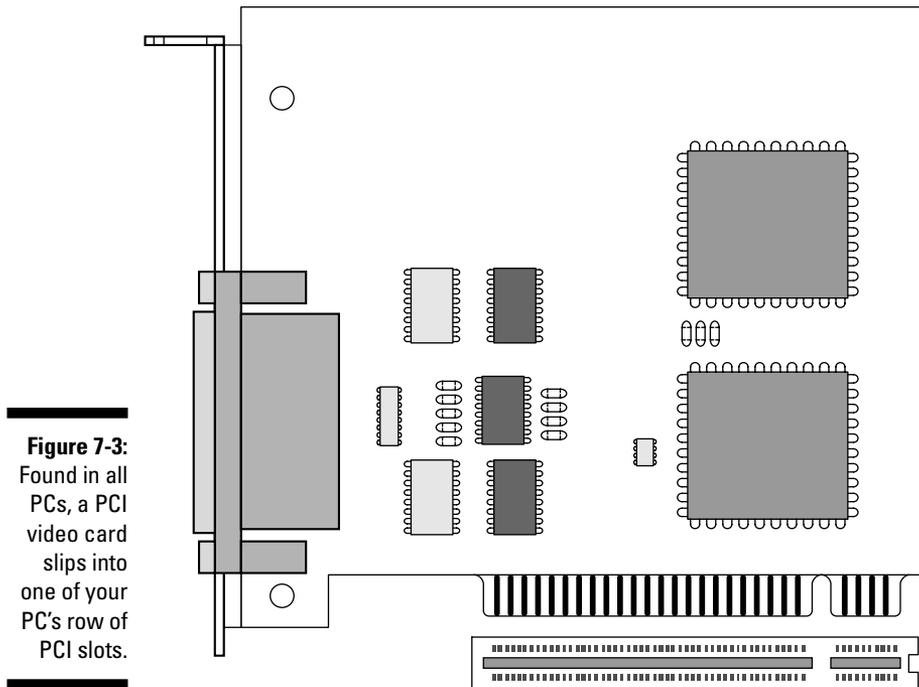


Figure 7-3:
Found in all
PCs, a PCI
video card
slips into
one of your
PC's row of
PCI slots.

AGP (Accelerated Graphics Port)

As graphics became more powerful and detailed, the old PCI slots couldn't keep up. The engineers solved the problem by adding a single AGP slot next to the row of PCI cards. Built specifically for video cards, the speedy AGP cards appeared on PCs sold mostly in the late 1990s through 2005.

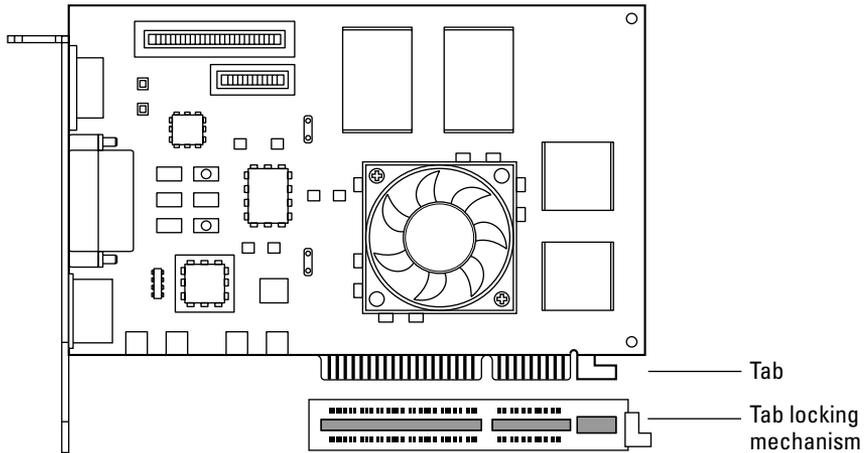
Quick identifier: Shown in Figure 7-4, an AGP slot is usually chocolate brown and offset a bit from the row of PCI slots. The bottom of the AGP card in Figure 7-4 has one notch; some AGP cards add a second notch. For easy identification of an AGP card, turn to Color Plate 15 in this book's color insert. The photo shows an AGP card and its dimensions. You can see a chocolate brown AGP slot in Color Plate 17.

Upgrade options: AGP video cards and slots have moved through several revisions, called 1X, 2X, 4X, and 8X. However, most PCs sold since the late 1990s accept either 4X or 8X AGP cards — the type sold in stores today. AGP slots accept only AGP cards.

PCI-Express (Peripheral Component Interconnect-Express)

Once again, as computer graphics became more powerful, the aging AGP standard couldn't keep up. The solution came with a PCI-Express slot, which replaced the AGP slot. PCI-Express slots appear on most PCs sold since 2005. PCI-Express slots come in different sizes.

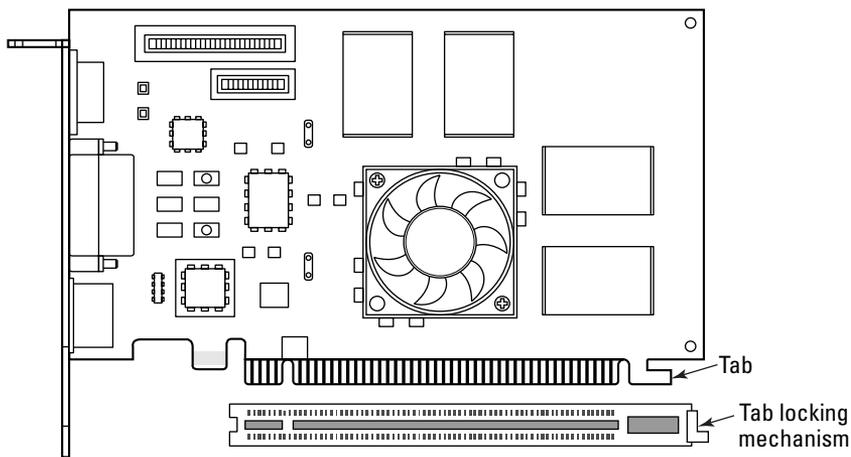
Figure 7-4:
This AGP
4x/8x video
card fits into
a 4x/8x
AGP slot.



Quick identifier: PCI-Express slots are usually black and are set off a bit from the row of PCI cards. Note how the card's bottom, shown in Figure 7-5, has one tiny tab and one long one. The tabs on AGP cards, by contrast, are more evenly spaced. Although PCI-Express slots come in several sizes, the vast majority of video cards come in the largest size, called 16x. For easy identification of a PCI-Express card, turn to Color Plate 16 in this book's color insert. The photo shows a PCI-Express card and its dimensions. You can see a black 16x PCI-Express slot in Color Plate 18, as well as two 1x PCI-Express slots.

Upgrade options: PCI-Express 16x video cards are widely available.

Figure 7-5:
This 16x
PCI-Express
video card
fits into a
16x PCI-
Express slot.





- ✓ For most video upgraders, the big question is whether to buy an AGP or PCI-Express video card. The answer depends simply on which type of video slot your PC has: AGP or PCI-Express.
- ✓ When in doubt as to which slot your PC has, look at the tiny white letters printed on the motherboard next to the slots. You'll spot the letters *AGP* next to AGP slots, for example.
- ✓ Each type of slot works only with its own type of card. An AGP card won't work in a PCI or PCI-Express slot, for instance, nor will a PCI-Express card work in an AGP or PCI slot.
- ✓ Slots sit together in a long row, like rake marks left in dirt. When you plug in a card, the card's flat *silver* end rests against the back of your PC, allowing its ports to protrude from the back of the PC's case. Don't be confused by other slots you may spot on your motherboard — the smaller, thinner slots you may see are reserved for memory (see Chapter 8 for more about memory).
- ✓ Computer gurus refer to the row of slots as your computer's *expansion bus*.
- ✓ When in doubt as to your computer's type of video port, check your PC's manual or download SiSoftware Sandra Standard (www.sisoftware.co.uk), a popular free utility that reveals lots of boring information about your computer's innards — including its video card and slot.

Installing a new video card

Difficulty level: Easy

Tools you need: One hand and a screwdriver

Cost: Anywhere from \$50 to \$200 or more



Stuff to watch out for: Cards are particularly susceptible to static electricity. Tap your computer's case to ground yourself before touching the card. If you live in a particularly dry, static-prone area, wear latex gloves — the kind that doctors and dentists wear.



Cards are delicate, so don't bend them. Handle them only by their edges, as the oil from your fingers can damage their circuitry. Finally, those little silver dots on one side of the card are sharp metal pokers that leave ugly scratches on your skin.

When shopping for a new video card, make sure it's the same type that fits in your PC's video slot, either PCI, AGP, or PCI-Express. Make sure it also has a TV-Out port if you plan on connecting your PC to your TV.

To install a video card — or any other type of card, for that matter — follow these steps:

1. **Turn off your computer, unplug it, and remove the cover.**

Don't know how that cover comes off? Flip to the Cheat Sheet at the front of this book for the answers.

2. **Locate the right slot for your card.**

Line up Figure 7-1 with what you see on your own PC's motherboard to identify your computer's expansion slots and locate the right one for your card. Check Color Plate 17 in the color insert pages in this book to see a motherboard in full, glorious color. Don't confuse your computer's row of expansion slots with its memory slots.

If you have a lot of room, keep your cards spaced as far apart as possible. That helps keep them cooler.

3. **Remove the slot's cover if necessary.**

If you're replacing a card, skip this step.

Unused slots often have a little cover next to them to keep dust from flying in through the back of your computer. With a small screwdriver, remove the screw that holds that cover in place, as shown in Figure 7-6. (Turn to the color insert pages in this book and take a look at Color Plates 19 and 20 to see this step in color.) Don't lose that screw! You need it to secure the card in place.

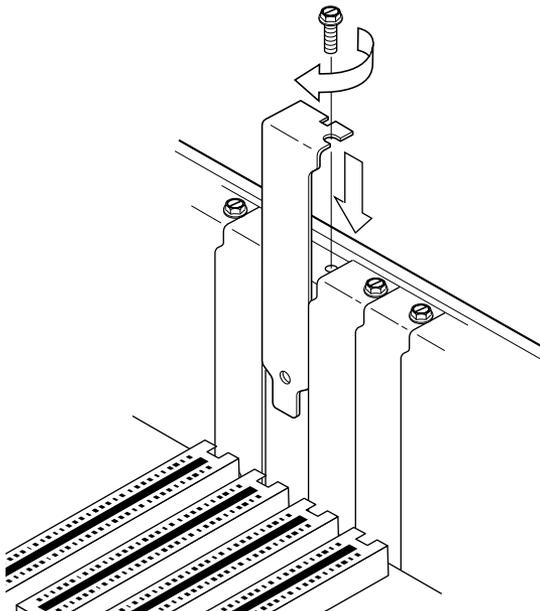


Figure 7-6:
Remove a
slot's cover
to insert a
new card.

Dropped the screw in there somewhere? Keep poking at it with a screwdriver or chopstick until you get it out. If you lose the screw inside the computer, your computer could electrocute itself.

If the screw's still lost inside your PC, pick up your computer and shake it upside down until the screw falls out. Keep the screw handy, and keep the little cover bracket, too.

4. Push the card into its slot.

When you've identified the card's appropriate slot, hold the card by its edges and position it over the correct slot. (See Color Plates 22 and 23 in the color insert pages.) The edge with the shiny metal bracket should face toward the *back* of your computer. (That shiny bracket replaces the cover you removed in Step 3.)

Line up the tabs and notches on the card's bottom with the notches in the slot. Push the card slowly into the slot. You may need to rock the card back and forth gently. When the card pops in, you can feel it come to rest. Don't force it!



Don't let any card come into contact with any other card. That can cause electrical problems, and neither the card nor the computer will work.

Some but not all AGP and PCI-Express video slots have a little retaining clip that fits over a tab on the end of the video card. Slide the clip so it holds down the card tightly.

5. Secure the card in the slot with the screw.

Yep, your expensive new video card is held in place by one screw.

6. Plug the computer back in, turn it on, and see whether Windows recognizes and installs the card.

Windows usually recognizes newly installed cards and sets them up to work correctly. If something goes wrong, head for Chapter 19 for quick-fix tips about installing drivers. If everything's working, however, put your PC's cover back on.



Whenever you install a new video card or any other card, be sure to visit the manufacturer's Web site to download and install the latest drivers. Card manufacturers, especially video card manufacturers, constantly update their drivers to fix bugs.

If the card doesn't work after you've installed the latest drivers, head for the next section: Troubleshooting.

Troubleshooting a Card That Doesn't Work

When you turn your PC back on, Windows usually greets the card with excitement and either kick starts it into action or asks for drivers. That's when it's time to run any installation programs that came with the card, usually tucked away on a CD. Visit the manufacturer's Web site to download and install the latest drivers.

General troubleshooting tips

Still doesn't work? Then try the following:

- ✔ You often need to restart your PC before a card will work correctly.
- ✔ Make sure that the card is seated securely in its slot and screwed in tightly.
- ✔ Nine times out of ten, the problem lies with the software. Although the card is sitting in the slot correctly, the software conflicts with some other card or driver. A new driver often cures it, a fix described in Chapter 19.
- ✔ Sometimes newer computers don't get along with older cards. I had an older video capture card that disabled my USB ports for years. Eventually, I replaced the capture card with a USB capture box, and everything works fine.



If one of your older cards stops working, turn off your computer, unplug it, remove the cover, and remove the card. Then take a plain old pencil eraser and rub it over the contacts on the part of the card that fits into the slot. (Be slow and gentle.) This can remove any corrosion or buildup of crud. Also, try pushing the card more firmly into its slot. Sometimes, the cards creep up and out with age.

Dealing with a card that just doesn't seem to fit

Unlike other computer organs, expansion cards have remained remarkably uncomplicated over the years: You push it into the right slot, and it works. If the card's tabs don't fit into the slot, you're pushing them into the wrong type of slot.

Sometimes the tabs aren't the problem, but the card's length and girth are, as those vary wildly depending on the card's designer. Some cards are stubby, others stretch several inches past their neighbors. Some come packed with cooling fans and other circuitry that makes them very thick.

When a card bumps into its neighbors, it's time to rearrange them. Move the cards to different slots, trying different positions until they all fit. It's like packing bags in the car trunk in the grocery store parking lot. You have to try different combinations before the trunk lid will close.

If your cards refuse to pack themselves into your PC, though, single out the wide one that's causing the most trouble and look into buying a USB replacement.

Chapter 8

Adding More Memory

In This Chapter

- ▶ Understanding types of memory
 - ▶ Buying the right type and amount of memory
 - ▶ Installing additional memory
 - ▶ Fixing memory problems
-

Adding memory is one of the most popular upgrades today, especially for people upgrading to Windows Vista. It's also one of the easiest and cheapest upgrades around. Years ago, memory actually cost more per ounce than gold; computer stores doled it out to the highest bidder. Today, cheap memory chips are sold at your local discount warehouse store, often near the bulk-pack blank CDs.

What exactly *is* memory? When your computer's CPU (Central Processing Unit) tells your computer what to do, it needs a scratch pad for taking notes. Memory works as that scratch pad. The more memory your PC has, the larger the scratchpad, and the more complicated stuff your PC can do. You can run more programs, and more quickly.

This chapter explains the many types of memory, their unfortunate acronyms, how to buy the specific type of memory your PC needs, and how to snap the new memory into the right spot inside your PC.

Understanding Memory Buzzwords

This entire section's tossed in only for those curious about all the awful buzzwords surrounding memory, as well as the different types of memory you'll see for sale. You don't need to know any of this stuff. If you're only looking for a quick way to upgrade your PC's memory, jump to the later section, "Deciding What Memory to Buy."

Still here? Then here's the primer: No matter what type of memory your computer uses, it comes on *chips* — flat black things. (Your CPU comes on a chip, too.) Just as CPUs are rated by their power and speed, memory chips are rated by their storage capacity and speed.

Although all the memory serves the same purpose, it comes in several different packages. How do you know which type you need? The answer lies with your PC's motherboard — the flat panel inside your PC where all your PC's parts connect. Different types of motherboards use different types, speeds, and sizes of memory. If you buy the wrong type of memory, your PC won't be able to use it.

The main types of memory

Although manufacturers have created many types of memory over the years, all of the memory looks pretty much the same: A fiberglass strip about four inches long and an inch tall, with little notches in its sides and edges.

Different types of memory fit into different types of *sockets* — little slots that hold the strip's bottom and sides. The notches on the memory module must mesh with the dividers and holders on their sockets. If they don't line up, you're inserting the wrong type of memory into the socket.



To see what type of memory you have, compare its notches with the ones pictured in this chapter.



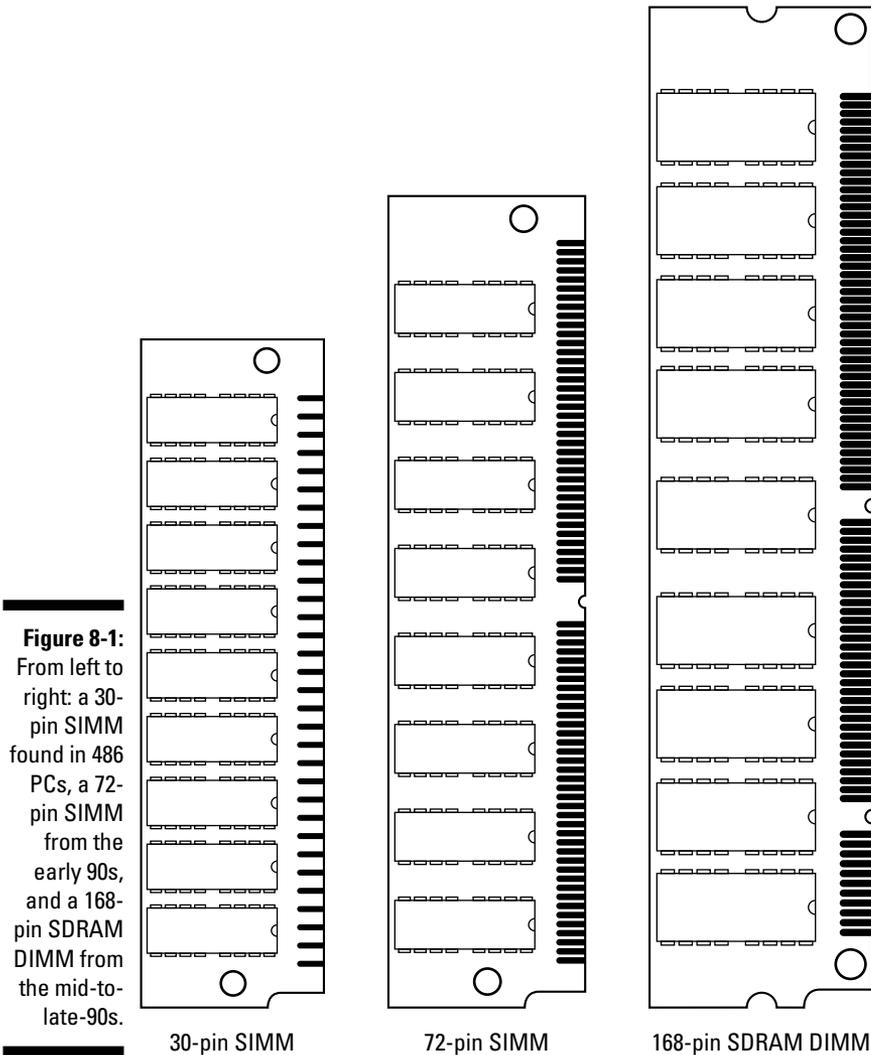
A memory module's *pins* refer to the little metallic stripes along the bottom edge that push down into the motherboard's memory socket. Pins aren't little pokey things.

SIMM (Single In-line Memory Module)

SIMMs come in two main sizes, as shown in Figure 8-1, so both sizes require a different-size socket. Ancient, pre-Pentium computers use the smaller size (3½ inches long), which has 30 pins and usually holds less than 20MB of memory.

Early Pentium computers used a larger size (4¼ inches long), which has 72 pins and usually holds no more than 64MB of memory. Both types simply push into a socket, held in place by friction.

Verdict: SIMMs are yesterday's technology from early '90s computers. Don't buy SIMMs for modern PCs.



SDRAM DIMM (Synchronous Dynamic Random Access Memory Dual In-line Memory Modules)

To meet the increased memory demands of newer and more powerful Pentium and AMD CPUs, designers created the speedier SDRAM DIMMs. With 168 pins, the 5¼-inch DIMMs (shown on the right in Figure 8-1) look much like longer SIMMs. They slide into newly designed slots with little clips holding them in place.

Verdict: Usually called simply *SDRAM*, DIMMs ruled the computer world through most of the '90s.

RDRAM (Rambus Dynamic Random Access Memory) or RIMM

Rambus, Inc., created a super-fast, super-expensive memory in the late 1990s and covered the chips with a cool-looking heat shield. The speedy 5¼-inch-long memory modules, shown in the left of Figure 8-2, enchanted Intel so much that the CPU maker designed its Pentium 4 CPUs and motherboards around them.

The rest of the computer industry ignored RDRAM because of its high price and licensing fees. Intel's main competitor, AMD, stuck with standard motherboards and SDRAM, the existing industry standard. RDRAM and SDRAM use different slots, so stick with the type of memory your computer is built around.

Verdict: Unless you're using a Pentium 4 with an Intel motherboard, you probably won't be using RDRAM.

DDR SDRAM (Double Data Rate SDRAM)

The biggest competitor to RDRAM, this stuff does some tricky piggybacking on the memory bus to speed things up dramatically. The catch? Because your motherboard must be designed to support it, these 5¼-inch memory modules use slots with different notches than those designed for traditional SDRAM. That means that DDR SDRAM modules, like the one in the middle of Figure 8-2, don't fit into a *regular* SDRAM slot or an RDRAM slot.

Verdict: Pentium 4 computers that don't use RDRAM often use DDR SDRAM memory. However, make sure your motherboard specifically supports DDR SDRAM before buying it. (DDR is also known as *Dual Channel*.)

DDR2 SDRAM (Double Data Rate 2 SDRAM)

DDR2 SDRAM (shown on the right in Figure 8-2) is simply a newer, faster version of DDR SDRAM. Yet again, your motherboard must be designed to support it, as these modules use yet another system of slots and notches.

Verdict: The latest PCs use DDR2 SDRAM, but like all other memory decisions, make sure your motherboard supports it before buying it.

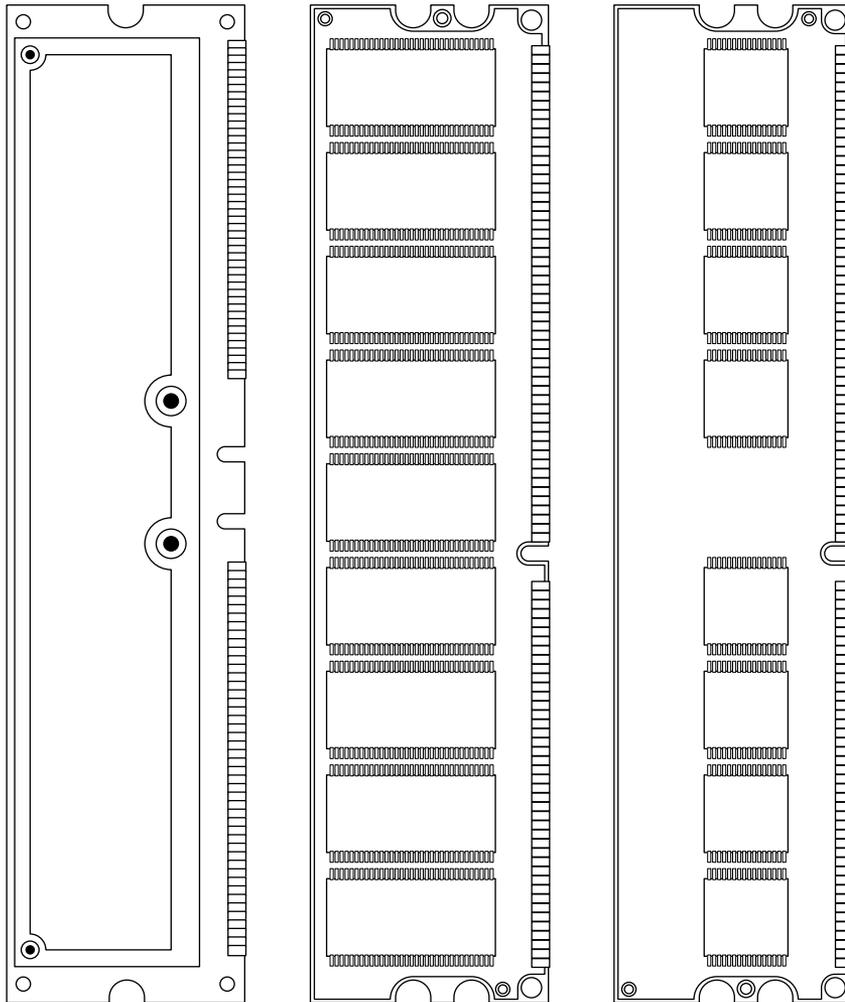


Figure 8-2:
From left to
right, an
RDRAM,
DDR
SDRAM,
and DDR2
SDRAM.

Deciphering memory advertisements and packaging

Your computer probably uses one of the five types of memory described in the previous section. You'll probably encounter most of the following few words when shopping for those types of memory or browsing the ads:

Bankings: This describes the number of memory slots (also called *banks* or *sockets*) in your PC. Most PCs' motherboards come with at least three or four memory slots.

Matched pairs: Some PCs require you to install memory in *matched pairs*. That means you need to buy and install *two identical* sticks of memory at a time. Also, those two memory sticks must be placed in *matched pairs* of memory sockets inside your PC. Not all PCs are this picky. But if your PC requires memory to be installed in matched pairs, be sure to buy *two identical* sticks.

Free slots: If all your memory sockets are full, you don't have any free slots. That also means you don't have room to insert any more memory sticks. So, how do you upgrade your memory? Unfortunately, you need to remove some low-capacity memory — a 256MB stick, for example — and replace it with a higher-capacity memory. Unfortunately, that tactic leaves you with a leftover-and-useless 256MB stick.

DDR400, DDR533, DDR2-4200, DDR2-6400: Numbers after an acronym describe the speed of a particular DDR SDRAM or DDR2 SDRAM module. The larger the number, the faster the memory — if your motherboard's equipped to handle it. You can usually install faster memory in slower motherboards without problem, but putting slower memory in faster motherboards will slow down your PC.



Laptop memory: Laptop computers use smaller parts for everything, and that includes memory. Regular sticks of memory won't fit into a notebook, and vice versa. Buy memory designed specifically for your brand *and* model of laptop.

Deciding What Memory to Buy

When faced with the unpleasant task of buying the right type, speed, and size of memory for a PC, most people give up and take it to the shop. Do-it-yourselfers often turn to online memory vendors because they've made the process so easy. Follow these steps for the quickest and easiest way to figure out how much memory is already inside your PC and the best type of memory to add to your particular model.

1. Visit Crucial (www.crucial.com) or another online memory vendor.

Most online memory vendors, including Crucial, offer special programs to scan your PC's memory requirements and offer recommendations.

2. Tell the Web site to find out what memory's inside your PC and to recommend compatible upgrades.

On Crucial, for instance, click Scan My PC. The Web site sends a small program to your PC to scan its memory and then present the results, as shown in Figure 8-3.

The Web site revealed these three things about my PC:

- **Current memory setup:** The PC currently has four banks of memory; two are filled with 512MB memory modules, and two are empty.
- **Possible upgrades:** Depending on the width of my wallet, I can upgrade my PC to 2GB, 3GB, or 4GB.
- **Memory type:** The details area shows that my PC can hold no more than 4096MB (4GB) of DDR2 memory running at a speed no faster than 3391. The memory must be installed in matched pairs.

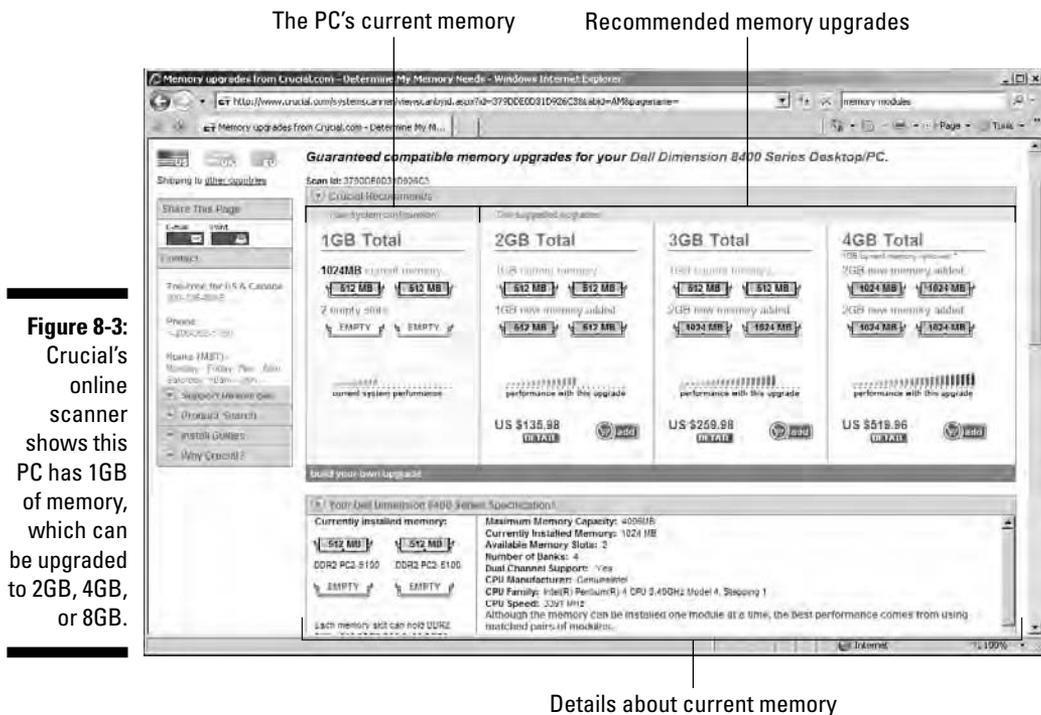


Figure 8-3: Crucial's online scanner shows this PC has 1GB of memory, which can be upgraded to 2GB, 4GB, or 8GB.

3. Decide how to upgrade.

My best bet is to fill the two empty slots with either 512MB (upping the PC's total to 2GB) or 1024MB memory modules (upgrading the PC's RAM to 3GB). To upgrade to 4GB, I need to discard the two existing 512MB modules and place a 1GB module in each slot — an expensive proposition.

My laptop fares worse, as shown in Figure 8-4.

Its two slots are filled with 256MB of memory each. My only choice is to discard them both and fill their two slots with two 512MB memory modules. That upgrades the laptop to 1GB of memory — the most memory the laptop can handle.

4. Buy the memory that meets your needs.

When you've identified the type and amount of memory you need, you're ready to make your purchase. Feel free to make a printout of what you've learned about your PC and memory-buying strategy at Crucial, and compare prices at other sites (or local stores) before buying. Or simply buy it from Crucial.

Figure 8-4:
Since my laptop's only two memory slots are already filled, I need to discard them to upgrade its memory.

The PC's current memory Recommended memory upgrades

The screenshot displays a web browser window with the URL <http://www.crucial.com/systemscanner/veviscanbyid.aspx?id=3CCDD08231D926C3&tabid=AM8&pagename=store%2Flistparts%2Easpx%3Fmodel%3Dvaio%2Bpcg%252dv>. The page is titled "Determine My Memory Needs - Microsoft Internet Explorer".

The main content area is divided into two columns:

- Left Column (Current System):**
 - 512MB Total** (512MB current memory)
 - Two 256 MB modules are shown.
 - 0 empty slots.
 - A bar chart shows "current system performance".
- Right Column (Recommended Upgrade):**
 - 1GB Total** (512MB current memory removed + 1GB new memory added)
 - Two 512 MB modules are shown.
 - A bar chart shows "performance with this upgrade".
 - Price: **US \$143.98** with a "DETAIL" button.

Below this comparison is a section titled "build your own upgrade" with a "Yama Strong VAIG P76-M/95B Series Specifications" table:

Currently installed memory: Two 256 MB modules	Maximum Memory Capacity: 1024MB
Each memory slot can hold DDR PC2700 with a maximum of 512MB per slot.*	Currently Installed Memory: 512MB
	Available Memory Slots: 0
	Number of Banks: 2
	Dual Channel Support: No
	CPU Manufacturer: GenuineIntel
	CPU Family: Mobile Intel(R) Pentium(R) 4 - M CPU 2.00GHz Model 2, Stepping 9
	CPU Speed: 1988 Mhz

Details about current memory



If you can't figure out what kind of memory your computer has, write down its make and model number, along with its number of memory slots. Carefully pluck out your computer's existing memory chips, put them in a plastic sandwich baggie, and bring them to the local computer store. The salesperson can then sell you the right type and amount. (Some memory chip stores may even accept trade-ins on memory modules you need to discard.)

Installing memory chips

Difficulty level: Medium

Tools you need: None

Cost: About 25 cents per megabyte, although the price constantly changes

Stuff to watch out for: Memory has more rules than Mrs. Jackson during her shift on lunch duty:

- ✓ First, be sure to buy memory that fits the same *size* as your motherboard's sockets. Not all memory fits every socket.
- ✓ Second, buy memory that's the right *speed* so that your computer can use it without tripping.
- ✓ Third, buy memory that's the right *capacity*. Different motherboards have different limits on how much memory they can handle.
- ✓ Finally, some computers require their memory to be installed in matched pairs. If yours does, you must buy and install two sticks of memory, not just one.

These four details are covered more fully in the “Deciding What Memory to Buy” section, earlier in this chapter. Choosing the right memory requires *much* more time than installing the darn stuff, which is why I recommend using the online programs supplied by memory vendors.

To install your new memory modules, follow these steps:

1. Turn off the computer, unplug it, and remove the case.

These steps get the full treatment on the Cheat Sheet in the front of this book. I also show how to remove a PC's case in the color insert pages in Color Plates 1 through 3.



If you live in a static electricity–prone environment, buy a grounding strap that wraps around your wrist and attaches to the computer. Even if you don't have static electricity problems in your area, you should still ground yourself by touching a metal part of your computer's case before touching its innards.

2. Locate the memory sockets on your motherboard and install the new memory chips.



See the Color Plates 10 through 13 in the color insert pages.

If you're working in a dry area with lots of static, take off your shoes and socks. Working barefoot can help prevent static buildup.

Need to remove an existing memory module to make room for the new-comer? Pull the socket clasps away from the existing memory module's sides and then pull the module up and out. (It's the reverse of the steps described later.) Place the extracted memory in a plastic baggie for safekeeping.

Check your motherboard's manual, if possible, to make sure that you're filling up the correct sockets and rows.

Look for the notched sides and bottom of the memory module. Align the notches with the socket's dividers and clasps, as shown in Figure 8-5 and in Color Plate 13. Push the memory stick straight down into its socket and then push its little locking clips toward its edges to hold it in place.

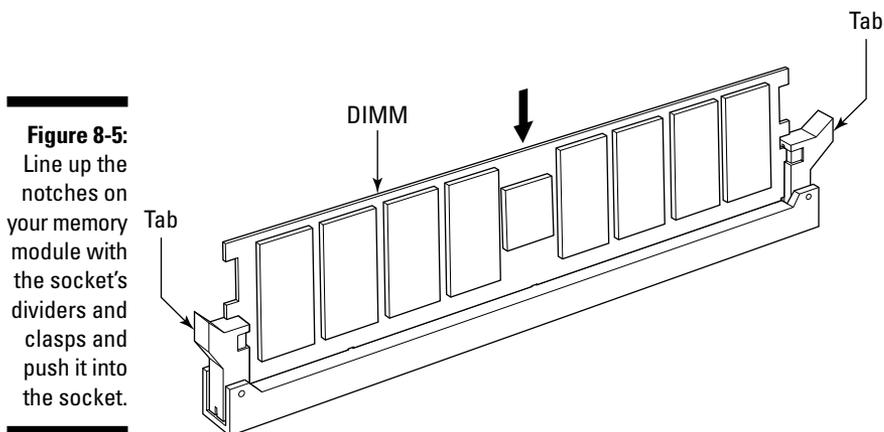
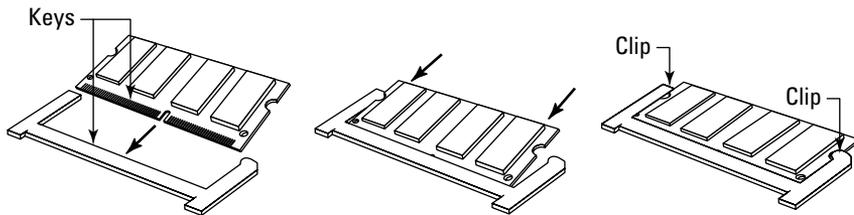


Figure 8-5: Line up the notches on your memory module with the socket's dividers and clasps and push it into the socket.



To fit memory into a laptop or notebook computer, remove the panel from the bottom of the laptop. (Check your notebook's manual to see exactly where its memory modules live.) Although different models and brands often use slightly different modules, most install somewhat like Figure 8-6.

Figure 8-6:
A laptop's tiny memory module pushes into a small socket beneath a special cover on the bottom of the laptop.



3. Double-check your work.

Are all the memory modules firmly in position? Wiggle them a little bit and make sure their clips hold them firmly. Are any of their pins showing? The pins should be deeply embedded in the socket.

4. Plug in the computer and turn it on.

Your computer might greet you with an error message about memory mismatch or something weird. The message sounds scary, but it's good news! Your computer found the new memory chips and was startled to find more than the last time you turned it on.

If your computer doesn't recognize your new memory chips, turn it off and push those chips into their sockets a little more firmly. That may do the trick.

5. Put the case back on.

Windows should run faster, more smoothly, and be able to juggle more programs at once.

Dealing with failing memory

Some computers are pickier about memory than others. Some, for instance, don't like you to replace their slower memory with faster memory. If you have a problem with your memory modules (your computer usually tosses up an error message bearing the keywords *parity error*), try isolating the problem: Remove all but one module of memory, turn on your computer, and see if the trouble remains.

If the computer runs fine, try reinserting the other memory modules, one by one, and turning on your computer each time. Eventually, you'll discover the module that's causing the problems and that needs replacement.

Chapter 9

Adding Storage with a Hard Drive

In This Chapter

- ▶ Understanding hard drive terms
 - ▶ Upgrading your Windows hard drive
 - ▶ Installing a hard drive
 - ▶ Defragmenting a hard drive
 - ▶ Fixing disk errors
 - ▶ Exploring backup methods
-

People pile their junk into closets, garages, and kitchen drawers. Computers stuff it all onto a humming hard drive. Unfortunately, hard drives suffer from the same problem as their household counterparts. They're rarely large enough to hold everything, especially after you've been computing for a few years.

Every new Windows version consumes more hard drive space than the previous version, and new programs always grow larger, too. The Internet keeps dishing up stuff that's fun to store. E-mail keeps piling up.

To deal with the constant information flow, some people upgrade to a larger hard drive. Others add a second hard drive, either inside the PC or by plugging an external hard drive into one of their PC's USB or FireWire ports.

This chapter shows you how to replace an existing drive, add a second internal drive, or add an external drive — a great way to make easy backups.

Understanding Hard Drive Buzzwords

People began stuffing hard drives inside their personal computers in the late '70s. Each year or so afterward, technicians found new ways to store more data on those little spinning disks trapped inside metal boxes. Today, several incompatible hard drive standards rule the computer store shelves. Each new release brings a new handful of abbreviations and numbers to sort out.

This section serves as a translation guide to the words, letters, and numbers you're bound to encounter when hard drive shopping. Support your back with a pillow and get comfortable; hard drives use plenty of buzzwords.



Vista technologies

Vista takes advantage of two new technologies being built into hard drives, and both of them help laptops most of all:

Hybrid drives: For best performance, look for a hard drive that's labeled as "Windows ReadyDrive." Inside these hybrid drives lives some *flash memory* — the same type of memory found on keychain drives. Your hard drive dumps frequently needed items into the speedy memory, letting Windows Vista grab that information quickly without waiting for the slower, mechanical part of the hard drive to grab it.



Hybrid hard drives work best in laptop PCs, because they prolong battery life. Instead of draining the batteries by turning on the mechanical hard drive, Vista grabs the information from the flash drive, keeping your PC quieter and cooler.

BitLocker Drive Encryption: If somebody steals your PC or laptop, they also steal something even harder to replace: All the information on your hard drive. Most hard drives contain passwords, credit card numbers, and other sensitive information, making a bad situation even worse. Hard drives with a special chip can take advantage of Vista's new BitLocker technology that locks your information up on your hard drive. Thieves won't be able to access the data on your hard drive, keeping your information safe.

Drive types

Hard drives constantly move to new technologies to pack more information into successively smaller spaces. These words describe the storage technology built into the drives found today:

IDE/ATA/PATA (Integrated Drive Electronics or Intelligent Drive Electronics): This fast and cheap standard quickly chased its decrepit precursors out of the barroom a long time ago. Today, most hard drives still use some form of IDE technology, often referred to as ATA (AT Attachment). Because these drives use technology called *parallel*, they've picked up the acronym PATA to describe all drives from this old school.

UDMA, UIDE, AT-6, Fast ATA, Ultra ATA, UDMA, and more: These subsequent flavors of IDE/ATA technology each add new technologies and longer acronyms. The result? More speed and more storage capacity.

SATA (Serial ATA): The newest incarnation of the IDE/ATA drives, these offer still greater performance. Older drives moved information to your computer through awkward, stubby ribbon cables. SATA drives transfer their information faster through sleek, thin cables that route through your computer's innards more easily.

External SATA: You guessed it, external SATA drives live outside your PC and plug into special eSATA ports you can add to your PC.



SCSI (Small Computer Systems Interface), Fast Wide SCSI, Ultra SCSI, Wide Ultra2 SCSI, and more: Pronounced “scuzzy,” this popular drive variety worked its way into the hearts of power users and network administrators. Today, SATA is slowly pushing SCSI away from even those folks.

Speed and space

The following terms appear on nearly every hard drive's box to help you find the drive with the size and speed you need:

Capacity: The amount of data the hard drive can store; the larger, the better. When buying a new drive, look for something with 50 gigabytes (GB) or more. Always buy the biggest drive you can possibly afford.

Access or seek time: The time your drive takes to locate stored files, measured in milliseconds (ms). The smaller the number, the better.

DTR (Data Transfer Rate): How fast your computer can grab information from files after it finds them. Larger numbers are better. Data transfer rates are broken down into burst and sustained, each described next.

Burst/sustained: These figures show how quickly your computer grabs and delivers information from your hard drive. The burst rate determines the speed at which your computer can fetch one small piece of information from your hard drive. The sustained rate, by contrast, refers to how fast it constantly streams data — fetches a large file, for example. Naturally, burst rates are much faster than sustained rates.

5000/7200/10000 RPM: The speed at which your hard drive's internal disks spin, measured in revolutions per minute (RPM). Bigger numbers mean faster and more expensive drives. (For some reason, techies leave out commas when discussing RPM.)



When you're purchasing a drive for everyday work or sound/video editing, buy a very *fast* one. If you're looking to simply store large amounts of data, such as MP3s, videos, text, or similar items, save money by buying a slower drive.

Hard drive hardware, mechanics, and connections

These terms describe your drive's physical characteristics — an important thing to know when you're installing the drive inside your PC.

Master/slave/Cable Select: Some hard drive cables come with two connectors, and this system lets you tell the PC which drive is attached to which connector. The drive containing the operating system (Windows) is known as the *master*; the other drive is a *slave*. By placing a little jumper across certain rows of pins on each drive, you tell it whether it's a master or slave.

The two connectors on a special Cable Select cable come with Master/Slave labels. Connect the drive you want as master to the cable's Master connector; put the other on the cable's Slave connector. Then choose the Cable Select jumper on both of the drives to let the PC know of your handiwork.



To designate their jumpers as master, slave, or Cable Select, some drives use abbreviations like MA, SL, and CS, or something even more obscure. The first letter of the abbreviation is the give-away.



Unlike IDE/ATA drives, SATA drives don't bother with master/slave/Cable Select relationships. Each SATA cable connects to its own drive, sparing you from fiddling with jumpers.

Cache: Memory chips included on a hard drive. Because memory chips work much faster than hard drives, they temporarily store, or *cache*, recently acquired pieces of information. If the computer needs the information again, it grabs it straight from the cache, saving time by not mechanically rooting for it on the disk. The more megabytes in the cache, the faster the drive.

Partition: A division of space inside a hard drive. When you take a hard drive out of the box, it's like a large warehouse. Before you can use it, you must *partition* it. Partitioning tells the hard drive what boundaries to use for storing data. In Windows XP and Vista, most people create one partition — often called a *volume* — that fills their entire hard drive.

Format: The structure a partition uses to store data. After you create a partition on a hard drive, the partition needs to be set up with virtual shelves so that the computer may stack data onto it. *Formatting* prepares the partition to accept data. All new partitions must be formatted before use. (Windows XP and Vista work most securely with the NTFS file system, so choose that when you're formatting your hard drive.)



Dual boot: A system that enables two operating systems to work on your PC. Some people want to run more than one operating system on their computers. They want to use Windows Vista part of the time, for instance, and Windows XP part of the time. Computers running with a dual-boot system present a menu when first turned on, enabling you to choose which operating system to use.

Internal/external: An internal drive installs inside your computer, hiding out of sight in the case. An external drive (sometimes called a portable drive) plugs into one of your computer's fastest ports and sits on your desk. An iPod can work as an external drive.



FireWire (also known as IEEE 1394): An optional port allowing for speedy data transfers. Many external hard drives plug into a computer's FireWire port, allowing them to work as quickly as their internal cousins. (No FireWire port? Slip a FireWire card into one of your PC's PCI slots, the same way as adding a graphics card, covered in Chapter 7.)



USB: A standard port used by most PCs. Early-to-mid '90s computers come with a USB 1.1 port, which transfers information too slowly for external hard drives. The newer USB 2.0 ports are 40 times faster.

PC card: Frequently found on laptops, these cards (which are about the size of a credit card) sometimes contain itty-bitty hard drives to be inserted into a PC slot for grabbing data while you're on the go. (Some people still call PC Cards by their earlier name, PCMCIA cards.)

Microdrive: IBM's miniscule hard drive that stores information on a Compact Flash card. Microdrives are used by some MP3 players and digital cameras.

Knowing Your Hard Drive Upgrade Options

You always know when it's time for a new hard drive. Windows constantly whines about needing more room, for instance. Programs refuse to install, complaining of not enough available space. Or perhaps your C drive suddenly grinds to a silent halt.

If your C drive dies and you can no longer boot your computer from it, try desperately to rejoice! Physically, this is the *easiest* hard drive upgrade of all. Because you're starting from scratch, you needn't make any complicated installation decisions. You simply replace your dead drive with a bigger, faster new one, covered in the later section, "Replacing a Dead Internal Hard Drive."

Converting SATA to IDE/ATA and vice versa

Some thoughtful manufacturers sell PCs that come with both SATA and ATA connectors on their motherboards. That lets you install either or both types of drives. But many motherboards come with only SATA or ATA connectors, and that's a problem when you're holding the wrong type of drive.

How do you connect a PC's ATA connector to a SATA drive? Or a SATA connector to an ATA drive?

The solution is a SATA/ATA converter. They cost around 20 bucks online, and many computer stores carry them. The converter slips onto the end of your hard drive's cable, converting its connector to the type that matches your PC's connector.

Emotionally, of course, replacing a dead hard drive is the most draining upgrade of all because you may have lost all your data (unless you backed it all up faithfully; see "Backing Up Your Hard Drive," later in this chapter).

If you simply need more storage space, you must make some difficult decisions. Here are your options:

- ✓ Add an external hard drive.
- ✓ Add a second internal drive.
- ✓ Add a second internal drive and install Windows on it; then use your old drive for storage.

Choosing either of the first two options leaves you with two nagging problems, though. First, your C drive, where Windows lives, will still be full. How do you clear up some free space? Windows doesn't do that automatically. If your C drive contains plenty of data files (MP3 files, text documents, spreadsheets, videos, and other files), move those files to your new second drive. You can also uninstall your C drive's largest programs and reinstall them onto your new, second drive. (Unfortunately, both choices still leave you with the next problem.)

The second problem lies here: Your newer drive is undoubtedly bigger and faster than your older drive. If Windows lived on your new drive, your computer would run faster. That's why many people choose the third option in the preceding bulleted list: Install Windows on the new internal hard drive and use the old one for storage.

The next three sections explore all the options and show you how to complete each upgrade.



If you have any doubts about installing a new hard drive and feel you might inadvertently lose some important information, please buy a backup system in addition to your new hard drive. Then back up all your important information before proceeding with any of these steps. Even if you're not installing a new hard drive, a working backup system makes good sense.

Replacing a Dead Internal Hard Drive

Difficulty level: Medium

Tools you need: One hand and a screwdriver

Cost: Roughly \$150 to \$500



Upgrading a laptop's hard drive

You can upgrade your laptop's hard drive just like you can upgrade your PC's hard drive. The biggest problem is copying the contents of your old laptop's hard drive onto your new drive. You need an *exact image* of your current hard drive; you can't just copy the contents over, or Windows won't run.

The easiest solution comes from Apricorn (www.apricorn.com) and its EZ Upgrade Universal Hard Drive Upgrade Kit. The kit comes with software and an empty box with a cable that plugs into your USB port. The kit works like this:

1. You buy a replacement hard drive, put your new drive in the box, and plug the box into your laptop's USB drive.
2. Run the kit's bundled software.

The software takes a snapshot of your laptop's current drive and duplicates the drive's image onto your newer, larger drive.

3. When the software's finished, turn off your laptop, remove its battery, and pop off the laptop's bottom cover (it's usually held on by a few screws).
4. Remove your laptop's old drive, put in your new drive, and replace the laptop's cover.
5. Put your laptop's battery back in, and when you turn on your laptop, it starts up with your new drive, complete with all your old drive's contents.

It's quick, it's easy, and it leaves you with a perk: Put your laptop's old drive into the leftover USB box, reformat it from within Windows, and you've created an external hard drive — great for backing up a PC or storing large files. For only \$50, it's the easiest way yet to upgrade a laptop's hard drive.



Stuff to watch out for: Severe emotional stress. Losing your hard drive can be devastating unless you have your original Windows disc, the discs for all your programs, and a backup of all your data.

The key point with this upgrade is making sure your replacement drive uses the same settings and cable as your old one.

Follow these steps to replace a dead hard drive:

1. Identify your old drive and buy a replacement of the same type.

Examine your old drive's cable. If the cable's flat like a ribbon (usually light blue or beige), it's a traditional IDE/ATA drive. No flat ribbon cable? Then you have a SATA drive. Replace your old drive with the same type as the old one, either IDE/ATA or SATA.

Buy a fast, large, and dependable hard drive. Don't skimp on quality; you've already experienced the pain felt when one doesn't last.

You can buy new hard drives at office supply stores, computer stores, or online at places like Amazon (www.amazon.com) or Newegg (www.newegg.com).

2. Turn off your PC, unplug it, remove your computer's case, and examine your drive's connections.

Removing the case is covered on the Cheat Sheet in the front of this book. Examine where the cables currently plug into your dead hard drive; those cables will plug into the same spot on your new one.

3. Remove the old drive and then slide in the new one in the old one's place.

Use your screwdriver for this task; save the screws.

4. If you're installing an IDE/ATA drive, set the new drive's master/slave jumper to match the jumper on the old hard drive.

Master/slave jumpers are explained in the "Hard drive hardware, mechanics, and connections" section, earlier in this chapter. If your dead drive is set to master, for instance, set the replacement drive to master.

5. Plug in the data cable and the power cable.

The cables from the old drive fit into their new drive's connectors only one way — the right way — on both ATA/IDE and SATA drives. (See Color Plates 24 and 26 in the color insert pages in this book.)

6. Screw down the drive (see Color Plates 26 and 17 in the color insert pages) and reinstall your data.

Partition and format the new drive as described in this chapter's "Partitioning and Formatting a Drive in Windows" section. Install Windows Vista onto the new drive as covered in Chapter 20, install your programs from their original discs, and run your backup software, if you have any, to retrieve your old data.

I cover backup systems in the "Backing Up Your Hard Drive" section, later in this chapter.

Although these are the basic steps, you'll find more detailed information for hard drive installation in this chapter's upcoming sections.



If your old hard drive had some extraordinarily valuable information on it, call a computer repair shop and ask for its Computer Forensics department. Many shops can grab information from a damaged hard drive — for a price.

Installing an External Hard Drive

Difficulty level: Easy

Tools you need: One hand

Cost: Roughly \$150 to \$500

Stuff to watch out for: External hard drives are by far the easiest way to add extra storage space to your computer. Most PCs come with a USB 2.0 port, so shop for a USB 2.0 external drive. (USB is the same port most iPods plug into.) Don't choose a FireWire or eSATA external drive unless you know your PC has one of those ports.



External hard drives can easily be moved from one PC to another. Just plug it in, and the drive's icon shows up next to your existing drive in Windows. They make excellent backup drives, and they're handy for moving large files from one PC to another.

To install an external hard drive, follow these steps:

- 1. Plug the external hard drive into its power adapter, and plug the adapter into the wall.**

Some external hard drives use rechargeable batteries, but if the AC adapter is handy, use that when plugging the external hard drive into your computer.

Most hard drives require external power for reliability. Geeks call their little black power adapters *wall warts*.



2. Install any software required by the hard drive and plug the cable into the hard drive's enclosure.

A few external hard drives come with a program that formally introduces the new hard drive to the computer, making the first bits of conversation less awkward.

Some external drives also require partitioning and formatting when they're first purchased, a process described later in this chapter in the "Partitioning and Formatting a Drive in Windows" section.

External hard drives come with a cable that fits into a port on the hard drive's enclosure. (The cable only fits into the port one way — the right way.)

3. Plug the other end of the hard drive's cable into your USB, FireWire, or eSATA port and turn on the drive.

All three of these ports are usually found on the back of your PC:



- A *USB port* looks like the one shown in the margin. If your drive is USB 2.0, make sure to plug it into a USB 2.0 port, as well. (I describe USB ports in this book's appendix.)
- A *FireWire port*, shown in the margin, is sometimes called an IEEE 1394 port.
- An *eSATA port*, shown in the margin, is still relatively uncommon on today's PCs.

No matter how you plug your drive into your PC, Windows greets the newcomer and places a little icon for it next to your clock, as shown in Figure 9-1.

Figure 9-1:

When plugged in, the external hard drive's icon appears in Windows Vista, top, and Windows XP, bottom.





4. Wait for the new drive's icon to appear in your Computer or My Computer window.

In Vista, choose Computer from the Start menu to see your drive's icon (shown in the margin). In Windows XP, choose My Computer from the Start menu.



Most external drives work as soon as you plug them in. An occasional few need to be formatted, which I cover in the "Partitioning and Formatting a Drive in Windows" section, later in this chapter.

5. Double-click the new drive's icon to see the drive's contents.

That's it. Double-click the icon to open it and start moving files to and fro just as with any other drive.

6. Always tell Windows before you disconnect your drive.

You can sometimes damage your data or your external hard drive by not telling Windows before you disconnect it. To tell Windows, right-click the drive's icon in your Taskbar and choose Safely Remove from the menu, as shown in Figure 9-1.



External drives hate to be dropped. Make sure that both your shoelaces are tied before carrying one across the room.

Adding a Second Internal Hard Drive

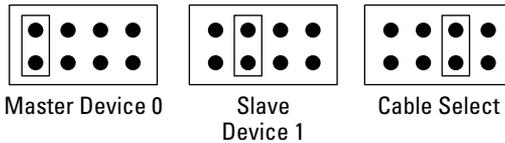
If you've decided that you would like to buy a second internal hard drive instead of replacing the one you already have, you need to make another key decision: How should you set up that drive within your computer?

The main reason to install a second hard drive inside your PC is to increase your storage capacity. That gives you two options as to how the new hard drive will work with the existing drive:

- ✓ **Use the new drive for additional storage.** Install the new hard drive, keeping your existing drive set up the same way. Windows gives the new drive the next available drive letter, usually D. Then, you can start moving your large data files from your C drive to your D drive. (Windows isn't smart enough to move the files over automatically, even though that empty new drive is sitting there.)
- ✓ **Replace your existing hard drive with your new drive and begin using your older drive for storage.** By installing Windows on your new drive, you can take advantage of its faster speed and capacity. This option also allows you to upgrade to Windows Vista during your installation.

To assign an IDE/ATA drive as either master or slave, check the drive's manual or simply eyeball the label affixed to the drive. In either case, you find an illustration, like the one in Figure 9-2, showing two rows of dots or pins. Movable jumpers slide on or off the pins in different combinations to assign the drive as master, slave, or Cable Select.

Figure 9-2: Moving the jumper to change an IDE/ATA drive's configuration.



SATA drives don't require any jumpers to be moved. Just plug the drive's SATA cable onto the motherboard's next available SATA connector (shown in the margin).

The following section covers the first, easiest option: How to add a second hard drive to your computer and use it for storage. Your current Windows drive stays the same; your computer just has a big new hard drive for you to begin filling with files.

Adding extra storage to your computer with a second hard drive

Difficulty level: Easy

Tools you need: One hand, a screwdriver, and tweezers (or a paper clip)

Cost: Roughly \$150 to \$500

Stuff to watch out for: You may need special rails or an adapter to mount your hard drive inside your computer. Some drives come with mounting rails and/or an adapter, like the drive in the color insert's Color Plate 26. Others screw directly to the case, like the drive in the color insert's Color Plate 27. If your hard drive doesn't slide snugly into your computer, you may need to head back to the store. (Rails and adapters are pretty inexpensive.)

Follow these steps to add a second hard drive inside your PC:



1. Turn off and unplug your computer and remove the case.

If you live in a static electricity-prone environment, buy a grounding strap that wraps around your wrist and attaches to the computer. Even if you don't have much static electricity in your area, remember to touch your computer's case to ground yourself before touching its innards.

2. If you're installing an IDE/ATA drive, move the new drive's jumpers to set it as slave.

Drives come with two rows of pins, as shown previously in Figure 9-2. Using a pair of tweezers or an emergency bent paperclip tool, remove the jumper and push it onto the pins that designate the drive as slave. Check the drive's manual or labeling. (The drive in the color insert's Color Plate 24 is set as slave.)

Because your existing drive is already set up as master, you don't need to mess with it.



If you're installing a SATA drive, don't worry about setting master/slave jumpers; those drives don't need them.

3. Slide the new drive in a mounting bay next to the existing drive.

Drives usually sit in a *mounting bay*: a collection of compartments inside your computer. Your CD-ROM or DVD drives usually take up some of the compartments, as does your existing hard drive. Find an empty bay — you can often find a spot right next to your existing hard drive — and slide the new drive in place.



When you're handling a hard drive, be careful not to damage its exposed circuitry by bumping it into other parts of your computer.

4. Attach the cables to the new hard drive.

Look for the hard drive's cable connections carefully, as SATA drives and IDE/ATA drives use different cables. If you find yourself trying to connect an IDE/ATA cable to a SATA drive or vice versa, head back to the store with the drive and ask for a converter.

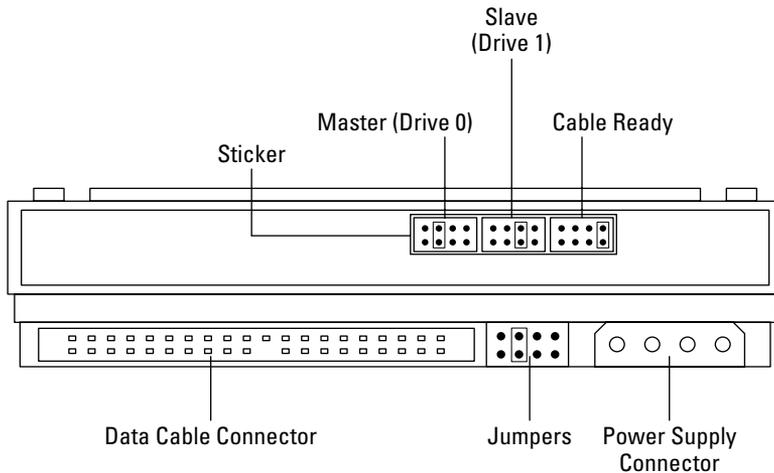
Here's how to connect both types of drives:

IDE/ATA drives:

- **Data cable:** One end of a flat ribbon cable already connects to your motherboard; the other end has two connectors, one for each of your PC's two drives.

