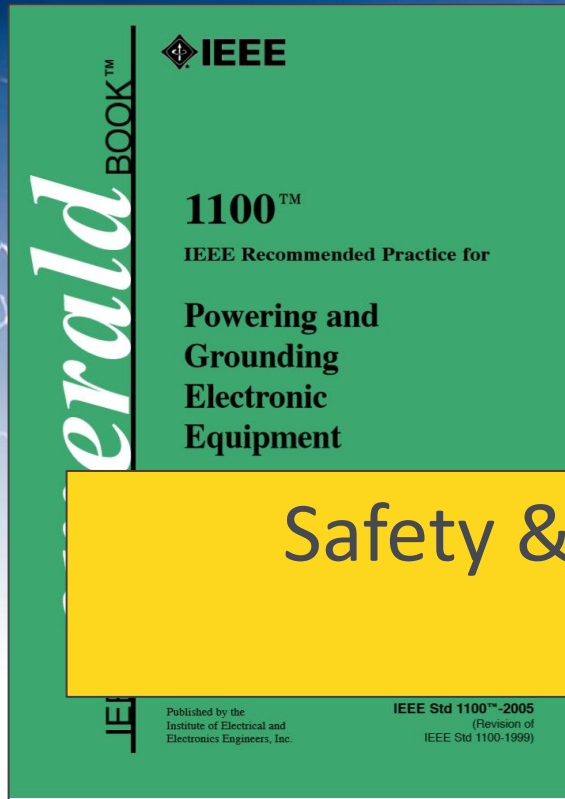




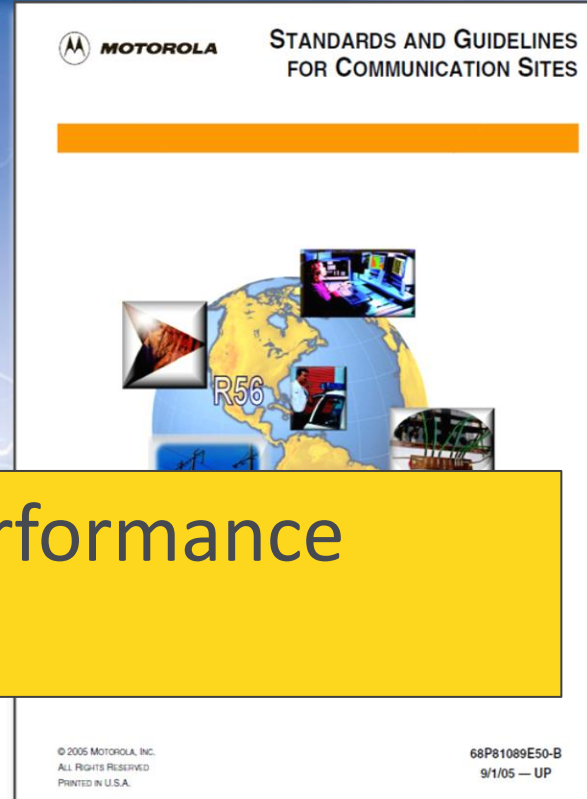
Common Grounding and Bonding Mistakes

Ronald Glaser *CEA*

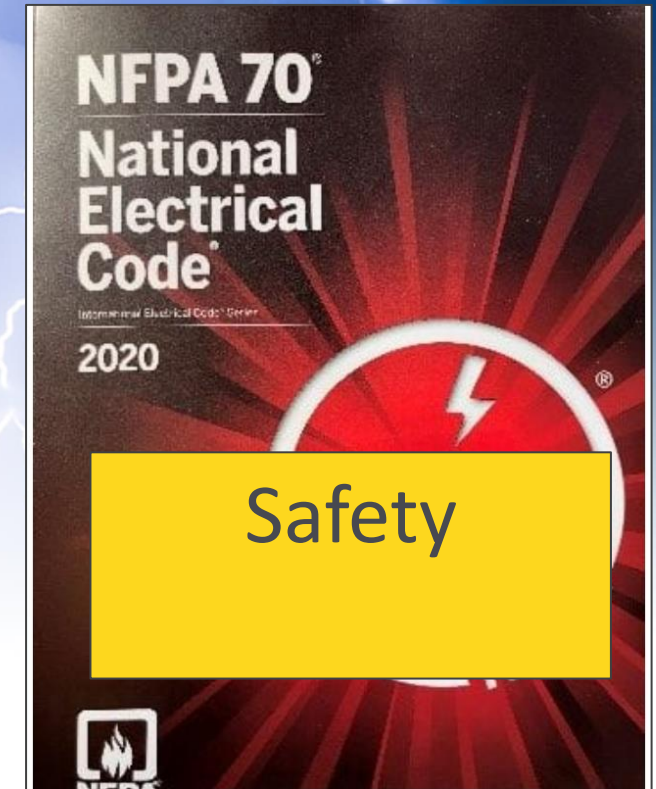
Best Equipment Protection
Starts with Good Grounding and Bonding Practices



