

Laptop PCs: basic troubleshooting and repair (quick lesson)

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In this quick lesson, you'll dig into key components and issues related to maintaining and troubleshooting a laptop PC's hardware. You'll learn how to make the most of your battery's life by adjusting power management and other system settings. In addition, you'll find out how to install memory into a laptop PC, replace a hard drive or use external storage and make repairs to displays, keyboards and pointing devices. As this is an on-demand class, all lessons are available when the class enrolls.

Configure power management and resolve battery issues Page 1 of 6

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Individuals who seek to get work done away from an external power source cite usable battery life as one of the key factors involved in how much work they can get done while on the go. Yet many of those same individuals don't know how much latitude they have in controlling power consumption while operating on battery power, nor do they always take the steps necessary to maximize battery lifetime. Over the long term, proper storage of your battery when not in active use can also extend its lifetime significantly.

Checking the battery

You can check the level of charge on your laptop PC battery by clicking the power icon in your system tray, as shown in Figure 1. The battery charge level is indicated by the height of the green area inside the battery container in the icon.

Many of the figures and examples in this quick lesson focus on the Microsoft Windows Vista operating system.



Figure 1: The power icon looks like a battery with a wall plug to its left.

When you click this icon, an information window opens, as shown in Figure 2. This window indicates how much charge remains in the battery and enables you to select a power plan to manage how your laptop PC uses battery power.

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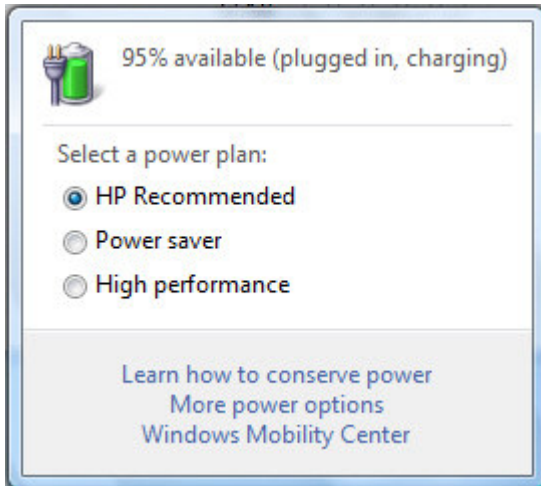


Figure 2: The power icon provides information about battery charge and power plan in use.

Another option is to use the [HP Battery Check](#) utility. You need to download this tool, and then run it with your laptop PC plugged into an AC power source.

Understanding power plans

Windows Vista includes three default power plans:

Balanced: Offers as much power as the laptop PC can deliver during periods of activity but significantly reduces power consumption during idle periods.

Power saver: Saves power by reducing system performance whenever possible. Use this setting if you want to squeeze as much life out of your battery as possible.

High performance: Maximizes system performance and responsiveness to user input. Battery life can be reduced by as much as 50 percent from Balanced values when the PC uses this power scheme while running on battery power.

HP notebooks generally ship with the following power plans defined, among others:

HP Recommended: Offers slightly different settings from those for Power saver when running off the battery but with faster time-outs when running plugged in to an external power source. See Table 1 for the details.

Power saver: Same as the Windows Vista default power plan of the same name.

High performance: Same as the Windows default power plan of the same name.

The HP Recommended plan replaces the Windows default Balanced power plan. It makes sense to select HP Recommended for most situations in which the laptop PC switches between plugged-in and battery-powered usage. The following table lists default power plan settings.

		Power Plan		
		HP Recommended	Power saver	High performance
Turn off display	Battery (minutes)	5	3	10
	Plugged-in (minutes)	15	20	15
Sleep	Battery (minutes)	10	15	60
	Plugged-in (minutes)	25	60	never
Brightness	Battery (percent)	40	40	100
	Plugged-in (percent)	100	100	100

Table 1: Key settings for default HP power plans.

There are many other settings associated with individual power plans users may want to investigate. These include time-outs for hard disks, wireless network adapters, USB (universal serial bus) devices, processor power management, and more. To dig into this level of detail, select **Start > Control Panel**. In Classic view, double-click **Power Options**. For any of the power plans shown, click **Change plan settings**, and then click **Change advanced power settings**. The Power Options dialog box opens, displaying individual power plans in complete detail, as shown in Figure 3.