The flat ribbon cable should have a second, empty connector a few inches away from where it connects to your existing drive. Push that empty connector into your new drive's data cable connector (labeled in Figure 9-3). The cable's connector has a little tab that aligns with the notch where it plugs in. (See the color insert's Color Plate 24 for close-ups of the notch in the data cable and its connector.)

Figure 9-3:
An IDE hard drive includes a power supply connector, data cable connector, and a jumper across two of the master/slave/Cable Select pins.



- **Power supply:** See that bundle of power supply cables dangling from your computer's power supply? Find an unused cable and insert its connector into your drive's power supply connector (labeled in Figure 9-3). The plug fits into the drive's socket only one way, as shown in the color insert's Color Plate 24. (Power supplies are covered in Chapter 10.)

SATA drives:



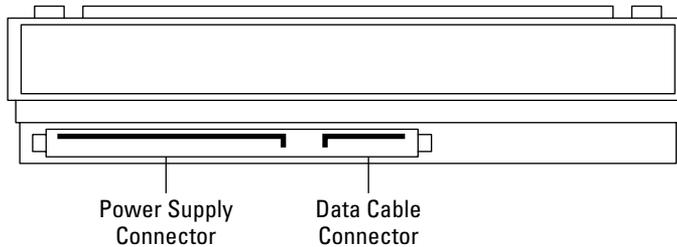
- **Data cable:** Follow the cable of your first drive to see where it plugs into a motherboard connector marked SATA 0. Plug your second SATA drive into the motherboard's SATA 1 connector, adjacent to where the first drive plugs in. (Or, if the SATA 0 connector isn't used, plug your new SATA drive's cable into that connector instead.)

Plug the other end of this thin cable leading from your PC's motherboard connector into the smaller of your SATA drive's two connectors, as shown in Figure 9-4 and in the margin. The color insert's Color Plate 25 shows the cables inserted into a SATA drive.

- **Power cable:** This thin cable leading from your PC's power supply (Chapter 10) pushes onto the larger of the drive's two connectors, as shown in Figure 9-4 and in the margin.

Some SATA cables come with the data and power connectors melded together as one connector. They're aligned properly so they both push onto the drive's two adjacent connectors fairly easily.

Figure 9-4:
A SATA drive includes two connectors, one for power, and the other for data. Sometimes the two connectors live together on the end of one cable.



5. Screw the drive in place, if necessary.

Cables attached? Master/slave jumper set, if necessary? If the drive didn't come with mounting rails, fasten the drive in place with its little screws. The drive didn't come with its own screws? Then head back to the computer store, look in the hardware aisle, and buy screws for mounting hard drives. The screws should be short enough to keep from going in too far and possibly damaging the hard drive.



If your two hard drives are in the same large bay, sometimes loosening the existing drive's screws helps you slide the new drive into place. If you loosened the other drive's screws to make room for the second drive, retighten them after the new drive is in place.

Awkward position? Sometimes it's easier to attach the cables *after* the drive is in place. Use your own judgment.



Technically, each drive is held in place with *four* screws. If only two screws are within reach of your screwdriver, skip the other two screws; the hard drive won't walk away. Just don't over-tighten any of the screws.

6. Replace the PC's cover, plug in your computer, and turn it on.

Chances are, your computer recognizes the drive right off the bat, and you see the drive's name appear on the screen as the computer first wakes up. If the name doesn't appear, and Windows can't find the drive, head to the "Windows doesn't recognize my hard drive's full size" section, later in this chapter.

7. Partition and format your new hard drive.

You find this information in the "Partitioning and Formatting a Drive in Windows" section, later in this chapter.

Installing Windows on a new hard drive

Because your new hard drive is probably bigger and faster than your old hard drive, where Windows currently resides, it makes sense to install Windows onto the new drive. You may then use your older drive as your storage drive. Yes, this process is more complicated than just adding the new drive as your second drive and keeping your existing Windows drive as is. But it's also worth the effort.



If you're already running Windows on your existing drive, save a *lot* of work and time by buying a Windows XP- or Windows Vista-compatible copy of Norton Ghost by Symantec. Install your new drive as the slave drive, and tell Norton Ghost to copy an image of the entire C drive to the D drive.

When it finishes, reverse the two drives' positions so your new drive is on the C drive. (Or, if you're installing a SATA drive, plug that one into the motherboard's SATA 0 connector.)

After booting from Windows on your new drive, reformat your old drive, as explained the next section, and begin using the old drive for storage.

Partitioning and Formatting a Drive in Windows

Before Windows will store information on a new hard drive, the drive must be partitioned and formatted. Luckily, Windows makes this chore fairly easy. Windows usually chooses the correct settings for you, so you often just click the Next button to proceed through all the menus.



If you don't have Windows XP or Windows Vista, rummage through your new hard drive's packaging for a CD supplied by the manufacturer. That CD's setup software can partition and format the drive. No setup software? Download it from the drive manufacturer's Web site.

When using Windows, make sure you're logged on with an Administrator's account. Other accounts aren't able to partition or format drives.



Planning to install Windows onto your newly connected hard drive? Then don't bother with this section. Both Windows Vista and Windows XP partition and format a newly installed drive as part of their installation process. Check out Chapter 20 for the scoop.

To partition and format a hard drive in Windows Vista or Windows XP, follow these steps:

1. Open the Start menu, right-click Computer (Windows Vista) or My Computer (Windows XP), and choose Manage from the pop-up menu.

The Computer Management window appears, as shown in Figure 9-5.

Figure 9-5:

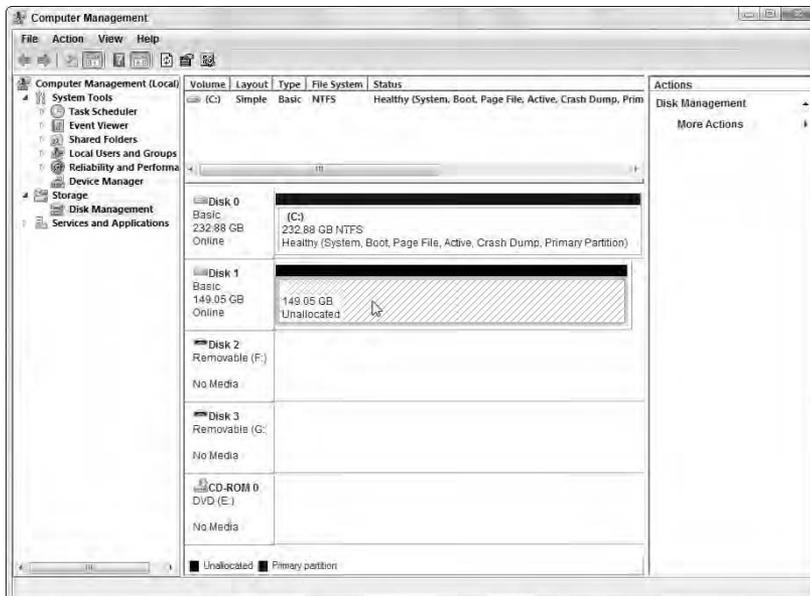
The Windows Vista Computer Management area contains many ways to control your computer.



2. Double-click Storage to reveal its contents, if necessary, and then click Disk Management to see your drives.

Windows lists all your recognized drives, including your CD drives and memory card readers, as shown in Figure 9-6.

Figure 9-6: Windows displays information about your drives and enables you to prepare a newly installed hard drive.



Windows Vista lists five drives in Figure 9-6 (this window looks nearly identical in Windows XP):

- *Disk 0*: This is the current C drive, the one Windows Vista lives on.
- *Disk 1*: This is the newly installed drive. It's listed as being *unallocated*, meaning it has been neither partitioned nor formatted. When you partition and format the drive, Windows converts the unallocated space into usable space and assigns a letter to it.
- *Disks 2 and 3*: These are memory card readers, which read cards from digital cameras, MP3 players, cell phones, and other toys. (There are currently no cards plugged into the card readers shown in Figure 9-6.)
- *CD-ROM 0*: This is the computer's CD or DVD drive.

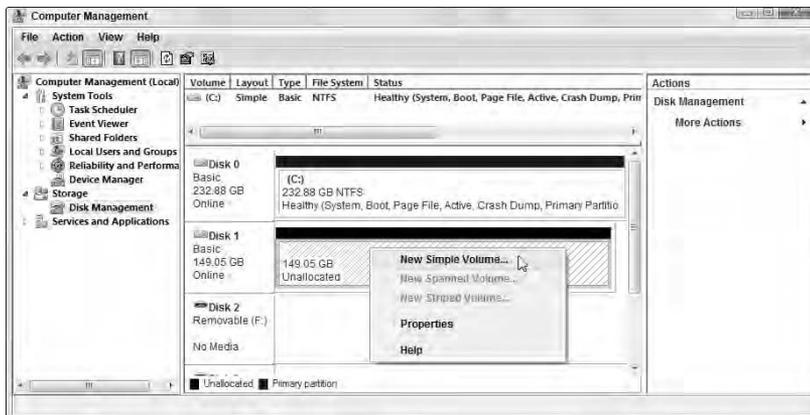
You may see other drives listed here on your own PC.

3. Right-click the unallocated drive's listing and choose *New Simple Volume (Windows Vista)* or *New Partition (Windows XP)*, as shown in Figure 9-7.

Windows Vista uses the term *volume* to describe what Windows XP calls a *partition*: a managed space for Windows to begin filling with information.

The New Simple Volume Wizard (Windows Vista) or the New Partition Wizard (Windows XP) appears. Both wizards do the same thing.

Figure 9-7:
Right-click the new drive and choose New Simple Volume (Windows Vista) or New Partition (Windows XP) to summon the wizard that walks you through the process.



4. When the wizard's opening window appears, click Next.

At this point, Windows XP opens another window for you to choose Primary Partition; Windows Vista skips that step.

5. Choose your partition size and click Next.

Windows Vista and XP can both handle huge partitions, so choose the biggest one offered. (Windows usually chooses that size automatically, as shown in Figure 9-8.)

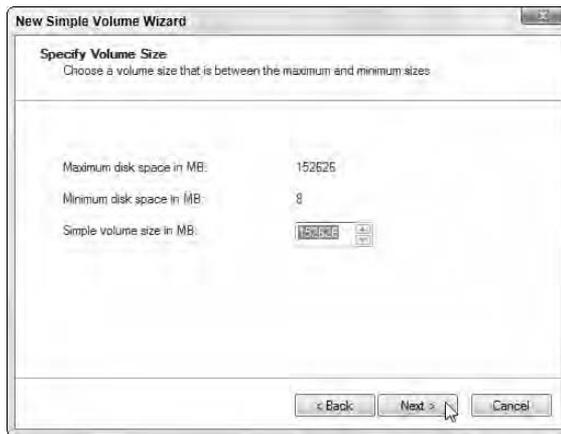


Figure 9-8: Choose the largest partition size offered and click Next.

6. Select the Assign the Following Drive Letter option button and click Next.

As shown in Figure 9-9, Windows looks for the first available drive letter and assigns that to the incoming drive. Feel free to choose that letter, as Windows allows you to change the letter anytime you want.

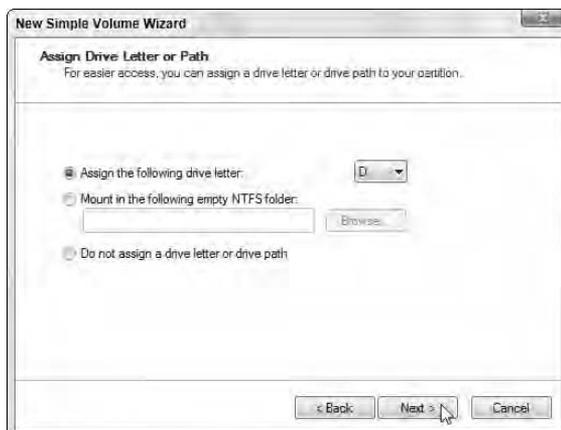


Figure 9-9: Choose the drive letter offered by Windows — you can always change it later.

7. Choose how to format the newly created partition and click Next.

Now that you've created the partition and assigned your new hard drive a letter, it's time to format the drive. Windows automatically offers the best option. As shown in Figure 9-10, Windows offers to format the drive using NTFS and using its standard allocation size.

Windows automatically names a newly installed drive New Volume, but feel free to choose something more imaginative. (The name simply appears as a label by the drive's icon in Windows.)

8. Click Finish.

The meticulous wizard sums up your choices on its last page. If you don't like something, click Back to change it. Otherwise, click Finish, and the wizard begins formatting your hard drive.

Figure 9-10: Choose NTFS for the most secure system in Windows Vista and Windows XP, leave the second option at Default, and give the drive an optional name.



You can't use the new drive until it's through formatting, but you may continue working with your other drive during the formatting process.

When Windows (or your drive manufacturer's software) finishes partitioning and formatting your new hard drive, the Computer Management window's Disk Management area looks similar to Figure 9-11.

- When you're formatting a drive for Windows XP or Windows Vista, be sure to choose NTFS in Step 7. If you choose any other format, your user accounts won't be secure, and users can access files from other user accounts.

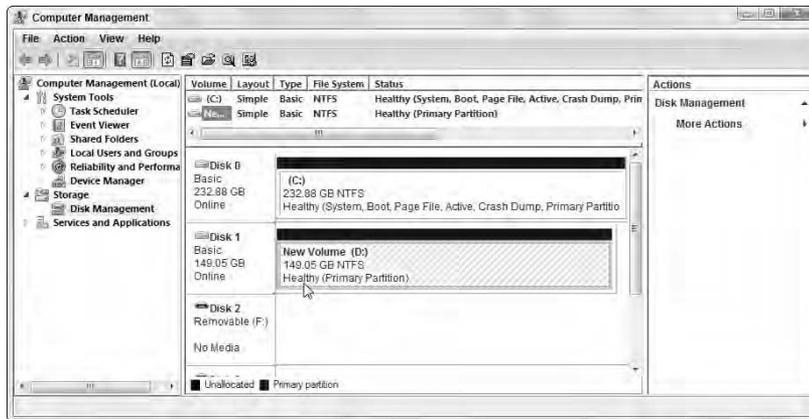


- Want to change a drive's letter, perhaps to bump your CD drive up to E and give your newly installed second hard drive the letter D? Right-click the drive's name in your Computer Management's Disk Management window (refer to Figure 9-6) and choose Change Drive Letter and Paths. Windows lets you select any available drive letter.

It's usually safe to change drive letters on CD and DVD drives as well as USB drives. But be very careful when changing letters on drives that contain installed programs; the programs may not work afterward.

If Windows ever complains that it can't find something on a drive with a newly changed letter, a Browse dialog box pops up. Click the Browse button and select the drive's new letter.

Figure 9-11: Windows pronounces the newly partitioned and formatted drive healthy.



Dealing with a Broken Hard Drive

The difficulty of hard drive installation often corresponds to the age of a computer. The problems increase drastically with age. If your computer is only a few years old, you probably won't have much trouble installing a new hard drive. But as you move past three years, well, the problems increase. This section explores some typical hard drive problems, from installation to everyday use.

First, though, here are a few things to check right off the bat:

- Check your connections to make sure that gremlins didn't loosen any cables.** Is the ribbon cable plugged in all the way on both the drive and the motherboard? Is the power cable plugged in all the way? Are your master/slave/Cable Select jumpers set correctly?

- ✓ **Make sure that you're using an 80-pin ribbon cable.** A ribbon cable is made of dozens of little wires pushed together into a flat ribbon. Older hard drives used a 40-wire ribbon cable; the newer ones use 80 wires. When in doubt, start counting.
- ✓ **Are you trying to start your computer off a newly formatted master hard drive?** The computer can't start properly because the drive doesn't yet contain an operating system. Turn the computer on with your Windows CD or DVD in the disc drive and install Windows.

Windows doesn't recognize my hard drive's full size

When you first turn on your computer, words dash onto the screen. Those come from your computer's BIOS (Basic Input/Output System) as it scopes out your computer's vital statistics. Notice how the computer discovers and displays the names of your hard drives — even before Windows loads? Your BIOS has found the drives and dutifully noted their names so that it can pass them along to Windows.

The work your BIOS does in the background occasionally causes problems, each described as follows, along with the solution.

Improperly set BIOS

Your BIOS recognizes hard drives in either of two ways. You can either type in the hard drive's settings yourself — a laborious process — or you can set your BIOS to Auto so that it recognizes the new hard drive automatically.

The solution? Make sure that your BIOS has its hard drive settings on Auto so that it automatically recognizes your new hard drive. Although breeds of BIOS differ from each other, you can usually find this setting in its IDE Configuration area.

To change that setting, watch your computer's screen carefully when it boots up. It usually says something like `Press F1 to enter Setup`. Press that key to enter your BIOS settings. Make your changes, save your settings, and hope it solves the problems. If it doesn't, you may have an outdated BIOS, covered next.

I'd give you the exact steps, but there aren't any: Different PCs come with different BIOS versions, each with its own particular steps.

Outdated BIOS

Historically, hard drive capacity quickly outpaced other computer technology. The BIOS on pre-1994 computers, for instance, couldn't handle hard

drives larger than 504MB. The next generation of BIOS chips could work with hard drives up to 8.4GB. Another revision moved the limit up to 32GB.

The solution? Ask your computer manufacturer or head to its Web page to see your computer's current hard drive size limitations. If your computer's BIOS can't handle your hard drive's full capacity, your BIOS might need upgrading.

When your computer boots up, quickly write down the BIOS version displayed on-screen. Then compare that version with the latest update listed on your manufacturer's Web site. If your BIOS version is older, try downloading and installing the update.

The drive isn't formatting correctly

Today's large hard drives have outgrown older formatting methods. The method Windows XP and Vista prefer, NTFS, handles the largest drive you can find on store shelves. But Windows XP offers an older method, FAT32, for compatibility purposes. FAT32 can only recognize partitions of up to 32GB. The solution? Reformat your partition, but use the NTFS system.

Defragmenting the hard drive

When your computer first copies a bunch of files on the hard drive, it pours them onto the hard drive's internal spinning disks in one long strip. When you delete some of those files, the computer runs over and clears off the spots where the files lived.

That leaves holes in what used to be a long strip. When you start adding new files, the computer starts filling up the holes. If a file is too big to fit in one hole, the computer breaks up the file, sticking bits and pieces wherever it can find room.

After a while, a single file can have its parts spread out all over your hard drive. Although your computer remembers where to find everything, it takes more time because the hard drive has to move around much more to grab all the parts.

To stop this *fragmentation*, a concerned computer nerd released a defragmentation program. The program picks up the information on your hard drive and pours it back down in (approximately) one long strip, putting all the files' parts next to each other.

Windows Vista defragments your hard drive automatically on a regular schedule, but Windows XP doesn't. But if you want to defragment your drive immediately in either Windows version, follow these steps:

1. Right-click your hard drive's icon in Windows and choose Properties.

Right-click the drive from either Computer (Vista) or My Computer (Windows XP). Windows displays the drive's Properties dialog box, which tells you its capacity and how much space it has left.

2. Click the Tools tab and then click the Defragment Now button.

Windows brings the Disk Defragmenter dialog box to the screen.

3. In Windows Vista, click Defragment Now to start the process. In Windows XP, click the Analyze button, and then, if Windows recommends defragmenting the drive, click the Defragment button.

Clicking the Analyze button in Windows XP tells Windows XP to analyze your hard drive to see if it needs defragmented, as shown in Figure 9-12.

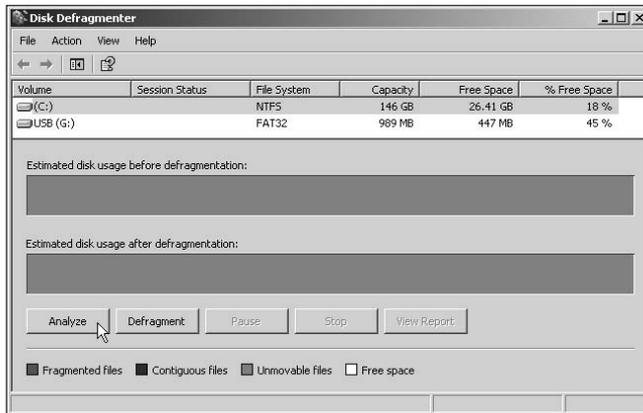


Figure 9-12:
The
Windows
XP Disk
Defrag-
menter.

Windows XP examines your drive, displays a colored, graphical analysis of your drive's condition, and makes a recommendation as to whether you need to defragment the drive or not. Let it go to work if it thinks your hard drive needs defragmentation.

- ✓ If at least 15 percent of your hard drive's volume doesn't consist of free space, defragmentation will take a *long* time. Better consider buying a larger hard drive, or a second one that can hold some of the information packed onto your current drive.
- ✓ When Windows is through defragmenting, it issues a report on its results. Some files can't be defragmented, so don't worry if you see that message. If a file is being used at the time, Windows can't defragment it. Some files will always be in use, as Windows needs them to keep running.
- ✓ Compact discs don't have a defragmentation problem because computers only *read* information from them. Even CD-RW drives aren't constantly erasing and adding new information to the discs, so the information on the discs is never broken into many pieces.

- ✓ Defragmenting a drive can take several minutes, especially if you haven't done it for a while. In fact, on some slow drives, the process may take up to an hour. The more often you defragment a drive, however, the less time it takes.

Checking for disk errors

Ever lost your train of thought after somebody snuck up and tapped you on the shoulder? The same thing can happen to your computer.

If the power goes out or a program crashes while a computer is working, the computer loses its train of thought and forgets to write down where it put stuff on the hard drive. (That's why you should always close your programs before turning off your computer.)

These lost trains of thought result in *disk errors*, and Windows fixes them pretty easily when you follow these instructions. In fact, Windows can often sense when it has crashed and can automatically fix any resulting errors. If your computer is running strangely, checking for disk errors is often the first step toward a quick fix:

- 1. Right-click your hard drive's icon and choose Properties.**

Open Computer in Vista or My Computer in Windows XP and right-click the hard drive's icon.

- 2. Click the Tools tab from the top of the Properties dialog box.**

- 3. Click the Check Now button.**

A new dialog box pops up, offering several options.

- 4. Choose all the options.**

Different Windows versions offer different options, but clicking them all results in the most thorough check.

- 5. Click the Start button.**

Windows examines your drive, looking for suspicious areas and fixing the ones it can. The process can take a *long* time; feel free to let it run overnight.

When Windows finishes the process, the proud little program leaves a dialog box on the screen summing up the number of errors it found and fixed.

Depending on the way your hard drive's error-patching program is set up, your computer may gather any unused file scraps and store them in files like FILE000.CHK, FILE001.CHK, FILE002.CHK — you get the point. Feel free to delete those files. They contain nothing worthwhile, as you quickly discover if you try to open them with your word processor.

Backing Up Your Hard Drive

Nothing lasts forever, not even that trusty old hard drive. That's why it's important to keep a copy — a *backup version* — of your hard drive for safe-keeping. Table 9-1 shows some of the most popular backup methods and their pros and cons.

<i>Method</i>	<i>Pros</i>	<i>Cons</i>
Backup program and discs	Cheap; comes with Windows.	Windows Vista can back up to CDs or DVDs, but Windows XP can only back up to CDs. But the catch to both versions is you must sit in front of your PC, slowly feeding it new discs.
Backup program and tape drive	Relatively inexpensive. The program can back up your hard drive automatically while you're sleeping — meaning that you do it more often.	Although tape drives are easy to install and boast a large capacity, they're slow. If you're choosing tape, choose the more expensive, high-quality systems. They're more reliable.
External hard drives and Windows's built-in backup software	Fairly inexpensive, easy to install and use, fast, and versatile.	None.

Other things to consider about choosing your backup method are as follows:

- ✓ Windows Vista and Windows XP Professional come with backup software that automatically searches for backup systems to use. Both versions can also back up your hard drive to an external hard drive.
- ✓ Although the best backup method changes over the years according to capacity, cost, and the size of the hard drive, external hard drives are the best choice for home and small business users.
- ✓ Don't skimp on your backup system. If it's not accurate, it's a waste of time. And if it's not convenient, you'll never use it.



Chapter 10

Replacing the Power Supply or Laptop Battery

In This Chapter

- ▶ Understanding power supply terms
 - ▶ Replacing your power supply
 - ▶ Replacing your laptop's battery
 - ▶ Quietening your power supply
-

You can't see it, but you can sure hear it: Your computer's power supply sits in a corner of your computer's case with its cooling fan whirring away. Some fans add a pleasant, running-water ambience to the room. Others whine like a weed whacker.

Power supplies suck in the voltage from the wall outlet and reduce it to the 5 or 12 volts preferred by your computer's dainty innards. This simple task heats up the power supply, however, so it needs a noisy, whirling fan to keep it cooled off.

The power supply's fan sucks hot air out of your computer's case and blows it out the hole in the back. In fact, if you keep your computer too close to the wall and don't move it for awhile, the fan leaves a black dust mark on the wall.

Power supplies retire faster than many other computer parts. This chapter shows how to interview potential replacements and place the newly hired power supply into its proper cubicle.

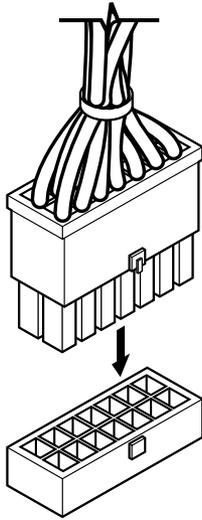
Understanding Power Supply Buzzwords

A power supply is simply a metal box with lots of wires dangling from it. The box screws to the back of your PC, and the wires connect to various spots inside your PC. You'll encounter these words most often when shopping for or replacing power supplies:

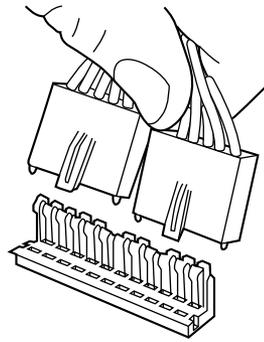
Internal power supply: The cable running from your wall outlet to the back of your computer plugs directly into your computer's power supply. From there, the power supply distributes the proper voltage to all of your PC's parts.

AT: A computer's parts sit on a *motherboard*, a large flat piece of circuitry that moves information throughout your computer. A large number of older computers use an AT-style motherboard. AT motherboards require a different type of internal power supply than their newer cousins, ATX motherboards. Why talk about motherboards in a chapter about power supplies? Because one of the power supply's many cables plugs into a connector on the motherboard, and different motherboards use different-sized connectors. Older motherboards use what's called an "AT-sized" connector (shown in Figure 10-1) that feeds electricity from the power supply to the motherboard.

Figure 10-1: The newer, ATX power supplies sport a single plug and socket; the older AT power supplies sport two plugs that nestle together into a single socket.



ATX socket and connector



AT socket and connectors

ATX: These newer motherboards require different types of power supplies than AT-style motherboards. They come with a single plug (see Figure 10-1) that connects to the motherboard.

Proprietary: Here's where things get ugly. Some manufacturers don't always use standard power supplies. Instead, they design their own proprietary models with plugs that don't work on most motherboards. Some Dell PCs have this problem, for example. When shopping for a power supply for a Dell PC, make *sure* the power supply specifically says it's for your year and model of Dell PC.

Surge protectors: If you live in an area where the power fluctuates a lot, buy a *surge protector*. Glorified power strips, surge protectors plug into the wall; you plug the computer into the surge protector. When a power surge occurs, the protector sacrifices itself to save your computer. The power still flows, but the now-dead surge protector no longer monitors it.



Always buy a surge protector with an indicator light that lets you know when it's worn out. Otherwise, you have no way of knowing whether it's still protecting your computer.

The best (and most expensive) surge protectors also contain *line conditioners*, which level out the power's subtle ebbs and flows, ensuring best performance.

Uninterruptible Power Supply (UPS): Although they're much more expensive than surge protectors, these goodies do much more. You plug your computer into the UPS and plug the UPS into the wall. A UPS, like the one in Figure 10-2, conditions the power but also keeps your PC running during a power outage: When the power dies suddenly, the batteries in the UPS immediately kick in, keeping your computer up and running. Most uninterruptible power supplies last for only 5 to 15 minutes, but that's usually plenty of time to save your work, shut down your computer, grab a soda, and feel good about your foresight while you wait for the lights to come back on.



A UPS works only for a few minutes during a power failure. Then it, too, runs out of power, cutting off your PC's electricity. That's why it's important to always save your work before leaving your PC.

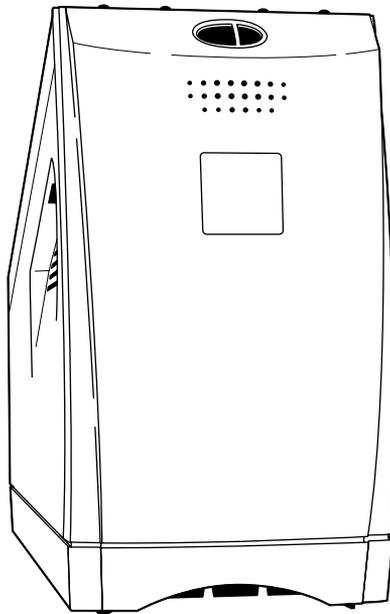


Figure 10-2: Depending on its load, an uninterruptible power supply keeps computers running for 5 to 20 minutes after the power dies.

Deciding which power supply to buy

If you expand your living room by knocking down a wall, you need more than a single 100-watt bulb to light everything up. Similarly, the more gizmos you've plugged into your computer, the more watts you need to feed them.

To ensure enough power for everything inside your PC, make sure that your replacement power supply is rated for at least 400 watts. Feel free to grab an even higher-rated one, if you like; you won't be wasting electricity. A power supply's wattage rating explains how many watts it's *able* to send when your PC needs it. The 400-watt rating doesn't mean your PC will suddenly start sucking up wattage like an electric sponge. If your PC needs only 100 watts for a task, the power supply sends only 100 watts.

If you've been upgrading lots of computer parts lately — a second hard drive, a powerful Windows Vista-capable video card, or lots of USB or FireWire peripherals — a more powerful power supply is a wise choice for your next upgrade.

I buy power supplies from PC Power and Cooling at www.pcpowercooling.com. The site offers an online form where you answer questions about your computer's setup. As you begin listing your PC's number of disk drives and other parts, the Web site narrows down your options, eventually listing several power supplies that meet your needs. PC Power and Cooling sells top-notch (and quiet) power supplies that should keep your computer's parts happy.

Installing a New Power Supply

Difficulty level: Medium

Tools you need: One hand and a screwdriver

Cost: Approximately \$50 to \$100

Stuff to watch out for: Power supplies can't be repaired, just replaced. Throw away or recycle your old power supply.



Don't *ever* open your power supply or try to fix it yourself. The power supply stores powerful jolts of electricity, even when the computer is turned off and unplugged. Power supplies are safe until you start poking around inside them.



If you're confused about which power supply to buy, bring your old one with you to the computer store and match its connectors and screw holes with a new one, making sure the wattage is the same or higher. Or buy a new one online from Power PC and Cooling. Check out the company's Web site at www.pcpowercooling.com and answer a few questions about your computer. Power PC and Cooling recommends the right replacement.

To install a new power supply, perform the following steps:

1. Turn off your PC, unplug it, and remove its cover.

If you've never gone fishing inside your computer, the Cheat Sheet in the front of this book details how to remove your computer's cover.

2. Unplug the power supply cables from the motherboard, the drives, and the power switch.

Your power supply is that big boxy thing in your computer's corner. Bunches of cables run out of a hole in the power supply's side.

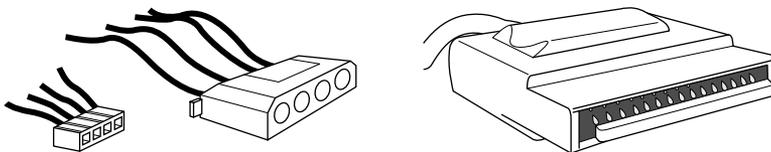
Each cable has one of several types of plugs on its end. The plugs have several different shapes to keep them from plugging into the wrong place. Even so, put a strip of masking tape on the end of each plug and write down its destination. You and your computer will feel better that way.

Here's a rundown of the plugs, their shapes, and their destinations:

- *Motherboard:* Power supplies come with either one or two rectangular-shaped plugs that fit into a single socket on the motherboard. They're most likely either AT- or ATX-style connectors (refer to Figure 10-1).
- *Drives:* Disk drives, tape backup units, and other internal goodies get their power from three different sizes of plugs, as shown in Figure 10-3.
- *Power switch:* Small wires lead straight from the motherboard to the power switch on the computer's case.

Unless your computer is packed to the brim with goodies, a few cables on your power supply won't connect to anything. (Those cables are thoughtfully supplied to power any future additions.)

Figure 10-3:
From right to left, drives receive power from either the smaller "Berg" plugs, the larger "Molex" plugs, or the svelte SATA power plugs.



3. Remove the screws holding the power supply to the back of the computer's case.

Look on the back of your computer near the fan hole, and you see several screws. Some of these screws hold your power supply in place, as shown in the color insert's Color Plate 5, but other screws may hold your fan inside your power supply.

With the computer's case off, you can usually tell which screws hold the power supply in place. Try loosening the screws slightly; that sometimes makes it easier to tell which screws are which.



The screws that hold the power supply in place are generally closer to the outside edge of the computer's rear. The screws that hold the fan are generally closer to the fan's edge. Don't loosen the fan's screws if you can help it.

You may need to remove extra plastic vents from the power supply; they help route air around your CPU to keep it cool and refreshed.

4. Lift out the power supply.

Does the power supply come out easily? If the power supply is cramped, you may need to loosen the screws holding some drives in place and pull them forward a bit.

If the power supply still won't come out, make sure that you've removed all the screws. Some power supplies have extra screws around the base to hold them down.

5. Buy a replacement power supply.

If you don't want to purchase a replacement power supply online, take the old one to the store and look for an exact replacement. If you're planning on adding more computer toys — CD or DVD drives, a powerful graphics card, sound cards, USB gadgetry — or filling up your slots with more gadgets, buy a power supply with a higher wattage.

If you can't find a replacement power supply, you're probably stuck with a proprietary model. Head to your computer manufacturer's Web site and look for the replacement for your particular computer model.



Some crafty people plug in their new power supply before installing it, just to listen for the fan. If the fan doesn't work, return the power supply for one that works.

6. Make sure that the voltage is set correctly.

Look on the back of the power supply, which is near the fan. A red switch toggles the power to either 120 volts or 220 volts. If you're in the United States, make sure that the switch is set to 120 volts. If your country uses 220 volts, flip the switch to the 220-volt setting.

7. **Place the new power supply where the old one sat and tighten the screws.**
8. **Reconnect all the cables to the motherboard, the drives, and the power switch.**

Grab any little pictures you drew and look at any masking tape labels you put on the old power supply's cables. (Forgot to label them? Well, it doesn't really matter which disk drive gets which plug, but labels offer a sense of assurance.)



The two black wires on the two AT-style plugs almost *always* face each other when pushing them into their motherboard sockets (refer to Figure 10-1). Make sure that they snap into place. Make sure that you hook up the power switch connectors according to your notes.

You rarely connect all of a power supply's available cables to your computer; just leave the rest tucked away some place so they won't touch the motherboard. If you install a new toy later, use one of those extra cables to give it power.

If you didn't find a SATA power cable attached to your new drive, buy an AT-to-SATA converter power cable. The converter plugs into an unused AT plug on the power supply to transform it into a SATA plug.

Be sure that you tighten down any disk drives you may have loosened.

Also, check to make sure that you haven't knocked any other cables loose while moving around inside your computer.

9. **Reconnect the power cord.**

Plug your computer back in; its power cord should push into the socket near the fan.

10. **Turn on the power and see whether it works.**

Do you hear the fan whirring? Does the computer leap to life? If so, then all is well. If the fan is not spinning, though, something is wrong with the new power supply or your power outlet.

Try plugging a lamp into the power outlet to make *sure* that the outlet works. If the outlet works, take the power supply back. The computer store sold you a bad power supply. (That's why some people follow the tip in Step 5 and plug in the power supply to test it before they install it.)

11. **Turn off the computer and put the case back on.**

Is everything working right? If it is, turn off the computer, put its case back on, and put a cool glass of iced tea in your hands. Congratulations!

Replacing Your Laptop's Battery



Even if they don't explode in a ball of flames, laptop batteries eventually die of old age. Most batteries last between 18 and 24 months, depending on how often they're used and recharged. Toward the end, you'll notice that it doesn't hold a charge nearly as long, and you're constantly prowling for power outlets.

Difficulty level: Medium

Tools you need: One hand and a new battery

Cost: Approximately \$50 to \$150

Stuff to watch out for: Laptops only accept batteries made specifically for their make and model. Others either won't fit or may not put out the right voltage. Visit your laptop manufacturer's Web site to see if they sell replacement batteries. If you're shopping online for a third-party replacement, make sure the part number printed on your battery matches the part number of the battery you're purchasing. (Don't shop by the battery's photo on the Web site, as some Web sites use generic photos.)

When it's time to replace your old battery with a new one, follow these steps:

1. Save all your open files, close your programs, and turn off your laptop.

You want to turn it off — completely off. Don't just choose hibernate or sleep modes.

2. Release the latch on the battery compartment and remove the old battery.

A sliding lever on the laptop's side or bottom usually reveals a trap door that opens, letting you slide out the old battery.

3. Slide in the new battery, replace the cover, and slide the latch closed.

The battery only fits one way — the right way. After it's inside, replace the cover and slide the latch to lock the cover back in place.

4. Charge the new battery inside your laptop.

Although replacement batteries often come with enough charge to give them a quick test, your laptop may need to charge the new battery before running on battery power alone. Leave the laptop turned off but plugged in overnight to ensure a good charge.

Quieting Your Power Supply

Power supply problems usually announce themselves in obvious ways. A strong signal that you've got a problem is that, suddenly, your computer stops turning on; another big one is that the fan never blows. In these situations, your only hope is to replace the power supply.

Unfortunately, there's not much you can do about the annoying whining noise that many power supplies make.

Whining power supplies: Replace 'em

Some power supplies wail like a mid-'60s Volkswagen heading up a steep hill. Others purr quietly like an idling BMW.

The noise comes from the fan inside the power supply that blows air across the power supply's innards. The fan cools off the inside of your computer at the same time.

As for the racket? Well, many power supplies are just noisy little beasts. There's just no getting around the racket without buying a new one that's designed to run less noisily.



- ✓ If your power supply is much too noisy, consider replacing it. Today's power supplies are much quieter than the rumbler released five or more years ago.
- ✓ If your power supply doesn't make any noise, you're in even *worse* trouble. Hold your hand near the fan hole in the back. If you don't feel any air blowing out, the fan has died, and your computer is getting hotter by the second. Save your work quickly and immediately turn off your computer. Buy a new power supply before turning on your computer again. Without a power supply's cooling fan, a computer can overheat like a car in the desert with an empty radiator.



Don't try taking apart your power supply to quiet down the fan or make repairs. Power supplies soak up electricity and can zap you, even when they're unplugged. Never mess around inside a power supply.

Diagnosing the source of a whining noise

Sometimes it's hard to differentiate between a noisy power supply fan and a noisy hard drive. Each has a constantly spinning motor, so both are susceptible to the burned-out bearing syndrome.

To tell whether the noise is coming from your power supply or your hard drive, turn off your computer, unplug it, and open the case. Then pull the power supply's cable out from the back of your hard drive. (It's one of the two connectors toward the right side of Figure 10-3.) Plug your computer back in and turn it on. Because the hard drive isn't getting power, it doesn't turn on with the rest of your computer. If you hear a noise, it's your power supply.

If you don't hear a noise, it's your hard drive. Unfortunately, hard drives cost much more to replace. For more information about hard drives, see Chapter 9.

Part III

Teaching an Old PC New Tricks

The 5th Wave

By Rich Tennant



“So I guess you forgot to tell me to strip out the components before drilling for blowholes.”

In this part . . .

Finally, it's time for the fun stuff! Your PC's been a glorified typewriter for too long. This part of the book explains how to turn it into an entertainment center.

It explains how to hook up your PC to your stereo, so you can hear cannonballs fired in front of you and splashing in the water behind you.

Several versions of Windows Vista come with a digital video recorder, and Chapter 12 explains how to put it to work by installing a TV tuner in your PC. That not only lets you watch TV, but automatically record TV shows and movies, as well. Plus, you can watch your PC on your big television screen — perfect for gaming.

If you prefer making your *own* movies, Chapter 13 walks you through upgrading your PC for heavy-duty video editing. (That lets you take advantage of Windows Vista's new Movie Maker program and new DVD Maker program.)

No DVD burner yet? Chapter 15 walks you through the confusing acronyms and explains which one to buy. Scanners find their due, as well, in Chapter 14.

Chapter 11

Fine-Tuning Your PC's Sound

In This Chapter

- ▶ Understanding sound card terminology and connectors
 - ▶ Installing a sound card
 - ▶ Hooking up a PC's sound to a stereo
 - ▶ Adjusting sound on a PC
-

Years ago, computers simply beeped when you turned them on. A few early games managed to strangle the computer's little speaker into making squawking noises, but that was no fun. After a few years of awkward sputters, engineers created *sound cards*: circuit-filled gadgets that plug inside your PC to add music and explosions to computer games.

Gamers still cherish computerized sound, but sound appeals to many other people, as well. Musicians turn their home PCs into full-fledged recording studios, for example, and movie lovers connect them to their home theater systems to hear seven-channel sound tracks. And anybody who's created a digital-photo slideshow or home movie knows how well a soundtrack can liven up boring vacation shots and disguise muffled dialogue.

This chapter explains how to upgrade the sound on your PC or laptop, adjust it properly, and connect it to speakers or your home stereo.

Understanding Sound Card Buzzwords

Almost every PC and laptop sold today comes with at least two sound jacks. The pink or magenta jack's for plugging in a microphone; plug your speakers or headphones into the other jack (often green).

High-end PCs, however, come stuffed with enough ports to satisfy the needs of musicians, movie fans, *and* gamers. Here's a rundown on the terms surrounding computerized sound and an explanation of the ports found on a typical sound card, like the one shown in Figure 11-1. Most PCs come with at least the first four jacks on this list; the other jacks appear on high-end cards bound for the homes of gamers, musicians, or home theater enthusiasts.

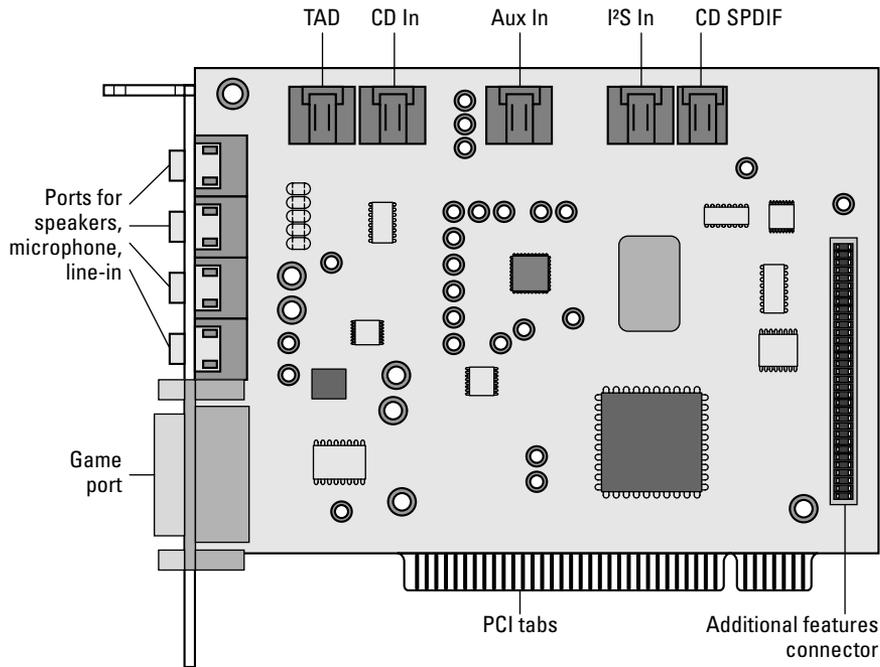


Figure 11-1:
Ports on a
typical
sound card.

Microphone: Used exclusively for recording through a small microphone, this $\frac{1}{8}$ -inch stereo port works fine for podcasts. Professional microphones sound much better but come with a $\frac{1}{4}$ -inch plug. To plug a $\frac{1}{4}$ -inch plug into an $\frac{1}{8}$ -inch jack, you need an inexpensive adapter sold at RadioShack and similar stores. (Sometimes $\frac{1}{8}$ -inch jacks are called “mini-jacks” or “stereo mini-jacks.”)

Speakers: The $\frac{1}{8}$ -inch stereo speaker jack found on all PCs and laptops works with either headphones or small desktop speakers.

Line Out: To hear the best sound your PC has to offer, connect a stereo cable between this $\frac{1}{8}$ -inch stereo jack and the Line In jack of a home stereo or amplifier.

Line In: Built to accept amplified sounds, this $\frac{1}{8}$ -inch stereo jack lets your PC record music that comes from a small radio, tape recorder, mixing board, or an amplifier’s Line Out jack.



Game port: Sized midway between a parallel port and a serial port, this accepts a joystick for games. Plug in a Y-adapter to plug in *two* joysticks.

Sound boxes and accessory cards: Sound cards try to pack as many ports into as little space as possible: Everything needs to fit onto that little metal strip accessible from the back of your PC. That's enough space to add jacks for a microphone, speakers, game port, and the handy Line In/Out. But how do you cram in extra ports for MIDI (Musical Instrument Digital Interface), digital, optical, front speakers, rear speakers, middle speakers, and a subwoofer?

Some sound cards solve the lack-of-space problem by hogging an adjacent slot. A second card, shown in Figure 11-2, replaces a slot cover but doesn't actually plug into the motherboard. A ribbon cable then connects the main card to the second card, providing the extra connectors. (Some call this small accessory gadget a *daughterboard*.)



Figure 11-2:

High-end sound cards often take up two slots by using a second card to add more connectors.

Other manufacturers skip the daughterboard, instead providing a small box that plugs into the sound card and sits on your desk or adds ports along your PC's front end. Some manufacturers don't bother with the sound card at all. They stuff all the circuitry into a port-filled sound box that simply plugs into one of your PC's USB ports.



TAD (Telephone Answering Device): A few computers come with built-in answering machines. The Audio Out cable from the answering machine plugs into the Universal Audio Connector port (shown in the margin) that sits inside a sound card. Most people ignore it.



AUX In (Auxiliary In): You might wind up with an extra sound-producing gadget inside your computer that doesn't have a designated plug-in spot on your sound card. To accommodate any unexpected, usually obsolete toys, some sound cards have an AUX In connector. It's rarely used today.



I_S In (Inter IC Sound bus): Digital sound information plugs in here, although different cards use the port in different ways. For example, a DVD drive's hardware decoder cable might plug in here. Chances are yours will go unused.



CD S/PDIF (Sony/Philips Digital Interface): Some older CD drives came with a digital output that plugs in here. (The connector has two pins.) This is rarely used today, as most CD drives just send their audio directly to the PC through their data cable. This connector can be safely ignored.



CD In: This is for the CD drive's analog sound output. (It usually has four pins.) Like the CD S/PDIF connector, this is rarely used. Today's CD drives send their audio digitally to the PC through their data cable. Don't bother hooking this up unless you're specifically told that it's necessary.



MIDI In: MIDI stands for Musical Instrument Digital Interface. Plug a MIDI cable from your music synthesizer's MIDI Out port into this port. If you're not a musician with a MIDI instrument, ignore this and the MIDI Out port described next.

MIDI Out: The cable from the MIDI synthesizer's MIDI In port plugs in here so it can send your PC instructions on what sounds to play.



If your PC lacks MIDI ports, some sound cards let you plug a special Y converter cable, available at music stores, into your sound card's game (joystick) port. The cable then provides both a MIDI In and MIDI Out port.

AC-3 (Audio Code 3): Although Dolby Laboratory calls its audio series *AC-3*, it actually uses *six* separate sound channels. Because AC-3 uses five speakers plus a subwoofer, AC-3 is often called a *Dolby 5.1* system.

Subwoofer: The coolest sound cards come with a way to send sound to a *subwoofer* — a big box with a large speaker that plays the bass rumbles of explosions and drums.

Surround sound: Sometimes referred to as 4.1, surround sound uses a pair of speakers by the monitor, a pair of speakers behind the listener, and a subwoofer wedged in a corner to shake the walls.

5.1, 7.1: These numbers refer to the number of speakers. The .1 part always refers to the subwoofer, so a 5.1 system has six speakers: one atop the monitor for the center channel, one on each side of the monitor, a pair behind the listener, and a subwoofer in the room's corner. A 7.1 system works like 5.1, but adds an extra pair of speakers, one on each side of the listener.

Amplified speakers: Most sound cards don't crank out enough power to drive a traditional set of bookshelf speakers. To increase the volume, most computer speakers come with a tiny amplifier hidden inside their box. If your speakers require batteries or an AC adapter for power, they're amplified speakers.

Converter cables: All of a sound card's jacks must fit onto the card's narrow slot. To pack them all in, you're stuck with stereo mini-jacks — small 1/8-inch jacks similar to the headphone jack on an MP3 player. If you want to plug in cables with larger jacks, like those found on musical instruments and professional microphones — buy some adapters. (RadioShack sells them, as do most consumer electronics and office supply stores.)



For the best sound, connect your sound card's speaker output through one of your home stereo's input jacks, described in this chapter's "Connecting Your PC's Sound to a Stereo" section. An amplifier and decent speakers can make a cheapie sound card sound like the best on the market.



RadioShack carries many converter cables and adapters. When faced with a confusing situation, draw or snap a photo of your sound card's connectors, as well as the connectors on what you're trying to plug in. Bring the pictures to the store and buy a cable or adapter that converts one connector to the other.

When you're not sure what plugs in where, glance at Table 11-1. Some forward-thinking computer manufacturers now color-code their jacks the same way.

Table 11-1 Deciphering a Sound Jack's Color-Coding	
<i>The Jack's Color</i>	<i>What Plugs into It</i>
Pink	Microphone (unamplified sound)
Light blue	Line Input (iPod, VCR, tape deck, or other amplified source)
Lime green	Stereo speakers (two front speakers or headphones)
Black	Stereo speakers (two rear speakers)
Silver	Stereo speakers (two side speakers)
Orange	This jack sends out digital audio signals meant mostly for home theater amplifiers that accept 5.1 sound.

Creating a podcast

A *podcast* is a fancy word for an audio recording shaped around a particular interest. Some are spoken-word documentaries, others take a talk radio format, and others play music. But they're all served up on the Internet as *MP3 files*, a format playable by any computer, iPod, or portable digital music player.

You can make your own podcast with your PC's bundled microphone and the free recording software that came with your sound card. But your podcasts will sound *much* better if you invest about \$100 in a small mixing board, a better microphone, and a sound editing program. (Audacity (<http://audacity.sourceforge.net>) costs nothing, but requires a bit of fiddling to figure out.)

After you've recorded your podcast in an MP3 format, you face your biggest hurdle: Finding people who want to listen.

To learn more about creating, marketing, and even making money on podcasts, pick up a copy of *Podcasting For Dummies*, by Tee Morris and Evo Terra (Wiley Publishing). Feel free to drop by the author's site at www.podiobooks.com. You can download podcasts there, as well as at podCast411 (www.podcast411.com), or even from iTunes itself: Click the word *Podcasts* in iTunes' left column.

Upgrading Your PC's or Laptop's Sound

The next two sections explain how to upgrade your PC's sound. The best sound quality comes by opening your PC's case and installing a sound card. If you own a laptop or don't want to remove your PC's case, a sound box is the next best thing: The box simply plugs into a USB port on your PC or laptop.

But no matter which route you choose, be sure to read the following section, "Connecting Your PC's Sound to a Home Stereo." That's the only way to hear the best sound your PC has to offer.

Installing a new sound card

Difficulty level: Easy

Tools you need: One hand and a screwdriver

Cost: Prices range from \$30 for cheap game cards to \$500 for mid-level recording studios, with quality cards averaging between \$100 and \$200.

Stuff to watch out for: Before removing your PC's old sound card, look at the existing wires plugging into the card's connectors. Then find those same connectors on your new card so you know where to plug back in those same wires. Sometimes adding tape labels to each wire and its connector lets you find the right places after you install the card.

Some PCs don't come with a sound card. Instead, the PC's manufacturer places a small sound chip directly on the motherboard. If you hear sound from your PC but don't find a sound card inside, your sound comes straight from the motherboard. You can still upgrade those PCs by installing a new sound card, just as described here.

To install a sound card, follow these steps:

1. Turn off your computer, unplug it, and remove the cover.

Don't know how your PC's cover comes off? Flip to the Cheat Sheet at the front of this book for the answers.

2. Locate a vacant PCI slot.

See that row of metal strips on the back of your PC's case? Inside your PC, you'll spot a row of slots lined up with those metal strips. (They're usually white.) Those are your PCI slots, and you need to push your new sound card into one of them. The sound card's ports then extend out that vertical slot in your PC's case, making them accessible.

3. Remove the slot's metal backplate cover if necessary.

If you're replacing your PC's current card, skip this step. If you're adding a new card, though, keep reading.

Unused slots often have a thin metal backplate cover over them to keep dust from flying in through the back of your computer. Remove the screw that holds that cover in place, (refer to Figure 7-6 in Chapter 7 and to Color Plates 19, 20, and 21 in the color insert pages in this book), and then lift out the cover. (Save the screw, as you need it to secure the new sound card in place.)

If the screw accidentally drops into your PC, pick up your computer and shake it until the screw falls out.

4. Push the card into any vacant PCI slot.

Hold the card by its edges and position it over any empty PCI slot. The edge with the shiny metal bracket faces toward the *back* of your computer. (That lets your card's ports extend out the back of your PC.)

Line up the tabs and notches on the card's bottom edge with the notches in the slot. Push the card slowly into the slot. You might need to rock the card back and forth gently. When the card pops in, you can feel it come to rest. Don't force it!



If your card's so thick that it bumps into a neighboring card, move it to a different slot so they don't touch. You might need to juggle several cards to find the right fit.

5. Secure the card in the slot with the screw you removed in Step 3.

6. Install any accessories, if necessary.

Some sound cards come with a port-filled plate that's accessible from the *front* of your PC. It usually sits in an unused *drive bay* — the area where a disc drive normally lives. Be sure to connect the wires from the plate back to its connector on your sound card.

On the rare chance that one of your PC's internal parts — old CD or DVD drives, modems with built-in answering machines, or other sound-producing gizmos — need to connect to your sound card, connect their wires to the sound card's specialized jacks discussed earlier in this chapter.

7. Plug the computer's power cord back into the wall and PC, turn on your PC, and see whether Windows recognizes and installs the card.

Windows usually recognizes newly installed cards and sets them up to work correctly. If something goes wrong, head for Chapter 19 for quick-fix tips about installing drivers. If everything's working, however, put your PC's cover back on.

8. Install the latest version of the card's drivers and software.

Whenever you install a new sound card or any other card, visit the manufacturer's Web site. Find the site's Support or Customer Service section, and then download and install the latest drivers for that particular model and your version of Windows, be it Vista or XP. Card manufacturers constantly update their drivers and software to fix bugs.

If the card doesn't work after you've installed the latest drivers, head for this chapter's last section: "Diagnosing and fixing hardware problems."



Installing a sound box

Difficulty level: Very Easy

Tools you need: One hand

Cost: Prices range from \$30 for a USB flash drive-sized model to \$500 for home theater models. Plan on spending between \$100 and \$200 for a good one.

Stuff to watch out for: Most sound boxes use the ubiquitous USB port, but before buying, check the fine print to make sure it uses a USB 2.0 port. Some older models use the much less powerful USB 1.1 port found on PCs built more than five years ago.

Follow these steps to install a sound box to a PC or laptop.



1. Plug the sound box's USB plug into the USB port of your computer or laptop.

Although a few small portable sound boxes draw their power right from your PC's or laptop's USB port, larger ones plug into a wall outlet. If the outlets by your desk are crowded, you might need a power strip. Because some adapters are large enough to cover up an adjacent outlet, look for a power strip with lots of extra space between outlets.

2. Install the sound box's software.

Sound boxes are notorious for dumping huge amounts of borderline-useful software onto your hard drive — trial versions of software with rapid expiration dates, for example. Be prepared for that bit of rudeness with a post-installation trip to the Control Panel to remove any unwanted software.

3. Choose the new sound box for your PC's Default sound.

If you're leaving your old sound card in place — a must with laptops, as the sound circuitry is permanently installed — then the sound box installs itself as second sound device in Windows. That leaves your old sound card's settings intact and lets you switch to whichever one you want to play the sounds.

To switch to your newly installed sound box, choose Control Panel from Windows' Start menu. Then, open Windows Vista's Hardware and Sound category and open the Sound icon. (In Windows XP, choose Sound, Speech and Audio Devices category, choose Sounds and Audio devices, and click the Audio tab.)

Finally, choose the sound box as your new default device, as shown in Figure 11-3.



Some sound cards and boxes ignore Windows' Control Panel icons and add their *own* icon to the Control Panel. If you spot a Control Panel icon named after either your card or its manufacturer, open it with a double-click. It usually offers many more options than Windows' standard settings area.

4. Connect your gadgets to the sound box.

Now's the time to make a trip to RadioShack or an office supply store. Many sound boxes come with only one cable: a USB cable for plugging into your PC. That means you'll have to buy cables for everything else you want to connect to the sound box: speaker cables, a microphone, optical cables for hooking up to a surround sound system, and similar items.

Figure 11-3: The Control Panel lets you choose the Default device (your PC's chief sound-making gadget) in both Windows Vista (left) and Windows XP (right).



Like anything else, sound boxes have their pros and cons:



✔ Sound boxes finally bring fantastic sound to laptops. Musicians record concerts and jam sessions with their laptops and a sound box.

✔ A sound box lets you hear true, 5.1 surround sound while watching a DVD on your laptop. But to *hear* that sound, you must also tote along five speakers and a subwoofer. For true portability, check out the inexpensive 5.1 surround sound headphones that sell for less than \$50 at computer stores and online. (They plug into a standard laptop headphone jack.)



✔ When you install a sound box or different type of sound device to a laptop, be sure to set the new device as Default in Step 3. Otherwise, your laptop will keep using its own built-in speakers.

✔ Like sound cards, sound boxes work best when hooked up to a home stereo and *real* speakers — not the plastic amplified desktop speakers commonly sold with computers today.



✔ Before buying, make sure the sound box contains all the ports you need. Some leave off a game port (shown in the margin), for example, to fit all the other stuff onto the front of the box. That limits your joystick to a USB model.

Installing a headphone/microphone set

The most popular online computer games call for players to interact both verbally as well as through the keyboard. To make sure your exclamations, insults, and praises are heard by all the game players, pick up a headphone/microphone headset. Although it makes you look like a telemarketer, the headset places the microphone right where you need it: in front of your mouth.

The best headsets plug into your USB port or are wireless, using Bluetooth technology. If your PC doesn't support Bluetooth, pick up a tiny USB Bluetooth adapter for less than \$25. The Bluetooth adapter plugs into your USB port and lets your PC connect with *all* your nearby

Bluetooth devices: headsets, cell phones, mice, and other Bluetooth-equipped gadgets.

For convenience, look for a headset that has a volume control either on the cord itself or an easily accessible part of the headphone. Comfort is the number one problem with most headsets, so be sure to try on the headphone before laying down your cash.

Finally, after installing the headset, run through Windows' sound settings described in the "Fixing Windows sound settings" section to make sure the microphone and headphone levels are to your liking.

Connecting Your PC's Sound to a Home Stereo

The only way to hear your PC or laptop at its best is to hook it up to a home stereo. There's just no comparison in sound. To hear how good your PC's sound can be, invest a few dollars in cables and try it yourself.

If you're connecting your sound to a home theater system and want surround sound through five speakers and a subwoofer, flip ahead to Chapter 12, where I explain how to hook up a surround sound system.

