

**PROTECTOR AND SIGNALING  
 GROUNDS**

**1.00 INTRODUCTION**

This section covers the selection of protector and signaling grounds and the installation of ground-connecting apparatus.

**2.00 SELECTION OF PROTECTOR GROUND**

**2.01** The selection of protector grounds shall be made in accordance with the order of preference shown in Table A. No deviation is permitted from this requirement except by the approval of the supervisor or other authorized instructions.

**2.02** To provide an effective ground, a metallic pipe or structure must have 10 feet or more of its surface buried in moist soil.

**2.03** Where it is determined that nonmetallic pipe has been used for service entrance, connect to the next choice ground.

**2.04** At radio stations connect the protector ground to the radio station ground.

**3.00 SELECTION OF SIGNALING GROUND**

The grounding mediums listed in Table A may also be used for signaling grounds. Follow the same order of selection as for protector grounds. Ground strips connected to grounded sheath cables are also suitable signaling grounds.

**TABLE A**

<b>Choice</b>	<b>Grounding Medium</b>	<b>Limitations</b>
1st	Public Water System Metallic Service Pipe	Connect to cold water pipe in service.
<b>Note:</b> Where a water pipe is not readily available (within 35 feet) or where unusual circumstances are encountered, the protector may be grounded to the power service conduit, service equipment enclosures (meter boxes etc), or grounding conductor of the power service if the grounded conductor of the power service is connected to a water pipe at the building. Methods and limitations of fastening to service equipment enclosures and grounding conductors of power service shall be covered by local instruction.		
2nd  Any one of three listed, preferably same as power ground.	Private Water System Metallic Service Pipe or	Connect to cold water pipe in service.
	Grounded Metallic Structures (Buried Tanks, Pipes, and Conduits) or	Where permitted to use public gas system pipes, connect to street side of meter.
	Ground Rod of Multigrounded Neutral Power System	Identification of multigrounded neutral power systems should be covered by local instructions.
3rd	Telephone Ground Rod	Do not use with multiple station protectors such as 109-, 116-, or 117-type protectors. See 5.05 for bonding telephone ground rod to power rod when required by local instructions.

4.00 INSTALLATION OF STATION GROUND CLAMPS

4.01 The ground clamp should be located at a point where it will not be subjected to excessive movement or vibration and where it is least likely to be damaged by plumbers or other workmen. If the pipe is insecure or subject to vibration, tape ground wire (using friction tape) to pipe in close proximity to ground clamp (see Fig. 1).

4.02 Where insulated joints are found (usually at meters, valves, pumps, etc), the ground clamp should be installed at a point at which the insulating joint will not break continuity to ground. Where pumps, meters, etc, may be removed for seasonal overhaul, the ground clamp should be installed at a point at which the continuity to ground will not be broken.

4.03 Make certain that the surface of the metallic pipe to which the ground clamp is being fastened is free of paint, rust, etc.

4.04 Install ground clamp as follows and as shown in Fig. 2:

1. Back off locknut and setscrew. Form copper shoe to approximate contour of pipe. Bend the strap on each side of the soldered nut.
2. Bend strap around the pipe and place strap on the rivet using the hole that provides the least slack in the strap.
3. Bend excess portion of the strap back and tighten setscrew firmly, but exercise care to avoid breaking clamp or damaging pipe.
4. Remove excess portion of strap. Place ground wire under washer and tighten locknut firmly. Ground wire insulation should be removed approximately 1/8 inch from washer.

