Chapter 1: Sweating the Hard (ware) Stuff

In This Chapter

- **Putting your laptop on the doctor's couch**
- **Mastering Device Manager**
- **Working with device drivers**
- **Running a diagnostics program on the hardware**

It was working just fine yesterday. The screen was bright and shiny, the hard disk purred like a happy kitten, and the WiFi was wide and fine. But now your laptop is doing an imitation of a black plastic box. Nothing works, and neither do you. Before you take drastic action (throwing a fit, throwing a screwdriver, or throwing it away) read this chapter and the next to see if a solution will bring your plastic box back to life.

You should ask one question first. Not, "What's the meaning of life?" The ultimate question is this: What's changed since the last time your laptop worked properly?

Before you do anything else, try shutting down your machine. Count to five and then turn it back on. If you're lucky, a simple reboot will get you past an occasional situation where an extremely uncommon combination of events results in a problem. If the problem comes back immediately, or comes back on a regular basis, proceed to look for a cure.

- Was your laptop struck by lightning?
- Did it tumble to the floor from the top of a 12-foot staircase?
- Was there a splashdown into a pool of water?
- Was it abducted by aliens and inspected with strange probes?
- Did your 6-year-old try to insert a peanut butter sandwich into the CD drive?

If Yes is the answer to one of these catastrophic questions, then you have a pretty good idea of where to look for a solution: What got fried, broken, soaked, or gummed up? A professional has to deal with many of these sorts of problems; some may not be fixable — although the data on the hard disk drive may be recoverable.

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The first place to look: Did you recently add or change any components (memory, hard disk drive, CD/DVD drive) or plug or unplug any external devices into a slot, port, or other connector on the machine? Retrace your steps to make sure you did the job properly. Check that all cables are plugged in properly, and look for crimps, cuts, or chews in the wiring.

The basic point is this: Begin your quest by trying to going back to the past. In Chapter 2 of this book I discuss the details of System Restore, which automates time travel when it comes to the software side of the equation.

Giving Your Laptop a Physical

Let's play doctor. A trio of complex tools helps with diagnosis: your eyes, hands, and the highly sophisticated computer between your ears. If your machine has stopped working properly after you changed the hardware, the obvious first step is to see if you made a mistake or if the component has failed.

1. **Prepare a clean, stable, and well-lighted examination table.**
2. **Put a clean piece of cardboard or cloth on a sturdy table and place your laptop on it.**
3. **Unplug the AC adapter from the laptop and set it aside.**
4. **Remove the rechargeable battery from the laptop.**
5. **Ground yourself.**

   Do this by touching a metal pipe or the center screw on the exterior of an electrical outlet.
6. Examine the computer's top, bottom, and four sides.

   Look for any obvious signs of damage. Is there a crack in the case? Is coffee oozing out of the USB port? Can you smell peanut butter in the CD drawer? If yes, go to Step 7.
7. **Get thee to a laptop repair shop.**

   If you have a no-questions-asked accidental damage warranty, you may be in luck. If not, get an estimate for the cost of the repair before giving the go-ahead; it might make more sense to buy a new machine.

Memory modules

If you opened up the hatch on the bottom of the laptop to add or change a memory module, go back to the compartment.

- Make sure that the memory modules you added are the proper type for your machine.

- Did you install them correctly?
- Are the modules latched into place?

If the only change you have made is to add memory and the system refuses to boot after you tried to reinstall the chips:

1. **Remove all the new modules.**
2. **Restore the original block of memory.**
3. **Close the hatch.**
4. **Restart the computer.**

   If the machine now works properly, consider two possibilities:

   - You have the wrong type of memory module.
   - The memory is defective.
5. **Consult with the memory seller for help.**

Power problems

If you disconnected the rechargeable battery, or removed and then reattached the hard disk drive, make sure you properly reinstalled the battery. In most laptop designs, the battery clicks into place and then is secured with a latch.