But if you're connecting your PC through an amplifier to a pair of speakers, follow these steps:

1. Plug a converter jack into your PC's Line Out jack.



Most Line In ports on home stereos accept connections through RCA jacks. To connect your PC to those jacks, pick up RadioShack part number 274-369, officially known as a *Y-Adapter, Phono Jacks to Stereo 1/8-inch Plug*. The handy adapter, shown in the margin, plugs into your sound card's 1/8-inch jack and offers two handy RCA ports on its other end, one for each stereo channel.



This same handy RadioShack converter lets you plug your iPod and most other portable music players into your home stereo, as well. Just unplug it from the back of your PC and plug it into your iPod or music player. Plug it back into your PC when you're through.

Plugging the jack into your sound card's *speaker jack* might work, but the sound might be too loud for your home stereo, leading to distortion.

2. Connect a stereo audio cable from the converter jack's two RCA ports to your stereo's two Line In ports.

Pick up a stereo RCA cable long enough to reach between your PC and your home stereo. Found at any electronics stores, office supply stores, or even most drugstores, the stereo cable has two RCA jacks on each end, ready to plug into the two RCA ports on both your PC's adapter and your stereo.

If your stereo lacks a free pair of Line In jacks, connect the cable to any other jacks designed to accept sound: a tape deck, for instance, or VCR.

The *red* jack connects to the stereo's *right* channel. The other jack (usually white) connects to the left channel.



3. Set your stereo's front sound input to Line In.

Most stereos let you hear sound from a variety of gadgets: tape players, radios, VCRs, or record players. To hear your PC, turn the stereo's input to Line In — or the name of the jack you've plugged the cable into in Step 2.

4. Adjust the volume.

Play music through your PC at a low volume, and then slowly turn up the volume on your stereo. You'll probably want to control the volume at your PC because that's within reach. So turn the volume up on your stereo, and leave your PC set fairly low. Then, as you turn up the volume on your PC, your stereo will grow louder, as well.

- ✓ Tweak the volume settings until you find the right mix. If the PC's too loud and the stereo's too low, you'll hear distortion. If the PC's too low and the stereo's too loud, you'll blast your ears when you turn up your PC's sound.
- ✓ Don't bother spending the extra cash for super-expensive "high-fidelity" audio cables. They won't make your PC sound any better.

Healing a Sick Sound Card

When trying to fix a problematic sound card, leave off the computer's case until the sound works correctly. You'll find yourself constantly checking connections or peering at the card's innards for its part number when checking for the latest drivers or support on the Internet.

The next section covers Windows settings that control your computer's sound. Run through each one until you solve the problem. If you're still scratching your head, continue to the last section. Something might be wrong with the sound card itself or some of its cables.

Fixing Windows sound settings

Windows offers oodles of ways to craft your computer's sound, tweak your sound settings, and fix things that stopped working. You can troubleshoot the way the card's drivers work with the computer, and you can adjust the sound quality through software settings. Because Chapter 19 covers drivers in detail, this section covers how to tweak Windows' built-in software settings.

Windows packs all the important settings into several areas, so these steps run you down the line, enabling you to adjust everything until it's just right in both Windows Vista and Windows XP.

Changing Windows Vista sound settings

Follow these steps to run through all of Windows Vista's sound settings, calibrating your volume level, speaker placement, and microphone recording level.

Note: The sound programs included with some laptops and desktops overwrite Vista's sound setting windows with their own versions. Depending on your PC's sound circuitry, your windows may differ slightly from the ones described here.

- 1. See if you've muted any programs by right-clicking the taskbar's speaker icon near the clock and choosing Open Volume Mixer.**

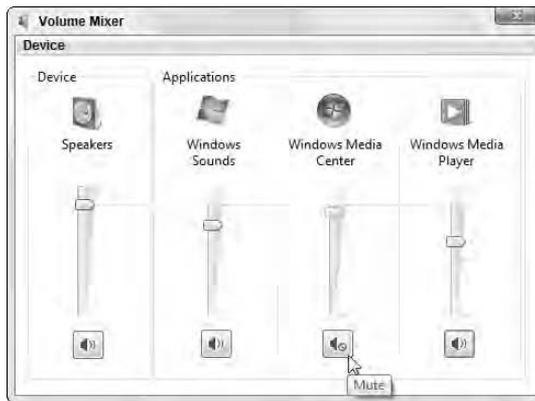
Windows Vista's new Volume Mixer window, shown in Figure 11-4, differs from the one found in Windows XP. Windows XP lets you change only your PC's *entire* volume or mute *everything*; Windows Vista, by contrast, lets you change the volume of each program *individually*. That means you can turn down or mute Vista's error message sounds, for instance, but keep your music playing loudly.

Make sure you haven't inadvertently muted or turned down the volume of one of your programs. Close the Volume Mixer window when you're through.

- 2. Right-click the taskbar's speaker icon near the clock and choose Playback Devices to see the Sound window.**

As shown earlier in Figure 11-3, the Sound window lists all the gadgets connected to your PC that can play sounds: Your speakers, for instance, as well as a digital connection to your home stereo that provides 5.1 or 7.1 sound.

Figure 11-4:
Make sure you haven't inadvertently muted the volume of one of your programs.

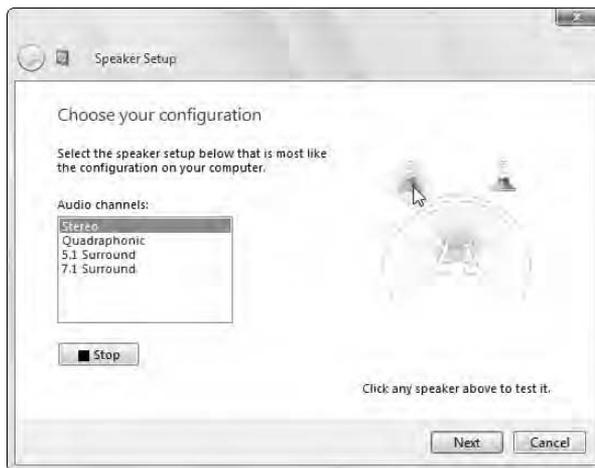


3. Click a listed sound device, check its settings, and then move to the next listed device until you've tested them all.

Click the device marked as default (look for a green check mark by the name) and click the Configure button. For example, clicking Speakers and clicking the Configure button lets you test your PC's speaker setup, as shown in Figure 11-5.

Click any speaker shown in Figure 11-5 to hear Vista play a sound through it. It's a very simple test, but it's also a lifesaver when trying to figure out whether you've set your eight speakers in the right locations for a 7.1 surround setup. Even if you're using a simple pair of speakers, you can make sure you haven't switched their left and right positions.

Figure 11-5:
Windows Vista lets you test each speaker individually to make sure its working and correctly placed.



4. Click the Sound window's Recording tab, click your microphone, and check its Properties settings.

On the Recording tab, shown in Figure 11-6, Vista lists everything able to record on your PC. On most PCs, you see at least the microphone and the Line In jack.

Figure 11-6:
Click your microphone's listing and click the Properties button to set its recording levels.



Click your microphone and click the Properties button. (The microphone's Configure button lets you set up Vista's speech recognition system, *not* adjust your sound levels.) When the Microphone Properties window appears, click the Levels tab.

Although the sliding control on the Levels tab lets you change the recording volume, there's no way to gauge its effect. For a visual indicator of what you're doing, open Vista's new Sound Recorder program from the Start menu (Start⇨All Programs⇨Accessories⇨Sound Recorder) and begin speaking into the microphone.

As you speak, a little green bar in Sound Recorder moves according to your microphone's recording level. Slide the levels in the Levels tab area until the microphone records at a middle level — not moving all the way to the right or left. You'll have to play back a few recordings until the recording levels sound right.

Close the Microphone Properties window when you're through.



Vista's Sound Recorder saves files in only WAV or WMA format. Neither are suitable for iPods and many other music players, so don't bother using that program to make any podcasts. Instead, try Audacity (<http://audacity.sourceforge.net>), a free program for recording and editing sound.

5. Click the Sound window's Sounds tab to assign different sounds to Windows events.

Bored with the same old opening music when Windows loads? Tired of your New Mail sound? Replace them by selecting your favorite sounds from computer games or other areas. Unfortunately, the menu allows only WAV files, so you can't assign the vastly more popular MP3s or MIDI files.

If you're not hearing any sounds when Windows loads, fix the problem by assigning a sound.



Windows Vista keeps its sounds on your C drive in the Media folder within the Windows folder. In other words, look in `C:\windows\media` for the sounds. They're named after their events. Windows' opening sound is called Windows Startup, for instance.

Changing Windows XP's sound settings

Windows XP owners can run through these steps to fine-tune their PC's sound settings.



1. From the Start menu, choose Control Panel and double-click the Sounds, Speech, and Audio Devices icon.

If you've switched to Windows XP's Classic View, where the Control Panel shows dozens of icons, double-click the Sounds and Audio Devices icon. Then jump ahead to Step 3.

2. Double-click the Sounds and Audio Devices icon.

The Sounds and Audio Devices Properties window appears. A huge switchbox of controls, it includes settings that change nearly every aspect of your sound.

3. Click the Volume tab and look for muted items.



The biggest problem by far with sound cards comes from their mixing software. A sound card controls everything in your computer that makes sound. And because you don't necessarily want to hear everything at once, some devices are usually muted. To make sure you haven't muted what you're trying to hear or record, click the Advanced button in the Device volume area, examine the Play Control window, and look for anything marked as Muted.

4. Add missing devices to the mixer and remove any unused ones.

Sound cards control so many devices that the mixer leaves some off so that the panel fits on the screen. To see *all* your sound card's available sound components, choose Properties from the Play Control's Options menu. Make sure that the devices you're using are checked, and the ones that aren't connected stay unchecked.

Click OK to close the window.

5. While still on the Volume tab, choose your number of speakers.

In the Speakers settings area, the Advanced button tailors the sound for your particular speaker setup. Choose the one that's applicable for your setup.

6. Click the Sounds tab to assign different sounds to Windows events.

Bored with the same old opening music when Windows loads? Tired of your New Mail sound? Replace them by selecting your favorite sounds from computer games or other areas. Unfortunately, the menu allows only WAV files, so you can't assign your favorite MP3s or MIDI files.

7. Click the Voice tab to test your sound card's capabilities.

Almost all cards play and record sounds. A few old ones, however, can't do both at the *same time*. This makes them terrible for holding conversations over the Internet, editing sound and video, and using other areas where you need to hear and record simultaneously.

To test your sound card's ability to play and record simultaneously, click the Test Hardware button to start the Sound Hardware Test Wizard.



Diagnosing and fixing hardware problems

Today's sound cards come with zillions of jacks, so check to make sure that everything is plugged into its correct spot. Check them all systematically so that you can rule out bad connections and move to other areas. Are the left and right speakers placed on the correct sides? Are the front and rear speakers plugged into the correct jacks?

Check out these things when your computer doesn't sound as good as it should:



- ✓ If you're using *digital* speakers, often required for surround sound, make sure you've connected your digital cable into your PC, not an *analog* cable. The digital cable usually resembles a mono RCA cable that connects a port on your sound card with a port on your speakers. Sometimes the digital cable plugs into the subwoofer, which sends the sound to the other speakers. If that cable's not connected, you won't hear anything when in digital mode.
- ✓ If you're using *analog* speakers, make sure you've connected your analog cables. You need a stereo cable for each pair of speakers. (The subwoofer gets a mono cable.)

- ✔ If none of your speakers plug into the wall, they probably use batteries. Try a new set of batteries. (And try to remember to turn those speakers off when you're away from your computer.)
- ✔ When you're stumped, turn to the Internet for help. Thousands of frustrated computer users have posted questions — and received answers — on the Internet's Newsgroups area. Those messages and their answers still linger on the Internet, waiting for you to read their solutions. Chapter 22 shows how to search the Newsgroups for the answers you need.

Chapter 12

Turning Your TV into a Home Theater with Vista's Media Center

In This Chapter

- ▶ Identifying audio and video cables and connectors
 - ▶ Installing a TV tuner
 - ▶ Connecting the TV signal to the PC
 - ▶ Connecting the PC's video to the TV
 - ▶ Connecting the PC's sound to the TV
-

Determined to pry TiVo off the nation's TV sets, Microsoft tossed its *own* digital video recorder into Windows Vista: Windows Media Center. Formerly sold separately, Windows Media Center comes with two versions of Windows Vista, and it lets you schedule movie and TV show recordings automatically with your PC. The catch? Your PC needs three things to record television:

- ✓ A TV signal, which usually enters your home through a cable in the wall
- ✓ A TV tuner, which is usually a card that drops into a slot inside your PC
- ✓ Vista's Home Premium or Ultimate version, as Windows Media Center isn't included with Vista's other versions

This chapter explains how to install the TV tuner for recording and watching TV on your PC. It also explains how to connect your PC to your TV and home stereo, turning your PC into the backbone of a home theater.

The problem with recording digital cable and satellite channels

If you subscribe to digital cable channels or satellite TV, I've got some bad news: Those providers encode their TV signals to thwart thievery. Unscrambling the signal requires a special decoder box that connects to your TV. The box then feeds your TV one unscrambled channel at a time. Because that evil decoder box controls both the channel changing *and* the decoding, your PC's TV tuner won't work: It can't unscramble the channels, nor can it switch channels to record your scheduled shows.

Digital cable subscribers can still record the *non*-digital channels entering their home, which are channels 2 through 99 — those aren't scrambled. But your digital channels, usually

channels 100 and above, must go through the cable box before entering your TV or TV tuner.

One solution comes in the form of an Infrared (IR) control cable — a little Infrared transmitter on a cable. You tape the IR transmitter over your box's IR receiver and plug the transmitter's other end into your PC's TV tuner. Then, when it's time to change channels and begin recording, Media Center tells the IR transmitter to tell the box to switch channels. As the channel pours in, your PC's tuner starts recording the unscrambled channel straight from the decoder box.

Not all TV tuners come with the Infrared control cable, however, and if yours doesn't, you're stuck with channels 2-99.

Identifying the Cables and Connectors on Your TV Tuner and TV

Your TV tuner comes with plenty of ports to grab video and send it to your TV screen in a variety of ways. Table 12-1 helps you identify the cables, their connectors, and their purpose in life.

<i>The Cable and Its Connectors</i>	<i>Its Name</i>	<i>Its Location</i>	<i>Its Purpose</i>
	Coaxial (RF) cable	Almost all TV tuners and TV sets	Most TV tuners and TV sets come use this port to transport TV channels.
	RCA (composite)	Some TV tuners and some TVs	These carry sound, video, or both from the currently tuned channel. Yellow cables always carry <i>video</i> . Red (right) and white (left) cables carry stereo sound.

<i>The Cable and Its Connectors</i>	<i>Its Name</i>	<i>Its Location</i>	<i>Its Purpose</i>
	S-Video	Some TV tuners and some TVs	This cable, usually black, carries high-quality video but no sound.
	Optical/ Toslink	Some sound cards and home stereos	This carries Dolby AC-3 sound (sometimes called <i>multichannel, surround sound</i> , or <i>5.1</i>) but no video.
	USB	TV tuner	Here's where you plug an external TV tuner into your PC or laptop.
	Infrared	Some TV tuners	Bundled with some TV tuners, this lets you change channels on your TV tuner (not your TV set or its decoder box) with a remote control.

Installing a TV Tuner

Difficulty level: Medium

Tools you need: One hand and a screwdriver

Cost: Cards average between \$50 and \$200.

Stuff to watch out for: When shopping for a TV tuner, make *sure* it comes with Vista-compatible drivers. Many older and inexpensive TV tuners don't include Vista drivers and never will.

TV tuners that come with handheld remotes receive bonus points. You'll be watching the screen from a distance and need a handy way to control the action.

Some TV tuners plug into a USB port, providing a great way to turn laptops into portable TV sets.



To install a TV tuner, follow these steps. (If you're installing an *external* TV tuner, plug it into your USB port, shown in the margin, and jump ahead to the following section, "Connecting Your TV Signal to Your PC.")

1. Turn off your computer, unplug it, and remove the cover.

Don't know how your PC's cover comes off? Flip to the Cheat Sheet at the front of this book for the answers.

2. Locate a vacant PCI slot.

See that row of metal strips along on the back of your PC? Inside your PC, you'll spot a row of slots lined up with those metal strips. (They're usually white.) Those are your PCI slots, and you need to push your new TV tuner card into one of them.

3. Remove the slot's back plate cover if necessary.

If you're replacing a card, skip this step, as the cover has already been removed.

Unused slots often have a little cover over to them to keep dust from flying in through the back of your computer. With a small screwdriver, remove the screw that holds that cover in place. (Refer to Figure 7-6 in Chapter 7 and to Color Plates 19, 20, and 21 in the color insert pages in this book.) Don't lose that screw, as it will hold your new tuner card in place.

If the screw accidentally drops into your PC, pick up your computer and shake it until the screw falls out. Keep the screw handy, and save the little cover, too; if you remove the card, you need the bracket to cover up that slot again.

4. Push the card into any vacant PCI slot.

Hold the card by its edges and position it over any empty PCI slot. The edge with the shiny metal bracket should face toward the *back* of your computer. (That shiny bracket replaces the cover you removed in Step 3.)

Line up the tabs and notches on the card's bottom edge with the notches in the slot. Push the card slowly into the slot. You might need to rock the card back and forth gently. When the card pops in, you can feel it come to rest. Don't force it!

Don't let any card come into contact with any other card. That can cause electrical problems, and neither the card nor the computer will work.

5. Secure the card in the slot with the screw you removed in Step 3.

6. Plug the computer back into the wall outlet, turn it on, and see whether Windows recognizes and installs the card.

Windows usually recognizes newly installed cards and sets them up to work correctly.



If something goes wrong, head for Chapter 19 for quick-fix tips about installing drivers. If everything's working, however, put your PC's cover back on.

7. Install the latest version of the card's drivers and software.



Whenever you install a new tuner card or any other card, visit the manufacturer's Web site. Find the site's Support or Customer Service section, and then download and install the latest drivers for that particular model and your version of Windows, be it Vista or XP. Card manufacturers constantly update their drivers and software to fix bugs.

8. Install the IR receiver for the remote control, if needed.

TV tuner cards that include handheld remote controls sometimes come with an IR receiver that gives you something to aim at. The IR receiver is a thin cable with a jack on one end and little plastic receiver on the other end. Plug the cable's jack into the card's IR port, and then place the receiver within sight of where you'll point the remote.

TV tuners that plug into a USB port usually have the receiver built into their box. Aim the remote control at the little box's built-in receiver when changing channels. (The built-in receiver is usually hidden by dark translucent plastic.)

After you've installed the TV tuner, it's time to connect it to your TV signal, described in the next section.

Connecting Your TV Signal to Your PC



This part's easy, as the vast majority of TV tuners grab a TV signal only one way: through the coaxial port shown in the margin.

Knowing that, here's the easy way to connect it to your PC: Unplug the coaxial cable from the back of your TV and plug it into the coaxial port on your PC's new TV tuner. Then jump to the "Connecting Your PC's Video to a TV" section to finish the job.

A better alternative, however, is to buy an inexpensive splitter that turns that single cable into *two* cables: One stays plugged into your TV, and the other plugs into your PC's TV tuner. This has two big advantages:

- ✓ You can watch a show on your TV while your PC's TV tuner records a second show on a different channel.
- ✓ Your TV still functions normally, even when the PC is turned off.

Follow these steps to connect your TV signal to your PC (and your TV, if desired):



1. Unplug the coaxial cable from your TV's RF In port.

Found on the back of every TV, this accepts the signal from a cable that runs from either the wall or an antenna. The cable's connector pushes or screws onto the port on the back of your TV.

Although a few coaxial cables push onto their connectors, most screw onto them. You might need a pair of pliers to loosen the connector; your fingers can handle the rest.

2. Plug the cable into a splitter, if desired. (The cable goes into the side of the splitter with only one port.)

If you don't have a splitter, skip to Step 5 and plug the cable directly into your TV tuner's TV In port.

The splitters cost a few dollars at any consumer electronics shop. The splitter has one coax port on one end and two coax ports on the other. While buying the splitter, buy two coaxial cables — one for your PC and the other to plug back into your TV.

Coaxial cables always screw onto a splitter; the push-on connectors tend to fall off.

3. Plug a coaxial cable onto each of the two ports on the splitter's other side.

4. Plug one of those two cables back into your TV where you unplugged the first.

5. Plug the other cable into your TV tuner's TV In port.

That's it. The splitter then lets your TV keep its same connection, so it still receives the same channels. Plus, your PC receives all the channels, as well.

Connecting Your PC's Video to a TV

TV tuners let you watch TV on your PC without problem. But you can also route the TV shows back onto your TV screen, letting you enjoy them on the big screen. You can do this either of two ways:

- ✓ **TV tuner:** Some TV tuners can connect directly to a television set.
- ✓ **Video cards:** Some video cards (see Chapter 7) offer a television connection, as well.

The secret is to find a TV Out jack on your PC's TV tuner or video card that matches a Video In jack on your TV. After you find those two jacks, you simply connect the appropriate cable between the two matching jacks.



For the easiest PC-to-TV connections, pretend your PC's a VCR. Then, connect your PC's TV Out jack to your TV's VCR Video In jack.

Look for any of these four jacks on both your PC and TV:



✔ **S-Video:** If your TV and PC's tuner both offer this port, connect the two with an S-Video cable for the best picture. Found on high-quality TV sets, S-Video not only carries a good picture, it lets you keep your PC's monitor plugged in (unlike the last two jacks on this list).



✔ **RCA:** Found on most TV sets and some TV tuners, this yellow port sends medium-quality video to the TV. If your PC doesn't have S-Video, connect an RCA cable between the RCA port on both the PC and the TV.



✔ **DVI:** Many HDTV (High Definition Television) sets come with a DVI port — the same one found on most LCD monitors and PCs. That makes the TV connection as easy as unplugging your PC's monitor and plugging the cable into your HDTV set. Unfortunately, you lose the convenience of seeing the picture simultaneously on both your TV and your PC's monitor.



✔ **VGA:** Some HDTV sets also come with a VGA port. Although it doesn't provide nearly as good a picture as the DVI port, this port also lets you turn your HDTV into a replacement monitor.

After you've chosen the highest quality port on both your PC and TV, follow these steps to connect your PC to your TV:

1. Set your PC and your TV within a few feet of each other.

Most video cables are less than six feet long, which doesn't give you much working room.

2. Connect a cable between the matching TV ports on both your PC and your TV.

Connect the appropriate cable between your PC's TV Out port and your TV's Line In, Video In, or VCR Video port. RCA and S-Video cables line the shelves of most consumer electronics stores.

If your TV has more than one Line In or Video In port, remember which port you're plugging it into. You'll need to switch your TV's Video Input, usually located through a button on the TV's front or its remote, to that port.

3. Adjust your PC's video settings so the picture fits on the TV's screen.

Unless you're connecting your PC's DVI port directly to an HDTV's DVI port, this could be the most difficult part of all: A PC's high-resolution image is too large to fit on a TV's low-resolution screen. These tweaks make it look the best, though:

a. *First, set your PC's video to display a low-resolution of 640 x 480:*

Windows Vista: Right-click the desktop, choose Personalize, and choose Display Settings. Then slide the Resolution slider on the Display Settings window toward the left until the resolution shows 640 x 480. Click OK to make the switch.

Windows XP: Right-click the desktop, choose Properties, and click the Settings tab. Then slide the Screen Resolution slider to the left until the PC switches to 640 x 480. Click OK to make the switch.

b. *Finally, adjust your TV's vertical and horizontal settings to squish the picture onto the screen as best as you can.*

You can usually access these settings through knobs on a fold-down panel along the TV set's front.

After following those steps, your Windows desktop should appear on your TV. If you're still having trouble, try these tips:

- ✔ When connecting your PC to an HDTV, set your PC's video resolution to 1280 x 720 with a refresh rate of 60 Hz. (Step 3 describes how to change the resolution.) If that works, try bumping up the resolution to 1920 x 1080 to take full advantage of the TV's highest quality. Not all video cards offer these resolutions, however, so experiment with your PC's resolution to see what looks best on the big screen.
- ✔ These steps connect your PC's *video* to your TV, but not its sound. If your PC's own sound isn't good enough, connect your PC's sound to your home stereo, explained in this chapter's next section.
- ✔ If you can't find matching connectors on your PC and TV, you have two choices: Install a new video card with a TV Out port inside your PC (Chapter 7), or buy a PC-to-TV converter box from Amazon (www.amazon.com) or a computer store. The box plugs into your USB port, giving your PC an RCA or S-Video port to connect to your TV.
- ✔ If you still can't see anything on your TV, reconnect your monitor, head to your video card's settings in Step 3, and tell your video card to turn on its TV Out port. Different video cards offer this option through their own manufacturer's software, unfortunately, so I can't give you exact instructions.



Connecting Your PC's Surround Sound to a Multispeaker Home Stereo

Most home stereos cost several hundred dollars more than the cheap desktop speakers sold with many PCs today. If you watch a lot of DVDs on your PC and want surround sound — or you simply want higher-quality sound when listening to MP3s — this section explains how to connect your PC's sound to a stereo or home theater with surround sound: five speakers and a subwoofer.

Most of today's home stereos accept sound from at least three types of connectors: digital, optical, or RCA jacks. As with connecting video, the key to success is finding the best sound source your sound card dishes up, and connecting it to the best sound source accepted by your home stereo.

Follow these steps to connect your PC's sound to your home stereo.

1. Count the speakers connected to your home theater or stereo.

If your stereo sends sound through a single pair of speakers, usually one speaker on each side of the TV, it's probably using *analog* sound. If it's piping walls of sound through five or more speakers, however, it's probably using *digital* sound. Those two types of sound use different connections, as I explain in the next few steps.

There's little point in setting up digital sound if you're only listening through two speakers on your stereo.

2. Discover the type of sound offered by your PC's sound card.

All sound cards can send analog sound; the better sound cards send digital sound, as well.

Examine your sound card's jacks on the back of your PC. Most sound cards offer at least two of these three connectors.

- Optical/Toslink (digital):** A Toslink digital connector, shown in the margin, resembles a square hole. Sometimes it's called an *optical* connector. When not in use, the hole's usually plugged with a small plastic cover that pulls off with a little effort.

- Coaxial/RCA (digital):** Sometimes called a S/PDIF or digital coaxial connector, this single RCA jack is sometimes orange.

- 1/8-inch (analog):** When your sound card offers only a single 1/8-inch headphone or Line Out jack, you're limited to stereo sound.



3. Find your stereo's matching Audio In jack.

Examine the bundle of jacks along the back of your stereo.

If you have only two speakers connected to your home stereo, you'll probably spot a pair of RCA Audio In jacks.

If you have more than two speakers, you'll probably find either a Toslink or a single RCA connector.

4. Connect the matching cable between the matching ports on your PC's sound card and your stereo.

The instructions differ depending on whether you're connecting with analog or digital cables.



Analog: To connect your PC's sound card to a pair of RCA jacks on your stereo, pick up Radio Shack part number 274-369. Shown in the margin, it's officially known as a *Y-Adapter, Phono Jacks to Stereo 1/8-inch Plug*. Plug the adapter into your sound card's 1/8-inch Line Out jack. Plug a stereo RCA cable into the adapter's other two jacks and connect the cable's other end to your stereo's two RCA Audio In ports. (The *red* jack connects to the stereo's *right* channel. The other jack [white] connects to the left channel.)



This same handy adapter lets you plug your iPod and most other portable music players into your home stereo, as well. In fact, if you can't find the adapter, buy an iPod-to-stereo connection cable, as it does the same thing.

Digital: Buy whichever digital cable matches the digital ports on both your PC and home stereo, Toslink or RCA. Connect the cable between the two ports, and jump to Step 6.



Stuck with a Toslink connector on your PC's sound card and a RCA connector on your home stereo or vice versa? Pick up a Toslink/RCA converter from Ram Electronics (www.ramelectronics.net) or a stereo store. For less than \$30, the converter lets the two connect.

5. Switch your stereo's Audio In knob to either Line In or the jack with your PC's sound.

Most stereos let you hear sound from a variety of gadgets: tape players, radios, VCRs, or even record players. To switch to your PC, turn the stereo's input selector knob to Line In — or the name of the jack where you plugged in your PC's sound cable.

If you've plugged in a digital connection, you might need to flip a switch on your stereo to switch it to digital mode or the one used for DVD players.

6. Adjust the volume.

Play music through your PC at a low volume, and then slowly turn up the volume on your stereo. You'll probably want to control the volume at your PC because that's within reach. So turn the volume up on your stereo, and leave your PC set fairly low. Then, as you turn up the volume on your PC, your stereo will grow louder, as well.



- ✓ Play around with the volume settings for awhile until you find the right mix. If the PC's too loud and the stereo's too low, you'll hear distortion. If the stereo's too loud and the PC's too low, you'll blast your ears when you turn up the sound on your PC.
- ✓ Don't bother spending the extra cash for expensive "high-fidelity" audio cables. They don't make your PC any sound better.

Connecting Your PC's Sound to a TV

Earlier in this chapter, I explain how to connect your PC's video to your TV set, letting you watch shows on the TV's larger screen. For the best sound, most people then connect their PC's sound to their home stereo, which I describe in the previous section.

But if you'd prefer to hear the sound coming from your TV set's built-in speakers, you want this section.

Here's the secret to viewing and hearing your PC's TV shows through your TV: Pretend that your PC is a VCR. By thinking that way, the job's as easy as plugging your PC's sound cable into the TV's jacks that are meant for a VCR's sound.

1. Buy a cable with a 1/8-inch stereo plug on one end and two RCA jacks on the other.

Commonly sold as an iPod accessory, this cable also lets you plug your iPod into a stereo.



If you can't find the right cable, buy Radio Shack part number 274-369, shown in the margin and described in the previous sections. The handy adapter plugs into your sound card's 1/8-inch jack and offers two RCA ports on its other end. Then buy a two RCA cables and plug them into the adapter's two RCA ports.

2. Plug the cable's 1/8-inch plug into your PC's Line Out jack.

That leaves you with a pair of RCA jacks that contain your PC's stereo sound.

3. Connect the two RCA cables into your TV's VCR Audio In jacks.

Only one RCA port on your TV? Connect the red jack to the red port, and leave the other dangling. You'll hear only mono sound rather than stereo.

4. Set your TV's Input to VCR.

This brings in the video from your PC's TV Out jack, which you hooked up in this chapter's "Connecting Your PC's Video to a TV" section. And it brings in the sound that you've just connected.

5. Adjust the volume.

Play music through your PC at a low volume, and then slowly turn up the volume on your TV. You'll probably want to control the volume at your PC because that's within reach. So turn the volume up on your TV and leave your PC set fairly low. Then, as you turn up the volume on your PC, your TV will grow louder, as well.

Chapter 13

Making Movies

In This Chapter

- ▶ Translating digital camcorder technobabble
 - ▶ Downloading movies from a digital camcorder
 - ▶ Upgrading a computer for video editing
-

For years, computers merely replaced typewriters. Today, they're replacing reels of family movies and old tapes. More and more people have ditched their bulky old camcorders for the convenience and accuracy of digital camcorders. Digital videos are easier to edit and easier to pour into your PC for editing and copying to a DVD.

This chapter explains some of the concepts behind digital videography and shows you how to prepare your computer for the oncoming onslaught of embarrassing video memorabilia.

Understanding Camcorder Buzzwords

In digital moviemaking, your camcorder stores each movie inside one huge file. The first obstacle is pouring that huge file into your computer. Engineers have created several differently sized funnels for you to choose from, which I explain in this chapter.

The second stumbling block comes from the language that's sprouted up around digital video. Before you can set up a digital editing room that meets your needs, you must understand some of the most frequently encountered buzzwords.

This section explains the terminology surrounding the world of digital video. Grab your philosopher's cap and march forward to tread the waters of analog and digital.

Analog camcorders: Analog camcorders — the bulky old ones used before digital camcorders hit the shelves — save your video onto tape as magnetic waves, not numbers. Because analog camcorders can't dish up numbers, they don't work with Windows Movie Maker or other video editing programs. To edit those movies on your PC, you must first import the video with a video capture card, covered in the sidebar, "Capturing sound and video from analog camcorders."

DV (Digital Video) camcorders: Working like high-speed digital cameras, DV camcorders measure the light and sound hitting their sensors and store the measurements as numbers on special digital videotape. Because the video already lives as a string of numbers, it's easy to copy to your PC as one big file, ready for editing.

Optical/digital zoom: Digital cameras and camcorders can use two different methods when zooming in for close-ups of distant images. An *optical* zoom works like a telescope to magnify the image. When the optical zoom finds its best image, the camcorder takes the picture.

With *digital* zoom, by contrast, the camcorder examines the best image its optical lens could gather. Then it mathematically exaggerates the image, guessing at how an even closer view would appear. Unfortunately, the camcorder's mathematical guesswork usually adds jagged edges, which destroys the natural beauty of an image.

Optical zooms provide much more realistic images than digital zooms, so when shopping, give optical zoom rates much more credence than digital zoom rates.

Webcam: Webcams usually plug into a USB port to send a snapshot to your PC at regular intervals, usually for uploading to a Web site. (You can check out my webcam at www.andyrathbone.com.) Digital camcorders and some digital cameras can double as webcams.

FireWire (IEEE 1394 or Sony i.LINK): Digital video files are *huge*, requiring a speedy method of transportation from your camcorder to your computer. FireWire ports move information rapidly, and their early lead quickly captured the digital camcorder market.

USB: As the digital camcorder market matures, more of them now support the popular USB ports used by most digital cameras. The digital video standard remains FireWire, though, so you might have trouble finding a USB-compatible digital camcorder.

Capturing sound and video from analog camcorders

Older camcorders are *analog*, not *digital*. Unlike digital camcorders, they're not converting their video into numbers as they record. That makes it harder to move the camcorder's video onto your number-lovin' PC. The solution is a *video capture device* — a gadget that comes in two forms: a card plugged inside your PC or a box plugged into your PC's USB port.

To dump an analog camcorder's video into your PC, connect the camcorder's Video Out cable to your video capture device's Video In port. Then connect its audio cables to your sound card's Line In jacks. When you begin playing back the

camcorder's video, the video capture card's software combines the incoming video with the sound and saves the movie as a large digital video file.

When the video's on your PC, you can edit it just as easily as if it came from one of today's digital video camcorders.

Bought a new digital camcorder? Check its manual. Some digital camcorders will connect to an analog camcorder and convert that old analog video into digital footage.

Capturing Sound and Video from Digital Camcorders

Digital camcorders cooperate with your computer quite easily. As you shoot your footage, the digital camcorder packs both the video and sound into a single file.

That leaves the problem of moving the file from the camcorder to the computer. (When recording a TV show with a TV tuner card, covered in Chapter 12, the card dumps the file straight onto your hard drive, sparing you any transportation troubles.)

To move the video from your camcorder to your PC, you need one cable that's plugged into one of the jacks discussed in this section.

FireWire cable: Several years ago, Apple placed FireWire ports onto their computers as standard equipment. Some PC folks refer to a FireWire port as an *IEEE 1394* port, but they're both the same thing. Some PCs don't come with a preinstalled IEEE 1394 port, unfortunately. If yours lacks that port, you need to buy a FireWire card and install it inside your computer. (See Chapter 7 for more about installing video cards and other cards into your computer.)

USB cable: Although most digital camcorders still use FireWire, a few have switched to USB, instead. Check your camcorder's manual to see which type of port it uses.



Although it's called digital *video*, the signal coming from a DV camcorder's port contains both video *and* sound. The clever video-editing software figures out which part of the file contains the guitar solo and which contains the close-up of fingers racing across the fret board.

The few digital camcorders that use USB ports require USB 2.0 ports, not the USB 1.1 ports found on some older PCs. If your camcorder takes forever to dump a file onto your PC, make sure your PC has a USB 2.0 port.

Upgrading a PC for Video Editing

If your PC's able to run Windows Vista and its 3D graphics, transparent windows, and built-in video recorder, your PC can probably stand up to the rigors of video editing.

Still, different PCs work better than others. The next three sections describe what things in a PC make for the best video editing: a fast PC, two fast hard drives, and video editing software.

A fast computer

Any PC with a FireWire port can grab incoming video fairly quickly. After all, you're simply copying a file from one place (your camcorder) to another (your PC). Editing the video — cutting away the boring parts and stringing together the good ones — doesn't require much processing power, either. The entire editing process is just telling the PC when to start and stop playing your video. Even when you add transitions between shots — fades, for instance — you're only giving the PC instructions on what to do later, when you've finished editing.

A fast PC proves its mettle when you're through editing the movie and want to apply all your editing work to the video. At that point, your PC examines all your edits, extracts the good parts, discards the bad, and weaves them back together into a cohesive whole, complete with transitions between the scenes. The process can take hours, even on a relatively fast PC.

When your PC's too slow for the jobs you're throwing at it, it's time to buy a new one. If you plan on making lots of videos, buy as fast a PC as you can afford. Look for the words *Intel Core Duo* or *AMD Athlon 64 X2* on the PC's spec sheet.

If you can't afford something that powerful, you can still edit videos on a slower PC. But transforming your edited work into a finished creation will take a lot longer. Be prepared to let it sit and work all night.

Showing off your digital photos on TV

Most PCs sold in the last five years work fine for connecting to digital cameras and then grabbing and storing their images. The problems begin when the photos are *inside* your PC. How can you show them off to family and friends without crowding everybody around your PC?

Connecting your PC to a TV, covered in Chapter 12, solves that problem. Vista's Windows Media Center, the software bundled with Windows Vista Premium and Ultimate editions, does a nice job of displaying your photos in a slideshow, complete with a soundtrack. And *every* Vista version comes with Windows Photo Gallery, which also creates a slideshow. (Fire up

Media Player in the background to add music to the show.)

But Vista offers another alternative if you're not keen on connecting your PC to your TV. Windows Vista's DVD Maker, bundled with Windows Vista's Premium and Ultimate Editions, also creates a smooth slideshow from your digital photos, complete with a soundtrack of your choice. Then it copies the show onto a blank DVD for easy playback on any DVD player.

I explain how to put DVD Maker to work in *Windows Vista For Dummies* (Wiley Publishing).

Bonus: Outfitting a PC for video editing also turns it into a fantastic game machine, letting it run all the latest games at their finest.

Two fast hard drives

Digital video consumes about 3.6MB for each second of footage, or about 13GB of space per hour. For many PCs, that's a *lot* of space. But I'm just getting started. After you've edited the video, you need additional space to store your finished movie.

To capture an hour's worth of vacation video from your camcorder, edit out half, and create a new, half-hour video, you need at least 20GB of empty hard drive space.

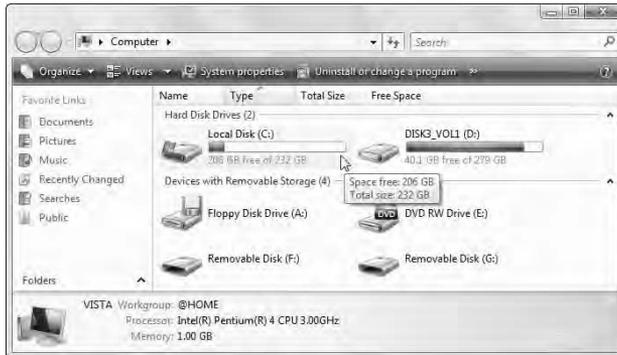
Also, video-editing software writes files to the disk in one smooth stream. That means that best results happen when you use two *separate* hard drives. You heard me right. You're best served by using one hard drive to capture the incoming video and the other drive to collect the edited video as the software writes it to the disk.

In short, if you're considering editing digital video, take a look at the amount of space left on your hard drive.



Vista makes it easy to see your PC's hard drives and the amount of space left on them. Open Computer from the Start menu, and Vista lists the hard drive's size and amount of free space, as shown in Figure 13-1.

Figure 13-1:
Open
Computer
from the
Start menu
to see your
hard drive's
size and
free space.



For example, my PC in Figure 13-1 contains two hard drives. Hard drive C is 232GB in size and has 206GB of free space. The second hard drive, D, is 279GB in size and has 40GB of space. That's plenty of room for editing video.



To see your hard drives and their free space in Windows XP, open My Computer from the Start menu and click one of your drive's icons. The hard drive's amount of free space appears in the window's bottom left corner. In Figure 13-2, for example, my PC's C drive is 145GB in size, with 44.1GB of free space.

Figure 13-2:
Open
Computer
from the
Start menu
to see your
hard drive's
size and
free space.





To see a hard drive's size and amount of free space in either Windows Vista or Windows XP, hover your mouse pointer over the drive. A pop-up appears, shown in Figures 13-1 and 13-2, listing the drive's total size and amount of free space.

Consider these tips when preparing a PC's hard drives for video editing:



✓ When buying a new hard drive, make sure your hard drives are fast. Look for the code words *7200 RPM* or *10,000 RPM* on the drive's box, as they indicate speed. Bigger numbers mean faster drives. (I cover hard drives in Chapter 9.)

✓ Before transferring digital video from your camcorder to your Windows XP computer, defragment your hard drive. Right-click the drive's icon in My Computer and choose Properties from the pop-up menu. In the dialog box that appears, click the Tools tab, and then click the Defragment Now button. That liberates a large continuous area of free space that your hard drive can use to quickly write incoming video information.

Windows Vista automatically keeps your hard drive defragmented, sparing you the trouble.



✓ Be sure your Windows XP hard drive is formatted in NTFS format rather than FAT32 or FAT16, or you'll run into file size problems. FAT32 limits a file's size to only 4GB, and FAT16 limits it to 2GB. (Windows Vista automatically formats hard drives in NTFS.)

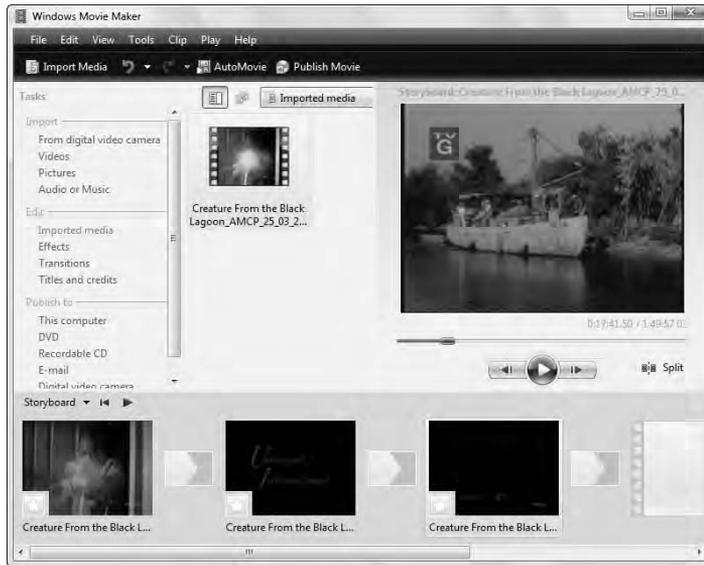
Video-editing software

Windows Vista's Premium and Ultimate versions and Windows XP all include free video-editing software called Windows Movie Maker. Although the pros might turn up their noses, Windows Movie Maker (shown in Figure 13-3) does a great job of importing your digital camcorder footage, letting you hack out the ugly bits, save the good, weave in a soundtrack, and patch together the results in a single file.

It's fine for splicing together vacation videos, editing out commercials from recorded TV shows, and creating other small video projects. Combined with the DVD Maker program bundled with Vista's Premium and Ultimate versions, you can turn your videos into finished DVDs, complete with opening screen menus.

Even if you plan to move into the big leagues by purchasing a third-party video-editing program, try editing your first videos in Windows Movie Maker to get a feel for how video-editing packages work. (The all work in a very similar fashion.)

Figure 13-3: Windows Movie Maker works fine for editing videos to play back on your computer, television set, e-mail to friends, or save as DVDs.



Note how your computer handles Movie Maker's demands. Teamed with your current computer, Movie Maker might be all you need to edit out the embarrassing portions of your vacation videos.

Always store a copy of your original videotapes *and* your finished DVDs in a safe place. You or your ancestors will want to see them in the future.

Chapter 14

Adding a Scanner

In This Chapter

- ▶ Understanding scanning terms
 - ▶ Understanding TWAIN
 - ▶ Installing a scanner
 - ▶ Scanning a document directly in Windows Vista
 - ▶ Making your scans the correct size
-

Scanners work like a tiny, flat copy machine. But instead of printing paper copies of what you place onto the scanner's bed, a scanner stores a copy of your item as a computer file.

In the process of taking this detailed digital picture, scanners magnify *everything*. That means that any extraneous item on the original — a piece of dirt, a lint speck, a cat hair, a grain of sand, or a fingerprint — shows up in full detail in the scanned version stored on your computer. Be sure to clean the scanner's glass before putting it to work.

This chapter leads you through scanning, from installation to pushing the Scan button.

Understanding Scanner Buzzwords

You might notice some of the same words appearing on the boxes of both scanners and digital cameras. That's because scanners work much like digital cameras, except they're limited to close-ups of large, flat items. Because of this specialized purpose, scanners come with their own specialized words, making you wade through awkward acronyms like dpi and TWAIN.

When you find yourself sinking into your scanner's vocabulary, use this rope to help pull you out.

dpi (dots per inch): Choosing a higher dpi setting tells the scanner to collect more detailed information about your image. That translates to a larger image on your monitor, a larger-sized file, and a higher-resolution image with higher quality when printed.

Dots per inch also means *pixels per inch*, and monitors display everything by lighting up pixels on the screen. Using a higher-resolution setting on your monitor lets you view a higher-resolution image more comfortably. (Chapter 3 explains pixels, as well as how to change your monitor's resolution settings.)



You'll scan the majority of your photos and documents at between 75 and 300 dpi.

OCR (Optical Character Recognition): Scanners take high-quality, up-close pictures, usually of flat surfaces. The key word is *pictures*. You can't scan a letter and expect to read it in a word processor. But wouldn't it be nice if you *could* do just that? Well, some brainiac invented OCR software that analyzes images for recognizable characters. Then it dumps the characters into a text file as words. That lets you scan a document, run OCR software on the image, and save the text into a file for importing into a word processor.

Neither Vista nor Windows XP includes OCR software, although some scanners toss it in for free. Check your scanner's bundled software.



When using OCR software, be sure to align the document or book onto the scanner in the correct position, usually with the top sheet against the top edge of the scanner's glass plate. Then scan at 300 dpi. Finally, most OCR software understands neither grammar, spelling, nor etiquette. That's up to you and your word processor to fix.

Optical/enhanced: Many scanners list an optical dpi rating and another rating for enhanced. The difference? The enhanced mode is a computerized exaggeration of the optical mode. For a true look at what your scanner can handle, rely on the optical figures. (Digital cameras and camcorders, discussed in Chapter 13, use similar computerized exaggerations with their digital zooms.)

TWAIN: A not-for-profit group decided to liberate scanners from their complicated bundle of software. So the group created a set of standards for manufacturers to incorporate into their scanners. Thanks to TWAIN, many programs — including some versions of Windows Vista and Windows XP — can easily bypass your scanner's bundled software and access your scanner directly.



The initials TWAIN don't stand for anything. The TWAIN organization says it lifted the name from Rudyard Kipling's poem, "The Ballad of East and West," which contains the line, "and never the twain shall meet." However, one of TWAIN's founders said he coined the term from *Toolkit Without An Interesting Name* after frustration at finding a name for a rather dry topic.

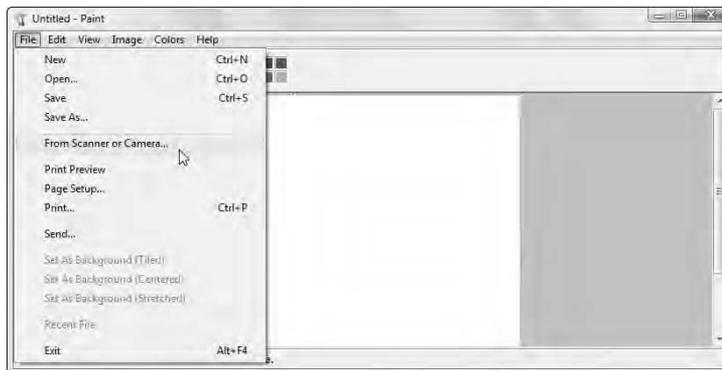


TWAIN is a *device-specific* driver. You need to install the specific version of TWAIN that comes with your device. The TWAIN driver that comes with one scanner, for instance, won't necessarily work with other scanner models.

WIA (Windows Imaging Architecture): Incorporated in Windows Me and carried through to Windows XP, WIA builds upon TWAIN to enable users to run their TWAIN-compatible devices directly from Windows. With WIA, for instance, you may access many scanners from Vista's Paint program, shown in Figure 14-1, or most other graphics programs, using the same commands for every brand or model of scanner.

Some graphics software — Adobe Photoshop, Jasc Paint Shop Pro, and others — can also control your scanner directly. Turn on your scanner, insert the material to be scanned, and load your graphics program. Choose Acquire or Import from the program's File menu. The program tells your scanner to grab the image and dump it directly into your graphics program, conveniently bypassing your scanner's bundled software. (The Acquire/Import trick works through the scanner's TWAIN driver, so it only works with TWAIN-compatible scanners.)

Figure 14-1:
To avoid a scanner's complicated bundled software, open Paint's File menu and choose From Scanner or Camera. From Scanner or Camera to control the scanner directly with Vista's built-in software.



24-bit color and 48-bit color: Computers use *bits* — a state of being turned on or off — to process information. Any item boasting 24-bit color means it can handle 16,777,216 colors, a standard known as True Color or photo quality. It's fine for most needs. (Some design and printing professionals scan at 48-bit color mode.)



USB: Almost all scanners support USB 2.0 ports. The speedy USB 2.0 standard enables them to dump high-quality images onto your computer much faster than allowed by the older USB standard. If your old computer lacks a 2.0 USB port (you'll know because color scans take so long), pick up a USB 2.0 card and install it into your computer. (See Chapter 7 for more about installing cards; USB 2.0 cards plug into a PCI slot.)

Installing a Scanner

Installing a scanner works much like installing a printer (see Chapter 4), except that you needn't worry about ink nor toner cartridges. Installing the scanner's fairly easy. (The hard part comes when trying to figure out all the confusing options offered by the scanner's bundled software.)

Follow these steps to install a scanner:

1. Remove the scanner and its accessories from the box.

Be sure to search the scanner's box for a cable — probably USB — the software, the manual, and any weird-looking plastic holders for negatives or slides. Some scanners come with their lids detached, so you might need to rummage around for that.

2. If required, install the software before installing the scanner.

Better check the manual on this one. Some scanners require their software to be installed *before* the scanner is plugged in.

3. Remove any tape securing the scanner's lid in place.

4. Unlock the scanner.

Almost all scanners come with a lock that holds their mechanism in place during transport. Be sure to lock the scanner before you move it. And always unlock the scanner when you've put it in place. Although most new scanners have safeguards, running a scanner while it's locked can cause damage.

Look for a round plastic area with a notch along the scanner's side. Rotating that round piece of plastic usually unlocks the scanner. (Sometimes there's a little slot to insert in the lock; a coin often works in the slot as a makeshift screwdriver.)

5. Put on the scanner's lid and fasten its connecting cable, if necessary.

Most lids don't have a firm hinge. Some have two prongs that slide in and out of holes, and others have spring mechanisms.

6. Plug your scanner into the power outlet and plug its connector into your computer.



Some use FireWire ports, others USB. (Some older ones connect to their own expansion card or, heaven forbid, your PC's antiquated parallel port.)

7. Press the power button.

After a second or two, Windows recognizes your new scanner. If it doesn't, try fiddling with your bundled software to see if it recognizes your new software.

If your computer doesn't seem to notice all your work, it's time to head to the next section.

Dealing with a Scanner That Doesn't Work

The biggest problem with scanners comes from their bundled software. It's often stuffed with options you don't need, making it harder to find the ones you want. To solve the problem, try skipping the software completely. Both Windows Vista and Windows XP include simple scanning software, described in the following section.

Another problem comes from plugging a USB 2.0 scanner into an older USB 1.1 port. USB 2.0 scanners want to throw information around quickly, and a computer's older, USB 1.1 port can't grab it that quickly. If your scanner takes forever to dump its image into your PC, you probably need to upgrade to a USB 2.0 port.

If you're still having troubles, try some of these solutions:



- ✓ Scanners often go to sleep when you haven't used them for a while. Try pushing the power button off and then on again to wake the scanner back up.
- ✓ If you're using a USB hub, try plugging the scanner directly into the computer's USB port. Some finicky devices don't care for hubs.
- ✓ If low-resolution scans work but your computer freezes or sends odd error messages during high-resolution scans, your computer might need more memory. Computers use memory to store information as they scan, and high-resolution scans contain a *lot* of information.
- ✓ Close down all other programs and try running the scanner by itself.
- ✓ Sometimes it's difficult to tell if the scanner itself is causing problems, or if complicated software is making the scanner act up. If your scanner doesn't seem to be working properly, bypass its software and try scanning it directly from Windows, as described in the next section.

Scanning with Windows' Built-in Software

If you find your scanner's bundled software cumbersome and downright difficult, you have an alternative. Windows Vista and Windows XP come with their own simple software for scanning images. Using Windows' menus also lets you diagnose trouble, as it lets you know if the problem lies with your scanner's software or within the scanner itself.

Follow these steps to hand the scanning reins to Windows Vista; the steps in Windows XP are almost identical. Although it's good for a quick scanner test, it's so simple you might find yourself using it for quick tasks: scanning an item for a fax, e-mail, or party flyer.



Before scanning anything, always clean it and the scanner's glass thoroughly with a lint-free cloth. Any dirt or residue will show up on the scan.

- 1. Lift your scanner's cover, place the item to be scanned on the glass, and close the cover.**

Most scanners seem to prefer that you nestle the scanned item in the top-right corner. Yours might be different. Very few, however, like you to place the image haphazardly on the middle of the glass, as the resulting images will tilt when viewed on your screen.

Like cooking grills and tennis rackets, some inexpensive scanners have sweet spots where the picture looks its best upon scanning. If you're having trouble with poor optics, light leaks, or uneven light along the scanner's edges, search the Web site to see if your particular model of scanner has a sweet spot. (Chapter 22 covers Web searches.) You might need to experiment by moving your item to different spots on the bed.

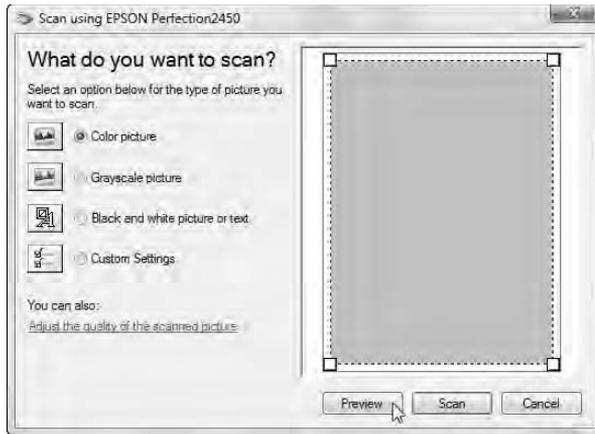


- 2. Open Paint, click the File menu, and choose From Scanner or Camera.**

Paint comes with every version of Windows, so I'm using that as an example here. But almost every graphics software offers a similar option under the File menu. If you prefer a different graphics program, click its File menu and choose Acquire, Import, or something similar to start scanning.

Windows' built-in scanning software jumps in, shown in Figure 14-2, with your scanner's name listed along the window's top edge.

Figure 14-2: Windows offers much simpler menus than the software bundled with most scanners.



If the scanner's name doesn't appear, it isn't WIA and TWAIN compatible (see the "Understanding Scanner Buzzwords" section earlier in the chapter for an explanation of those terms), and you're stuck with its bundled software.

If you own more than one scanner, choose your model from the pop-up menu.

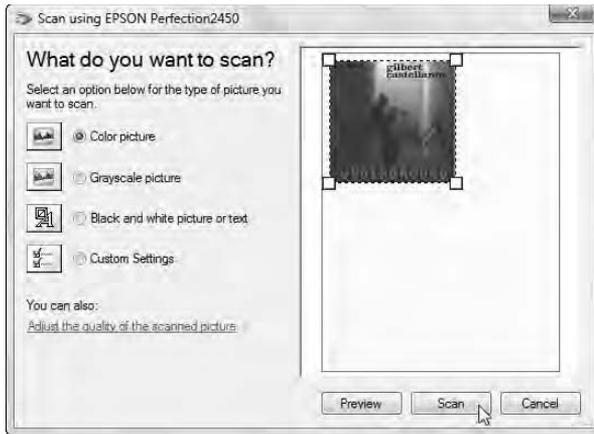
3. Choose your scan type and click Preview.

Windows offers four choices:

- *Color Picture*: This is the obvious choice for anything with color or being sent to a color printer.
- *Grayscale Picture*: Choose this for black-and-white photos where you want lots of shading. Try it to see how your color photo would look when printed by a non-color printer.
- *Black and White Picture or Text*: This is *literal*, as it separates everything into either black or white. It's mainly used for scanning text and line art, *not* old black-and-white photos.
- *Custom Settings*: Choose the resolution here, discussed in this chapter's "Choosing the right scanning resolution" section, or fiddle with the brightness/contrast settings.

When you click the Preview button, Windows scans the picture and places it on the screen. The crop marks surrounding the image, shown in Figure 14-3, show the exact area being scanned.

Figure 14-3: Click the Preview button and Windows scans the picture; drag the little boxes to surround the image so the scan crops its edges.



No crop marks around your image? Drag the corners of the little boxes to surround the image so the scanned file includes the image only — not the entire scanner area. Spend a little time adjusting them so you don't accidentally lose part of the image.

4. Click the Scan button and save the image in Paint.

When you click the Scan button, Paint scans your image and brings it into the program, as shown in Figure 14-4. From there, you can save the image as either a JPG or TIF file:

Figure 14-4: The scanner drops your scanned image into your graphics program, ready for touchup, resizing or printing.



- **JPG:** Choose JPG format if you're saving a photo. The JPG compresses images to save disk space, removing details that you'd never notice or miss. Almost all Internet-posted photos use the JPG format.
- **TIF:** Choose TIF for something you'll print, like a party flyer. Unlike JPG, TIF doesn't compress the image. That results in a larger file but saves the highest-quality image possible. (You can always convert the image to JPG later.)

I save all my images in Windows Vista's Pictures folder or Windows XP's My Pictures folder. Each of those folders live directly on Windows' Start menu.

- ✓ Windows' built-in scanning tool works great when you need a simple, no-frills way to grab your scanned images. Because the wizard works at such a simple level, it's a good way to test your scanner, making sure it's getting along with Windows.
- ✓ If your scanner worked fine until you unplugged it and plugged it back in again, repeat the process, but more slowly. Windows needs a few seconds to figure out when a USB or FireWire cable has been unplugged from the computer. Then it needs a few more seconds to recognize that one's been plugged in. Plug and unplug slowly.
- ✓ Unlike printers and modems, scanners aren't designed for sharing on a network. That's why USB scanners are preferable in multicomputer environments. If a friend down the hall really needs to scan a few photos, he can pick up your scanner, take it to his computer, plug it in, and start scanning. (He probably needs to install its drivers first, though.)
- ✓ Always remember to lock a scanner into place before moving it. This usually involves turning a knob along its side. Locking the scanner prevents damage to its sensitive scanning mechanism.



Choosing the right scanning resolution

Remember when you bought that 2400 dpi scanner because it sounded so much better than those 1200 or 300 dpi scanners? Well, when you're scanning at 2400 dpi, that's 2,400 dots per inch. Your monitor uses a pixel to display every dot. And very few monitors can display more than 2,000 pixels across their entire screen.

The point? If you scan something at 2400 dpi, you're going to see an extreme close-up of a tiny piece of your image. The rest extends off the edges of your monitor. Instead of automatically choosing the highest resolution your scanner offers, check out Table 14-1 for some common dpi settings.

<i>To Scan This ...</i>	<i>For This ...</i>	<i>Use This dpi Setting ...</i>	<i>And Save As This.</i>
Photo	E-mail	75	JPG
Photo	Web	75	JPG
Anything	Printing	Printer setting	TIF
Letter	Faxing	200	TIF
Letter	OCR	300	TIF
Anything	Archive	2400	TIF

Don't take Table 14-1 as a mandate; it's a general guideline and a good starting point. Try several scans at varying dots per inch to see which works best for you.



You can always resize or resample an image to a smaller size using graphics software. But you can't make an image larger without making it look blurry.