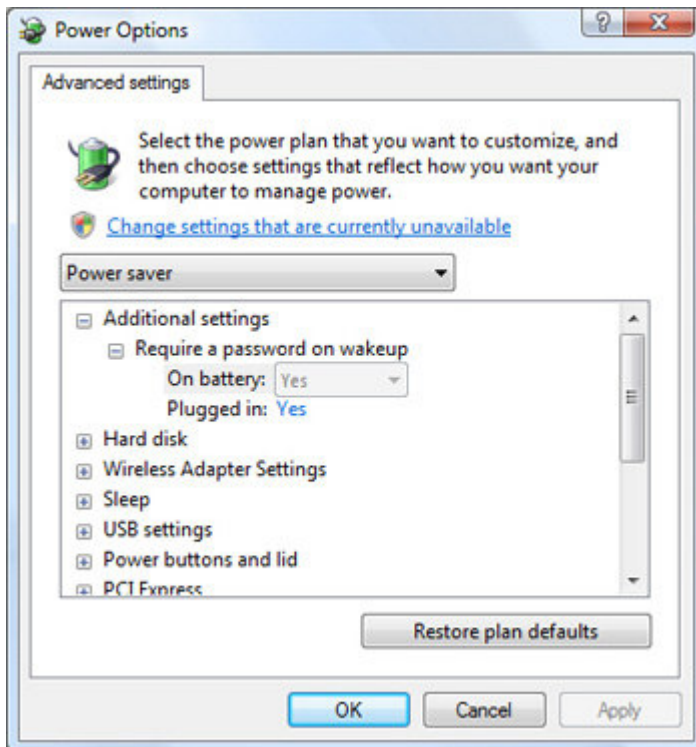


Figure 3: The Power Options dialog box.

Optimizing battery life

Typical lithium ion or NiMH (nickel metal hydride) batteries last longest (that is, accept the greatest number of full charges before displaying diminished charge retention) if not stored in your laptop when it's plugged into a wall socket. You can achieve optimal battery life by storing the battery at temperatures between 35 and 45 degrees Fahrenheit (typical refrigerator temperatures) at a 40-percent charge level. Before you take the laptop PC on the road, charge the battery up to 100 percent. When you return to your home or office, discharge it until the level reads 40 percent, and then place it in a waterproof bag and put it back into the refrigerator.

HP provides a well documented website focused on mobile PC battery care and usage. Visit [Wireless and mobility -- maximize your battery life](#) and browse the links for more information.

Next, learn how to address storage issues on a laptop PC.

Address storage issues

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There are two basic methods to increase the amount of disk space on a laptop PC. One method involves swapping a smaller, older drive for a bigger, newer one. The other involves adding one or more additional drives to the pool of available storage.

If your laptop PC has two internal drive bays with only one hard disk installed, you can add an additional disk without replacing the original one. In addition, if your laptop PC has a free USB port, you can connect an external USB drive and extend your storage by 500 GB (gigabytes) or more.

Adding or replacing an internal laptop PC drive

Before you undertake the project of replacing an internal drive or adding a new one, check with your laptop manufacturer to make sure you won't void your warranty. To replace a hard drive in a laptop PC, follow these general steps:

1. Identify and acquire a compatible drive, such as a 2.5-inch IDE (Integrated Drive Electronics) or SATA (Serial Advanced Technology Attachment) model.
2. Look for information, illustrations, or instructions on how to open the case, what tools will be needed, how to dismount the old drive, and how to insert the new one. Also be sure to back up the data on the drive you're replacing so you can restore its contents to the new drive, if necessary.
3. Power off the laptop PC and remove the battery.
4. Follow the instructions to open the drive hatch or hatches. Ordinarily, you only need a small Phillips-head screwdriver to perform this step.

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Websites such as Repair4Laptop.org list numerous HP laptop PC models and offer photos or videos that show exactly what to expect and what to do when adding or swapping an internal laptop PC drive.