- Is the battery correctly installed? Installing a battery upside down is almost impossible, but I've seen people try. And it's rare for a modern battery to short out suddenly while installed in a machine; they more commonly fade over time.
- Did your battery take a hit outside the machine? If the battery fell and was damaged while it was out of the machine, or if something metallic managed to short out the connections while it was out of the compartment, a good battery could go bad.
- Is something keeping the connectors covered? I've seen a piece of paper or a sticky label cover the connectors on the battery (or inside the battery compartment) preventing the flow of power.
- Did your machine work properly until the last time you unplugged the AC adapter? Make sure you properly reinstall the power cable in the three places where it detaches:
  - Computer
  - Adapter
  - Wall outlet

- Does the outlet have power? One of the most common causes for laptop "failure" is plugging the AC adapter into an electrical outlet that's off; the outlet may be designed for use with a lamp controlled by a wall switch.

In Europe and many other parts of the world, electrical wall outlets may have a small on/off switch next to the socket. You can test any socket by plugging a lamp or radio into it.

When an LCD won't display

Modern laptop displays are wonders of color, brightness, and resolution. (That means the pictures are pretty and the words are easy to read.) The machines are surprisingly durable, unless you manage to drop your laptop to the floor with its lid open, or if you back up your car and pass over the computer you left in the driveway.

However, an LCD can fail, and in most situations I don't recommend the average user attempt this repair. The parts are tiny and delicate and the working space inside a laptop would give an ant a cramp.

If your LCD suddenly stops working, take these steps:

1. **Reboot the machine.**

   See if this was a momentary failure.

   If you see the ordinary startup text on the screen (the name of your computer maker and some details about the model), go to the next step.

2. **Try to get to the BIOS setup screen.**

   The text should tell you how. On many laptops you press one of the F keys or the Escape key during the bootup.

3. **Check the LCD settings.**

4. **Reset the BIOS to its default configuration.**

   Find the option that instructs the system to do that and hope the problem is fixed. Electrical surges, certain software conflicts, and some viruses can cause unwanted changes to the BIOS screen.

5. **Go to the step that suits your circumstances:**

   - Step 6 if your machine restarts and the screen works properly
   - Step 7 if all you see is a black hole, a bright line, or distorted bands of color or gray

6. **Run a full antivirus scan.**

7. **Consider sending the machine to the repair shop.**

External devices causing internal problems

Did you install a new external device like a USB hard drive or a keyboard? Here you cross over into a hybrid between hardware and software.

Although these new devices aren't *inside* the sealed box, anytime you add a new piece of hardware to a laptop, Windows looks for and enables a piece of software called a *device driver.* It may change the Windows Registry, a database of nearly every component of your machine.

Devising a Solution with Device Manager

All the problems discussed previously in this chapter are ones that prevent you from using your laptop. Other types of problems occur once a machine is up and running:

- A hardware component (like the pointing device, the sound system, or the WiFi transceiver) stops working.
- External devices connected to a USB, FireWire, eSATA, ExpressCard, or PC Card stop doing their thing.

The first step here is to consult the Device Manager, a component of all versions of Windows. Here you find a list of all the hardware parts the computer has found in its self-checkup. And most importantly, the machine can tell you when it detects a conflict between devices or an outright failure. See Figure 1-1.

Device Manager can do the following:

- Determine, at a glance, whether the hardware on your computer is working properly.
- Expand the report for each device to learn details about problems found by the computer. Examine each listing for full details or scan the report for an exclamation point warning or a red X declaration of failure to launch.

If your laptop uses a dual core, quad-core, or (someday an octo-core or a google-core) processor, the Windows Device Manager and other system tools may detect what it thinks are 2, 4, 8, or a google CPUs within your machine. It's still just one microprocessor, but each core is treated as if it stands alone.

- Change hardware configuration settings or change advanced settings and properties for devices.
- Identify and learn the details of device drivers loaded for each system component.

