

STATION PROTECTORS INSTALLATION AND INSPECTION

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INSTALLING PROTECTORS—GENERAL	4	2.01 This paragraph lists the test equipment and material covered in this practice. For convenience, CTS catalog numbers are listed if available.
INSTALLING PROTECTORS—FUSELESS	5	a. Test Equipment:
BURIED INSTALLATIONS	6	(1) B. Voltage Tester, CTS #74-94-310-3.
INSTALLING PBX PROTECTORS	7	b. Material:
1. GENERAL		(1) 72A Bracket, CTS #70-75-104-8.
1.01 This practice provides information for installing station protectors used at stations served by grounded metal shielded cable and open or multiple line wire. See CTSP 475-500-402 and 475-500-403 for information on protector selection and application and ground selection.		(2) 123 Type Protector, CTS #70-75-052-0.
1.02 Station protectors minimize danger to people and damage to station equipment from abnormally high voltage or currents.		(3) Ground Wire Warning Tag, CTS #51-77-016-4.
1.03 Insulated building attachments must be used on flammable surfaces when fused type of protectors are used.		(4) 350 Type Fuseless Protector, CTS #70-75-056-4.
1.04 Building attachments may be of the noninsulated type when fuseless protectors or converted fused protectors are used.		(5) 300 Type Gas Tube Protector, CTS #70-75-079-3.
1.05 If possible, use a 72A bracket and station ground clamp attached directly to a water pipe when installing a fuseless 123 type protector indoors. Where accessibility to the protector for maintenance presents a problem, do not install any protector indoors.		(6) 590 Type Fused Protector, CTS #70-75-054-8.
1.06 Fused protectors must be used when it is necessary to run more than one drop or cross-connect wire to furnish battery for a telephone system. A maximum of three drop or cross-connect wires furnishing battery for a system may be terminated on one fused protector and should be bridged on the line side of the protector.		(7) Busbar Adapter, CTS #70-75-001-7.
1.07 Sneak current fuses are not required with protectors associated with residence systems, wiring plans, or key equipment. However, they shall be provided on special services and leased lines when		(8) 2100H Type Fused Protector, CTS #70-75-053-0.
		(9) 502A1 Type Fuseless Multiple Protector, CTS #70-75-062-9.
		(10) 492 Protector Modules, CTS #70-75-041-6.
		(11) 400 Type Fuseless Gas Tube Multiple Protector, CTS #70-75-077-7.
		(12) 405 Gas Tube Two-Pair Mounting Block, CTS #70-75-106-4.
		(13) U Type Fused Multiple Protector, CTS #70-75-090-4.
		(14) 201 Grounding Lug, CTS #68-11-018-9.
		(15) 202 Bonding Clip, CTS #68-11-018-9.
		(16) 1094A Type Sneak Current Protector, CTS #70-75-059-9.
		3. LOCATION OF PROTECTORS
		3.01 Before installing protectors, the following should be taken into consideration:

a. **Fuseless Protector:** The line conductors remain grounded for the duration of a power contact and the voltage on the wire cannot rise sufficiently to create a hazard. To ensure this safety feature, the length of ground wire from the protector should be as short as possible (50 feet maximum for 14 and 10 AWG; 75 feet maximum for 6 AWG) to provide a low resistance path to ground. A ground wire run from the foundation of a building to an exterior ground should be buried at least 12 inches deep. Increase the depth to 18 inches where earth is likely to be disturbed. Buried ground wire runs should not exceed approximately 3 feet for No. 14 and No. 10 wire and 15 feet for No. 6 wire.

b. **Fused Protector:** To reduce the extent of exposure that might exist when fuses open as a result of power contact, the line conductors on the line side of the protector should be as short as possible.

c. **Accessibility:** Avoid placing protectors where a ladder is necessary for installation or maintenance or where they would be inaccessible. See paragraph 1.05.

d. **Location of Telephone and Power Ground:** The telephone ground shall be located to simplify common grounding.

e. **Appearance:** Avoid locations on the front of buildings or in living quarters.

f. When mounted indoors or underneath buildings, select a dry and well ventilated location.

g. Where snow and moisture might create a problem, locate the protector between 3 and 5 feet above grade if exterior mounted.

h. The location of station protectors, station wire, and ground wires should always comply with the practices covering electrical and mechanical protection and separations.

i. Unless absolutely necessary, attachments should not be made to aluminum siding and other such siding. If it is necessary to make an attachment to such materials, the property owner should be notified and permission obtained.

j. In general, station protectors should be located as near as possible to the entrance hole for the station and ground wires.

k. When locating protectors in alleys and on business buildings, etc., where there is commercial or private traffic, it is necessary to select a safe location. This may involve raising or

lowering the protector; also, it may be desirable to locate the protector inside the building.

3.02 When it is necessary to multiple fuseless or fused protectors for interior installation, there should be 1 inch separation when mounted horizontally, and 2 inches separation when mounted vertically. On external installations, there should be 1 inch separation horizontally and sufficient separation vertically to allow removal of the cover.

4. INSTALLING PROTECTORS—GENERAL

CAUTION: Before connecting the protector ground wire, test the power company ground rod, wire, cabinet, meter box, etc., using a B voltage tester.

4.01 Whenever possible, use a 72A bracket and 123 type protector to provide a direct connection to the grounding medium. The 123 type protector and the 72A bracket should be used indoors only. See paragraph 1.05.

4.02 Where possible, use a common clamp for wiring at the protector. The common clamp method is used to retain station and ground wires or buried drop and ground wires. Drop and station wires should NEVER be in the same clamp. Generally, aerial drop wire will not be affected by this practice.

NOTE: Never place an aerial drop or buried service wire on a building (when station protection is required) unless the station protector can be installed and grounded before the installer leaves the premises.

4.03 The first clamp to be placed on buried service wire should be 4 inches above ground level; the last clamp should be 2 to 4 inches below the protector.

4.04 The intermediate clamps should not exceed 18 inches maximum distance from the first, last, or any other intermediate clamp.

4.05 Terminate line and inside wires on the protector so that the ring conductors (single tracer or red wires) are connected to the right side of the protector.

4.06 All screws and fasteners should be of sufficient length to mount the protector securely.

4.07 Table A lists the ground wire size required for single or multiple installation of protectors.

4.08 The initial protector ground wire installed should be of sufficient gauge to provide protection for any future protectors installed. See Table A.

