

## 16-TYPE CABLE CLOSURES DESCRIPTION AND INSTALLATION

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### 1. GENERAL

**1.01** This section covers the description and installation of the 16-type closure used in conjunction with D encapsulant for encapsulating buried sheath openings in waterproof cables and for rehabilitation of air core cable.

**1.02** This section is reissued to:

- (a) Delete the use of E encapsulant
- (b) Revise tables to include 16BB2 closure
- (c) Delete reference to 16A1, 16B1, 16C1, and 16D1 closures
- (d) Include precautions on handling D encapsulant
- (e) Include new materials and methods.

Revision arrows are used to emphasize the more significant changes.

**1.03** *To prevent water or contaminants from entering the splice, it is important that immediately after assembly of closure that:*

- Closure be solidly supported in final position on a firm foundation
- Encapsulant be poured
- Closure be protected from sun.

**1.04** The 16AA2 closure is used to encapsulate the connection between buried waterproof distribution cable and service wires as outlined in Section 631-600-214.4

### NOTICE

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**SECTION 633-500-104**

**1.05** The 16-type closures will accommodate maximum size cables and splice bundles as listed in Table A. ♦For larger cables use the 23-type closure as outlined in Section 633-500-110.♦

**TABLE A**

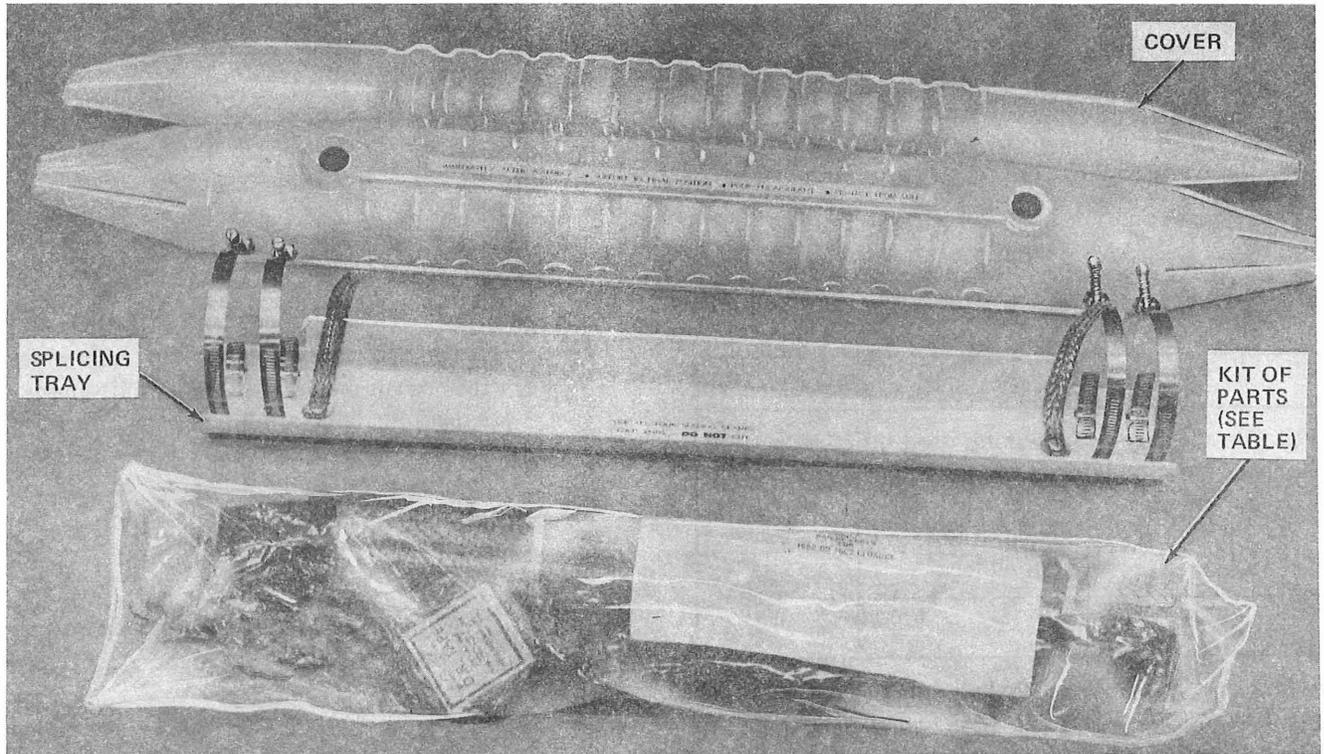
**MAXIMUM SIZE CABLES PER END AND SPLICE BUNDLE (INCHES)**

| <b>CLOSURE</b> | <b>SINGLE CABLE<br/>MAX DIA</b> | <b>BRANCH CABLE<br/>MAX DIA (NOTE)</b> | <b>SPLICE BUNDLE<br/>MAX DIA</b> | <b>SHEATH<br/>OPENING</b> |
|----------------|---------------------------------|--|----------------------------------|---------------------------|
| 16A2           | 1.2                             | 1.7                                    | 2.5                              | 12                        |
| 16BB2          | 2.5                             | 3.7                                    | 3.7                              | 12                        |
| 16B2           | 2.5                             | 3.7                                    | 3.7                              | 21                        |
| 16C2           | 2.5                             | 3.7                                    | 4.2                              | 21                        |
| 16D2           | 3.4                             | 5.0                                    | 5.9                              | 21                        |
| 16E2           | 3.4                             | 5.0                                    | 6.6                              | 21                        |

**Note:** Maximum diameter is the total diameter of the two cables combined entering one end.

2. DESCRIPTION

2.01 The 16-type closure is illustrated in Fig. 1.



KIT OF PARTS CONSISTS OF:

- INSTRUCTION SHEET
- CORRUGATED LINER
- D SEALING TAPE
- PLASTIC CLAMPS
- FOAM BLOCK
- DR TAPE
- DISPOSABLE GLOVES
- B BOND CLAMP
- VINYL TAPE
- FOAM STRIP
- CABLE TIE
- FUNNEL
- PLUGS
- ABRASIVE STRIP
- SOLVENT WIPES

| CLOSURE | KITS OF PARTS |
|---------|---------------|
| 16A2    | D-180841      |
| 16BB2   | D-180895      |
| 16B2    | D-180829      |
| 16C2    | D-180829      |
| 16D2    | D-180773      |
| 16E2    | D-180773      |

Fig. 1—16-Type Closure

2.02 Since the closure is not watertight, the splice must be totally encapsulated to prevent the entry of water.

2.03 Optional parts not furnished with the closure which must be ordered separately are as follows:

(a) **D Encapsulant:** Tables B and C list the use and estimated quantities of D encapsulant required to fill the closures. The D encapsulant is described in Section 081-852-123.