5. Remove the old drive and add the new drive, or install an additional drive into an empty drive bay.

Once you've reassembled your system, the PC should recognize the new drive the next time you reboot. If you've replaced your system drive, you must reinstall your operating system or use a bootable USB or CD image to boot the PC.

If you replace a lower-capacity, older internal drive with a higher-capacity, newer drive, consider purchasing a portable USB enclosure for that drive. You can convert it to an external storage device for as little as \$15.

Using external USB drives

There's a plethora of offerings available for laptop PC use, but these fall into two form factors: 2.5-inch and 3.5-inch drives.

Small, lightweight, highly portable enclosures are usually built around the same 2.5-inch hard disks that go into modern laptop PCs. These cost a bit more and provide less storage space but are designed to go with you on the road without adding too much bulk or weight to your laptop bag. You can find drives in capacities from 40 GB to as high as 160 to 200 GB.

Many of these portable external drives feature a dual USB plug arrangement and thus require two available, powered USB ports. That's because USB ports are each limited to 500 mA (milliamps) and 4.75 to 5 V (volts) of power, and most hard disks require more than that to operate. The first USB plug handles data and power, whereas the second plug is for power only. Both plugs must usually be connected and working before the drive will work. These also draw on your laptop PC battery, so factor this draw into your battery life calculations.

Larger 3.5" external USB hard disks offer larger capacities -- 80 GB to 1 TB (terabyte) -- at lower prices but must draw power through an external power supply (called a **brick**) that plugs into a wall socket. This means you can't use these drives when you're on the go; however, it makes them very handy for use at home or in the office for backup and extra storage space.

Using flash drives

For extremely portable storage, nothing beats a USB flash drive. Capacities vary from 1 to 16 GB. This is enough storage to carry all of your email files and entire libraries of project files with you wherever you go. It's hard to beat these devices: you can carry sizable amounts of data with you and plug into just about any desktop or laptop PC to retrieve whatever you need.

Make your desktop portable

There are a number of specialty software environments designed to enable users to pick up and carry their electronic desktops with them wherever they go. This technique works with equal facility on portable USB hard disks or flash drives, depending on how large a filespace you wish to make portable.

Products such as Migo, Ceedo, and others let you grab your email application and message archives, desktop settings, browser favorites, and all the other personal elements of your workspace and store them on a flash drive or a USB hard disk. When you plug that device into a laptop or desktop PC, it shows you your familiar virtual surroundings and desktop, and lets you work just as if you were on your usual PC at home or in the office. Thus, laptop users who bounce between a desktop and a laptop PC may find this technology extremely useful.

Next, learn how to upgrade your laptop PC's memory.

Upgrade memory

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Study after study shows that no upgrade improves Windows performance or boosts user satisfaction with their PC more than adding RAM (random access memory) to a machine. Although many laptop PCs come equipped with 512 MB or 1 GB of RAM, those same computers can often accommodate at least twice as much RAM as is currently installed. In many cases, at least one laptop PC memory module, called a SODIMM (small outline dual inline memory module), is readily accessible on the underside of a laptop PC using only a small Phillips-head screwdriver.

To understand if a memory upgrade is an option for your laptop PC, you must determine the following:

The amount of memory currently installed on your laptop PC and its maximum capacity: If the amount installed is less than the maximum, you can probably install an upgrade and reap some benefits.

The kind of memory your laptop PC requires: Most memory vendors offer memory finder utilities on their websites that ask you to identify your computer, and then describe the memory options available to you.

How to access the memory slots: You can usually find this information on the laptop PC vendor's website or in your owner's manual. Many vendors offer an electronic version of the owner's manual online.

Websites such as Repair4Laptop.org offer photos or videos that show you exactly what you must do and how you should do it.

Installing new memory modules

Most HP laptop PCs support two SODIMM slots, both easily accessible on the underside of the case. It's surprisingly easy to swap out memory; however, you may want to consider taking your

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laptop PC to a local repair shop if keyboard or top deck removal is difficult.