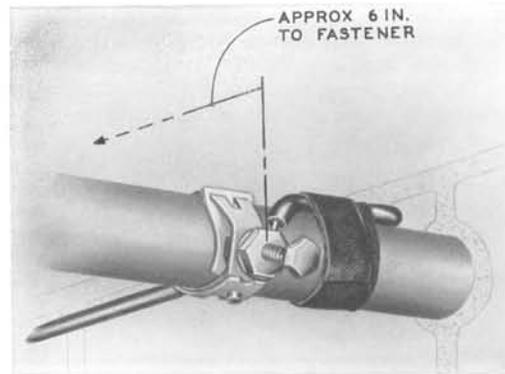
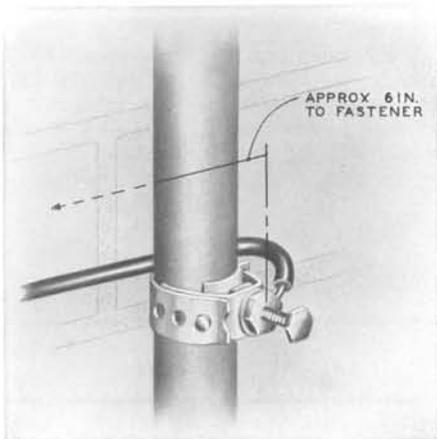


FIG. 1—TYPICAL GROUND CLAMP INSTALLATIONS

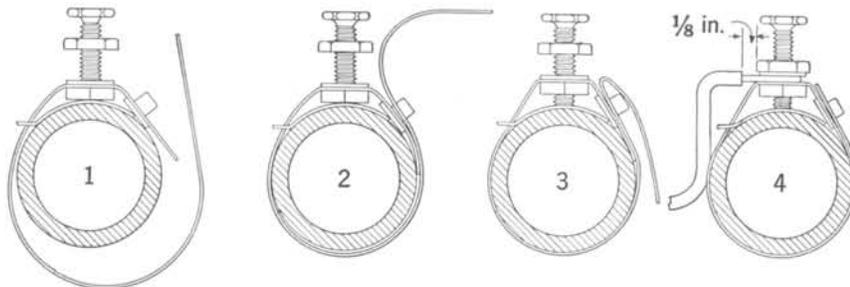


FIG. 2—GROUND CLAMP INSTALLATION—SMALL PIPE

- 4.05 Two clamps may be bolted together if pipe is too large for a single clamp (see Fig. 3).
- 4.06 An L-type ground clamp should be used to terminate a No. 6 ground wire on a metallic pipe.
- 4.07 A ground wire caution tag, Form E-3013, or local equivalent may be placed at the station ground clamp to lessen the possibility of anyone's tampering with the clamp or wire.

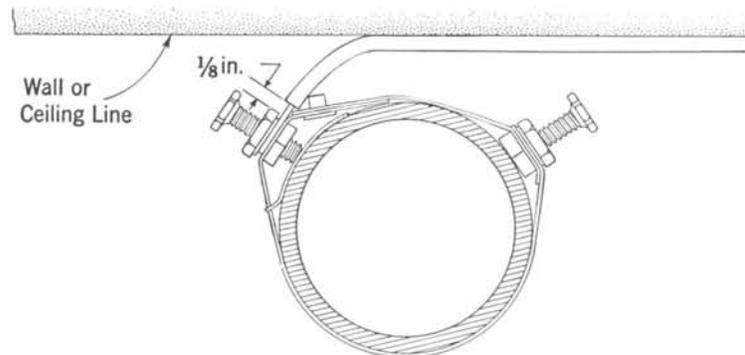


FIG. 3—GROUND CLAMP INSTALLATION—LARGE PIPE

#### 5.00 INSTALLATION OF GROUND RODS

- 5.01 Inspect ground rods before and after driving to make certain that tail wire is not broken.
- 5.02 Locate and install ground rods as indicated in the following:
- Where least likely to be damaged or tampered with.
  - As near as practicable to masonry walls in earth-floor basements.
  - Approximately 12 inches from outside wall (see Fig. 4).
  - Driven to a depth of approximately 3 inches below ground level. (Increase depth where damage from digging is likely.)
  - Spaced at least 12 inches apart.
  - At least 6 feet from power service ground rods.