TABLE B

USE OF D ENCAPSULANT FOR ENCAPSULATING SPLICE

| USE   |   |             |
|---|---|-------------|
| Can it be used for buried waterproof cable splices? | Can it be used on rehabilitated nonpressurized buried air core cable splices? | Reenterable |
| Yes*  | Yes   | Yes         |

\* Waterproof cable filled with FLEXGEL<sup>†</sup> filling compound (indicated by the letter "F" or "G" in the cable code) does not require cleaning. In those cases where petroleum jelly (PJ) filled cable (indicated by the letter "L" or "J" in the cable code) is used on new construction and in reentry and rehabilitation, solvent cleaning must be used, since petroleum jelly (PJ) filling compound must be removed thoroughly. This is required to assure a watertight seal between the D encapsulant and the conductor insulation. Solvent cleaning, as outlined in Section 632-410-200, is the most effective method.

† Trademark of Western Electric.

TABLE C

ESTIMATED QUANTITY OF ENCAPSULANT REQUIRED TO FILL 16-TYPE CLOSURES

| CLOSURE | D ENCAPSULANT (GRAMS)<br>(NOTE) |
|---------|---------------------------------|
| 16A2    | 2,800                           |
| 16BB2   | 5,200                           |
| 16B2    | 6,500                           |
| 16C2    | 7,900                           |
| 16D2    | 12,400                          |
| 16E2    | 13,200                          |

**Note:** It is recommended that extra kit of encapsulant be available in case splice is smaller than anticipated to ensure closure is completely filled.



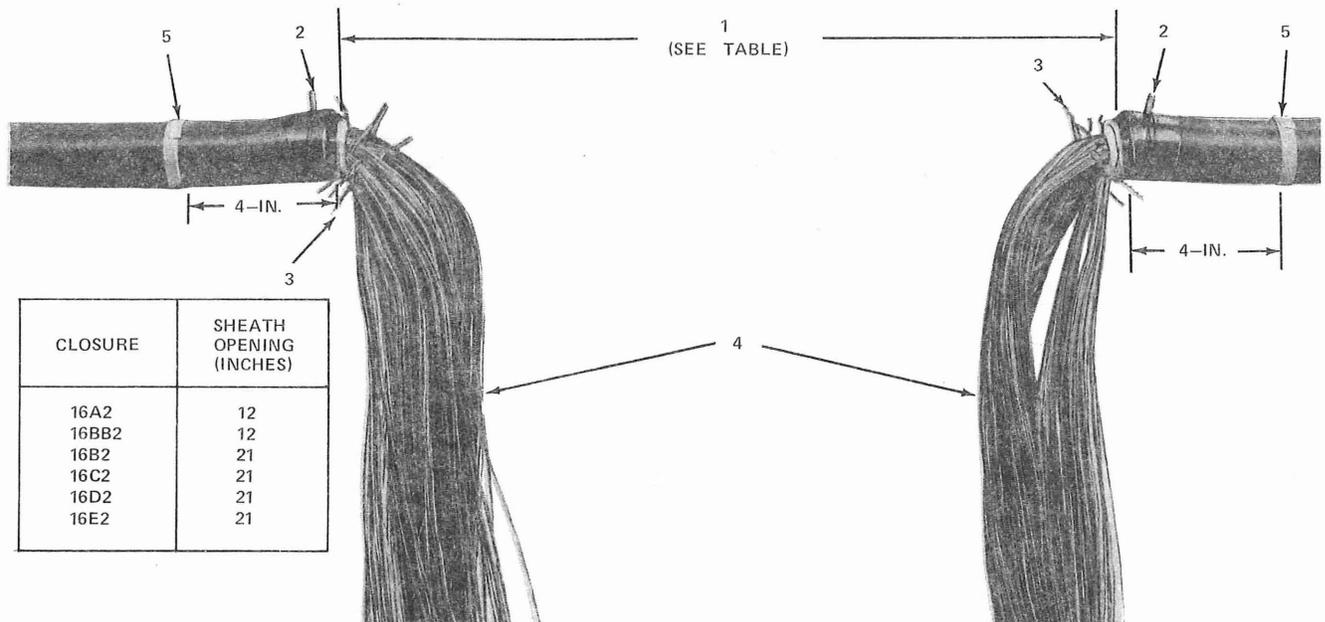
**Do not experiment with other encapsulants.**

(b) **Kit of Parts D-181122:** This kit consists of an upper and lower plate and a nut for securing a No. 6 ground wire to bond the cable sheath to the power company ground as shown in Fig. 9.

(c) No. 6 ground wire (when required).⚡

### 3. CABLE SHEATH PREPARATION

3.01 Prepare cable sheath as illustrated in Fig. 2.



1. **Caution: Exercise care when removing sheaths to prevent damage to the core wrap.** Mark cable sheaths per table, then remove jacket and metallic shields from each cable end. When cables have UM-type protection, remove the outer polyethylene jacket and underlying corrugated steel shield back 14 inches from butt of cable (Fig. 14) on both sides of sheath opening.
2. **Warning: Do not force the bond clamp between the aluminum shield and core wrap as this could damage the conductors.** Install *inner* plate of B bond clamp as outlined in Section 081-852-118. Do not install outer plate at this time.
3. Remove core wrap and install binder group identification ties and remove unit binders.
4. Waterproof cable filled with FLEXGEL filling compound (indicated by the letter "F" or "G" in the cable code) does not require cleaning. In those cases where petroleum jelly (PJ) filled cable (indicated by the letter "L" or "J" in the cable code) is used on new construction and in reentry and rehabilitation, solvent cleaning must be used, since petroleum jelly (PJ) filling compound must be removed thoroughly. This is required to assure a watertight seal between the D encapsulant and the conductor insulation. Solvent cleaning, as outlined in Section 632-410-200, is the most effective method.
5. Install paper marker 4 inches from butt of cable to aid in positioning metal tray.

