



MORGAN SYSTEMS

Technical Bulletin

Modern Do-It-Yourself Grounding Techniques

Proper safety grounding of telecommunications equipment is one of the most important but least understood elements of good installation practice. Earth neutral connections provide numerous benefits to equipment owners including personal electric shock safety, protection from voltage surges caused by lightning and power line delivery variations, and reduction or elimination of electromagnetic interference from nearby sources. Here are some basic tips to follow when designing an installation in which grounding is an integral part:

1. Start with the location. Electronic equipment, especially transmitting gear, should always be located at ground level or below ground where the distance from equipment chassis to the earth terminal connection point is as short as possible. In all cases try to keep the ground leads less than 10 feet in length running in a straight line. If an elevated site is mandatory then all connecting leads such as transmission lines, rotator lines, AC feeder lines, etc. should reach ground level first (where lightning protection can be installed) and then routed to their proper destinations (antenna on roof, AC system, etc.).
2. Choose an electrode wisely. Don't use cold water pipes or AC service neutrals to achieve ground. Both of these often travel very long distances before actually reaching earth ground, and they are often full of joint connections, corrosion, and dissimilar metal changes along the route. Making connections through these sources in transmitting applications frequently increases local interference because they become part of the radiation pattern at ground level. Grounding should always be done with the shortest distance to the actual dirt entry point where a rod may be driven. Ground rods come in many sizes but a length of 6 feet or more is highly recommended. Use rods that have a bright dipped copper clad finish to the steel core or solid brass for best long term results. Keep the earth around the rod wet as often as possible to increase effectiveness and dissipation capability.
3. Always add weather protection to ground rod connections. Products such as "Liquid Rubber", RTV Compound, commercial aquarium sealers, or roof patching tar make fine coverings for electrical joints and they'll prevent corrosion and rust. Use an anti-oxidant compound to coat the

conductors before connecting them together as a further protection from weatherization. Many are available, but among the better ones are Morgan Manufacturing's M-601 and M-602, Penetrox or Noalox. All are easily applied and available from electrical supply houses or hardware stores.

4. What kind of wire to use in making ground leads? Copper definitely, but remember that the length of ground leads is far more important than wire size or type. Use conductors of #12 or larger, covered or bare. But keep them short!
5. Always ground coaxial cable shields, but be sure to do it by routing the coaxial cable to the ground rod joint. Don't ground cable shields by attaching a wire to the shield in some convenient fashion and running a long length of wire from that point to a ground rod. The effect is mostly lost that way. Route the cable to the rod and insert a grounding block or some homebrew means, then route the cable to the equipment. As always, keep the leads short!
6. Check the condition of ground connections every six months or so. Keep in mind that the rod connections are exposed to a variety of outdoor conditions and animals!

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