IEEE 1100 Books



Motorola R-56

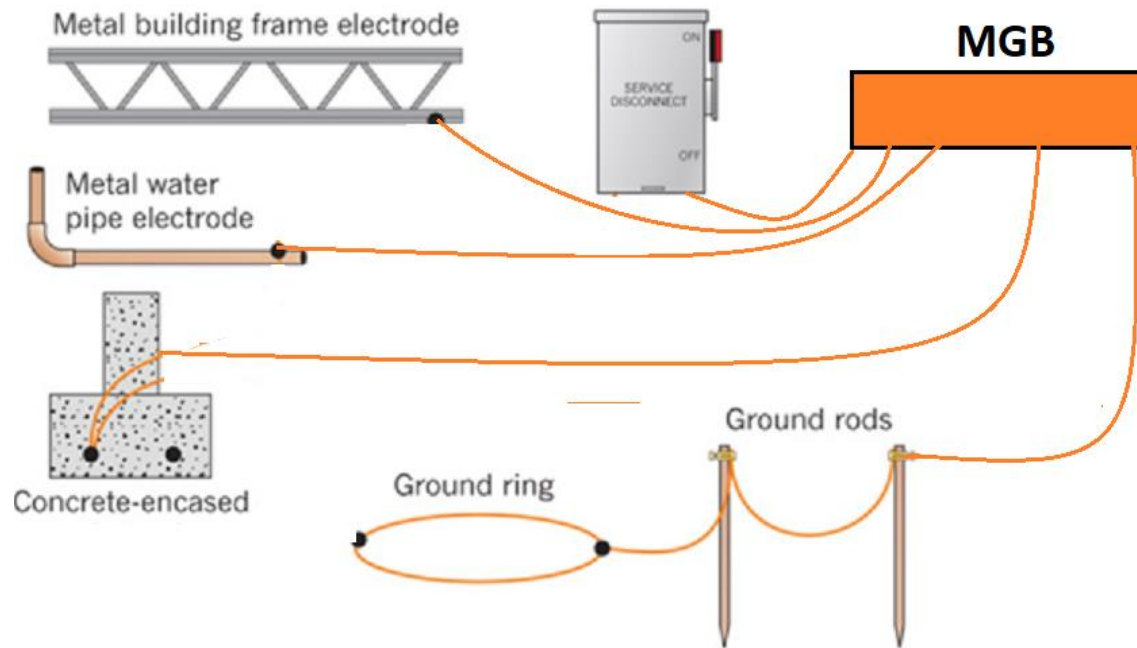


NEC NFPA 70 Section 250

Standards are in constant flux. Make sure your using the most recent documents

Session 1: *Grounding & Bonding*
Practical Solutions
February 10, 2021

Grounding and Bonding

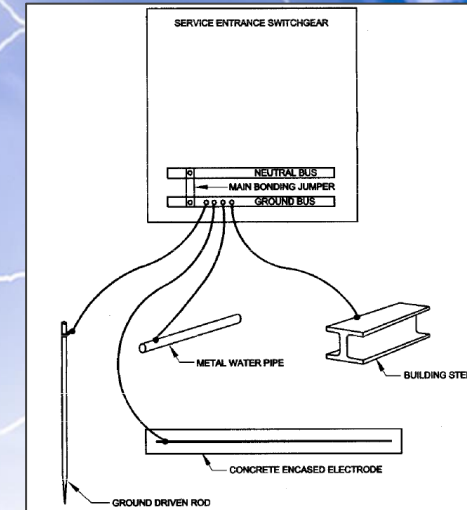
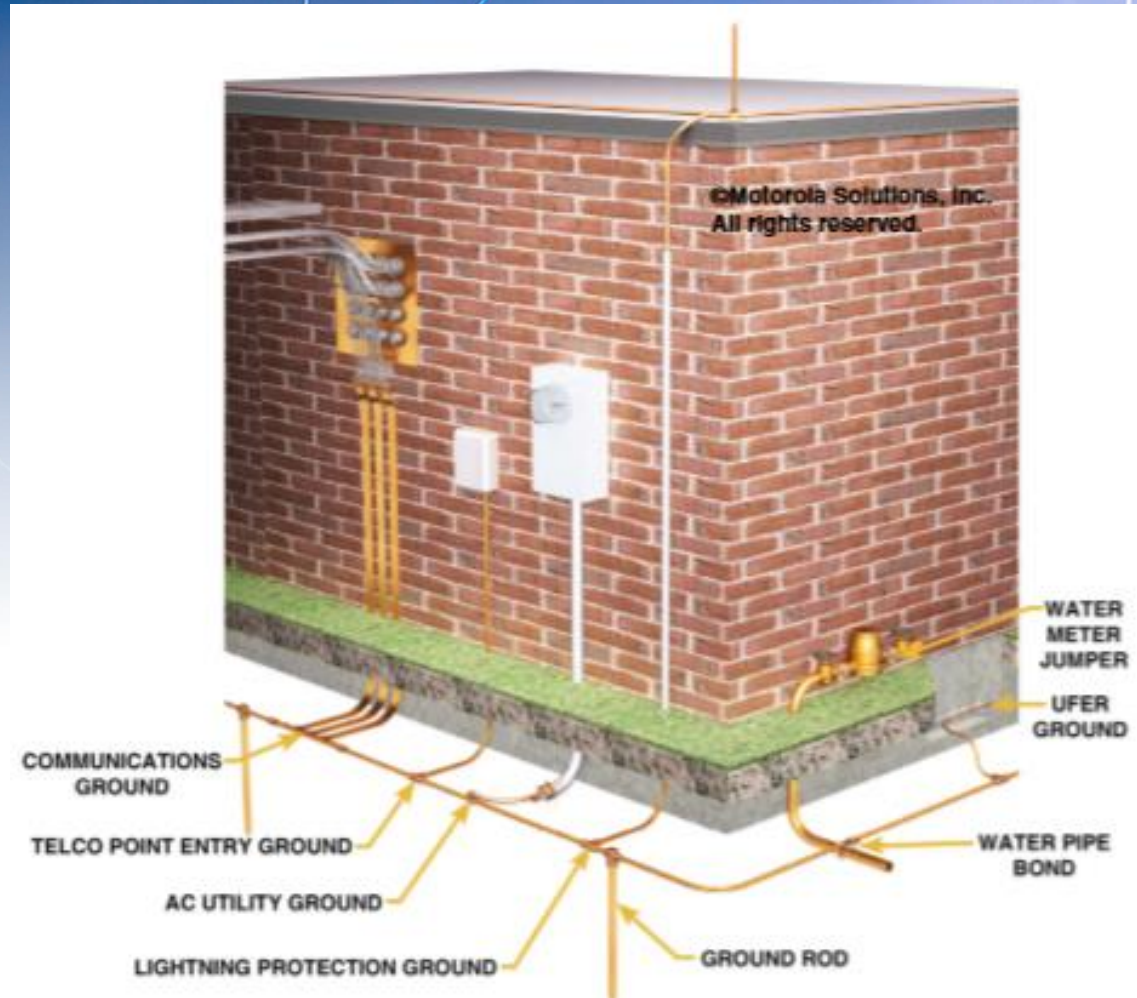


- All Grounds ultimately feed direct to a Master Ground Bar (MGB).
- Exception is if a facility is surrounded by a Ground Loop. Then all outside grounds tie to the ground loop and a SINGLE connection is fed into the MGB

