

## STATION PROTECTION INSTALLATION AND INSPECTION

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### 1. GENERAL

**1.01** This section covers the installation of station protectors. It also includes the use of 150A Covers, 46A Shields, and associated protector mountings.

**1.02** This section replaces Sections 638-215-200 and 465-310-201 which are canceled.

**1.03** Service orders on other local instructions will specify whether or not station protection is required.

**1.04** Station protectors prevent damage to station equipment from abnormally high voltage or current.

**1.05** Noninsulated building attachments should be used with fuseless protectors or with fused protectors that have been converted to fuseless type.

**1.06** When installing a fuseless 123A1A or 128A1A-2 Protector, if possible, use a 72A or 90A Bracket.

**1.07** Fused protectors must be used when it is necessary to run more than one drop or block wire to furnish battery for a telephone system. A maximum of three drops or block wires furnishing battery for a system may be terminated on one fused protector and must be bridged on the line side of the protector.

**1.08** Sneak current fuses (60-type) are not required with protectors associated with resident systems. They shall be provided on special service and leased lines when specified on the service order or by other local instructions. The 60-type fuses are listed in Table A.

| TABLE A — 60-TYPE FUSES |                      |                   |
|-------------------------|----------------------|-------------------|
| FUSES                   | CURRENT<br>(AMPERES) | COLOR OF<br>SHELL |
| 60A                     | .500                 | Red               |
| 60D                     | .500                 | Red               |
| 60E                     | 1.800                | Black             |
| 60F                     | .267                 | Red               |
| 60G                     | .750                 | Grey              |
| 60H                     | .267                 | Red               |
| 60J                     | .300                 | Grey              |

### 2. LOCATION OF PROTECTORS

**2.01** 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 to provide a low-resistance path to

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ground. When possible, the 123- or 128-type protectors should be installed directly on a metallic cold water pipe by means of a 72A or 90A Bracket.

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

(c) Accessibility (Avoid placing where a ladder is necessary for installation or maintenance.)

(d) Location of telephone and power ground. (The telephone ground shall be located to facilitate common grounding.)

(e) Appearance (Avoid locations on fronts of buildings or in living quarters.)

(f) Dry and well ventilated locations when mounted indoors or underneath buildings.

**2.02** When it is necessary to multiple fuseless or fused protectors, there should be 1 inch separation when horizontally mounted and 2 inches separation when vertically mounted (Fig. 7, 20, and 27).

### 3. INSTALLING PROTECTORS—GENERAL

**Caution:** Before connecting the protector ground wire, test the power company ground rod, ground wire, cabinet, meter box, etc, with a B Voltage Tester prescribed in Section 620-105-010. The voltage test shall be as prescribed for vertical power ground wires or metallic conduit.

**3.01** Terminate line and inside wires on the protector so that the ring conductors (single tracer or red wires) shall be connected to the right side of the protector (on the ceiling, the right side as viewed from the inside wiring end of the protector).

**3.02** Protectors installed indoors may be mounted in any position.

**3.03** All screws and fasteners shall be of sufficient length to mount securely. The 080 Division of the Plant Series Practices contains information concerning the various types of screws, anchors, etc, required to install the protectors.

**3.04** The size ground wire required for single or multiple installation of protectors is listed in Table B.



*When the initial protector ground wire is installed, it should be of sufficient size to provide protection for any future protectors installed (Table B).*

**TABLE B — GROUND WIRE CAPACITY**

| GROUND WIRE<br>SIZE | NO. OF PROTECTED CIRCUITS |           |
|---------------------|---------------------------|-----------|
|                     | FUSELESS                  | FUSED     |
| No. 14              | 1                         | 3         |
| No. 12              | 2                         | 6         |
| No. 10              | 6                         | 7         |
| No. 6               | 7 or More                 | 8 or More |

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

**3.05** Backboards should be used only on uneven or insecure mounting surfaces.

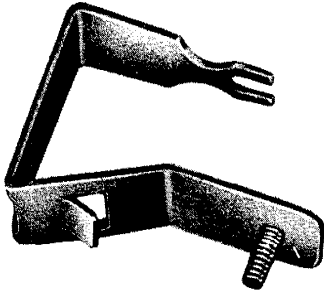
**3.06** The type and number of protectors that can be mounted on a backboard are listed in Table C.

**TABLE C — PROTECTOR CAPACITY OF BACKBOARDS**

| NO.     | TYPE<br>PROTECTOR | TYPE<br>BACKBOARD |
|---------|-------------------|-------------------|
| 1 or 2  | 123 or 128        | 79                |
| 3 to 10 | 123 or 128        | 81                |
| 1       | 98 or 106         | 79                |
| 2 to 5  | 98 or 106         | 81                |

#### 4. INSTALLING PROTECTORS—FUSELESS

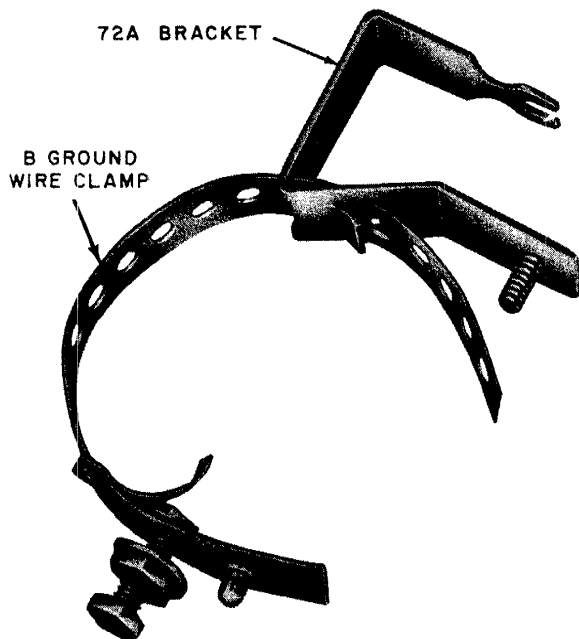
**4.01** The 123A1A Protector preferably should be installed directly on an acceptable metallic cold water pipe by means of a 72A Bracket and a B Station Ground Wire Clamp. The 72A Bracket is illustrated in Fig. 1.



**Fig. 1—72A Bracket**

**4.02** To install the 72A Bracket on the 123A1A Protector proceed as follows:

- (a) Place a B Station Ground Wire Clamp through the slots in the 72A Bracket (Fig. 2).



