



# Improvements in AC Power Protection and Isolation Technology

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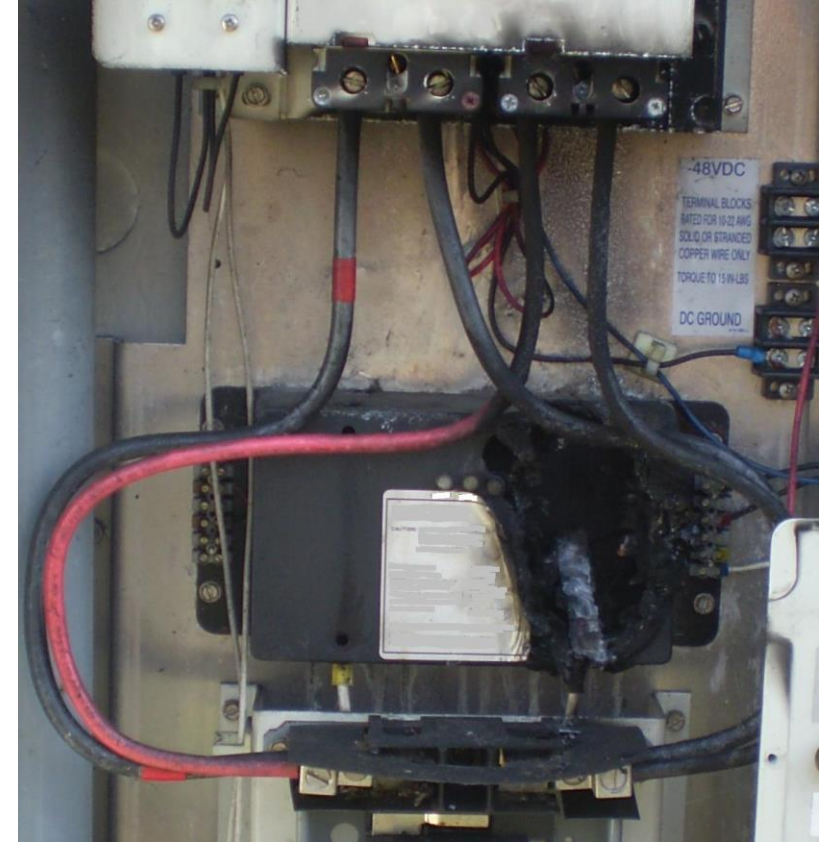
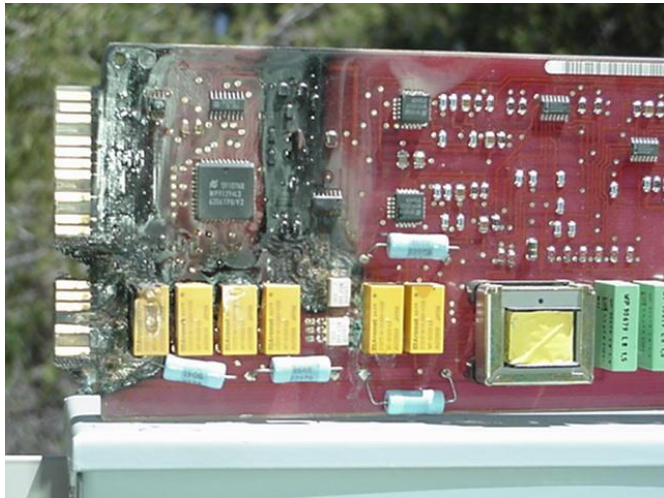
# Improvements in AC Power Protection and Isolation Technology

Remote electronic carrier equipment is regularly placed in high lightning areas. These types of installations include digital loop carrier, DSL and fiber mux equipment. During a lightning produced ground potential rise (GPR), electronic carrier systems in close proximity of the GPR event, may suffer damage to their DC rectifiers from fault currents that “rise” through the grounding systems of the remote electronic carrier cabinet.