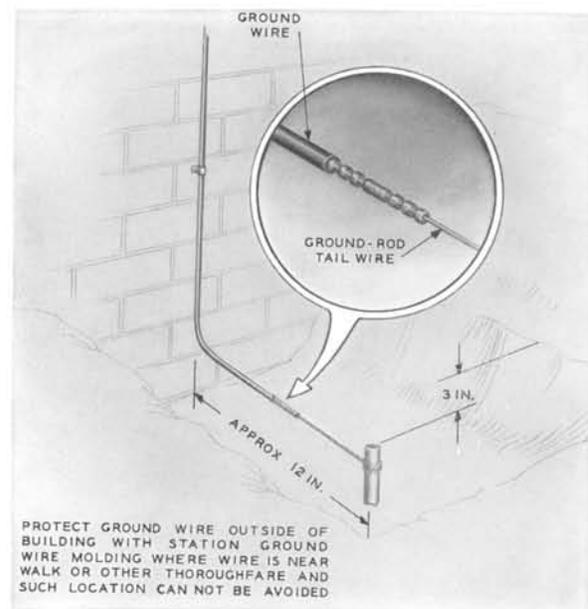


FIG. 4—GROUND ROD INSTALLATION NEAR WALL

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- Approximately 2 feet from base of wooden poles or posts, where conditions permit (see Fig. 5).

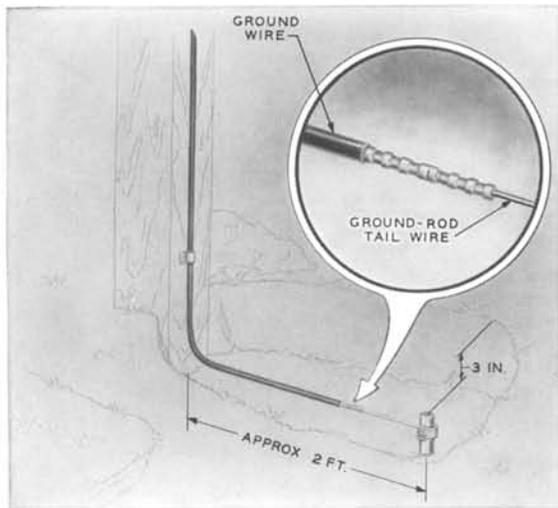


FIG. 5—GROUND ROD INSTALLATION NEAR WOODEN POST

5.03 After ground rod is installed, No. 14 ground wire is spliced to tail of rod with a .064 brass sleeve. Do not tape splice. When a larger size of wire must be terminated on the ground rod for bonding purposes, a B strand ground clamp is used to make the connection.

5.04 Only one protector may be connected to a ground rod. *Ground rods should not be used with multiple protectors (of such types as 109, 116, or 117).*

5.05 Where local instructions so specify, bond the telephone ground rod to the power ground rod with No. 6 ground wire as shown in Fig. 6. The B strand ground clamp or approved equivalent may be used at the telephone ground rod, and an L-type ground clamp may be used at the power ground rod.

5.06 When using a power ground rod as a grounding medium, fasten ground wire to rod with a station ground clamp.

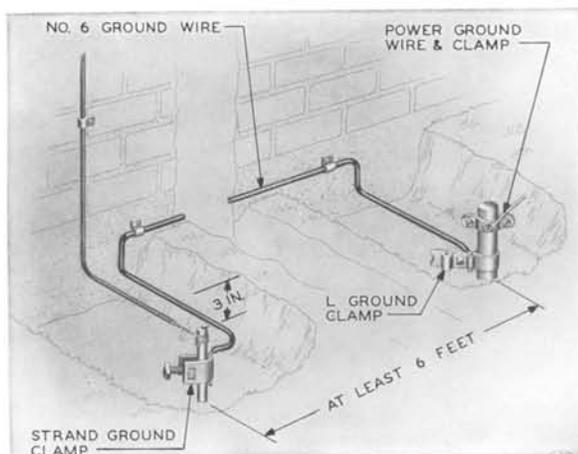


FIG. 6—BONDING TELEPHONE AND POWER SERVICE GROUND RODS