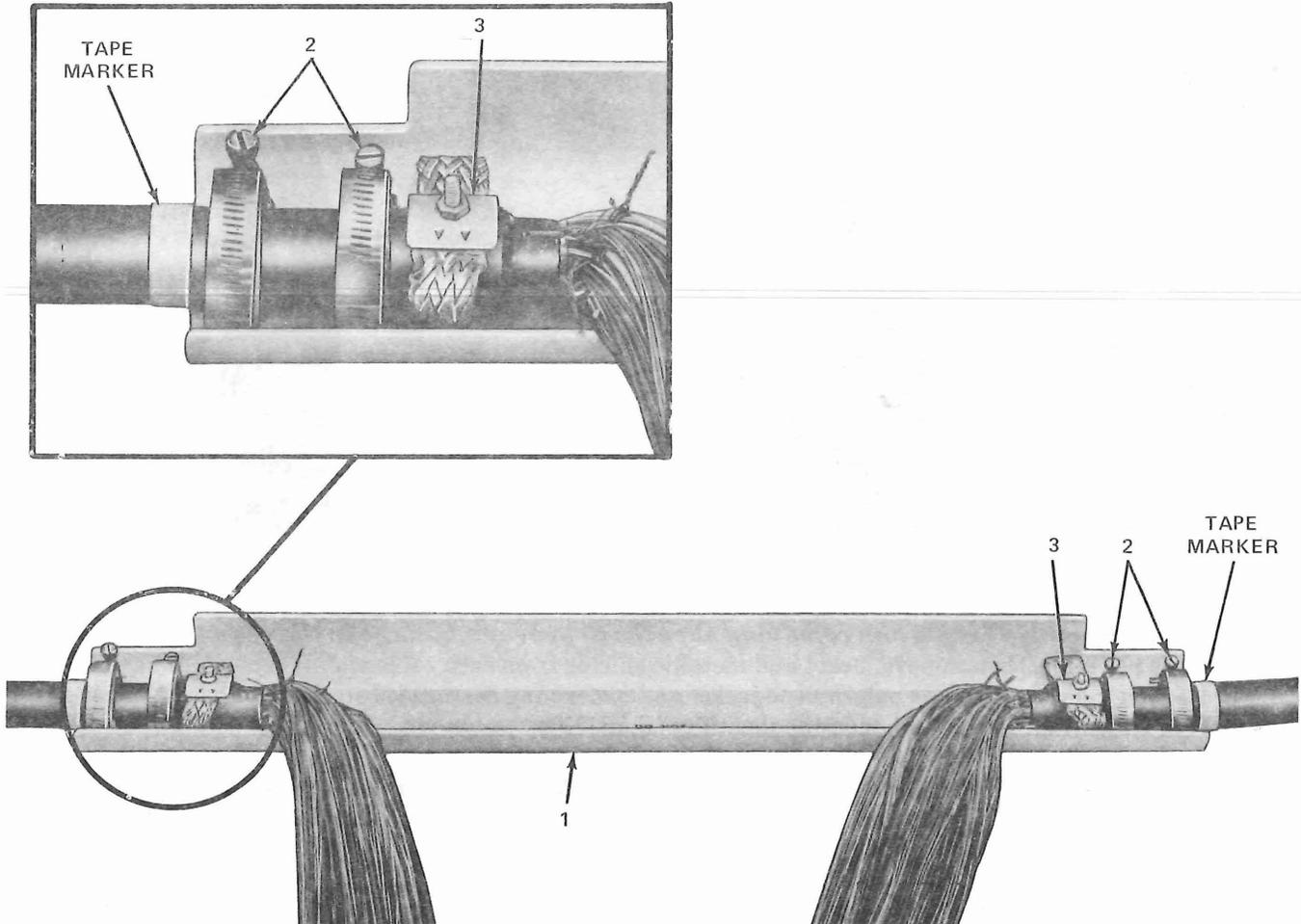
Fig. 2—Cable Sheath Preparation

## 4. INSTALLATION OF SPLICING TRAY

4.01 Install splicing tray at straight splice as illustrated in Fig. 3.

◆**Note:** Inline splicing can be done with the

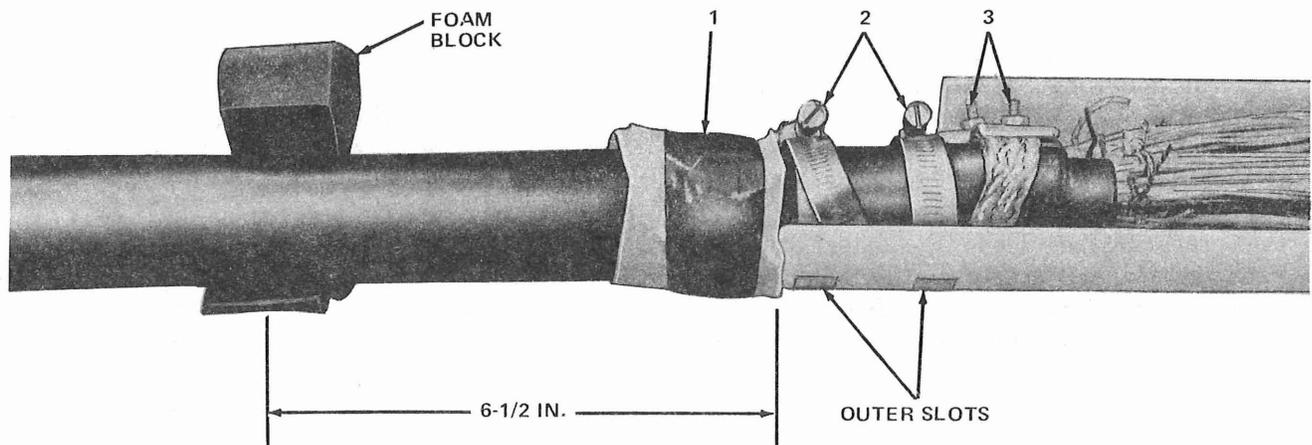
tray in place but is often easier if the tray is added after the wirework is complete. However, it will be necessary to place a temporary bond across the sheath opening until the tray is placed.◆



1. Position splicing tray between tape markers.
2. Place all four sealing clamps around cable sheath, and secure metal tray by **ratchet tightening** sealing clamps. Fold back excess length of sealing clamp and store in base of metal tray. **Do not push the excess through a tray slot.**
3. ◆Spread the strands of the braid to form a hole and place over the stud of B bond clamp perpendicular to the cable length, then place outer plate and secure with nut. **Tighten nut with 216-type tool only.** Tuck excess bond braid back underneath cable in the tray.◆

Fig. 3—Installed Splicing Tray at Straight Splice

- 4.02 When two cables enter one end, install splicing tray as illustrated in Fig. 4.



1. **Prior to installation of splicing tray**, form a collar on each cable as outlined in Fig. 8. Protect collars during splicing by wrapping with release paper from strips of D sealing tape. Secure with vinyl tape.
 

**Note:** Building of sealing tape collars at this time is necessary only when two cables are present. The release paper must be removed before closing the splice.
2. Reposition sealing clamps in outer slots of tray, then position cables in tray and secure with sealing clamps. **Ratchet tighten the clamps.** Fold back excess length of sealing clamps and store in base of metal tray. Do not push the excess through a tray slot.
3. Push bond braid over stud of each B bond clamp, then place outer plate and secure with nut. **Tighten with 216-type tool only.** Tuck excess bond braid back underneath cable.
4. Place center of foam block between cables 6-1/2 inches from end of tray.

Fig. 4—Installed Splicing Tray at Two-Cable Entry

## 5. SPLICING

5.01 Splice the cables and secure splice bundle as outlined in Fig. 5 and 6.

**Note:** There are no special problems in constructing splices in the 16-type closure; however, the following information should prove helpful:

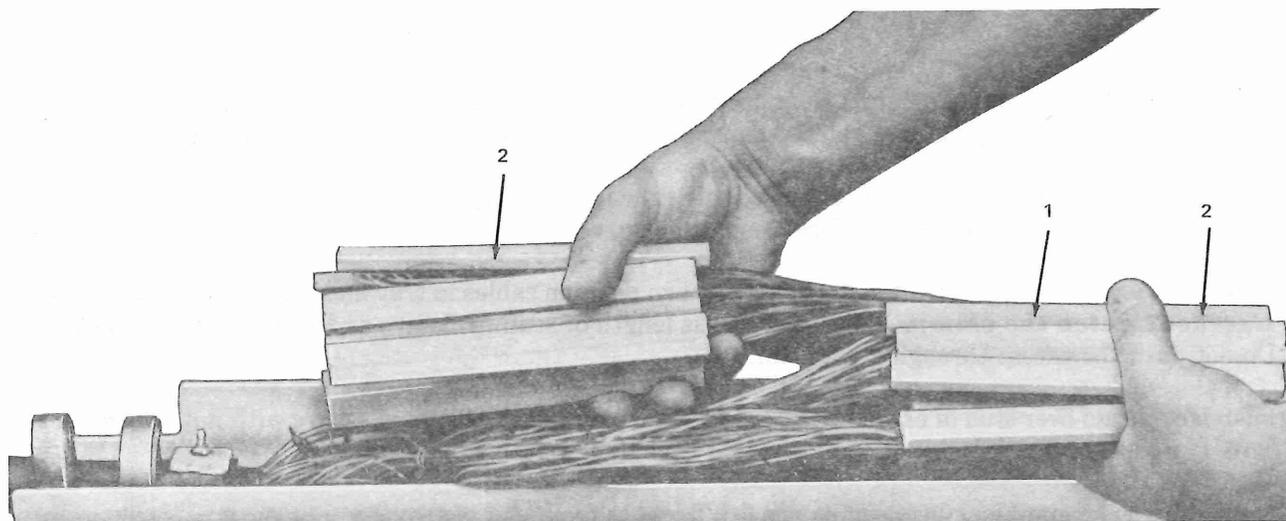
(a) Foldback splicing should be done with the splicing tray installed as described in Part 4. When preparing the cable for the foldback method of splicing, **do not tie the matching units together with a common tie at the butt of the cable.** ♦This prevents wire movement and

**uses more room in the closure and also limits the flow of encapsulant.**♦

(b) Splice the groups toward the back of the closure first and dress core of cable loosely in the bottom of tray.

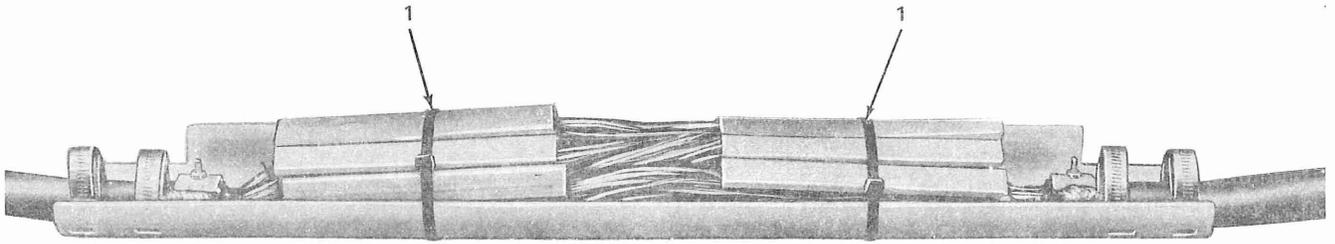
(c) Inline splicing can be done with the tray in place but is often easier if the tray is placed after the wirework is complete. ♦However, it will be necessary to place a temporary bond across sheath opening until tray is placed.♦

(d) When splicing screened cable, restore the screen as outlined in Section 640-010-005.



1. Splice cable conductors using 710-type connectors or approved equivalent as outlined in Section 632-205-220. ♦If 710-type connectors are used for splicing, install a 710-FS-25 filler strip in the connector bridge ports as outlined on the instruction sheet for the filler strip and in Section 632-205-220.♦
2. Position connectors on top of cable core as shown (foldback splice).

Fig. 5—Positioning Spliced Conductors on Top of Cable Core

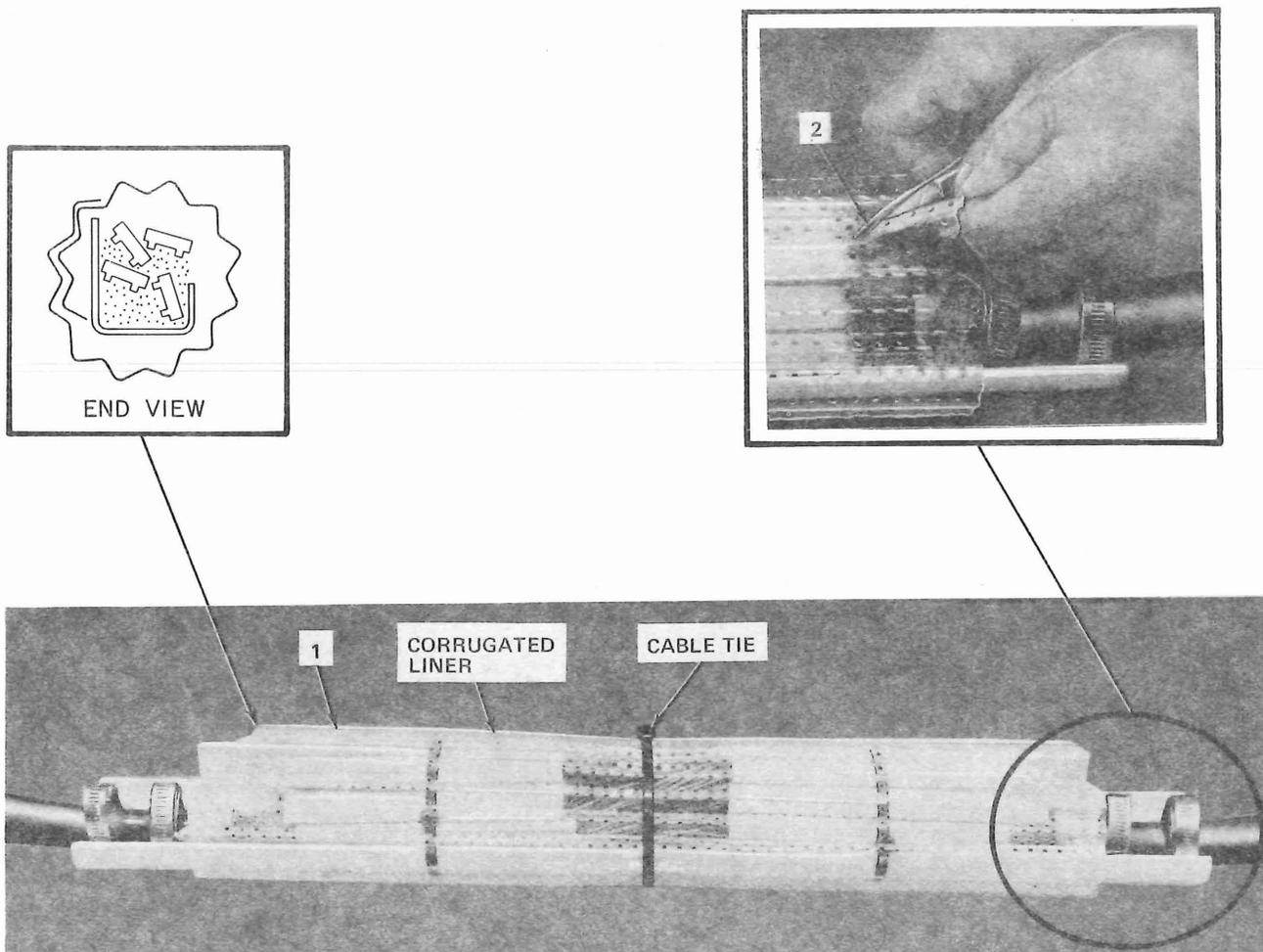


1. Tie down the splice bundle with cable ties and cut off excess cable tie.

**Fig. 6—Securing Splice Bundle**

6. INSTALLATION OF CORRUGATED LINER

6.01 Install the corrugated liner around the completed splice as illustrated in Fig. 7.



1. **Warning:** *Assure that no wires are sticking through the corrugated liner to cause a path for water to reach the splice.* Place and center corrugated liner with seam up around outside of metal tray and secure with cable tie. The liner, to which D encapsulant will adhere, controls the splice and prevents conductors and connectors from contacting the closure cover, thus assuring complete encapsulant coverage and penetration. No other wrap is required.

