

Lightning Protection and Grounding Systems Part I

Lightning protection and radio grounding are two key elements of amateur radio. These are interconnected and one directly affects the other. Lightning protection obviously prevents damage to our equipment in case of a lightning strike and radio system grounding can assure proper operation of our antennas and radios especially in the region of HF frequencies. Grounding for system performance is not as essential for VHF and UHF as it is for HF. However, lightning protection is important for equipment operated at any radio frequency.

Frequently we hear that you need a ground or ground system for lightning, RF and low voltages such as AC power telephone and etc. One properly installed ground system protects in all these areas. All grounds should be interconnected through low resistance paths. This is one of the most important concepts in grounding. If they are not interconnected with a low resistance and low impedance path a voltage surge caused by lightning in one will result in a voltage difference of up to several tens of thousands of volts between them. This will result in huge amperage surges between them which can severely damage or even destroy equipment including your radios. And, worse it can result in a catastrophic fire.

When protecting our ham radios from lightning many variables are involved. Usually we think of lightning entering our equipment from an antenna. This is true in many instances. However, it or induced surges on AC power lines, telephones, cable connections and other sources can also enter our equipment. All these entrances ways need lightning protection. Typically AC power and telephones have good grounding systems but never the less they should be verified to be adequate. Cable television connections and many other sources offer little protection. The grounding block on cable offers little lightning and surge protection. Verify all electrical entrances to your residence have adequate protection. All grounds from these systems should be interconnected through a low impedance grounding system.

We usually direct most of our attention to our antenna system when thinking of lightning protection. The location and antenna type should determine the size, type and location of our antenna grounding system. The closer we can get our lightning protection devices to the antenna or antenna support the better chance we have to disperse the strike's energy. A common and single point ground inside the shack is also critical in lightning protection. This and outside grounds, again, must all be interconnected. Coax shield is not an adequate interconnect for grounds.

A gas discharge tube at the middle of a dipole is a good example of locating protection near the antenna. Antennas on towers should have protection both at the top of the tower and the base. This includes rotor and other control cables. All these devices should be interconnected by either flat copper ribbon conductors or to very large gauge wiring. Number six to number zero wiring or bigger should be used. The bigger the more lightning can be carried safely to ground. Bends of copper ribbon or wire expected to

conduct lightning energy should be at least eight inches in radius. A complete turn of the bend should be sixteen inches in diameter.

All tower legs should be connected to separate ground rods. These ground rods should in turn be connected to each other through copper ribbon conductors or large gauge copper wiring as previously discussed. All outside connections should be made with exothermic welds or by heavy duty metal clamps. A joint compound such as "Ox Guard" should be used with metal clamps. Exothermic welds are made by enclosing the joint in a commercially purchased mold and pouring a provided powder into the mold. The powder is ignited and the burning process melts a large amount of solder into and on the joint. Joint compound can be purchased from local hardware stores or from amateur radio equipment suppliers.

That concludes our discussion of lightning protection and grounding systems for the moment. Next time we will continue our discussion.