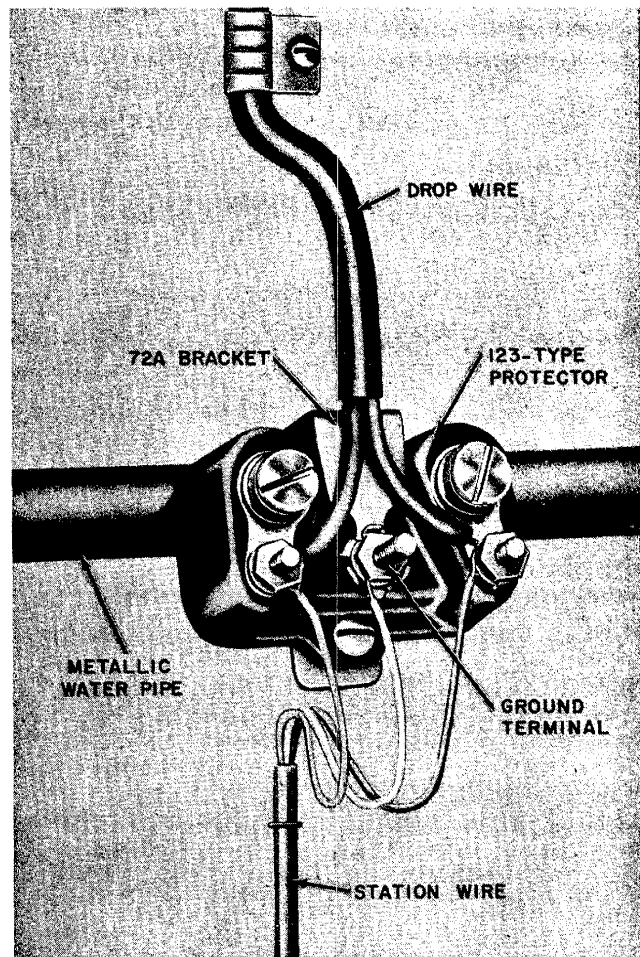
**Fig. 2—B Station Ground Wire Clamp Through Slots in 72A Bracket**

- (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 123A1A Protector and into the threaded hole of the bracket. Tighten the mounting screw, ground terminal nut, and protector ground terminal nut (Fig. 3).

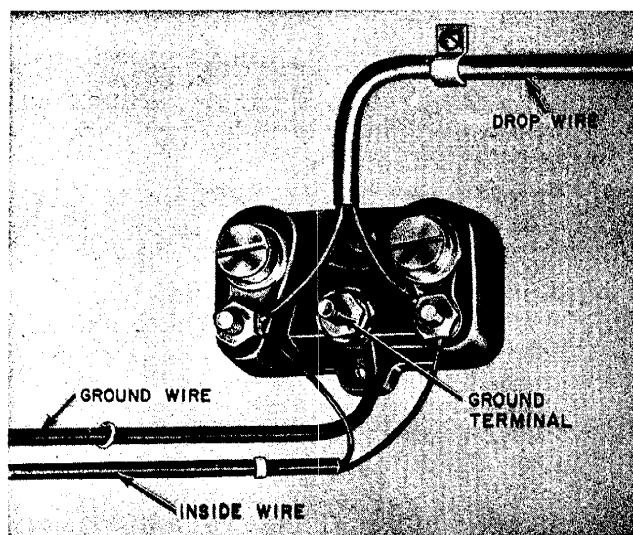
**Note:** A protector installed in this manner is grounded through the 72A Bracket and eliminates the need of station ground wire. Do not use the 72A Bracket with the 128A1A-2 Protector.



**NOTE:**  
B STATION GROUND WIRE CLAMP NOT SHOWN  
FORM E-3013B OMITTED FOR CLARITY.

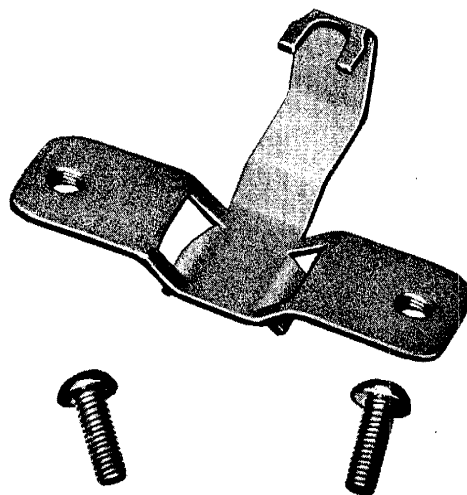
**Fig. 3—123A1A Protector Installed on a Metallic Water Pipe**

**4.03** Fig. 4 illustrates a typical installation when the 123A1A Protector cannot be installed on a metallic cold water pipe.



**Fig. 4—123A1A Protector**

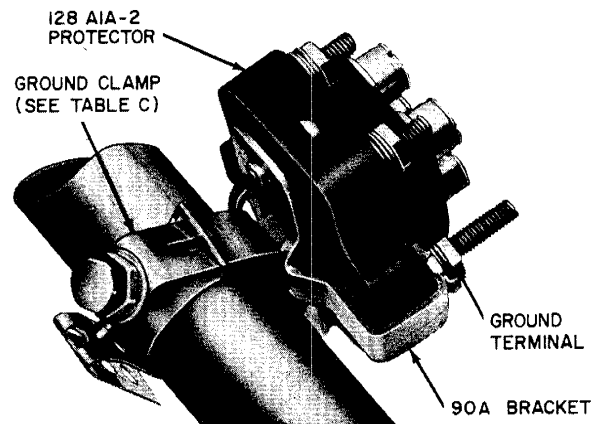
**4.04** The 128A1A-2 Protector preferably should be installed directly on an acceptable metallic cold water pipe by means of a 90A Bracket and a B Station Ground Wire Clamp. Fig. 5 illustrates the 90A Bracket.