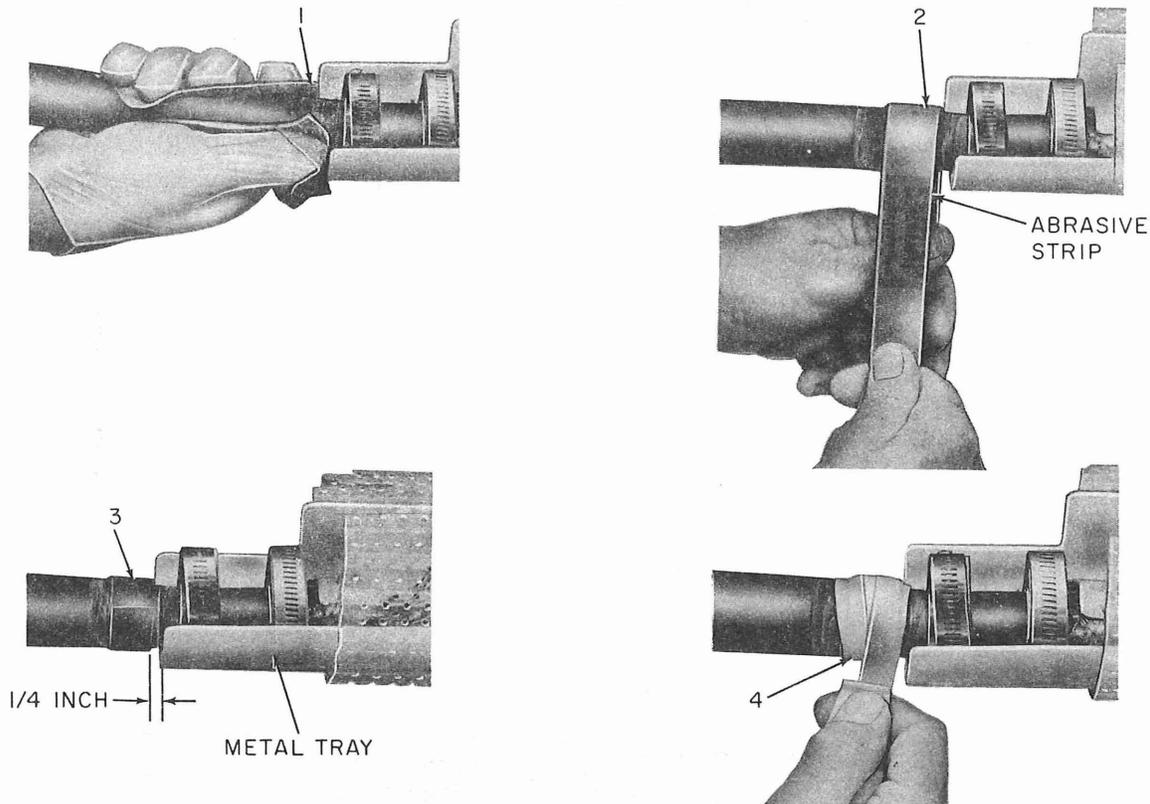
2. Cut a V-notch approximately 2 inches by 2 inches on top of the corrugated liner under the filling hole location to provide an unrestricted flow while encapsulating.

Fig. 7—Installed Corrugated Liner

## 7. FORMING COLLARS ON CABLE SHEATH

7.01 *Place a collar on each cable sheath as outlined in Fig. 8 to form a seal.* The D encapsulant will not bond to cable jacket; however, it

will bond to the white side of the DR tape, thus preventing a leak between the polyethylene jacket and the encapsulant.



1. **Caution: Use disposable gloves while handling solvent wipes.** Using solvent wipes supplied with the closure, clean about 2 inches of cable sheath beyond the end of tray. If the tray is not in place, mark the jacket at the point where the end of the tray will be.
2. **Caution: Do not scuff the cable sheath longitudinally as this could produce leak channels.** Using abrasive strip or carding brush, scuff the cleaned area circumferentially. Remove the scuffing debris. Longitudinal scratches must be scuffed out to prevent potential leak paths for water.
3. **Caution: Do not heat the tape directly in the airflow of a heater or blower. This reduces the adhesion of the tape to the cable sheath. If preheating in cold weather is required, place the tape in a warm place prior to use.** Using one turn (ends butted) of 3/4-inch wide by 1/8-inch thick D sealing tape, form a collar approximately 1/4 inch from metal tray location.

**Note:** When a No. 6 ground wire is used to bond the cable sheath to power company ground as shown in Fig. 9, the bare copper conductor must be placed between layers of D sealing tape as shown in Fig. 9.