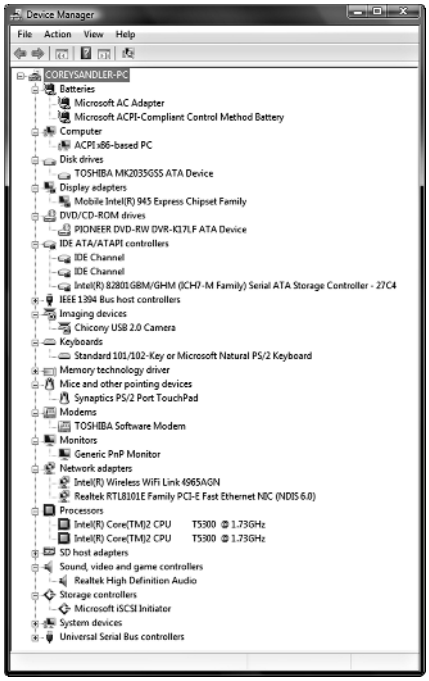

Figure 1-1: The Windows Device Manager shows all the laptop's hardware components.

- ✦ Install updated device drivers or roll back to the previous version of a driver.
- ✦ Enable, disable, and uninstall devices.
- ✦ View devices based on their type, their computer connection, or the resources they use.
- ✦ Show hidden devices to determine information that might help during advanced troubleshooting.

Current versions of Windows, including XP and Vista, automatically allocate resource settings (including memory locations and *interrupts* — special signals sent by a device to the processor requesting its attention).

In some cases, a hardware manufacturer's support department may tell you to make specific assignments; note any changes you make so that they can be undone in case they cause new problems.

Opening Device Manager

Device Manager is a standard Windows component. If you've chosen the Classic look for Windows Vista, follow along to get there:

1. **Click the Start button.**
2. **Go to the Control Panel.**
3. **Click a Device Manager icon.**

If you're using the new Vista style, do these steps:

1. **Click the Start button.**
2. **Go to the Control Panel.**
3. **Click Hardware and Sound ➪ Device Manager.**

In Windows XP, do these steps:

1. **Click the Start button.**
2. **Go to the Control Panel.**
3. **Choose the System icon.**

   The System Properties window appears.
4. **Choose the Hardware tab.**
5. **Click the Device Manager button.**

Viewing the status of a device

A *status report* tells you

- ✦ Whether a device has drivers installed
- ✦ Where it is on the computer's internal bus
- ✦ Whether Windows considers it to be working properly

To display a report, do these short steps:

1. **Double-click a component listed in the Device Manager.**

   The Properties screen appears.
2. **Select the General tab.**

   See Figure 1-2.

If the operating system can't talk with the device, or finds it functioning improperly, a message appears in the Device status window. Follow these steps loosely:

1. **Note the problem code.**
2. **Try the suggested solution.**

The report may include a suggested solution.

3. **Enter the code into a search engine on the Internet.**

   You may also be able to find a solution there.

4. **Call the support department for your laptop or component maker.**

5. **Click the Check for Solutions button if provided.**

   Some devices have the button, which lets you submit a Windows Error Report to Microsoft.

Sorting the display of devices

In the standard or default view presented by Device Manager, components are displayed in groups sorted by type. However, with a click you can re-sort them based on how they connect to the computer (such as the bus or port they use) or on the resources they use.

The value of these alternate views is that they may help diagnose a problem caused by one of the laptop's systems — its USB or ATA bus, for example — rather than failure of a device connected to it.