TABLE A. Ground Wire Capacity

Size	Protectors		
	Fused		Fuseless
No. 14	1 to 3	Or	1
No. 10	4 to 8		2 to 6
No. 6	any number		any number

NOTE: The ground wire between protectors shall be the same size as the ground wire between the protector and the grounding electrode.

4.09 In all cases, a ground wire warning tag shall be placed conspicuously on the ground wire beneath the protector and at all other ground and bond wire terminations. The tag shall be secured on the ground wire as close as possible to the protector and clamps.

5. INSTALLING PROTECTORS—FUSELESS

5.01 Preferably, the 123 type protector should be installed directly on an acceptable metallic cold water pipe by means of a 72A bracket (see Figure 1) and a station ground wire clamp. The 123 type

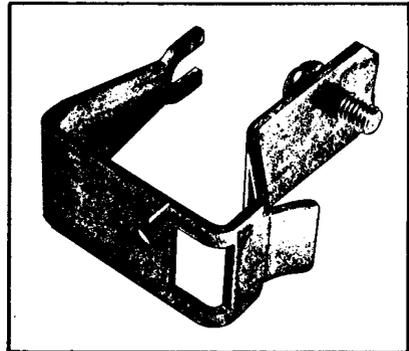


FIGURE 1. 72A Bracket

protector is for indoor installation only. See paragraph 1.05.

5.02 To install the 72A bracket on the 123 type protector, proceed as follows:

- a. Place a station ground wire clamp through the slots in the 72A bracket. See Figures 2 and 3.

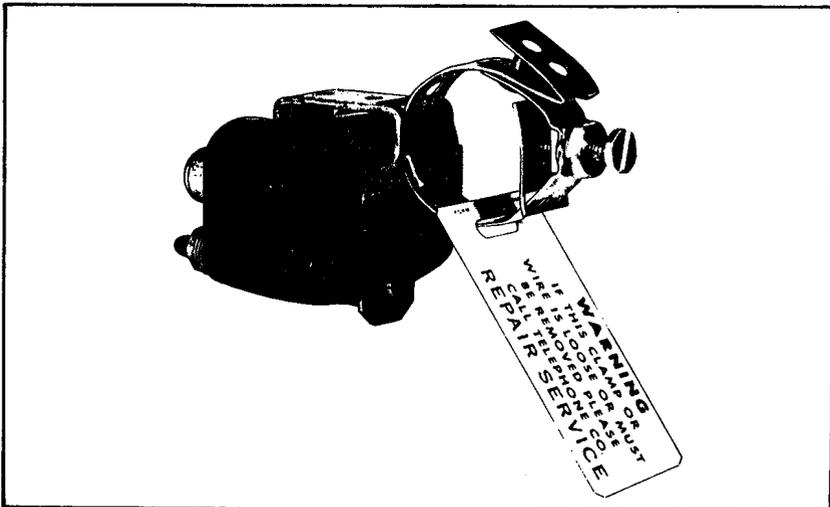


FIGURE 2. Station Ground Wire Clamp Through Slots in 72A Bracket Attached to 123 Type Protector



FIGURE 3. Front View of 123 Type Protector, 72A Bracket and Ground Clamp with Water Pipe Removed

b. Attach the ground wire clamp to an acceptable cold water pipe in the usual manner. Remove the screw from the 72A bracket and slide the protector into place, making sure the notched portion of the bracket is under the pronged washer of the protector ground terminal.

c. Place the mounting screw furnished with the 72A bracket in the bottom mounting hole of the 123 type protector and into the threaded hole of the bracket. Tighten the mounting screw, ground terminal nut, and protector ground terminal nut. See Figure 4.

NOTE: A protector installed in this manner is grounded through the 72A bracket; therefore, a station ground wire is not necessary.

5.03 Figures 5 through 16 show typical installations of single and multiple protectors. Also shown are typical installations of two single protectors at the same location.

a. Figure 5 shows a typical installation when the 123 type protector cannot be installed on a metallic cold water pipe (for indoor use only). See paragraph 1.05.

b. Figures 6, 7, and 8 show typical installations of

single fuseless and gas tube protectors.

c. Figure 9 shows a typical multiple installation of fuseless protectors.

d. Figure 10 shows a typical installation of a single fused protector.

e. Figure 11 shows a typical multiple installation of fused protectors.

f. Figure 12 shows a typical installation of a multiple type fuseless protector.

g. Figure 13 shows a typical installation of the multiple type gas tube protector.

h. Figures 14, 15, and 16 show a typical installation of the multiple type fused protector.

5.04 All the measurements shown in Figures 17 through 21 should be followed when locating and wiring station protectors.

6. BURIED INSTALLATION

6.01 The armor of underground wire or the aluminum tape of service wire should always be grounded at the buried closure and at the customer's location. The grounding is required to minimize shock

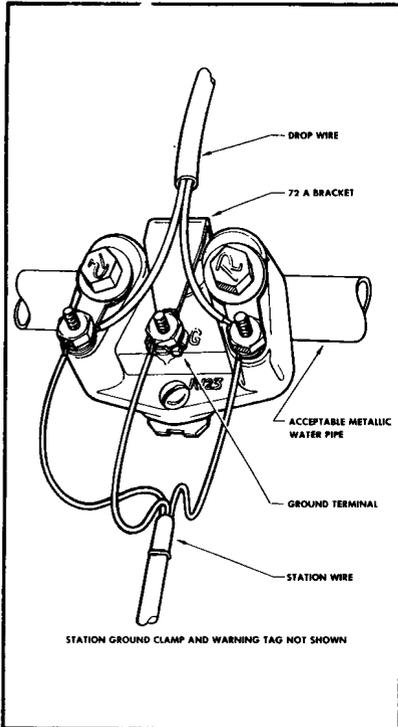


FIGURE 4. 123 Type Protector Installed on a Metallic Water Pipe (for Indoor Use Only)

or fire hazards from sustained power contact at the customer's location.

6.02 The 201 grounding lug will be used to bond the aluminum shield of service wire or the armor of underground wire to the protector.

6.03 Install the protector on the wall. Mark the location of the 201 grounding lug on the service wire. Cut around the outer jacket with a knife.