For accessible slots, you need only turn off your laptop PC, disconnect the power supply, remove the battery, and then open the memory access cover. SODIMMs are secured by snap-on metal clips at both sides. Pop these out gently, and then gently wiggle the module to remove it. You must generally remove both old modules before inserting new ones, which require you to seat the edge connectors at the bottom, and then slide the retaining clips onto both sides. When your laptop PC boots up, the memory counter should reflect the new amount of memory you've just installed.

The next section helps you manage motherboard and CPU (central processing unit) settings.

Manage motherboard and CPU settings

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The BIOS (Basic Input/Output System) is an essential but nearly invisible program that operates in the background on every PC. The BIOS establishes settings for PC hardware, boot order among multiple drives, interface language, and more. Access to the BIOS requires pressing a key just as the PC begins to boot up, right after you turn it on.

For most HP laptop PCs, these special keys provide the following types of functions:

Esc: Displays the POST (power on self test) message that occurs at initial device bootup, along with other status information as devices are checked and come online. This also provides easy access to the Windows Vista boot menu, where you can enable various safe modes, repair and logging tools, and more.

F1: Displays system information, including laptop PC make and model, system board ID, processor type and speed, memory size, boot ROM data, and BIOS version.

F2: Runs a startup check that inspects the RAM and hard disks.

F9: Starts the Boot Device menu, which lets you examine and reorder available boot devices on your laptop PC.

F10: Invokes the Computer Setup routines from the laptop PC's EPROM where you can examine settings or change your system configuration. Available options include interface language, boot options, and device configurations (which permit use of virtualization technology and button sounds to be enabled or disabled).

F11: Invokes the HP Recovery Manager, a utility that guides users through system repair when system problems require immediate action.

BIOS, driver, and other system software updates for HP laptop PCs may be accessed through the HP Update program. To use this tool, select **Start > All Programs > HP**, and then select **HP Update** to start the HP Update Wizard, as shown in Figure 4.

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Figure 4: The HP Update Wizard helps users identify and download available BIOS and driver updates.

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Click **Next**. The wizard interacts with an HP website to identify available driver or BIOS updates and enables you to download and install them. Updating drivers is usually advantageous; however, most experts advise against updating your BIOS unless it fixes problems you have experienced or adds new functionality that you require.

Checking CPU and memory timing

To check how fast your CPU and memory are actually running, you can run CPU-Z, a freeware utility available for download on the CPUID.com website. After downloading and installing CPU-Z, run the **cpuz.exe** file. You should see something similar to Figure 5. For modern mobile processors, such as the Intel Mobile Core 2 Duo X7800 shown in Figure 5, you won't necessarily see the maximum CPU speed in the Core Speed entry on the CPU tab because the laptop PC regulates its core speed very closely.

The results shown here are for a laptop PC with the power plan set to High performance.