# Improvements in AC Power Protection and Isolation Technology

TVSS/ SPD devices equipped with MOV style surge protection may suffer catastrophic failures during multiple flash lightning events thus leaving the site with no protection.



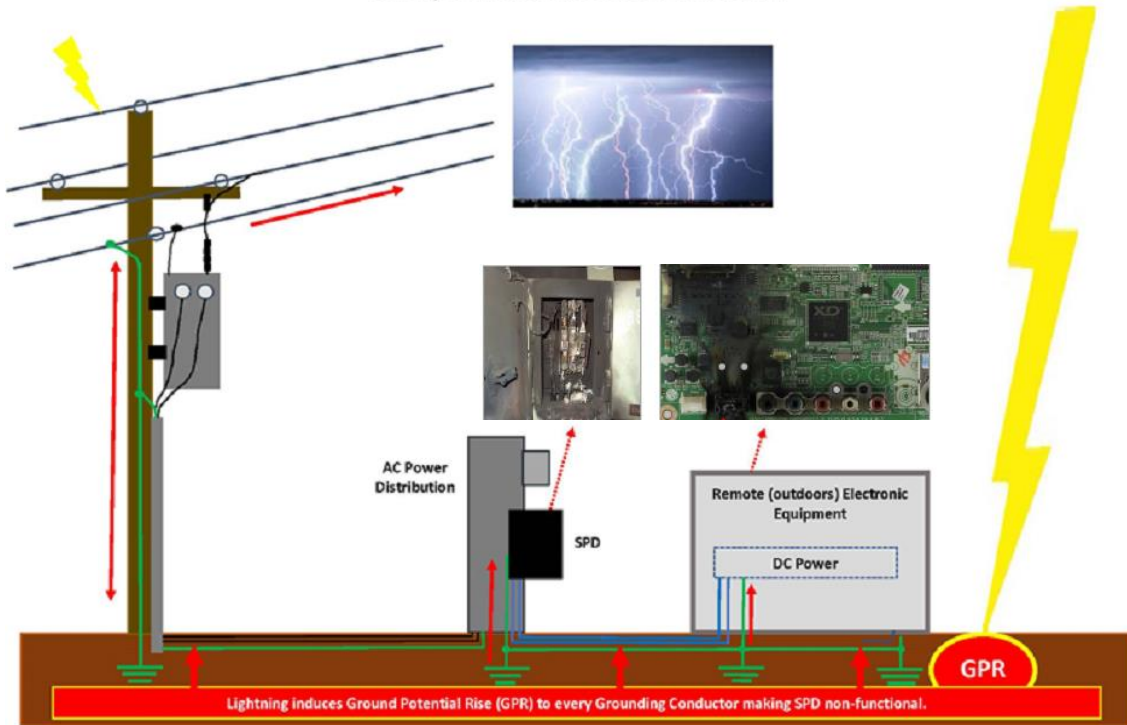
# Improvements in AC Power Protection and Isolation Technology

The original AC isolation technology employed a sensor based on electrostatic discharge events which created false tripping from multiple, non lightning, sources including strobe lights mounted on utility vehicles.