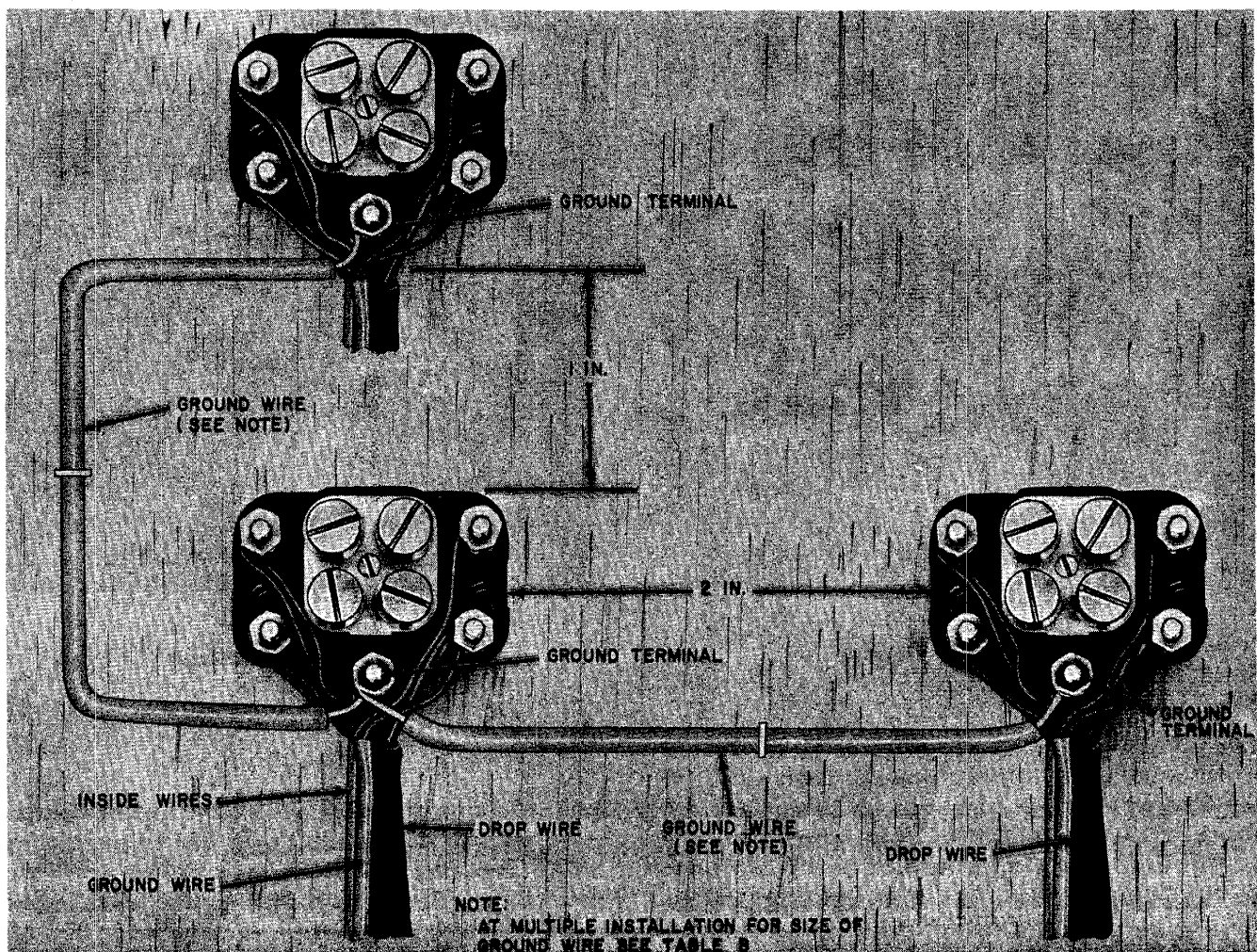
**Fig. 5—90A Bracket**

**4.05** The 90A Bracket is installed on the 128A1A-2 Protector as outlined in 4.02. Fig. 6 illustrates a 128A1A-2 Protector installed on a metallic cold water pipe using a 90A Bracket.

**4.06** Fig. 7 illustrates a typical installation when the 128A1A-2 Protector cannot be installed on an acceptable metallic cold water pipe.

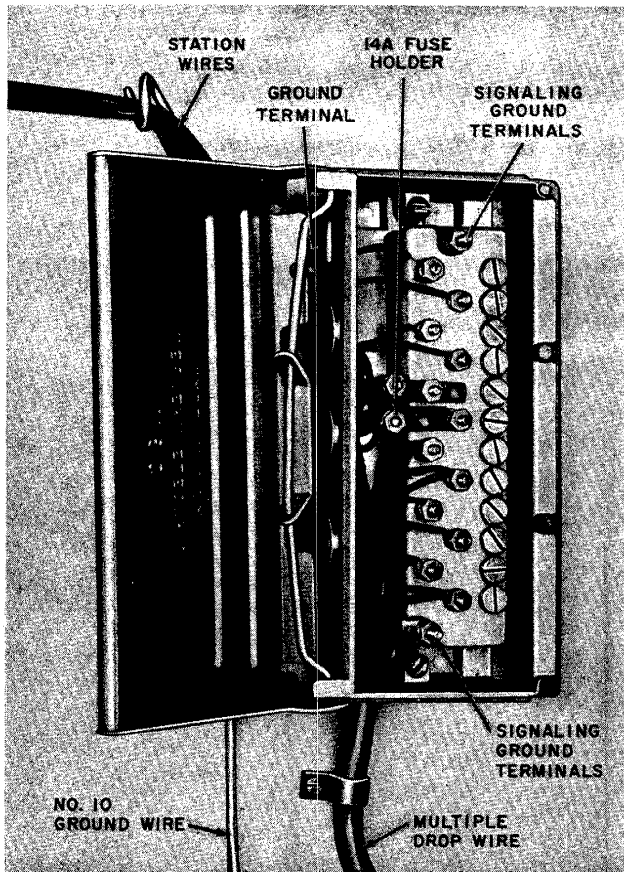


**Fig. 6—128A1A-2 Protector Installed on a Metallic Water Pipe**



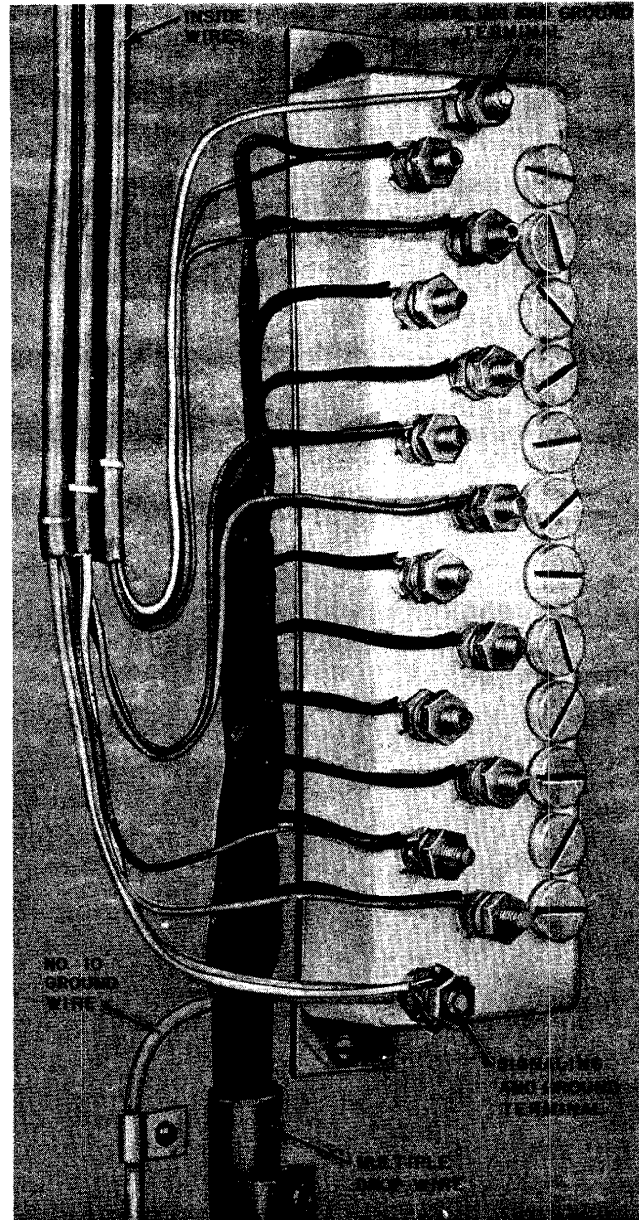
**Fig. 7—128A1A-2 Protector**

**4.07** The 116C Protector is for outdoor mounting. It is shown served by multiple drop wire (Fig. 8). Terminate all drop wire during the initial installation. Terminate the drop wire conductors under the bottom nuts. Terminate station wire conductors between the washers under the top nut. A ground terminal is provided on the rear of the metal housing. The signaling ground binding post is internally bonded to the ground terminal.