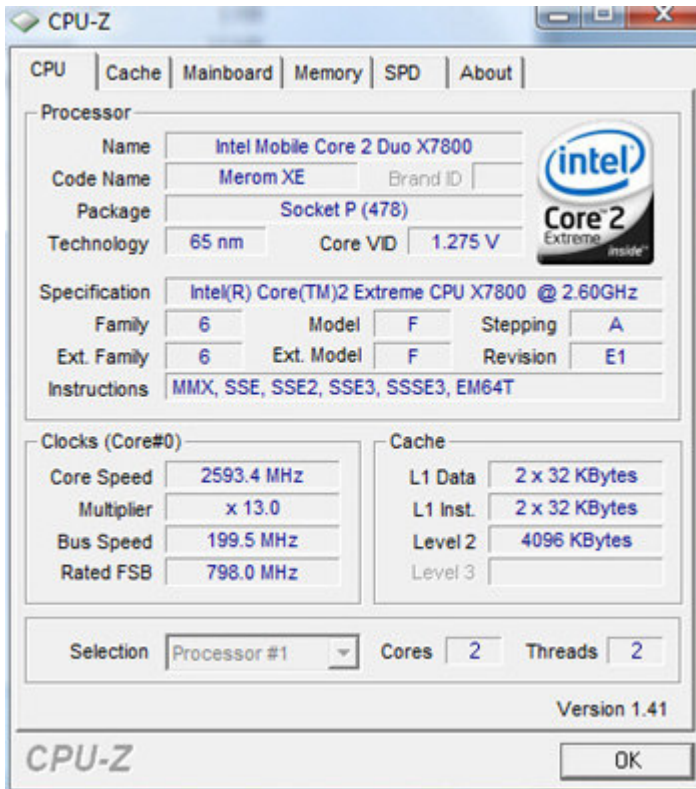


Figure 5: CPU-Z displays processor data and speed on its CPU tab. You can compare the actual configuration for your laptop PC's memory to the settings stored in the RAM SPD (Serial Presence Detect) table, which is programmed at the factory when the memory is fabricated. Figure 6 shows the contents of CPU-Z's Memory tab for an HP Pavilion HDX 9000 laptop PC.

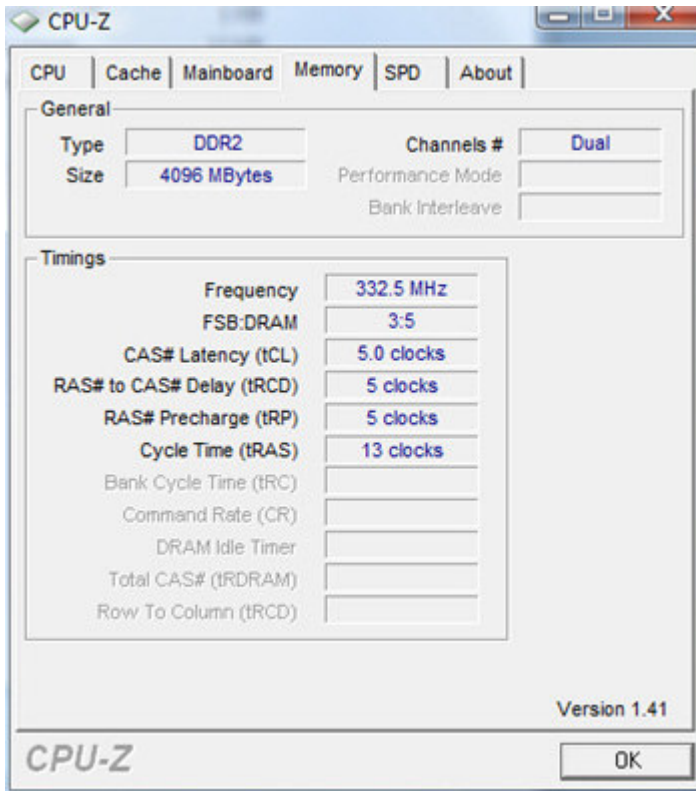


Figure 6: CPU-Z Memory tab.

Figure 7 shows the SPD tab for SODIMM 1 on the same computer.

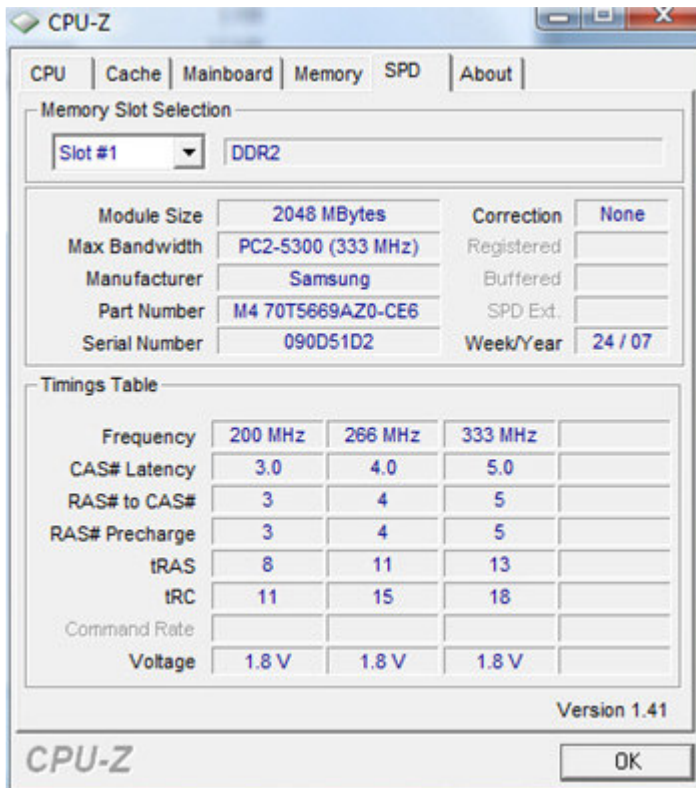


Figure 7: CPU-Z SPD tab.