# Improvements in AC Power Protection and Isolation Technology

Today's Ineffective SPD Protection



*A quick overview:*

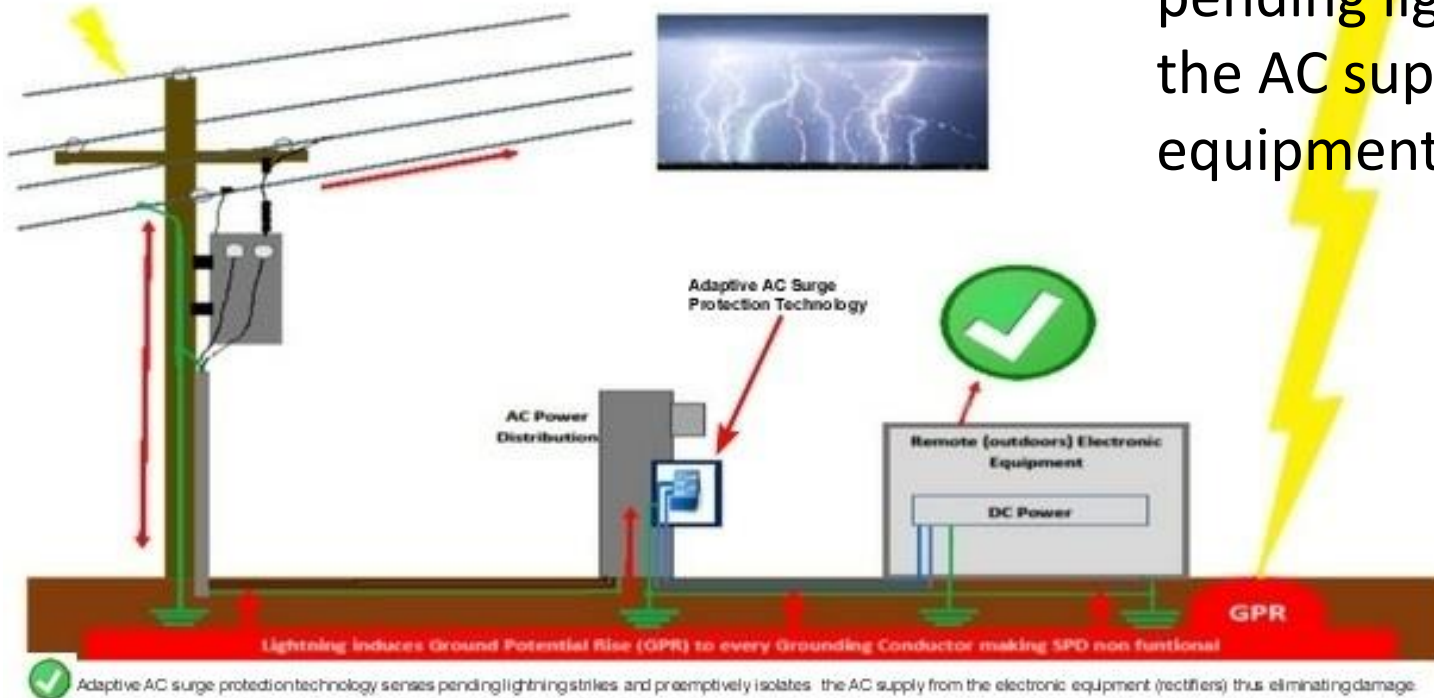
A lightning Ground Potential Rise (GPR), especially a ground strike event, can cause a voltage rise through the grounding system of a remote electronic cabinet.

Lightning surge current can follow multiple paths including back firing of the primary protection associated with the copper cable facilities terminated in the remote electronics cabinet, damage to the DC power rectifiers, ring generators and electronic equipment can occur.

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Adaptive AC surge protection technology senses pending lightning strikes and preemptively isolates the AC supply and neutral from the electronic equipment (rectifiers) thus eliminating damage.