Turning a scanner into a copy machine

Although scanners look and work much like copy machines, they differ in one frustrating way: They have trouble reproducing your image at the same size on the same-size sheet of paper. The software with some scanners lets you turn it into a copy machine, but if your scanner's software is giving you trouble, try this trick to make a printed copy of something:

- 1. Place your item face-down in the top-right corner of the scanner bed.**
- 2. Place a sheet of 8.5-x-11-inch office paper on top of it, in the same corner.**

(Feel free to make a large X on the sheet of paper before setting it on top of your scanned item.)

- 3. Preview your image on the scanner, being careful to crop the scan to the *same size* as the 8.5-x-11-inch paper, and then make your scan.**

(The large X you drew on the sheet of paper makes it easier to see in the scanned preview.)

- 4. Open your scanned image in a graphics program and print it on an entire sheet of paper.**

You can use any graphics program for the last step, but choose Page Setup from the program's File menu and tell the program to print your scan on a single sheet of 8.5-by-11-inch paper. Because that's also the size of your scan, you'll end up with an actual-size printed reproduction of your scan.

If you're scanning something that you want to archive for later use, use 2400 dpi or higher resolution and burn the gargantuan image on a blank CD or DVD. A high-resolution image always leaves you the option of taking it to a professional print shop for making a high-quality print.

Dealing with scans that look awful

A glance at all those menu options on a scanning program should make anyone realize that scanning is a fine art. (If that's not enough, look at the menus on Adobe Photoshop — or just look at the software's price tag.) Like any other art, scanning takes lots of practice before things look exactly the way you want.

Luckily, scans are free, just like digital photos. Take several using different settings and delete the ones you don't like. You're not wasting any paper — just temporarily filling space on your hard drive.

Here are a few basic tips to get the most out of your scanner:



- ✓ When in doubt, visit the scanner manufacturer's Web site and download the latest versions of the software and drivers. Most manufacturers update them on a regular basis to repair problems discovered by other annoyed users. The warehouse workers stuffed the scanner's box several months before it arrived on store shelves, and its software and drivers are usually out of date.



- ✓ Always clean your scanner's glass surface with a lint-free rag (never paper towels, which can scratch) and some glass cleaner. Spray the cleaner on the rag, not the glass, or the glass cleaner could seep between the glass and the scanner's sides. Any dust on the glass or your photo (or whatever you're scanning) shows up when scanned.
- ✓ Make sure your monitor displays as many (or more) colors as your scanner's current setting. (I explain how to change your monitor's color settings in Chapter 3.)



- ✓ If you're using an older USB scanner, turn off or unplug your other USB devices before making large scans. That speeds up the rate at which your scanner can send information to your computer.
- ✓ You can find a wealth of information about scanners on the Internet. If you're serious about scanning, definitely pick up a book devoted entirely to the subject. You can apply lots of tricks to scan successfully.

Chapter 15

Adding a CD or DVD Drive

In This Chapter

- ▶ Understanding CD and DVD terminology
 - ▶ Identifying varieties of CD and DVD drives
 - ▶ Installing a CD or DVD drive
 - ▶ Fixing problems with CD and DVD drives
 - ▶ Recording onto CDs and DVDs
-

CDs pushed floppy disks off the stage about a decade ago. Only computing old-timers remember when programs arrived on a small stack of floppies, and software installation was like dropping quarters into a slow parking meter. Very few people miss floppy disks.

Today, most new programs arrive on a single CD, ready to pop into your computer like a breath mint. Adding to the fun, CDs can contain music as well as programs. Everybody in the office thinks you're backing up your work, but you're actually copying a Biosphere CD onto your computer.

Now DVDs are moving in, possibly pushing CDs into the realm of floppies. For example, your PC needs a DVD drive to install Windows Vista — Vista's too large to fit onto a CD. Vista can also write to DVDs, letting you create movies as well as make high-capacity backups.

This chapter makes some sense of CDs, DVDs, and the terminology surrounding them. It explains how to install new CD or DVD drives and fix or replace the old ones.

Understanding CD and DVD Buzzwords

CD and DVD drive terminology can be more confusing than the fine print on a credit card bill. Here's a look at the drives you're likely to run across, either in your own PC or those at work.

If you don't feel like putting on your wading boots, jump ahead to the "Just tell me what drive to buy!" sidebar and skip over the large pool of acronyms lying ahead.



CD drives will soon disappear from PCs. Any DVD drive can read both CDs and DVDs. Writable DVD drives can read and write to both CDs and DVDs.

Flavors of CDs and CD drives

CDs and CD drives come in the following flavors:

CD drive (Compact Disc): Still found in older computers, these drives do just one thing: read compact discs (CDs). They can't write (or *burn*) new information onto a blank CD. Many CD drives manufactured before 1998 can't even read audio CDs digitally, considerably reducing their sound quality.



Some evil music publishers sell awful copy-protected CDs that don't play in computers at all. Before buying a music CD, read the label carefully and make sure that you can return the CD if it won't play on your computer.

CD-RW drive (Compact Disc Read/Write): Almost all CD drives read *and* write information to blank CDs. Also known as *recordable drives* or *CD burners*, their prowess is judged by their speed at reading and writing information. (Look for a read/write speed of at least 48x.) The front plate of most CD-RW drives contains a red light labeled Writing that lights up as the CD writes information to the disc.

CD-R (CD-Recordable) disc: Readable in any CD drive, these cheap, blank CDs can be written to only *once* by CD-RW drives. They're meant for storing files you want to keep indefinitely: music CDs, archive copies, and digital photos.

CD-RW (CD ReWritable) disc: More expensive than CD-Rs, these CDs can be written to, erased, and written to again by CD-RW drives. Buy these to store things that change often, like your daily backups. Although most drives can read CD-RW discs, they're most dependably read by the drives that wrote the information onto them.



You can write to only those CDs that are designed specifically for recordable CD drives. You can't reuse those freebie AOL discs given away at the grocery store.

Kodak Picture CD: When you have your film developed, for an extra charge some developers and photo kiosks can stick your pictures on a CD as well as make prints. One example, the Kodak Picture CD, includes a built-in slideshow program for your PC and DVD player, as well as editing tools.

Flavors of DVDs and DVD drives

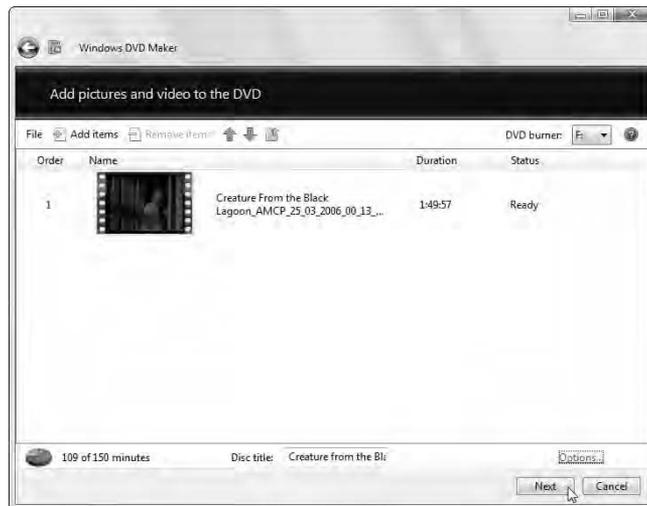
DVDs and drives come in the following flavors:

DVD drive: Short for Digital Versatile Disc or Digital Video Disc, these drives read the DVDs you buy or rent at video stores, as well as play music CDs and program CDs. Unlike writable CD drives, writable DVD drives use different formats to write to blank DVDs. Unfortunately, the different formats aren't always compatible with each other.



Windows Vista can *finally* write information directly to a blank DVD, as shown in Figure 15-1. There's no need to buy a third-party program for writing files to a DVD or creating a movie destined for the DVD player.

Figure 15-1: Unlike previous Windows versions, Windows Vista can write files, including video, directly to a blank DVD.



DVD-R, DVD-RW drives: Created by Pioneer and Sony, this first school of recordable DVD standards keeps drives compatible with most (but not all) DVD drives and players. (Note the minus sign between the DVD and the letters R and RW.)



With recordable DVD discs as well as CDs, the term *R* (*Recordable*) means the blank disc can be written to once; the term *RW* (*Read/Write or ReWritable*) means the blank disc can be written to, erased, and written to again many times.

DVD+R, DVD+RW drives: Supported by Microsoft and a wide variety of hardware manufacturers, this newer class of DVD standards allows more features, versatility, and compatibility with existing drives and players.



Just tell me what drive to buy!

Don't bother buying a CD drive anymore. Instead, buy a DVD burner — a drive that reads and writes to both DVDs and CDs. When you're shopping for a new DVD burner, buy one that supports *all* the main formats: DVD-R, DVD+R, DVD-RW, and DVD+RW. Some drives abbreviate that entire string of acronyms to one: DVD \pm R/RW. When you see that string of acronyms on a DVD drive's box, that drive plays and writes to *all* the DVD formats you're likely to come across.

Most CD drives come labeled with several speed ratings: 48x/24x/16x, for example. That refers to

the speed at which a drive can *read*, *write*, and *rewrite* information, in that order, to or from the disc. The larger the number, the faster the speed, and the less time you spend waiting for the drive to finish its work.

DVD drives, by contrast, ignore those speed rating rules. You must read the fine print to find out which speed applies to which action: reading, writing, or rewriting. Plus, some DVD drives also list their speeds for reading, writing, and rewriting CDs, too. That makes for a *lot* of fine print, unfortunately.

DVD-RAM drives: An oddball format created by Matsushita mostly for computer data storage, these drives use blank DVDs enclosed in little caddies. Like all other DVD drives, they can still play movies and CDs.

DVD-R, DVD+R, DVD-RW, DVD+RW discs: Although most DVD drives sold today can read and write to *all* of these formats, some older drives can't. If you're stuck with an older drive, buy the correct type of blank disc for the format used by your particular DVD drive.

Dual-layer discs: These discs add a second layer of data beneath the first one that's accessible from the same side of the disc. That lets you pack twice as much information onto the DVD, typically 8.5GB or about 4 hours of video. (Normal, single-layer DVDs hold about 4.7GB or 2 hours of video.)

Buzzwords in advertising

These terms pertain to both CDs and DVDs and usually appear listed on the drive or disc's packaging.

Cache (buffer size): To speed things up, drives contain some speedy memory chips to hold information recently grabbed from a disc. If the information is needed again, the drive dishes it up out of the speedy memory *cache*, sparing the delay of rereading the disc. Bigger caches result in faster drives.

700MB/80 minutes: The most commonly found blank CDs today, these hold 700MB of information or 80 minutes of digital audio. Most modern drives handle them fine.

4.7GB/120 minutes: The most commonly found blank DVDs today, these hold 4.7GB of information or 120 minutes of video. Most DVD drives and players handle them without problem.

8.5GB/240 minutes/dual layer: Some newer DVD drives and discs are *dual layer*, meaning they can stuff two layers of information on the same side of the disc for a total of 8.5GB of information or about four hours of video. All DVD players and drives can read dual-layer discs, but only *dual-layer* DVD burners can write to them. Only DVDs specifically labeled as *dual-layer* are dual-layer discs.

Internal/external: Internal drives mount inside your computer. External drives come in their own little box and plug into your computer's USB or FireWire port. External drives can be shared between different computers, making them great for backups and taking to friends' houses.



USB: The USB 1.0 and 1.1 ports found on older computers limit an external drive's writing speed to about 4x. Most externals require the faster USB 2.0 standard. If you're stuck with an older USB port and a USB 2.0 drive, pick up a USB 2.0 add-on card and install it in one of your PC's PCI slots, a simple and inexpensive procedure described in Chapter 7.



FireWire: These speedy ports support fast external drives just as well as USB 2.0. (They're also well supported by desktop video applications.)

Optical drive: Because CD/DVD drives read information with little lasers, they're sometimes called *optical* drives.



The most up-to-date compact disc information resides online at Andy McFadden's gargantuan CD-Recordable FAQ Web site (www.cdrfaq.org). A matching smorgasbord of up-to-date online information about DVDs lives at Jim Taylor's www.dvddemystified.com.

Installing an External CD or DVD Drive

Difficulty level: Easy

Tools you need: One hand

Cost: Anywhere from \$100 to \$200

Stuff to watch out for: Actually, there's not much to look out for. Installing an external CD and/or DVD drive is as simple as plugging in a mouse or keyboard.

1. Remove the new drive from the box and find all the goodies in the packaging.

The drive and its USB or FireWire cable are included in the box. (Older drives sometimes use a parallel or PC card.) Many external drives come with power supplies, as well.

If you're bored, take a peek at the instruction booklet for specific installation instructions: Some come with software that usually should be installed *before* you plug in the drive — if you can wait that long.

2. Plug the drive's power cable into the wall, if necessary, and turn it on.

Some drives grab their power straight from your computer's USB port.

3. Install the drive's software, if necessary.

4. Plug the drive's cable into the computer.

Plug the drive's cable into its port and your computer's appropriate port: USB, FireWire, or parallel. (And with some older drives, a laptop's PC card slot.)

Windows automatically recognizes your drive when it's plugged into the USB or FireWire port.

If Windows asks for drivers the first time it's plugged in, insert the drive's installation disc into one of your *computer's* drives — not the drive you're trying to install.



Installing an Internal CD or DVD Drive

Difficulty level: Medium

Tools you need: One hand, a screwdriver, and tweezers

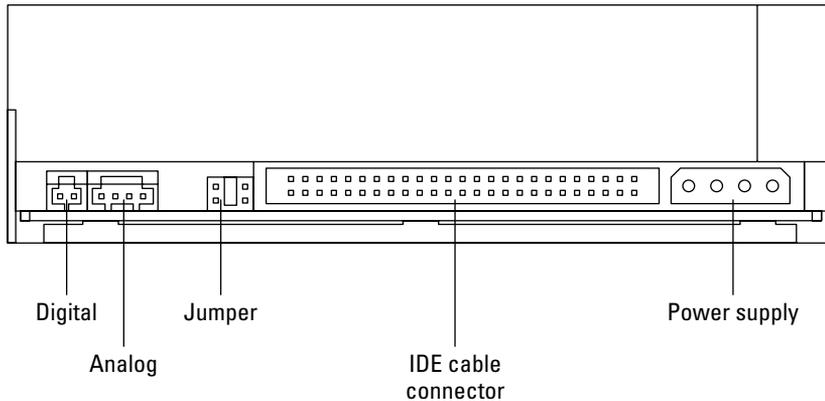
Cost: Anywhere from \$25 to \$150

Stuff to watch out for: Internal CD/DVD drives install the same way as installing a hard drive, discussed in Chapter 9: Just slide in the drive, screw it in place, and plug in the same two cables (power and data). Check out Figure 15-2 to identify where the cables plug in; the following steps offer more precise instructions.

1. Turn off your computer, unplug it, and remove its case.

You can find complete instructions on the Cheat Sheet at the front of this book.

Figure 15-2:
Cable connectors on a CD or DVD drive (left to right): digital, analog, jumper, IDE cable connector, and power supply.

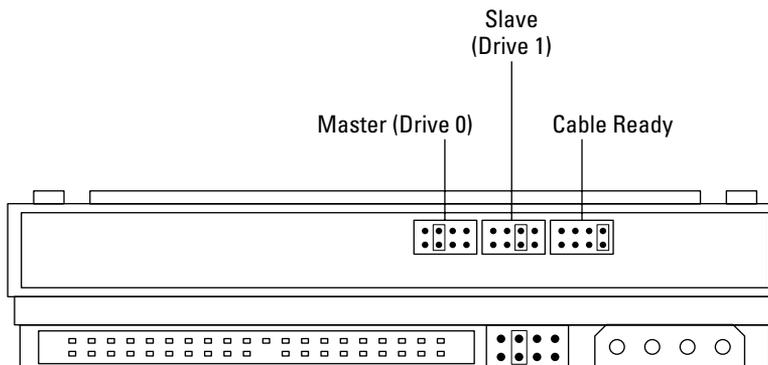


2. Decide if the new drive will be master, slave, or Cable Select, and then set its jumper accordingly.

Most computers have room for more than one CD or DVD drive these days. Because the drive's ribbon cable usually has two connectors that accept a drive, the computer needs to know which drive is attached to which cable connector.

You do that by moving a little *jumper* over different pairs of pins on the back of the drive, as shown in Figure 15-3. Use a pair of tweezers to pull the jumper off the existing jumpers and push it onto the appropriate ones. (A bent paperclip pries off a stubborn jumper, if tweezers aren't handy.)

Figure 15-3:
By moving a jumper across different pairs of pins, you tell the drive to work according to its position on the ribbon cable.



Check the drive's manual to see which pins it prefers in your particular configuration. Here are some suggestions:

- If you're replacing an existing drive, look at the current drive's jumper settings. Then set the new drive's jumpers the same way. If the current drive is set at master, for instance, set the new drive to master, as well. (Different drives use different pin settings, so don't simply duplicate the pin's location; use the labeling, instead.)
- If you're installing a second drive onto the same cable as your current drive and the current drive is set to master, set the second drive's jumpers to slave. (There's one exception: If the current drive is set to Cable Select, use Cable Select for the second drive, as well.)
- If you're installing a new drive onto a cable by itself, set the new drive's jumpers to master.
- If you're installing any drive onto a ribbon cable with connectors labeled master and slave, you'll probably set its jumpers to Cable Select.

If you need more information about master, slave, and Cable Select settings, check out their coverage in Chapter 9.

3. Slide the new CD or DVD drive into the front of your computer.

You need a vacant *drive bay*, which is an opening where your disk drives normally live. The drive should slide in the front. You usually need to pry out a rectangular plastic cover from the front of your computer before the drive slides in. (Sometimes you must pry out a thin foil protector from behind the plastic cover, too.)

4. Connect the flat ribbon cable between the drive and your motherboard.

The ribbon cable has a plug on each end and a third plug a few inches from another connector. The two plugs that are closest together plug into your drives; the connector that's farthest apart from the pair plugs into the motherboard.

Ribbon cables have a red stripe along one side. One of the pins on the motherboard's (or card's) IDE connector is labeled Pin 1. When plugging the cable into the motherboard or card, make sure the edge with the red stripe is closest to Pin 1. (The drive won't work if the cable is reversed.)

Here are the different scenarios for connecting the cable:

- If you're replacing an older drive, simply remove the ribbon cable's connector from the old drive and plug it into the new drive. (The connector only pushes in one way, so don't force it.)



The other end of the connector is already plugged into the proper spot on the motherboard.

- If you're adding a second drive, find the ribbon cable connecting to your first CD/DVD drive. The ribbon cable should have a second connector a few inches from the first drive. Plug that second connection into your new drive. The ribbon cable's other end is already plugged into the proper spot on the motherboard.
- If you're adding a completely new drive, locate where your hard drive's ribbon cable currently plugs into the motherboard; you'll see an unused connector next to it. (It's usually labeled Secondary IDE.) Plug the CD/DVD drive's ribbon cable into that empty connector. Plug one of the other connectors into your drive.



Don't plug a CD/DVD drive and hard drive onto the same ribbon cable. Hard drives work much faster than CD/DVD drives, and you don't want to slow it down.

5. Connect the power cable.

Rummage around the tentacles of wires leading from your power supply until you find a spare power connector. They come in two sizes; plug one of the larger ones into your CD or DVD drive. (The plug fits only one way, so don't force it.)

6. Screw the drive in place.

Although some drives screw in from the sides, others fasten with two screws along the front.

7. Replace your computer's cover, plug the computer in, and turn it on.

When Windows boots up, it should recognize the new drive and automatically install it for you.

8. Run the drive's software, if necessary.

Unlike most things you push or screw into your PC, CD and DVD drives don't require drivers in Windows XP and Windows Vista. Some drivers come with free disc burning software that's more powerful — but more complicated — than the disc burning tools built into Windows Vista and Windows XP.



Although CD and DVD drives don't require drivers, they might need updates to their *firmware* — built-in software that helps them write to discs. Visit your drive manufacturer's site, download the latest firmware for your drive, and run the installation program to bring your drive up-to-date.

Dealing with a CD or DVD Drive That Doesn't Work

When that newly installed drive doesn't work, it's time to retrace your steps. Sometimes the master/slave jumpers are in the wrong place. Other times a cable isn't plugged in to the right connector. Run through the steps in the preceding section, making sure everything connects the way it should.

If you're having trouble hearing theater-quality sound from your DVD player, Chapter 11 covers computer sound issues.

Dealing with a burner that doesn't burn discs

If your computer is having trouble writing information to a CD or DVD, several things could be the problem. Here's a list to check:



- ✓ Your hard drive needs up to 1GB of free space when your drive burns data to a blank CD; it needs up to 8GB of space when burning to a blank DVD. If Windows says it needs more hard drive space, use the Disk Cleanup program, covered in Chapter 21. If you burn a lot of DVDs, you might need a larger hard drive, covered in Chapter 9.
- ✓ Always burn information that's currently on your *own* PC. If the information lives on a *networked* PC, copy the information to your own PC, and then burn it. Your PC needs to write to the disc in an uninterrupted stream, and your network might not send the information quickly enough.
- ✓ Disc burning programs usually burn at the fastest speed possible. That might be more than your particular CD or DVD drive can handle, leading to botched burns. Look at the blank disc's label for its rated burning speed, and then reduce Windows' burn speed accordingly.
- ✓ Drives must write information to the disc in a continuous flow. If your computer is interrupted during the process and doesn't feed information to the drive quickly enough, the disc might suffer, leading to skips or gaps in the data. To be extra safe, don't run other programs when you're burning CDs or DVDs.
- ✓ Buy blank discs in bulk, as some damaged discs inevitably turn into coasters. You'll feel less guilty about throwing a damaged one into the trash if you still have 49 more on your stack.





- ✓ Third-party disc burning programs often disable Window's own method of burning to CDs and DVDs. Use one program or the other, but don't try to use both.
- ✓ If you're using a third-party program to burn your discs, check the manufacturer's Web site often for updates. Burning programs seem to accumulate lots of patches and fixes that enhance performance.

Understanding MP3 and DVD decoders (MPEG)

As described in Chapter 9, digital sound and video consume *lots* of disc space when stored in files. To shrink the file's sizes, Windows uses special *codec* software. (*Codecs* contain mathematical algorithms for compressing and decompressing digital sound and video.) Similarly, a *decoder* decompresses the files so that you may hear or view them.

The problem? Not all versions of Windows contain those decoders, and you can't create an MP3 or watch a DVD without them.

Here's the scoop:

Windows Vista and Windows XP both include a free MP3 codec that lets you listen to and create MP3 files in Media Player. (If your version of Windows XP *can't* create MP3 files, fix the problem by installing Service Pack 2 from Windows Update.)

It's another story with DVDs, though. By themselves, only two Windows Vista versions can play DVDs: Vista Home Premium and Vista Ultimate. If you own any other version, you need to buy third-party software to watch DVDs on your PC.

Windows XP treats DVDs even worse. No Windows XP versions let you watch a DVD on your PC. To fix the problem, you must install a Windows XP-compatible DVD codec.

Some DVD drives and most new PCs come packaged with free DVD software made by a third party. The software installs the codec that enables Windows to decode and play the videos. If you reinstall Windows XP from scratch, be sure to install your DVD drive's software in order to watch DVDs.

How do I know my disc drive's model and speed?

Unfortunately, Windows doesn't tell you your drive's speed rating nor the type of discs it requires. That leaves the sleuth work up to you, by following these guidelines:

- ✔ Look at your PC's documentation, if it came with any.
- ✔ Check out your PC's sales receipt. Some of them list every part inside your PC, including your drive's type and speeds. At the least, it should list the drive's model number and manufacturer.
- ✔ Visit the drive manufacturer's Web site, look up the drive's model number, and download its information sheet.
- ✔ When all else fails, open the case on your computer, remove the drive, and look at the stickers on its case. They'll list the manufacturer and model number. From there, you can visit the drive manufacturer's Web site to see the drive's ratings.

Buying the right blank discs for your CD or DVD drive

When you're creating something you want to keep around for awhile — backups of your digital photos, a duplicated music CD, and similar permanent items — buy blank CD-R discs.

When you want to write information repeatedly to the same disc — a daily backup, for example — buy blank CD-RW discs.

The same rules apply to blank DVDs, but it's a little more complicated, as DVDs come in two flavors: DVD-R and DVD+R. Early DVD drives could write to only one of those two formats. Newer players can write to both.

As you've noticed, the cost for blank CDs and DVDs ranges wildly. How do you know which one to buy? That question's not answered easily, however, because you never know what you're getting. Most vendors buy their blanks from third parties, and then put their own name on them.

Because there's no way of knowing who *really* made the discs, there's no way of sticking with a particular brand.

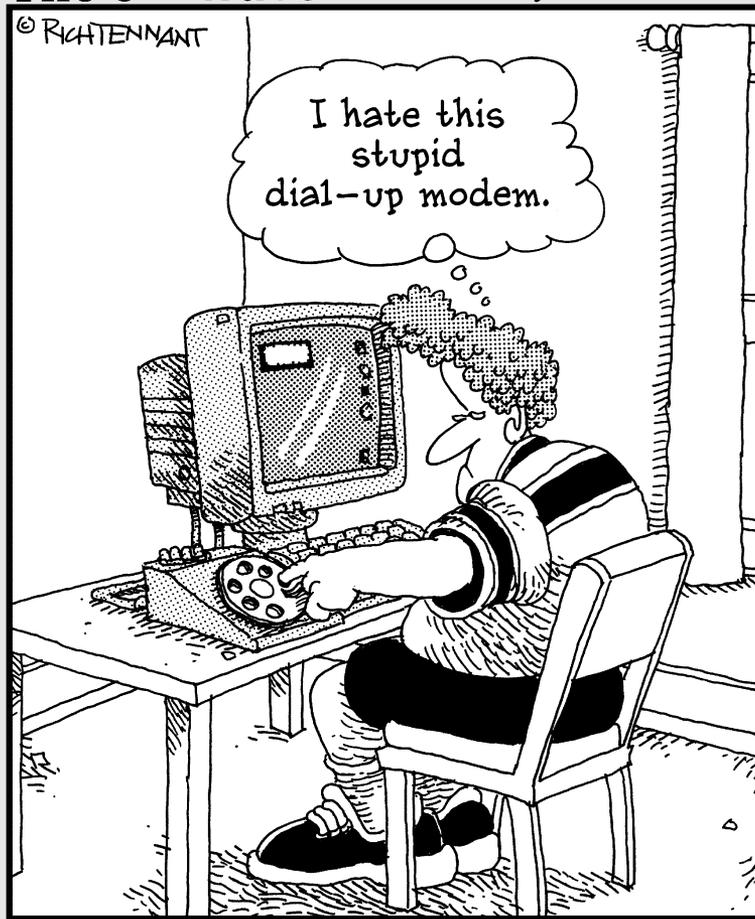
To increase your odds of success, try several brands, and then stick with the ones that work the best with your particular drive. Borrow a disc or two from your friends and see how it works for you. You'll run across a few duds, but that's the way the blank disc business works.

Part IV

Communications

The 5th Wave

By Rich Tennant



In this part . . .

Windows Vista loves to chat. As soon as you install or upgrade to Windows Vista, it tries to connect with the Internet and announce its presence.

Windows Vista is ready to talk to any other computers sitting in your home or office, as well. Don't want to string networking cables around the house? Windows Vista is content to chatter through the airwaves — it includes built-in support for wireless networking.

This part of the book shows you how to install or upgrade your modem for dialup Internet access as well as send and receive faxes. You find out how to set up your own home network, as well as add wireless access so that you can check your e-mail while you're gardening.

And if you're ready to sooth your paranoia level a notch, Chapter 18 shows you how to set up Windows Vista's built-in firewall and poke holes in it, if necessary, for those programs that need to chat in special ways.

Chapter 16

Replacing a Modem

In This Chapter

- ▶ Figuring out dial-up, DSL, cable, and other fast modem technologies
 - ▶ Upgrading to a better modem
 - ▶ Installing an external modem
 - ▶ Configuring Internet Explorer for a dialup modem
 - ▶ Buying a cable modem to replace a rental unit
 - ▶ Stopping call waiting disconnects
-

Windows keeps a constant finger on the Internet's pulse, turning the Internet from a luxury into a necessity. Vista even drops by Microsoft's Web site occasionally to make sure you've paid for your copy of Windows. Because Windows loves the Internet so dearly, it's understandable that nearly every computer sold in the past few years comes with a built-in dialup modem and a network card for high-speed Internet connections.

So, what's left to explain in a chapter on modems? Well, how to understand their language, for one. What's *broadband* service, for example, and how do you use it to speed up an Internet connection? Where do you prod your computer when it suddenly stops talking to the Internet? How do you replace a modem that no longer works?

This chapter tackles those questions and more, including how to replace your rented cable modem with your own inexpensive model, which stops the cable company from charging you rental fees.

Understanding the Various Types of Internet Services

Internet services — the companies you pay for the privilege of connecting to the Internet — come rated largely by how fast they spew information back and forth to other places. Here's a rundown of the three most common types of Internet connections available today: dialup, cable, and DSL.

Although you're probably tempted to eyeball the fastest type of Internet connection and say, "Gimme that one there, mate," it's not always that easy. Your Internet options depend largely on where you live. Most companies offer their services to certain areas only, and your options decrease the farther you live from larger cities. Choose the fastest one you can afford that's available in your area.



The speeds listed for each type of service constantly vary. Though your car's engine can move the car at 100 mph, you can't always drive that quickly because of stoplights, narrow streets, and traffic. The Internet has traffic problems as well, which slow down things for everybody. In fact, when a Web site loads slowly on your PC, the problem could very well lie with the Web site itself, not your connection.

Dialup or POTS (Plain Old Telephone Service)

The slowest by far, dialup modems still provide the Internet's gateway for many people, especially those in rural areas. An ordinary phone cord connects the computer's modem to an ordinary phone jack. To log on, the Internet browser dials a number provided by the Internet Service Provider (ISP) and waits for a connection. Most dialups work at speeds between 28,800 bps (bits per second) and 56,000 bps (also known as 56K).

The higher the bps number, the more information the modem is able to move in and out of your computer. Faster modems enable you to connect to the Internet more quickly, making Web sites splash onto your screen faster.

People with dialup connections hog the phone line when connected — nobody else in the house can use it. Also, even though modems can connect at 56K, they rarely connect at that high a speed; the speeds average in the high 40s.

For many people, this is the only type of Internet service offered in their area. Be patient. Broadband — the faster service provided by cable and DSL modems — will come to you one of these days.

Cable modems

The speediest of all, cable modems grab Internet data at anywhere from 1,500 to 10,000K and send data at speeds from 256 to 1,500K. (My cable modem downloads at 7,000K and uploads at 512K.) That's pretty darn fast.

The Internet rushes into your home through the same coaxial cable that your TV shows flow through, making your cable TV company your Internet Service Provider.

To set things up, a cable techie drops by your house or office to do this: Install a network card in your computer (if it needs one), split your cable TV signal, and hook the cable to a special cable modem, which you rent for a monthly fee. After the cable modem's connected to your PC's network card, your cable modem lets you connect to the Internet at blistering speeds.

Yes, the family can still watch cable TV or listen to cable radio at the same time you're blazing around the Internet.



Many cable providers and other broadband ISPs claim to offer “unlimited Internet access.” *Unlimited* is a marketing term, of course. They all get upset if you start downloading too much information — lots of movies, for instance — and they'll slow down or cut off your access.



People with Internet connections like cable and DSL (described in the next section) should read Chapter 18 on setting up a firewall. Because they're always on and constantly receptive to Internet commands, broadband modems make irresistible targets for evil computer hackers.

DSL (Digital Subscriber Line)

DSL offers yet another broadband modem that attempts to squeeze the most information through your home's tiny copper phone lines. Phone companies use digital signal processing techniques to beef up the copper wire's bandwidth. DSL enables you to download from 640K to 3,000K and send data at up to 768 Kbps.

The downside? You must live near a phone-switching station for DSL to work, and the closer you live to the station, the faster your connection. Some people ask a realtor if a house is near good schools. Others ask if it's close to a phone-switching station.



Asymmetric DSL, or *ADSL*, shuttles data at different speeds, depending on whether you're uploading or downloading. It's fine for home users, who rarely upload many files. *Symmetric DSL* moves data at a constant speed in either direction. *SDSL* works better for businesses that must transmit large amounts of information.



Baud, bps, Kbps, Mbps, and other tidbits

Modem speed is measured in *bps* (bits per second). Some people measure modem speed in baud rate, a term that only engineers really understand.

If you see the term *Kbps*, it's the metric system way of saying, thousands (Kilo) of bits per second.

That means that 56K (pronounced *fifty-six KAY*) is *56,000 bits per second*.

With the advent of broadband technologies like the cable modem, a new unit of measure arose: 1 Mbps means roughly 1,000 kilobits, or roughly a million bits per second.

Installing or Replacing a Modem

Difficulty level: Easy

Tools you need: One hand and, for internal modems, a screwdriver

Cost: Anywhere from \$25 to \$150

Stuff to watch out for: These three sections explain how to replace the three most common types of modems: internal dialup, external dialup, and cable modems.



PC card modems for laptops don't warrant a section because they're so easy to install: Slide the PC card into your laptop's PC card slot, usually found on the laptop's side. Install the PC card's bundled software, and you're done.

Replacing your internal dialup modem

Replacing an internal modem consists of pulling out the old modem card from a slot inside your PC, pushing the new one into that newly vacated slot, and plugging the phone cord into the modem's Line jack. If you're not keen on opening your PC's case, plug in an external modem, instead, described in the next section.

Internal dialup modems cost the least, followed by external dialup modems, followed by cable modems.



Cards are particularly susceptible to static electricity. Tap your computer's case to ground yourself before touching the card. If you live in a particularly dry, static-prone area, wear latex gloves — the kind that doctors and dentists wear.

To install a card, follow these steps:

1. Turn off your computer, unplug it, and remove the cover.

Don't know how that cover comes off? Flip to the Cheat Sheet at the front of this book for the answers.

If you're adding a new internal modem — not replacing your old one — jump to Step 4.

2. Locate your existing internal modem.

See that row of slots toward the back of your PC? Those slots line up with the slots on the back of your PC — the part where you plug in most of your cables. Look to see where you plug in your phone cable — that's the back end of your internal modem card. The bottom of the card rests inside a slot.

3. Remove your old modem card.

With a small screwdriver, remove the single screw that holds that card in place. Save that screw, as you need it to secure the new card in place.

After you remove the screw, only friction holds the card in its slot. Pull up on the card until it pops out of the slot.

If you drop the screw inside your PC, poke it out with a screwdriver or chopstick. If that fails, shake your PC upside-down until the screw falls out.

If you're adding a new card to an empty slot, remove the screw holding the cover in place. Then remove the cover and proceed to Step 4.

4. Push the new card into its slot.

Line up the tabs and notches on the card's bottom with the notches in the slot. Push the card slowly into the slot. You might need to rock the card back and forth gently. When the card pops in, you can feel it come to rest. Don't force it!

5. Secure the card in the slot with the screw.

Yep, your precious modem is held in place by one screw.

6. Plug the computer back in, turn it on, and see whether Windows recognizes and installs the new internal modem.

Windows usually recognizes newly installed cards and sets them up to work correctly. If your modem came with a CD, be sure to insert it when Vista begins clamoring for *drivers* — translation software that helps Vista talk to new parts.

If something goes wrong, head for this chapter's "Troubleshooting Modem Problems" section. If everything's working, however, put your PC's cover back on.



7. Connect a phone cable from the modem's Line jack to the phone jack in the wall.

If you need a place to plug in your telephone, plug it into the modem's second phone jack — the one with the icon of the phone next to it. Not sure which jack is which? Jump to Step 3 in the next section, "Installing an external dialup modem," for more detailed instructions.

Installing an external dialup modem

External USB dialup modems — the most common external modems — are the easiest type of modem to install. Check the box at the store to see if it includes a USB or serial cable. No cable? Pick one up at the store.

To install an external modem, follow these steps:

1. Locate where to plug in your new modem.

Examine the back of your computer, and then match up its ports with the pictures in this book's Appendix. External modems plug into an unused serial or USB port. (Most plug into the USB port.)

2. Connect the cable between your modem's port and the port on your PC.



Almost all modems plug into your PC's USB port, that rectangular slot shown in the margin. If the plug doesn't push easily into the port, turn the plug upside down and try again. (Only friction holds it in place.) The cable should fit perfectly at both ends; the plugs fit only one way.



If your modem cable's plug *isn't* rectangular, it probably plugs into a serial port, shown in the margin.

3. Plug the phone line into the back of the modem.



If your modem has a single phone jack in the back, plug one end of the phone cord into that jack and plug the cord's other end into the phone's wall jack. However, if your modem has *two* phone jacks, the procedure is a little harder: One phone jack is for the phone line cord, and the other is for a telephone. If you plug the cables into the wrong jacks, neither the modem nor the phone will work.



If you're lucky, the two phone jacks are labeled. The one that says *Phone* (or shows a picture of a phone) is where you plug in your telephone. The one that's labeled *Line* is for the cord that runs to the phone jack in your wall.

If the two jacks *aren't* labeled, just guess at which line plugs into which jack. If the modem or your phone doesn't work, swap the two plugs. (Having them wrong at first doesn't harm anything.)

4. Plug the modem's AC adapter into the wall and plug the other end into the modem. Then turn the modem's power switch on.

Almost all external modems need an AC adapter. Then they need you to turn them on. (These are two things that can go wrong.)

5. Tell Windows to search for your modem, if necessary.

As soon as you turn on your newly plugged in modem, Windows should recognize it and set it up for use. If Vista starts asking for drivers, now's the time to insert the CD that came with your external modem.

If something goes wrong, head for this chapter's "Troubleshooting Modem Problems" section. If everything's working, however, put your PC's cover back on.

6. Adjust any settings, if necessary.

If this is your first modem, there's one thing to set up: Internet Explorer. If Internet Explorer doesn't find your modem, drop by this chapter's last section, "Troubleshooting Modem Problems."

Replacing a cable modem

Sooner or later, you're going to grow tired of paying a monthly rental fee to your cable company for its cable modem. And as you note the rapidly decreasing prices of cable modems, you might want to buy your own. Or at least, that's what I did. Here's how.

1. Visit your cable provider's Web site and note what modems it accepts.

Not all cable modems work with every provider. To see which modem brands and models your ISP supports, visit the Support area of your cable company's Web site. Some cable providers support more than a dozen different models from different manufacturers.

2. Buy one of the supported cable modems.

You can find many cable modems available online at Amazon (www.amazon.com). If your city has offered cable service for a year or so, you might also find them available at computer stores and even home stereo stores.

3. Choose a time to install the modem.

Find out the hours your cable company offers technical support and install the modem while the technical support lines are open. *You will need to talk to them after installing the modem or the modem won't work.*





If your company offers 24-hour technical support, replace your modem in the late evenings or weekends, so you don't have to wait on hold so long.

4. Turn off your computer.

5. Turn off and unplug the old cable modem's power cord.

Remove the old modem's AC adapter from the wall.

6. Plug your new cable modem's AC adapter into the wall.

Plug the adapter's other end into your new modem.

7. Unplug the cables from your old modem and plug them into the new modem.

You find two cables:



Remove the network cable (it looks like a big phone line) from the old modem and plug it into the new one. The jack fits only one way.

Remove the cable connection from your old modem and plug it into the new one. This looks like the same cable that plugs into your TV or cable box.

8. Turn on your new cable modem and turn on your computer.

Don't panic when your new modem doesn't work. It's not supposed to work yet. Every modem has a *MAC address* (Media Access Control) — a special code number that enables the cable company to find it over the Internet.

You often find your modem's MAC address on a sticker placed on its side or bottom. If it's not there, check the modem's box. *You need that number!*

9. Call the cable company's technical support line and give them your new MAC address.

The technical support people diligently type your new MAC address into their computers, replacing the old modem's MAC address.

10. Make arrangements to return the old cable modem and its AC adapter.

At first, my cable company wanted me to drive 50 miles to its drop-off station. I complained and asked to talk to a supervisor. The supervisor agreed that was too far away and sent a truck out to pick it up the next day — for free.

11. Play FreeCell until your new modem starts working.

It takes your cable company's network anywhere from a few minutes to several hours to locate your new modem and start sending information.

During this time, the new modem's lights will flash, frantically trying to find someone to talk to. When the cable network finally connects, Internet Explorer and your e-mail program start working again. You're done!

Your new cable modem won't connect any faster than the old one because your ISP determines your connection speed. But it sure is nice to remove that monthly rental fee from your cable bill.

Troubleshooting Modem Problems

Installing modems is pretty easy, actually. The more difficult part is making sure your software knows how to talk to it. Here's how to complete the process by configuring Internet Explorer to work with a new Internet Service Provider, turn on a dialup modem's fax capabilities, and tweak a modem's settings.

Windows Vista can't find my dialup modem!

Sometimes all your modem installation work goes unnoticed: Vista looks the same when you turn on your PC and complains that it can't find a modem. Should this humiliating experience happen to you — a frequent occurrence with modems connecting through a PC's serial port — follow these steps to point Vista's gaze toward your newly installed modem.



If your dialup modem came with software or an installation program, run it now to save yourself lots of time and trouble.

1. **Click Start, choose Control Panel, and choose Phone and Modem Options from the Hardware and Sound category.**

Depending on your PC's setup, Vista's Location Information window might appear, as shown in Figure 16-1. If it doesn't appear, jump to Step 3.

Location Information

Before you can make any phone or modem connections, Windows needs the following information about your current location.

What country/region are you in now?
United States

What area code (or city code) are you in now?
212

If you need to specify a carrier code, what is it?

If you dial a number to access an outside line, what is it?

The phone system at this location uses:
 Tone dialing Pulse dialing

OK Cancel

Figure 16-1: Enter your area code, as well as any other dialing or location information.

2. Fill out Vista's Location Information window, should it appear, and click OK.

For most people, this means entering your area code in the text box below What Area Code (or City Code) Are You in Now?

Feel free to fill out the other boxes if you're not in the United States, you need to dial a number to access an outside line, you're using a rotary (not tone) dialing system, or you need to enter a long distance carrier code.

When you click OK, Vista leaves you at the Phone and Modem Options dialog box.

3. Click the Modems tab of the Phone and Modem Options dialog box, and click the Add button.

That magic sequence of clicks fetches the Add Hardware Wizard's Install New Modem dialog box, as shown in Figure 16-2. That *finally* lets you tell Vista about your new dialup modem.



Figure 16-2:
Click Next to let Vista automatically find your new modem.

4. Click Next, and then if Vista still can't find your modem, click Next again.

The Add Hardware Wizard tries to detect your modem. If it found it — a rare occurrence, indeed — you're not only lucky, you're through.

Chances are, though, the wizard comes up empty-handed, forcing you to click Next and move to the next step.

5. Select your modem from a list.

Vista lists all the modems it knows about, as shown in Figure 16-3, and leaves you with three courses of action:

- If Vista lists a manufacturer other than the Standard Modem Types shown in Figure 16-3, click it: Chances are, Vista's found your modem. Then select your modem's model from the Models column.

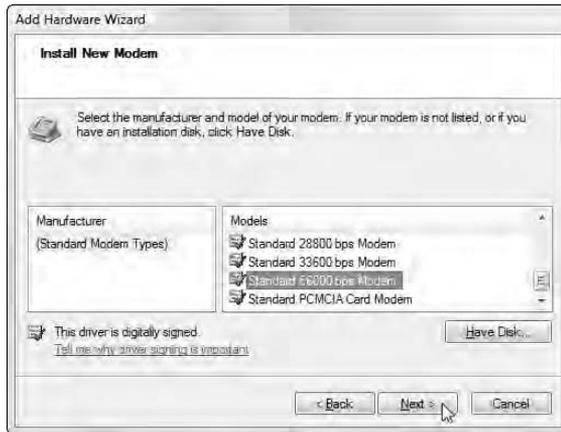


Figure 16-3:
Choose
Standard
56000 bps
Modem.

- If Vista *doesn't* list your modem's manufacturer, though, choose Standard 56000 bps Modem from the Models column. That usually works for most dialup modems. Click Next, choose All Ports, and click Next to finish the process.
- If your new modem came with software, insert the disc now — even if you've already run the software previously. Vista will scrutinize the disc's contents for any files it recognizes or knows how to use.

Chances are, one of these three things will successfully introduce Vista to your modem. If it still doesn't work, however, you need to find a driver written specifically for your modem, a chore tackled in Chapter 19.

Setting up your Internet account with Internet Explorer

Windows Vista constantly prowls your PC in search of a working Internet connection. If it finds a connection, through a cable modem, a network, or a wireless hotspot, you're set: Vista passes the news along to Internet Explorer, letting your PC connect to the Internet automatically and smoothly. If Vista can't find the Internet, however — a frequent occurrence with dialup modems — the job's up to you.

Vista helps Internet travelers through connection problems by sending them a questionnaire that quizzes you about the details. After your short interrogation, Vista connects to your ISP and lets you start surfing the Web.



If you're setting up a wired or wireless network, a job I describe in Chapter 17, Vista should automatically find the network's Internet connection and share it with every PC on your network. If Vista still has trouble, flip to Chapter 17 for network and wireless troubleshooting tips.



To transfer your existing Internet account settings between computers, fire up Windows Vista's Easy Transfer program (Chapter 5). The program copies one PC's settings (including ISP settings) into the other PC, sparing you the bother of following these steps.

Here's what you need to get started:

- ✓ **Your username, password, and access phone number.** If you don't have an ISP yet, Vista's wizard finds you one, so grab a pencil and paper. (The wizard's ISP suggestions are a tad pricey, however. You're often better served by calling local carriers listed in your phone book under Internet Access.)
- ✓ **A plugged-in, turned-on modem.** Follow the steps in the "Installing or Replacing a Modem" section to make sure your modem's both plugged in and turned on.



Whenever your Internet connection gives you log-on problems, return here and run through the following steps. Vista walks you through your current settings, letting you make changes. Summon the wizard by following these steps:

1. Click the Start button and choose Connect To.

The Connect To button fetches a list of every way your PC currently knows how to connect with the Internet. But when Vista can't find a way for your PC to connect, it comes up with an empty list.

Instead, Vista immediately complains that it can't find any networks connected to your PC. Ignore its whines and move to Step 2.

If Vista found a *wireless* network, by chance, you're in luck. You can hop aboard the signal by double-clicking the network's name. (I cover networks in Chapter 17.)



2. Choose Set Up a Connection or Network.

Scour the window's fine print for this option. When clicked, depending on your PC's model and setup, Vista might display any or all of these options:

- *Connect to the Internet:* Vista makes yet another valiant effort to sniff out an Internet signal. Broadband users should click here, for example, to let Vista find and automatically set up their Internet connection.
- *Set Up a Wireless Router or Access Point:* Head here to set up a wireless Internet connection you've set up in your home or office, a task I cover in Chapter 17.

- *Manually Connect to a Wireless Network:* You click here mostly when connecting to paid wireless networks at airports or coffee shops. It lets you enter a wireless network's name and password, should Internet Explorer suddenly demand them.
- *Set Up a Wireless Ad Hoc (Computer-to-Computer) Network:* Very rarely used, this option lets you connect two or more PCs for exchanging files and other information.
- *Set Up a Dialup Connection:* Dialup users want this one, as it lets you tell Vista what to do with that phone line you've plugged into your modem's phone jack.
- *Connect to a Workplace:* This setting lets you connect securely to your office — *if* your office network supports this sophisticated type of connection. If so, ask your office's computer department for your *Virtual Private Network (VPN)* settings and instructions.
- *Connect to a Bluetooth Personal Area Network (PAN):* If your PC has *Bluetooth* — a short-range form of wireless that replaces cables — click here to set up the connection. You head here to connect with Bluetooth cell phones, for example.

3. Choose Set Up a Dialup Connection and click Next.

Because you're not choosing wireless or broadband, dialup is your only Internet connection option. To speed things along, Vista passes you a questionnaire, shown in Figure 16-4, ready for you to enter your dialup ISP's information.



The screenshot shows a Windows Vista dialog box titled "Set up a dial-up connection". The main text reads "Type the information from your Internet service provider (ISP)". The form contains the following fields and options:

- Dial-up phone number: 800-555-5555 (with a "Dialing Rules" button to the right)
- User name: billg@microsoft.com
- Password: masked with dots (with "Show characters" and "Remember this password" checkboxes below)
- Connection name: Dial-up Connection
- Allow other people to use this connection: unchecked checkbox (with a sub-note: "This option allows anyone with access to this computer to use this connection.")
- A link: "I don't have an ISP"
- Buttons: "Connect" and "Cancel" at the bottom right.

Figure 16-4:
Enter your
ISP's dialup
phone
number,
your
username,
and your
password.



If Vista complains that it “could not detect a dialup modem,” your modem is too old for Vista to find it automatically. Instead, you need to offer the type of handholding found through Vista’s Add Hardware Wizard, covered in the preceding section.

4. Enter your dialup ISP’s information.

Here’s where you enter your three all-important pieces of information: Your ISP’s dialup number, your username, and your password, as described in the following list.

- **Dialup phone number:** Enter the phone number your ISP gave you, complete with the area code.
- **Username:** This isn’t necessarily your name, but the *username* your ISP assigned to you when giving you the account. (Your username is often the first part of your e-mail address.)
- **Password:** Type your password here. To make sure that you’re entering your password correctly, select the Show Characters check box. Then deselect the check box when you’ve entered the password without typos.



Be sure to select the Remember This Password check box. That keeps you from reentering your name and password each time you want to dial the Internet. (*Don’t* select that check box if you don’t want your roommate or others to be able to dial your connection.)

- **Connection Name:** Vista simply names your connection Dialup Connection. Change it to something more descriptive if you’re juggling several dialup accounts from different ISPs.
- **Allow Other People to Use This Connection:** Select this option to let people with other user accounts on your PC log on with this same dialup connection.

Clicking the words I Don’t Have an ISP brings up a window where you can sign up for Internet access from Microsoft’s own ISP or with one of Microsoft’s partners. (No, they’re not giving away Internet access for free.)



Click the words Dialing Rules, next to the phone number. There, you can enter key details, such as your country code and whether you need to dial a number to reach an outside line. Windows remembers this information, making sure that it dials a 1 if you’re dialing outside your area code, for example. Laptopppers should visit Dialing Rules for every city they visit.

5. Click the Connect button.

If you’re lucky, your PC announces that it has connected to the Internet. Load Internet Explorer from the Start menu and see if it lets you visit Web sites.

If Internet Explorer still can’t visit the Internet, move to Step 6.

6. Click the Start menu and choose Connect To.

Your newly created dialup connection will be waiting, as shown in Figure 16-5.

7. Click Dialup Connection and click Connect.

Vista tosses one more screen in your face, as shown in Figure 16-6. This gives you a chance to type in your password, for example, if you didn't select the Remember This Password check box in Step 4. It's also where you can tweak your connection settings, handy for temporarily changing the phone number, for example.

Figure 16-5:
Click your newly created dialup listing and click Connect to dial the Internet.

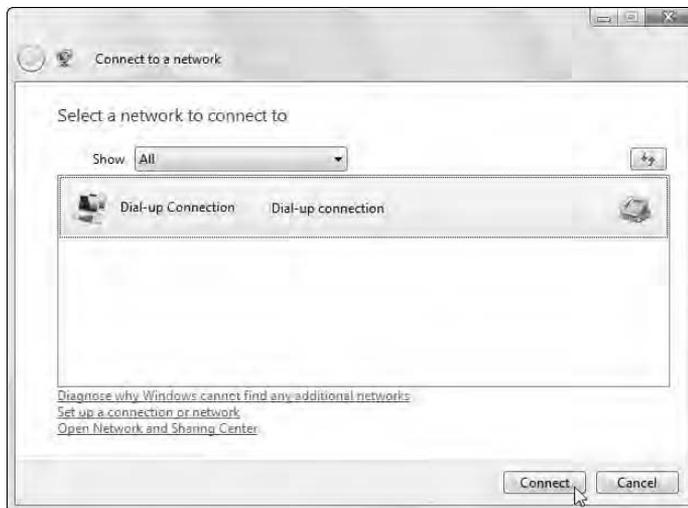


Figure 16-6:
Change the phone number, if necessary, and then click Dial to dial the Internet.



8. Click Dial to dial the Internet and connect to your ISP.

You're done. Windows Vista automatically leaps into action, uses your settings to call your Internet provider, and lets you know when it's connected.

Then it's time to load Internet Explorer from the Start menu and start browsing. In the future, though, just load Internet Explorer when you want to browse. Your PC automatically dials the Internet using the connections you've created here.

Always plugging its own products, Microsoft drops you off at one of its own Web pages (Windows Live), and you're ready to browse. Need a place to go for a quick test? Log on to www.andyrathbone.com and see what happens.



Don't be afraid to bug your ISP for help. The best ISPs come with technical support lines. A member of the support staff can talk you through the installation process.



Internet Explorer doesn't automatically hang up when you're done browsing. To make your PC hang up the phone when you close Internet Explorer, choose Internet Options from the program's Tools menu and click the Connections tab. Click the Settings button and then the Advanced button. Finally, select the Disconnect When Connection May No Longer Be Needed check box and click OK. (You can also hang up by right-clicking your dial-up connection icon from the bottom right corner of the taskbar and choosing Disconnect from the pop-up menu.)

Sending and receiving faxes with a modem

Almost all dialup modems can send and receive faxes, but you probably don't have software that can take advantage of it. That's because Windows Vista removed the fax software from its Home Basic and Home Premium versions — the two versions preinstalled on most home PCs. (Microsoft left its fax software only in Vista's Business, Enterprise, and Ultimate versions.)

If you want to send or receive faxes with your dialup modem in Vista Home or Premium versions, you need to drop by your local office supply store and buy fax software. (WinFax is a popular program.)



Only *dialup* modems can send and receive faxes; cable and DSL modems don't know how to fax. Most PCs come with a built-in dialup modem pre-installed, however, so this might not be a problem for you.

Dealing with a modem that inappropriately disconnects

Some exceptionally popular people have call waiting installed on their phone lines. When these people talk on the phone and another call comes in, the phone makes a little beep sound. That's the signal for the person to interrupt the conversation and say, "Can you hold on a second? I have another call."

Your modem behaves more rudely than that. If somebody calls your house while your modem is talking to another modem, the beep makes your modem hang up, cutting off your Internet session in the process.

The solution? Dial the four characters ***70**, (that's an asterisk, the number seven, the number zero, and a comma) before dialing the other modem's number. For example, rather than tell your computer to dial **555-1212**, tell it to dial ***70,555-1212** to turn off your call waiting. That funky little code tells the phone company to turn off call waiting during that call. (Incoming callers hear busy signals.) When you finish that call, your call waiting is automatically turned back on.

To make your modem automatically disable call waiting before connecting to the Internet, follow these instructions:



- 1. Double-click the Hardware and Sound icon in the Control Panel.**
- 2. Click the Phone and Modem Options icon.**
- 3. On the Dialing Rules tab, choose your current location and click the Edit button.**
- 4. Click the box to disable call waiting and choose the appropriate code.**

Select the check box marked, To Disable Call Waiting, Dial:, as shown in Figure 16-7.

Click the adjacent pull-down menu and select your appropriate code.

The ***70**, command works only with the newer tone (push-button) phones. If you're one of the few holdouts with the older, rotary phones, dial **1170**, (the numbers 1170 followed by a comma).

- 5. Click the OK button to save your settings and exit.**

Click OK on the next dialog box, as well.

Following these instructions disables call waiting whenever your computer makes a phone call.

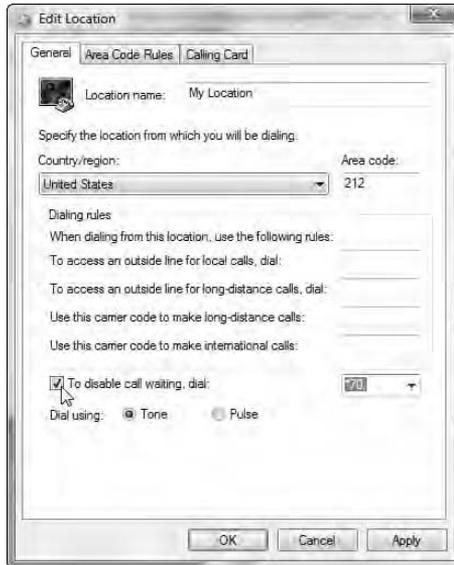


Figure 16-7: Disable call waiting to keep the beep from throwing your dialup connection off-line.

Chapter 17

Linking PCs with a Network

In This Chapter

- ▶ Understanding network buzzwords
 - ▶ Choosing between a wired or wireless network
 - ▶ Installing and configuring a wired and wireless network
 - ▶ Sharing files and printers in Windows Vista
 - ▶ Troubleshooting a network
-

A few years ago, if you wanted a computer network in your home, you were automatically considered a nerd who built robots in the garage.

Now, networks are for average, everyday folk. Many families today are on their second computer, having outgrown the first a few years ago. Some families are on their third PC, if you count the laptop.



Just tell me what to buy!

For the greatest speed, reliability, and the least expense, buy these things to create a home network:

- ✓ **Fast Ethernet PCI cards:** Slip one of these cards into slots inside each of your PCs.
- ✓ **Wireless router:** In the approximate center of your group of PCs, place a wireless router with a port for each PC. (Most wireless routers support up to four PCs.) Connect your cable or DSL modem to the router's WAN port.
- ✓ **Fast Ethernet cables:** Connect a cable between a port on your router and a port on each of your PCs.

✓ **Wi-Fi network adapters (optional):** If one of your PCs lives farther than a cable's length from your router, buy that PC a Wi-Fi network adapter. (Many wireless network adapters plug into a USB port for easy installation.)

If none of your PCs need wireless, save money by buying a router *without* built-in wireless — if you can find one. Most routers today come with built-in wireless because wireless is so handy for laptops.

And that's where a network comes in. Connecting your PCs with a network lets them easily and cheaply share a single Internet connection. A home network also lets families share a printer or dip into the MP3 stash on other PCs.

Whatever your networking needs might be, this chapter explains how to set up a simple home network between Windows Vista PCs. If your Windows XP PCs are already networked — a job I explain in *Windows XP For Dummies* (Wiley Publishing) — these instructions let the Windows Vista PC join their fold. (As a bonus, I explain how to add wireless access for surfing the Web while lapping beside the pool.)

Understanding Network Buzzwords

No matter what type of network you use, you're likely to stumble into some very odd terminology when shopping or reading packaging. Here are translations for the most common stumbling blocks:

Network adapter: A gadget that attaches to your PC to send and receive network signals. Wired network adapters transport the signals through cables; wireless network adapters come with a small antenna for sending and receiving network signals.

Router: An intelligent box that links your PCs into a network, letting each PC access both the Internet and your other PCs. Most routers today let you plug in at least four PCs, as well as send and receive wireless network signals to dozens of other PCs.



Routers make great firewalls, as explained in Chapter 18. Because the router sits between your PCs and the Internet, the bad guys can't get in nearly as easily.

Network cables: Wires that connect your PC's network adapters to your router. The network adapter, router, and cables are the three main parts of any network. If your PCs are too far away for cables to be practical, you can use wireless, described next.

WAP (Wireless Access Point): A device that transmits wireless networking signals between the wireless network adapters on other PCs. Most routers now come with a built-in wireless access point to send information through the air to distant PCs.

Local Area Network (LAN): A relatively small group of connected computers, modems, and printers.

Internet Connection Sharing (ICS): A way that Windows lets several PCs share one PC's Internet connection. All those piggybacking PCs slow down the original PC, however, so most people prefer buying a router to send the Internet connection among PCs.

Gateway: A connection between any smaller network and a larger one. A router, for example, works as a gateway that lets all the PCs on your home network connect to the biggest network of all: the Internet.

Switch: A box that keeps track of which computer asked for which piece of information and manages the flow of information accordingly. Most routers include a built-in switch that handles at least four PCs.

Encryption: A coding method for keeping information private. Each computer on an encrypted network uses a password system to scramble and descramble information sent between them. Wireless networks use encryption to keep miscreants from eavesdropping.

WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access): These two different security methods use encryption to keep eavesdroppers out of your wireless network. Although Vista supports both types of encryption, choose WPA — if your equipment allows it — as it's *much* more secure than WEP.

IP (Internet Protocol) Address: Each computer on a network has an *IP address* — a unique identifying number. By routing information to and from IP addresses, the network enables everything to communicate.