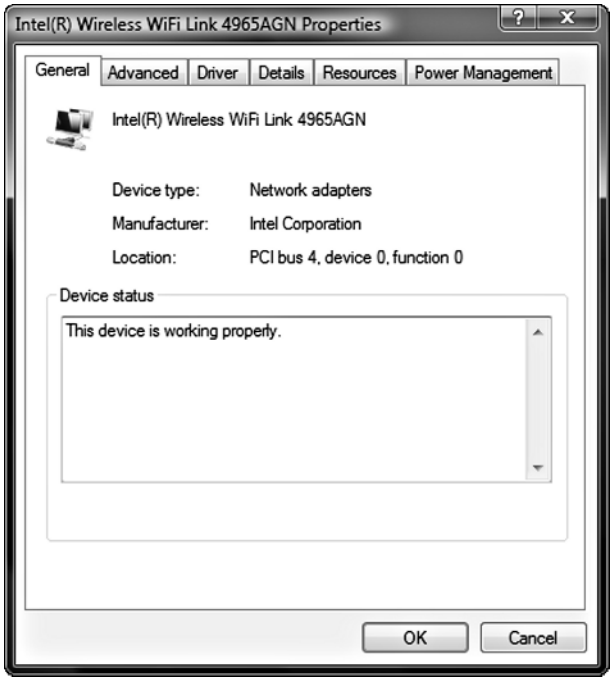

Figure 1-2: The status report shows the manufacturer, model number, location, and whether Windows can talk with it in the expected manner.

To change the sorting of device, do the following:

1. **Open the Device Manager.**
2. **Click View.**
3. **Select an option:**
   - **Devices by Type.** Shows components grouped by type, such as batteries, DVD/CD-ROM drives, or imaging devices.
   - **Devices by Connection.** Shows components grouped by how they connect to the computer. Laptops, because their motherboards are much more tightly integrated than those in many desktops, may use only a few types of connections.
   - **Resources by Type.** Shows all allocated resources in the laptop and the devices using those resources. The report includes direct memory access (DMA) channels, input/output (I/O) ports, interrupt request (IRQ) levels, and memory addresses.
   - **Resources by Connection.** Shows all allocated resources sorted by the type of connection.
   - **View Hidden Devices.** *Hidden devices* include those for which a driver is installed but the component is currently unattached; this might include an external hard drive, for example.

Driver: Follow That Laptop

Drivers are the link between hardware and the operating system. The driver translates commands from Windows into instructions that a specific piece of hardware can follow; going the other way, a piece of hardware can communicate with the driver which passes along instructions to Windows. Drivers allow hardware makers to add uncommon features to its equipment.

When a piece of hardware stops working without apparent physical damage, the problem is often due to a corrupted or missing device driver. Device Manager should inform you if the driver has a problem, but you may need an updated version, especially if

- ✦ You change to a new version of Windows
- ✦ Windows itself receives a major update from Microsoft while on your laptop

Repairing or updating a driver

Windows Update, a component of the operating system's current versions, lets you

- ✦ Check for updates to specific devices
- ✦ Set the utility to automatically check for new versions of drivers

To update drivers using Windows Update, follow along:

1. **Choose Start ➪ Windows Update.**
2. **Click Check for Updates.**

   This option is in the left pane. See Figure 1-3.
3. **If updates are available, click the driver you want to put in place.**
4. **Click Install.**

To set Windows to automatically check for recommended updates, follow these steps:

1. **Open Windows Update.**
2. **Click Change Settings from the options in the left pane.**
3. **Choose Install Updates Automatically.**

   This is the recommended option. You can instruct the system to install new updates every day at a particular time, or select a specific day of the week. You might want to tell the system to do so every day during your lunch hour or at 4:30 on Friday afternoon, when you anticipate not being at your desk.

   Sub-options here include:

   - Downloading updates but waiting for the user to choose whether to install them.
   - Checking for updates but allowing the user to choose whether to download and install them.
   - Never check for updates. This is the officially not-recommended sub-option. This makes your machine more vulnerable to security problems, and you may also miss all kinds of nifty improvements to the system.

   If you chose to update automatically, go to Step 4.

   The recommended setting is Install Updates Automatically.
4. **Choose a time to install any downloaded updates.**

Manually updating drivers

The automatic process works well for most users and most equipment combinations. However, some especially obscure pieces of hardware (or obscure uses for that hardware) may require you to seek out and install a device driver on your own; you might also be told to do so by a technical support department.

Figure 1-3: When Windows Update appears, click View Available Updates to see if updated drivers for the devices in your machine are available. This is the Windows Vista version of the facility.

To manually install a driver, follow along:

1. **Open Device Manager.**
2. **Double-click the device name you want to update.**
3. **Click the Driver tab.**
4. **Click Update Driver.**
5. **Follow the instructions.**

   See Figure 1-4.