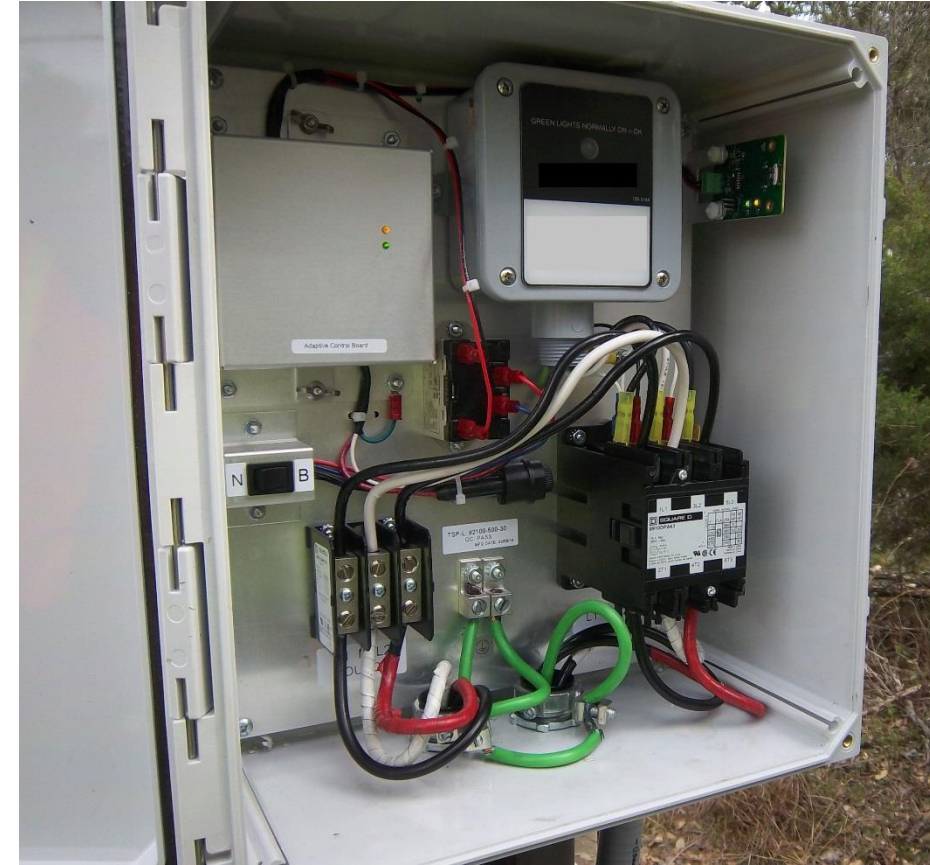
# Improvements in AC Power Protection and Isolation Technology

## Adaptive AC Surge Protection Technology

This is a whole new category of Power Protection that goes beyond traditional Surge Protection Devices.

Designed to monitor the integrity of the electrical power, and adapt its performance and operating mode to the conditions required to protect the electrical systems and equipment connected to it.

Pre-emptive Lightning Detection works in tandem with Adaptive AC Surge Protection by detecting the proximity and severity of lightning, and adjusting its performance and operating mode to enable preemptive protection measures.



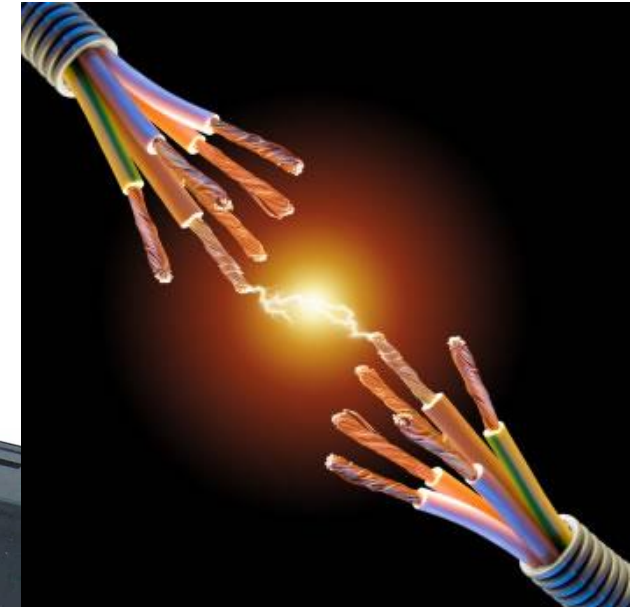
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## Electrical Wiring Monitoring

- Analyzes the electrical system and wiring before start up and during equipment operation.
- Disconnects critical load if a wiring fault is detected in electrical system, thus protecting equipment.