This lets you compare actual settings to the manufacturer's recommended settings. By looking at the Frequency value in the Timings field in Figure 6, you can tell you should read the Timings values in the 333 MHz column in Figure 7, because the 332.5 MHz value in Figure 6 most closely matches that column in Figure 7.

Now that you know how to work with motherboard and CPU settings, read on to find out how to resolve display issues.

Resolving display issues

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Most laptop PCs include external video outputs, primarily VGA (Video Graphics Array), with an increasing number of devices offering DVI (Digital Visual Interface), or HDMI (High Definition Multimedia Interface) support.

When your laptop PC's built-in display isn't working properly, you can quickly and easily determine if the problem relates to the built-in graphics circuitry or to the display itself by plugging in an external monitor. If the external monitor lights up and things work as they should, the built-in display is at fault. If the external monitor also fails to work, it's likely that your laptop PC graphics circuitry has failed. Because this can involve replacing a standalone graphics module or the system board inside the laptop, depending on the make and model of your computer, you need to perform a cost-benefit analysis on making repairs or replacing your laptop PC.

Fixing a skewed or clipped image

When the display works but the image is skewed or clipped, double-check the display settings. Right-click an unoccupied area of the desktop, select **Personalize**, and then click **Display Settings**. The Display Settings dialog box opens, as shown in Figure 8.

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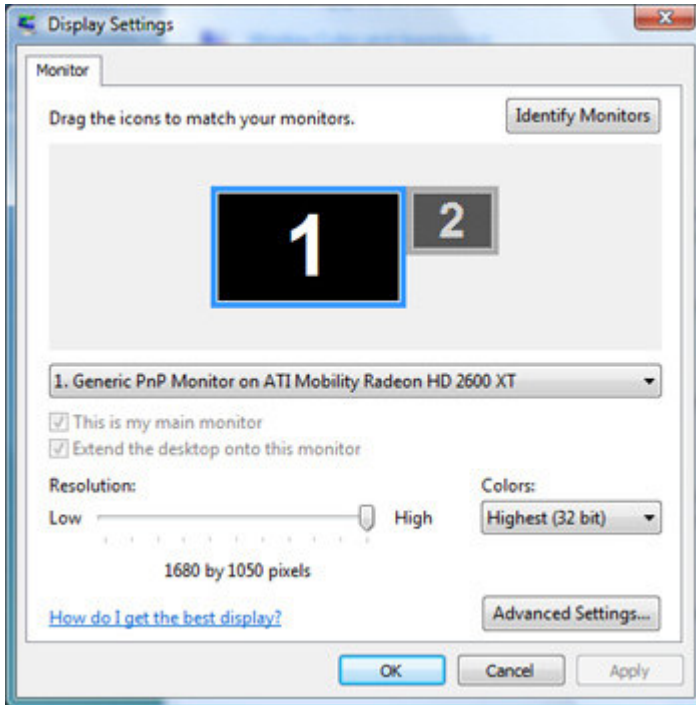


Figure 8: Display Settings dialog box.

Check your Resolution setting to ensure it's not set too low for your laptop PC. You can adjust this setting by moving the slider bar. Also click the **Advanced Settings** button, and then click the **Monitor** tab. Make sure the screen refresh rate matches recommended vendor settings.

If all of these settings are correct, try replacing your monitor driver. Click **Start**, type **device manager** in the Start Search text box, and then press **Enter**. In Device Manager, double-click whichever entry under Monitors corresponds to your built-in display. Many laptop PCs use the Generic PnP Monitor entry. In the monitor Properties dialog box, as shown in Figure 9, click the **Driver** tab, and then click **Update Driver**. Windows Vista attempts to find the latest driver online.