**Fig. 8—116C Protector**

**4.08** The 117B Protector (Fig. 9) is for indoor installation. Drop wire is terminated on the protector in the same manner as outlined for the 116C Protector (4.07). The ground wire is placed under the pronged washer of the protector ground terminal (Fig. 9). The signaling ground binding post is internally bonded to the ground terminal.



**Fig. 9—117B Protector**

**4.09** To protect the 123A1A or 128A1A-2 Protectors at outside installation, a 150A Cover or a 305A2 Protector Mounting is installed over the protectors. The 150A Cover is also used inside when a protective covering is required. Fig. 10 illustrates the installation of the 150A Cover.



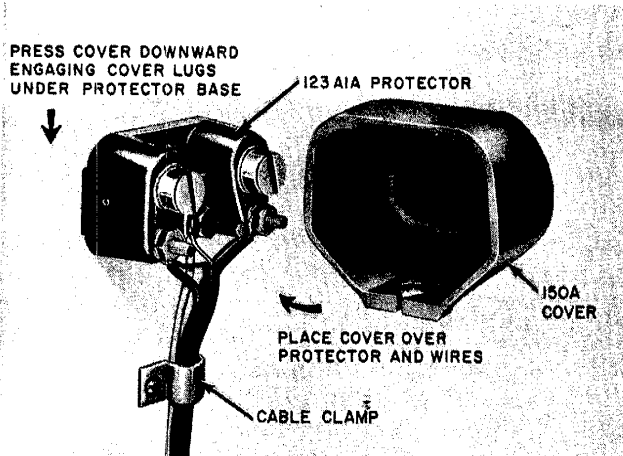


Fig. 10—Installation of 150A Cover

**4.10** When using the 150A Cover bring all the wires together under a common clamp. The clamp is the last attachment and is placed about 2 inches below the protector.

**4.11** To remove the 150A Cover, grasp the sides of the cover with the thumb and forefinger and at the same time apply pressure with the middle finger at the central tapered portion in an upward direction. When the cover lugs clear the base of the protector, the cover may be lifted off.

**4.12** The 305A2 Protector Mounting is used to house the 123A1A or 128A1A-2 Protector at outside installations. Two screws are furnished with the protector mounting for fastening the protector to the back of the mounting. Two holes are provided in the back for attaching the protector mounting to its mounting surface. Fig. 11 illustrates a 123A1A Protector installed in a 305A2 Protector Mounting.

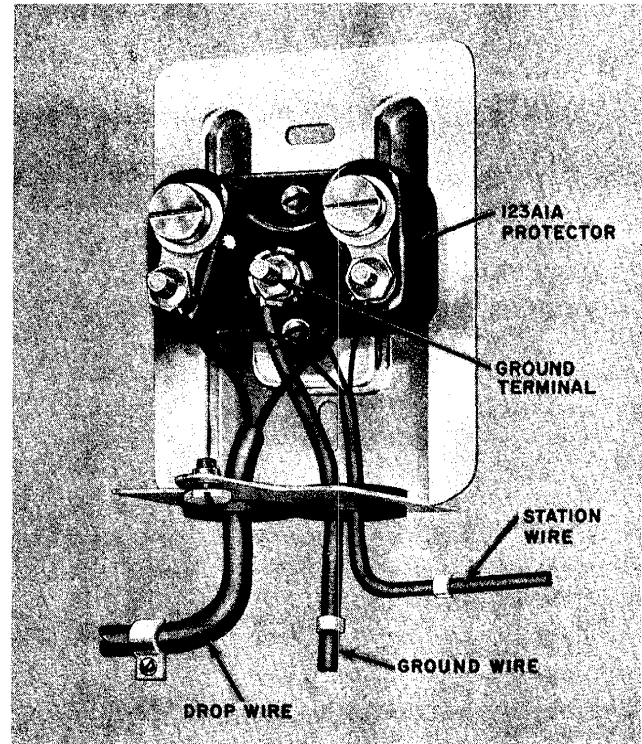


Fig. 11—305A2 Protector Mounting

## 5. INSTALLING PROTECTORS—FUSED

**5.01** Typical installations of the fused 98AA, 106C, and 106CA Protectors are shown in Fig. 12, 13, and 14, respectively.

