Preventing Equipment Loss from Electrical Disturbances

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Zapped! Public service answering points (PSAPs) continue to experience damage from lightning and other electrical disturbances at an alarming rate. The good news is there is a simple and affordable solution.

Electrical disturbances are categorized into two classes, external and internal electrical anomalies. External disturbances include lightning strikes, utility switching, and accidents resulting in line disturbances. Amazingly, these only account for 20 percent of problems.

Internal disturbances, such as transient voltages generated when something switches, account for the balance. Examples include lighting, HVAC compressors, refrigeration systems, vacuum cleaners, space heaters and even uninterruptible power systems. Standards by organizations such as ANSI/IEEE, NEC, AT&T, and Motorola (Standard R56) all explain in detail what measures should be taken to prevent catastrophic loss of equipment due to electrical disturbances.

A proper systematic design for electrical protection begins with the grounding. ANSI/IEEE, Motorola and NEC 250.56 recommend resistance of 25 ohms or less. They require a single-point grounding reference, as does the utility company. If multiple ground rods are used, they must be bonded to the utilities' ground to ensure the single-point system. Then proper surge protection can be addressed.

There are four major site entrances for surges that require individual attention in order to effectively protect a site and reduce the probability of damage.

1. AC Power: Main service entrance, sub panels and generator
2. Telephone/Data: Data circuits, LAN, control, security and card access, and CCTV
3. RF Cabling: Antennae transmitting and receiving lines and cable television service
4. Tower light systems

Effective grounding or earthing alone will not protect a facility from damage due to surges, transients and lightning. However, an effective combination of grounding, equipment bonding and properly installed surge devices on all circuit conductors entering the equipment area will provide maximum site

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