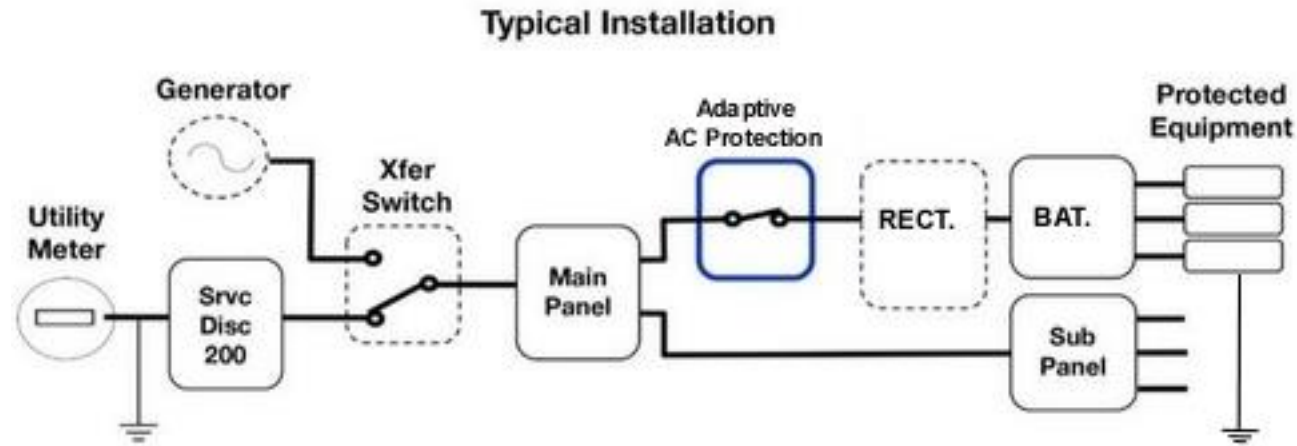
## Voltage Monitoring

- Constantly monitors the AC voltage to ANSI standards for safe operating levels.
- Disconnects critical load if a Voltage exceeds predetermined levels, thus protecting equipment.





# Improvements in AC Power Protection and Isolation Technology



- Monitors for atmospheric conditions capable of producing Lightning strikes within 5 miles of protected equipment.
- Pre-emptively signals and Disconnects Power to connected equipment, thus eliminating Lightning Surge damages, blown out equipment and power feed brownout conditions.
- During Power Disconnect mode, normal operation of equipment continues if connected to Batteries.