Choosing Between a Wired or Wireless Network

Today's home network consists of a small box called a *router* that links your PCs, letting them exchange information. Your biggest decision is how to link the PCs to the router: with wires or wirelessly. The answer is easy: look at the distance between your PCs.

If your PCs sit relatively close together, created a *wired* network. It's the easiest to set up, most reliable, secure, and best of all, the cheapest way to go.

If your PCs live too far apart to connect them comfortably with wires, choose *wireless*. Wireless networks cost more and require *much* more setup time, but they let you hop onto the Internet with your laptop from any room in the house — or even in the yard.

If some PCs are close, but a few are far away, mix the two: The most versatile networks combine both wired and wireless, letting your closest PCs connect with wires and saving the wireless for the laptop or the game console near your TV.

The hardest part of setting up a network comes when looking at the dizzying number of wired and wireless equipment available, so the next two sections explain your options.

Understanding wireless (Wi-Fi) home networks

Wireless is all the rage today. People don't want to string wires across the hallways and under the carpet anymore. They just want their computers to start talking to each other. But because wireless networks come in *three* main flavors, which wireless network is best? The next few sections look at the major players, but keep these things in mind before coming home with a bag full of wireless gear:



- ✓ Wireless networks work best in open spaces, such as outdoors or inside a big room. Wireless signals lose speed and strength as they travel through walls, ceilings, and floors. Consider the location of each computer before choosing between a wireless or wired network. The best solution often lets some PCs connect with wires and others wirelessly.
- ✓ Wi-Fi devices communicate at a range of several hundred feet, depending on how many barriers the signal must pass through. Many airports and restaurants offer them for visitors who compute while having coffee. To cater to the laptop crowd, small adapters like the Linksys Wireless USB network adapter, shown in Figure 17-1, stash easily into a laptop bag.

Wireless comes in three basic flavors, shown in Table 17-1, all with a variation on the number 802.11. From slowest to fastest, they're known as 802.11*b*, 802.11*g*, and 802.11*n*, each described below. Because all three are compatible, your wallet's width usually determines the one you take home: The cheapest of the three wireless types is the slowest, and the fastest costs the most.

Table 17-1: The Three Types of Wireless Networks at a Glance

<i>Standard</i>	<i>Speed</i>	<i>Range</i>	<i>Cost</i>
802.11b	Slowest	100 feet	Lowest
802.11g	Medium	100 feet	Medium
802.11n (Due in early 2008)	Fastest	150 feet	Highest

Figure 17-1: By plugging into a USB port, the Linksys Wireless USB network adapter allows a computer to connect to a Wi-Fi network.



802.11b

Although it's the slowest wireless network speed today, 802.11b provides enough oomph for moderate networking and Internet needs. The 802.11b standard sends and receives signals at 11 Mbps. (The lower the Mbps number, the slower the connection.)

Compatibility: 802.11b devices can also talk with the faster 802.11g and 802.11n speeds described next. But those faster devices must slow their chatter to 802.11b speed when communicating.



An extension to the 802.11 wireless standard, 802.11b allows up to 11 Mbps communication in the 2.4 GHz band with fallback rates to 5.5, 2, and 1 Mbps during signal drops.

802.11g

This newer, faster wireless standard tweaks the Wi-Fi (802.11b) standard to add five times the speed and a slightly wider range. The speed drops dramatically the further it travels.

Compatibility: Fortunately, 802.11g devices work fine with Wi-Fi (802.11b) devices on your network. They simply lower their speed to match the slower Wi-Fi speeds.



Yet another extension to the 802.11g standard provides speeds up to 54 Mbps in the 2.4 GHz band with fallback rates of 48, 36, 24, 18, 12, 9, and 6 Mbps.

802.11n

The standards for the even faster 802.11n wireless standard are still being hammered out, but that hasn't stopped manufacturers from releasing *Pre-N* wireless equipment that guesses at the final standard. If you buy Pre-N equipment — network adapters and wireless transmitters — buy it all from the *same* manufacturer to ensure it all works well together.

Compatibility: The 802.11n wireless networks will remain compatible with the two earlier wireless networks by simply slowing down when talking with them.



The fastest wireless standard yet, 802.11n will provide speeds up to 540 Mbps in the 2.4 GHz and 5 GHz bands with fallback rates to remain compatible with earlier standards.

Understanding wired home networks

The fastest networks use cables. And because cabled systems have been around long enough to work out most bugs, wired networks are relatively inexpensive, fast, reliable, and compatible with each other.



Ethernet, a relatively old, wired networking standard, shuffles information through cables and connectors resembling phone lines, but with larger connectors.

Although the term *Ethernet* refers to several types of networks, only two are widely used in today's home networks: *Fast Ethernet* and its older and slower cousin, which I refer to as simply *Ethernet*.

The newer Fast Ethernet standard shuffles information ten times more quickly than the older Ethernet standard. Fast Ethernet is heavily favored by people who move around large files: sound, video, or graphics.

Both types of Ethernet work in a spider-like layout, as shown in Figure 17-2: A box called a *router* sits at the center, moving information to other computers through their individual cables, arranged like legs on a spider.

Unplugging cables with Bluetooth

Unlike wireless networks, which link groups of PCs, Bluetooth works to replace a different type of wiring: the single cable that traditionally connects two devices. Bluetooth's short-range, low-speed technology lets a cell phone pair up securely with a headset, for example, or lets a mouse talk wirelessly with a PC.

Bluetooth devices also communicate in *pairs*, not groups. A digital camera with Bluetooth connects to a single computer with Bluetooth, for instance, to dump its photos onto the computer.

Stuck with a Bluetooth gadget and a PC or laptop that doesn't support Bluetooth? Pick up a Bluetooth USB adapter — a little stick that plugs into an unused USB port. They usually cost less than 30 bucks.

Bluetooth works at short ranges — less than 30 feet — and it's not compatible with Wi-Fi or other networks. Don't expect your Bluetooth camera to dump photos into your Wi-Fi enabled-PC down the hallway.

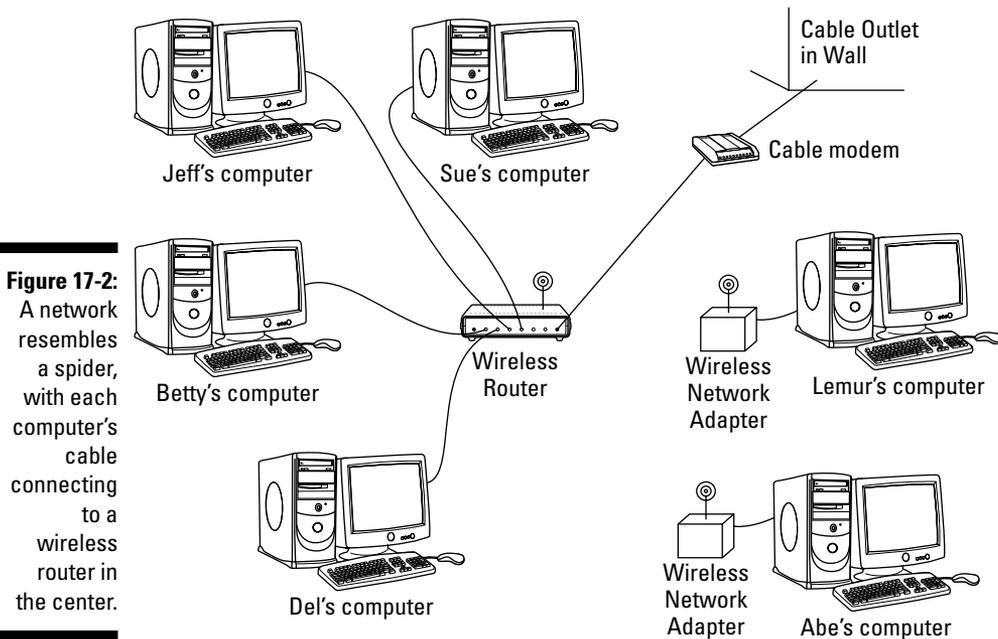


Figure 17-2: A network resembles a spider, with each computer's cable connecting to a wireless router in the center.

The biggest compatibility problem between Ethernet (10Base-T) and Fast Ethernet (100Base-T) comes with their cables. Although the cables look identical, Fast Ethernet won't run reliably over Ethernet cable. Always buy Fast

Ethernet cables to stay as compatible as possible. (The words Category 5 or CAT-5 are usually printed on Fast Ethernet cable.)

You can mix Ethernet and Fast Ethernet equipment because they contain auto-sensing equipment that translates the speed differences. The auto-sensing router at the center sends information to each computer at its appropriate speed level.



These terms might help you decipher the code words on the packages of networking equipment at the store:

- ✓ Based on the IEEE 802.3 standard, 10Base-T moves data at 10 Mbps through Category 3 (CAT-3) cables with RJ-45 connectors and a length of no more than 994 feet.
- ✓ Officially based on the IEEE 802.3u standard, Fast Ethernet moves data at the rapid rate of 100 Mbps through Category 5 (CAT-5) 100Base-T cables with RJ-45 connectors and a length of no more than 325 feet. It's also called *UTP* (Unshielded Twisted Pair) wiring. CAT-5 cables also work with Ethernet 10Base-T, so CAT-5 is the logical cabling choice these days.
- ✓ Some networking equipment offers a newer, faster type of Ethernet, 1000BASE-T. It moves data at 1000 Mbps through Category 5 (CAT-5e) cable, but Category 6 (CAT-6) cables are more reliable. It's used mostly in offices for PCs that constantly move large amounts of information. It's overkill for most home networks.

Turning electric outlets into network ports

Very few rooms come with a network port in the wall, but *every* room comes with a power outlet, a fact exploited by the HomePlug network system. Plugging a HomePlug adapter into a power outlet turns the outlet into a network jack. Buy a HomePlug adapter for each PC, and all your computers can talk to each other.

The HomePlug standard encrypts the data as it moves between devices; that keeps neighbors from plugging into your porch light's outlet to swipe your MP3 files.

HomePlug still has several problems, though: It's relatively high-priced, slower than Ethernet, hard to find in stores, and you still need a router to inject the Internet into your outlets so your PCs can Web surf. But for some people, it lets them finally add a network port to an out-of-the-way place: The basement, for example, the wine cellar, or other places that wired and wireless systems can't reach well.

Creating a Wired and Wireless Computer Network

Networks can be *very* scary stuff. But if you're just trying to set up a handful of computers in your home or home office, this section might be all you need.

Start by drawing a picture of your network. Find your closest grouping of computers and draw their relative locations onto a piece of paper. Draw a dot near the closest group of computers — you want to place your router there.

Using your drawing for reference, measure the physical distance between each of your computers and the router, adding enough feet to snake the cable around desks or along the walls. When in doubt, give yourself ten extra feet for each computer. Write down the length of cable required to connect each computer to the router.

Some homes come with networking jacks built into the walls. If you're that lucky, write down the length of cable necessary for reaching from each computer to its network jack.

Are some computers too far apart for cables? Buy them wireless network adapters, and make sure your router has built-in wireless (most do).

The easiest way to connect two computers

Sometimes you simply need to link two computers, quickly and easily, to move information from one to another (from an old computer to a new one, for example, as I describe in Chapter 5).

The easiest way is to buy a network adapter for each PC (new PCs usually come with one pre-installed) and a *crossover cable*, which is a special breed of Ethernet cable. Be sure to emphasize *crossover* or *crossed* cable when shopping at the computer store; a regular Ethernet cable won't work. Connect the crossed cable between the two computers' network adapters, and Vista creates a quick network between the two computers. If one computer

has a way to connect to the Internet, the second computer should be able to share that Internet connection.

Or, connect an Easy Transfer Cable between the USB ports of two computers, as I describe in Chapter 5. Created especially for Windows Vista, the cable creates a makeshift network between the two PCs.

Finally, connect to the Internet with one PC, and then turn on Vista's Internet Connection Sharing to let the second PC piggyback on the first PC's connection.



Don't worry about printers. If one PC has a printer, every PC on the network can access it, printing to it as if it were their own.

The following sections explain how to buy the three parts of a network, how to install the network hardware, and how to make Windows Vista create a network out of your handiwork.

Buying parts for your network

Here's your shopping list. Drop this onto the copy machine at the office and take it to the computer store.

- ✓ **Fast Ethernet cable:** Buy one Fast Ethernet cable for each PC that won't be using wireless. Fast Ethernet cable is known by a wide variety of names, including 100Base-T and CAT-5. But if you're hunting for it at the computer store, just look for the network cable that looks like telephone cable and says *CAT-5* or *Category 5* on the label.

For any computer placed too far away for a cable, buy a wireless network adapter, described next.

- ✓ **Network adapters:** Each PC needs its own network adapter, either wired or wireless. For wired PCs, buy one 100Base-T Ethernet PCI card for each PC. Don't want to open your PC's case to install a PCI card? Then buy a USB network adapter, instead. Make sure the adapters are Windows Vista compatible.



- ✓ Many new computers (and almost all laptops) come with a wired network adapter preinstalled, so look at the back of the computer for the giveaway: something that looks like a large phone jack.

If the computer is too far away to connect with wires, buy it a wireless network adapter. (They plug into USB ports, too.)

- ✓ **Wireless router:** Every computer's network cable must plug into a single *router*, as shown in Figure 17-3. Most routers today come with built-in wireless to connect any PCs farther than a cable stretch away. Buy a wireless router with enough ports (jacks) to plug in each computer's cable — plus a few extra ports for computers you might want to add later.

Installing wired or wireless network adapters

Difficulty level: Medium

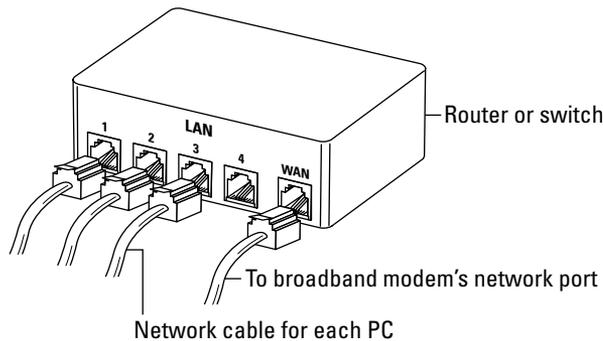
Tools you need: One hand and, for installing internal network adapters, a screwdriver

Cost: Anywhere from \$25 to \$150

Stuff to watch out for: If you're using a USB network adapter, just plug the adapter into your PC's USB port. (Bought a PC Card network adapter for the laptop? Slide it into your laptop's PC Card slot, that credit-card sized slot in the laptop's side.) Install the adapter's software, if it came with one, and you're through.

Figure 17-3:

The router sends information directly to the computer that asks for it, keeping up the network's speed.



Some wired and wireless adapters, however, come on cards. To install a network card, either wired or wireless, follow these steps:

1. Turn off your computer, unplug it, and remove the cover.

Don't know how that cover comes off? Flip to the Cheat Sheet at the front of this book for the answers.

2. Find an empty slot.

See that row of slots toward the back of your PC? Those slots line up with the slots on the back of your PC — the part where you plug in most of your cables. Find an empty one for your new network card.

3. Remove the slot's cover.

With a small screwdriver, remove the single screw that holds that card in place. Save that screw, as you need it to secure the new card in place.

If you drop the screw inside your PC, poke it out with a screwdriver or chopstick. If that fails, shake your PC upside-down until the screw falls out.





4. Push the new card into the empty slot.

Cards are particularly susceptible to static electricity. Tap your computer's case to ground yourself before touching the card. If you live in a particularly dry, static-prone area, wear latex gloves — the kind that doctors and dentists wear.

Line up the tabs and notches on the card's bottom with the notches in the slot. Push the card slowly into the slot. You might need to rock the card back and forth gently. When the card pops in, you can feel it come to rest. Don't force it!

5. Secure the card in the slot with the screw.

Yep, your precious card is held in place by one screw.

6. Connect the cables between the network cards and the router.

The cables all snake around until they plug into a numbered port on the router. You might need to route cables under carpets, around doorways, or through a hole in the floor or ceiling to move between floors. (Don't forget to plug the router's power cord into the wall.)



Don't plug any PCs into the router's WAN port. That's for plugging in your cable or DSL modem to connect with the Internet.

7. Turn on the computers and their peripherals.

Turn on the computers and their monitors, printers, modems, and whatever else happens to be connected to them.

Windows usually recognizes newly installed equipment and sets everything up to work correctly. If your network adapter card came with a CD, be sure to insert it when Vista begins clamoring for *drivers* — translation software that helps Vista talk to new parts.

If something goes wrong, head for this chapter's "Dealing with a Network That Isn't Networking" section. If everything's working, however, put your PC's cover back on.

8. Select a location for your network.

When Windows Vista wakes up and notices the newly attached network equipment, it asks you for your network's *location*: Home, Work, or Public Location. Choose whether you're working at home or work (safe) or in public (less safe), and Vista automatically adds the proper security level to protect you.

Vista does a reasonably good job of casting its networking spells on your computers. If the computers are all connected correctly and restarted, chances are they wake up in bondage with each other. If they don't, try restarting them all again.

Bothersome workgroup names

Like anything else in life, networks need names. A network's name is called a *workgroup*, and for some reason, Microsoft used different workgroup names in different versions of Windows, and that causes problems if you have Windows XP PCs on your network.

Here's the problem: Windows XP Home PCs automatically use MSHOME as their workgroup name. Windows XP Professional and Windows Vista PCs, by contrast, use WORKGROUP as their workgroup name. The result? Put a Vista PC and a Windows XP Home PC on the same network, and they can't find or talk with each other: One PC searches in vain for other MSHOME PCs, and the other looks for only WORKGROUP PCs.

The solution is to give them both the *same* workgroup name, a fairly easy task with these steps:

1. On your Vista PC, click the Start menu, right-click Computer, and choose Properties.

The System screen appears, revealing basic techie information about your PC.

2. Choose Change Settings.

That task lives in the section called Computer Name, Domain, and Workgroup Settings. Clicking it fetches a questionnaire.

3. Click the Change button.

The Computer Name/Domain Changes dialog box appears.

4. In the bottom box, change the Workgroup name to MSHOME.

That puts Vista on the same workgroup as your Windows XP PC.

Alternatively, you can change your Windows XP PC's workgroup name to WORKGROUP by following these same five steps but clicking the Computer Name tag in Step 2. But no matter what you call your network's workgroup, make sure that every networked PC bears the *same* workgroup name.

Tip: Be careful in this step to change each PC's *workgroup* name, not its *computer* name, as they're different things.

5. Click OK to close the open windows and when asked, click the Restart Now button to restart your PC.

Repeat these steps for your other networked PCs, making sure that the same name appears in each Workgroup box.

Keep these things in mind when setting up your network:

- ✔ Although Windows Vista usually sits up and takes notice as soon as you plug in a network cable, wireless networks require more tweaks before they catch Vista's attention. To make your wireless network adapters start working, head for the next section, "Connecting Wirelessly."
- ✔ Windows Vista automatically shares one folder on every networked PC — the Public folder — as well as any folders inside it. Any files you place inside that folder are available to everybody on your PC as well as anybody connected to the network. (I explain more about sharing files, folders, printers, and other items later in this chapter's "Connecting to and Sharing Files with Other PCs on Your Network" section.)



Windows XP names its shared folder Shared Documents. Vista names that same folder Public, instead. But both do the same thing: Provide a place to share files with other people on your network.

- ✓ Click your Start menu and choose Network to see your other computers on your network.
- ✓ If your PC connects to the Internet through a dialup connection, run the Internet Connection Wizard, as described in Chapter 16. (That wizard then lets all your networked computers share that computer's Internet connection.) After that computer is set up, run the wizard on the other networked computers.
- ✓ If your PCs can't see each other, make sure that each PC uses the same Workgroup name, covered in this chapter's "Bothersome Workgroup Names" sidebar.

Connecting Wirelessly

Setting up your own wireless home network takes two steps:

1. Set up the wireless router or wireless access point to start broadcasting and receiving information to and from your PCs.
2. Set up Windows Vista on each PC to receive the signal and send information back, as well.

This section covers both of those daunting tasks.



Still haven't installed your wireless network adapter? Head for the previous section, "Installing wired or wireless network adapters."

Setting up a wireless router

Wireless connections bring convenience, as every cell phone owner knows. But they're also more complicated to set up than wired connections. You're basically setting up a radio transmitter that broadcasts to little receivers attached to your PCs. You need to worry about signal strength, finding the right signal, and even entering passwords to keep outsiders from listening in.

Wireless transmitters, known as *Wireless Access Points* (WAPs), come either built into your router or plugged into one of your router's ports. Unfortunately, different brands and models of wireless equipment come with different setup software, so there's no way I can provide step-by-step instructions for setting up your particular router.

However, the setup software on every wireless router requires you to set up these three basic things:

- ✓ **Network name (SSID):** Enter a short, easy-to-remember name here to identify your particular wireless network. Later, when you tell Vista to connect to your wireless network, you'll select this same name to avoid accidentally connecting to your neighbor's wireless network.
- ✓ **Infrastructure:** Choose *Infrastructure* instead of the alternative, *Ad Hoc*.
- ✓ **Security:** This option encrypts your data as it flies through the air. Turn it on using the recommended settings.

Some routers include an installation program for changing these settings; other routers contain built-in software that you access with Internet Explorer or any other Web browser.



As you enter settings for each of the three things, write them on a piece of paper: You need to enter these same three settings when setting up your PC's wireless connection, a job tackled in the next section.

Setting up Windows Vista to connect to a wireless network

After you've set up your router or wireless access point to broadcast your network's information, you must tell Windows Vista to receive it.

To connect to a wireless network, either your own or one in a public place, follow these steps:

1. Turn on your wireless adapter, if necessary.

Many laptops turn off their wireless adapters to save power. To turn it on, open the Control Panel from the Start menu, choose Mobile PC, open the Mobility Center, and click the Turn Wireless On button. Not listed? Then you need to pull out your laptop's manual, unfortunately, because it doesn't fully support Vista's wireless networking.

2. Choose Connect To from the Start menu.

Windows lists all the wireless networks it finds within range, as shown in Figure 17-4. Don't be surprised to see several networks listed — they're probably your neighbors'.

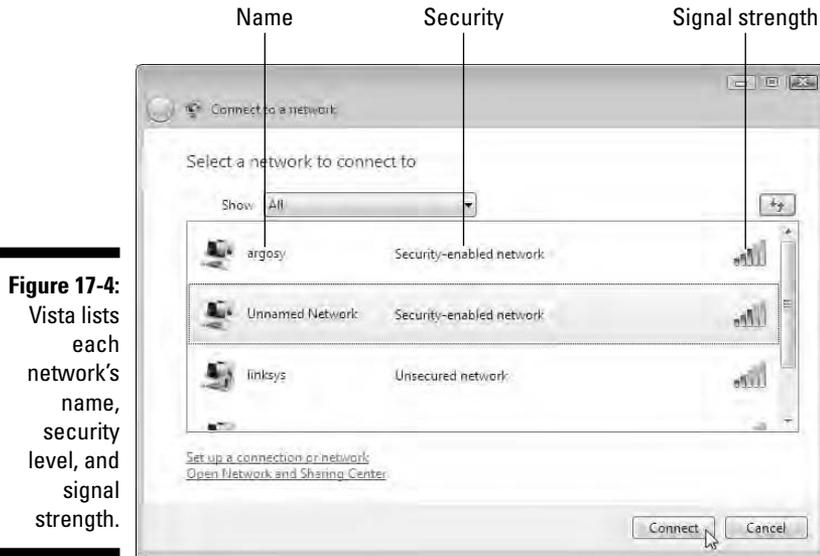


Figure 17-4: Vista lists each network's name, security level, and signal strength.

Vista sums up each available connection three ways, all shown in Figure 17-4:

- **Name:** This is the network's name, also known as its *SSID* (Service Set Identifier). Wireless networks frequently overlap, so network names let you connect to the specific network you want. Choose the SSID name you gave your wireless router when you set it up, for example, or select the name of the wireless network at the coffee shop or hotel.
- **Security:** Networks listed as *Unsecured Network* don't require a password: You can hop aboard and start surfing the Internet for free. Unsecured, however, means they aren't encrypted: technical-minded snoops can eavesdrop. Unsecured networks work fine for quick Internet access but aren't safe for online shopping. A network listed as a *Security-Enabled Network*, by contrast, is safer, as the network's password filters out all but the most dedicated snoops.
- **Signal Strength:** These little vertical bars work much like a cell phone's signal strength meter: The more bars you see, the stronger the signal. Connecting to networks with two bars or less will be frustratingly sporadic. You might want to reposition your laptop or PC, if possible, or try moving the antennas on the router or wireless adapter.



If you need to revisit a previous step, click the little blue Back arrow in the window's top-left corner.

3. Connect to the desired network by clicking its name and clicking Connect.

If you spot your network's name, click it and then click the Connect button.

If you *don't* spot your network's name, head to Step 6.

4. Choose whether you're connecting from Home, Work, or a Public Location.

When you connect, Vista asks whether you're connecting from Home, Work, or a Public Location so that it can add the right layer of security. Choose Home or Work only when connecting to a wireless connection within your home or office. Choose Public Location for all others to add extra security.

If you're connecting to an Unsecured Network — a network that doesn't require a password — you're done. Vista warns you about connecting to an unsecured network, and clicking the Connect Anyway button lets you connect.

If you're connecting to a Security-Enabled Network, however, Vista asks for a password, described in the next step.

5. Enter a password, if needed, and click Connect.

When you try to connect to a security-enabled wireless connection, Vista sends you the window shown in Figure 17-5, asking for a password.



Figure 17-5:
Enter the wireless network's password and click Connect.

Here's where you type the password you entered into your router when setting up your wireless network.

If you're connecting to somebody else's password-protected wireless network, pull out your credit card. You need to buy some connection time from the people behind the counter.

Don't see your wireless network's name? Then move to Step 6.

6. Connect to an unlisted network.

If Vista doesn't list your wireless network's name, two culprits might be involved:



- *Low signal strength:* Like any radio signal, wireless networks are cursed with a limited range. Walls, floors, and ceilings sap their strength. Keep moving your computer closer to the wireless router or access point, continually clicking the Refresh button (shown in the margin) until your network appears.
- *It's hiding:* For security reasons, some wireless networks list their names as Unnamed Network. That means you must know the network's *real* name and type in that name before connecting. If you think that's your problem, move to the next step.

7. Click a wireless network listed as Unnamed Network and click Connect.

When asked, enter the network's name (SSID) and if required, its password, described in Step 5. (You need to get the SSID and password from the wireless network's owner.) When Vista knows the network's real name and password, your PC will connect.

If you're still having problems connecting, try the following tips:

- ✔ When Vista says that it can't connect to your wireless network, it offers two choices: Diagnose This Connection or Connect to a Different Network. Both messages almost always mean this: Move Your PC Closer to the Wireless Transmitter.
- ✔ If you can't connect to the network you want, try connecting to one of the unsecured networks, instead. Be sure not to enter any passwords, credit card numbers, or other sensitive information, however, and just stick to Web browsing.
- ✔ Unless you specifically tell it not to, Vista remembers the name and password of networks you've successfully connected with before, sparing you the chore of reentering all the information. Your PC will connect automatically whenever you're within range.
- ✔ Cordless phones and microwave ovens, oddly enough, interfere with wireless networks. Try to keep your cordless phone out of the same room as your wireless PC, and don't heat up that sandwich when browsing the Internet.

Connecting to and Sharing Files with Other PCs on Your Network

Even after you've set up your network, Vista *still* might not let you see your connected PCs or their files. That's right: Yet *another* security measure prevents PCs from seeing each other or sharing files on your private network. Here's how to knock some sense into Vista's security:

1. Click the Start menu and choose Network.

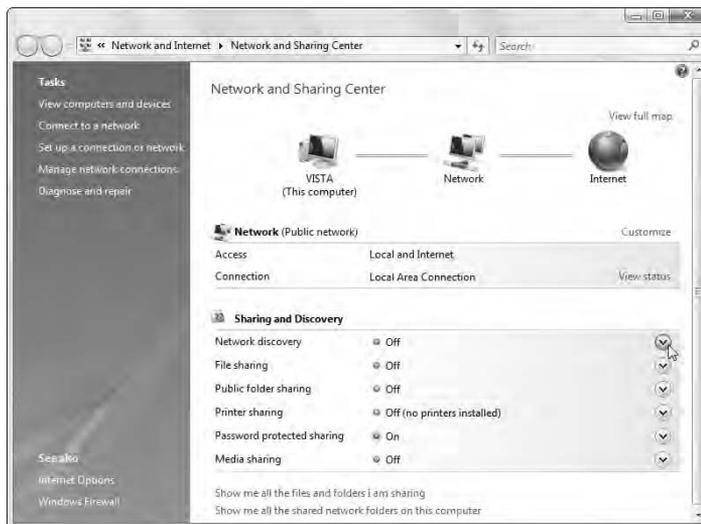
When it's working right, you should see icons for all your connected PCs here. To connect to a PC and see its shared files, just double-click its name.

But the first time you set up a network, Vista's Network window comes up blank. A banner across the window's top warns, "Network discovery and file sharing are turned off. Network computers and devices are not visible. Click to change."

2. Click the window's warning banner or click the Network and Sharing Center button.

Clicking either one fetches the Network and Sharing Center, as shown in Figure 17-6.

Figure 17-6:
Open the Network and Sharing Center to change settings that let you find other PCs on your network.



3. Change the following areas in the Network and Sharing Center.

To turn an area on or off, click the little downward-pointing arrow, shown with the mouse pointer pointing at it in Figure 17-6. When the panel drops down, click to turn the feature on or off.

- *Network Discovery*: Turn this on. This allows people on other PCs to see your PC on the network.
- *File Sharing*: Turn this on. This lets people access files or printers you've chosen to share with them.
- *Public Folder Sharing*: Turn this on. You want to share your Public folder, as it's the common place where everybody places files they want to share with others. Choose Turn on Sharing so Anyone with Network Access Can Open, Change, and Create Files.

To let other people open your Public folder's files but *not* change them or place their own files there, choose Turn on Sharing so Anyone with Network Access Can Open Files instead.

- *Printer Sharing*: Turn this on if you've attached a printer to your PC. That lets other PCs print to it.
- *Password Protected Sharing*: Turn this off. If it's turned on, only people with user accounts on your *own* PC can access your Public folder and other shared items.
- *Media Sharing*: Turn this on. That makes your songs, photos, and videos accessible to anybody else on your network.

4. Place files and folders you want to share with others into your PC's Public folder.

The Public folder lives one click away in every Vista folder: It's listed in the folder's left column.

If your PC still can't see other PCs, or those PCs can't see your PC or its files, check out the following tips:

- ✔ Turn off all the PCs, the router, and your broadband modem. Then turn on your broadband modem, your router, and your PCs — in that order, waiting 30 seconds between each one.
- ✔ Retrace your steps, making sure to turn on Public Folder Sharing and turn off Password Protected Sharing.
- ✔ Make sure that all your PCs have the same workgroup name, described in this chapter's sidebar, "Bothersome workgroup names."



Deleting files from a networked PC

Normally, anything you delete on your PC ends up in your Recycle Bin, giving you a last chance at retrieval. That's not true when you're working on a file in a *networked* PC's Public folder. When

you delete a folder on another PC's Public folder, it's gone for good — it doesn't hop into the Recycle Bin of your PC *or* the networked PC. Beware.

Sharing a Printer on the Network

Many households or offices have several computers but only one printer. To let everybody on the network print on that printer, share it by following these steps on the Vista computer connected to the printer:

1. **Click the Start menu, choose Network, and click the Network and Sharing Center button along the top.**

The Network and Sharing Center window appears, as shown earlier in Figure 17-6.

2. **Turn on Printer Sharing and click Apply.**

Look in the Printer Sharing category and click the Off button to reveal the menu. When the menu drops down, choose Turn on Printer Sharing and click Apply to share that printer with the network.

Now, tell your other networked PC (or PCs) about your newly shared printer by following these steps:

1. **Click the Start menu, choose Control Panel, and select Printer from the Hardware and Sound category.**

The Printers window lists icons for any installed printers. (Ignore the Microsoft XPS Document Writer, as it's not a real printer.)

2. **Click the Add a Printer button.**

The Add Printer window appears.

3. **Choose Add a Network, Wireless, or Bluetooth Printer and click Next.**

Your PC glances around the network for the other PCs' shared printer. When it finds it, click its name and click Next to install it. If it doesn't find it, move to Step 4.

4. **Choose The Printer That I Want Isn't Listed, and then click Browse to go to the shared printer.**

Clicking the Browse button fetches a list of your networked PCs. Double-click the PC with the attached printer, and Vista lists the printer's name.

5. **Double-click the shared printer's icon and click Next.**

Vista finally connects to your networked printer. You might also need to install the printer's software on your PC before it can print to the networked printer.

Dealing with a Network That Isn't Networking

Sometimes networks communicate as gleefully as birds on a sunny spring morning. Other times, they stand still and refuse to talk, like strangers in an elevator. Wireless and wired computers each come with their own special types of problems. I tackle both of them in their own sections.

Fixing problems with wired networks

Books on troubleshooting and setting up networks easily run into the 1,000-page range. Before cracking the spine on one of those books, though, many network gurus start with these tricks:

- ✓ If some computers don't recognize the network, turn off all the computers and networking equipment. Then turn on the cable modem, wait a few moments, and then turn on the router.

Then turn on the other computers one by one to isolate the problem computer. Before moving on to another computer, make sure that the one you're working with connects to the Internet and to the other computers.
- ✓ After you've isolated the problem computer, check the wiring. Make sure you're using CAT-5 cable and that the cable's no longer than 300 feet. Make sure that the cable is plugged firmly into both the router and the network adapter. (It's not plugged into your modem's phone jack by mistake, is it?)
- ✓ Call up the Windows Device Manager, described in Chapter 19, and make sure that Windows doesn't list any codes or errors next to your network adapter. Make sure you're using the adapter's newest drivers.

- ✔ Make sure that the Windows Vista firewall, covered in Chapter 18, is turned off while you're troubleshooting the network. If everything works when the firewall's turned off, you've found the culprit: Check the firewall's settings.
- ✔ Choose Help and Support from the Start menu, run through the three help sections listed in the networking section. Windows Vista leads you through setting up the network, step by step, to make sure you haven't forgotten anything.

Fixing problems with wireless networks

Wireless networks have many more potential problems than wired networks, primarily because of their security issues. Wireless networks use passwords and setup codes to keep out the bad folks. That extra layer of protection sometimes keeps things from working correctly.

- ✔ Keep an eye on your signal strength by checking the properties of your wireless network adapter. Without a strong enough signal, wireless computers can't speak to each other. Try relocating the wireless access point for optimal signal strength.
- ✔ While you watch your adapter's signal strength meter, slowly point its antenna in different directions. If you're using a USB adapter with a cable, move the adapter to different spots on your desk. If necessary, stick it to a wall with Velcro. Antenna position is often key; have somebody watch your computer's signal strength meter while you slowly move the antenna on your router.
- ✔ Many companies sell antennas specifically designed to increase your signal by pointing it in specified directions. They don't work with all models of routers, but try Googling your router's model and the term *wireless antenna*.
- ✔ Try temporarily disabling your encryption. If the wireless connections work with the encryption disabled, concentrate on setting up the same encryption on each computer so that they all match.
- ✔ Run through all the suggestions listed for wired networks and see if any of them work.
- ✔ The Internet holds a wealth of information about networking, as well as friendly, informative people. Chapter 22 shows you how to discover them and their advice for your particular computing problems. (The Troubleshooting & Tutorials section of www.practicallynetworked.com can be especially helpful.)

Chapter 18

Filtering Out Evil with Firewalls

In This Chapter

- ▶ Understanding how firewalls work
 - ▶ Setting up the Windows Vista firewall
 - ▶ Allowing programs to work with Windows Vista's firewall
 - ▶ Using a third-party firewall
-

Even if you're not using a traditional network in your home or office, you're probably using a network every day. The Internet is a vast network connecting computers around the world. And with those connections come dangers.

See, your computer opens a door to the Internet whenever it asks for information. And naturally, because your computer needs to receive information — a Web page, for example — the computer holds the door open.

Unfortunately, some people make a habit of looking for open doors and trying to sneak in when nobody's looking. Why? For some people, the childish thrill of seeing if they can sneak into Jeff's locker and snoop around without getting caught is just too tempting to resist.

Others sneak in like burglars, looking for things they can steal: credit card numbers, e-mail addresses, or other private files. Some work like vandals, sneaking in and destroying whatever they get their hands on.

Simply put, your computer needs somebody to stand guard at the door, opening and shutting the door at the right times to filter out the bad folks.

A *firewall* is that security guard. A firewall can be either software or hardware, and this chapter explains how it works, how to find one, and how to make sure it does its work without constant supervision.

Understanding Firewall Buzzwords

The Internet is a computer network, and anybody who's looked at a network's settings menu knows how complicated it is. Because firewalls work at your computer's Internet connection point, they, too, come with some pretty complicated setups. Here are some of the words that you might encounter when choosing and setting up a firewall:

Firewall: A piece of hardware or software that watches the information going in and out of your PC. Depending on its settings, the firewall either permits or blocks the information.

Hardware firewall: A router or other specialized box that connects directly to the modem and inspects the information as it passes to or from the modem. Because the hardware firewall — the router, in most cases — sits between your PC and the Internet, potential attackers can't attack the PC directly. That limits their attacks to the router itself, which is more difficult to exploit than a PC.

Software firewall: A program that polices the information flow between computers, letting you decide what programs can exchange information with other computers. A software firewall helps keep worms from spreading between PCs linked in a home or office network.

Windows firewall: The firewall software built into both Windows Vista and Windows XP. (Before Service Pack 2 arrived, Windows XP's firewall went by the name *Internet Connection Firewall*, and Microsoft left it turned off by default.)

Rules: Settings on a firewall that describe its behavior. Your router looks at its rules to decide who can communicate with your PC. Rules can dictate which programs may talk to the Internet, for instance, and which may not. Other rules can allow some computers to talk to your PC, but not others. If you don't set any rules, the firewall follows the ones Microsoft initially set up, which are reasonably safe.

Shared: Drives and folders that have been given permission for others to access. Windows Vista automatically shares everything inside its Public folder with other users on a local computer network, like the one I describe how to set up in Chapter 17. The Public folder's contents can't normally be reached from the Internet.

IP Address: A specific number assigned to a computer by your Internet Service Provider that lets it connect to the Internet. Working like a house's street address, the IP address enables the Internet to route information directly to and from your computer.

Why cable and DSL modems need firewalls

Cable and DSL modems can be more dangerous than dial-up Internet connections, and here's why:

Whenever your computer connects to the Internet, your Internet Service Provider (ISP) assigns it a number known as an *IP address*. Because a dialup user's computer's IP address changes each time she dials the Internet, a hacker might have more trouble finding and relocating that particular computer. That keeps the computer safer from unauthorized connections. Even if a hacker breaks in once, the computer

will have a different address the next time it connects to the Internet, making it more difficult for the hacker to relocate.

Most cable and DSL modems, by contrast, remain constantly connected to the Internet, which means that the computer's IP address doesn't change nearly as often — if ever. After a hacker locates a susceptible computer's address on the Internet, he or she can break into it repeatedly. Firewalls help weed out hackers trying to break into your PC.

Hacker: A person who enjoys fiddling with computers and exploring their limits. Good hackers (sometimes called “white hat” hackers) enjoy challenges like creating robots that bring them drinks. Evil hackers (sometimes called “black hat” hackers) enjoy exploring other people's computers — regardless of whether or not they've asked for permission.

Turning On (or Off) Windows Vista's Firewall

Windows Vista comes with a built-in firewall, just like Windows XP. Actually, the two firewalls are very similar. Both Windows XP (with Service Pack 2) and Windows Vista turn on the firewall automatically when you set up a network or connect with the Internet.



In both Windows XP and Windows Vista, you must be logged on with an Administrator's account to access Windows' firewall.

It's easy to see if Windows Vista's firewall is turned on: Vista constantly nags you if the firewall's ever turned *off*. But to see for yourself that Vista's firewall is running — and turn it on if it's turned off — follow these steps:

1. **Choose Control Panel from the Start menu.**



2. Click the Security icon and choose Windows Firewall.

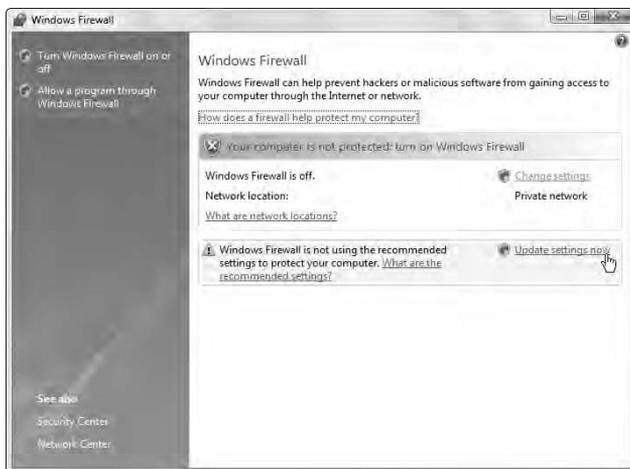
The Windows Firewall window appears, as shown in Figure 18-1, showing whether the firewall's turned on or off.

If the Windows Firewall screen says “Your computer is not protected: turn on Windows Firewall,” as shown in Figure 18-1, Vista's firewall is turned off. Turn it back on by following the next step.

3. Click Update Settings Now.

The little hand mouse pointer points to those words in Figure 18-1. When you click the words, Windows Vista immediately turns on your firewall.

Figure 18-1:
The Windows Firewall window tells you whether your firewall is turned on or off.



You might not always want the firewall turned on, as described in the next two tips:

- ✓ If you're using a firewall from a third party company, keep Windows firewall turned off. Unlike anti-spyware programs, firewalls interfere with each other, so you should run only one. To turn off Windows firewall, click Change Settings, click Off (Not Recommended), and click OK.
- ✓ Windows firewall sometimes nags you when it's turned off. But if you *want* the firewall turned off, turn off the nag screens, as well: Choose Start→Control Panel→Security→Security Center. Then, from the Windows Security Center window's left column, choose Change the Way Security Center Alerts Me. Finally, choose Don't Notify Me and Don't Display the Icon (Not Recommended).

Turning on Windows XP's firewall

Windows Vista and Windows XP turn on their firewalls in slightly different ways. If you're still using Windows XP, follow these steps to see your PC's network connections, see which ones are firewalled, and turn on the connections you want protected.

1. **Choose the Control Panel from the Start menu, click the Network and Internet Connections icon, and click the Network Connections icon.**

Windows XP lists all your computer's network connections, including dialup, broadband Internet gateways (a network's Internet connection), and network bridges (a connection of two networks, like FireWire and an Ethernet network).

2. **Right-click the Internet connection you want to protect and choose Properties.**
3. **Click the Advanced tab.**

4. **Click in the little box in the Internet Connection Firewall section.**

Clicking in the little box turns on the firewall.

5. **Click the OK button.**

Depending on whether you left a little check mark in Step 4's little check box, you've turned the firewall on or off.

Enable Windows XP's firewall only on connections to the *Internet*. (You needn't turn on the firewall for your Bluetooth connection, for example, even though Windows XP lists Bluetooth as a network connection.)

Using America Online to connect to the Internet in Windows XP? Then these instructions won't help at all. America Online uses its own, special dialup connection that doesn't allow members to tinker so easily with their network settings. That includes turning on the firewall.

Letting a Program Poke through Windows Vista's Firewall

Although firewalls offer protection, they can be as annoying as an airport security scan. In their zest for security, firewalls sometimes go overboard, stopping programs from working the way they should.

You might try to run a new program, for example, only to be greeted with the window in Figure 18-2. If you spot that window and you *haven't* tried to run a program, click the Keep Blocking button: You've effectively stopped what could be a rogue program from connecting with the Internet.

But if you want the program to run, click the Unblock button instead. The firewall adds that program to its Exceptions list and no longer bugs you about it.

Figure 18-2: Windows firewall lets you know when it's stopped a program from connecting with the Internet.



On a few conditions, however, you'll need to delve deeper into the firewall's settings:

- Manually add a program to the Exceptions list.
- Change how the firewall blocks a particular program.
- Unblock a program you've blocked by mistake.

To do any of those three things, follow these steps:

1. Choose Control Panel from the Start menu.

The Control Panel appears, listing its categories.

2. In the Security category, choose Allow a Program Through Windows Firewall.

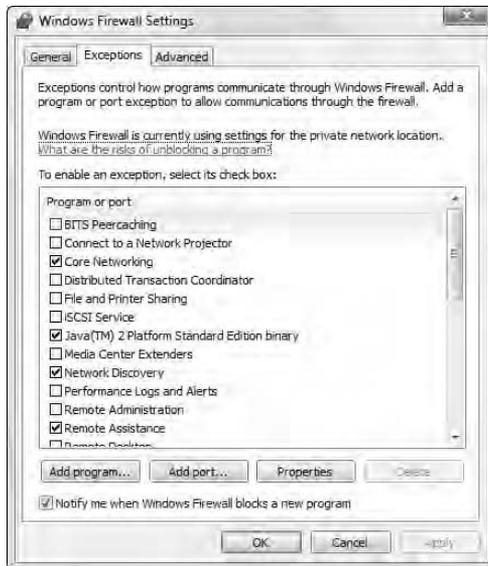
The Windows Firewall Settings window opens to its Exceptions tab, as shown in Figure 18-3. Here, Windows Firewall lists the programs it recognizes. Programs with a checked box are able to accept incoming connections through the firewall. No check mark in a program's box? Then that program is blocked.

From this window, you can take any of the following actions:

- **Add a program to the Exceptions list.** Don't see your program on the Exceptions list? Click the Add Program button, and the Add a Program window lists all your known programs. Click the program's name and click OK to put it on the Exceptions list.
- **Unblock a program.** Unblock any mistakenly blocked program by putting a check mark in its adjacent box and clicking Apply.

- **Block a program.** Block any suspicious program from accepting Internet connections by removing the check mark from its box and clicking Apply.
- **Delete a program's name.** If you've uninstalled a program but it still appears on the list, click its name and click Delete to remove its entry.

Figure 18-3: Programs with a check mark may accept incoming Internet connections; programs without a check mark have those connections blocked by Windows firewall.



3. Click OK to save your changes.

The firewall saves your work and closes the window.



These tips help you wring the most work out of your firewall:

- ✓ Want more information about a program listed in the firewall? Click that program's name and click the Properties button. (Refer to Figure 18-3.) A window appears, explaining the program's purpose.
- ✓ Think you've messed up your firewall settings? Click the Advanced tab and click Restore Defaults. That removes any changes you've made to the firewall, leaving it set up the way it was when first installed. (Clicking Restore Defaults might also keep some programs from working until you add them to the Exceptions list again.)
- ✓ Don't want the firewall to monitor one of your network connections — your FireWire or Bluetooth connection, for example? Click the Advanced tab and remove the check mark from that particular connection's name.

The difference between hardware and software firewalls

Like antivirus programs, firewalls usually butt heads: You don't want to install two firewalls on the same PC. The exception comes with hardware firewalls. Most routers come with a built-in hardware firewall that manages the traffic flow between the Internet and your network or PC. Hardware firewalls don't conflict with software firewalls, like the ones built into Vista and Windows XP. Feel free to run them both, and they'll both get along fine.

In fact, the software firewall does something extra that the hardware firewall can't: It manages traffic between the PCs on your network. If an evil program infects a PC on your network, the software firewall can help stop that PC from infecting the other PCs on your network.

Manually Configuring a Firewall's Ports

Sometimes adding a program to the firewall's Exceptions list, described in the preceding section, isn't enough. Specifically, some programs want you to open specific channels so they can chatter through them. These places are called *ports*.

You might come across a finicky program with special port requirements. For example, the *World of Warcraft* online game needs TCP protocol on port 3724 to be open for outbound TCP connections.

Here's how to tell Windows Vista's firewall to accommodate that pesky program:

- 1. Choose Control Panel from the Start menu.**

The Control Panel appears, listing its categories.

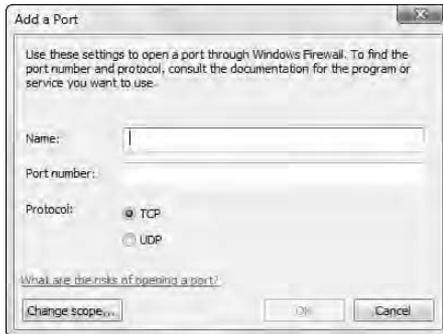
- 2. In the Security category, choose Allow a Program Through Windows Firewall.**

The Exceptions tab appears on the Windows Firewall Settings window, as shown earlier in Figure 18-3.

- 3. Click the Add Port button.**

The Add a Port window appears, as shown in Figure 18-4, ready for you to poke the required holes in your firewall.

Figure 18-4:
The Add a Port window lets you open a port on your PC for programs to communicate through.



4. Describe what you're doing in the Name box.

This is for your own use so you can remember later why you're doing this. For instance, type **Enabling Port 3724 for World of Warcraft**.

5. Type the required port number in the Port Number box.

Here's where you tell the firewall which ports to open; in the case of *World of Warcraft*, you want it to open 3724.

Need to open several ports, or a range of ports? Enter every port number, separated by commas, like this: **3724,3725,3726,3728**.

6. Click either the TCP or UDP radio button, and then click OK.

World of Warcraft wants the *TCP* port changed, so click that radio button. The Add a Port dialog box now looks like Figure 18-5.



Figure 18-5:
When filled out properly to open TCP port 3724, the Add a Port box looks like this.



7. Repeat these steps for any other ports that need to be opened.

After you've opened the port required by your program, Windows Vista should allow the program to hold its conversations through the firewall.

- ✓ *World of Warcraft* isn't the only program with these special needs. You might find yourself changing ports for other online games and chat programs where it's important that the computer can accept communications that it didn't initiate. (Search the troublesome program's manual or help area for *firewall* to see which ports to open.)
- ✓ Internet file-swapping programs also want certain ports open so they may communicate and share files. It's a drag, but check the program's fine print to see what ports it craves. Then add those ports to the firewall by following the steps in this section.

Part V

Introducing Parts to Windows

The 5th Wave

By Rich Tennant



“We should cast a circle, invoke the elements,
and direct the energy. If that doesn’t work,
we’ll read the manual.”

In this part . . .

This part of the book aims directly at Windows Vista owners. Today, most upgraders pick up their screwdrivers because they want their PCs to be strong enough to handle Windows Vista. Or if they've already upgraded, they want to fix or replace the parts and software that Windows Vista snubs.

When you're ready to upgrade to Windows Vista — or you're not sure you've done it correctly — this part of the book details exactly how to install Microsoft's latest Windows version. You can upgrade from Windows XP or install Windows Vista onto a newly installed, gargantuan hard drive.

Also, be sure to turn here if somebody or some error message says that you need a new driver. You discover how to find the right one, replace the old one, and tweak the settings on the new one if it's still not driving diligently along the dotted yellow lines.

Finally, if something leaves you completely in the lurch, read Chapter 22 to find out how to consult the ultimate Free Tech Support System: the Internet's Web sites and newsgroups.

Chapter 19

Hiring the Right Driver for Windows

In This Chapter

- ▶ Understanding drivers
 - ▶ Installing a driver for a new computer part
 - ▶ Finding a driver for a computer part
 - ▶ Locating a driver's version number
 - ▶ Updating a problem driver with a newer driver
 - ▶ Rolling back a driver to the earlier one
-

Sometimes upgrading a computer goes as smoothly as throwing a well-catered party. You install the new part, and Windows instantly recognizes it, announcing its name in a merry pop-up window for everybody to see. Windows embraces the latest arrival, hands it a drink, and immediately introduces it to all parts of your computer.

Other times, well, it's a party disaster. Windows snubs the part when you plug it in, and the computer turns a cold shoulder, as well. Or when you turn your computer back on, your computer responds with an antisocial error message that ruins the fun for everybody.

Often, installation problems lie not with the part itself, but with its driver — the software that lets Windows put the part to work. Although Windows Vista comes with nearly 20,000 drivers on its DVD, some of your PC's parts will probably go unrecognized. This chapter shows you how to go about finding and installing decent drivers. If a driver doesn't seem to be doing the job, you discover how to replace it politely, with a minimum of hard feelings on anybody's account.

And if the new driver does an even worse job than the old one, heaven forbid, this chapter reveals the button hidden in Windows Vista's Secret Panel: At one click of a button, Windows fires the new driver and puts the older driver back in place until you can find a better replacement.



This is a meaty chapter, and you troubleshooters will spend a lot of time here because many of Windows' hardware problems start and end with drivers.

Understanding Driver Buzzwords

Whenever anything goes wrong in Windows, nearby computer gurus often exclaim, “Sounds like a driver problem! You'd better get an update.” Of course, it's an easy conversation stopper, freeing the guru from fixing your computer.

But what exactly does that mean? What's a driver? Where do you find an updated one? How do you know which driver works the best? This section probes the background behind Windows' continuing problem with its drivers.

But, first thing's first. A *driver* is piece of software that enables Windows to communicate with a specific computer part — an interpreter, if you will. Some drivers use several files to carry out their duties; others use just one. Their names vary widely. But almost every piece of hardware in your computer needs its own, specific driver, or Windows doesn't know how to communicate with it.



Because outside companies — your printer's manufacturer, for instance — write drivers for their own printers, tech support people like to pass the buck: If you have a problem with your printer, your printer's tech support people might say you have a *Windows* problem and should contact Microsoft. Microsoft's tech support people are likely to tell you that you have a *driver* problem and that you should contact your printer's manufacturer.

Here's a list of the buzzwords to remember when you're installing new hardware, troubleshooting a PC problem, or tracking down an updated driver for a bothersome computer part.

Version: Manufacturers continually update their drivers and release new replacement versions. Sometimes new versions add new features. Often, they fix problems with the previous driver versions. And sometimes, if a version is so new that it hasn't been tested under a wide variety of conditions, the new driver doesn't work as well as the *old* driver.

Version Number: Manufacturers assign the number 1.0 to a driver when it's first released to the public. Whenever they release a new version of the driver, they change its number, often giving a hint as to the extent of the driver's changes. A driver moving up an entire digit, from 1.0 to 2.0, for instance, probably offers substantial new features. A driver with a smaller number change, version 1.1, for instance, probably just fixes small problems or adds minor features to version 1.0. Version 1.11 usually fixes tiny problems with the version 1.1 update. (Version 1.11a fixes miniscule problems with Version 1.11.)



The driver bearing the *highest* version number is the most current release. It's usually (but not always) the most reliable. The Windows Device Manager, described later in this chapter, enables you to view a driver's version number. (Jump ahead to Figure 19-13 to see an example.)

Version History: The best companies stock their Web sites with a detailed description of every driver's version number, its date of release, and the features that each version repairs or adds. By examining a driver's version history, you can easily spot the newest driver and discover whether it repairs the problems that you've been experiencing.

Device Manager: Windows collects more information about drivers than your local DMV. The Windows Device Manager, the archive of driver details, lists the drivers used by every part of your computer. The Device Manager serves as the starting point for anything to do with drivers, including their installation, update, or removal. (The Device Manager gets its own arena in this chapter's "Using the Device Manager to fix driver problems" section.)

Device Provider: Listed in the Device Manager, the device provider is the company that created the driver. Most manufacturers write their own drivers for their products. They then hand the drivers to Microsoft; Microsoft then bundles those drivers with each new release of Windows. When you install Windows, it can then recognize and begin using a computer's parts.

Many manufacturers balk at creating drivers for their older parts, unfortunately, because the companies are too busy pushing their newer parts. Not wishing to strand the millions of people still using older computers, Microsoft picks up the stick and writes its *own* drivers. Drivers listing Microsoft as the Device Provider usually came bundled with Windows.

Microsoft's drivers are often generic, though. Microsoft writes a driver that recognizes *all* game controllers, for instance, allowing any game controller to move things around on the screen. However, manufacturers often write separate drivers for specific models of a game controller. When you update to the manufacturer's driver, Windows suddenly realizes that your game controller has *seven* programmable buttons, for instance, and finally enables you to use them.



Add Hardware Wizard: Hidden away in the Control Panel's Classic view, this program tells Windows to look for newly installed hardware that *isn't* Plug-and-Play. It's handy for installing older hardware that worked on older PCs, but that Windows Vista doesn't automatically recognize and install. See the "Running the Add Hardware Wizard" section later in this chapter.

Driver signing: Desperate to keep drivers from growing long sideburns, Microsoft prefers to inspect each newly released driver and if it meets approval, stamp it with the Windows logo. If you install a driver that hasn't been through Microsoft's approval process, Windows flashes a warning message, as shown in Figure 19-1.

Figure 19-1: Windows complains if you try to install a driver that hasn't been through Microsoft's approval process.



Despite its fear-inspiring message, the warning shown in Figure 19-1 appears often when you're installing very new drivers or parts manufactured by smaller companies. Companies often don't have enough time or money to wait for Microsoft to approve their drivers. If the new driver doesn't work, you can always remove it, as described in this chapter's last section, "Using the Device Manager to fix driver problems."

Installing (or Reinstalling) a Driver

Sometimes installing a driver is an automatic, one-time-only process — especially when you plug a Plug and Play device into a USB or FireWire port. It works like this:

1. Plug in the new part.

For instance, I plugged a digital camera into my computer's USB port, and I turned on the camera.

2. Watch Windows greet your new part.

Windows beeps in excitement, spouting the pop-up message shown in Figure 19-2. In less than a minute, Windows spun out a second message, shown in Figure 19-3, saying that my camera was ready to use.

- ✓ After you've installed a Plug and Play item and Windows successfully recognizes it, Windows skips the greeting messages the next time you plug in that same item. Instead, Windows simply recognizes your device. (It also places the device's name in your Device Manager, enabling you to probe it for driver details.)
- ✓ When you unplug or turn off a Plug and Play device, Windows beeps, a way of telling you it knows you've unplugged your gadget. (The sound comes in handy when frantic game-controller movements yank the cord out of your computer.)



- Windows almost always beeps in excitement when you plug something into a USB or FireWire port. If it doesn't beep, unplug the device, wait a moment, and then plug it back in. Never, *ever* unplug and plug in a device quickly. Give Windows a chance to beep in recognition.

Figure 19-2:
As I plug in the camera, Windows begins searching for the right driver.



Figure 19-3:
Windows identifies the camera, installs the driver, and leaves the camera ready to use.



Dealing with a Driver That Won't Drive

Sometimes you plug in a new part, and Windows stays mum: No welcome sign. Or you install a part inside your computer, push your computer's power button, and Windows completely ignores your laboriously installed part.

Occasionally, Windows does recognize *something*. It might even recognize the part's name — an Epson printer, for example. But it refuses to put it to work, instead asking you to insert the CD that came with your device. If this happens, you have three options, discussed in the following three sections:

- Run the software that came with the device, if any.
- Run the Add Hardware Wizard.
- Find a driver and install it yourself.

Running a part's bundled software

Windows doesn't always recognize every newly installed part. That's why many products come with their own setup software. Running the setup software automatically installs the drivers and adds any programs that help you use the new part.

To install the software, simply insert its CD into your computer's CD drive. Windows usually takes notice of the new CD and automatically runs the setup software, as shown in Figure 19-4. (It often asks permission before running the setup software.)



Figure 19-4:

Insert the installation CD, and Windows automatically runs a program that lets you install the part's driver.

Windows often ends the setup process by asking you to restart your computer. When the computer wakes up, Windows takes notice of the new part and begins its welcome messages as shown earlier in Figures 19-2 and 19-3.

- ✔ If Windows doesn't notice any setup software on the CD, don't worry — the driver is probably on there, but the manufacturer didn't write any software that automatically installs it. In that case, move on to the next section, "Running the Add Hardware Wizard." That section explains how to make the Windows wizard locate the driver on the CD and install it for you.
- ✔ Still won't install? Then visit the part manufacturer's Web site and look for the latest driver, a process covered in the "Finding a new driver" section later in this chapter. Download the newest available driver, install it, and keep it handy for the next crisis.



- ✓ Sometimes you want to view a CD's contents, but Vista's darn AutoPlay window keeps jumping up whenever you insert the CD. To bypass the AutoPlay software, hold down the Shift key while inserting a CD. Then right-click the Computer icon, choose Explore, and examine the CD's contents without being bothered.