Printers are treated differently than other devices internal or external to a laptop. To find out the status of printer drivers or to change printer settings, go to the Control Panel and click the Printers icon.

Restoring a driver to a previous version

Oops. The new driver stopped a device from working. Windows offers a quick way to *roll back* a driver to its previous version:

1. **Open Device Manager.**
2. **Double-click the category that includes the device to be fixed.**
3. **Double-click the name of the device.**

4. **Click the Driver tab.**
5. **Click Roll Back Driver.**

   This solution only works if a previous version of the driver is stored within Windows. If you haven't previously updated the driver, or if (for some reason) the earlier driver has been deleted, the Roll Back Driver button isn't available.

Running a diagnostics program

Laptop: Heal thyself. If Dr. "Bones" McCoy could diagnose and cure most ailments with a wave of his sensor probe, why can't you do the same with laptops? Okay, okay. *Star Trek* was fiction, and we live in the real world or something like that. We haven't quite reached the point where humans or machines can be healed with the wave of a tricorder, but diagnostic tools have made tremendous advances. Physicians can peer into the body with CAT scans and MRIs. And from the very first days of computers, we've been able to examine the function of many technical components by running sophisticated diagnostic programs.

One big caveat here: You can't run a diagnostic program on a laptop that won't boot up and show at least minimal signs of life. The program needs to use the processor and the system's basic pathways to explore the hardware.

Figure 1-4: The Driver tab includes a button to update the driver manually. You're asked for the new driver's location.

Many laptop manufacturers provide diagnostics programs as part of the basic software that comes with the machine. This helps both the user and the company, because it pinpoints problems with the hope that at least some can be fixed without sending the machine back to its maker.

For example, current models of Toshiba laptops come with a utility creatively named Toshiba PC Diagnostic Tool. The first part consists of a basic information window that displays hardware details, including the model, its serial number, the version of the operating system detected, and major hardware components. See Figure 1-5.

The second part of the utility delivers the tricorder. The Diagnostic Tool tests all of the components installed within the machine; its tests stop at the ports. You can choose to run all tests or concentrate on specific suspects. See Figure 1-6.

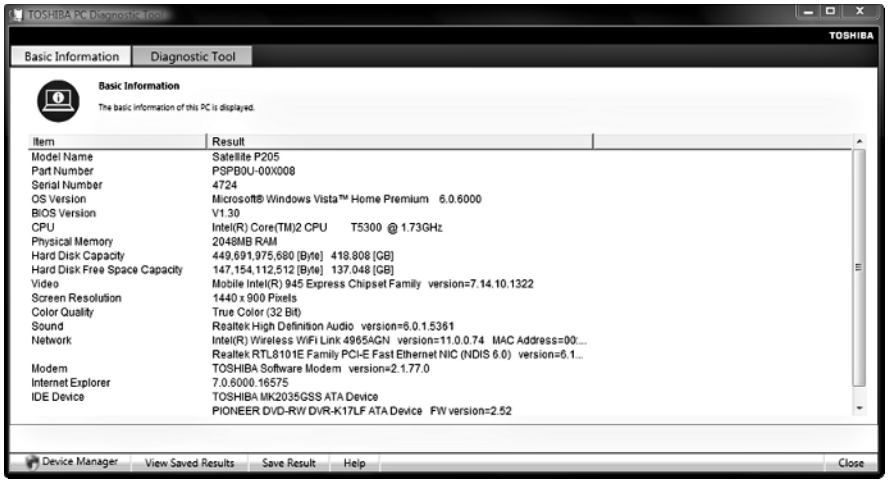

Figure 1-5: The Toshiba diagnostics information screen offers a quick inventory of the essential parts of your machine.

If your laptop doesn't come with a diagnostic program, or if you want to add software that includes more detailed or more rigorous testing, you can purchase utilities from other sources. Some programs let you *loop* a particular test over and over again, which is one way to find an intermittent failure. One product that does a good job is CheckIt diagnostics from Smith Micro Software, Inc. See Figure 1-7.