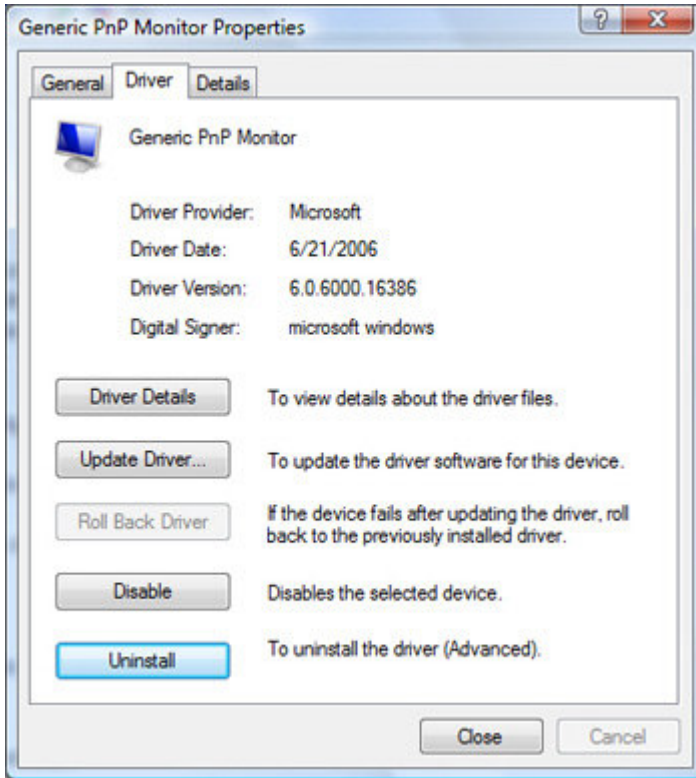


Figure 9: Monitor Properties dialog box.

If that doesn't work, click **Driver Details** and write down the full file specification for the driver file in use. You should be able to visit the manufacturer's website and download and install a replacement by searching for the file name.

Working with an external monitor

For most laptop PCs, working with an external monitor is as simple as plugging it into the VGA, DVI, or an HDMI port, depending on the kinds of connections and cables you have available. Most modern equipment is PnP (Plug and Play) compatible, and Windows Vista does an excellent job of identifying such devices and loading the necessary drivers.

At a minimum, you might have to use a generic driver long enough to identify and download a device-specific driver from the external monitor vendor's website.

Adding an external monitor to a laptop PC provides an additional benefit as well. Once plugged in and powered up, you should see a window that reads New Display Detected on your built-in screen, as shown in Figure 10.

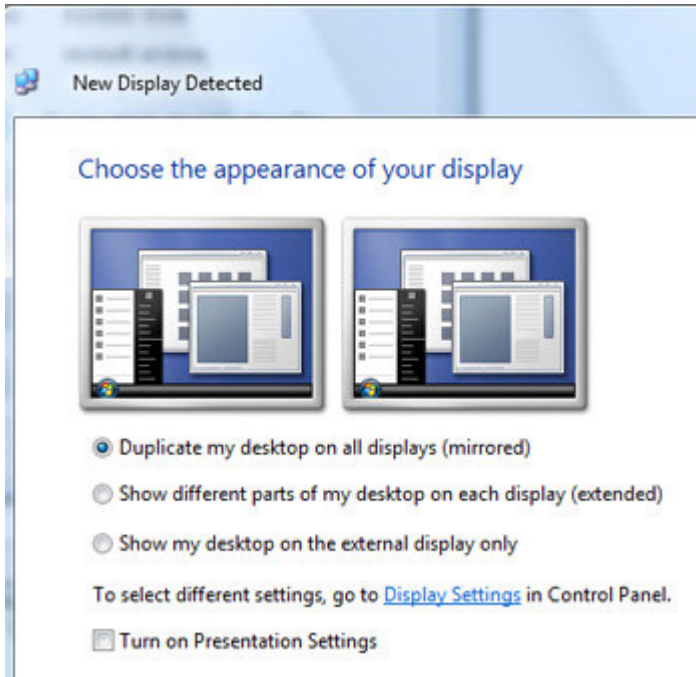


Figure 10: When a new display is detected, you can duplicate content from one screen to the other, or extend your desktop across both screens.