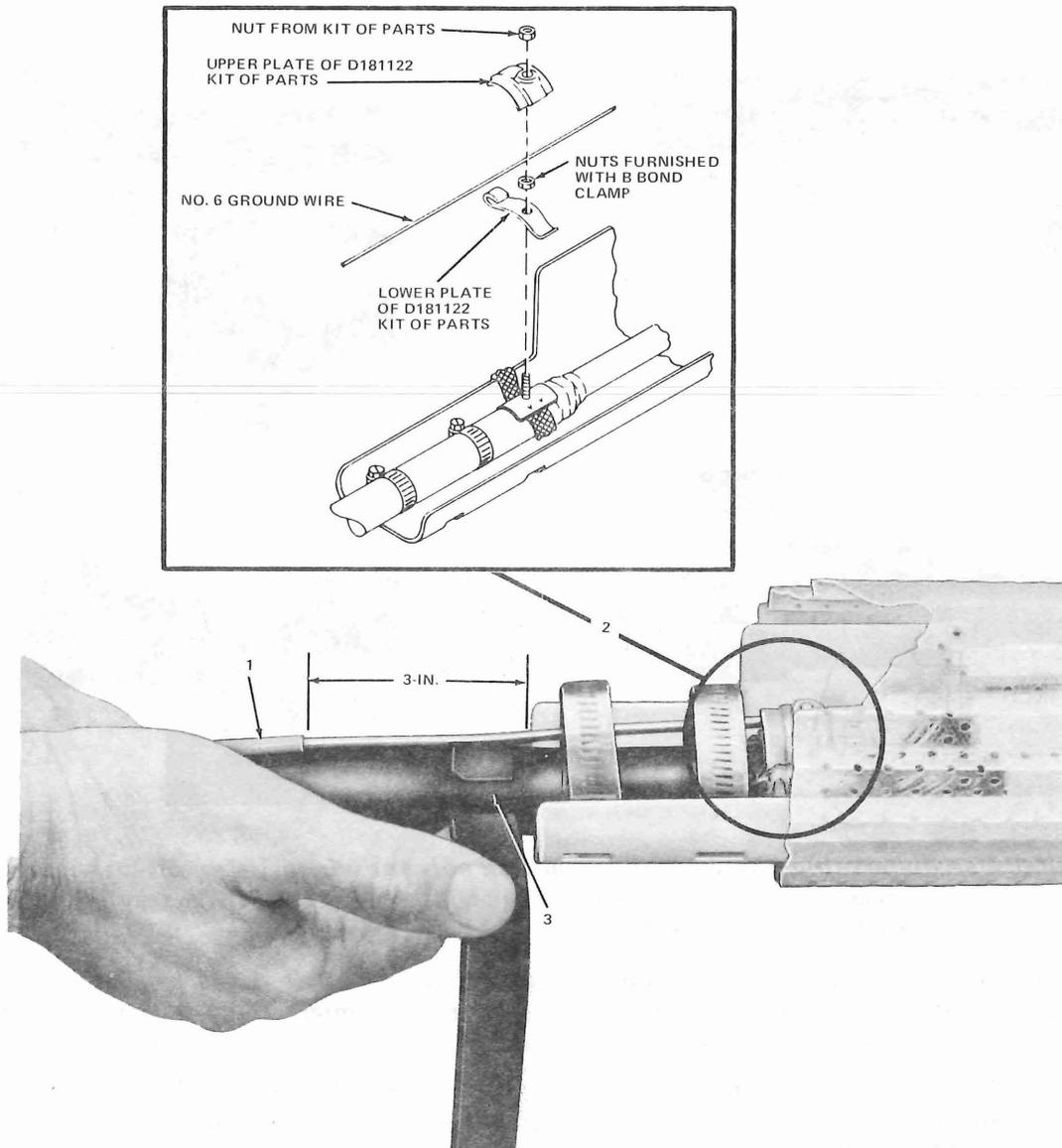
4. **Warning: Use only 3/4-inch wide DR tape and the length specified. Excessive use of DR tape prevents flow of encapsulant into closure.** Cut a length of 3/4 inch wide DR tape approximately 3 times the circumference of the cable, then stretch-wrap the DR tape (white side out) over the sealing tape collar to completely cover and compress it. Do not stretch the last turn of DR tape, but press the tape on firmly so it will not peel off while encapsulant is curing.

**Note:** Remove release paper from collar at the two-cable entrance.

Fig. 8—Forming Collar

**SECTION 633-500-104**

**7.02** Bond the cable sheath to the power company ground using No. 6 ground wire and D-181122 kit of parts as covered in local instructions or as shown in Fig. 9.

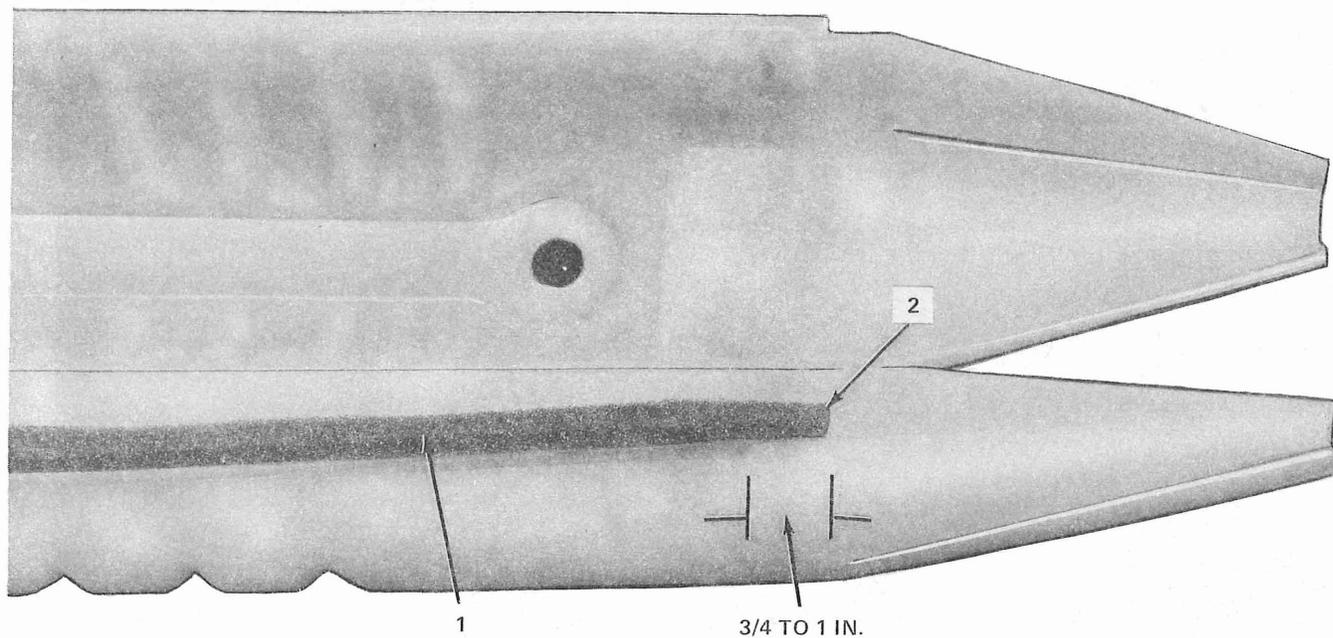


1. Remove insulation from the ground wire to a point 3 inches beyond the end of tray to prevent water from migrating between copper conductor and insulation into the splice.
2. Install and secure copper conductor of ground wire using D181122 kit of parts.
3. Clean and scuff cable jacket as outlined in Fig. 8. Then place a solid copper conductor of No. 6 ground wire between 1-1/2 layers of D sealing tape as shown and continue to build a collar as outlined in Fig. 8.