Running the Add Hardware Wizard

If you install a new part and Windows Vista doesn't recognize it, the first thing to try is to fire up the CD that came with the part. Most CDs usually install the part for you, but a few leave you stranded. When that happens, call in the mysteriously hidden Add Hardware Wizard. Here are the steps for summoning the wizard from its lair in Windows Vista:

1. Open the Control Panel from the Start menu.

The Control Panel appears. If you're like most people, the Control Panel displays its Category view: Ten or so categories appear, each with tasks listed beneath them.

2. Choose Classic View from the Control Panel's upper-left corner.

The Control Panel's upper-left corner lists Control Panel Home, which summons the Control Panel's normal, Category view. Instead of clicking there, click the words *Classic View*, just beneath it, and the Control Panel suddenly shows a swarm of formerly hidden icons.



3. Double-click the Add Hardware icon, shown in the margin, and click Next at the opening screen.

The Add Hardware Wizard leaps into action, as shown in Figure 19-5, offering two options:

- Search for and Install the Hardware Automatically (Recommended)
- Install the Hardware That I Manually Select from a List (Advanced)

4. Choose Search For and Install the Hardware Automatically, and click Next.

Vista takes another look for your new part. If you're lucky, it finds and installs it, leaving you with a happy glow as you go about your business.

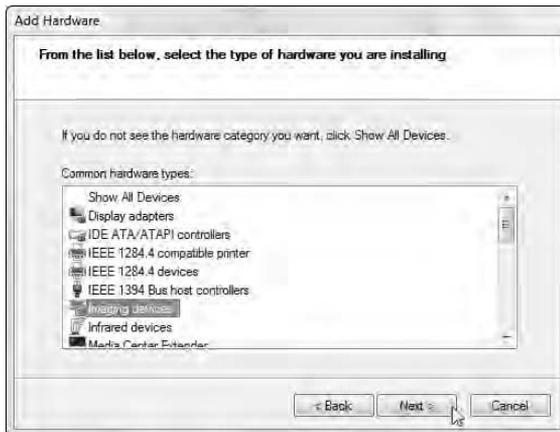
Chances are, though, it comes up blank, leaving you with the only option: Click the Next button.

5. Choose the category of part that you've installed and click Next to install your part, or click Back to return to the previous list.

When Vista lists different categories of computer parts, shown in Figure 19-6, click the one pertaining to your newly installed part. For instance, if you've installed a scanner, choose Imaging Devices.

Figure 19-5:

The Add Hardware Wizard helps install older hardware that Vista doesn't recognize automatically or that didn't come with a working installation CD.

**Figure 19-6:** Choose the category of your new device and click Next.

If you choose Imaging Devices, for example, Windows displays a list of scanner and camera manufacturers, as shown in Figure 19-7.

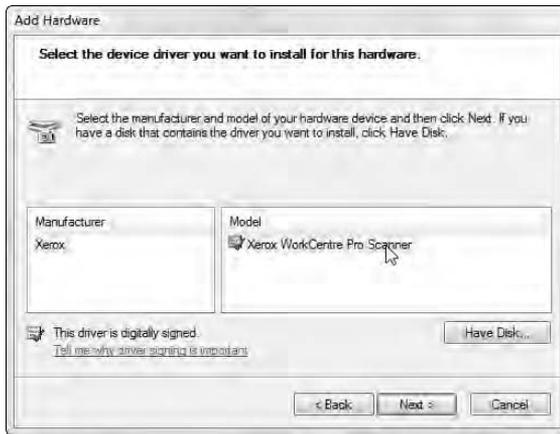
Click the manufacturer of your part from the list on the left, and then click its model number from the list on the right. The wizard installs your device, and you're through.



If your device came with a CD but no driver installation program, click the Have Disk button in Figure 19-7 and insert the CD. Windows finds the CD's driver, compares it with any other drivers it has, installs the newest or most reliable one.

Don't spot the right category for your part? Not sure of its model name? Vista *still* hasn't installed your part? If any of these three ugly events occur, select the Show All Devices option from the top of the list in the wizard screen shown in Figure 19-6, and click Next.

Figure 19-7:
Click your part's manufacturer name and model number, if shown.



6. Choose the device you've installed by selecting the manufacturer or connection device.

Windows Vista makes a last-ditch effort to help. Instead of making you choose between categories and model numbers, it lists *all* the part manufacturers and models it can recognize, as shown in Figure 19-8. If you spot your device here, click it; Windows Vista can still install a driver for it, finishing your work.

Figure 19-8:
Choose your part's manufacturer and model or click Have Disk to install a driver from a CD, USB drive, or a folder on your hard drive.



If Vista *still* leaves you with an uninstalled part, though, try any of these things before giving up:



- ✔ Did your part come with a disk or CD but no installation program? Now is your chance: Insert the disk or CD and click the Have Disk button, as shown earlier in Figure 19-8. When the Install from Disk dialog box appears, click the Browse button and tell Windows the letter of the disk drive containing the CD. Windows should scour the CD, find the elusive driver, and install it.
- ✔ If an installed part still goes unrecognized by Windows, try using Windows Update, covered in Chapter 1. Sometimes Windows Update offers drivers for your newly installed computer parts.
- ✔ If you reach this step with no success, the burden rests upon you to track down the right driver (described in the next section). When you've grabbed it, return to this section, follow Steps 1–5, and click the Have Disk button, shown in Figures 19-7 and 19-8.
- ✔ When you click the Have Disk button, Windows asks for the *location* of your newly found driver. If you've downloaded the driver to a folder on your hard drive — usually your Downloads folder — choose that location after clicking the Browse button. Windows finds the driver, installs it, and you're through. *Finally.*

Finding a new driver

Occasionally, Windows forces *you* into the role of grunt worker, and you have to ferret out a driver for a computer part. You can find drivers in four basic ways:

- ✔ Search the Internet for the manufacturer's Web site and hopefully, the part's driver. (I explain this in the rest of this section.)
- ✔ Search the Internet for *any* site, not necessarily the manufacturer's Web site, that offers the driver. (I explain how to find help on the Web in Chapter 22.)
- ✔ Ask a friend or the staff at the computer store if they have a driver. This is doubtful; however, some kindly nerd might take pity, if you can find one.

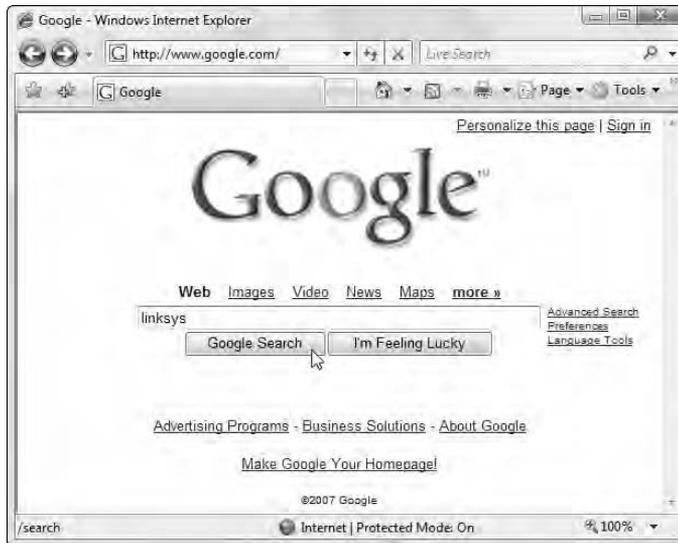
The easiest way by far, and the method supported by the most manufacturers these days, is to download the driver straight from the manufacturer's Web site. Here's the basic procedure, although it varies from site to site.

1. Find the manufacturer's Web site.

Try looking on the box your part came in; you can often find the site's name listed there or in the manual.

Don't know the manufacturer's name? Look on the part itself. Sometimes the manufacturer's name appears in fine print etched on the part's circuits. After you've found the manufacturer's name, head for www.google.com with your Internet browser, type the manufacturer's name into the search box, and click the Google Search button, as shown in Figure 19-9.

Figure 19-9:
Type the name of the manufacturer into the search box and click the Google Search button.



Google quickly glances at the Web and then displays a surprisingly accurate list of potential Web sites.

2. Go to the manufacturer's Web site.

Google sorts its list by probability, with the most likely candidates at the top. Click the manufacturer's site name to visit the Web site.

3. Find the Web site's page containing the downloadable driver.

Some sites list a menu for *Downloads* or *Drivers* on the opening page. With others, look for *Customer Support* or *Technical Support*. Try clicking a *Site Map*, if you spot one, and search for downloadable drivers from there.

Linksys simplifies the process, as it lists *Downloads* in the top-right corner of its first page. Click the Downloads button, as shown in Figure 19-10.

4. Locate the correct driver for your part and Windows version.

Linksys lets you choose both the part's name, as well as your version of Windows. Then it presents a download page, as shown in Figure 19-11.

No Windows Vista driver available? You might still have luck with a Windows XP driver. Don't bother with drivers for Windows versions earlier than that, though, because they probably won't work.



Figure 19-10:
Locate the
Web page
containing
driver
downloads.



Figure 19-11:
Click the
download
button, and
then
download
the proper
driver both
for your part
and your
operating
system.



5. Save the driver into a folder on your computer.

Vista usually saves downloaded files in your Downloads folder. You can find those downloaded files by clicking the Start menu, clicking your username, and opening the Downloads folder.

I created a folder in my computer's Public folder called Drivers Archive. In the Drivers Archive folder, I created a separate folder for each downloaded driver. Because the drivers are stored within the Public folder, they're available to every user on my computer and to every computer on my network.



6. Log off the Internet and examine the downloaded driver.

Most drivers come compressed in a *zipped* file to save download time. Double-click the zipped file to see its contents. If you spot a Setup file, click it. The Setup program automatically installs your newly downloaded driver.

No Setup program? Then here's what to do:

- **If you've never installed a driver for your device**, use the Add Hardware Wizard, described in the preceding section. When you arrive at Step 5, click the Have Disk button, click the Browse button, and tell Windows where you've downloaded your new driver. Windows finds the new driver, installs it, and passes around the drinks.
- **If you want to update your existing driver**, head to the "Using the Device Manager to fix driver problems" section coming up next and follow the instructions for updating an old driver.

Using the Device Manager to fix driver problems

When your computer acts up and Windows can't communicate with a computer part or peripheral, a driver's often the culprit. Display adapters (commonly called *video cards*) frequently cause problems like displaying odd colors or borders, or windows that behave in strange ways. Printers, too, rely heavily on their drivers.



Use the Device Manager whenever you have problems with a piece of hardware. There, you can find the version number of the part's current driver and a way to update or repair the driver.

To view your computer's collection of drivers, fire up the Device Manager, as described in the following steps:



1. **Open the Start menu, choose Control Panel, and open the System and Maintenance category.**

The System and Maintenance category spills nearly a dozen icons across the screen. (If Control Panel is already set in Classic View — the view where it *doesn't* show categories — jump to the next step.)



2. **Double-click the Device Manager icon.**

The Device Manager window hops to the screen, as shown in Figure 19-12. The Device Manager lists all the parts Windows recognizes inside your computer, as well as whether they're working correctly.

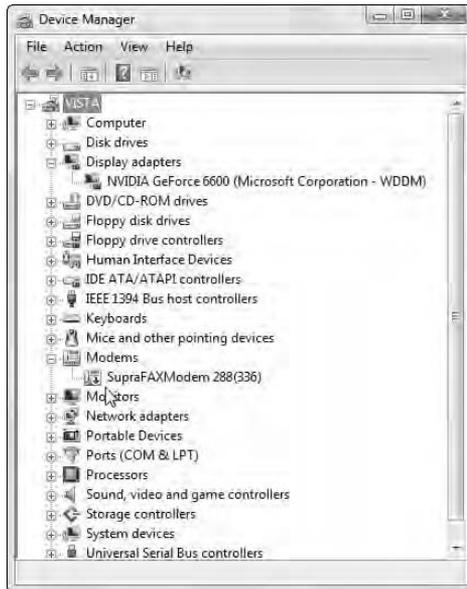


Figure 19-12:
The Device Manager lists all the parts installed inside your PC.

If the Device Manager notices a computer part that's not working correctly, it tells you by placing a symbol on that part's icon. An icon bearing a downward-pointing arrow has been disabled for some reason, offering a clue that it needs attention. (The Modem icon shown in Figure 19-12, for example, has a downward-pointing arrow.)



Sometimes the Device Manager displays a problem code, number, and suggested solution next to a problematic part. Searching for these words and codes on the Internet (see Chapter 22) often can help you solve problems.

3. Click the plus sign next to the category you want to view.

Clicking the plus sign next to Display adapters, for example, shows that my computer uses an NVIDIA GeForce 6600 video card.

4. Double-click the brand name to view details about the part's driver.

Double-clicking NVIDIA GeForce 6600 reveals the Properties dialog box (shown in Figure 19-13) for that model of video card. There, different buttons give you every detail of the driver's private life.

5. Click the Properties dialog box's Driver tab, and then click the Driver Details button.

This reveals all the drivers working to help Windows communicate with your part, as shown in Figure 19-14.

Each time that you click one of those driver files, Windows reveals the driver's version number — an essential detail when you're hunting for newer, updated drivers. (Drivers are numbered sequentially, so higher numbers mean newer drivers.)

The other main buttons in Figure 19-13 — Update Driver, Roll Back Driver, and Uninstall — get their own sections, described next.

Figure 19-13: Click the Driver Details button in the Properties dialog box to view information about a part's drivers.



Figure 19-14: The Driver File Details dialog box reveals the version number for every driver file.



Updating an old driver

Even after installing a brand new part and installing its bundled driver, sometimes the thing *still* doesn't work correctly. In that case, it's time to try updating its driver. Follow these steps to make sure your computer uses the most up-to-date drivers for its parts.

1. Locate the version number of your current driver.

Run through Steps 1–5 in the preceding section, “Using the Device Manager to fix driver problems.” In Step 5, click the Driver Details button on the Driver tab, and click each of the driver's files. Write down the file version number for each file. (The files sometimes all use the same number.)

2. Find an updated driver.

You can find complete instructions earlier in this chapter in the “Finding a new driver” section. Be sure to remember where you've saved the new, updated driver.

3. Repeat Steps 1–5 from the previous section, “Using the Device Manager to fix driver problems.” In Step 5, click the Driver tab, click the Update Driver button, and click Next.

The Hardware Update Wizard asks where it should search for your new driver, as shown in Figure 19-15.

4. Choose Browse My Computer For Driver Software, point Windows to the folder containing your new driver, and click Next.

Windows offers two options here, as shown in Figure 19-16:

Figure 19-15:
Tell Windows to browse your computer for driver software, and then locate the folder containing your updated driver.

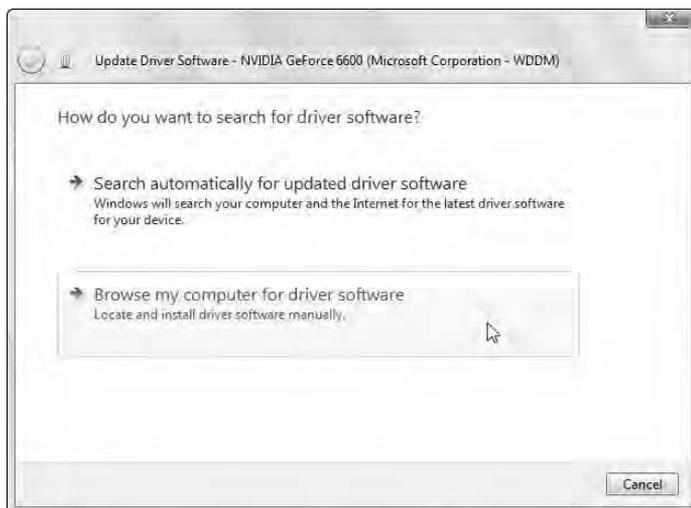


Figure 19-16: If you know the driver's location, click Browse and navigate to the folder; otherwise, click the second option.



- If you *know* the driver's location — you downloaded it to a folder, for example, or it's on a CD — click Browse, choose the driver's location, and click Next. Windows searches that location and installs your drivers. Mission accomplished.

If you downloaded the driver yourself, click Include Subfolders, shown in Figure 19-16, before clicking the Browse button. (That lets Windows know where to search.)

- If you *don't* know the drive's location, however, choose Let Me Pick From a List of Device Drivers on My Computer and move to the next step.

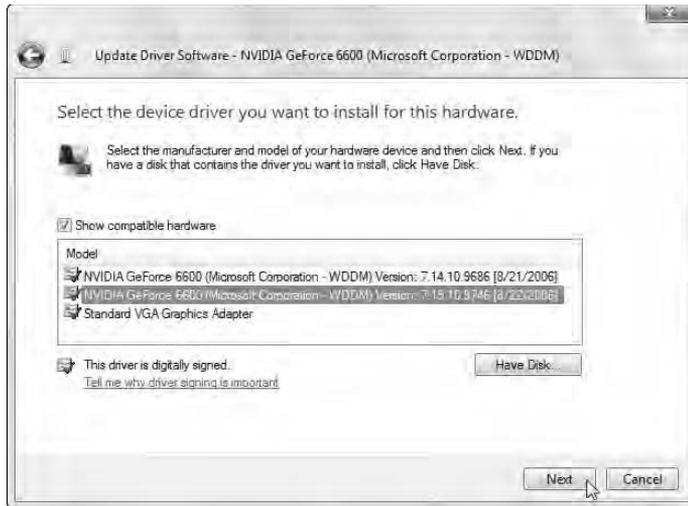
5. Choose the driver for your new part and click Next.

Windows shows you the list of compatible drivers that it found for your part, as shown in Figure 19-17. If you spot your new driver on the list, click it, click Next, and Windows installs it. Whoopee!

If your driver *isn't* on the list, click the Have Disk button. Tell Windows exactly where your new driver is located and try again. This time, Windows should find it.

If Windows still balks and says it can't find a better driver than your current driver, stop. The driver you've downloaded isn't a newer version. Head back to the "Finding a new driver" section, try to find a newer driver, and run through this section again.

Figure 19-17:
Click the
name of
your new
driver and
click Next.



Here's a last resort if Windows doesn't list your new driver: Click the box to remove the check mark next to the Show Compatible Hardware option, shown in Figure 19-17, and select a driver from that list. (This might install a driver that gives Windows limited use of the part. Although it rarely makes the part work perfectly, it's worth a try because you can always roll back to the old driver, described in the following section.)

- ✓ Sometimes Windows balks at installing *unsigned drivers*, as described earlier in this chapter in the "Understanding Driver Buzzwords" section. (Figure 19-1 shows the Windows caution message.) Don't worry about the unsigned stuff. Install the driver anyway.
- ✓ If your new driver makes things even *worse*, feel free to roll back to the original driver using the Roll Back feature, described in the next section.

Rolling back to the original driver

Sometimes the new driver isn't the panacea you'd hoped it would be. Your computer doesn't work any better at all. In fact, sometimes you've not only wasted your time searching for a new driver, but you've made things much, much *worse*.

Fortunately, Windows keeps your previous driver in its back pocket for times like this. Tell Windows to *roll back* — reach into its back pocket and put the original driver back in place. It works like this:

- 1. Call up the Device Manager by performing Steps 1–5 in the earlier section, "Using the Device Manager to fix driver problems."**

2. When you click the Driver tab in Step 5, click the Roll Back Driver button.

You see a picture of this dialog box and the Roll Back Driver button in Figure 19-13. When Windows asks if you're *sure* you'd like to roll back to the previous driver, shown in Figure 19-18, click the Yes button.

Figure 19-18:
Click Yes to tell Windows to return to your previous driver.



Windows dutifully removes the naughty driver you just installed and replaces it with the previous driver.

- ✔ This trick works wonders because Windows always keeps the old drivers in its back pocket for safekeeping.
- ✔ Changed your mind and decided that the new driver really *was* working better? Feel free to install it again. And then roll back again if you change your mind. You can spend hours doing this.
- ✔ Yes, indeed, you can spend a lot of time with this entire *chapter*. Finding a driver that works perfectly makes it all worthwhile, though. If a device gives you constant trouble, keep checking the manufacturer's Web site for a newer driver.

Chapter 20

Installing or Upgrading to Windows Vista

In This Chapter

- ▶ Preparing to install Windows Vista
 - ▶ Choosing the right version of Vista
 - ▶ Buying a full or upgrade version
 - ▶ Choosing between an upgrade or clean install of Windows Vista
 - ▶ Upgrading Windows XP to Windows Vista
 - ▶ Doing a clean install of Windows Vista on an empty hard drive
-

Although Windows Vista might be the latest step in Microsoft's long, climbing staircase of Windows versions, it has a long way to go before reaching a comfortable plateau. Many people still stumble over its perplexing mix of product versions, product keys, activation codes, and zillion-page licensing agreements.

This chapter covers those obstacles and explains how to install the darn thing onto your current computer, either by upgrading Windows XP or installing Vista onto an empty hard drive.

Understanding Windows Vista Buzzwords

One of the most perplexing problems you might face when you're ready to make the Windows Vista upgrade begins at the computer store. Which version should you buy? Or, for people who bought new computers with Windows Vista preinstalled, which version came on its bundled DVD? Here's a quick taste of the Windows Vista flavors. I discuss them all in more detail throughout this chapter.

Upgrade version: The upgrade versions of Windows Vista are cheaper than the full versions (usually about 50 bucks less), but there's a catch: They

upgrade only certain versions of Windows XP, as described in Table 20-1. If you don't have a working copy of one of those Windows XP versions on your PC, the upgrade version won't install.



Unlike Windows Vista's upgrade version, Windows XP allowed its upgrade version to be installed onto an empty hard drive. To prove you owned a qualifying previous Windows version, you simply needed to *insert your old Windows CD* during the installation process. Windows Vista's upgrade edition, by contrast, doesn't allow that. It installs itself onto only a *working, activated copy of Windows XP with Service Pack 2 installed*.

Full version: If you're not upgrading a working copy of Windows XP on your PC, you need the *full* version to install Windows Vista. You pay extra for the privilege, of course. Most people buy the full version if they want to do a clean install, described next.

Clean install: When you do a clean install, you're installing Windows Vista onto an empty hard drive. Although more difficult and more expensive, it's the best way to ensure Vista works well on your PC.

OEM (Original Equipment Manufacturing) version: Microsoft sells stripped-down versions of Windows to manufacturers to preinstall on the PCs they sell. The OEM version is locked to that specific computer.

Microsoft doesn't support OEM versions, as the manufacturer custom-configures them to work with your computer's preinstalled parts. Questions about these versions should be aimed at your computer's manufacturer. (Visual ID: The disc usually bears the letters OEM.)

Recovery or Reinstallation disc version: New computers that come with Windows Vista preinstalled sometimes don't include an OEM version *or* a real Windows Vista DVD. Instead, they include a Recovery disc that restores your hard drive to the state it was in when you bought it. That recovery technique usually wipes out all your files in the process, unfortunately. (Visual ID: Look for the words Recovery, Recover, or Reinstallation on the disc. Always check with your computer's manufacturer before using this version; it'll tell you how it affects your computer.)

Activation: Windows Vista's Activation feature takes a snapshot of your computer's parts and links it with Windows Vista's serial number, which prevents you from installing that same copy onto another computer — even your laptop. Unfortunately, the Activation feature might also hassle you if you change a lot of parts in your computer. Vista's official Hassle Window gives you a phone number to call and convince Microsoft that you're not a thief.

Product key: This is a 25-character code that comes with each Vista version as a form of copy protection. You must type in that 25-character code when installing Vista, or the program refuses to install.

Partition: This is a sectioned-off storage area on a hard drive. Usually, a hard drive contains one large partition bearing the letter C as its name. But some meticulous folks want to divvy up their hard drives into several smaller partitions to keep their information orderly. The computer then assigns those partitions different letters. In Windows, a hard drive with two partitions looks like two smaller hard drives bearing the letters C and D.

Preparing to Install Windows Vista

Installing Windows Vista takes more thought than simply popping the DVD into the drive and following the instructions. You need to choose a version of Windows Vista that meets your needs. Plus, you must decide whether to upgrade your Windows XP PC or start from scratch by installing Windows Vista onto an empty hard drive.

Here's a rundown on how to start planning your upgrade to Microsoft's latest operating system. Make up your mind about these things before buying any version.

Choosing the right version of Windows Vista

Windows Vista comes in four main versions, and that makes upgrading Windows XP to Windows Vista a tad complicated. Not all versions of XP will upgrade to every version of Vista. Table 20-1 shows which XP versions can be upgraded to which Vista versions.

	<i>Windows Vista Home Basic</i>	<i>Windows Vista Home Premium</i>	<i>Windows Vista Ultimate</i>	<i>Windows Vista Business</i>
Windows XP Professional	No	No	Yes	Yes
Windows XP Home	Yes	Yes	Yes	Yes
Windows XP Media Center Edition	No	Yes	Yes	No
Windows XP Tablet PC	No	No	Yes	Yes

Surprisingly, the inexpensive Windows XP Home wins the versatility award here, as you can upgrade it to Vista Home Basic, Vista Home Premium, Vista Ultimate, or even Vista Business version.

Windows XP Professional, sold mostly to power users and business owners, can be upgraded to only Vista's Ultimate or Business versions.

So, which version do you choose? Here's the rundown:

Windows Vista Home Basic: Windows Vista Home works fine for home or small office users who want cut-rate basics such as e-mail and Web browsing. It leaves out most of the fun stuff, though, such as making automatic, unattended backups, creating fancy digital photo slideshows, recording TV shows, and copying movies and slideshows to DVDs.

Windows Vista Home Premium: The most popular version for consumers, this contains features Vista Home left out. Vista Home Premium makes automatic backups and photo slide shows, for example, and — if you install the right hardware (covered in Chapter 12) — records TV shows, edits movies and recorded shows, and writes them to DVDs. It also contains what used to be known as Windows Media Center Edition, designed to let you connect your PC to a TV set.

Windows Business: Meant for businesses, this leaves out all the fun multimedia stuff from Vista Home Premium: No DVD maker, photo editor, movie maker, or fancy games. But it adds in a more robust backup program for automatic, unattended backups.

Windows Ultimate: This full-sized cruise vessel contains *all* of Windows Vista. It's Windows Vista Home, Home Premium, and the Business edition rolled into one mega-package. It's for computer enthusiasts who want it all.

The following list might help you decide which version is best for your needs:

- ✔ No version of Windows Vista is any easier to install onto your computer than any other.
- ✔ If you're planning on connecting to a large network at work, ask the network manager whether your corporate network insists that you open the wallet for either the Windows Vista Ultimate or Business version. (Remember to write it off as a business expense.)
- ✔ Always place the CD from your *old* version of Windows XP into the same box as your Vista upgrade DVD. You'll need that Windows XP CD if you ever need to reinstall the upgrade version of Windows Vista. If that's too much for you to remember, buy Vista's full version.
- ✔ The Microsoft Windows Vista Web site explains the differences between the different Vista versions in more detail, if you haven't made up your mind. Head to www.microsoft.com/windowsvista.



Choosing between a clean install or an upgrade

When you perform an *upgrade* you're installing Windows Vista over a previously existing operating system. It's a fairly simple process. A *clean install* means that you're completely erasing the computer's hard drive and installing Windows Vista onto the empty drive. Naturally, the clean install is more complicated.

Nevertheless, many people choose the more complicated route for these reasons:

- ✔ **Upgrading is quicker and easier to install but leaves room for more problems down the road.** Upgrading to Windows Vista is like painting a house without removing the old layer of paint first. Because the old operating system's cracks and peeling edges still lurk beneath the surface, an upgrade leaves some potential problems. Windows Vista must work harder to untangle your computer's unsolved mysteries and problem areas and apply its own languages and designs on top of them.
- ✔ **Windows Vista usually runs more reliably when it's written onto a clean slate.** A clean install strips the house down to the drywall. Windows Vista then pours itself into place, filling the cracks and providing a solid layer of protection with no chance of initial confusion. Clean installs require more upfront work, but it means that when something goes wrong, you know it's Windows Vista's fault — not the result of some earlier problem that keeps cropping up.

When choosing between an upgrade or clean install, keep the following in mind:

- ✔ If your computer's been running fairly smoothly or if you don't want to bother with the extra work required by a clean install, upgrade your existing operating system. Although you're increasing your chance for problems, Windows Vista is usually fairly good about sorting out what's what.
- ✔ If your computer's been giving you problems, you're simultaneously installing a new hard drive, or you just like the feeling of moving into a newly built house, choose the clean install. It takes much more preparation and time, but your computer will probably run more smoothly. However, be prepared to flex a little more computer techie know-how.
- ✔ Only Vista's full versions can perform a clean install of Windows Vista; the upgrade versions can't. For more details, check out the definitions of upgrade and full versions in the "Understanding Windows Vista Buzzwords" section and read this chapter's last section.



Doing this legwork *before* you install Windows Vista is essential, as you might experience problems getting online immediately after installing the program. The better prepared you are, the smoother your installation will be.

Installing Windows Vista

Whether you're doing a clean install or an upgrade, you still must make the same basic preparations before you put Windows Vista on your computer. Grab your pencil and check these off as you go.

- ✔ **Compatibility:** Before upgrading or installing, run the *Upgrade Advisor*, the Windows Vista compatibility checker that I discuss in Chapter 6. The program analyzes your computer's hardware and existing software and points out potential problem areas. After you've solved all the problem areas by finding new versions, patches, and drivers, move to the next step.
- ✔ **Research:** If the Upgrade Advisor shows you might have problems, visit Chapter 22. It explains how to search Web sites to see how other people have handled their Windows Vista compatibility problems.
- ✔ **Security:** The Upgrade Advisor usually points out these computer bodyguards: antivirus software, security programs, system utilities, and other programs designed to protect you. You don't want them to protect you from Windows Vista's installation process, however, so turn them all off, disable them, or even better, uninstall them: Most security programs won't work with Vista until you buy their upgraded Vista-compatible version.
- ✔ **Clean up and defragment your PC:** Uninstall the programs you've collected over the years but never used much, if ever. Run Disk Cleanup (see Chapter 9) to clean up as much trash as possible. Finally, defragment your C drive (covered in Chapter 9) to give Vista as much space as possible to settle in for the long haul.
- ✔ **Back up:** Back up all your important data. If you don't have an external hard drive, covered in Chapter 9, now's the time to buy one of these little critters. Dump all your important data onto it. (Don't worry so much about backing up your programs, as they can always be reinstalled from their original discs.)

Upgrading to Windows Vista

After you've followed the preparations outlined in this chapter's previous two sections, it's time to upgrade to Windows Vista. The better your preparations, the better your chances are for a successful upgrade.

Follow these steps to upgrade your existing Windows operating system to Windows Vista. (The next section shows you how to perform a clean install.)



You can't return to Windows XP after upgrading to Windows Vista. When you move past Step 5 in the following list, there's no going back.

Follow these steps to upgrade your copy of Windows XP to Windows Vista:

1. Insert the Windows Vista DVD into your DVD drive and choose Install Now, as shown in Figure 20-1.

Vista churns away, preparing to install itself. If Vista doesn't appear on the screen, make sure you haven't inserted the DVD into a *CD* drive.

If it still doesn't appear, open My Computer from Windows XP's Start menu and double-click your DVD drive's icon.

You must upgrade while running Windows XP. Don't try to upgrade by starting or restarting your PC with your Windows DVD in the DVD drive.

Choosing the Check Compatibility Online option takes you online to download Vista's Upgrade Advisor, which I cover in Chapter 6.



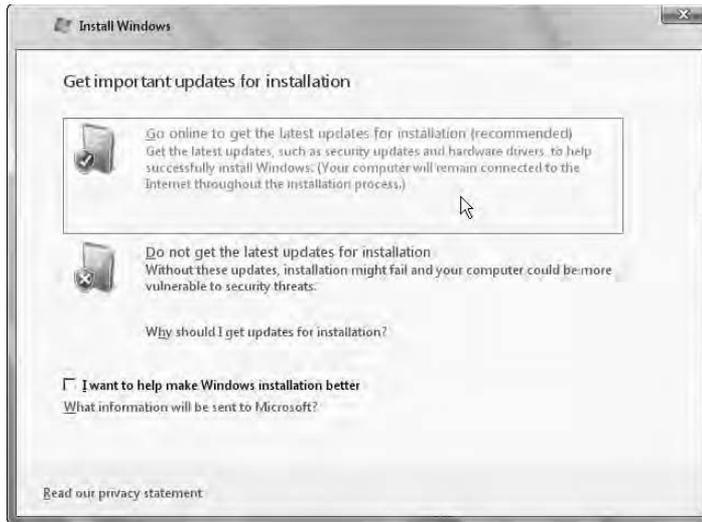
Figure 20-1:
Choose
Install Now
from the
Windows
Vista
installation
screen.

2. Choose Go Online to Get the Latest Updates for Installation (Recommended), as shown in Figure 20-2.

This step tells Vista to visit Microsoft's Web site and download the latest updates — drivers, patches, and assorted fixes — that help make your installation run as smoothly as possible.

If Vista skips this step, it can't find your PC's Internet connection. Make sure your PC can connect to the Internet, and then try again.

Figure 20-2: Be prepared for a wait as Vista downloads the latest updates and security fixes.



3. Type your product key and click Next, as shown in Figure 20-3.

The *product key* usually lives on a little sticker affixed to the DVD's packaging. No product key? You're stuck. You can't install Windows Vista without a product key, or Vista will stop working after 30 days. (If you're reinstalling a version of Vista that came preinstalled on your PC, look for the product key printed on a sticker affixed to the side or back of your PC.)

While at this screen, do these two things, as well:

- **Product key:** Write your product key on top of your Windows Vista DVD with a felt-tip pen. (Write on the side of the DVD that's *printed*.) That way, you'll always have your valid product key with your DVD.
- **Activation:** *Don't* select the Automatically Activate Windows When I'm Online check box. You can do that later, when you know Vista works on your PC.

4. Read the License Agreement, select the I Accept the License Terms check box, and click Next.

Take an hour or so to read Microsoft's 47-page License Agreement carefully. You need to select the I Accept the License Terms check box option before Microsoft allows you to install the software.

5. Choose Upgrade and click Next.

Upgrading preserves your old files, settings, and programs. If this option's unavailable, either of two things could be wrong:

- You're trying to upgrade an incompatible version of Windows XP. You can't install Windows Vista Home version on Windows XP Professional, for example. See Table 20-1 for the lowdown. Take your copy of Vista back to the store and plead for mercy.
- Your copy of Windows XP doesn't have Service Pack 2 installed. To fix this, visit Windows Update (www.windowsupdate.com) and download Service Pack 2. If the site refuses, you probably don't have a genuine copy of Windows XP installed, a problem you should take up with your PC's vendor.
- Your hard drive isn't big enough. Your hard drive needs up to 15GB of free space to install Vista.

When you click Next, Vista copies files onto your PC's hard drive, and then installs itself. It usually restarts your PC a few times during the process.

6. Choose your country, time and currency, and keyboard layout and click Next.

Vista looks at how your Windows XP PC is set up and guesses at your location, language, time and currency. If it guesses correctly, just click Next. If it guesses wrong, however, set it straight on your country, local time, currency, and language used with your keyboard.

7. Choose Use Recommended Settings.

Vista's recommended security settings keep Vista automatically patched and up to date.



Figure 20-3:
Type the
product key
and click
Next.

8. If you're connected to a network, choose your PC's location.

Vista gives you two options: Home, Work, or a Public Location.

Choose Home or Work, and Vista eases up on the security a bit, letting the PCs on the network see each other. If you're in a public setting, though, choose Public Location. Vista keeps your PC more secure by not letting other PCs share any of its files.

After rummaging around inside your PC for a few more minutes, Windows Vista appears on the screen, leaving you at the logon screen. But don't rest yet. Run through the following steps to complete the process:

- **Use Windows Update.** Visit Windows Update, described in Chapter 1, and download any security patches and updated drivers issued by Microsoft.
- **Make sure that Vista recognizes your software.** Run all your old programs to make sure that they still work. You might need to replace them with newer versions or drop by the manufacturer's Web site to see whether they offer free updates.
- **Check the user accounts.** Make sure that your PC's user accounts all work correctly.

Welcome to Windows Vista!

Copying your old hard drive's files and settings to your new Vista drive

If you're installing Vista onto a big new hard drive, you face one big question: How do you transfer your *old* drive's information onto your new hard drive after installing Vista?

The answer comes with Vista's Windows Easy Transfer Program, covered in Chapter 5. Although the program is meant for copying information between two PCs, it can also tuck away your PC's information in a safe place. Then, after you install Vista on your new hard drive, the program can grab that tucked-away information and place it on your new drive with Vista.

Before installing your new drive, turn to Chapter 5 and find the section about transferring information between two PCs with Windows Easy Transfer. When running the Easy Transfer program on Windows XP, tell Vista to stash your old PC's information on CDs, DVDs, an external hard drive, or even a place on a network.

Then, after installing your new hard drive and installing Vista on it, run Windows Easy Transfer again. This time, though, tell it to grab your old drive's information from where you've stashed it.

Doing a Clean Install of Windows Vista

The best way to install Windows Vista is to buy a large new hard drive, install it as described in Chapter 9, and install Vista on the new drive. Installing Vista on an empty drive — known as a *clean install* — has several advantages:

- ✔ The new drive is likely larger and faster than your old one. That means Windows Vista runs faster, significantly speeding up your computer. Your new drive's larger size gives Windows Vista ample room to run at top performance.
- ✔ Windows Easy Transfer can stash away your old hard drive's information onto CDs, DVDs, an external hard drive, a network location, or if there's enough room, as a file on your old drive itself. By stashing away your old drive's information in advance, you can use Windows Easy Transfer to copy it onto your new Vista drive. (See the sidebar, "Copying your old hard drive's files and settings to your new Vista drive.")
- ✔ You still have access to your old operating system — your entire old computer, if you will — for emergencies. If you still need to access your old operating system, exit Windows Vista and turn off your computer. Swap your old drive with your new one and restart your PC with your old drive installed, bringing your old operating system and its programs to the screen.

When you're confident that Windows Vista is installed and running well, reformat your old hard drive and use it for storage.



Windows Vista carefully sets up its installation menus so that the most likely option rests at the top. You can usually install Windows Vista simply by pressing Enter at each menu.

To perform a clean install of Windows Vista onto a new hard drive — or to perform a clean install of Windows Vista on your old drive (erasing its contents in the process) — follow these steps:

1. Turn off your computer, insert the Windows Vista DVD into your DVD drive, and restart your PC.

If you see a message asking you to press a key to boot from the CD or DVD, press any key. Vista will begin loading itself from the DVD.

2. Confirm your language, time and currency format, and language for your keyboard and click Next.

Vista has woken up in a strange place and doesn't know where it is. If you're in the United States and you speak English, just click Next. Otherwise, choose your appropriate regional options.

3. Choose Install Now.

Vista churns away for a few moments.

4. Type in your 25-character product key, shown earlier in Figure 20-3, and click Next.

The *product key* usually lives on a little sticker affixed to the DVD's packaging. No product key? You're stuck. You can't install Windows Vista without a product key, or Vista will stop working after 30 days. (If you're reinstalling a version of Vista that came preinstalled on your PC, look for the product key printed on a sticker affixed to the side or back of your PC.)

While at this screen, do these two things, as well:

- *Product key:* Write your product key on top of your Windows Vista DVD with a felt-tip pen. (Write on the side of the DVD that's *printed*.) That way, you'll always have your valid product key with your DVD.
- *Activation:* Don't select the Automatically Activate Windows When I'm Online check box. You can do that later, when you know Vista works on your PC.

5. Read the License Agreement, select the I Accept the License Terms check box, and click Next.

You need to select the I Accept the License Terms check box option before Microsoft allows you to install the software.

6. Choose Custom.

The Upgrade option will be grayed out because you started Windows from the DVD.

7. Choose where you want to install Windows; partition the drive, if necessary, and click Next.

A window appears listing all the hard drives in your PC.

If you're installing Vista onto a single empty hard drive, choose Disk 0 Unallocated Space and click New, and then Apply. Vista adds a partition to the drive, making it ready for Vista to bed down.

If you're installing Vista onto a single drive that's already empty and partitioned, choose Disk 0 Partition 1.

If you're installing Vista onto a single drive that's partitioned and has some information on it — perhaps your old Windows XP drive — choose Disk 0 Partition 1, choose Drive Options (Advanced), and choose Format to permanently delete the disk's contents. (You should back up any information you want to save *before* you get to this step.)

8. Wait for Vista to install itself.

Vista takes its time here, with nothing for you to do but twiddle your thumbs for at least 15 minutes.

9. Choose your User Name and picture and click Next.

Type in a name for yourself — your real name or your cat's name, Vista doesn't care. Make up a password and type one in, as well. It's not required, but it makes your PC much safer.

Then either click one of the suggested pictures to represent your account, or just click Next to have Vista assign one to you. (You can always change it later through the Control Panel's User Accounts area.)

10. Type a name for your PC and click Next.

Or just click Next to use your User Name with the letters -PC after it: Andy-PC, for example.

11. Choose Use Recommended Settings and click Next.

Vista's recommended security settings keep Vista automatically patched and up to date.

12. Confirm the time and your time zone, click Next, and click Start.

Vista jumps to the screen on your new hard drive, ready to be put to work.

When Vista won't boot from your DVD drive

When you turn on or restart your PC with your Vista DVD in your DVD drive, your PC usually asks you to press a key to start from the DVD or CD. When you press any key, Vista loads from the DVD.

But if that doesn't happen, you need to do some fiddling. Specifically, you need to tell your computer to use its DVD or CD drive as the first startup device. And to do that, you need to visit your PC's BIOS (Basic Input/Output System). Here's what to do:

- 1. Restart your PC with your Windows DVD in the DVD drive.**
- 2. Press the key that enters your PC's BIOS area.**

Watch your PC as it starts up. You'll see a message like, "Press F1 for BIOS" or something similar. (Different PCs use a slightly different message.) When you see that message, press F1 or whatever key your PC

says to press. Your BIOS screen should appear on the screen.

Note: Updating the BIOS is a technical adventure for nerds. If you change the wrong setting, your PC might stop working properly. If you think you've made a mistake, don't save your changes. Just restart your PC and start over.

- 3. Look for a setting in the BIOS called Boot Order or something similar.**
- 4. Select your DVD drive as the first startup device.**
- 5. Save your changes, exit the BIOS, and restart your PC.**

Vista should start from your DVD drive. If this still doesn't work, check to make sure your DVD drive is set as Master on its cable (covered in Chapter 15) and try again.

Chapter 21

Troubleshooting and Fixing Windows

In This Chapter

- ▶ Running older programs in Vista
 - ▶ Stopping unwanted programs from running
 - ▶ Diagnosing your PC's performance
 - ▶ Receiving help from a friend with Remote Assistance
 - ▶ Cleaning a full hard drive
 - ▶ Finding advanced information about your system
 - ▶ Avoiding viruses, worms, and hoaxes
-

Like its little brother Windows XP, Windows Vista includes a large sack of troubleshooting tools. This chapter shows you where to find the tools and offers tips as to which ones to reach for during certain awkward moments.

It explains how to nuke those unwanted programs that you find loading themselves as soon as Vista appears, for example. It explains how to diagnose your PC's performance to find its weakest links. Hard drive full? Check out the “Clean Out Your Hard Drive with Disk Cleanup” section to do some digital housekeeping.

Should a problem seem too much for you to deal with, read the “Using Remote Assistance” section. It explains how to invite a friend to see your PC's screen on their *own* monitor, letting them push the magic button sequence that fixes its problems.

Don't be afraid to browse through these tools, even when things are running fine. Grow familiar with them and how things should look. Choose your favorite tools. Later, when you need the information, you'll know exactly which tool to reach for. Dig in.

Handling Windows Vista's Incompatibilities

Windows Vista is a snob. It only likes Windows Vista–approved parts and software. If Vista comes across something that's not written especially for it to use, it sometimes refuses to acknowledge the part or program's presence. Usually Vista tells you of this incompatibility problem; other times, it leaves you guessing what's wrong.

Windows Vista upgraders often experience this problem immediately. Their computer is stuffed with older parts and software written for earlier versions of Windows. As Windows Vista takes over, it sniffs your computer, finds any incompatible software or parts, and then disables them to avoid problems.

Bought a computer with Vista preinstalled? You're still not safe. If you try to install software or parts that don't specifically claim to be Windows Vista–compatible, they might not work. Others may work with reduced features.

This chapter shows you how to discover potential incompatibilities *before* installing or upgrading to Windows Vista. It also shows how to use Windows Vista's Program Compatibility Wizard to cure software problems that may pop up down the road.

Understanding incompatibility buzzwords

Some parts of your computer stop working when you upgrade to Windows Vista. Chances are, the parts still function, but they lack *drivers* that enable Windows Vista to understand them. The solution? Find and install new, Windows Vista–compatible drivers for those parts, a process I cover in Chapter 19.



To make incompatible software work, visit the software manufacturer's Web site and look for *upgrades* or *patches* that allow the software to run with Windows Vista.

Here are some common compatibility epithets you find flying through the air as Windows Vista examines your computer's parts and software.

Program Compatibility Wizard: A Windows Vista program that enchants older programs into thinking they're still running under their favorite version of Windows. When the wizard tricks a Windows Me–era program into thinking it's still running under Windows Me, for instance, the program runs without problem.

Nonstandard: Hardware or software that deviates slightly from established guidelines, usually to add or remove features. Some keyboards, for example, come with extra keys: You can push an E-mail button to load your e-mail program. Because that keyboard's software might not be compatible with Windows Vista, the keyboard's custom buttons may stop working when you upgrade. The solution? Head for the keyboard manufacturer's Web site and download that keyboard's Windows Vista drivers.

Windows 9x: A phrase used to identify Windows versions 95, 98, and Millennium (Me). Windows Vista and Windows XP run with a different type of *engine* than the one used by those three earlier Windows versions. Those different engines account for most incompatibilities.

Windows 2000 (W2K): A version of Windows that shares similar features to Windows XP and, potentially, Vista. If you can't find a driver written specifically for Vista or Windows XP, try one written for Windows 2000. (Drivers written for Windows 9x versions, described previously, rarely work in Vista.)

DVD Decoder: Only Windows Vista Home Premium and Ultimate editions can play DVD movies. That's because a DVD's video files come in a compressed format. Microsoft left out the decompressor or *decoder* from all Vista versions but Home Premium and Ultimate. If you own another Vista version, you must buy either the decoder or a DVD-playing program from another company. (If you buy Vista preinstalled on a PC, the manufacturer usually tosses in a free DVD decoder so you don't have to hunt one down.)

iPod: Windows Vista refuses to acknowledge that an iPod exists. To use an iPod in Windows Vista, you must download and install Apple's free iTunes program at www.apple.com/iTunes.

Finding out what's compatible

Windows Vista tries to keep compatibility surprises to a minimum. Before you install it, Windows Vista can analyze your computer and alert you as to which parts and programs in your computer will have compatibility problems.

I explain how to run Vista's Upgrade Advisor program in Chapter 6.



- ✓ By downloading and running Windows Vista's Upgrade Advisor before you actually install the software, you can get a good idea about what needs attention. Some things may need to be replaced, but the program explains possible solutions to those problems, as well.
- ✓ Be sure to print out the program's results and findings. That list comes in handy when you're heading to the computer store to find new parts.

Fixing problem programs with Vista's Program Compatibility Wizard

You need to replace *everything* that Windows Vista says is incompatible. Many of the parts work after you find and install the correct drivers, as described in Chapter 19. And some of your software will work after you run the Program Compatibility Wizard.

Some programs written for earlier versions of Windows — Windows Me, for example — might become confused when running in an operating system that offers so many new security settings, like Windows Vista. To fix this problem, the Windows Vista Program Compatibility Wizard can place a soothing Windows Me blanket of settings over the confused program, tricking it into thinking it's still running in Windows Me. The program still runs, Windows Vista still has control, and you still get your work done.

Best yet, Windows Vista remembers which blanket settings the program finds most cozy. Then, whenever you run the program in question, Windows Vista automatically fetches those blanket settings so that you don't have to keep bothering with the wizard. Although the wizard can't make up for problem drivers, it's great with Windows-version trickery.



Don't try to use the wizard for anti-virus, backup, or most utility programs. It won't work. You need to buy new Vista-compatible versions of those types of programs.

Here's a look at how to use the Program Compatibility Wizard to keep your older programs running strong:

- 1. Choose Start, choose Control Panel, and click the Programs category.**

The Programs category appears, listing all the Control Panel settings that cover programs.



- 2. In the Programs and Features category, choose Use an Older Program with This Version of Windows and click Next.**

The Program Compatibility Wizard leaps to the screen, as shown in Figure 21-1, ready for you to bypass its opening screen with a click of the Next button.

- 3. Choose a method to locate the program and click Next.**

The wizard offers three options, as shown in Figure 21-2.

Here's when you want to choose which option:

- *I Want to Choose from a List of Programs:* Choose this option most often for programs installed on your hard drive. The wizard searches all your programs, lists them all on the screen, and enables you to select the problem program.

- *I Want to Use the Program in the CD-ROM Drive:* This option works well for programs that won't install or that play directly from the CD.
- *I Want to Locate the Program Manually:* Select this option if the first one doesn't work. Click the Browse button to locate the program that you want the wizard to fix.

4. Select your program and click Next.

As the wizard lists the programs on the screen — whether they're all the ones it found on your hard drive, on your CD, or in the directory you chose — click the one that's causing the problem.

The file is usually the name of the program, as shown in Figure 21-3, but you might have to experiment. Choose Setup or Install, for instance, if you're trying to install a program from a disc.

Figure 21-1: The Program Compatibility Wizard offers to trick older programs into thinking they're running under their favorite older version of Windows.



Figure 21-2: Choose the first option unless your program is on a CD. If the first option doesn't work, try the third option.





Figure 21-3:
Click the
name of the
program for
the wizard
to trick.

I manually selected the `SIMANT` file (*SimAnt* is a Maxis game that came out in 1991) from its folder because the wizard couldn't find it.

If you manually locate the program in Step 3, the wizard lists that program's location, enabling you to change it, if needed. Click Next.

5. Choose the version of Windows that the program prefers, and then click Next.

Look at the program's box (you kept the box, right?) and find the System Requirements in the fine print. You need to enter much of that information in the next few steps.

Start by choosing the version of Windows the program was designed for, as shown in Figure 21-4.

I chose Windows 95 because *SimAnt* ran under DOS. (But it didn't work under Windows Vista — the game froze.)

6. Choose the game's required settings and click Next.

As shown in Figure 21-5, you may choose the program's required colors and resolution, as well as turn off Windows Vista's visual themes.

Because *SimAnt* is very old, I clicked them all to make Windows Vista seem as old as possible.

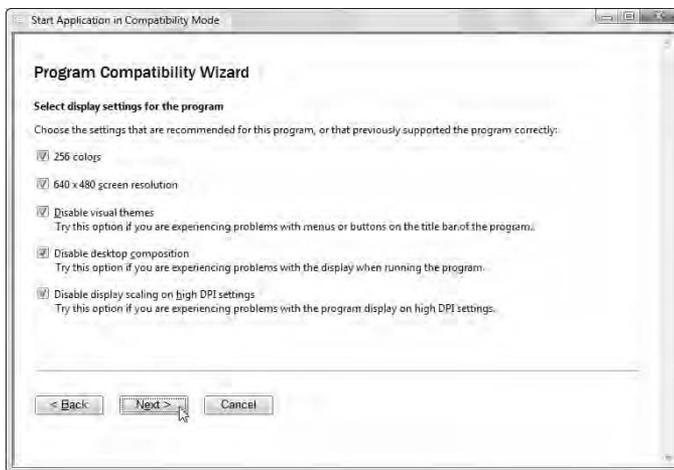
7. Choose Run This Program as an Administrator and click Next.

Choosing this option tells Vista not to butt in and say you're not authorized to run the program.

Figure 21-4:
Choose the
version of
Windows
the program
likes.



Figure 21-5:
Choose the
program's
require-
ments.



8. Click Next to test the game's new settings.



- ✓ If the program freezes, press Ctrl+Alt+Del simultaneously and then choose Start Task Manager from the list. Click the problem program's name and choose End Task from the menu.
- ✓ If it runs, you're set. Choose the Yes, Set this Program to Always Use These Compatibility Settings option. Click Next, and Windows Vista remembers to use those settings whenever you run the program.
- ✓ If it doesn't work correctly, choose the No, Try Different Compatibility Settings option and try again.
- ✓ Or give up by clicking the No, I Am Finished Trying Compatibility Settings option. Then look for help on the Internet, as described in Chapter 22.

When the wizard finishes, you're asked whether you'd like to tell Microsoft what you found out. If the wizard solved your program's problems, Microsoft updates its database so that it knows how to solve those problems in the future. (Click No if you don't want to share your results with Microsoft.)



Don't like wizards? Do-it-yourselfers can right-click the program's icon and choose Properties. The Compatibility tab offers all the wizard's settings, and the Memory tab offers even more settings that you can tweak.



Don't forget to visit Windows Update if a program or part doesn't work. Microsoft often stockpiles fixes and patches for problem programs there; Windows Update, covered in Chapter 1, can automatically install them for you.

Vista has trouble running old DOS programs in full-screen mode. If your DOS program won't run in a window, you may have trouble running it in Vista.

Stopping Unwanted Programs from Running When Windows Starts

Spyware and other nuisance programs often slipped themselves into cracks in earlier versions of Windows and then ran automatically when you turned on your PC. They hid themselves so well that finding them turned into a Herculean task.

With Windows Defender, it's easier to see which programs are running automatically behind your back. When you spot any that are giving you trouble, you can snip them off your PC so they stop running.



Windows Defender comes built-into Windows Vista; Windows XP owners can download the free program here: www.microsoft.com/athome/security/spyware/software/default.mspx.

Follow these steps to stop programs from running when Vista loads:

- 1. Open Windows Defender by clicking Start, choosing All Programs, and then clicking Windows Defender.**

The program rises to the screen, as shown in Figure 21-6.

- 2. Click the Tools menu and choose Software Explorer.**

Clicking the Tools menu shows Windows Defender's Settings and Tools areas, each ripe with options. Choosing Software Explorer brings up the Startup Programs page, as shown in Figure 21-7. It lists every program that runs automatically when Vista is loaded, as well as technical details: filenames, authors, versions, and installation dates.

Figure 21-6: Windows Defender launches, showing the last time it scanned your PC.

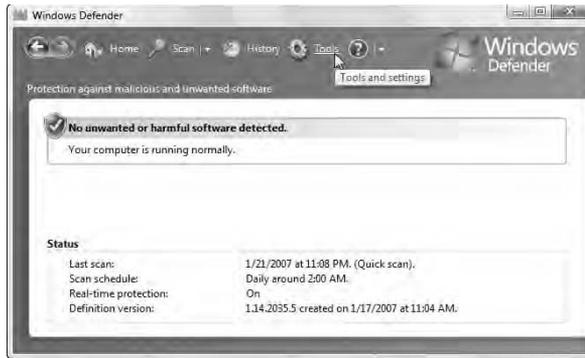


Figure 21-7: Windows Defender's Software Explorer tells you about the programs that automatically load themselves whenever you turn on your PC.



3. Click an unwanted program's name and choose **Disable**.

The big question comes down to this: How do you know what programs to disable? Sometimes the answer's obvious. You find a program with an installation date and time that matches when you mistakenly installed a rogue program from a Web site.

Sometimes the program's Publisher name rings a bell, particularly if you've found that company's name bad-mouthed on Google a few times.

Clicking the program and clicking **Disable** doesn't delete the program, but it keeps it from running automatically.

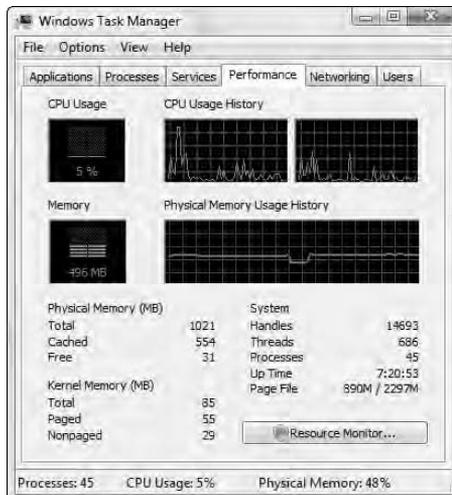
- ✓ Disabled the wrong program? Follow these steps again but click the program's name and choose Enable in Step 3 to start running that program again.
- ✓ You can also disable programs running under other people's accounts. To see those programs, click the Show for All Users button, shown in Figure 21-7. That lets you clean up rogue programs from other accounts without having to log into them.

Finding Information about Your PC's Performance with Task Manager

Early Windows versions offered a boring performance monitor. Clicking the Control Panel's System icon showed *System Resources: 75% free* or a similar percentage. It certainly wasn't much, but many people watched it constantly, always trying to increase their percentage.

Windows Vista makes the task even more fun with moving graphs, resizable columns, and adjustable options. Press **Ctrl+Alt+Del** simultaneously and choose **Start Task Manager** to view the updated Windows Vista Task Manager. The chart in Figure 21-8, for instance, shows how much energy my CPU consumed while I was playing Vista's 3-D chess game.

Figure 21-8:
The Task Manager's Performance tab graphs your memory's and CPU's usage history.



Clicking a different Task Manager tab reveals monitors for a different activity, as described in the following paragraphs:



Applications: Click this tab to see exactly what programs you're currently running on your PC. If a program is frozen, click its name and click the End Task button to close it down without affecting your other programs. (Or right-click the program's name and choose Go To Process to see its filename and how it affects your computer, described in the next paragraph.)

Processes: This tab lists each currently running program by name, the User Account that's using it, and the amount of CPU activity and memory it consumes. If something consistently consumes CPU activity, even when the computer is idle, scan your system with a virus checker.



Services: Here, you see all the background operations Windows Vista runs to support itself. They're listed mostly for techies to start and stop services manually. (Vista usually handles them all automatically.)

Performance: This tab shows you how much power your CPU uses. You may be surprised at how little of your CPU's power you actually use. If it's fluctuating drastically, you might need more memory or a bigger hard drive.

Networking: The Network tab enables network users to monitor the percentage of bandwidth your computer consumes. You see spikes as your computers swap data.

Users: This tab lets you see at a glance the number of people currently using your computer. (When they log off their User Account, they fall from the list.)

Using System Restore

The Windows System Restore feature provides an excellent first assault against computer troubles. It enables you to tell your computer to use settings saved when everything worked correctly. Follow these steps to fire up System Restore in Windows Vista:

1. Click **Start** ⇨ **All Programs** ⇨ **Accessories** ⇨ **System Tools** ⇨ **System Restore**.

Alternatively, click Start and type **System Restore** in the Search box to see the program's name and launch it with a click.

2. Click **Next to apply the recommended Restore Point**.

This undoes the most recent major change to your PC, be it a recent update, driver, or piece of software that may have messed things up.

3. Click Finish to confirm and return to the Restore Point.

Windows Vista applies the Restore Point and restarts your PC. When Vista wakes up, it behaves like it did when the Restore Point was first made. If Windows works better, you're through. If it behaves even worse, or System Restore didn't fix the problem, head to Step 4.

4. Select Choose a Different Restore Point and click Next.

Vista lists all the available Restore Points and their dates. Choose a Restore Point from a different date and click Next to try that one, instead. This brings you back to Step 3, a cycle you repeat until a Restore Point fixes the problem.

Hopefully, one of the Restore Points applies the right elixir to make Windows behave correctly. But if you want to return to the way things were *before* you began messing with System Restore, choose the Restore Point called "Undo: Restore Operation." That brings you back to square one, so you can try some of this chapter's other fixes.

Using Remote Assistance

Ever described your computer problem to a friendly computer guru over the phone, only to hear, "Gosh, I could fix that in a second if I was sitting in front of your computer"? The Remote Assistance tool solves that logistical problem. Remote Assistance enables a computer guru to connect to your computer, view your screen on his monitor, and use his mouse and keyboard as if they were your own. By remotely controlling your computer on-screen, a guru can fix problems and demonstrate solutions.



Send out a Remote Assistance invitation *only* to somebody you trust *completely* because he or she will have access to your PC and your files. Whoever controls your Remote Assistance session can see your desktop, any open documents, and anything you have visible on your screen.