To extend your desktop onto both screens, select the **Show different parts of my desktop on each display (extended)** option, click **Apply**, and then click **OK**. You'll increase your visible work area across both displays. This can be a real boon to those who like to work between or among two or more applications at the same time.

Repairing or replacing a laptop PC screen

Built-in laptop PC screens occasionally suffer from **dead pixels**, a condition in which some addressable location on the LCD (liquid crystal display) stops working and displays black all the time. There's not much you can do to fix such a problem except to replace your screen. If the PC is out of warranty, expect to spend \$250 and up to replace a laptop display, depending on its size. If you decide to replace the screen yourself, this will be your only cost. However, if you send your laptop PC in for professional repair, these costs can easily double.

Be sure to check the warranty on your laptop before undertaking such a repair. Replacing the screen usually voids your warranty.

Replacing a laptop PC screen is fairly simple: you must disassemble the top deck of the laptop PC, detach the screen from its power and signal inputs, remove it from the top deck, and then reverse the process to insert a new one. The degree of difficulty varies with the type of laptop PC you own, and how amenable the upper deck is to being opened. Again, Repair4Laptop.org has a series of photos and videos that provide step-by-step instructions for a wide range of laptop PCs. In addition, Tom's Hardware offers a tutorial entitled "How to replace a broken laptop or notebook display."

Fixing surface scratches

To fix small surface scratches or other minor surface damage to an LCD screen, you may have some luck in polishing small defects out with a soft cloth. Other methods include rubbing a small amount of petroleum jelly or even shaving cream into the scratch. You can also find scratch repair kits for furniture or automotive use that may be of some help.

Try fixing a very small part of the scratch as a test before applying any product to the entire scratch.

The next section covers fixes and workarounds for keyboard and touchpad problems.

Resolve keyboard and touchpad problems

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Unlike standalone desktop keyboards on which you can easily replace sticky or broken keys one at a time, many laptop PC keyboard problems require wholesale keyboard replacement.

Replacing a laptop PC keyboard requires opening the bottom deck of the laptop PC, which can void your warranty. Check your warranty first before replacing the keyboard.

As with earlier do-it-yourself repairs covered in this brief, you'll find that the Repair4Laptop.com website offers a wide range of tutorials with photographs and step-by-step instructions.

If you don't feel comfortable replacing the keyboard yourself, contact your laptop PC's manufacturer or a reputable computer repair shop. You may have to pay a bench charge of \$30 to \$75, and then as much as \$200 for a replacement keyboard, depending on your computer's make and model.

If your HP laptop PC is still under warranty and you experience keyboard or touchpad problems, it's recommended you ship the unit to an authorized HP service depot for repair.

Resolving touchpad problems

To deal with touchpad problems, consider switching to an external mouse as an affordable option. Small wired mice with retractable cords cost under \$10, and you can get a cordless mouse for \$20 to \$35. Undertaking repair is about the same level of difficulty as replacing the keyboard, and you must often remove the keyboard to get at the touchpad anyway.

Using a wireless laptop PC keyboard and mouse is a terrific option for many users, especially those whose computers include built-in Bluetooth receivers. For work at home or in the office, this kind of accessory can greatly improve your productivity by eliminating wires and giving you a less cluttered and more flexible work area.

Using a docking station or port replicator

An ordinary docking station or port replicator is a device that includes PS/2 mouse and keyboard ports and/or USB ports, and video ports for external monitors, that you can leave connected at all times. Higher-end docking stations or port replicators support dual external monitors, and may include wired Gigabit Ethernet ports, a power supply for your laptop PC, and built-in hard disks for backup or extended storage.

Prices generally range from \$60 to \$200, depending on the number of features. However, this is one case in which convenience often outweighs cost, especially if you want to sit down and get to work with a minimum of fuss. Plus, if your laptop PC is experiencing keyboard or touchpad issues, you can usually work around

them using a docking station or port replicator.

Although this quick lesson offered many do-it-yourself solutions for common laptop PC problems, if you've got an HP laptop PC, you always have the backing of HP support ready to help you resolve any issues. Just visit [HP.com](https://www.hp.com) to learn about support and troubleshooting services.