CAUTION: Do not cut into metallic shield. Bend the service wire at the cut in several directions until the outer jacket and shield break away cleanly. Slide the jacket and shield material off the end, exposing the inner PUC jacket.

6.04 Remove all but approximately 3/8 inch of the inner jacket by cutting around with a knife; then pull off the jacket. See Figure 22.

CAUTION: Do not cut into the conductor insulation.

6.05 Straighten the service drop at the prepared end. Slip the crimping collar (see Figure 23) over the wires and inner jacket and up onto the outer jacket.

6.06 With pliers or fingers, place the grounding lug (see Figure 23) against the inner jacket and push it under the metallic shield until the tapered end is inserted up to the step at the end of the sawtoothed edges. If the lug binds, tap it in lightly.

6.07 Move the crimping collar to within 1/16 inch of the cut end of the outer jacket. Rotate it until the opening in the collar is on the opposite side of the service drop from the grounding lug. Crimp the collar. Ordinary pliers may be used for this operation, with pressure applied as shown in Figure 24 (the crimp will be oval and the teeth of the grounding lug will not close). Apply enough pressure to close the collar, ensuring penetration of the lug teeth into the metallic shield.

6.08 Terminate the grounding lug directly on the ground post of a station protector. See Figure 25.

6.09 Use the lug, 202 bonding clip and wire combination where the ground post will not accept the spade tip of the grounding lug, such as when multiple protectors 400, 502A1, and U-type are used. Place the 202 bonding clip over the lug, securing the clip with two crimps on each of the two edges, using wire cutters. Slip an end of a 14 AWG ground wire into one of the open edges of the bonding clip and make two crimps. Use the other end of the 14 AWG ground wire for terminating on the ground post of the protector. See Figure 26. The same method can be used for terminating the buried service drop in a pedestal or terminal.

7. INSTALLING PROTECTORS—PBX

7.01 No other protection is required at location where PBX circuits terminate on main frame type protectors equipped with heat coils and carbon blocks.

7.02 Where main frame type protectors are not used, sneak current fuses are required. The 1094A type protector equipped with sneak current fuses (60D) will be used with either fuseless or fused protectors. Insert the 1094A type protector between the fuseless or fused protector and the station wire (for indoor mounting only). See Figure 27.

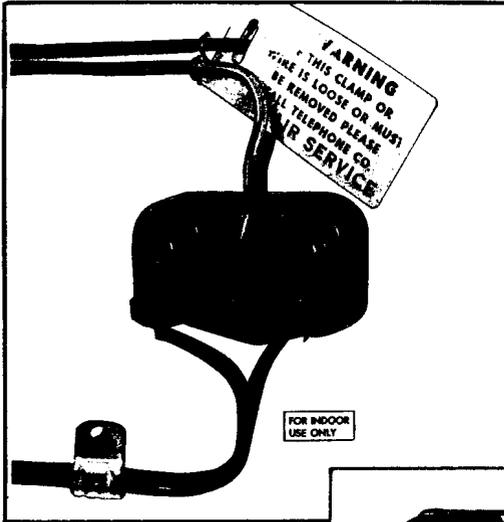
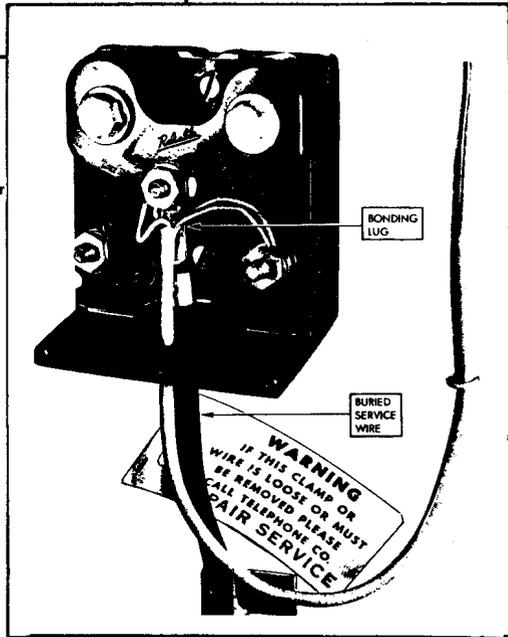


FIGURE 5. 123 Type Protector Mounted on Wall (For Indoor Use Only)

FIGURE 6. 350 Type Fuseless Protector With Buried Service Wire



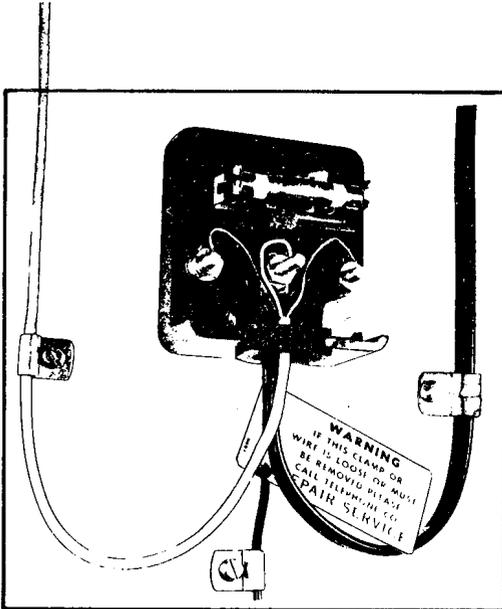
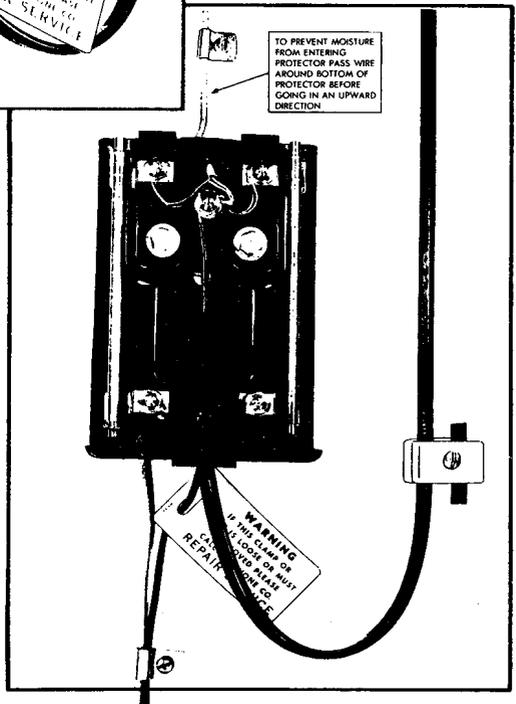


