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## Dealing With PC Power Issues

### Keeping the Electricity Flowing to Your PC...

A PC is made of many components. We've said before that the processor is the "brains" of the system. Which component is its heart? In some ways, the motherboard might play that role; certainly it is a crucial "body part." But a more apt analogy might be the power supply. If it stops pumping the computer's "life blood" - electrical power - through the system, all functionality will cease and all those chips and circuit boards will become as useless as a body whose heart has stopped pumping blood through its arteries.

Power is an essential element that we don't give much thought to -- until the lights go out. But a sudden loss of power (or a sudden surge of too much of it) can do more than render your system temporarily dead; it can cause permanent damage to sensitive components.

In this article, we look at something most of us usually take for granted: the "juice" on which your PC runs, and the devices -- surge protectors, Uninterruptible Power Supplies, generators and inverters -- that can help you keep the electricity flowing, as well as the computer's "heart," the PC power supply itself.

### All Power Supplies are not Created Equal

PC makers are fiercely competitive, and one way to lure customers is to have the lowest prices. In order to offer low prices and still make money, vendors have to cut corners somewhere. All too often, one of those "somewheres" turns out to be the power supply. The reasons are easy to understand: tech savvy computer buyers go into the store today knowing that they want a specific processor speed, a certain amount of memory, and a high capacity hard disk. If the computer vendor skimps on these components, buyers will stay away in droves.

Where better to save money than on an "invisible" component like the power supply. Only the most techie buyers ask about its brand or wattage. But cheapo power supplies can cause computer owners a huge amount of grief down the road. This is one of the most common points of failure in a PC that's a year or two old and otherwise working fine. A bad power supply is especially insidious because often it doesn't suddenly fail completely. Instead, it dies a long, slow death - causing all sorts of intermittent errors and crashes and freeze-ups along the way that mimic other hardware and software problems. Many computer users have reinstalled operating systems and replaced video cards or memory or processors when the real source of their problems was a power supply on its last legs.

Even if the power supply isn't of low quality, it may not be powerful enough to handle your system's needs. A 175 watt power supply that's adequate to run the one hard disk and CD-ROM that came with the system originally might croak when you add two more hard disks and a high end extra case fan. The voltage used by the components matters, too. Older components often use more voltage. Servers and other systems that run a lot of power-hungry peripherals may need high capacity power supplies of 400 watts or more.

The good news is: you CAN upgrade your power supply, and it's not as difficult or as scary as it might

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seem. Rule number one is that when a power supply goes bad, you don't open it up and try to fix it -- you replace it. I still fondly recall a system I once had, built by someone with a sense of humor. On the power supply casing was a sticker that said "if you open me, I will kill you." Although it made me laugh, I always took that warning very seriously. A computer power supply has a capacitor inside (as do TV sets) that retains electricity long after it's turned off or even unplugged.

If you do decide to install a new power supply, remember that there are two different kinds in common use: the AT and the ATX. The type of motherboard you have determines the kind of power supply you need. The AT supply has two connectors labeled P8 and P9 that plug into the motherboard. The ATX model has only one connector, a longer 20-pin type. If you have the older AT type board, it's very important that you plug the two connectors in correctly, with the black wires on each toward one another, or you can fry the motherboard.

Here is [a good article](#) that explains how to upgrade your power supply.

### **Protecting Your System from Too Much of a Good Thing**

Electricity is absolutely necessary for your computer to work, but it's possible to get too much of a good thing. The electrical current that comes out of the outlets in your home or office doesn't always flow at a consistent rate. Standard voltage for most devices in the U.S. is 120 volts, but the voltage may rise above or fall below this rated level. This may be due to the power company or it may be caused by bad wiring in your building. Having a lot of high powered devices plugged into the same circuit can also cause problems.

Power flow problems can take several different forms: power outages or blackouts (no electricity flowing from the outlet), brownouts or low voltage (too little electricity) or power surges/spikes (a sudden burst of voltage higher than rated). Power surges are a big problem because the sudden high voltage burst can damage or destroy the chips and circuit boards inside the computer. Technically, the difference between a spike and a surge is that a surge lasts longer.

