



Issues Associated with Abrupt Power Losses to Computers

Risk Solutions

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Risks

It is understood that electrical power transients (surges) or other power quality issues can cause physical damage to electronic devices such as computers or televisions. But it is important to know that an abrupt loss of electrical power can also cause a number of issues for a computer. Having a backup power system to allow the computer to operate without utility power or at a minimum to shutdown in a controlled, sequential manner is critical.

When power to a computer is turned off in the conventional way there is a sequence of activities that occur. The operating system (OS), the basic software package required to run the computer, controls that process. The OS ensures that each functional step has been correctly terminated before power is cut.

When power is abruptly cut, this controlled process does not take place causing some functions to be left hanging, cut off midstream. Most important of those is the system that deals with data. Data can be lost and / or it can be corrupted without obvious sign or indication of the cause. The speed with which data processing takes place, even in a modest desktop machine, can cause a substantial data loss during an abrupt loss of power.

Data storage devices are vulnerable to sudden power losses. In the case of disks, the sudden loss of power will cause the read/write head to quickly retract to its resting position. In doing so, the head may come in contact with the disk resulting in a "head crash".

In addition to the loss/corruption of data and the potential for a head crash, a third detrimental effect of a sudden loss of power involves computer cooling. Computer rooms may have dedicated air conditioning systems and stand alone computers have fans and other means to control and dissipate the heat generated by the computer operation. When power goes away, the cooling system(s) stops functioning. The residual heat, what has not been carried away by the cooling system, can cause the components to increase in temperature. Most electronic component manufacturers stipulate maximum operation temperatures. The warranty may become void even though the components have no visible sign of damage.



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Solutions

In order to protect computers and data, it is helpful for users to: regularly back up data; install voltage transient (surge) protection; and install a backup power source. When electric power from the grid disappears, standby power takes over in two different forms. For individual computers or small office servers, the focus is on turning the computers off in a controlled manner by using an Uninterruptible Power Supply (UPS). In a larger facility, it is the matter of keeping cooling and power going long enough to give the standby generator an opportunity to “synchronize”, to get up to a rate of speed sufficient to power the infrastructure and continue data processing.

UPS batteries are most often used to provide continuous power for a limited time during an outage. The UPS, fully charged, can provide power for several minutes to allow the computer to save the data and go through the OS shutdown process. Depending on the application and the design of the battery, the lifespan of a battery can be as short as 4-5 years for a “ten year life” battery. Elevated room temperature will shorten the life of any battery. Owners should routinely inspect their UPS systems to validate that the batteries are charged and able to be recharged.

Loss Example

Electric power was lost during a thunder storm. The site is equipped with a battery supported UPS system for bridging utility power and generator service. 60% of the batteries were found to be defective. Manual transfer to generator was successful but the diesel engine stalled after running for 5 minutes due to moisture in the fuel. This loss of power and the subsequent failure of the UPS system resulted in a major loss of data.