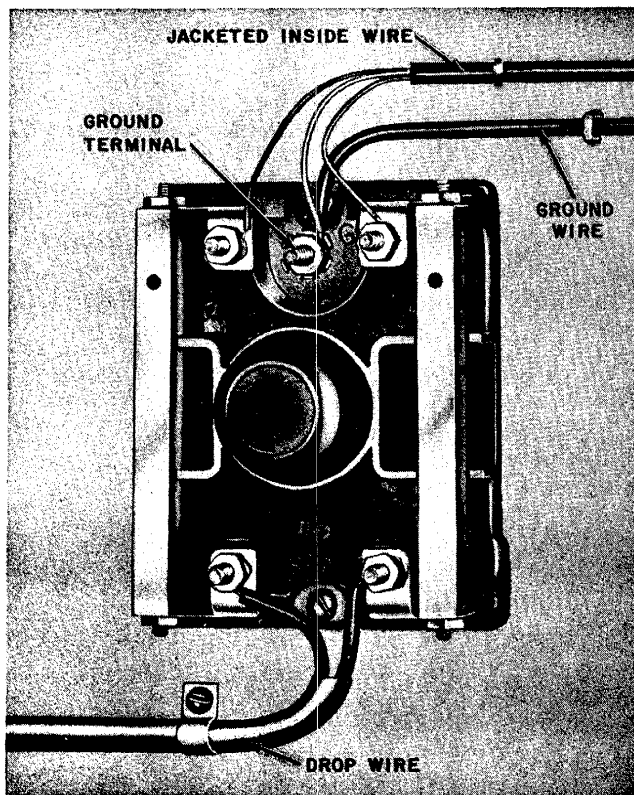


Fig. 12—98AA Protector

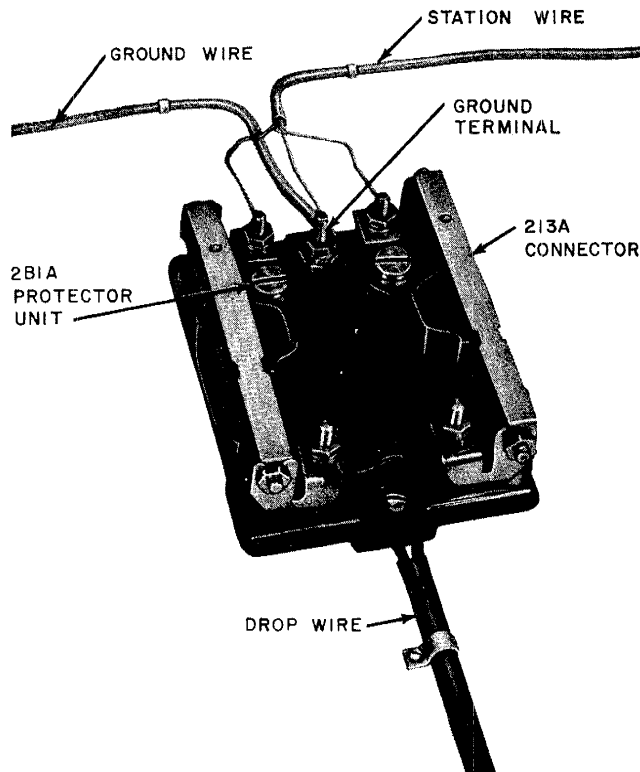


Fig. 14—106CA Protector

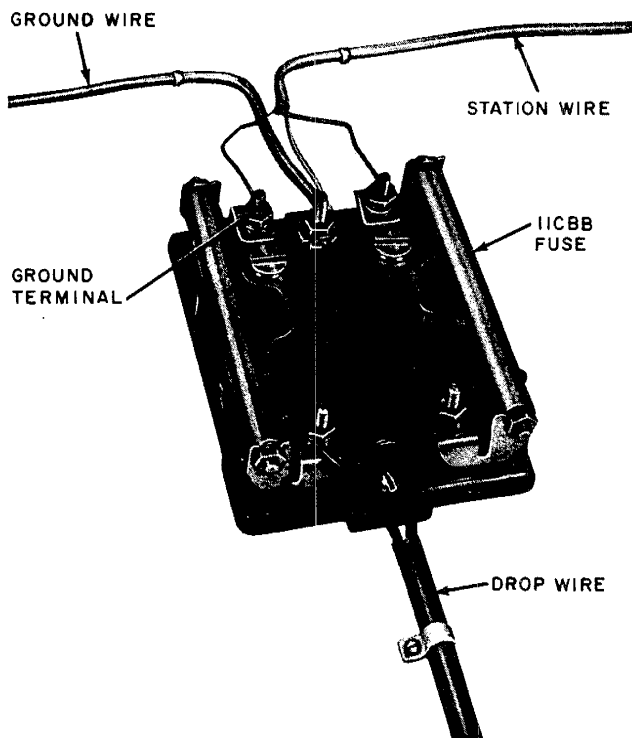


Fig. 13—106C Protector

5.02 The 93C Protector Mounting is used to house the 98- or 106-type protector at outdoor installations. Two screws are furnished with the protector mounting for fastening the protector to the back of the mounting. Two holes are provided in the back for attaching the protector mounting to its mounting surface. Fig. 15 illustrates a fused protector installed in a 93C Protector Mounting. The protector is coded 1293C Protector.

5.03 When fused protectors are installed in confined spaces such as protector cabinets provided by the customer, it is necessary to install a 46A Shield on the line side of the protector (Fig. 16). A metal detail is furnished with the shield and is placed between the protector and mounting surface. The shield is provided with two captive screws which fasten it to the metal detail. The shield is to prevent the highly ionized gases developed with the operation of a fuse from coming in contact with the line terminal of the protector.



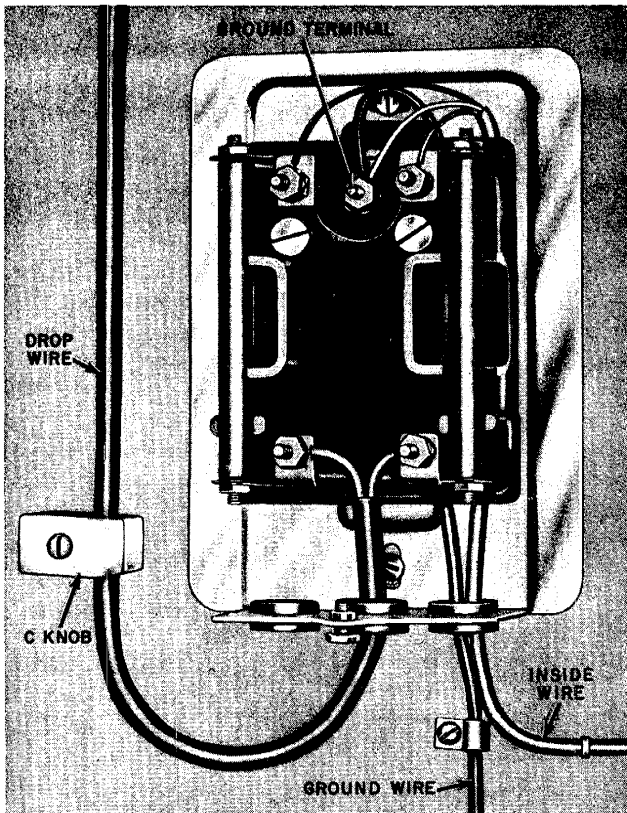


Fig. 15—1293C Protector

## 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 subscriber's location. The grounding is required to protect the wire from lightning damage and to minimize shock or fire hazards at the subscriber's location from sustained power contact.

**6.02** The 629 Division of the Plant Series Practices covers the installation of protectors at junctions of buried and aerial plant.

**6.03** The Thomas and Betts No. 264-30489-38 Lug-It can be used to bond the aluminum shield of service wire or the armor wire of underground wire to a 123A1A or 128A1A-2 Protector. The Lug-It has a spade-type tongue which can be placed under the washer of the protector ground terminal without removing the nut.