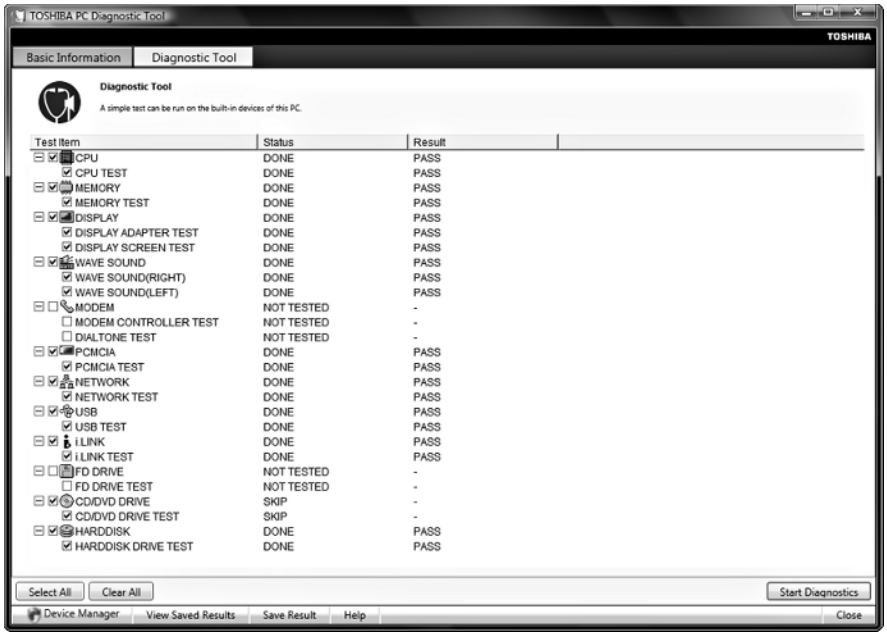

Figure 1-6: Testing this Toshiba laptop model, I excluded the dial-up modem and told the software not to bother testing the floppy disk because it's not there.

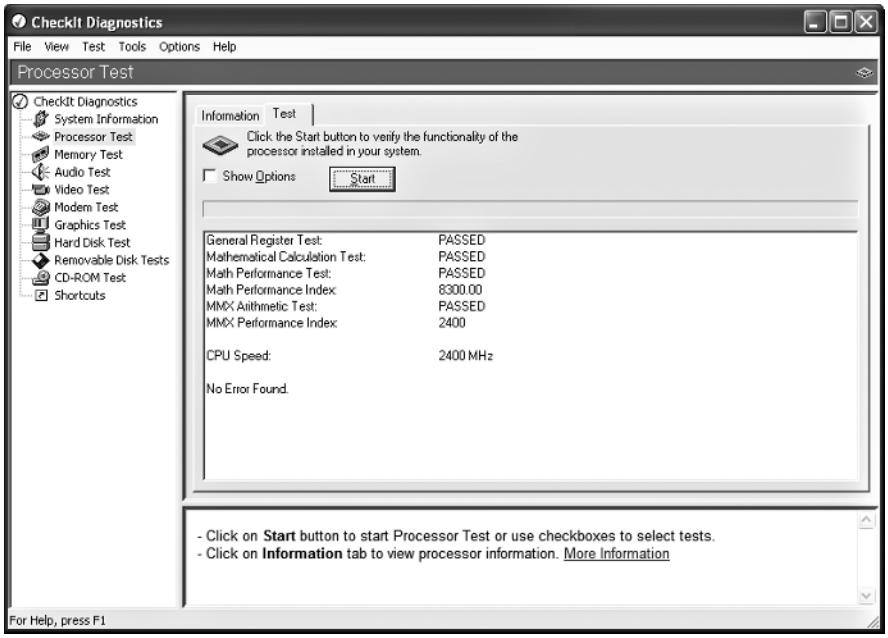

Figure 1-7: Advanced diagnostics tests include detailed exercises and reports on all of the components of your computer.