

## 9 Common Power Problems

**Power failure** or blackout is defined as a zero-voltage condition that lasts for more than two cycles. It may be caused by the tripping of a circuit breaker, power distribution failure or utility power failure. This condition can lead to data damage, data loss, file corruption and hardware damage.

**Voltage sags** are the most common power problem encountered. Sags are a short-term reduction in voltage, and can cause interruptions to older equipment such as adjustable- speed drives, relays, and robots. Sags are most often caused by fuse or breaker operation, motor starting, or capacitor switching. Voltage sags typically are non-repetitive, or repeat only a few times due to recloser operation. Sags can occur on multiple phases or on a single phase and can be accompanied by voltage swells on other phases.

**Power surge** takes place when the voltage is 110% above normal. The most common cause is heavy electrical equipment being turned off. Under this condition, computer systems may experience memory loss, data errors, flickering lights, and equipment shutoff.

**High-voltage spikes** occur when there is a sudden, rapid voltage peak of up to 6,000 volts.

These spikes are usually the result of nearby lightning strikes, but there can be other causes as well. The effects on vulnerable electronic systems can include loss of data and burned circuit boards.

**Switching transients** take place when there is a rapid voltage peak of up to 20,000 volts with a duration of 10 microseconds to 100 microseconds. They are commonly caused by arcing faults and static discharge. In addition, major power system switching disturbances initiated by the utilities to correct line problems may happen several times a day. Effects can include memory loss, data error, data loss and component stress.

**Electrical line noise** is defined as Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) and causes undesirable effects in the circuits of computer systems.

Sources of the problem include electric motors, relays, motor control devices, broadcast transmissions, microwave radiation, and distant electrical storms. RFI, EMI and other frequency problems can cause data error, data loss, storage loss, keyboard lockup and system lockup.

**Frequency variation** involves a change in frequency from the normally stable utility frequency of 50 Hz or 60 Hz, depending on the geographic location. This may be caused by erratic operation of emergency generators or unstable frequency power sources. For sensitive electronic equipment, the result can be data corruption, hard drive crash, keyboard lockup and program failure. However, current EDP equipment is not nearly as sensitive to minor frequency swings.

**Brownout** is a steady lower voltage state. An example of a brownout happens during peak electrical demands in the summer, when utilities can't always meet the requirements and must lower the voltage to limit maximum power. When this happens, computer systems can experience data corruption, data loss and premature hardware failure.

**Over voltage** is a steady higher voltage state that can last anywhere from a few minutes to a few days.