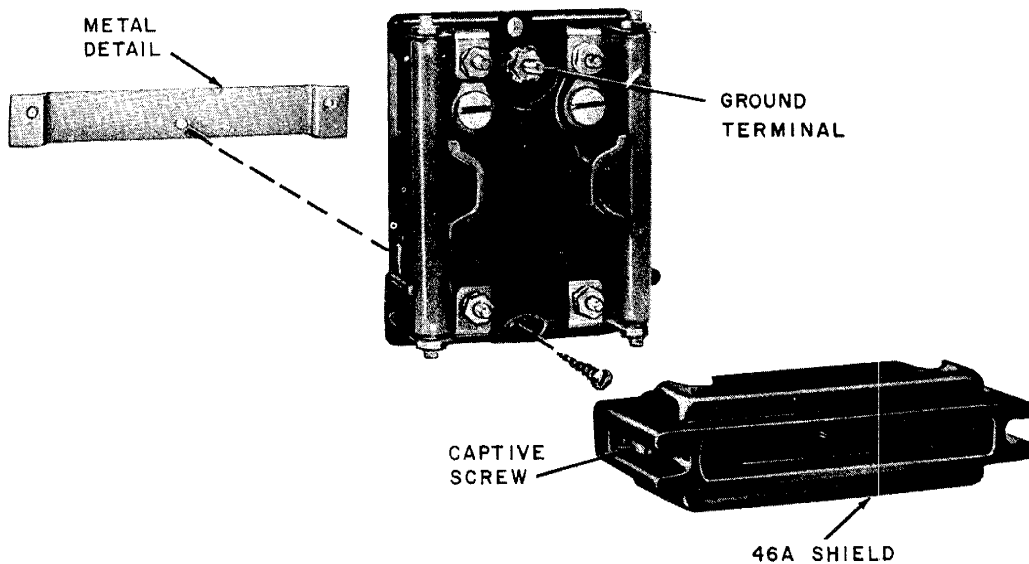
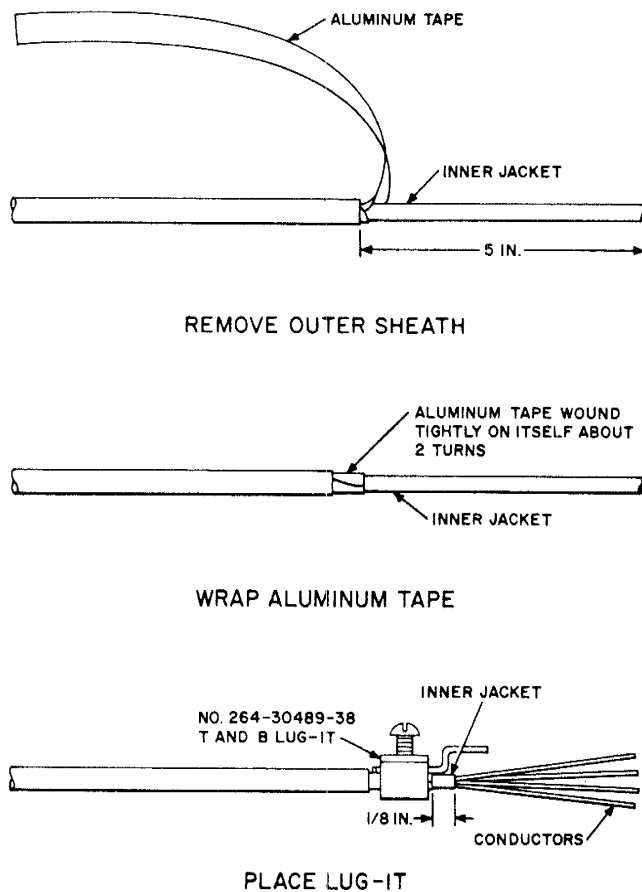


Fig. 16—Installation of 46A Shield

**6.04** Install the 123A1A or 128A1A-2 Protector on the wall and mark the location of the Lug-It on the service wire. Cut off the service wire about 5 inches beyond this mark. Remove the outer jacket, untwist the aluminum tape, and install the Lug-It as illustrated in Fig. 17.



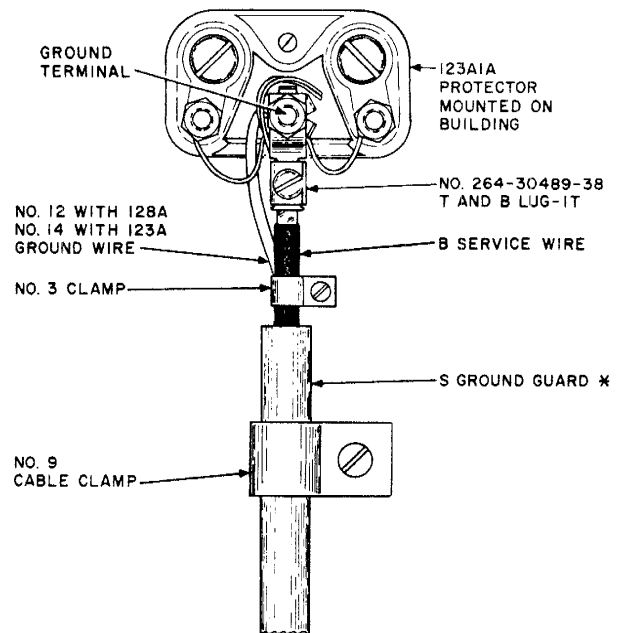
**Fig. 17—Placing Lug-It**

**6.05** The Lug-It can be installed on underground wire as outlined in 6.04 and Fig. 17.

**6.06** Fig. 18 illustrates the Lug-It installed on a 123A1A Protector.

## 7. INSTALLING PROTECTORS—PBX

**7.01** At locations where PBX circuits terminate on main frame type protectors equipped with heat coils and carbon blocks no other protection is required.

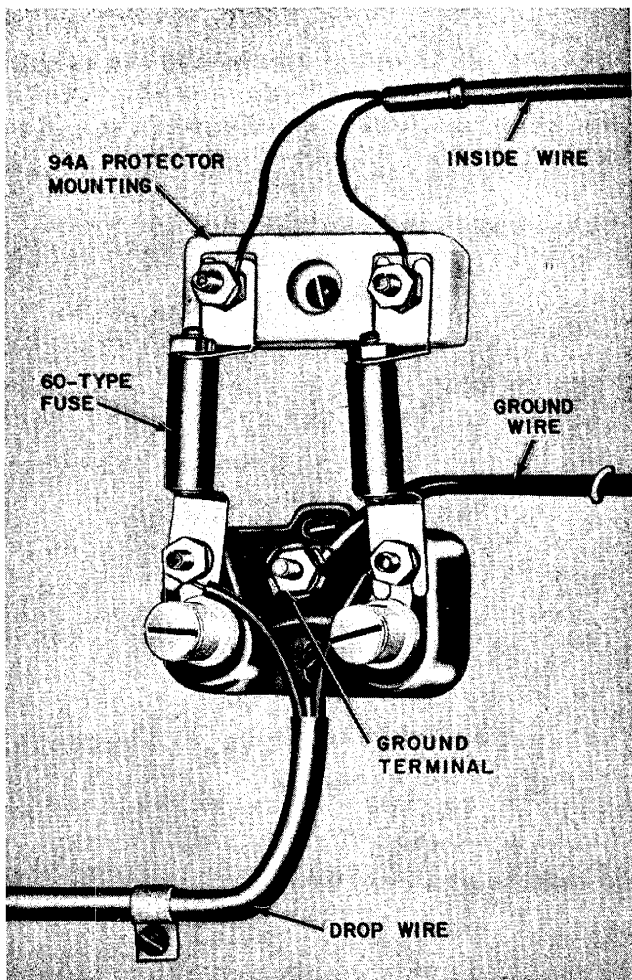


\* IF MORE MECHANICAL PROTECTION IS REQUIRED USE NO. 00 CABLE GUARD.

**Fig. 18—Service Wire on Protector**

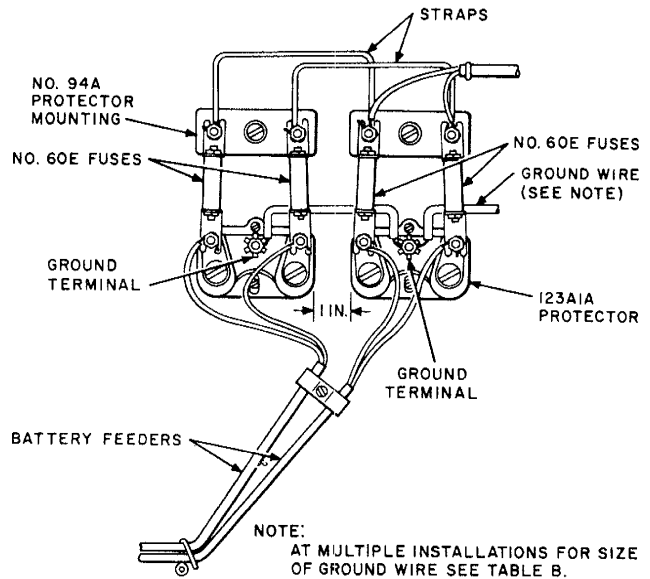
**7.02** At a main frame, No. 75A Heat Coils should be used for each conductor of a battery feeder group. Strap the pairs on the PBX side of the frame.