NOTE: the electrical outlet isn't the only route power surges can take to get into your system. If you have a modem attached to a phone line, a power surge on the line (usually during a lightning storm) can fry the modem.

To protect your system from power surges, you can buy a surge protector or suppressor. This will absorb the extra electricity and prevent it from damaging your computer. Some surge protectors also include line conditioners that can help level out smaller fluctuations in the current, called "line noise," that usually doesn't cause permanent damage but can cause intermittent problems.

One thing to be aware of in regard to surge protectors is that a big surge can burn out the device, leaving you with no protection against subsequent surges. Some surge protectors have indicators that let you know if they're still working.

Here is [an excellent article](#) on how surge protectors work.

### **A UPS for All Seasons**

A better (but more expensive) way of protecting your computers and critical peripherals is to plug them into an uninterruptible power supply (UPS). You then plug the UPS into the wall outlet. The UPS has a battery built in that charges while the electricity goes through it and on to the computer in normal operations. It acts as a surge protector if there are spikes or surges of high voltage.

However, it differs from a surge protector in that, if the electricity goes off, the UPS automatically switches over to battery power. The computer and other devices plugged into it keep on operating for as long as the battery lasts. Usually a UPS provides power for anywhere from five to thirty minutes, giving you time to shut the computers down gracefully so that your data won't be lost. You can also load

software that will shut the computer down automatically if you aren't there, when it receives a signal from the UPS letting it know that it's on battery power. Most UPS devices will also beep or make some other audio signal to let you know they're on battery power, and depending on your operating system and software, can be configured to send a notification across the network to a designated user/administrator.

There are actually a couple of different types of UPS devices. The standby UPS works as described above: the computer runs off the normal electricity passing through the UPS unless/until that flow is interrupted, at which time it switches to battery. The other type is called a continuous UPS. With this type, the battery is being continually recharged and the computer is always running off the battery. Continuous systems generally cost more than standby systems, because they are more stable and there's no momentary switchover time. To the user, the effect is the same.

The cost of a UPS varies from under \$50 to several hundred, depending on how long the UPS can power the computer on its battery as well as extra features such as automatic shutdown of the computers and monitoring of the power status and voltage draw of the equipment.

It is important to understand that a UPS is not intended to keep the computer up and running for you to work on during a prolonged power outage. For that, you need a generator or inverter.

Here is an [FAQ on UPS types](#) and how they work.

### **When Computing is Mission Critical**

If you want to be able to keep on working through a power outage that lasts more than a few minutes, you'll need a device that actually produces power: a generator or inverter. These emergency power systems may be necessary for mission critical servers that can't suffer any down time (for example, if you're hosting websites commercially). Of course, they are also useful for providing lights and air conditioning if a storm takes out the power for several hours, or for preventing food in refrigerators from spoiling. And, an emergency power system may be essential if someone is on life support or other critical medical equipment that relies on electrical power.

Generators have an engine that runs on gasoline, propane, or other fuel. A generator can be rated anywhere from 200 to 5000+ watts, and can cost anywhere from a few hundred to several thousand dollars. Large generators can be wired into your home or office building's circuit panel so that if the electricity goes out, the generator immediately comes on and takes over powering your appliances and other electrical devices.

You still need to use a surge protector or UPS when you're using a computer with your generator, as small generators can't keep the flow of electricity stable when refrigerators or other devices turn on and off.

Inverters are devices that convert 12-volt power (such as that of a car battery) to 120 volt power. Inverters are usually smaller than generators for the same price, but they are also quieter, and you don't have to deal with fuel.

Here's a good article with details on [how emergency power systems work](#).

### **Summary**

Keeping the electricity flowing smoothly and safely (for you and for your system components) is an important, but often overlooked topic. Luckily, there are a number of different devices on the market that can help you do that. I hope this article has made you think about your own power needs, and determine which of these devices will fit them.

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