Definition

Earthing or Grounding

MOTOROLA



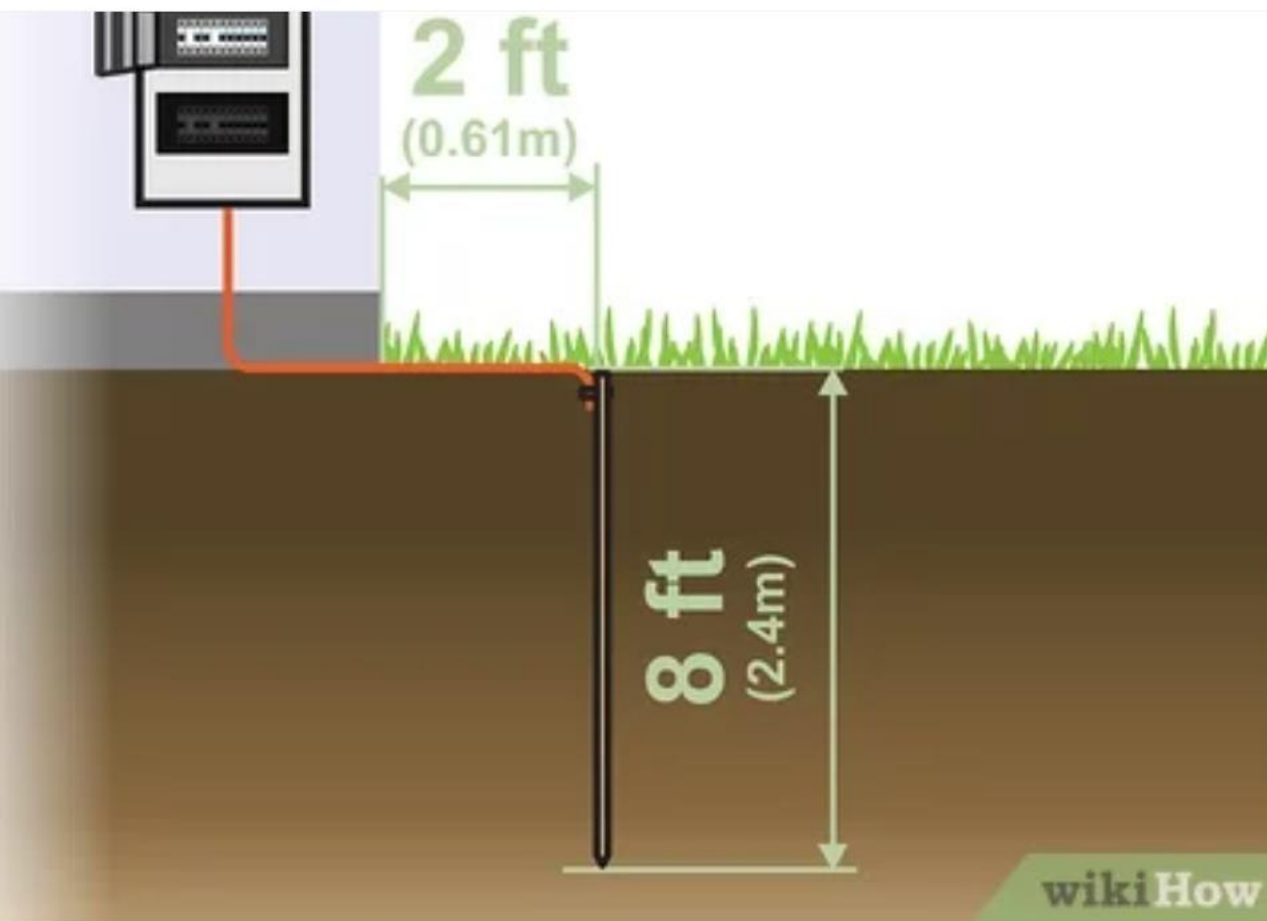
IEEE

III. Grounding Electrode System and Grounding Electrode Conductor

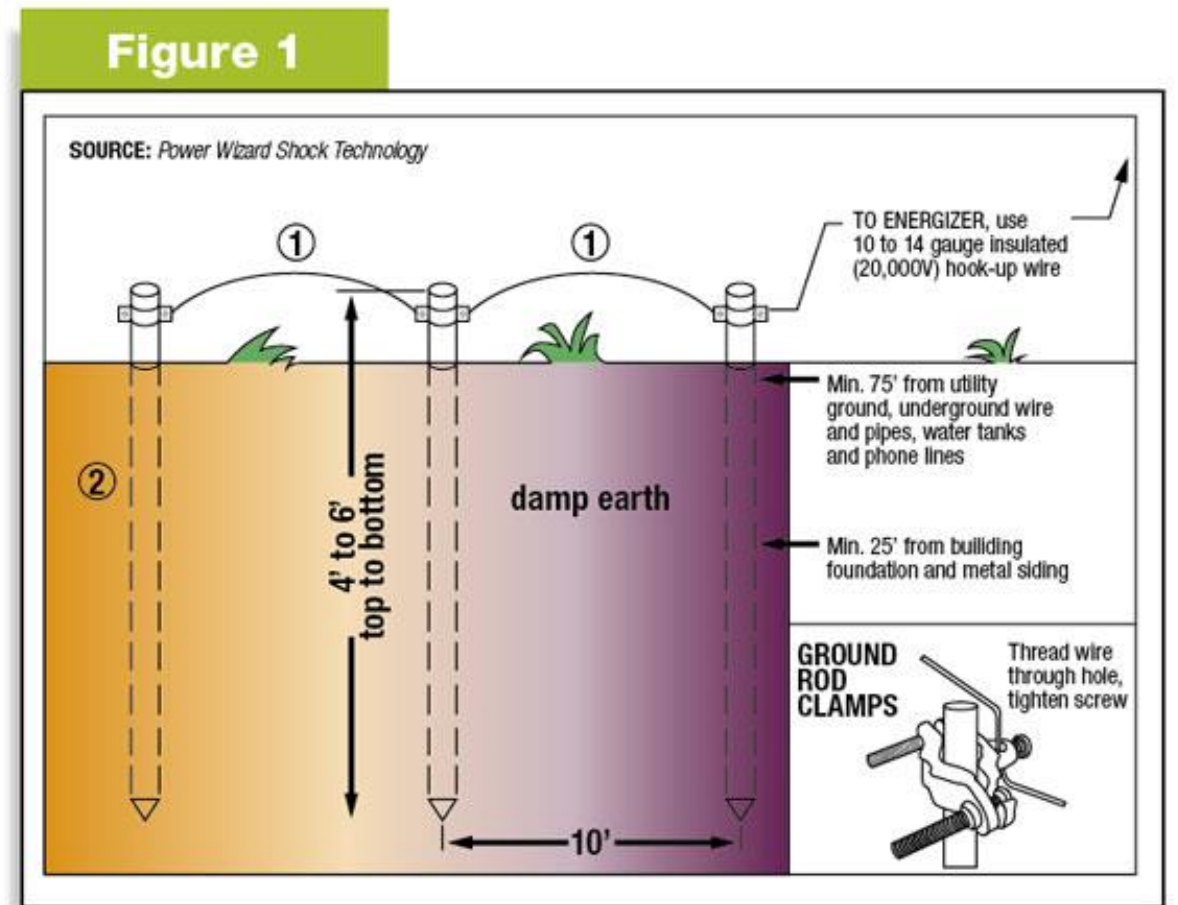
250.50 Grounding Electrode System. All grounding electrodes as described in 250.52(A)(1) through (A)(7) that are present at each building or structure served shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used.

Exception: Concrete-encased electrodes of existing buildings or structures shall not be required to be part of the grounding electrode system where the steel reinforcing bars or rods are not accessible for use without disturbing the concrete.

