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# Lightning Protection for the Amateur Radio Station

*Part 3*—In this final installment, the author shows how to develop a good external ground system to complete your station's protection.

## Establishing a Good Ground

Now that the SPGP (Single-Point Ground Panel) is connected through the wall to the outside world, there is still a lot of work to do. It's necessary to switch from brainpower and the challenge of getting copper strap through walls to the brute force required to establish a good ground system. The operative word here is *system*—not a ground rod, but a network of interconnected ground rods.

The primary purpose of the external ground system is to disperse as much of the lightning energy as possible into the earth before it follows the feed line into the radio station. No matter how hard one tries, some of it will follow the coax, which is why you created the protection plan for the radio equipment. The easier you make it for the strike energy to dissipate in the earth before it gets to the radio station, the less your equipment protection plan will be stressed.

With great diligence, hard work, no real estate restrictions, plenty of funds and highly conductive soil, it is possible for up to 90% of the strike energy to be dissipated in the earth, leaving just 10% heading for your equipment. This would be quite an accomplishment. In many commercial sites it doesn't work out that well and rarely, if ever, for the Amateur Radio station—there are always restrictions. Let's see what should be done and then adjust to the home environment's restrictions.

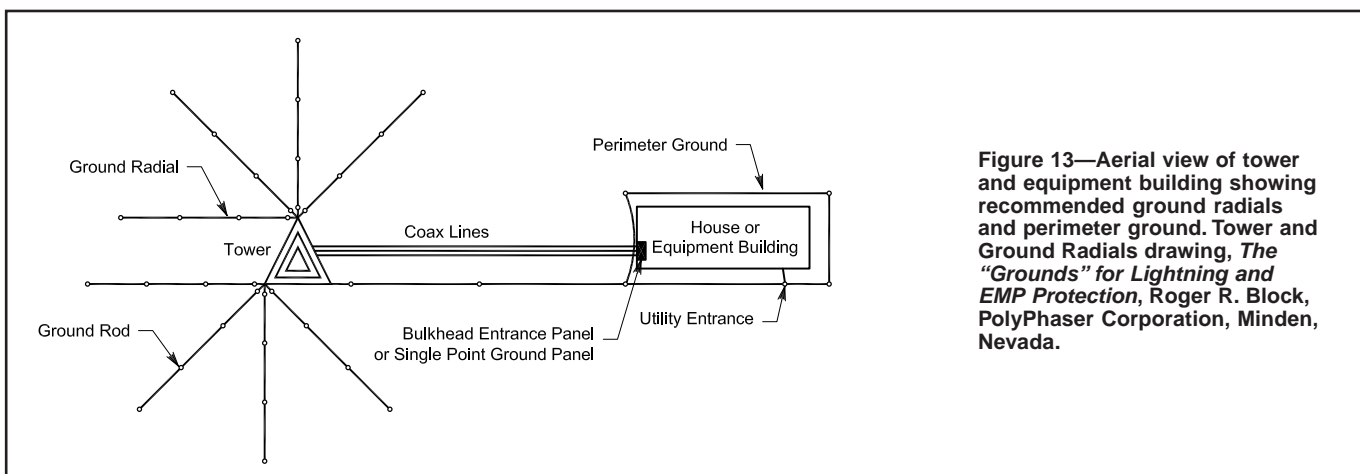
Figure 13 shows what has to be done. In the center, the

concentric triangles represent the tower. Ideally, the tower is separated from the house by 20 to 50 feet. This distance provides sufficient room for the dissipation of the magnetic fields during the strike event. This distance also takes advantage of the natural inductance of the antenna feed lines to limit the amount of surge and allow more time for the tower grounding system to absorb the strike energy.

## Radials and Ground Rods

Spreading out from the base of the tower is a set of eight radials. While the number of radials required for a particular installation will be dependent on the soil conditions in your location, the system shown here is a reasonable start. Each radial is a bare copper wire (preferably, strap) buried 6 to 18 inches below grade. The radials should be positioned so that the energy is dissipated away from the house.

Connected to the radials are ground rods. The ground rods are spaced approximately twice the length of a ground rod. For an 8-foot rod, the spacing would be 16 feet. During the strike, each ground rod has a cylindrically shaped region of influence centered on the ground rod. This is the region in which the ground rod disperses the strike energy. If the rods are placed closer, the regions of influence begin to overlap and the ground rod's ability to disperse energy is diminished. Although this overlapping does not harm the ground system,



**Figure 13—Aerial view of tower and equipment building showing recommended ground radials and perimeter ground. Tower and Ground Radials drawing, *The "Grounds" for Lightning and EMP Protection*, Roger R. Block, PolyPhaser Corporation, Minden, Nevada.**



