UPS Basics

Timely Information on Choosing the Right Backup Power System for Your Mission Critical Equipment

The Sneaky Problems Coming out of Your Walls

As you probably already know, computers are finicky. They seem to have a life of their own, sometimes performing perfectly, other times crashing without warning. One little-known element affecting a computer's performance is coming out of the wall—the electrical power. When the power is clean, no problem. When the power is unstable it can lead to data loss, computer crashes and equipment breakdown.

Almost all computer users have experienced the most obvious power problem...a complete loss of electricity. But other problems are sneakier and cause some of those mysterious crashes. Even worse, some slowly damage computers eventually causing complete computer failure.

Some electrical problems are not very obvious and damage equipment over time.

That's where smart UPS selection becomes important. Getting the right UPS for the right application saves time and money, provides the right level of protection for critical and non-critical devices and, quite frankly, reduces frustration. So here are the basics of UPS selection:

Three Types of UPSs

There are three main types of UPS designs. They provide a progressively wider range of protection against the nine most common power problems.

Stand-By UPS

A basic stand-by UPS provides backup power only when the power goes out entirely (or dips below a certain level).

(see Sneaky Problems, page 2)

Most Common Power Problems

Power Failure

Definition: A total loss of utility power
Cause: Can be caused by a number of events: lightning strikes, downed power lines, accidents

Power Sag

Definition: Short term low voltage
Cause: Triggered by the startup of large loads, utility switching, utility equipment failure, lightning. In addition to crashes, sags can damage hardware

Power Surge

Definition: Short term high voltage
Cause: With voltages above 110% of normal, surges can be triggered by heavy equipment being turned off or by utility switching. The results can potentially damage hardware.

Brownout

Definition: Reduced line voltage for extended periods of a few minutes to a few days
Cause: Can be caused by an intentional utility voltage reduction during peak demand periods or other heavy loads that exceed supply capacity.

Electrical Line Noise

Definition: High frequency waveforms that piggyback on the line waveform
Cause: Can be caused by either radio or electronic emissions generated by transmitters, welding devices, printers and lightning.

High Voltage Spike

Definition: Instant and dramatic increase in line voltage
Cause: Can be caused by lightning strikes and can increase power to over 6000 volts. A spike almost always results in data loss or hardware damage.

Frequency Variation

Definition: A change in frequency stability
Cause: Resulting from generator or small cogeneration sites being loaded and unloaded. Frequency variation can cause erratic operation, data loss, system crashes and equipment damage.

Switching Transients

Definition: Instantaneous high voltage increase
Cause: Normal duration is shorter than a spike and generally falls in the range of nanoseconds.

Harmonic Distortion

Definition: Distortion of the normal waveform generally transmitted by nonlinear loads
Cause: Switched mode power supplies, variable speed motors, copiers and fax machines are examples of nonlinear loads. Can cause communication errors, overheating and hardware damage.

(Sneaky Problems cont. from page 1)

They provide basic power filtering to eliminate noise put into power lines by radio signals, printers and other devices. A stand-by UPS has the slowest response and does not clean up "brown-outs" (the power dips but does not go out) and other power deviations. These systems are perfect for less sensitive and low-cost equipment like cash registers and calculators.

Line-Interactive UPS

The second kind of UPS, the "line-interactive" UPS, monitors the incoming power, cleans up some power deviations and responds quickly to power loss. However, it does not remove spikes, frequency shifts and the other power problems. A line-interactive UPS is a good choice for non-critical computers or equipment that is easily replaced.

On-line UPS

The third kind of UPS, the on-line UPS, provides the most protection. An on-line UPS isolates the input and output power from the battery allowing better control of the power levels reaching sensitive computers. It has an excellent response time and cleans all of the major power deviations including spikes and frequency shifts. Since an on-line UPS has the circuitry to condition power without using the battery, batteries last longer. An on-line UPS should be used on expensive or sensitive equipment, mission-critical computers and large applications where replacement batteries could become expensive after several years.

The right power protection saves time, money and headaches.