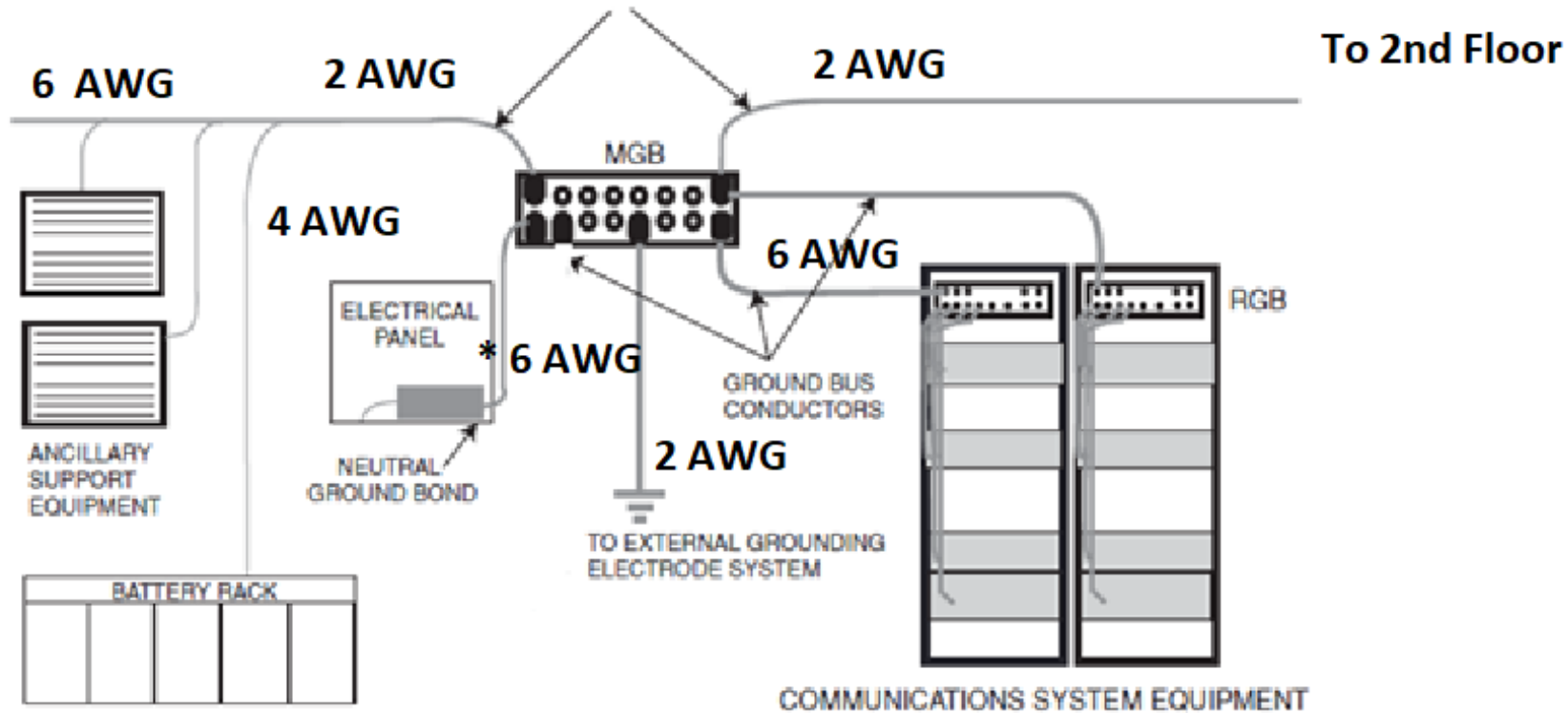
NEC



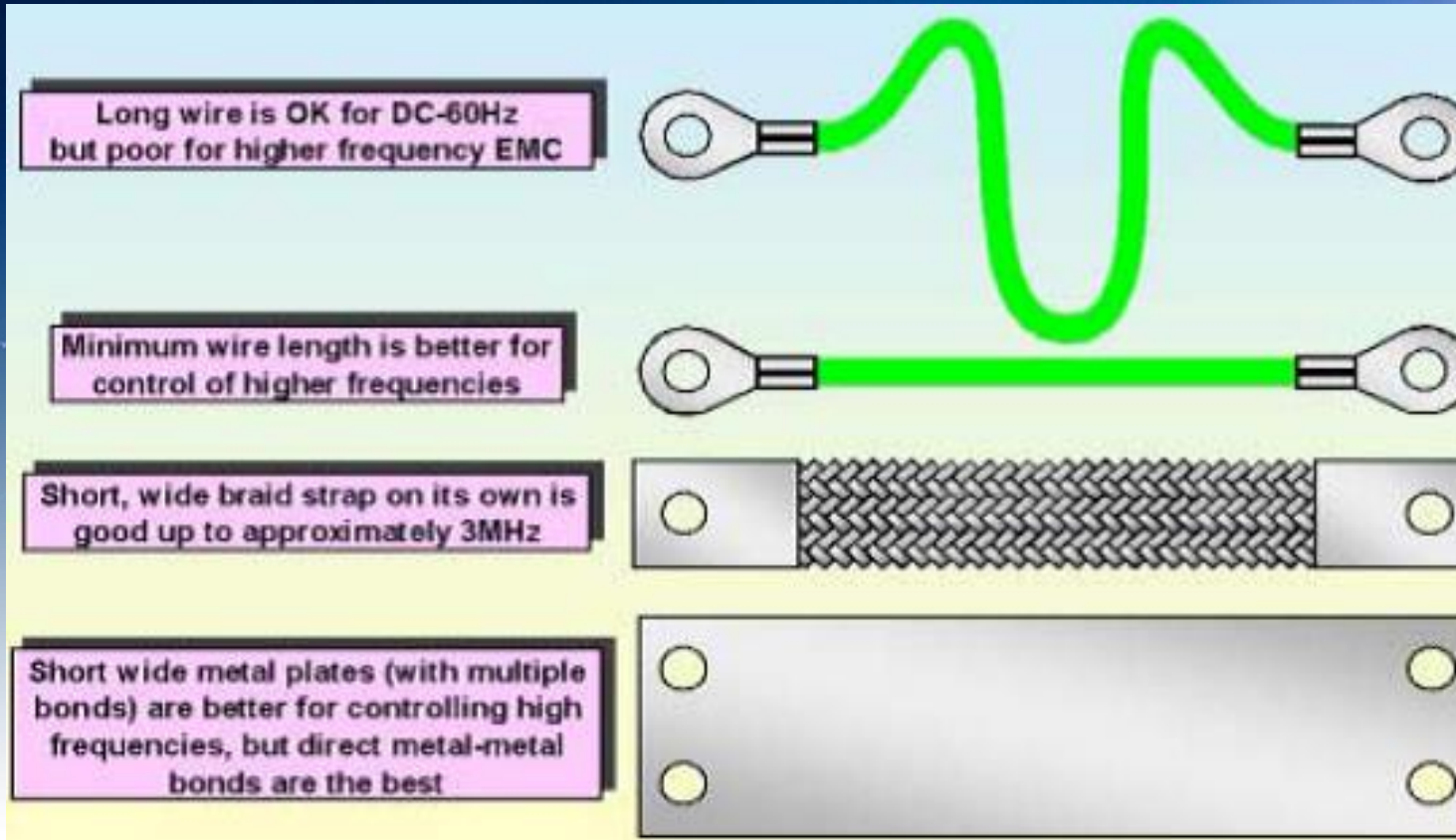
NEC target is <30 ohms for safety
Commercial and Industrial - <10 ohms



