



Technical Bulletin

## **DC Grounded Antennas -The Myth, the Legend, the Fantasy**

This is a subject that we just had to write about. In the lightning protection business we come into contact with many people who have had both dangerous and disastrous experiences with Mother Nature. And one that has perplexed antenna users for decades is the very common damage and destruction to radio equipment when connected to a so-called "DC Grounded" antenna system.

For many years, antenna manufacturers have touted the positive advantages of owning and operating a station with antennas whose feed systems are a direct DC short across the input terminals, and hence both sides of the coaxial feeder cable are placed at "ground" potential at the antenna site. In reality, there are no such advantages to this kind of feed system, but it is singly the most dangerous ever used from a lightning perspective.

The reason is pretty easy to both explain and understand. Lightning bolts that streak from clouds to ground frequently hit exposed metallic structures like towers and high antennas. This is simply because the metallic nature of the object electrically shortens the striking distance between ground and sky. When a large voltage potential is reached between the two during a storm the metal antenna acts like a prod, sticking up in the air and drawing the first arc.

Lightning wants to reach ground, and that's pretty much all it wants. And it will get what it wants in the easiest and least resistive way possible. Just about anything in the way can be easily vaporized out of the way by a good sized lightning blast. If ten different paths to ground are presented to a striking bolt (such as numerous transmission line conductors, the tower frame, etc.) then the currents will divide quite nicely between all of them, with the larger amount of current flowing in the path of least resistance and so on.

"DC Grounded" type antennas provide a very neat dual path for those lightning currents. Some of the blast will flow down the shield of the cable to ground level earth terminal connections while the rest will simply flow down the center conductor and ravage the radio connected at the other end. Keep in mind that at the point of impact a bolt of lightning can easily deposit 50,000 volts or more respective to ground. And for an instant the voltage at the radio equipment end will be the same. By the time the balance of the surge comes to an end the equipment will have long since been toasted, probably beyond repair.

The myth is that "DC Grounded" antennas offer good lightning protection. The legend is that antenna manufacturers have been claiming it for decades. The fantasy is that some of them still actually believe it. But it's not all hopeless. Here's how you can tell if your present antenna is one of these and what you can do about it. Disconnect the transmission line at the equipment end and measure across the center and outer conductors with a VOM on the R X 1 scale. If only a few ohms are measured then the antenna at the other end is a DC Grounded type. If you're satisfied with the performance of the antenna otherwise and wish to continue using it then you have two choices. First, disconnect the antenna whenever a storm approaches and hope you'll always be there to do it on time. Or second, install a blocking-type lightning arrestor that will shunt center conductor voltage to ground while blocking voltage from passing through the arrestor. Be sure to install the arrestor at ground level and ground the body of the device well.

If you're in the market for an antenna and wish to enjoy a bit of protection select the ones offered that use capacitor or link feed systems. Capacitor feed systems such as gamma matches are excellent feed systems and lightning protectors as well. They isolate the center conductor and force lightning into the shield.

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