# High Level Supervision



# Aerial View of Site 1



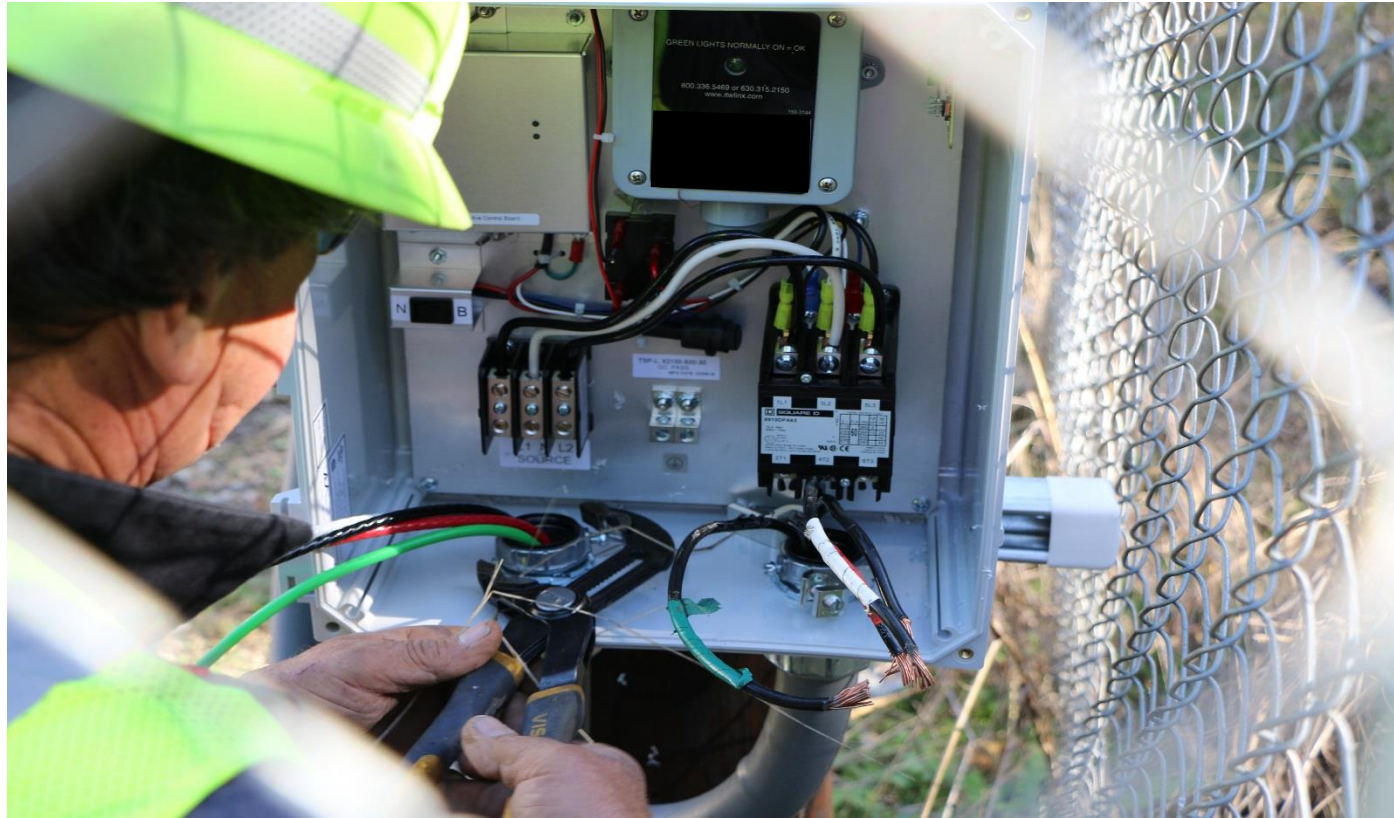
# Site 1



# Site 1



# Making In/Out AC Power Connections



Unit installed, tested and secured.



# Rectifier





# Aerial View of Site 2



# Preparations for Installation



# Overview of Mounting on Utility Pole



# Additional View



# Tested and Marked



# Improvements in AC Power Protection and Isolation Technology

## Intelligent Lightning Detection System

- Detects pending (overhead) lightning ONLY by calculating approaching and departing storm activity.
- Ignores disturbances.
- Ignores noise.
- Utilizes algorithmic calculations and microprocessor technology.
- Utilizes narrowband receiving techniques with indoor or outdoor settings.
- Capability to detect lightning strikes as a function of distance.
- Capability to detect noise threshold levels thus avoiding false triggering by man made or environmental events.

# Improvements in AC Power Protection and Isolation Technology

**Question:** Why is lightning detection and AC power disconnection the only effective way to protect remote outdoors equipment from the damaging effects of lightning induced surges?

**Answer:** The best protection is disconnecting the AC service conductors from the load during lightning events. “IEEE Std 1692™-2011, guide for the Protection of Communication Installations from Lightning Effects© • 5.2.2 AC service isolation”

**Question:** Why are traditional Surge Protection Devices (SPD's) not an effective protection method?

**Answer:** Traditional SPD's are designed to divert lightning surges to the ground assuming that the ground is effective and not saturated with Ground Potential Rise (GPR) produced by the nearby lightning strikes.

# Questions?



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