Here's how to invite and receive help from a friendly expert over the Internet or company network:

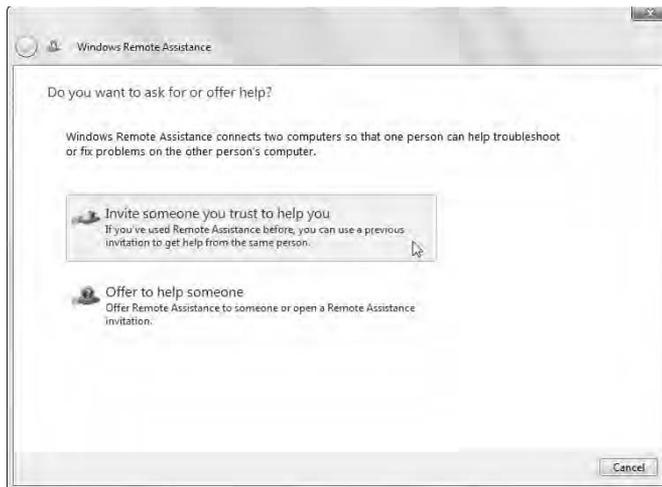
1. Click Start, choose Help and Support, and click Use Windows Remote Assistance to Get Help from a Friend or Offer Help.

That option lurks atop the Help and Support page's "Ask Someone" section.

2. When the Remote Assistance page appears, click the Invite Someone You Trust to Help You option and choose your invitation method.

As shown in Figure 21-9, clicking the Invite Someone to Help You option starts the Remote Assistance program.

Figure 21-9: Remote Assistance enables you to invite a knowledgeable friend to take over your computer and fix its problems or demonstrate a task.



Vista offers two ways to connect to your friendly expert:

- *Send an invitation through e-mail.* You can e-mail an invitation to your friend. This sends the invitation as an attachment to your message. However, it only works with Windows Mail or similar e-mail programs. If you read your mail on the Internet, choose the next option.
- *Save an invitation as a file.* Instead of e-mailing the invite as an attachment, this simply saves it as a file called `Invitation.msincident` and places the file on your desktop. Then you can attach it through a Web-based e-mail program like Yahoo! Mail, for example, or send it through an instant messaging program.

3. Create a password for your invitation.

To keep unwanted folks from breaking into your PC, you must create a password that locks the invitation. Call your friend and tell him the password. (Or tell him in person.)

Then, kick back and wait for your guru to receive your invitation and start the connection. (For some reason, a phone call begging for assistance often helps speed up the process.)

To keep unauthorized folks from connecting to and controlling your computer, always use a password that only you and your guru know. You should also be able to talk to the guru on the phone as he or she works on your computer.



4. Wait for the recipient to connect to your PC.

Upon receiving your invitation, the guru types in your password on his or her PC.

A notice appears on your screen, like the one shown in Figure 21-10, saying that the guru wants to start the session now.

5. Click Yes to start the Remote Assistance session.

6. Carry out your session by using the Remote Assistance window.

The Remote Assistance window, shown in Figure 21-11, quickly appears on-screen for both you and your friendly connected guru. Throughout the session, your screen appears on your guru's screen, and your guru sees everything you type, as well.

You may both type messages back and forth. At this point, the guru works as a coach, simply typing instructions on how you can fix your computer.

It helps if you and your friend can talk on the phone during the session. That's faster and easier than typing at each other.



Figure 21-10: Click Yes to allow the guru to see your computer screen.



Figure 21-11: Your screen immediately appears on the screen of your guru (Andy Rathbone), and you may type messages back and forth.



7. Allow the guru to take control of your computer, if asked.

The guru may tire of simply typing messages to you and watching you fumble around on your screen. Eventually, your guru may press the Take Control button on his or her own computer, requesting to share control of your computer.

Click Yes when the request comes through, as shown in Figure 21-12. Be sure to click the box that lets your friend respond to User Account Control prompts, or else you'll have to keep clicking them yourself as your friend works.

At this point, the guru controls your mouse and keyboard, opening menus where needed, and changing settings on your computer.

Figure 21-12:
Click Yes to allow the guru to watch *and* to share control over your computer's mouse and keyboard.



8. Click the Stop Control button to disconnect the session when you're through.

When you're done communicating, and the guru solves your problem, click the Stop Control button to stop the session. (Pressing Esc does the same thing, as does holding down Ctrl and pressing the C key.)

- ✔ When the guru takes control, you and the guru *both* share the mouse and keyboard. Just kick back and watch the guru control your computer. If you both fiddle with the mouse and keyboard, the computer freaks out, annoying everybody.
- ✔ If you're connected to the Internet through a dialup connection and the phone hangs up, quit the program and send out a new invitation. (The old one works only once.)
- ✔ Windows Remote Assistance comes with several restrictions: It only works with Windows XP and Windows Vista computers, you may only send invitations through a compatible e-mail program or as an attached file, and the two computers must be connected through the Internet or a network. Also, users must both have administrator accounts for best results.

- ✓ Problems? Right-click Computer on the Start menu, choose Properties, and click Remote Settings from the left column. Make sure you've checked the Allow Remote Assistance Connections to This Computer option. Click the Advanced button for more options, which is handy when you want to change an invitation's default life of only 6 hours.

Cleaning Out Your Hard Drive with Disk Cleanup

When Vista sends threatening messages about your hard drive running out of space, send in the Disk Cleanup program to clean out some of the trash. The program examines your hard drive for virtual flotsam and offers to delete it for you with a single click of the OK button.

Follow these steps to run Disk Cleanup:

1. Click the Start menu and open Computer.

The Computer program opens to display your hard drives.

2. Right-click your C drive, choose Properties, and click the Disk Cleanup button.

3. Choose whether to clean up your own account's files or those of everybody on the PC.

Normally, you choose Files from All Users on This Computer. It won't delete anything valuable. The biggest threat is that it empties everybody's Recycle Bin, making a final dump of items they've already deleted.

4. Click the areas to be deleted and click OK.

As shown in Figure 21-13, the Disk Cleanup tool displays the amount of trash sitting in Internet Explorer's cache, your Recycle Bin, Temporary files area, and other disk clogging areas.

Normally, Disk Cleanup just deletes the two biggest hogs: the Recycle Bin and the trash leftover from Internet Explorer as you surf the Web. But if those deletions *still* don't create enough room for your new computer game, put a check mark next to each item. (If you're curious about what you're deleting, click an item's name; Vista explains that item's purpose in the lower part of the window.)

When you click the OK button, Disk Cleanup deletes everything you selected from your hard drive.

Figure 21-13:
Disk Cleanup examines your computer's trash accumulation areas and offers to clear them.



Tidying Up Your Hard Drive with Disk Defragmenter

As your computer moves data around on your hard drive, it frequently breaks files into pieces, stuffing them wherever they fit. That makes the drive work harder when retrieving files because it must search in different locations to collect all the pieces.

Disk Defragmenter searches your hard drive for broken files and places all the pieces next to each other for quicker access. For more about defragmenting your hard drive, see Chapter 9.

Viewing Advanced System Information

When you really want to see what's under the hood, fire up Vista's System Information program. It exposes every technical detail about your computer and its parts.

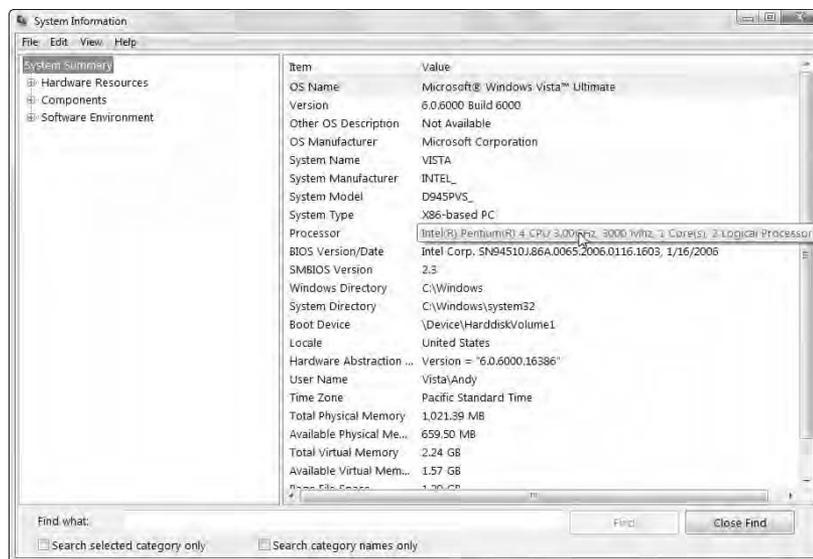
Most important of all, its entire haystack of data is searchable as a whole, enabling you to extract specific data needles when needed. Using System

Information is a great way to search for information about mystery objects that appear in other listings.

To fire up System Information, choose Start⇨All Programs⇨Accessories⇨System Tools⇨System Information.

The System Information tool, shown in Figure 21-14, opens to its System Summary page. There, you'll find detailed information about your edition of Windows Vista, your PC's CPU, amount of memory, and other technical information.

Figure 21-14: The System Information tool packs detailed, searchable information about your computer onto one page.



Clicking the categories on the left — Hardware Resources, Components, and Software Environment — reveals even more details about your PC's parts and the way Vista interacts with them. As you click the plus signs in the boxes along the window's left side, the entries expand along the right to show detailed information about that item.

In short, the tool wrings every piece of data out of your computer's hardware resources: components like networks, codecs, drivers, printers, USB devices, and modems; software, including drivers; running tasks; and Internet settings.

You'll probably never need it, but it's good to know it's there for emergencies.

Avoiding Virus and Worm Attacks

The best way to stop a virus from damaging your computer is to keep it from infecting your computer in the first place. Follow the tips in the following sections to reduce your risk of infection.

Use Windows Update often

Most viruses take advantage of weak spots within Windows. For instance, one virus programmer figured out a way to launch a virus when the user simply opened an e-mail. Users didn't have to open the e-mail's attachment to become infected by that virus because it launched itself automatically.

Microsoft released a patch to repair the problem, but it was too late: The virus had infected thousands of computers. However, long after Microsoft released the update, that particular type of virus continues to infect computers. Why? Because many people haven't used Windows Update to install the patch that fixes the problem.

To make sure you've installed all the security updates available for your Microsoft software, use Windows Update — a Web site that scans your computer and recommends what patches to install. Installing any patches marked *Critical* helps you avoid potential security problems.

You can access Windows Update in several ways in both Windows Vista and Windows XP:

- ✓ Using Internet Explorer, visit Microsoft's Windows Update Web site at www.windowsupdate.com.
- ✓ Open Internet Explorer and choose Windows Update from the Tools menu.
- ✓ Click the Start menu, click All Programs, and choose Windows Update.

You can also tell Windows Update to automatically check the Microsoft Web site, download any new critical updates, and let you know when they're ready to install. When you receive the notice about the new patch, you may examine it before allowing it to install.



Windows Vista comes set up to check Windows Update automatically. To make sure Windows Update is working as it should, click the Start menu, choose Control Panel, and choose Check This Computer's Security Status in the Security category.



In Windows XP, right-click the Start menu's My Computer icon, choose Properties, click the Automatic Updates tab, and tell Windows XP to download updates automatically and let you know they're ready to install.

Install and use antivirus software

Antivirus programs constantly patrol your computer, seeking out signs of a possible virus and destroying or deactivating the virus before it has a chance to infect or damage your computer. Windows doesn't include antivirus software, so unless your computer came with preinstalled antivirus software, you must purchase it from a third party.



Antivirus software wears out very quickly. In order for it to remain effective, you must continually download new updates or definitions from the software manufacturer's Web site. Without those updates, your antivirus software can only protect you against old viruses. It can't protect you from any *new* viruses that appear.



Some antivirus software enables you to turn on an automatic update feature. That enables the antivirus program to automatically link to the manufacturer's Web site and download new virus definitions as they become available. Look for that feature in your software and make sure that it's turned on.

Also look for a feature that performs automatic scans on your computer on a timed basis or every time you connect to the Internet.

Table 21-1 lists popular antivirus software, its manufacturer, and its Web site.

<i>Manufacturer</i>	<i>Product</i>	<i>Web site</i>
Symantec Corporation	Norton Antivirus	www.symantec.com
McAfee.com Corporation	VirusScanOnline	www.mcafee.com
F-Secure	F-Secure Anti-Virus	www.f-secure.com/
Trend Micro, Inc.	PC-cillin	www.trendmicro.com
Norman	Norman Virus Control	www.norman.com

Never open e-mail with unexpected attachments

An *attachment* is a program or file sent along with a piece of e-mail. Friends may send you digital photos, for instance. Others may forward a piece of e-mail or a chain letter. Some people send programs they've found helpful.



Whenever you see *any* attachment on an e-mail message, be suspicious immediately — even if you know who sent it to you. Viruses can place anybody's name in the From: box, making the message look like it came from a friend instead of a stranger.

If a friend sends you a message with an attachment that you didn't specifically ask for, *don't open it*. Don't respond to it, either. Instead, send a separate e-mail to your friend, asking whether he or she has sent you an e-mail with an attachment. Then wait for his or her response before opening the e-mail.

- ✓ Today, most viruses spread when people open attachments apparently sent to them by a friend.
- ✓ When a virus mails itself out to other people, it does it secretly. The owner of the computer rarely knows what's going on. That keeps the virus from being detected for as long as possible, allowing the virus to send a copy of itself to the contacts listed in the person's address book.
- ✓ The most suspicious e-mail attachments end in the letters EXE, VBS, and COM. However, they can use dozens of other types of files to do their dirty work.
- ✓ If somebody sends you e-mail saying that you've sent him or her a virus, immediately unplug your computer's phone line from the wall or turn off its modem. If you're sending e-mail through a network, unplug the network cable from the network card. That keeps your computer from sending the virus to even more people. Then run your antivirus software to disinfect your computer.

Scan downloaded software for viruses before using it

Some hackers create programs, infect them with a virus, and post them onto the Internet for unsuspecting people to download. When people run these infected programs, they infect their own computers.

To avoid this, don't download programs from suspicious places: newsgroups, pirate software sites, or sites that don't scan their programs for viruses before posting them. Scan any downloaded programs with antivirus software before running them on your computer.

Flushing Windows' System Restore cache

System Restore is normally a lifesaver when it comes to computer problems. The program takes automatic snapshots of your computer's settings while it's up and running. Then, if your computer crashes, a visit to System Restore can roll back your computer to one of those snapshots, which are called *Restore Points*. When your computer restarts with its new settings, everything usually works fine.

Unfortunately, System Restore doesn't work well to repair virus damage. In fact, System Restore can inadvertently save your computer's settings while it was still infected. If you use an infected Restore Point after you've disinfected your computer, you could reinfect your computer with the virus.

To keep this from happening, be sure to delete your System Restore points or cache after you disinfect your computer. Follow these steps to delete Restore Points in Windows Vista:

1. **Right-click Computer from the Start menu and choose Properties.**
2. **Click the System Protection tab and remove the check mark from any drive listed in the**

Automatic Restore Points section. (It's usually just your C drive.)

3. **Click the Apply button, click OK, and restart your computer.**

Restarting your computer with System Restore turned off makes it delete all your existing Restore Points.

4. **Download the latest virus definitions and updates for your antivirus software.**
5. **Scan your entire computer and its memory for any viruses.**
6. **Repeat Steps 1 and 2 to add check marks to your C drive (and any others that had check marks) and then click Apply.**

This turns System Restore back on and tells Windows to begin taking its automatic snapshots and making new Restore Points. Feel free to create your own Restore Point and label it something like, "Created after disinfecting from the virus."

Use a firewall

A firewall places a guard at your computer's connection to the Internet. Windows Vista and XP come with a firewall that helps keep malicious people from connecting to your computer through an unsecured Internet connection and planting viruses or backdoors.

Chapter 18 explains how to turn on the firewall built into Windows Vista.

Don't forward hoaxes

Just about everybody has received a message saying that a new virus is spreading rapidly and isn't detected by virus programs. The message usually

says to search for a certain file on your computer and immediately delete it. The message ends by asking you to pass along the message to all your friends.

Almost all of these messages are *hoaxes* — the computer equivalent of April Fools' Day pranks.



Don't pass along these types of messages to your friends because they only cause more paranoia and uncertainty about viruses.

To check the truth of an e-mail like this, visit any of the sites listed in Table 21-2.

Table 21-2 Web Sites That Identify Hoaxes	
<i>The Site</i>	<i>The Address</i>
Symantec's hoax site	www.symantec.com/avcenter/hoax.html
TruthOrFiction	www.truthorfiction.com
CIAC's HoaxBusters	http://hoaxbusters.ciac.org

Repairing virus damage

Although antivirus software programs work well at detecting viruses and disinfecting your computer, disinfection only removes the virus from your computer; it doesn't reverse the damage done by the virus. If your computer is infected, follow these steps to repair as much of the damage as possible:

1. Write down or print out the name of the virus.

Your antivirus program tells you which particular virus strain attacked your computer.

2. Locate the damaged programs and files.

Many antivirus programs provide you with a list of your damaged files. A few list your damaged programs, as well, if they can figure out what's been damaged. Print out the list, as you may need it for reference.

3. Visit your antivirus program's Web site.

The nice antivirus companies write special programs that automatically repair damage done by major viruses. If you get lucky and find one for your particular strain of virus, download the program, run it, and let it repair the damage.

4. Figure out what programs contained the damaged files.

This is the most difficult part and requires some major sleuthing on your part. If the antivirus software doesn't list the programs that contained your damaged files, and it doesn't offer a free repair tool, you have to figure out what programs are damaged on your own. By carefully researching your list of damaged files, you can often tell which programs contained them.



I've had the best luck using the Google search engine (www.google.com) described in Chapter 22. Carefully type in the exact name of the damaged file into the Search box and search Google's Web and Groups areas to see what programs those files are associated with.

Chances are, you'll spot the file's name listed somewhere in a context that makes it possible for you to identify it.

5. Reinstall the program that contained the damaged files.

If you have a backup, great! Use that to reinstall your damaged programs. If not, reinstall your program from its original installation CDs. Then visit the program manufacturer's Web site; you may need to download updates or patches released since you bought the program.

Chapter 22

Finding Help Online

In This Chapter

- ▶ Figuring out Internet buzzwords
 - ▶ Finding answered questions on newsgroups
 - ▶ Tips and tricks for successful searches
 - ▶ Using manufacturers' support Web sites
 - ▶ Using community support sites
-

Some problems can't be fixed by reading a book. That's because many problems pop up only when a certain version of software tries to run on a specific model of computer containing a specific combination of hardware. Only a small handful of people ever experience that particular problem.

No one person can explain the solution to every possible problem that might occur. However, I can show you the best way to find somebody else who has experienced the same problem as you, stumbled upon a solution, and posted the solution on the Internet.

This chapter explains how to arm yourself with the tools you need to extract those solutions from the bazillions of sites that make up the Internet.

Understanding Internet Buzzwords

Although you can find zillions of unknown words relating to the Internet, here are a few you may encounter when you use the Internet as a troubleshooting detective:

Search engine: An online resource that helps you find what you're looking for. The Internet resembles an unbound book with its pages thrown into the air and scattered randomly on the ground. A search engine provides an index to those haphazard pages. Search engines use software robots that race through the pages they find, cataloging their contents to create an index of all their words. Type a word into a search engine, and it lists all the sites that it knows that mention the word or subject.

Newsgroups: Online areas where people exchange messages about their particular interest. Newsgroups started in the Internet's early years; today, more than 50,000 newsgroups exist. Because people posting to newsgroups use computers, many newsgroups deal with specific areas of computing. Some people refer to newsgroups as *Usenet*.

Microsoft Knowledge Base: Microsoft's gigantic online collection of information about its products (<http://support.microsoft.com>). The Knowledge Base Web site not only lists documented problems, but it gives solutions for fixing them.

Workaround: A solution that helps bypass or minimize a problem's effects. Sometimes a specific computing problem can't be fixed. However, by taking some extra steps, you can learn to live with the problem. Microsoft's Knowledge Base frequently lists workarounds for problems.

FAQs (Frequently Asked Questions): A well-indexed list of commonly asked questions and their answers. Most people ask the same common questions the first time they encounter something new. Tired of repeating the same answers, knowledgeable people started creating lists of Frequently Asked Questions. Now FAQs are standard elements of most well-designed Web sites, newsgroups, and other online resources.

Acronym: A word that's derived from the first letters of other words. Because the phrase "Frequently Asked Questions" is rather awkward, people often substitute the acronym FAQ. The complex world of computing leads to an overabundance of acronyms, such as WWW (World Wide Web), CPU (Central Processing Unit), RAM (Random Access Memory), and many more.

Finding Help through Search Engines

Without a doubt, the first stop when you're searching for solutions to computing problems should be Google, the best search engine on the Internet. As I write this, Google's search robots are scouring umpteen pages on the Internet, indexing them word by word, and letting you search the results for free.

Google lets you search for information in many different ways, but searching Web sites and newsgroups brings the best results for troubleshooters. I describe how to search both in the following sections.

Searching Google for specific information

When I'm troubleshooting a computer problem, I *always* begin my search on Google (www.google.com), as shown in Figure 22-1. Google provides a quick



and easy way to find just about any company's Web site, as well as Web sites dealing with particular types of computing problems.

Google has indexed newsgroup conversations going back more than 20 years — a treasure trove for problem solvers.

Although it doesn't always reveal the exact solution, a Google search usually points in the direction to look. Google, like some other search engines, enables you to search by keywords, phrases, or a combination of the two. The key to using Google is to know when to search by *words* and when to search for *phrases*.

- ✓ **Words:** Search for specific words when you don't care where those words appear on a page. For instance, if you're having password problems when you connect to the Internet, you could type this:

```
password problem internet connect
```

- ✓ **Phrases:** Search for phrases, by placing the phrase inside quotation marks, when you *only* want to see pages containing two or more words sitting next to each other. If your password problem always brings up an error message that says *Error 623*, type this into the search box:

```
password internet "error 623"
```

By choosing the right combination of words and phrases in your search, you can make sure that Google knows exactly what pages to bring to your attention.

Figure 22-1:
Click the Google Search button to see Internet sites containing the words *password*, *internet*, and *"error 623"*.





Now that you know how to properly question Google, here's how to use Google's different buttons and tabs:

- ✓ Google offers two buttons: Google Search, and I'm Feeling Lucky. Clicking the Google Search button tells Google to display a list of Web sites that contain your search words or phrases. Clicking the I'm Feeling Lucky button immediately displays the Web site that most closely matches your search.
- ✓ Use the Google Search button most of the time and check out the Web sites that it lists. By contrast, use the I'm Feeling Lucky button as a time-saver when you're confident that Google knows exactly what page you're looking for. Typing in **Andy Rathbone** and clicking the I'm Feeling Lucky button, for instance, immediately brings up my Web site: www.andyrathbone.com.
- ✓ As shown in Figure 22-1, Google offers searches in five different online areas: Web, Images, Video, News, Maps, and More. (More lets you search through even *more* online areas, including mail-order catalogs, scholarly papers, and blogs.) It always searches for Web pages unless you click on one of those other areas. Google then lists many Web sites containing your words, using a patented ranking method to place the most likely choices at the top of the list.
- ✓ Clicking the Images link before clicking the Google Search button tells Google to search for pictures. It's great for finding pictures of computer parts. For instance, a Google Images Search for **nvidia "GeForce 7600"** immediately displays several photos of that video card, its circuits, and its packaging. That lets you confirm the identity of a mysterious card inside your PC, for example.
- ✓ To search through newsgroup postings, click the More link and click Groups before clicking the Google Search button. Because many people post their computer problems in newsgroups, and many other people post solutions, Google spits up a quick list of potential answers to your query.
- ✓ Don't bother searching through video, news, or maps. Those don't bring up answers to computer problems.



Mastering the art of pinpoint Google searching

Although Pinpoint Google Searching would make a great band name, successful Google searching is also an art in its own right. Google is so good that it often brings thousands of pages to your attention. The trick is to find *only* the pages that solve your problem. Here are my favorite tips:

- ✔ **Search for specific error messages by placing the message in quotes.** Error messages confuse *everybody*. Because messages look identical on every Windows computer, other frustrated people have probably already discussed that error message online. Hopefully, one of them also posted a solution.
- ✔ **Start your search in the newsgroups.** Many people use newsgroups to discuss particular aspects of computer technology — including beginning computing. Beginners often post their troubles here. Experts seeking to hone their troubleshooting skills try to solve as many problems as possible. It's a great place to start.
- ✔ **Expand your search to include the Web.** Many people run support sites that answer lots of questions.
- ✔ **Make your first search as specific as possible, and then expand your search from there.** For instance, type an error message exactly as you see it and put the message in quotation marks, like this: “**Faulting application netdde.exe**”. If you get too many results, add some context, such as the name of the problematic program. Not enough results? Remove the quotes from the phrase or search for the most confusing words in the error message.
- ✔ **Don't use quotes unless absolutely necessary.** Many people misspell when they post messages to newsgroups. Although Google's built-in spell checker kicks in if it can't find any answers to your query, it may not catch everything. Use quotes only on short phrases or specific error messages.
- ✔ **Add your Windows version to your search.** Just typing **Vista**, for instance, usually limits your search to Windows Vista issues. Similarly, add the letters **XP** after a search to limit your search to Windows XP problems.
- ✔ **Search for the letters FAQ.** FAQ stands for Frequently Asked Questions. Toss in this acronym along with the name of your problematic subject/product/part. You just might stumble upon a site that contains a FAQ dealing with your particular problem.
- ✔ **Sort your results by date.** When Google displays results from a newsgroup search, it sorts the results by relevance, with the best result at the top. If you choose Sort by Date, however, Google re-sorts its results, placing the newest results at the top. Some of the Internet's computer information is already obsolete; sorting by date ensures you're finding the newest information.

Think somebody e-mailed you the latest virus? Before opening the suspect e-mail, search Google for the exact words used in the e-mail's subject line. Then sort the results by date to see if people are already talking about it.
- ✔ **Don't give up too early.** Keep rephrasing your search slightly, adding or subtracting a few words and changing your phrases. Give it five or ten minutes before giving up. Remember, you'll be spending much longer than ten minutes waiting for tech support staff to answer your phone call.



Checking the Manufacturer's Support Web Site

Manufacturers spend big bucks for people to staff the technical support lines. Unfortunately, these employees often don't know any more about computers than you do. Instead, the tech support departments work like telemarketing departments. A person listens to your description of the problem, types the symptoms into his PC, and reads back the scripted responses.

Sometimes this tactic helps, but it's very expensive, both for your phone bill and for the company. And sometimes your questions still go unanswered. That's why an increasing number of companies pack as much technical support information as possible onto their Web sites, helping users find answers as easily as possible.



When you visit a manufacturer's Web site, look for hyperlinks like FAQ, Technical Support, or Driver Downloads. The sites mentioned in the following sections offer much more in-depth help.

Microsoft Knowledge Base

As shown in Figure 22-2, the Microsoft Knowledge Base Web site (<http://support.microsoft.com/search>) contains a continually updated, indexed list of more than 250,000 articles created by Microsoft's support staff.

See the words *Windows Vista Home Premium* in the Search Product box of Figure 22-2? That drop-down menu contains nearly every Microsoft product ever released, making it easy to isolate searches for specific products.

Choose your product in the drop-down menu and type your search words in the box below it. Figure 22-2, for instance, shows the Knowledge Base responding to questions about using Windows Easy Transfer in Windows Vista Home Premium. Browse through the answers supplied by the Knowledge Base to find specific solutions to dealing with your particular problem.



See the number 928634 near the mouse pointer in Figure 22-2? Microsoft assigns every answer its own number. When you're searching the Internet, you often spot a savvy techie respond to a user's question with a terse, "Check out KB 887410." When somebody on the Internet mentions a Knowledge Base number that applies to your problem, immediately write it down and head to the Knowledge Base. Entering the number in the text box immediately displays that solution.

- ✔ The Knowledge Base has proven to be quite versatile. It offers to fine-tune your search by asking you questions or letting you search within its displayed results. Some pages supply a general overview of the problem and include links to other Knowledge Base numbers that provide specific solutions for specific problems.
- ✔ If somebody gives you a Knowledge Base number for a solution, you can jump directly there by including it in the URL you type into your browser. To jump to article number 887410, for example, type this into your browser's address bar: `http://support.microsoft.com/kb/887410`.
- ✔ Although the Knowledge Base sticks to Microsoft products, it also contains information on how Microsoft's products interact with hardware and software from other manufacturers, as well as up-to-date information about viruses and other potential problem causers.

Figure 22-2: Microsoft's Knowledge Base searches for solutions to Windows Vista installation problems.



Serial number and service tag Web sites

Some manufacturers stamp a serial number or service tag on the invoice of every computer they sell. (Many place a sticker with the number onto the computer's case.) Then they create a custom-built Web page based around that particular computer: its motherboard chipset, expansion cards, CPU, and other hardware, as well as its bundled software.

Long after you've lost your computer's invoice and manuals, a quick trip to the manufacturer's Web site enables you to view everything that came with your computer, including part models and numbers, specific support information, warranty expiration information, driver downloads, and in some instances, upgrade information.

Dell and Gateway, among other computer makers, offer this service on their Web sites. If you're unlucky enough to have lost everything *and* scraped off your computer's serial number sticker, visit Dell or Gateway's site anyway. Both sites have technology that can peek inside your computer, grab its long-lost serial number, and fetch the customized Web site for you.

Manufacturer's Web sites in other countries

Most manufacturers sell their computers worldwide. And for some reason, some countries offer better support than others.

If a foreign site appears while you're searching, don't be afraid to give it a visit. If it turns up while you're searching in Google, use the Translate This Page button, if necessary, and Google offers to translate the site's language into one you can (mostly) understand.

Community Support Web Sites

For some people, computers aren't just a way to get work done — they're a passion. I've compiled a list of sites to visit for thorough information about their particular niche.

Tom's Hardware Guide

www.tomshardware.com

Although this site leans toward the technical, it's the best site for up-to-date information on computer hardware. You can find the latest performance rankings on CPUs, motherboards, memory chips, video cards, hard drives, and other peripherals — even joysticks. Tom's site is chock-full of reviews, how-to articles, community forums, and techie news. Even though it's written mainly for techies, Tom keeps the site surprisingly easy to understand.



When you're ready to buy something the site raves about, check out the page's adjacent Shop For section to search for the lowest-priced retailer.

Acronym Finder

www.acronymfinder.com

No one understands *everything* about computers, so don't be depressed if you spot YACA (Yet Another Computer Acronym) that you don't understand. Instead, head to the Acronym Finder site, type in the mystifying initials, and see the definition.

Although the site works well for technology-oriented items, it provides definitions for acronyms from many other areas, as well. GL2U.

Wikipedia

www.wikipedia.org

An editable online encyclopedia created by visitors, Wikipedia offers a wealth of information on all subjects, including technology. It doesn't offer help for specific questions, but the site gives you general background on computer parts and technologies, making for more informed shopping.

Since Wikipedia can be edited by anyone who visits, don't take it as an authoritarian source. Instead, use it as a branching-off point for finding further information.

Legacy, relic, and cult Web sites

Some great products hit the market only to die off in a few years. Some disappear when the company folds; other times a company may discontinue its older products in favor of new ones. Yet the owners of these older products find that they're still working fine and see no reason to upgrade.

To their credit, some manufacturers still offer drivers to support products released many years ago. Thanks to the Diamond Multimedia Web site, for instance, my 15-year-old Supra FaxModem still dials the Internet and sends and receives my faxes. Many other manufacturers still offer drivers for long-discontinued parts.

The key word is *legacy*. Toss in that word when searching on Google, and you may be surprised at how many drivers still exist for that outdated computer part. Few, if any, manufacturers still offer assistance, support, or guarantees

that old parts, software, and drivers still work. But all the same, you may just need one old Windows XP driver to get parts to work with Windows Vista.

- ✓ Many older products develop almost a cult following with a core group of people who provide grassroots support to each other. Some write their own drivers or software for the products, allowing them to take advantage of new features or keep them up to date with newer versions of Windows.
- ✓ When searching for support for your older product, try searching the newsgroups through Google's Groups search. When the list appears, choose Sort by Date so that the most recent discussions appear at the top. That gives you a quick idea of how much buzz still surrounds your faithful gadget, and it increases your chances of finding a Web site that still offers support.
- ✓ Stuck with an old MP3 player? RioWorld (www.rioworld.org) supplies working drivers, firmware, and software for more than a dozen Rio MP3 players. (It still offers drivers for the world's first mass-market MP3 player, the Rio 300.)



Part VI

The Part of Tens

The 5th Wave

By Rich Tennant



"Why am I modding my PC? I pimped my Xbox, my fish tank, and my Water Pik. This was next."

In this part . . .

Those of you with sharp eyes will realize something scandalous about this part right away: The chapters in it don't always contain ten items. Most have a wee bit more information or a wee bit less.

But by the time most people get to this part of the book, they're tired of counting numbers anyway. That's why these lists aren't numbered. They're just a bunch of facts tossed into a basket.

So when you read these chapters, remember that it's quality, not quantity, that matters. Besides, would you want to read a fake tip about 8255 PPI (U20) messages just because one of the chapters in this part needed a tenth tip?

Chapter 23

Ten Cheap Fixes to Try First

In This Chapter

- ▶ Making sure the computer is plugged in
 - ▶ Turning the computer off and on again
 - ▶ Installing a new driver
 - ▶ Googling an error message
 - ▶ Finding and removing spyware
 - ▶ Not opening unexpected file attachments
 - ▶ Using System Restore
 - ▶ Checking for overheating
 - ▶ Installing a new power supply
 - ▶ Defragmenting the hard drive
-

Before you spend any money at the shop, try these cheap fixes on your computer. You might get lucky. If you're not lucky, give yourself a good stretch and flip back to Chapter 21 for some deeper system-sleuthing tips.

Plug It In

Sure, it sounds silly, but industry experts get paid big bucks to say that unplugged equipment is the leading cause of “electrical component malfunction.” Sometimes a yawning leg stretch can inadvertently loosen the cord from the wall. Rearranging a computer on the desk almost always loosens cables that aren't pushed tightly into the back of the computer.

Check your power cord in *two* places: It can creep out of not only the wall outlet but also the back of your computer or whatever you've plugged into one of your PC's ports.

If you use a UPS or a surge protector, check *three* places: Check the back of your computer, check that your PC's power cord is plugged firmly into the UPS or surge protector, and check that the UPS or surge protector is plugged into the wall outlet.

And, uh, the machine *is* turned on, isn't it? (That's the leading cause of printer malfunction, by the way.) Some surge protectors have an on/off switch, so make sure the switch is in the On position. (Anytime you spot a light that's on, the part is plugged in.)

Turn Off the Computer, Wait 30 Seconds, and Turn It On

Before going any further, try closing the troublesome program and restarting it. Doesn't cure the problem? Then log off from Windows, and log on again.

If that doesn't fix it, shut down Windows and your computer and then turn it back on after about 30 seconds.

Sometimes the computer just gets confused for no apparent reason. If your computer drifts off into oblivion with no return in sight, try tapping the spacebar a few times. Try pressing Esc or holding down Ctrl while pressing Esc. One of my laptops woke up only when I prodded an arrow key.

Still no return? Then it's time to get ugly. The next few steps may cause you to lose any unsaved work. Sorry!

- ✔ Try rebooting the computer: Press the Ctrl, Alt, and Del keys simultaneously. Sometimes that's enough to wake up Windows and bring the Task Manager to life. (In Vista, it brings up a menu where you can choose Start Task Manager.) If one of your programs is the culprit, click the Task Manager's Applications tab for a chance to snuff out the troublemaking program with a click of the End Task button.
- ✔ If the computer still acts like an ice cube, head for the next level of attention grabbing: Press your PC's reset button. No reset button, or no results? Move to the next step.
- ✔ If the computer's *still* counting marbles on some virtual playground, turn off the computer, unplug the darn thing, or in the case of some laptops, remove its battery. (Windows often makes you hold the power button down for ten seconds or so to turn it off.) Then wait 30 seconds after it's been turned off, giving it a chance to really settle down. Finally, turn the computer back on and see whether it returns in a better mood.

You'd be surprised how much good a little 30-second vacation can accomplish.

Install a New Driver

When you suspect some part is involved — not always an easy call with Windows — your best chance at fixing the problem comes by finding a better driver. Drivers serve as translators between Windows' language and the language spoken by a manufacturer's particular part.

The better the translator, the smoother the conversations. Installing an updated video driver, for example, can fix irregularities in the display you'd been blaming on your monitor. An updated sound driver might rid your soundtracks of that awful static.

I describe how to track down and install drivers in Chapter 19.

Google the Error Message

When your PC gives you an annoying error message, write it down on a scrap of paper. Then type that error message into the search box on Google (www.google.com). Be sure to type in the *exact* error message and put it in quotes.

Thousands of people have seen that same error message. Dozens of them have already asked about it on Google. And if you're lucky, it won't take long before you find the few people who've posted solutions that could be as easy as clicking the right check box.

I describe how to search on Google in Chapter 22.

Find and Remove Spyware

Spyware programs sneak into Windows, often through Internet Explorer, as you visit Web sites. Some spyware hops onto your PC surreptitiously, other spyware piggybacks on programs offered by sneaky Web sites.

Spyware tracks your Web activity, sending your browsing patterns back to the spyware program's publisher. The publisher then sneaks targeted advertisements onto your PC's screen, either through pop-up ads, banners, or changing your browser's Home page.

Most spyware programs freely admit to being spies — usually on the 43rd page of the 44-page agreement you're supposed to read before installing the supposedly helpful program.

The biggest problem with spyware comes when you try to pry it off: They rarely include an uninstall program. That's where spyware removing programs come in.

Microsoft's Windows Defender spyware removal program, for example, comes preinstalled in Vista, and Windows XP owners can download it from Microsoft's Web site (www.microsoft.com/downloads). Windows Defender prevents some spyware from installing itself, and it removes any spyware it finds inside your PC. To help Windows Defender recognize the latest strains of spyware, Windows Update keeps Windows Defender up to date.



To make Windows Defender scan your PC immediately, a potential solution when your PC's acting strange, click the Start menu, choose All Programs, and launch Windows Defender. Click the Scan button, if the program hasn't already begun scanning your PC, and wait for it to finish.

But don't be afraid to run more than one spyware scanner on your PC. Unlike firewalls and anti-virus programs, spyware scanners don't conflict with each other: Each program does its own scan, killing off any spyware it finds. Two other popular programs are Ad-Aware (www.lavasoftusa.com) and Spybot Search & Destroy (www.safer-networking.org). Both programs are free, hoping to entice you into buying their more full-featured versions.

Avoid Viruses by Not Opening Unexpected Attachments

This isn't really a quick-fix tip, but it's certainly a way to avoid having to do a lot of fixing when a virus infects your PC. Most viruses can be avoided by following this simple rule: Don't open *any* e-mailed file unless you're expecting to receive it.

That rule works because most viruses spread by e-mailing a copy of themselves to *everybody* in the address book of an infected PC. That means most viruses arrive in e-mail sent from your friends' e-mail accounts.

Before opening any suspicious file, e-mail the sender and ask him if he meant to send you the file. That little bit of effort not only keeps your PC safer, it keeps you from having to clean up problems left over by rogue programs.

Run System Restore

Windows Vista and Windows XP include a wonderful tool for setting things right again. Called System Restore, this tool remembers the good times — when your computer worked fine and all the parts got along.

When your computer becomes a problem child, System Restore sends it back to that time when everything worked fine. I explain this miracle worker in Chapter 21.

Check for Overheating

Nobody likes to work when it's too hot, and your computer is no exception. Your computer normally works naked, but after a few months, it wears a thick, hot coat of dust.

Your first step is to look at the fan's round grill on the back of the computer. See all the dust flecks clinging to the grill, swapping barbecue stories? (See an example in Color Plate 33, in the color insert pages in this book.) Remove them with a rag or vacuum cleaner, being careful to keep the worst grunge from falling inside.

Second, check the vents on the front and sides of your computer case. Although the fan in the power supply is creating the airflow, the air is actually being sucked in these little holes and crevices. If these vents are clogged with crud, very little air moves across the components to cool them.

Don't just *blow* on the dust, either. The microscopic flecks of spittle in your breath can cause problems with the computer's moisture-sensitive internal components.

For best results, buy a cheap can of compressed air from a local computer store, remove your computer's case, and blast the dust off its innards every few months, paying special attention to crevices and grills. (Unplug it and carry it outside first. Angry dislodged dust particles float everywhere.)



The more parts and peripherals you add to your computer, the hotter it runs. Be sure to keep the vents clean.



Don't tape cards or cheat sheets (including the one from this book) across the front of your PC's case. That can block your PC's air vents, which are often disguised as ridges across the front of the case. When air can't circulate inside your PC, your computer heats up in a hurry. Also, don't keep your computer pushed up directly against the wall. It needs some breathing room so that its fan can blow out all the hot air from inside the case.

Install a New Power Supply

When computers simply refuse to turn on and do *anything*, and you know that the power cord isn't loose, it's probably because the power supply died.

Power supplies have become increasingly reliable over the past few years. Still, be sure to replace the power supply if the computer doesn't even make a noise when you push its power button.

Chapter 10 provides power supply replacement instructions.

Run Check Disk

Windows comes with several programs designed to keep it running trouble-free. Every few months — and immediately if Windows starts giving you some vague, unidentifiable trouble — follow these steps to find and run some of the troubleshooters:

- 1. Open the Start menu and click Computer (in Vista) or My Computer (in Windows XP).**

Windows lists your PC's disk drives and other storage areas.

- 2. Right-click your hard drive's icon and choose Properties from the pop-up menu.**

You want to right-click the Local Disk (C:) drive because that's the drive where Windows sets up camp.

- 3. Click the Tools tab to get to the goodies.**

The Tools tab reveals three buttons that check the drive for errors, defragment the drive, or backup the drive.

- 4. Click the Check Now button and then click the Start button.**

When the Check Disk dialog box appears, automate the disk checking process by checking the two boxes, Automatically Fix File System Errors and Scan For and Attempt Recovery of Bad Sectors.

Because you're checking the drive Windows lives on, the program will ask permission to run the disk check the next time you restart your PC. (That gives the program access to areas it can't reach while Windows is running.)

5. Repeat the process on your other hard drive icons.

If your PC has other hard drives, repeat the process on them, as well. If your PC has a card reader, this trick also works on memory cards, like the ones used in most digital cameras. (It also works on USB thumb drives.) It won't work on CD or DVD drives, however.



To defragment your hard drive — a way to speed it up by reorganizing its information — repeat the first three steps above, but click the Defragment Now button in Step 4. (I explain how to defragment a hard drive in Chapter 9.)

Chapter 24

Ten Handy Upgrade Tools

In This Chapter

- ▶ Using the manual and online sources
 - ▶ Having fun with a Phillips screwdriver, a small flashlight, and a quarter-inch nut driver
 - ▶ Turning household items into tools
 - ▶ Using fancier tools like magnetized screwdrivers and compressed air
 - ▶ Saving your original Windows DVD or CD
-

The next time you're at the computer shop, pick up a computer toolkit. You get most of the tools mentioned in this section and a snazzy, zip-up black case to keep them in. Most kits cost less than \$20.

If you don't want to spend money, you can probably salvage most of this chapter's handy items from a garage, junk drawer, kitchen, or laundry room.

But no matter whether you buy a toolkit or assemble your own, make sure that you keep it within reach when you're ready to open your computer's case.

Using the Manual and Online Sources

You *did* save all the documentation that came with your computer, didn't you? Unfortunately, those manuals and papers often come in handy when you're upgrading your PC. The documents describe the parts and model numbers of your PC's innards and how to fix certain things. Keep the manuals in a safe place, preferably sealed in a large Ziploc freezer baggie. Even a receipt helps: It usually contains the model number and brands of your PC's components.



Can't find anything? Then head to your PC manufacturer's Web site to see its vital statics. Did you buy a Dell or Gateway computer? Find the PC's serial number on the sticker affixed to your PC's case; then head to www.dell.com or www.gateway.com for a list of your computer's parts and drivers. (You can sometimes find out whether your PC is still under warranty, too.)

Save the manuals for every part or piece of software you buy for your computer. They're your first defense when something goes wrong.

A working knowledge of the Internet helps you keep your PC running smoothly, no doubt about it. The Internet contains information posted by millions of PC users, and some of them have gone through the same problems you have. When you can't figure out what's wrong, head for the Internet's newsgroups. (They're searchable from Google.) People post messages on the newsgroups about their computer problems and how they solved them.

Diagnosing and fixing your computer through the Internet gets its due in Chapter 22.



The Internet does you no good after you've installed a part and your computer stops working. Doing a little research *before* you start your fix-it job can save a lot of time.

The First Tools to Grab



Phillips screwdrivers: Phillips screwdrivers have a little square cross on their tip, not a flat blade. The pointed tip fits directly into the crossed lines on the screw's top, shown in the margin. Regular screwdrivers don't work.

The Phillips screwdriver doesn't need to be a tiny thing; most computer screws have fairly deep holes. Sometimes an over-eager computer nerd overtightens the screws that hold on your computer's case. If this is your problem, a nut driver does a better job of removing it.



Tighten screws just enough so they won't come out by themselves. Don't overtighten them. In fact, overtightening the screws that hold in a hard drive can damage the drive.



Nut drivers: By far my favorite tool, the nut driver looks like a common screwdriver but with a socket wrench on the end. It's useful because most computer screws not only work with a Phillips screwdriver, but also a 1/4-inch socket wrench. Notice how the Phillips screw in the margin also has six sides?

When you push the screw's six-sided head into the nut driver, it usually stays put. From there, you can often guide the end of the screw to its target deep inside your computer, push it into the hole, and start turning. The socket end grips the screw the entire time, so the screw doesn't fall out. You can't do that with a Phillips screwdriver — even the ones with magnetized tips don't grip as well as a nut driver.

A nut driver also works well when unscrewing things. Again, the screw stays lodged inside the socket better than it would with a screwdriver, enabling you to lift it out of the computer's case without dropping it.



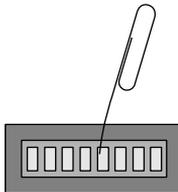
Almost all the screws lurking inside your computer — including the frequently accessed screws holding in the extension cards — work well with a quarter-inch nut driver.

Turning Household Items into Tools

Paper clips: They don't look like much, but you'd be surprised what they can do when they're partially straightened. Then they come in handy for several things:

- ✓ **Making stuck CD drives spit out their trays.** You find a tiny hole on the front of many CD-ROM drives — a hole much smaller than the headphone jack. If the disc gets stuck, try pushing the end of your straightened paperclip into the hole. The hole serves as an Emergency Eject System that extracts stubborn compact discs.
- ✓ **Prying jumpers off pins.** Although needle-nose pliers work better for this, a paper clip is often handier, and it doesn't damage the pins. (You may come across unruly jumpers when installing hard drives and CD/DVD drives.)
- ✓ **Flipping DIP switches.** Short for Dual Inline Package, these little rows of switches appear on some motherboards and hard drives. How do you flip those tiny things, shown in Figure 24-1? Grab the paper clip.

Figure 24-1:
Use a
straightened
paper clip to
flip tiny
switches.



Empty egg cartons: An egg carton works great for holding a computer's removed screws. Drop screws from different parts into different depressions. Forgetful people label each depression with a pen so that they remember which part uses them.

A small flashlight: Most of the stuff inside your computer's case is jammed in pretty close together. When everything's so dark inside, a flashlight helps you locate the right expansion card, find the model number of a sound card, or locate missing screws.



Small keychain flashlights work well to illuminate your PC's crevices, as do pen lights. Look for freebie keychain flashlights the next time you stay at a fancy hotel or visit a trade show. Flashlights are handy tools to add to your computer repair arsenal.



Keep a pad of paper and a pencil handy for writing down part numbers.

Magnetized Screwdrivers and Dust Blowers

The following items aren't crucial, but oh, they certainly are handy at the right times. If you spot one while shopping, think about buying it for an upcoming repair.

A magnetized screwdriver: The magnet makes it easier to grab a fallen screw you've just spotted with the flashlight. Just touch the screw with the end of the screwdriver and gently lift it out when it sticks to the end of the screwdriver.



Anything with a magnet can wipe out information on your floppy disks. To avoid problems, don't keep your magnetized screwdriver near your work area. Just grab it when you need to fetch a dropped screw and then put it back on the other side of the room. (Compact discs don't have this problem, by the way.)

Compressed air canisters: Commonly found at PC repair shops and art supply shops, *canned air*, as it's also known, lets you blow all the gross things out of the inside of your PC. Pranksters can also squirt coworkers in the back of the head when they're not looking.

Be sure to take the PC *outside* before you blow the dust off it, or it can make a mess on the floor. Plus, the smaller dust particles float through the air — you don't want to breathe that junk in, or to have it get sucked back into your PC through the fan.



Don't blow with your own breath on your PC's innards to remove dust. Although you're blowing air, you're also blowing moisture, which can be even worse for your PC than dust.



Every few months, vacuum off the dust balls that clog the air vent on the back of your PC. The cooler you can keep your PC, the longer it lasts.

Your Windows Vista DVD or Windows XP CD

Even when your computer's hard drive fails, it will still boot from its original Windows Vista DVD or Windows XP CD. Pop it into your disc drive, turn on your computer, and Windows appears on your screen. However, you still need to install Windows onto a working hard drive, described in Chapter 20, before you can run any of its programs.

Chapter 25

(Nearly) Ten Upgrade Do's and Donuts

In This Chapter

- ▶ Upgrade one thing at a time
 - ▶ Make a Restore Point before every upgrade
 - ▶ Watch out for static
 - ▶ Save your boxes, receipts, and warranties
 - ▶ Don't force parts together
 - ▶ Don't bend expansion cards
 - ▶ Budget yourself plenty of time for the job
 - ▶ Don't try to repair monitors or power supplies
-

Over the years, as hungry computer repair technicians swapped tales of occupational stress, they gradually created a list known as *The Upgrade Do's and Donuts*. The following tips have all been salvaged from lunch rooms across the nation and placed here for quick retrieval.

Do Upgrade One Thing at a Time

Even if you've just returned from the computer store with more memory, a wireless network card, a hard drive, and a monitor, don't try to install them all at once. Install one part and make sure that it works before going on to the next part. If you can stand it, wait a day to make sure no problems turn up.

If you install more than one part at the same time and your computer doesn't work when you turn it on, you may have trouble figuring out which particular part is gagging your computer.

Do Make a Restore Point before Every Upgrade

The Windows System Restore feature does a great job of reinstating your computer's settings that made it run smoothly and cleanly. However, System Restore only works if you've created a Restore Point for it to return to.

If you're installing anything that involves software, drivers, or setup programs, head to System Restore, covered in Chapter 1, and make a Restore Point that describes what you're about to do. Before installing that wireless network adapter, for instance, make a Restore Point with the name, "Before installing the new wireless network adapter."

Then, if the wireless network adapter bulldozes your finely tuned network settings, System Restore can return to those peaceful days when your network buzzed happily, giving you time to troubleshoot the problem.

Do Watch Out for Static Electricity

Static electricity can destroy computer parts. That's why many computer parts, especially things on circuit cards, come packaged in weird, silvery bags that reflect light like the visor on an astronaut's helmet. That high-tech plastic stuff absorbs any stray static before it can zap the part inside.

To make sure that you don't zap a computer part with static electricity, you should discharge yourself — no matter how gross that sounds — before starting to work on your computer. Touch a piece of bare metal, like the edge of a metal desk or chair, to ground yourself. You also must ground yourself each time you move your feet, especially when standing on carpet, wearing slippers, or after moving the cat back out of the way.

If you're living in a particularly static-prone environment, pick up a wrist-grounding strap at the computer store. (They usually sell them near the packages of memory.)

Do Hang On to Your Old Boxes, Manuals, Warranties, and Receipts

When you need to pack up your computer for a move, nothing works better than its old boxes. I keep mine on the top shelf in the garage, just in case I

move. Don't bother hanging on to the smaller boxes, though, like the ones that come with a video card or mouse.

Hang on to *all* your old manuals, even if you don't understand a word they say. Sometimes a newer part starts arguing with an older part, and the manuals often have hints on which switch to flip to break up the fight.

Just push some dust mice aside from under the bed and slide all the manuals under there.

Don't Force Parts Together

Everything in your PC is designed to fit into place smoothly and without too much of a fight. If something doesn't fit right, stop, scratch your head, and try again using a slightly different tactic.

When trying to plug a cord into the back of your computer, for example, look closely at the end of the cord and then scrutinize the plug where it's supposed to fit. See how the pins are lined up a certain way? See how the plug's shape differs on one side? Turn the plug until it lines up with its socket and push slowly but firmly. Sometimes it helps if you jiggle it back and forth slightly. Ask your spouse to tickle you gently.

How to fish out dropped screws

When a screw falls into the inner reaches of your PC, it usually lands in a spot inaccessible to human fingers. The following should call it back home:

- ✔ Is it in plain sight? Try grabbing it with some long tweezers. If that doesn't work, wrap some tape, sticky-side out, around the end of a pencil or chopstick. With a few deft pokes, you may be able to snag it. A magnetized screwdriver can come in handy here as well. (Don't leave the magnetized screwdriver near your floppy disks, though; magnets can wipe out the information on the disks.)
- ✔ If you don't see the runaway screw, gently tilt the computer to one side and then the other. Hopefully, the screw will roll out in

plain sight. If you can hear it roll, you can often discover what it's hiding behind.

- ✔ Still can't find it? Pick up the computer's case with both hands, gently turn it upside down, and tilt it from side to side. The screw should fall out.
- ✔ If you still can't find the screw and it's not making any noise, check the floor beneath the computer. Sometimes screws hide in the carpet, where only bare feet can find them.

Do not power up your computer until you can account for every screw, or you'll find yourself with an even worse problem: a shorted-out motherboard.



Things that plug directly onto your motherboard seem to need the most force. Things that plug onto the outside of your PC, by contrast, slip on pretty easily. They also slip off pretty easily, so some of the cables have little thumb screws to hold everything in place firmly.

Don't Bend Cards

Many of your computer's internal organs are mounted on fiberglass boards. That's the reason there's a warning coming up right now.



Don't bend these boards, no matter how tempting. Bending the board can break the circuits subtly enough to damage the card. Worse yet, the cracks can be too small to see, so you may not know what went wrong.

If you hear little crackling sounds while you're doing something with a board — plugging it into a socket or plugging something into it — you're pushing the wrong way. Stop, regroup, and try again. Check out Chapter 7 and make sure you're pushing the right type of card into the right slot: PCI, PCI-Express, or AGP. Also check the color insert pages in this book — Color Plates 17 through 23 show full-color photos to help you see where and how to insert cards.

Don't Rush Yourself

Give yourself plenty of time to install a new part. If you rush yourself or get nervous, you're much more likely to break something, which can cause even more nervousness.

And never, ever, start a new project on a Friday evening. Many tech support lines are closed during the weekend, leaving you with no help and no way to play *The Sims 2* or *Microsoft Flight Simulator*.

Don't Open Up Monitors or Power Supplies

You can't repair anything inside monitors or power supplies. Also, both the power supply and monitor store voltage, even when they're not plugged in.



To avoid an electric shock, don't ever try to open your power supply or monitor.

Appendix

The Rathbone Reference of Fine Ports

In This Appendix

- ▶ Identifying the plugs and ports on your computer
 - ▶ Understanding what devices use what plugs and ports
 - ▶ Finding out what ports can be added, expanded, or converted
-

Computers come full of holes (ports) where you insert a cable's end (plug). Unfortunately, computer ports rarely get better with age. Unlike a fine wine, a computer's ports grow obsolete with age, and engineers create new types of ports to replace them.

Chances are, many of your computer's existing ports will go unused. And in the coming years, you might have to buy port upgrades before you can plug in the latest devices.

Because it's increasingly difficult to keep track of what plugs in where — or what used to go here but now goes there — I've created the Rathbone Reference of Fine Ports.

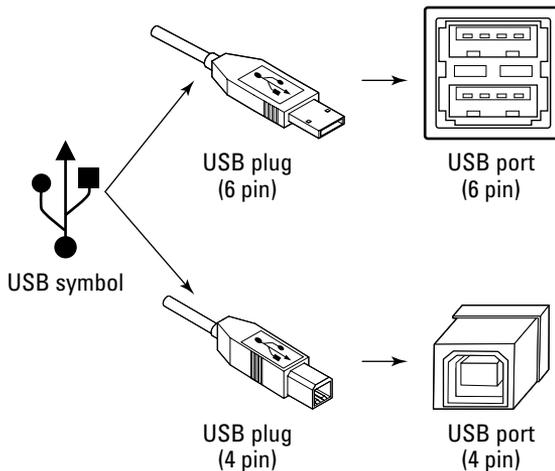
The reference, spread throughout the following sections, shows pictures of all the plugs and ports you're likely to encounter on your computer and the gear that plugs into it. Next to the pictures, you see the symbol commonly placed next to a port by computer manufacturers to identify its function.

Feel free to peek at this section whenever you plug something new into your computer during repairs and upgrades.



Throughout this book, you find a drawing of the appropriate plug and port next to the spot where it's used. Use that drawing as a memory jogger and return here if you need more information.

USB (Universal Serial Bus)



The Dirt: For the past ten years, manufacturers have shipped their computers with *USB ports* — small, rectangular-shaped holes ready to accept small, rectangular-shaped plugs. At first, everybody ignored them. But slowly, companies began creating items to plug into those holes.

USB plugs and ports now come in two sizes: The large rectangular ones (often called *six-pin*) come on most computers. The smaller, more squarish ones (sometimes called *four-pin*) appear on smaller items like MP3 players. The small, four-pin models lack the two pins supplying power, so gadgets with those ports usually come with batteries or an AC adapter.



You can buy a cord with a big, six-pin plug on one end that fits into your computer and a small, four-pin plug on the other end that fits into your small gadget (such as a digital camera).



USB 1.1 ports and plugs look identical to those using USB 2.0, a much faster standard designed about five years ago. Those old USB 1.1 devices still work in a USB 2.0 port, but USB 2.0 devices work reliably only in USB 2.0 ports.

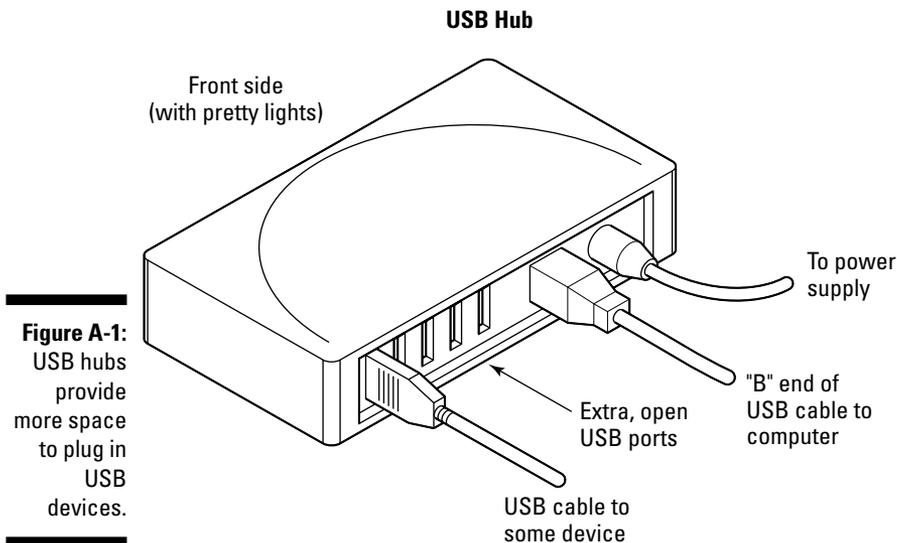
What's Connected: Today, store shelves brim with USB keyboards, mice, sound modules, digital cameras, hard drives, CD-ROM drives, and just about every other computer peripheral.

Background: Why the fuss about USB ports? Because manufacturers finally realized that most people don't *enjoy* removing their computer's cases to install things. People don't *want* to figure out which specialized hole their new gadget plugs into. And nobody enjoys explaining to a confused computer what's been plugged in.

USB solves all three problems. People plug any new USB gadget into any available USB port, and the computer almost always recognizes the new device and begins feeding it power through the cable. Simple. (A few power-hungry USB gadgets also plug into the wall or require batteries.)



USB's popularity created a problem, though. Older computers come with only two USB ports, and now everybody wants more than two USB devices. The solution is to buy an inexpensive USB hub. Shown in Figure A-1, a *USB hub* plugs into one of your existing USB ports and provides four or more USB ports. It works like a power strip, enabling bunches of USB gadgets to plug into a single port. Many hubs must be plugged into the wall to provide enough power for all the devices attached to it. A few finicky USB gadgets don't like hubs, however, and insist on plugging into the computer's original USB port.