FIGURE 7. 300 Type Gas Tube Protector
(Cover Removed)

FIGURE 8. 590X Protector—Converted
590 Type Fused Protector
to Fuseless Operation With
Two Inside Wires Using
Busbar Adapters



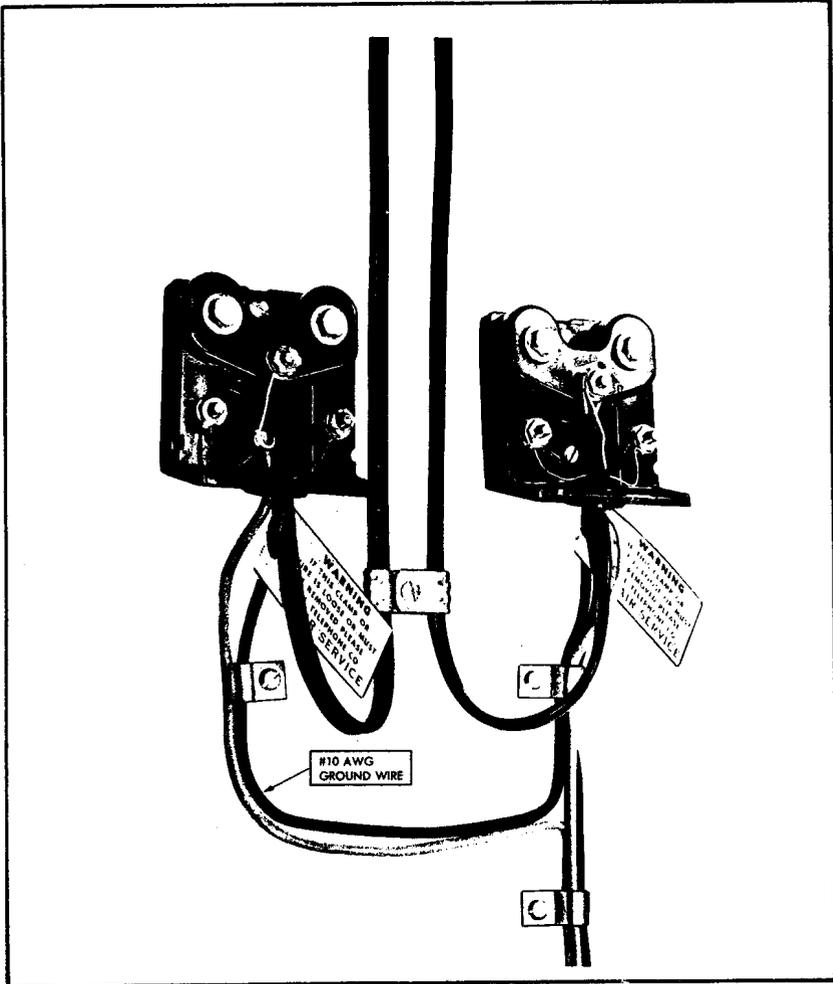


FIGURE 9. Typical Multiple Installation of Fuseless Protectors

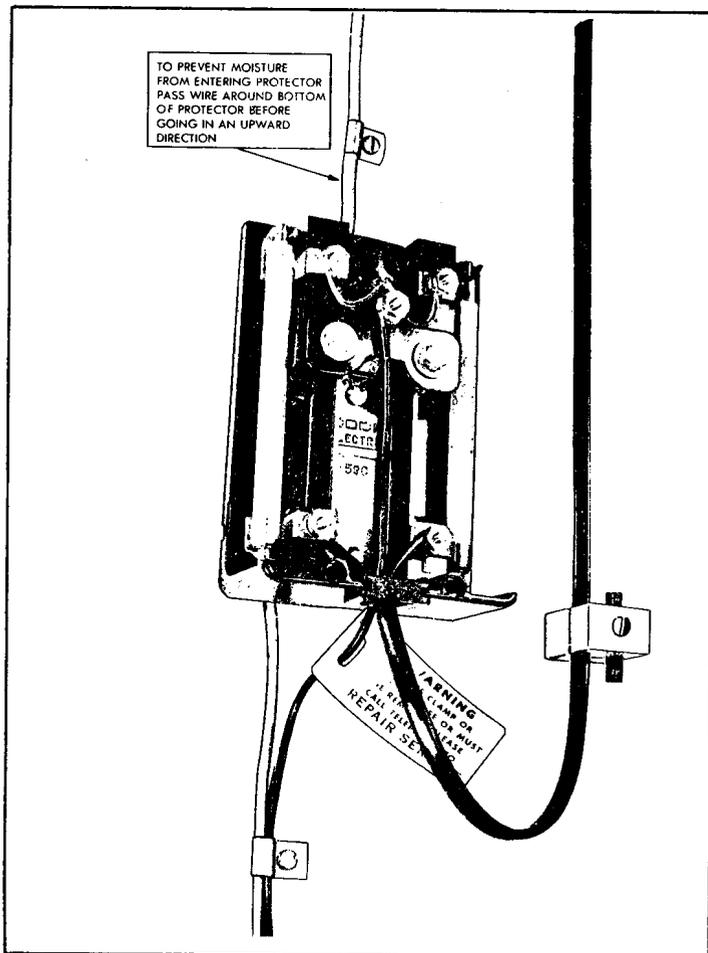


FIGURE 10. 590 Type Fused Protector with Two Inside Wires

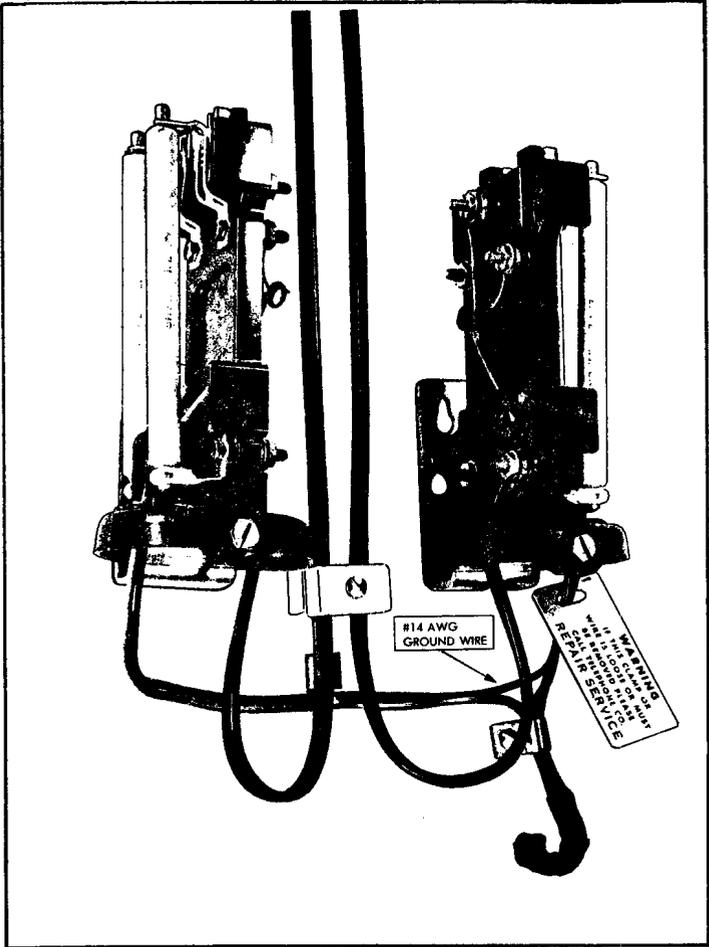