**7.03** Fig. 19 illustrates the 123A1A Protector equipped with 60-type fuses by means of a 94A Protector Mounting.



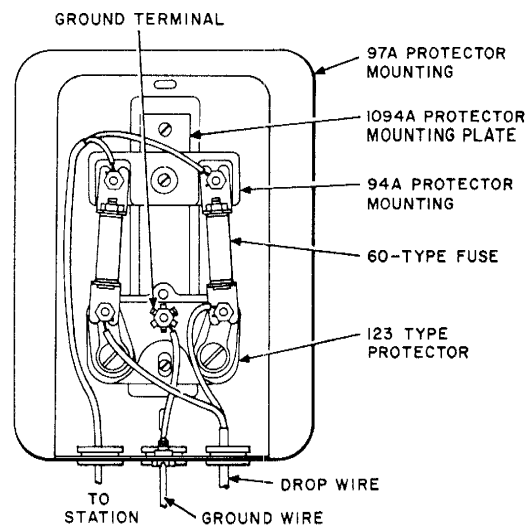
**Fig. 19—94A Protector Mounting and 60-Type Fuses**

**7.04** Fig. 20 illustrates a method of terminating two drop wires at a fuseless protector where 60-type fuses are required. Strap the pairs on the PBX side of the protector.



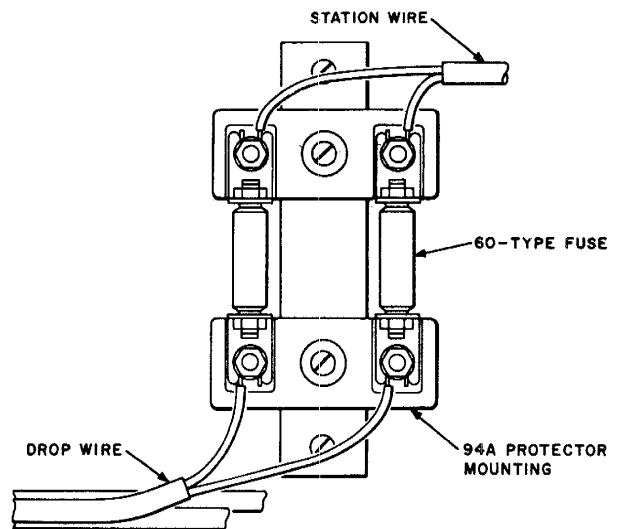
**Fig. 20—Fuseless Protectors and 60-Type Fuses—Multiple Pairs**

**7.05** The 97A Protector Mounting is used to house the 123A1A Protector equipped with 60-type fuses at an outdoor installation. Two screws are furnished with the protector mounting for fastening the protector to the back of the mounting. Two holes are provided in the back for attaching the protector mounting to its mounting surface. Fig. 21 illustrates a typical installation.



**Fig. 21—Fuseless Protectors and 60-Type Fuses—Outdoor Installation**

7.06 Fig. 22 illustrates a typical installation of 60-type fuses where no protector is required.



NOTE:  
1094A CONSISTS OF TWO 94A, ONE 97A MOUNTING, AND TWO 60-TYPE FUSES.

Fig. 22—1094A Protector With 60-Type Fuses

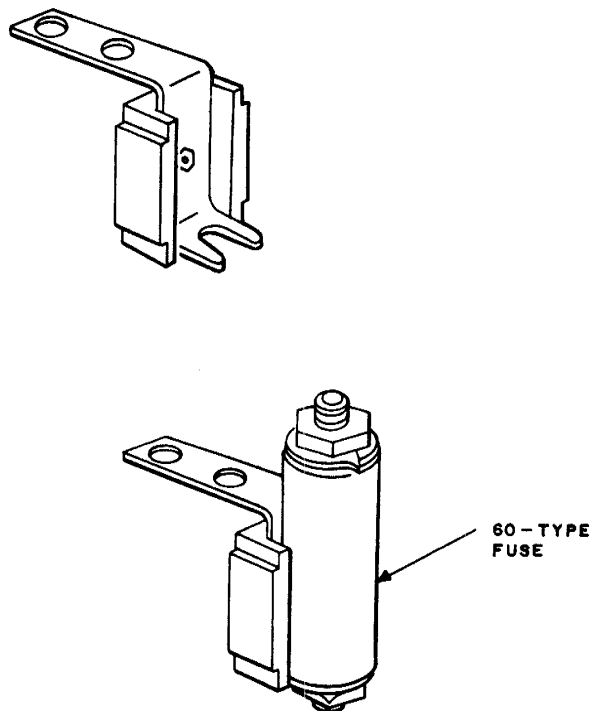


Fig. 23—14A Fuse Holder

7.07 When sneak current (60-type fuses) protection is required for pairs terminated on 1A4A-, 116-, or 117-type protectors, 14A Fuse Holders are required. Fig. 23 illustrates the 14A Fuse Holder.

**Note:** 60-type fuses cannot be installed in pole-mounted NH-type terminals.

7.08 Fig. 8 illustrates a 116C Protector equipped with 14A Fuse Holders and 60-type fuses.

7.09 Fig. 24 illustrates two battery feeder pairs terminated at a 117-type protector equipped with 14A Fuse Holders and 60-type fuses. Strap the pairs on the PBX side of the fuses.