The Verdict: Windows Vista automatically recognizes almost anything plugged into a USB port, including mice, webcams, joysticks, printers, hard drives, video capture devices, external CD/DVD burners, and scanners.



Standard talk about IEEE

For more than 100 years, the Institute of Electrical and Electronics Engineers (IEEE) has assigned numbers to things. (IEEE is pronounced *EYE-trip-ul-ee*, by the way, in case you want to earn points at geek gatherings.)

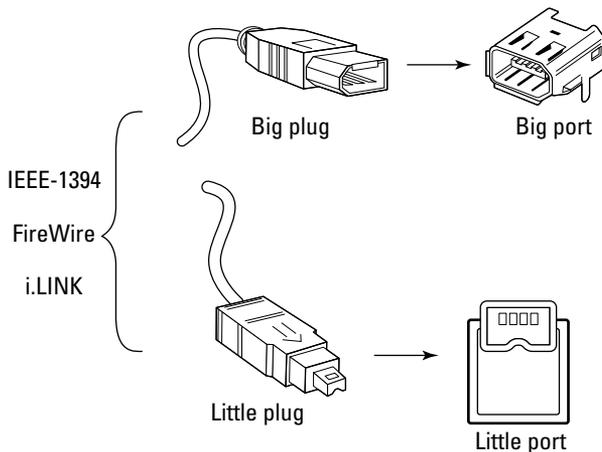
For instance, Apple Computers named its speedy information transfer system *FireWire*. Not to be outdone, IEEE named it *IEEE Standard 1394*.

Computer networks, commonly called *Ethernet*, are actually called *IEEE Standard 802.3*. When

printers communicate with computers, they use *IEEE Standard 1284*. IEEE's dictionary, where they keep track of all the numbers, is called *IEEE 100*. (Seriously.)

Don't be surprised by all the IEEE numbers that pop up in this book. For riveting late-night reading, visit the group's Web site at www.ieee.org. Unfortunately, the popular IEEE 100 dictionary is not available online.

IEEE 1394 (Also Known as FireWire or Sony i.LINK)



The Dirt: *IEEE 1394* officially stands for the Institute of Electrical and Electronics Engineers Standard Number 1394. Apple, the hip engineers who created Macintosh computers, mercifully named it *FireWire*. And Sony calls it *i.LINK*. (I use the term *FireWire* in this book.)

Most new PCs come with built-in FireWire ports. If you own an older computer, you might need to upgrade with a FireWire port on a card, as described in Chapter 7. (When you're shopping, look for a combination FireWire/USB 2.0 card so you can plug in *lots* of goodies.)

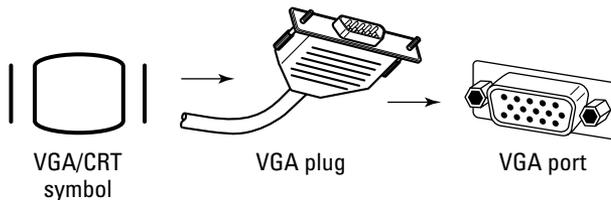
What's Connected: IEEE 1394, er, FireWire is a way to transfer lots of information *very* quickly, so it's gathered a large following with digital camcorder owners who want to copy video into their PCs for editing.

The Verdict: Make sure that your computer has a FireWire port if you plan to edit video from a digital camcorder that requires one. (Some digital camcorders have switched to USB 2.0.)



The first and most popular version of FireWire, known as FireWire 400, can transfer information up to 400 Mbps (megabits per second) through a cable length of up to 15 feet. FireWire's latest version, FireWire 800, transfers information up to 800 Mbps. FireWire 800 is still new, and few devices yet support it. Unlike Windows XP, Windows Vista no longer recognizes FireWire for networking two PCs.

Standard VGA Video Port

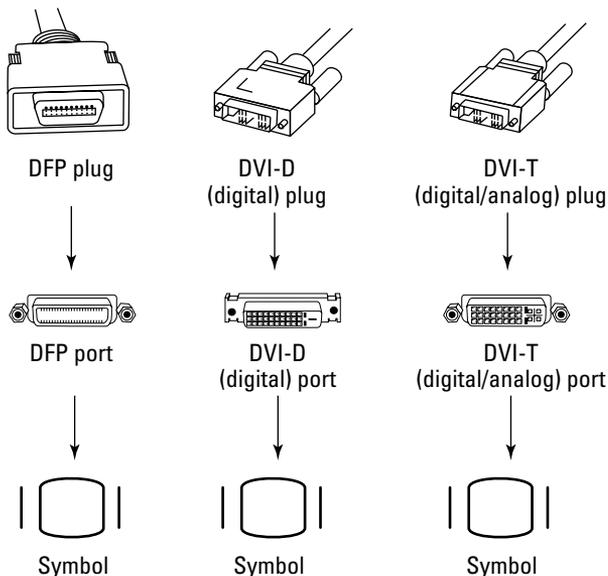


The Dirt: Everybody needs a video port (also called *VGA port*) to plug in their monitor, and some Windows Vista and Windows XP Professional users can install a second video port to add a second monitor to their desktops. (Windows XP Home doesn't support two monitors.)

What's Connected: Video ports have been around for years to support standard CRT (Cathode Ray Tube) monitors — the kind that look like old TV sets. The first variety of LCD monitors required special digital ports (described next), but now many LCD monitors also plug into normal video ports.

The Verdict: Almost every video card still supports standard, cathode-ray monitors. Most also support the cool, flat-panel LCD monitors. If you want to upgrade to an LCD monitor, make sure your PC's video card can handle it. (Chapter 7 explains this in more detail.)

Flat-Panel LCD Video Port (DVI)



The Dirt: If your new computer came with a traditional monitor, it probably plugs into a standard VGA port, which I describe in the previous section. If you're upgrading to a flat-panel monitor, you might need a new video card for it to plug into. You find much, *much* more about this complicated stuff in Chapter 7.

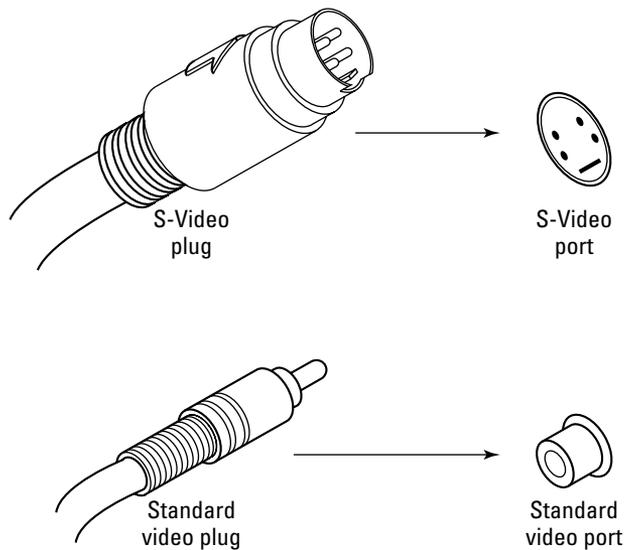


When “flat-screen” LCD monitors arrived in the late '90s, they brought two different connectors with them: Some used the 20-pin DFP (Digital Flat Panel) connector, and others had the 24-pin DVI (Digital Visual Interface) connector. DVI won the battle, so those old DFP monitors don't work with most of today's video cards. You'll find DFP-to-DVI adaptors on the Internet (try www.dvigeart.com), but DVI cards still won't work on all DFP monitors.

The Verdict: If you're buying a flat-panel LCD monitor, your video card needs the correct type of port for it to plug into. “Digital” LCD monitors require a DVI port. “Analog/Digital” LCD monitors can use either. To be on the safe side, many video cards today come with a VGA *and* a DVI port. To be *really*

safe, consider buying your monitor and card as a matched set. Chapter 7 offers the scoop.

Analog Video

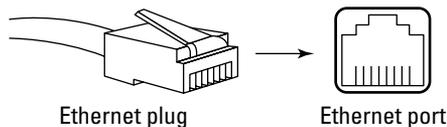


The Dirt: These connectors enable computers to exchange video signals with a variety of sources, usually your VCR, analog camcorder, or television. To capture video, the cards convert incoming video signals into a digital format by measuring the video signals and storing the measurements as numbers.

When you're sending video — displaying a laptop's screen on a television, for example — the converters do just the opposite, converting the computer's digital signals to analog.

The Verdict: Look for these jacks to transfer video signals to and from your computer. The lower-quality RCA connectors are almost always yellow. The much higher-quality S-Video connectors are almost always black. (Being more expensive, S-Video connectors aren't found on all computers or video sources.) Chapter 7 covers digital video.

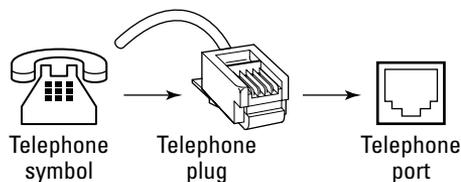
Ethernet (RJ-45)



The Dirt: When you accumulate too many household appliances, you hold a garage sale. When you accumulate too many computers, you connect them with a network so that they can share resources (such as printers, for example) and information. IEEE Standard 802.3, nicknamed *Ethernet*, is the most popular cabling used for small networks, so your computer might already have an Ethernet jack (also known as an *RJ-45 jack*) built in.

The Verdict: Ethernet jacks look almost identical to standard telephone jacks, but they're slightly larger. You can't fit an Ethernet jack into a phone jack, but you can accidentally push a phone cord into an Ethernet jack. (The phone won't work, though.)

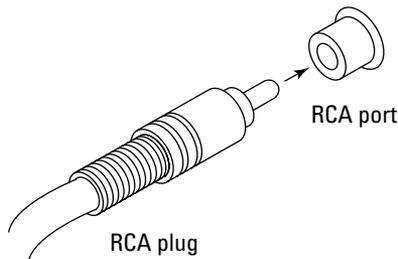
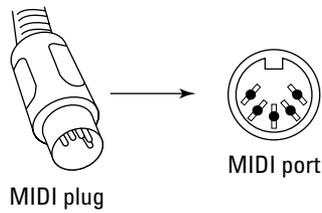
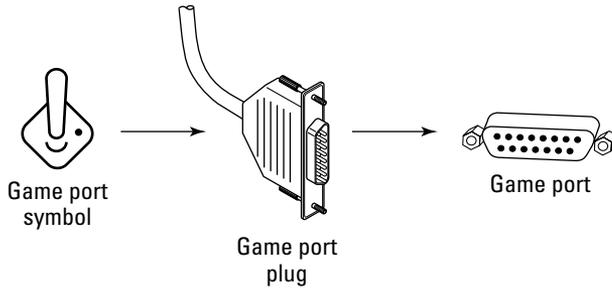
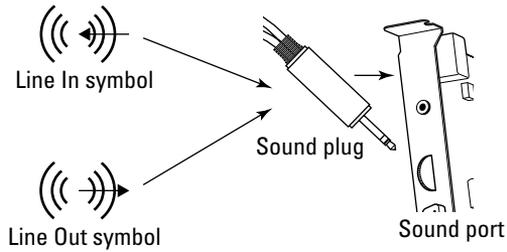
Telephone (RJ-11)



The Dirt: If you're using a dialup modem to connect to the Internet, you'll probably see two of these jacks on the back of your computer.

The Verdict: Examine the two jacks closely. One jack usually says Line; the other says Phone. (The Phone jack often bears a telephone symbol.) You must run a cord from the Line jack to the telephone jack in the wall. The Phone jack enables you to plug in a telephone handset for convenience's sake.

Stereo Sound

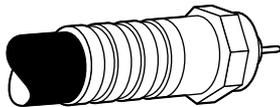


The Dirt: Sound cards come with bunches of jacks, so they get their own special figure. Line In is where you plug in stuff you want to record or have the computer play through its speakers. Line Out is where you plug in your speakers or headphones. (You can also connect that port to your home stereo's Line In port to hear your PC through your stereo.) The joystick or game controller plugs into the game port; most people use inexpensive Y-adapters to fit two joysticks into one port.

Some MIDI adapters plug into the sound card's game port, providing MIDI plugs for musicians to plug into a musical instrument's MIDI ports, such as those on a synthesizer keyboard. Finally, five-speaker sound cards often use an RCA port to power the subwoofer. High-end cards often use external RCA ports for S/PDIF digital audio transfers, described in Chapter 11.

The Verdict: Sound cards vary widely according to their expense. Some offer digital sound options, others offer surround sound and home theater plug-ins. Chapter 11 covers it all.

Coaxial Cable



Coaxial cable



Coaxial port

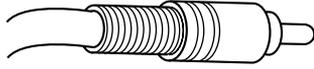
The dirt: Found on almost all TV tuners and TV sets, this carries TV channels. The cable usually pokes out of the wall and plugs into your cable box or TV set. The cable usually screws onto its connector by hand, although some simply push on.

The Verdict: You must plug your TV's cable directly from the wall into your PC's TV tuner *without* plugging into a cable box first. If you plug it into the cable box first, you'll be able to record only one channel: The channel your cable box is tuned to. I explain TV tuners in Chapter 12.

RCA (Composite)

The Dirt: These carry either sound (on a pair of cables) or video. To tell which jack carries what, look at its color: Red (right) and white (left) jacks each carry one channel of stereo sound; a yellow jack carries video. Because

most PCs pipe out sound through a tiny 1/8-inch jack, this jack usually pipes out video on a PC.



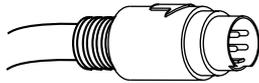
RCA plug



RCA port

The Verdict: Connect a cable from this jack to the same jack on your TV set to bring your PC's screen to your TV set. (To connect the sound to your TV set, run a cable from your sound card's Line Out jack to the red and white RCA ports on your TV.)

S-Video



S-Video plug

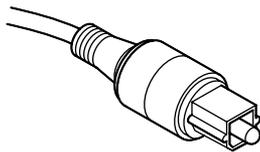


S-Video port

The Dirt: This cable, usually black, carries high-quality video but no sound.

The Verdict: These appear on both TV tuners and high-quality video cards. Both let you use your TV set as a monitor. If your TV accepts both RCA or S-Video jacks, use S-Video, as it's higher quality. (To hear TV soundtracks, you must still connect your PC's sound to your stereo or TV.)

Optical/Toslink



Optical/Toslink plug



Optical/Toslink port

The Dirt: Found on some high-quality sound cards, this carries Dolby AC-3 sound (sometimes called *multichannel*, *surround sound*, or *5.1*) but no video. Some sound boxes and cards offer an optical jack, others offer a Toslink jack, but they both carry the same thing: high-quality, six-speaker sound.

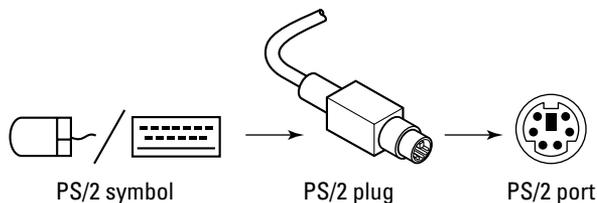
The Verdict: If your PC has optical but your stereo has Toslink — or vice versa — you can't connect your PC to your home stereo until you buy an adapter, a chore I cover in Chapter 11.

The Legacy Devices

A *legacy* device is simply an older piece of hardware, usually designed to be used with Windows Millennium (Windows Me) and earlier Windows versions. Legacy devices usually aren't *Plug and Play*-compatible, meaning that your computer doesn't automatically recognize and install them for you when you plug them in.

Although new computers often include these legacy ports, they usually go unused. These connectors are here in case you find a device that still requires one.

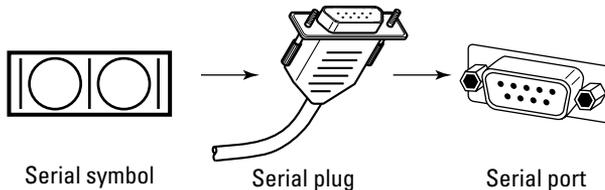
PS/2 mouse and keyboard



The Dirt: Older keyboards and mice often plug into a slim, round goodie called a PS/2 port. Most current models plug into a USB port, instead.

The Verdict: PS/2 keyboards work better for troubleshooting, as they work as soon as your computer boots up — before Windows begins running. Feel free to buy a USB mouse and keyboard, though.

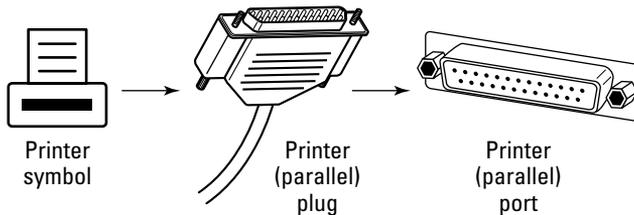
Serial connectors



The Dirt: Today, serial ports usually remain empty. Modems, their prime users, usually live inside the computer. A handful of other gadgets cling to them, mostly older PocketPCs, Palm Pilots, label printers, and similar nerdy gadgets. Most high-end PCs still include a serial port, but the budget models leave them off.

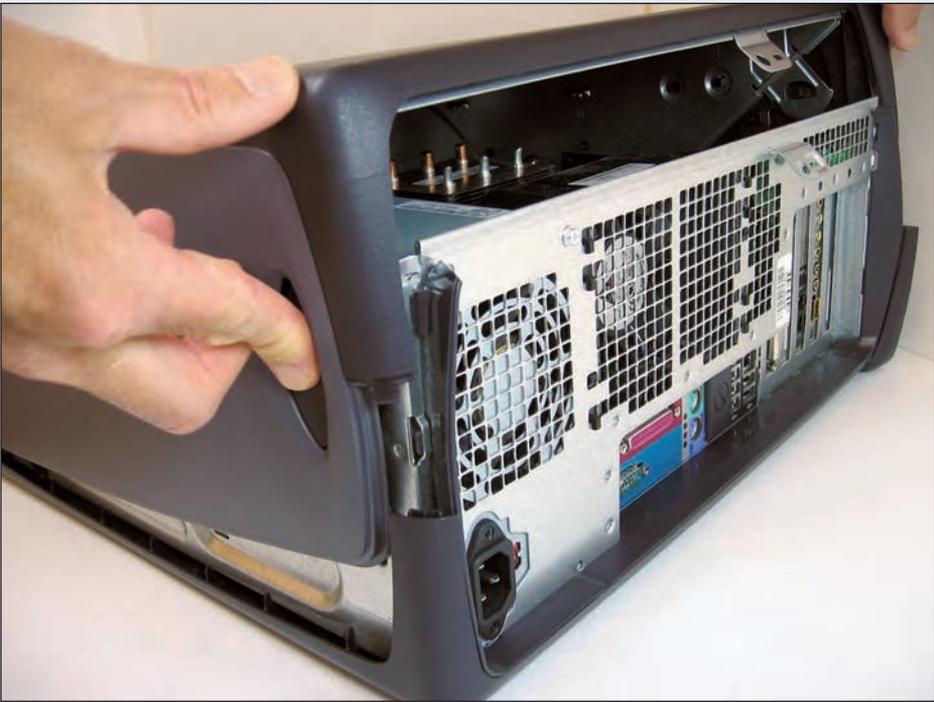
The Verdict: Ignore them.

Parallel (printer) connectors



The Dirt: Hunkered down next to a computer's two serial ports sits a parallel or printer port. (Nerds call it a *DB25 port*.) It's always been there for connecting to the printer.

The Verdict: Like serial ports, parallel ports are being replaced by USB ports. A few printers still use them, though, so they haven't yet dropped off high-end PCs. You probably won't find one on a budget PC.



Color Plate 1: Some computer cases open up like a box when you squeeze the top and bottom latches.



Color Plate 2: On other cases, you need to unscrew two thumbscrews.



Color Plate 3: After removing the thumbscrews, slide the cover off by pulling it to the rear.



Color Plate 4: On the back of every PC, you see the power supply, the ports, and the slots.



Color Plate 5: The power supply is held in place by four screws (circled).



Color Plate 6: These ports live on your PC's motherboard but poke out the back of the case so you can reach them. See the Cheat Sheet and the Appendix if you need help identifying these ports.



Color Plate 7: The back side of your PC's cards poke out the back of slots cut into the rear of the PC's case. (The bottom card is a TV tuner card; the top is a video card.)



PCI slots for most types of cards.

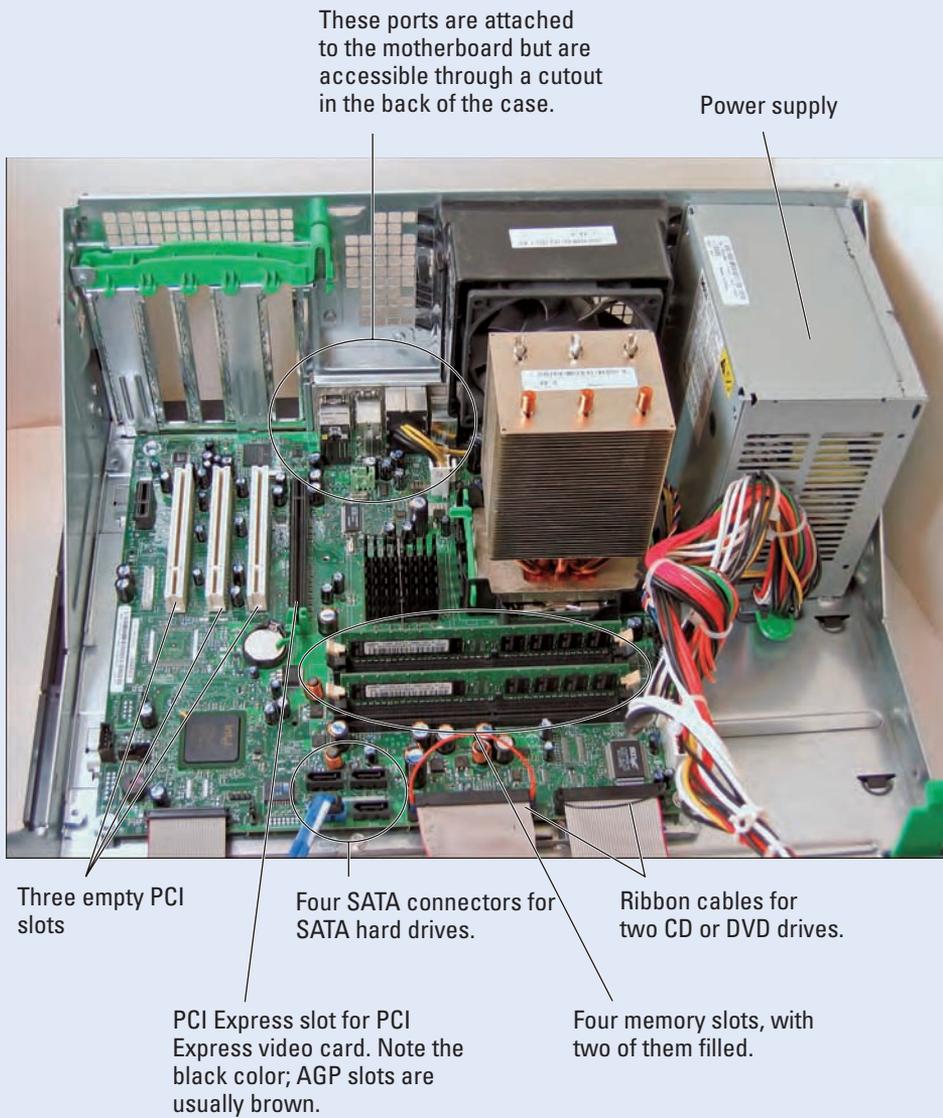
AGP slot for AGP video cards. (Note the brown color.)

Power supply. The wires plug into the motherboard and the disk drives (not shown).

Ports attached to motherboard and poking out the back of the case.

One memory chip and two empty memory sockets.

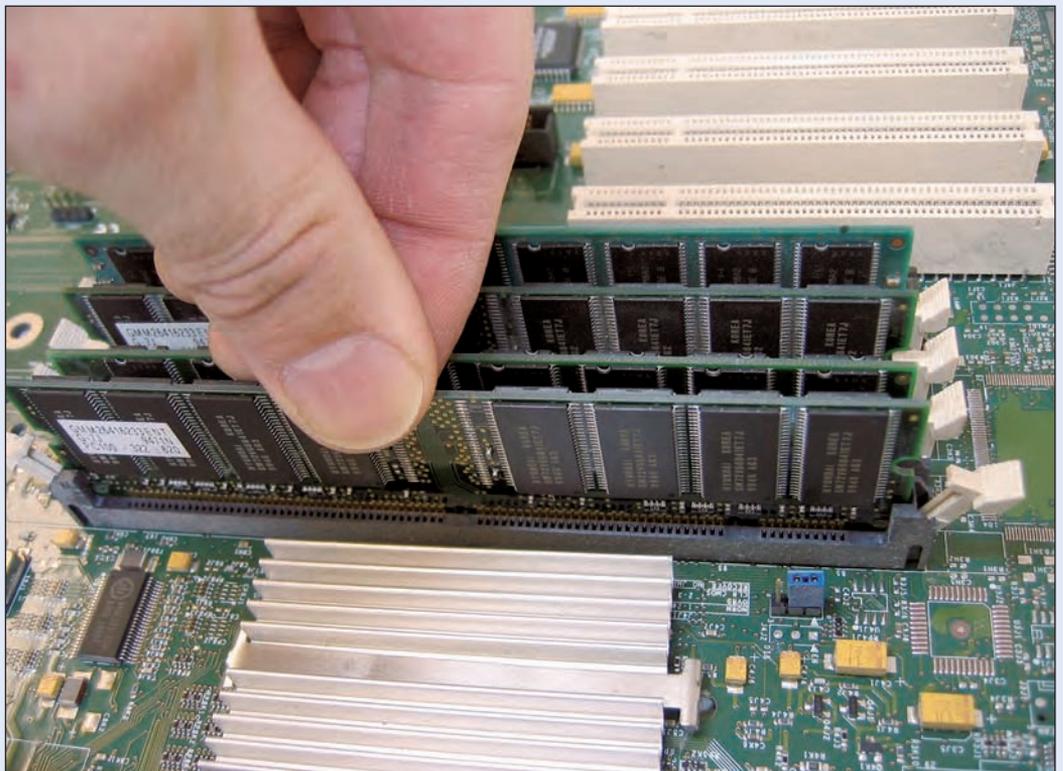
Color Plate 8: An older motherboard and its components.



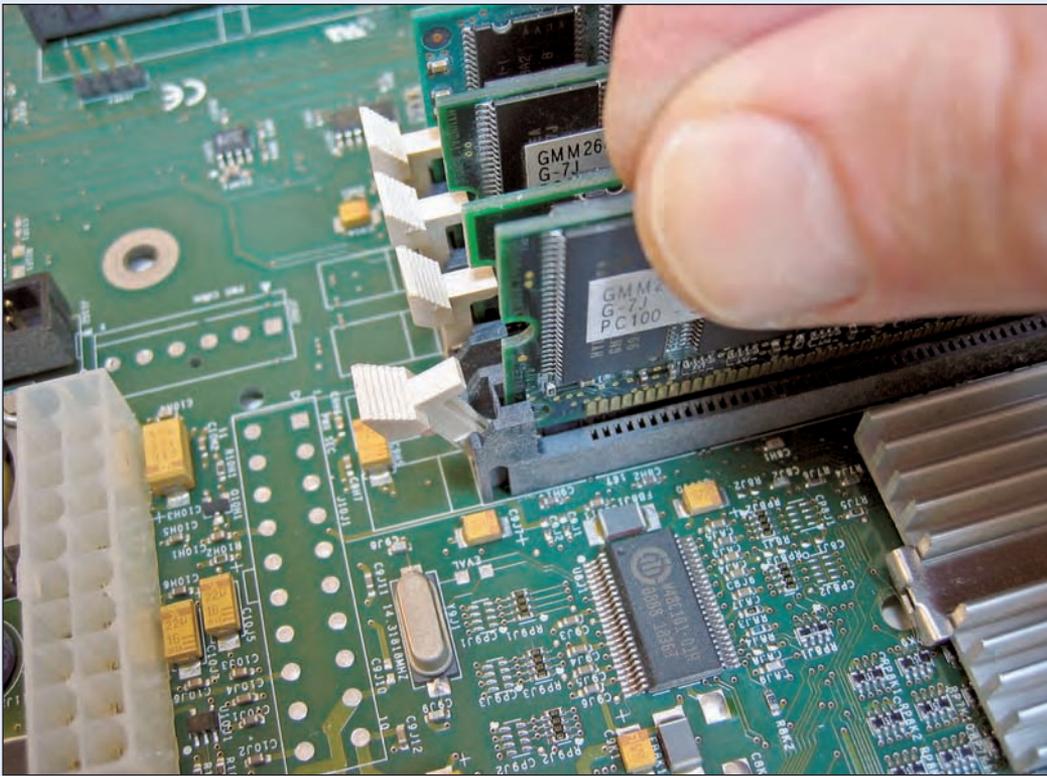
Color Plate 9: A modern motherboard and its components.



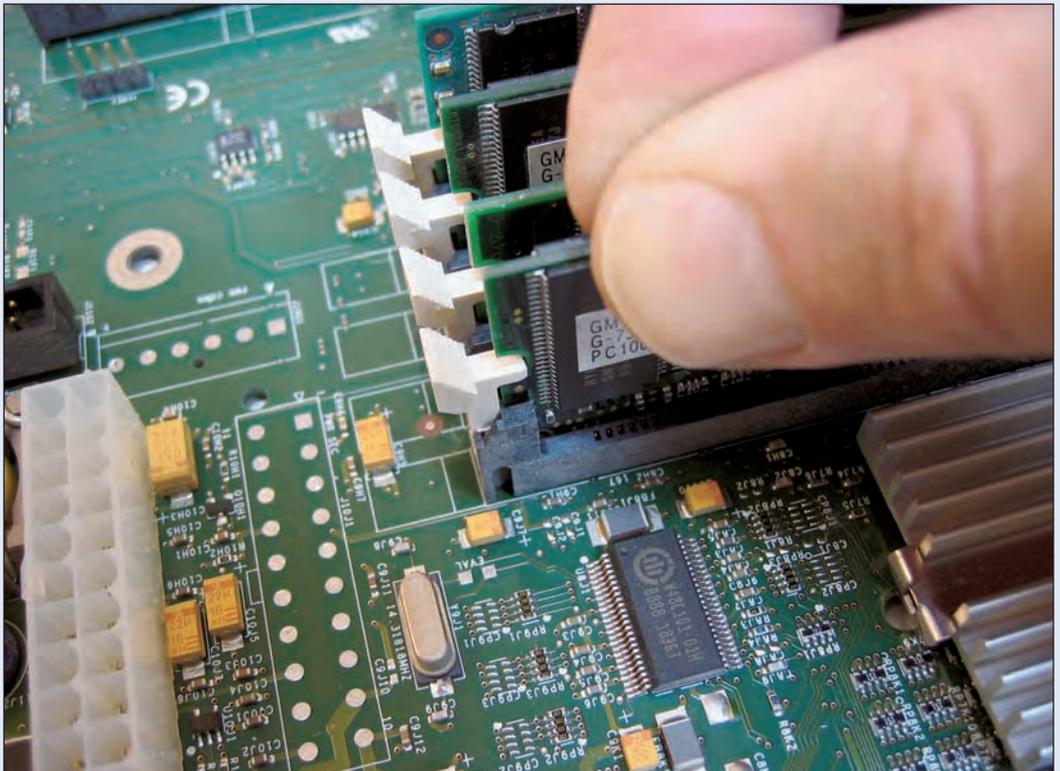
Color Plate 10: Line up the memory module's notches with the notches in the slot. If they don't line up, the memory won't fit. (Don't force it.)



Color Plate 11: Tilt the slot's white clips to the side, and then push the memory module down into the slot.



Color Plate 12:
As you push the memory into the slot, the two clips start to move inward. Push gently, but firmly.

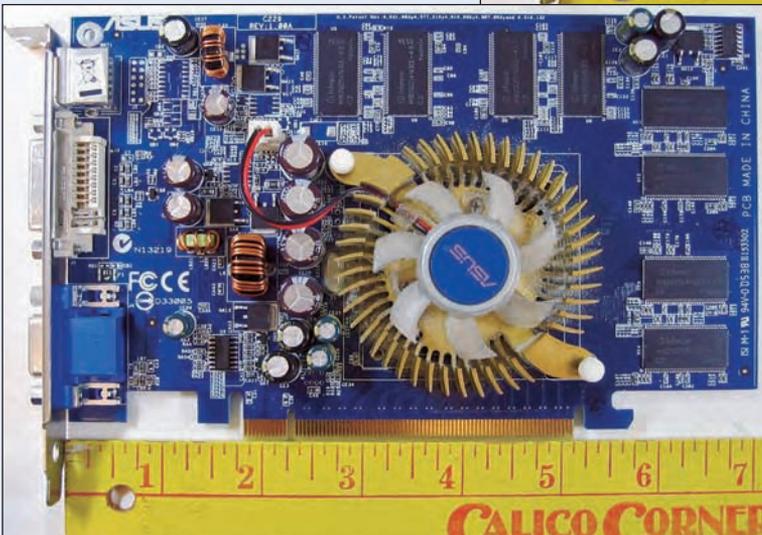
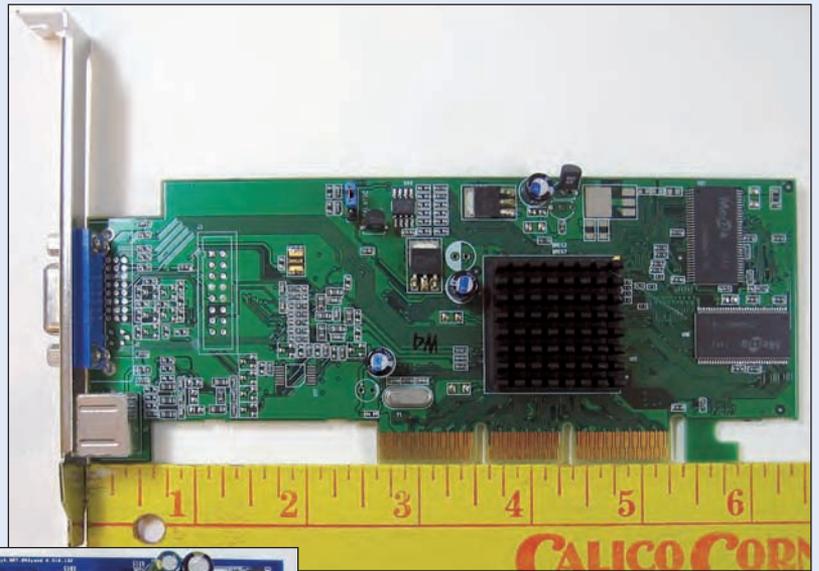


Color Plate 13:
When the memory module snaps into place, the clips automatically move into the memory module's side notches to keep the module from slipping out.



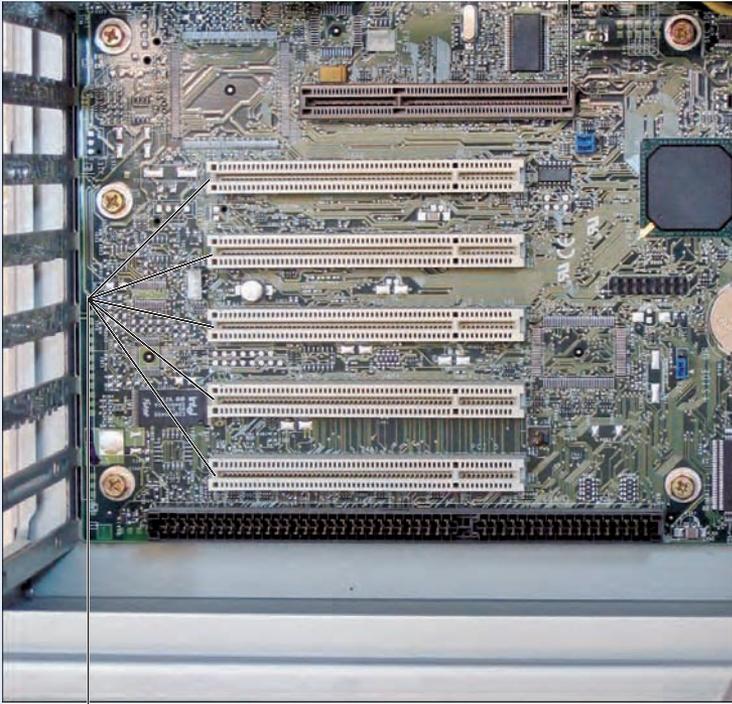
Color Plate 14: A PCI card. A PCI card's tabs are about $1\frac{5}{8}$ inches from the card's end.

Color Plate 15: An AGP card. An AGP card's tabs are about $2\frac{5}{8}$ inches from the card's end. Note the notched hook on the card's end, which locks into the plastic holder on the end of most AGP slots.



Color Plate 16: A PCI Express card. A PCI Express card's tabs are about $1\frac{3}{4}$ from the card's end. Like AGP cards, most PCI Express cards have a little notched hook on the end that locks into the slot's plastic holder.

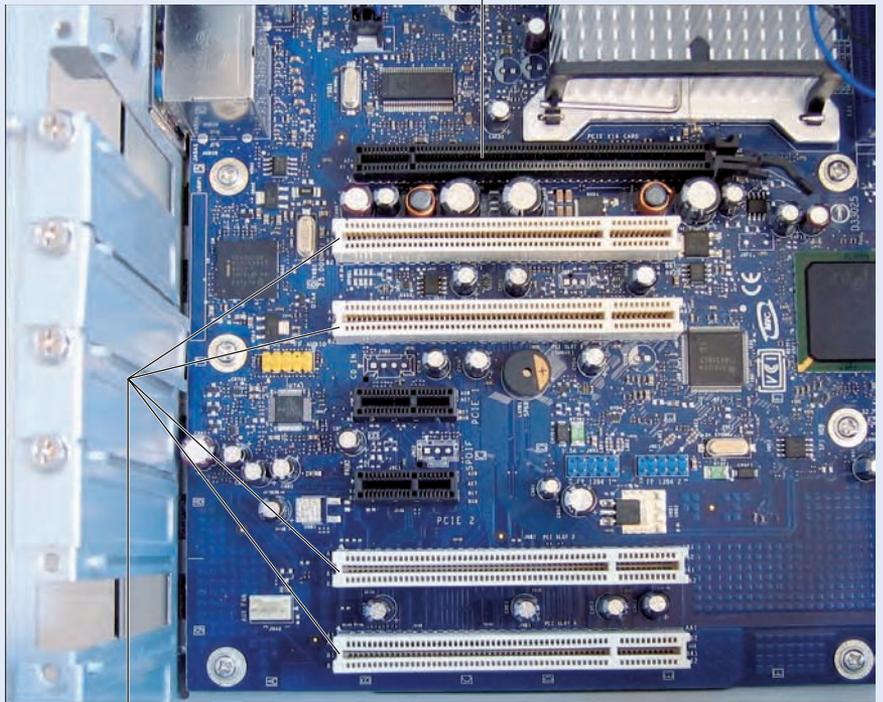
AGP slot



PCI slots

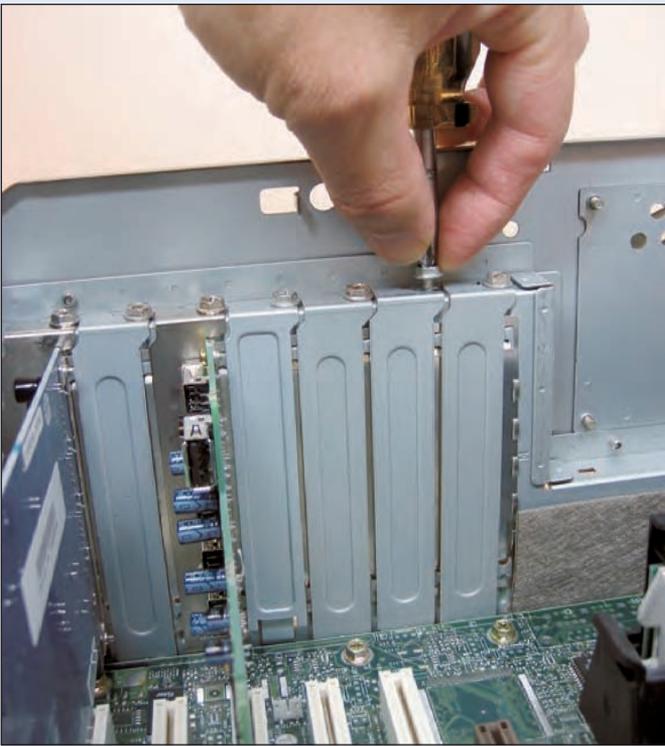
Color Plate 17: One AGP slot and several PCI slots. Most PCs have either one AGP slot (usually brown) or one PCI Express slot (below) devoted to the video card. The white slots are PCI slots, which accept almost all cards except for video cards. (The long black slot on the bottom is an ISA slot, now obsolete.)

PCI Express slot

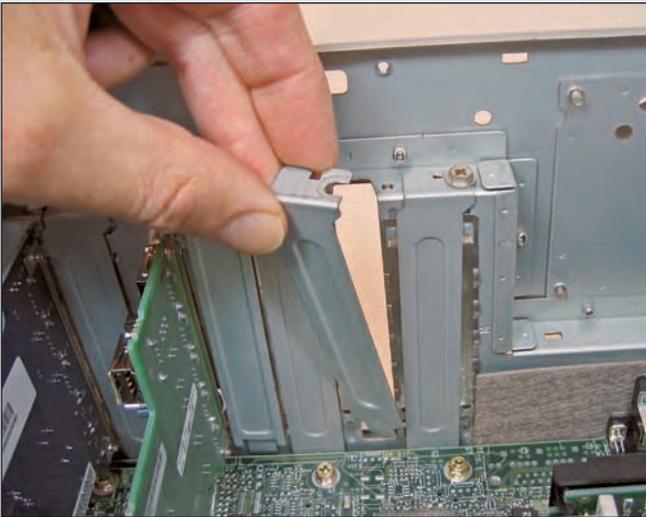


PCI slots

Color Plate 18: A PCI Express slot (usually black, although some brightly colored ones are now the rage) for a video card and several PCI slots for the other cards.



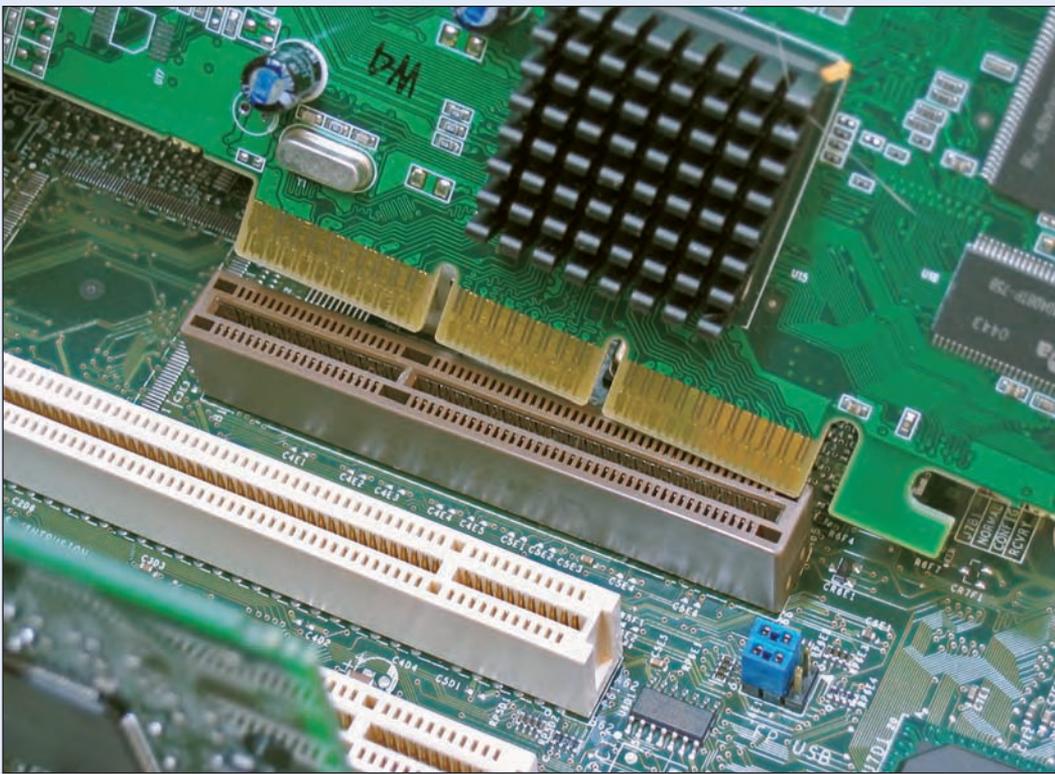
Color Plate 19: Remove the screw to add or replace a card. The screw holds either a slot cover or a card in place.



Color Plate 20: After removing the screw, remove the slot cover.

Color Plate 21: If you're replacing a card, pull the old card up and out of its slot.





Color Plate 22: Position the new card over the slot to make sure its tabs line up with the notches in the slot. Some cards, like this one, have an extra notch.



Color Plate 23: Push the card firmly into its slot. If you're installing a video card with a little fin, make sure the fin is held in place by the plastic holder. (The holder is green in this photo.)



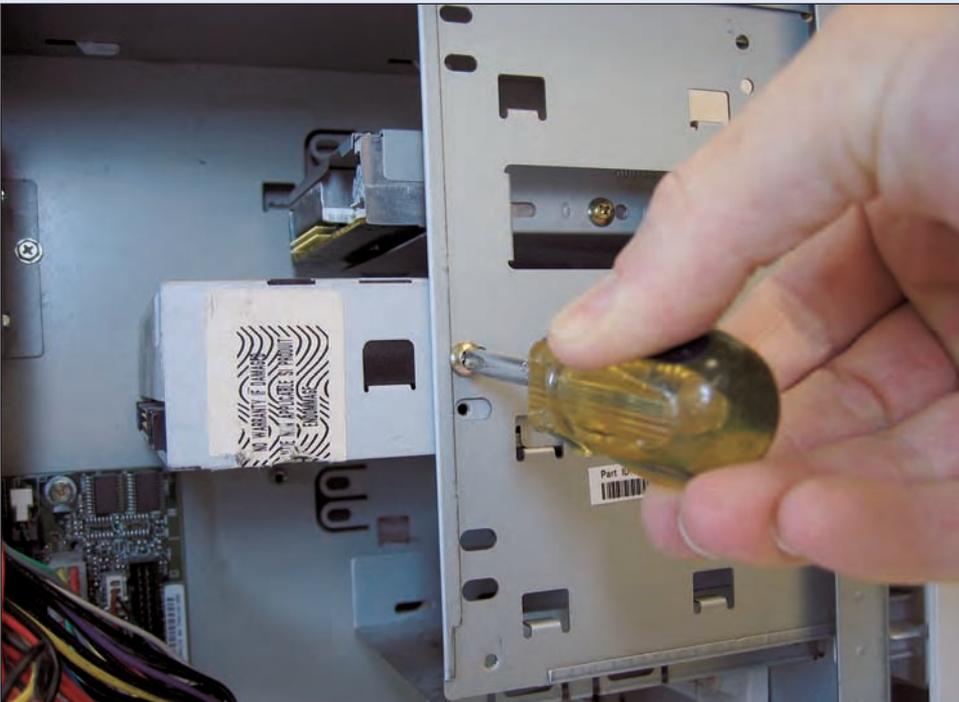
Color Plate 24: Plug two cables into an IDE drive, whether it's a hard drive or CD/DVD burner. The other end of the data cable (left) plugs into the motherboard. The power cable (right) extends from your power supply.



Color Plate 25: Plug two cables into the SATA hard drive. The data cable (right) plugs into the motherboard. The power cable (left) extends from your power supply.



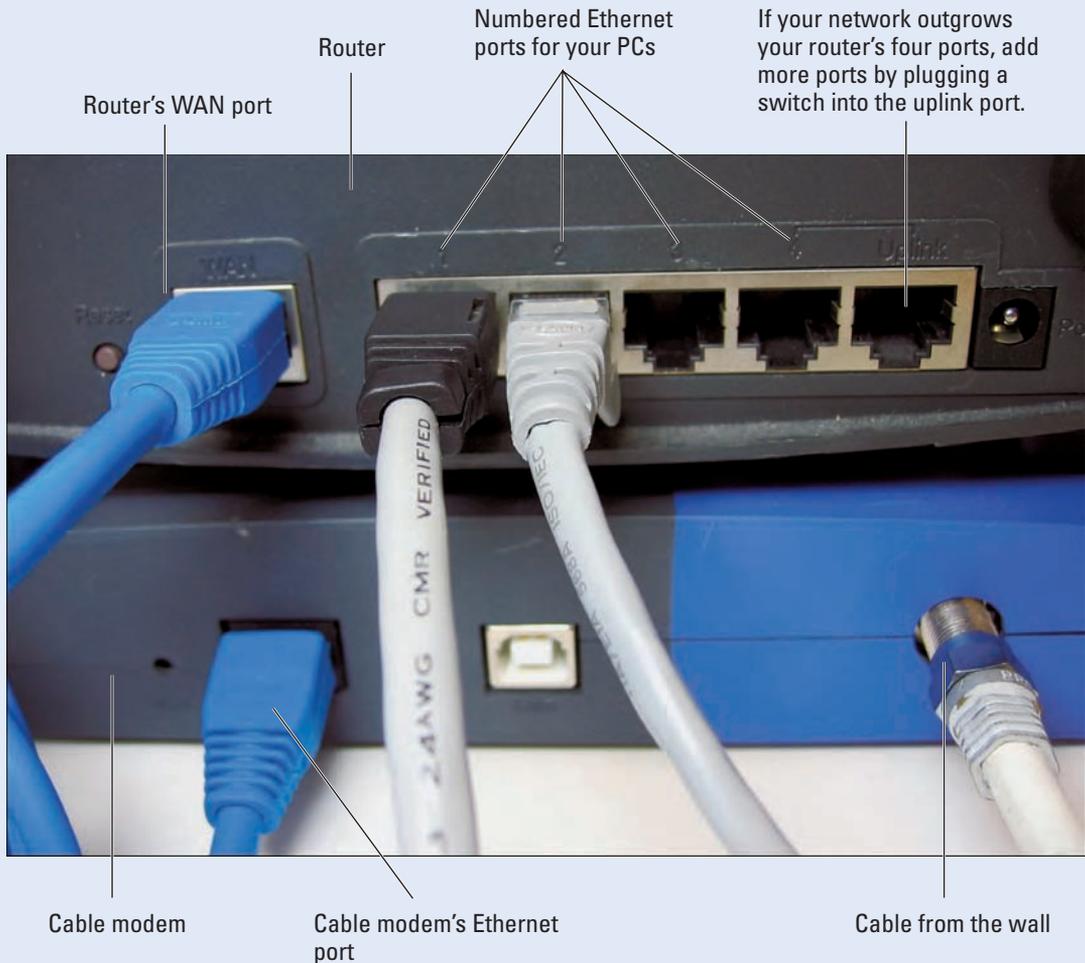
Color Plate 26: Some cases come with rails to screw onto the drives, making them easy to slide in and out of their drive bays.



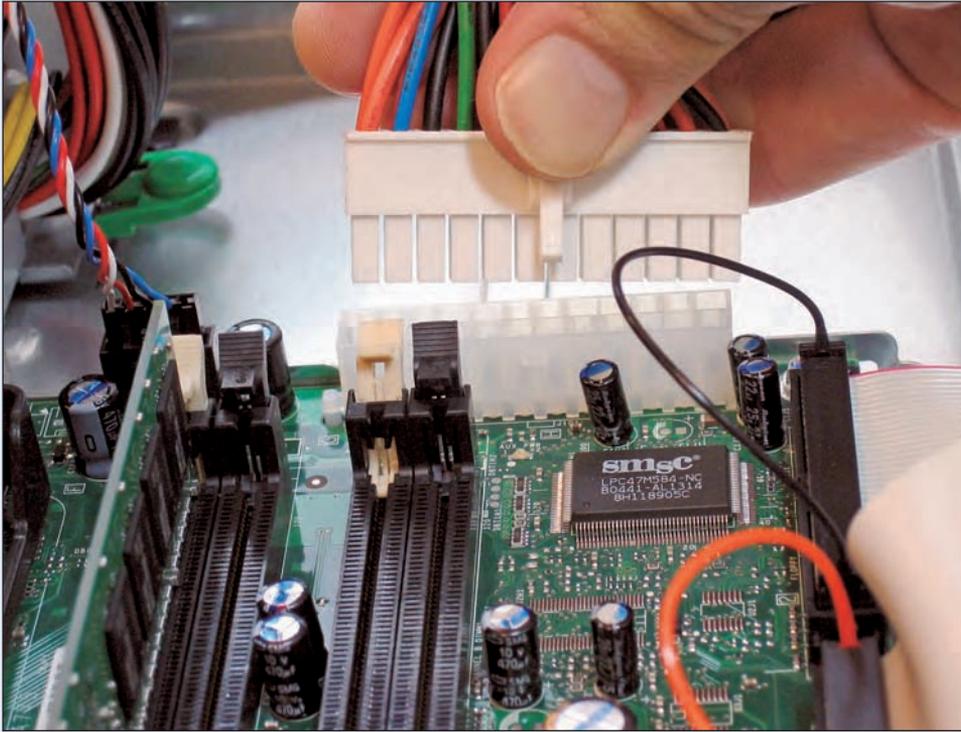
Color Plate 27: When cases don't include drive rails, you screw the drive directly to the case itself. (The screws are a slightly smaller size than the ones that hold cards in their slots, shown in Color Plate 19.)



Color Plate 28: Connect the round cable to your cable modem. Connect an Ethernet cable between your cable modem and the port on your router that's labeled "WAN." Then plug your PC's Ethernet cables into your router's numbered ports.



Color Plate 29: Close-up of the router and cable modem.



Color Plate 30: The largest plug extending from the power supply plugs into the motherboard. Most of the rest plug into your disk drives. (Shown in Color Plates 24 and 25.)



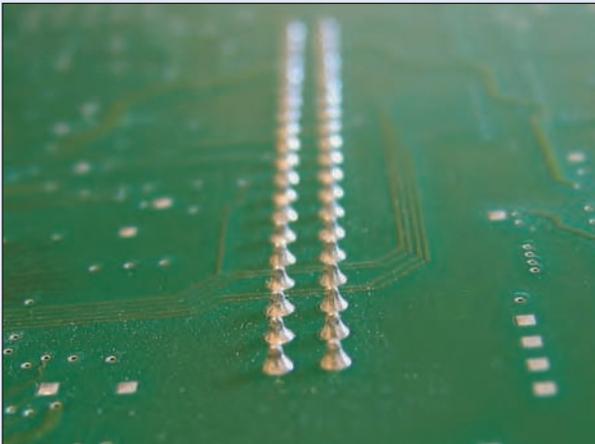
Color Plate 31: If your power supply didn't come with a plug for a SATA drive, buy an IDE to SATA power adapter.



Color Plate 32: Never open your power supply. It can store dangerous amounts of electricity, even when unplugged.



Color Plate 33: Don't let dust collect inside your PC. And when blowing off the dust with compressed air, do it outdoors, so the dust doesn't fill your lungs and get all over the room.



Color Plate 34: The undersides of cards and other circuit boards have sharp spikes. Handle them carefully.



Color Plate 35: The insides of most computer cases have sharp, rusting edges. Be careful not to rub against them.

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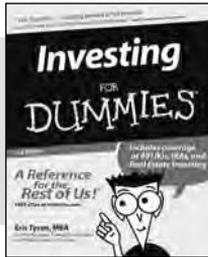
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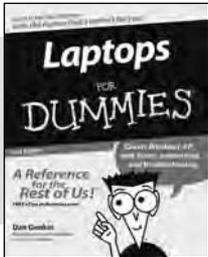
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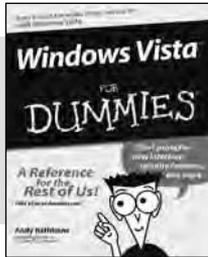
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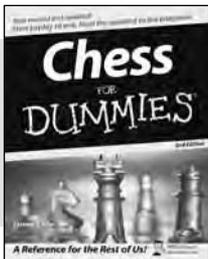
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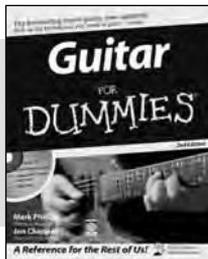
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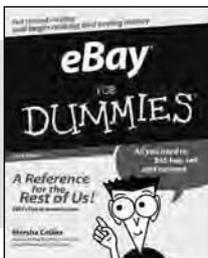
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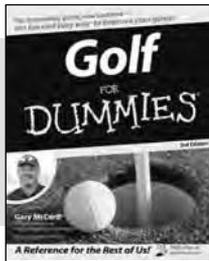
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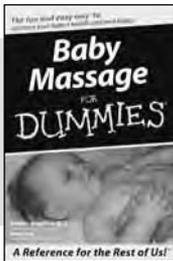
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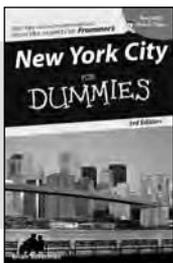
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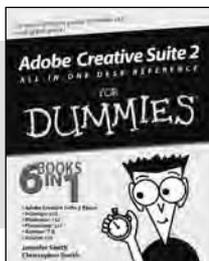


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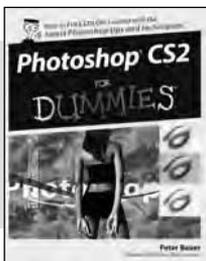
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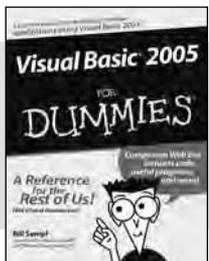


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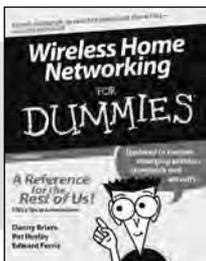
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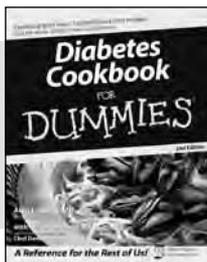


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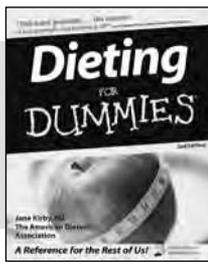
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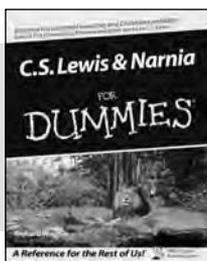
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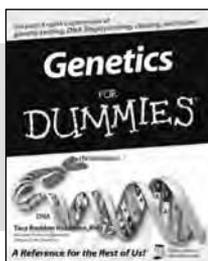
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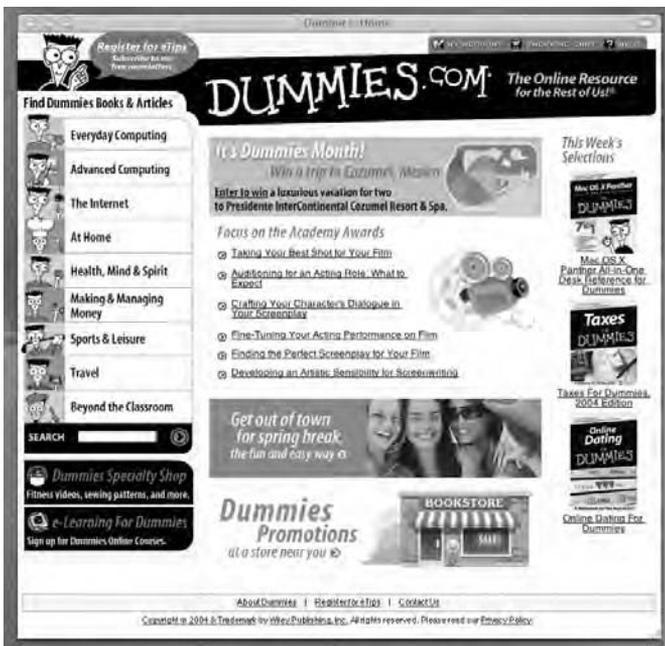


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