FIGURE 11. Typical Multiple Installation of 2100H Type Fused Protectors
(Covers Removed)

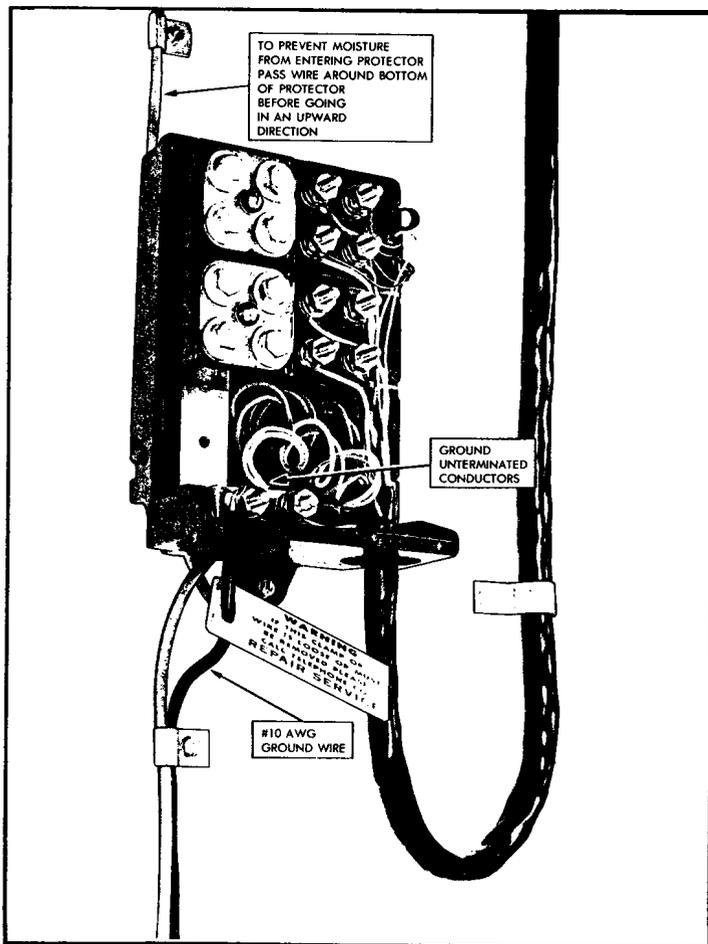


FIGURE 12. Typical Installation of Fuseless Multiple Protector 502A1 Type with Two 492 Protector Modules

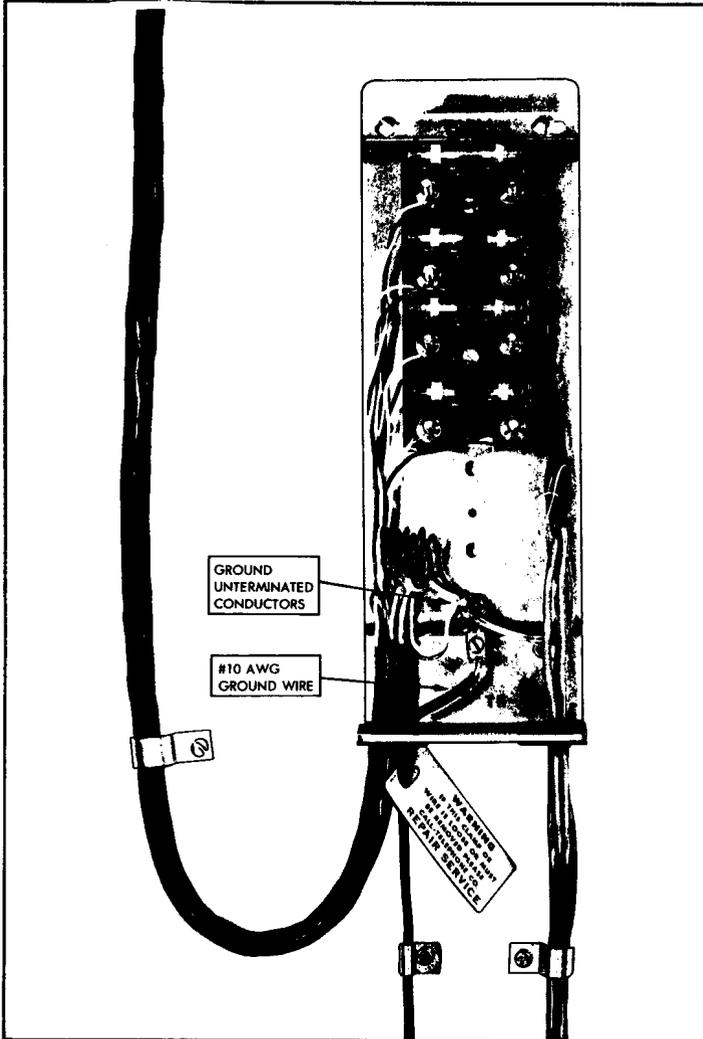


FIGURE 13. Typical Installation of Fuseless Gas Tube Multiple Protector Type 400 with Two 405 Two-Pair Mounting Blocks (Cover Removed)