Telecom – 0.5 ohms
NEBS – 0.1 ohms



- All Equipment Bonds are single point connecting back to a single MGB
- Typical Ground Bonds back to the MGB are no less than 4 AWG
- The more Bonds connected to a single cable the larger the feeder cable becomes



Equipment Bonds electrically connect equipment to grounding system

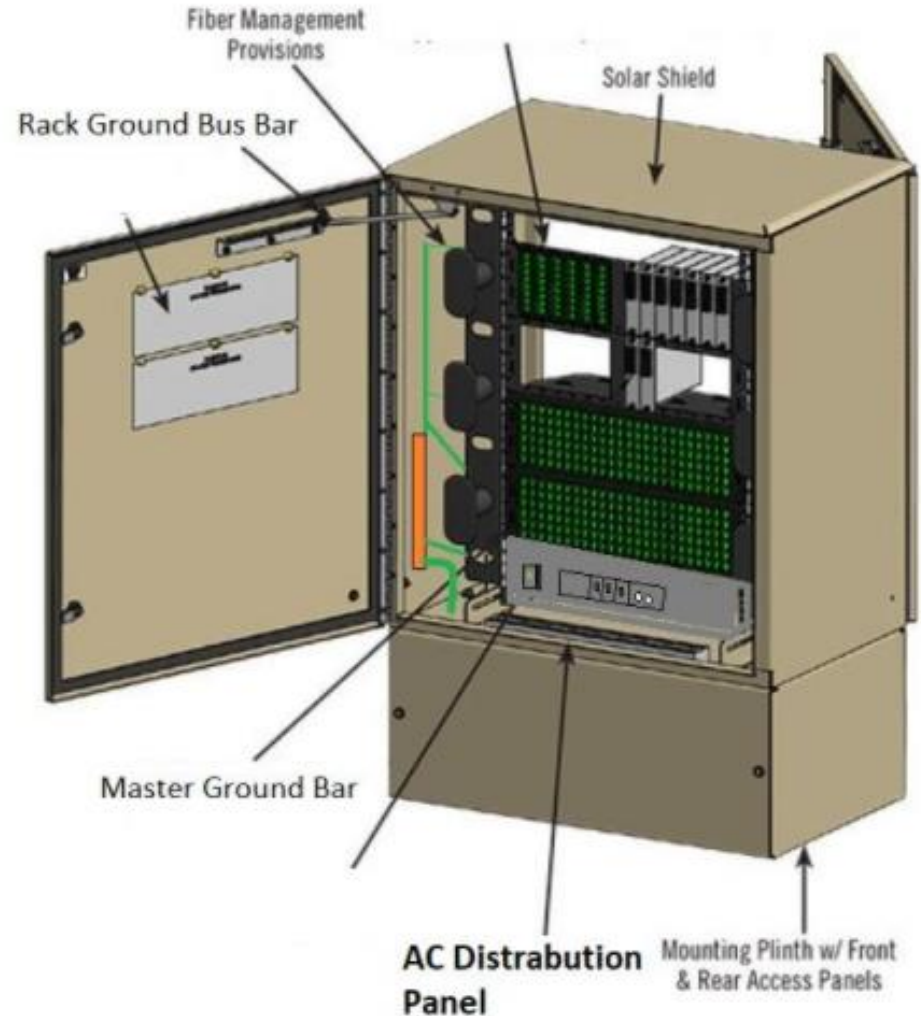
- No sharp bends – prevents proper surge and EMI protection
- Braid allows flexibility. Usually found on drawers or doors
- Bus Bar – BEST electrical bond for all frequencies