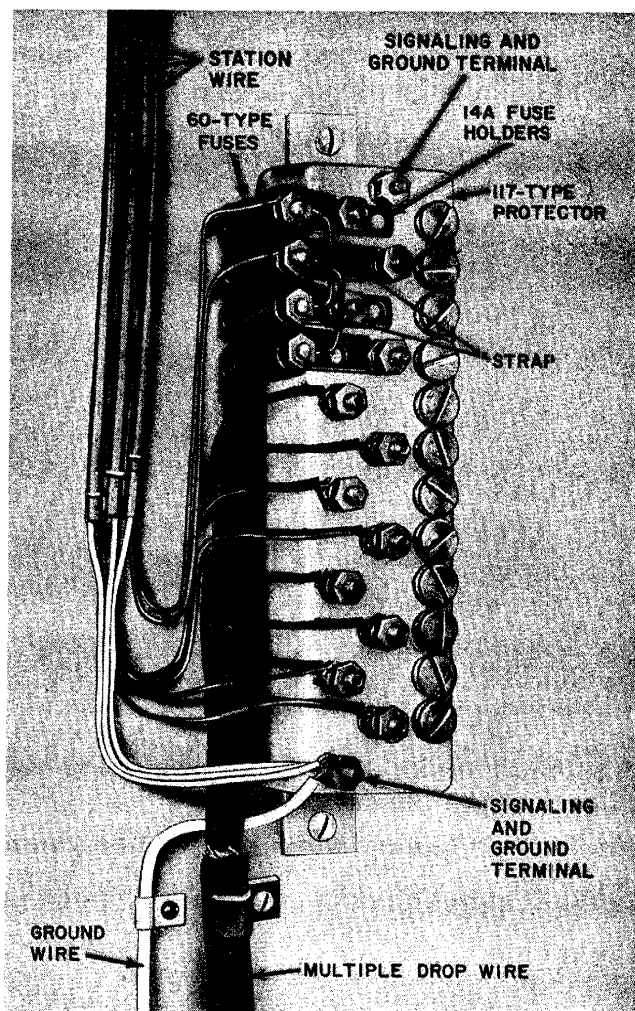
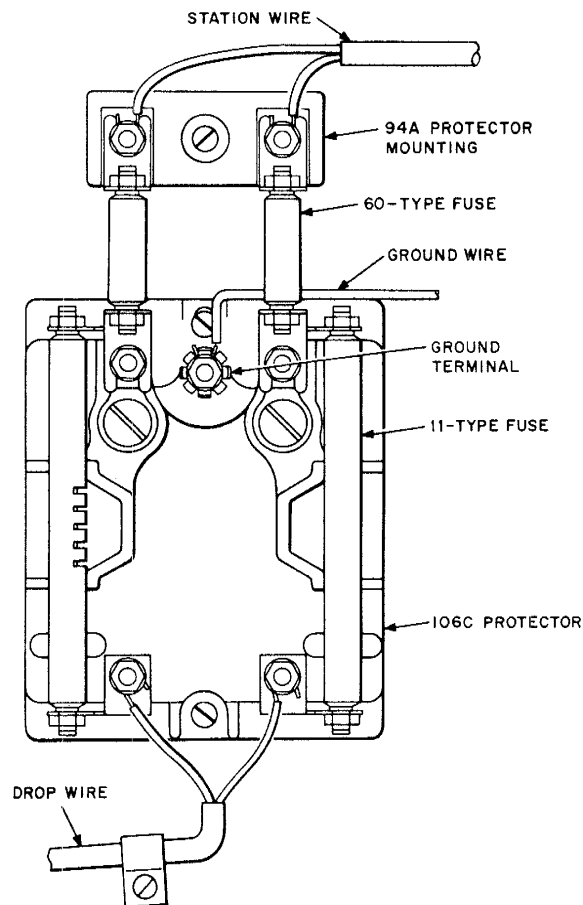


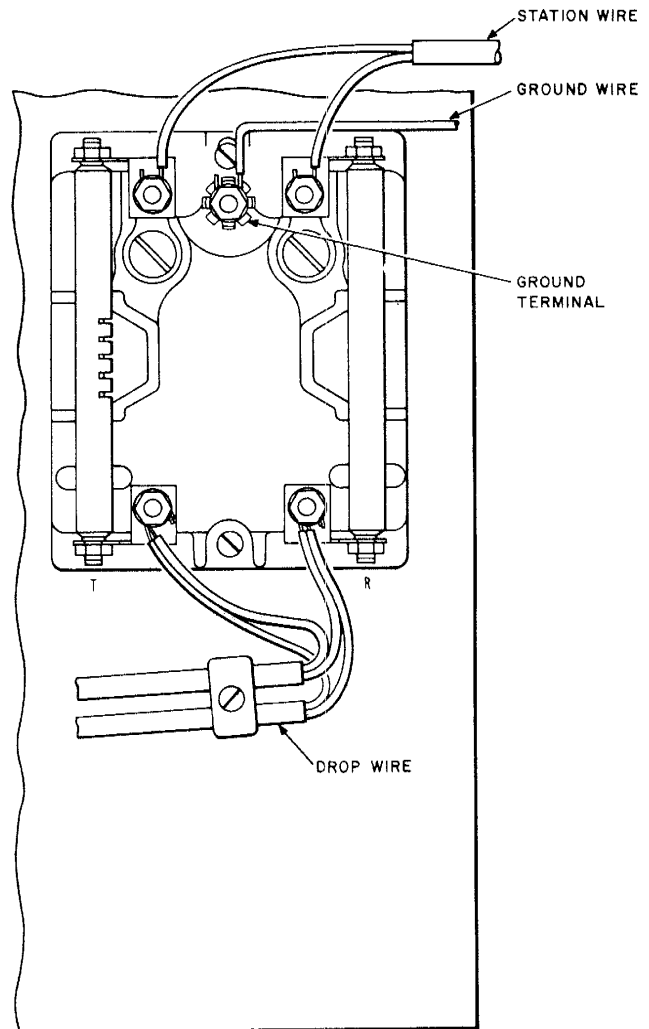
Fig. 24—117-Type Protector Strapped for Battery

**7.10** If it is necessary to strap the conductors at the binding posts, remove the 2A1A Protector Units associated with each conductor and install 2A1D Protector Units (Dummy). Mount a fused-type protector and terminate the multiple

conductors on the line side of the protectors. Use two 11CBB Fuses, one for the tip and one for the ring conductors (Fig. 25 and 26). On disconnects, replace the 2A1D Protector Units with 2A1A Protector Units.



**Fig. 25—94A Protector Mounting with Fused Protector**



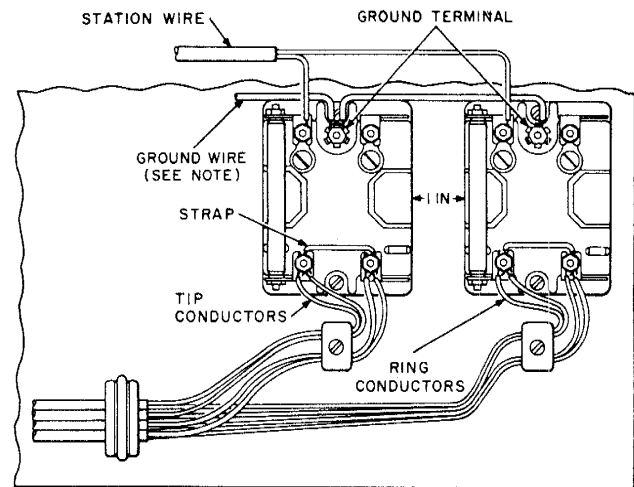
**Fig. 26—Drop Wire Bridged at Protector**

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7.11 Fig. 25 illustrates a typical installation of 60-type fuses with a fused protector.

7.12 Fig. 26 illustrates a typical installation of two multiple drop wires bridged at a fused protector. Three multiple drop wires are installed in the same manner.

7.13 Fig. 27 illustrates a typical installation when four or more battery feeder pairs are bridged at fused protectors. Bridge the pairs on the line side of the fused protectors. One 11CBB Fuse is required for each side of the circuit.



NOTE:

AT MULTIPLE INSTALLATIONS FOR SIZE OF GROUND WIRES SEE TABLE B.

**Fig. 27—Bridging Four Pairs at Fused Protectors**