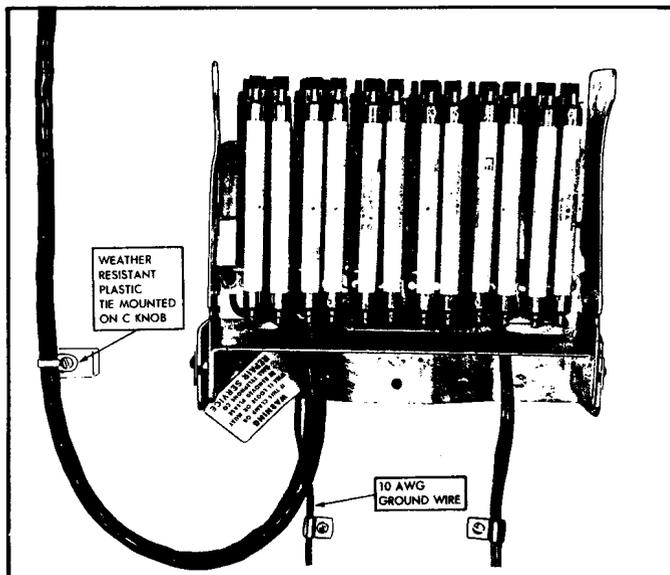


FIGURE 14. Typical Installation of U-Type Multiple Fuse Protector (Cover Removed)

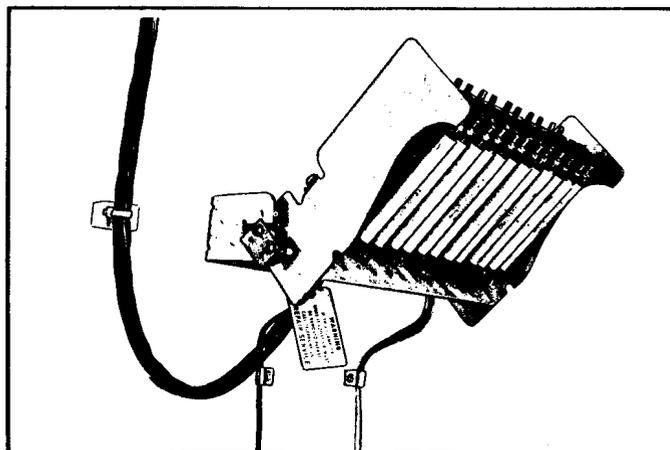


FIGURE 15. U-Type Protector Tipped Forward to Facilitate Attaching Inside Wires

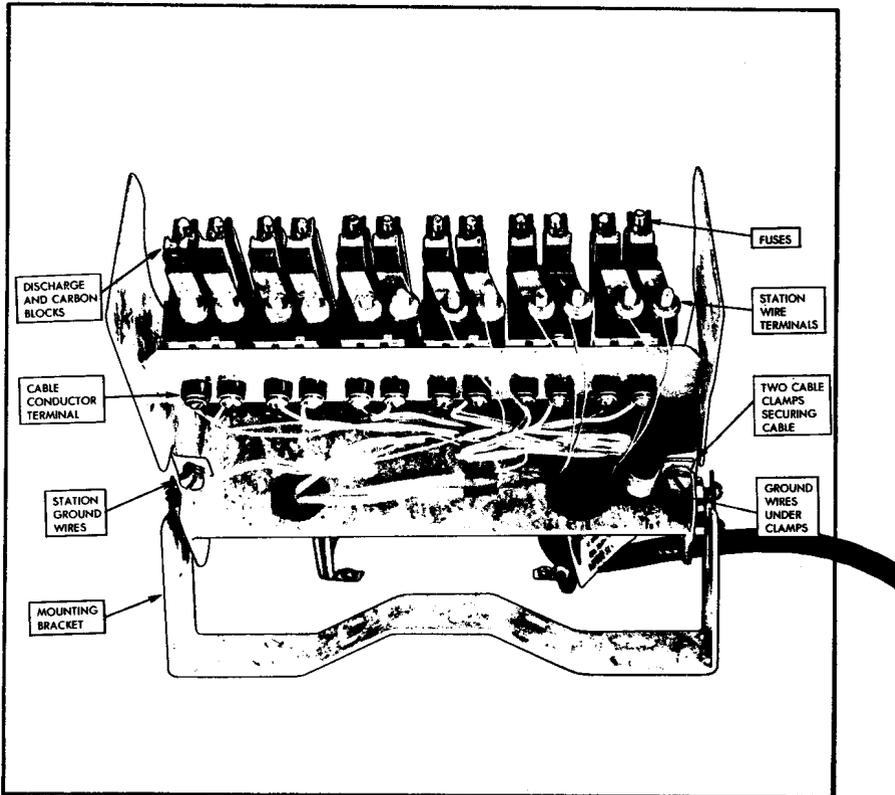


FIGURE 16. U-Type Protector as Viewed from Above with Protector Tipped Forward

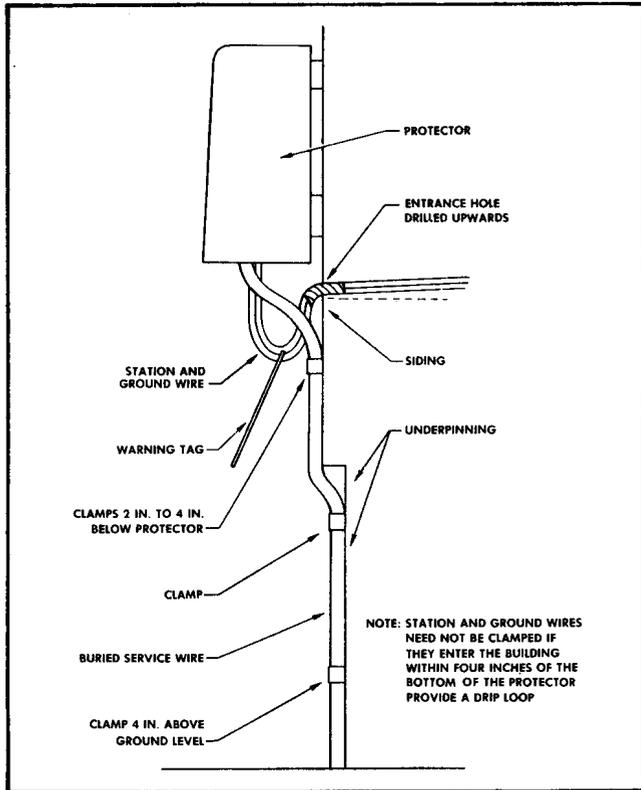


FIGURE 17.

