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Protecting Communication & Sensitive Electronic Equipment from Lightning & Voltage Surges

Operating a business requires a reliable and efficient means of communication and data processing. As stronger competition surfaces from every direction, a company's dependency on fast, accurate and convenient transmission of information increases dramatically. Businesses make great investments in state-of-the-art telephone systems, computer networks and expert diagnostic equipment in order to compete in the high-tech marketplace that exists in every industry today.

So, how would your business be affected if it lost the use of these systems for an extended period of time? Or even for a day? Suppose the computer system you use to communicate with financial institutions is damaged from a lightning surge. How big of an impact would this have on your operation? How long would it take to repair or replace a key piece of machinery or equipment that has been subjected to a voltage surge and rendered useless? Are you prepared if it does happen?

Lightning Strikes Without Warning

Recent claims show a wide range of damage being attributed to lightning or voltage surges. Lightning has caused damage to computer terminals, printers, motors, controllers, high-tech instrumentation and telephone communication systems. Unexpectedly, these businesses find themselves trying to rebound from losses costing upward of a few thousand dollars.

One loss in Atlanta, for example, saw lightning knock out an auto dealer's main telephone system and computer network. The equipment was damaged beyond repair and had to be replaced. After a \$1,000 deductible, the policy paid more than \$26,000.

One of the greatest hazards to communication systems or any system that employs sensitive electronic equipment is a voltage surge. It's a fairly common occurrence and damage usually can be avoided. But it still accounts for millions of dollars in lost revenue and repair costs each year nationwide. How can you help protect your equipment and other business investments from a damaging and costly voltage surge?

What is a Voltage Surge?

Voltage surges are disturbances in the normal pattern of a power system's supply voltage. Usually, this is thought of as a sudden spike that raises the voltage level above the limit

which equipment was designed to handle. While there are other types of transients, we will limit our discussion to overvoltage conditions.

Voltage surges happen when a sudden change to an electrical circuit occurs. A simple example of such a change occurs when the motor used in an air conditioner or freezer starts or stops.

More dramatic types of switching surges occur when the utility company energizes or de-energizes its equipment, or when overhead power lines slap together or are broken and fall to the earth. A third type of switching surge results from arcing due to loose connections or ground faults.

How Can You Protect Your System?

The simplest means of protecting your telecommunications system or other sensitive electronic equipment can be summed up in three words—single continuous ground. Let's look at these words in reverse order.

Proper Grounds

Electrically grounding equipment means providing a direct, low-resistance path for electrical current to return to earth. The most important concept to understand about electricity when dealing with surges such as lightning is that current always takes the path of least resistance to ground. As end users of electricity, we have virtually no control in preventing surges from occurring. But what we can do is direct the current flow when the surge does occur—by ensuring all equipment is properly grounded.

Continuous Grounds

In order to be effective, the grounding system must be continuous. This means grounding conductors should never be spliced or brought to a terminal strip. In addition, the electrical grounding system (including metallic conduits and raceways) should be bonded to the building's structural steel to provide maximum protection.

Single Grounds

Finally, there should be only one grounding system. All building systems, including electric, telephone, lightning, antenna, and underground metallic piping systems, should be connected together and bonded to the building grounding system.

Lightning can enter a building in ways other than over power lines. Overhead telephone lines or any other utility that is exposed to the outside (HVAC, water, etc.) can provide a conductive path for lightning surges to find their way inside. Lightning striking your neighbor's house can travel over to yours via common water lines. However, by connecting all of these systems to a common grounding point, the same voltage potential can be maintained and a path to dissipate the surge is ensured.

Surge Suppression

In addition to a single, continuous grounding system, the proper use of surge suppression devices is the best means of protecting your telephone and computer systems. When a voltage surge occurs, a Surge Protection Device (SPD) provides a low resistance path to ground so that the surge bypasses the equipment. Therefore, the voltage to which the electrical equipment is exposed to is limited to a level much below that of the surge.

Ideally, an SPD should be installed at the main service entrance equipment for the building to minimize surges from entering the premises through the power system. In addition, local surge protection should be provided within the building for terminal equipment, computers and other sensitive equipment such as computer-driven instrumentation.

Special Note on Isolated Grounds

One of the most abused concepts is that of an “isolated ground.” Often, “experts” in the field of computers or harmonics suggest the installation of a separate ground for computer or diagnostic systems as a means of eliminating noise or harmonic problems.

A separate ground is not an isolated ground. Having an equipment ground separate from the system ground may appear to correct the problem at hand, but it is not the proper grounding method. Consult a professional engineer or licensed electrician if you suspect you may have a condition involving a separate ground.

Prevention is Key

Don't neglect a proper grounding system for your equipment. Lightning and voltage surges can cause extensive damage and shut down your business. That can be costly, not only to the financial well being of your company, but to your reputation for reliability and customer service.

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