Outdoor Cabinet Bonds

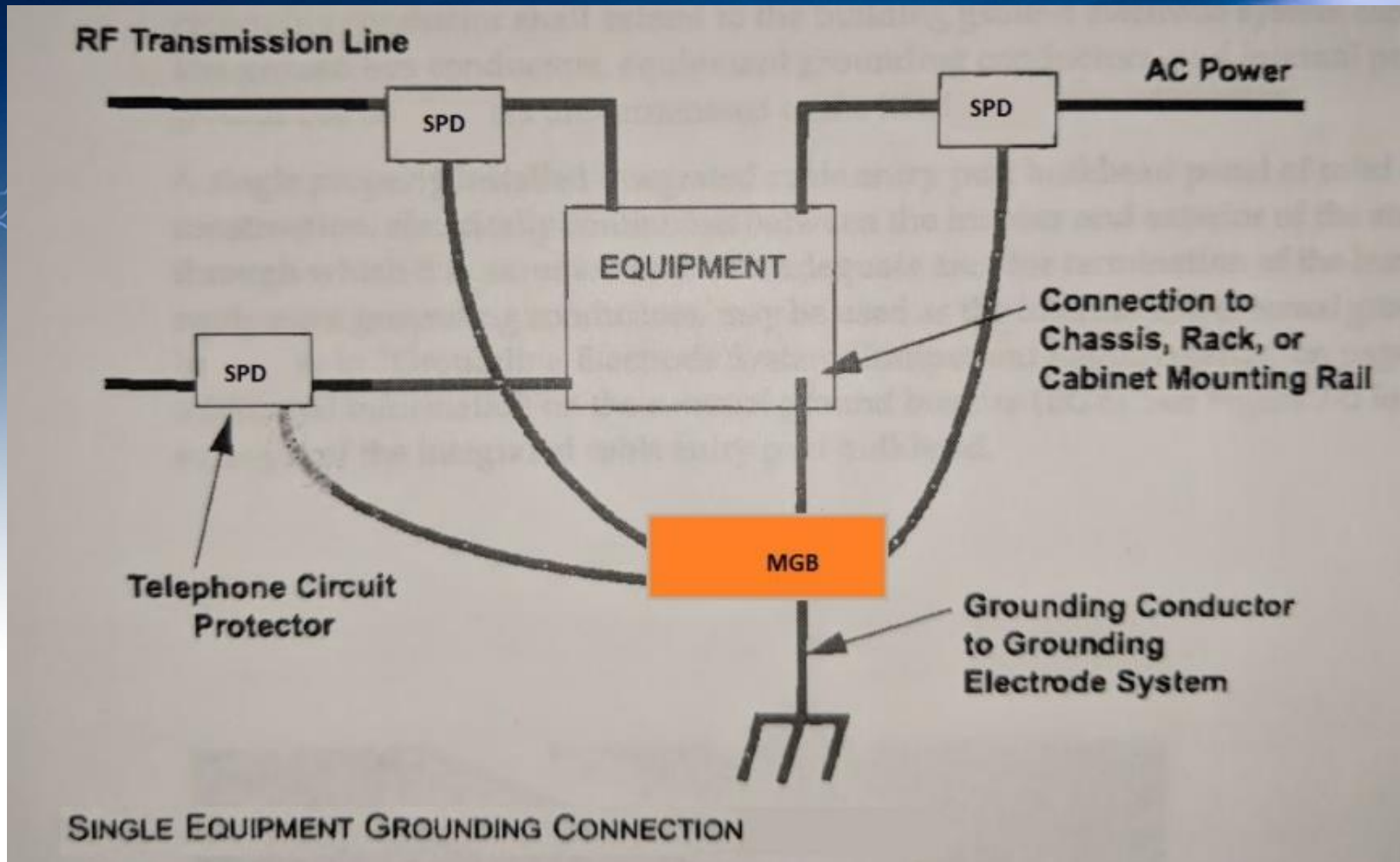
Outdoor Equipment Cabinets need to follow the same rules for single point grounding.

ALL GROUND FEEDS ARE SEPARATE TO THE MGB

Never connect the equipment chassis directly to the enclosure. This allows lightning surges and electricity to pass from chassis to the equipment



Surge Protection and Filters



All Surge Protectors should directly discharge into a SSGB or the MGB

Never discharge a SPD into the equipment rack ground. This causes transient surges to jump around the cabinet and can cause ground loops