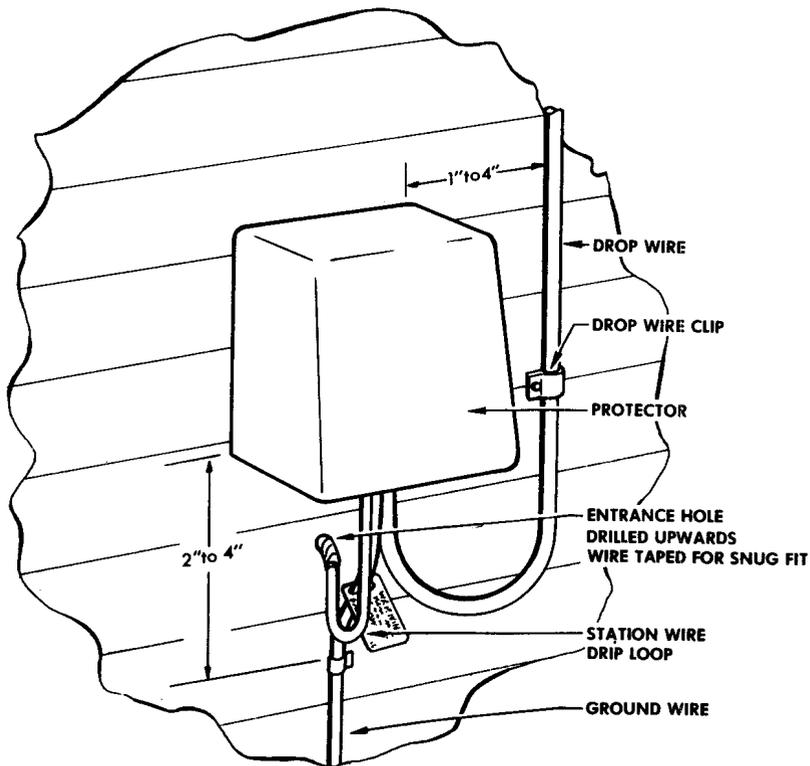


FIGURE 18.

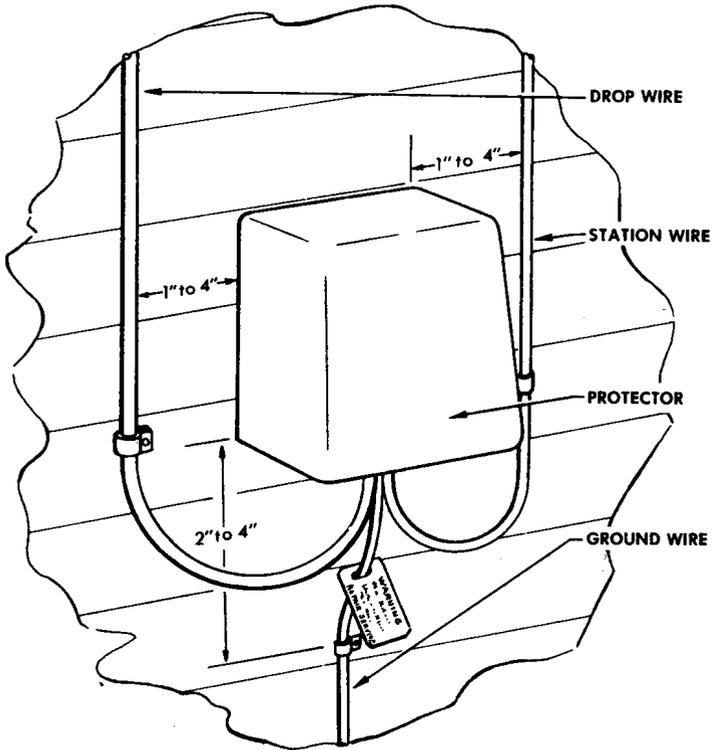


FIGURE 19.

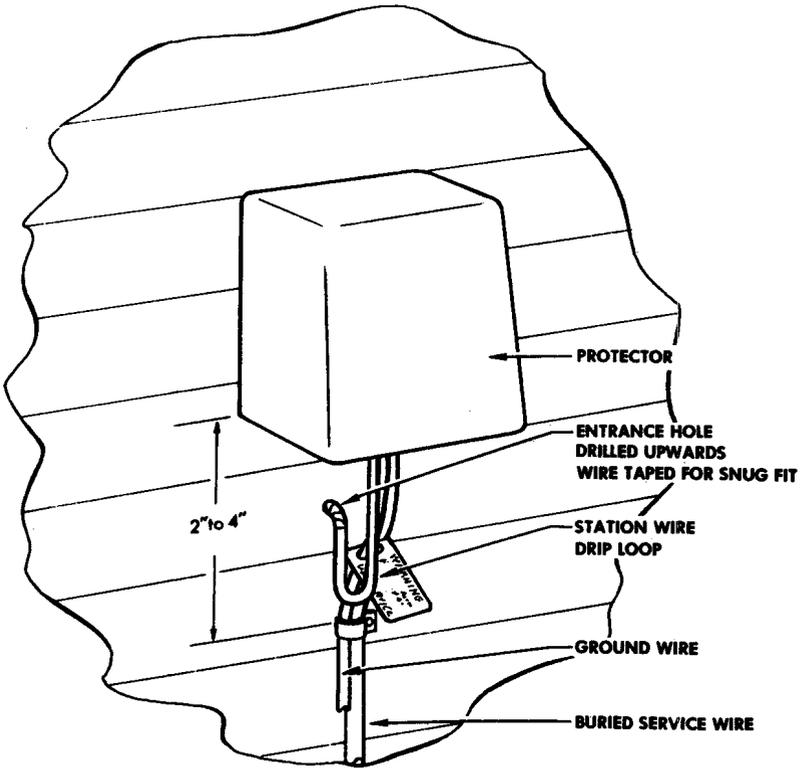


FIGURE 20.