**Fig. 9—Bonding Cable Sheath to Power Company Ground**

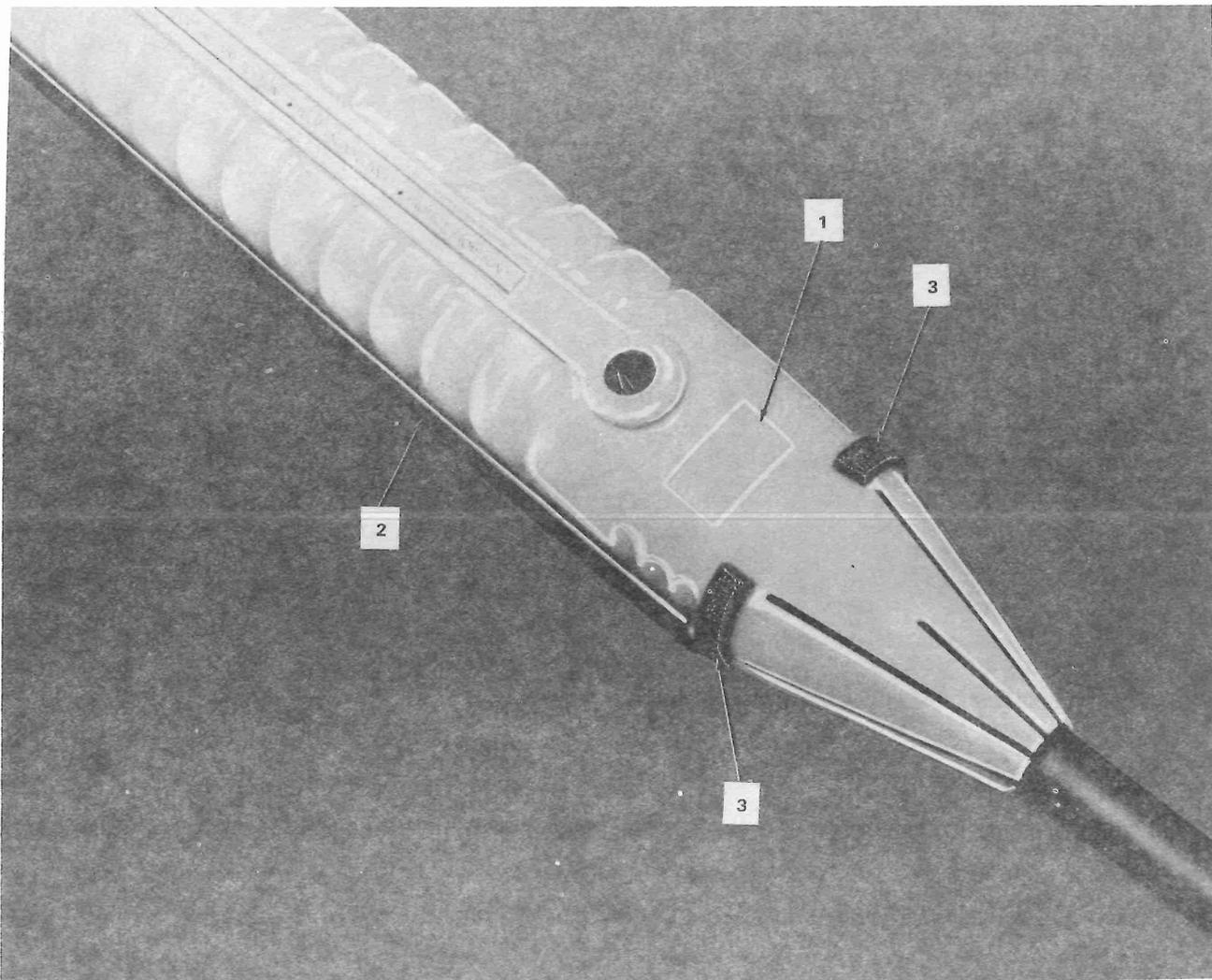
## 8. INSTALLING COVER

8.01 The installation of the cover is illustrated in Fig. 9, 10, 11, 12, and 13.



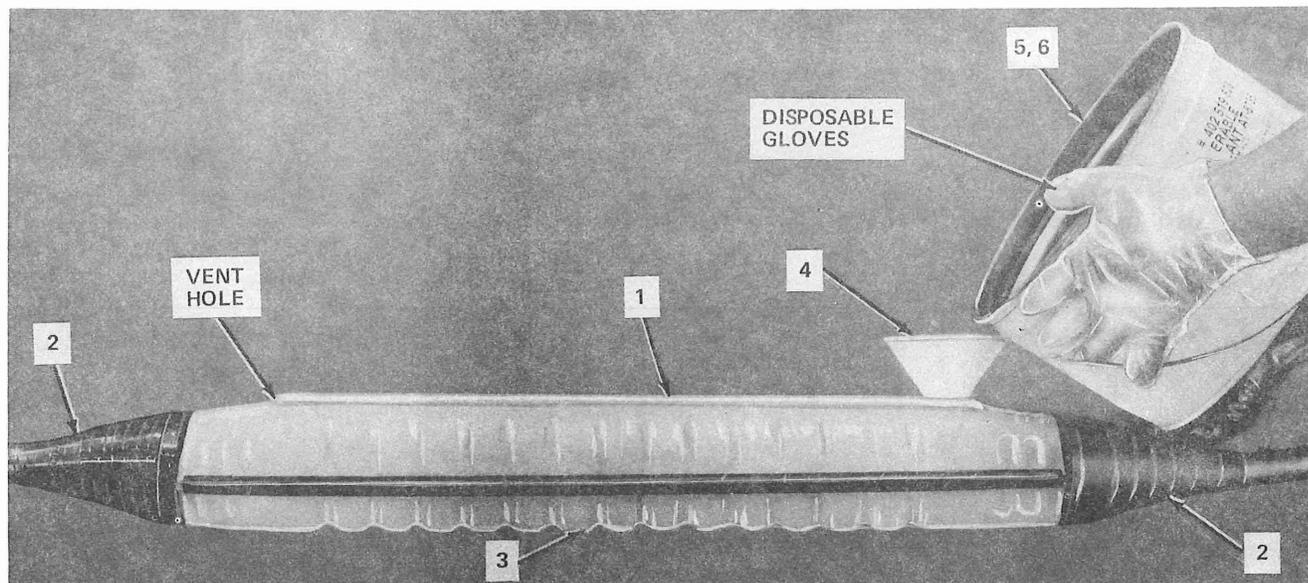
1. Remove the backing from one piece of foam tape and place flush with the inside edge of the closure opposite the hinge.
2. Cut the tape so that each end extends about 3/4 to 1 inch beyond the end of the flange.

Fig. 10—Applying Foam Tape



1. Wipe the inside of the cover clean, then place and center cover over completed splice so that holes are on top. Place a temporary cable tie around center of the cover to help hold closed until the plastic clamps are placed.
2. Slide black plastic clamps on flange of cover to secure in closed position. Remove the temporary tie.
3. Cut four pieces of foam tape 2 inches long from the second strip. Remove the backing and place the 2-inch long strips over the slits at each end of the hinge on the back of the cover and at each end of the plastic clamp on the front of the closure.