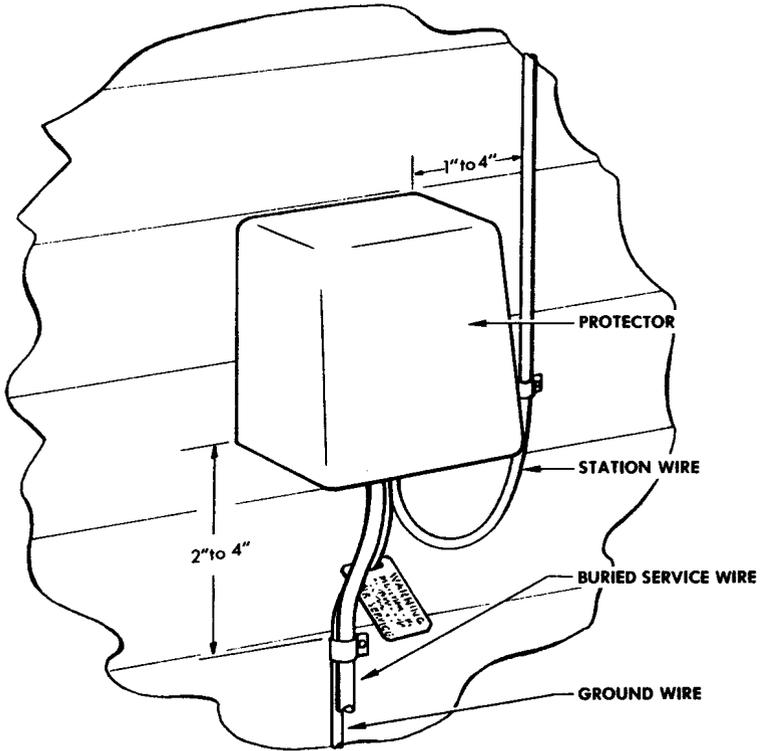


FIGURE 21.

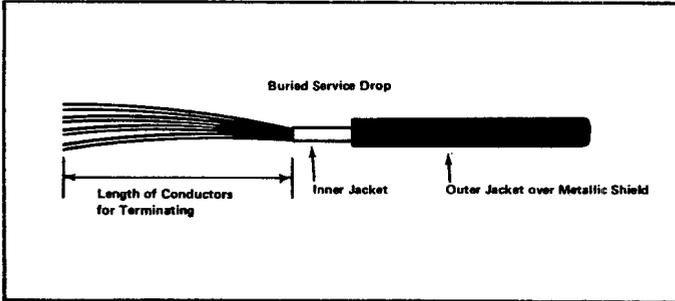


FIGURE 22.

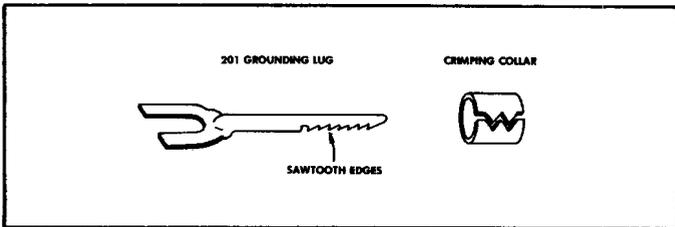


FIGURE 23.

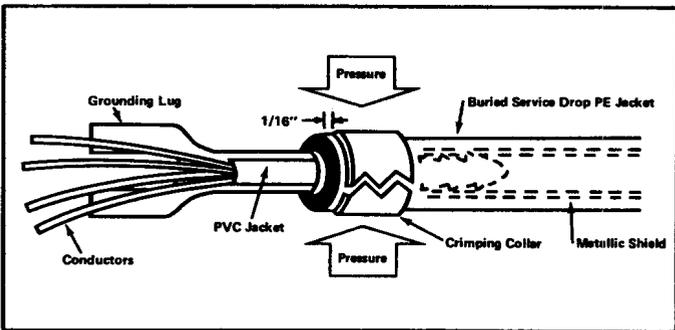


FIGURE 24.

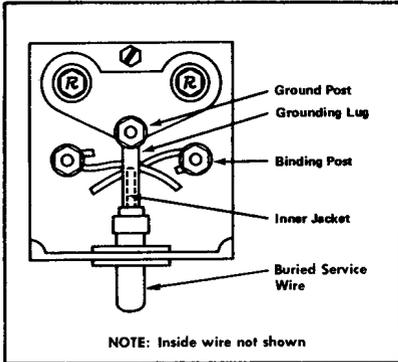


FIGURE 25.

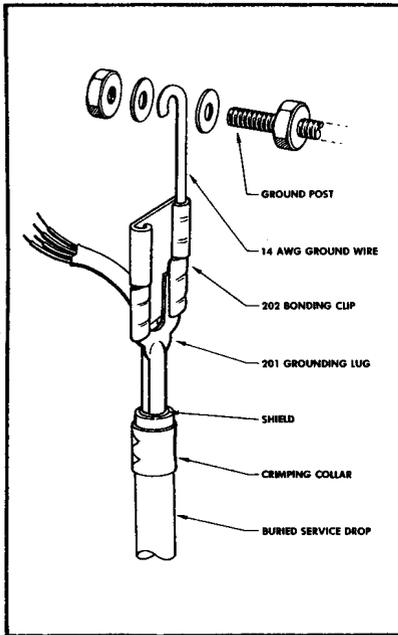


FIGURE 26.

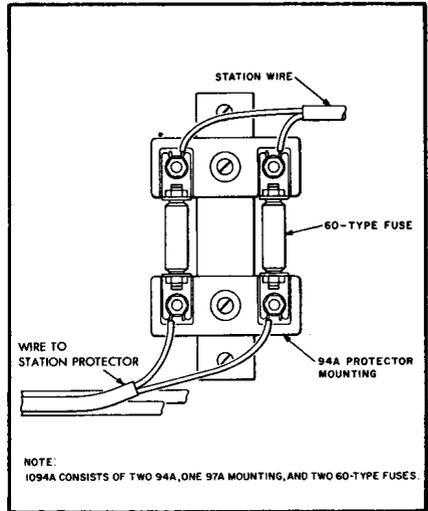


FIGURE 27. 1094A Type Protector with Type 60 Fuses