**Fig. 11—Applying Tape Over Ends of Closure**



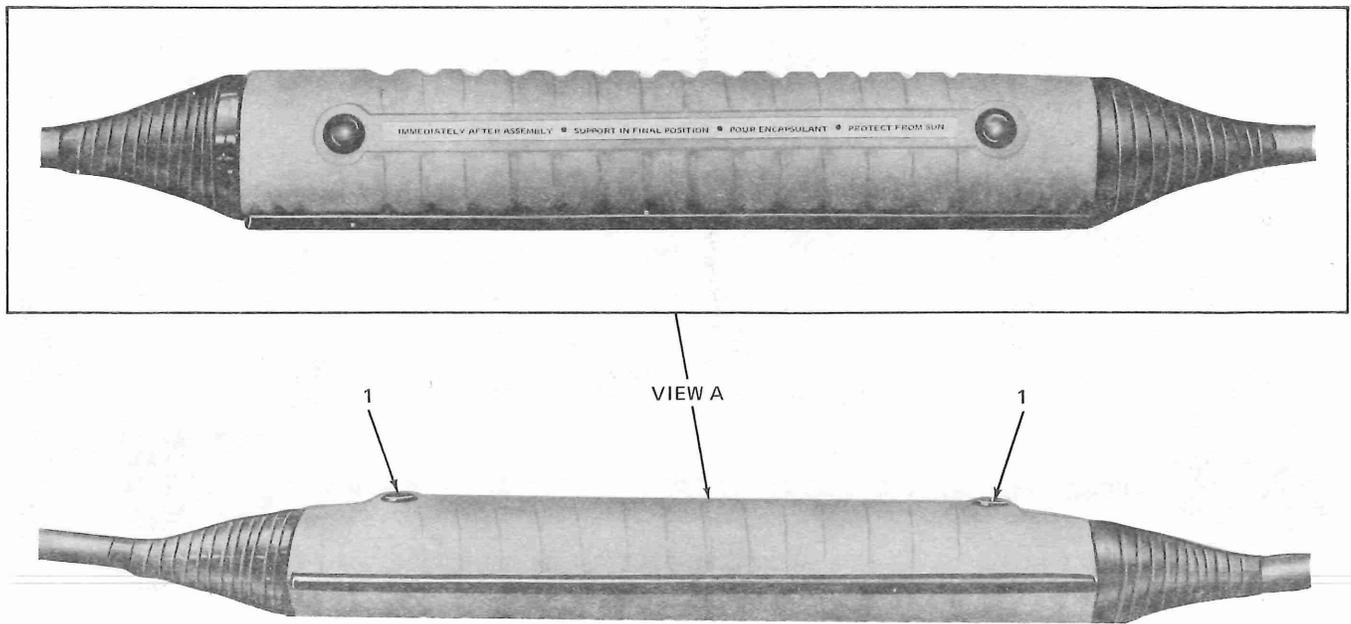
1. Position the cover over the splice so the holes are in alignment with the V-slots cut in the liner.◀
2. Wrap each nozzle with vinyl tape starting on the cable and extending to the edge of plastic clamps, assuring all foam tape is covered to prevent leakage. Hold the cover while wrapping to prevent movement and rotation about the splice.



*It is important that immediately after assembly:*

- *Closure be solidly supported in final position on a firm foundation (Step 3)*
  - *Encapsulant poured (Step 6)*
  - *Closure is protected from sun (Fig. 13).*
3. Remove all temporary supports and place closure on firm foundation before filling. This will prevent damage to the closure when backfilling the splice pit.◀
  4. Snap funnel in hole. If closure is not level, place funnel in upper hole.
  5. **⚠DANGER:** Use B disposable gloves AT-8982, Section 081-856-101, and standard safety glasses when mixing and pouring D encapsulant. Skin that has come in contact with unreacted polyurethane should be washed with soap and water. In case of eye contact, flush thoroughly with running water or KS-21527 eyewash and then get medical attention. Mix encapsulant per instructions on container and instruction sheet using the bucket for mixing the large kits.
  6. Pour the encapsulant into the funnel until encapsulant runs from vent hole. Plug vent hole and complete filling operation. Once started pouring encapsulant, do not interrupt any longer than necessary to mix additional encapsulant. This is important to ensure a complete watertight fill.◀

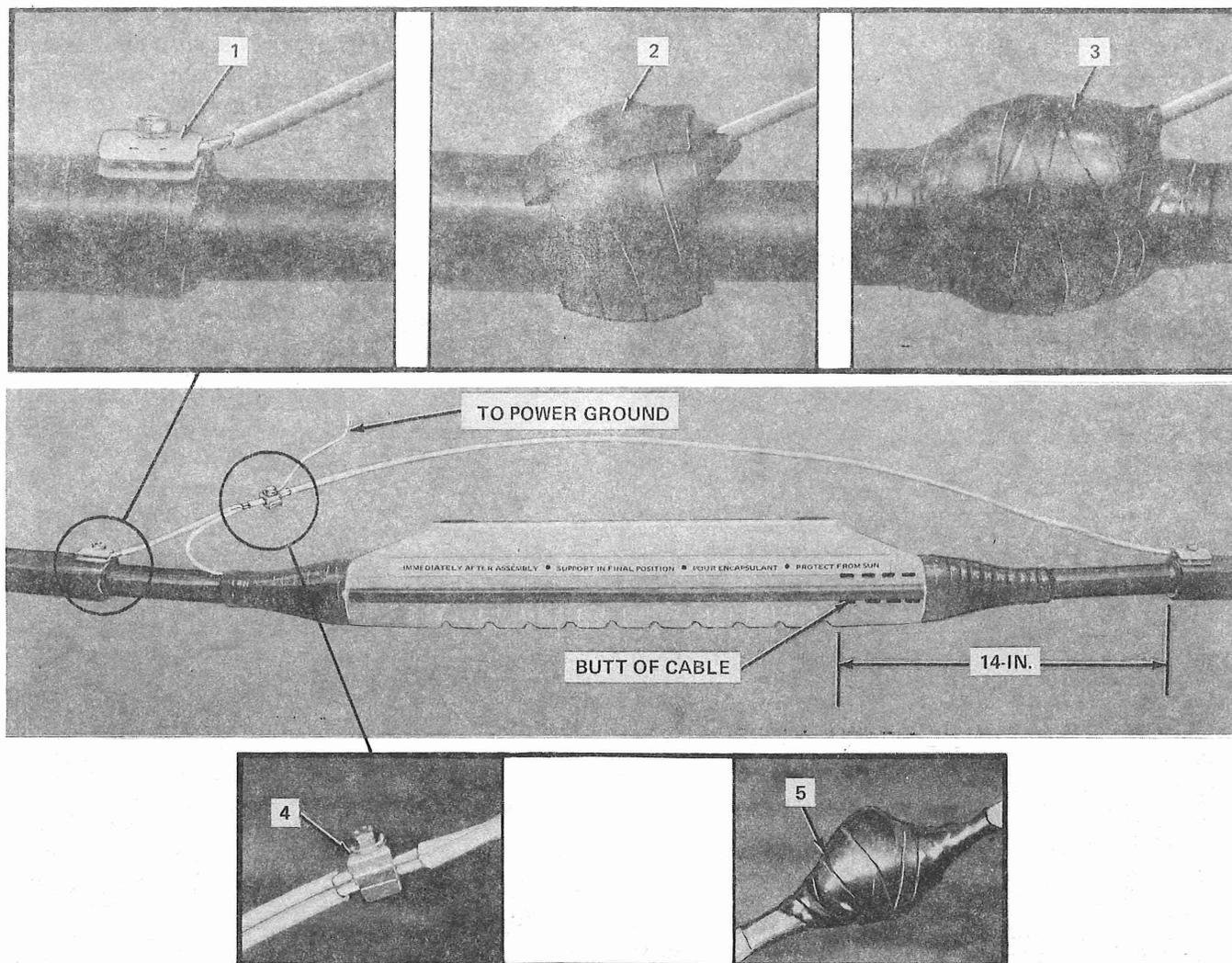
Fig. 12—Filling Splice With Encapsulant



1. Insert plugs in holes.

2. Backfill the splice pit. If the splice pit is not to be completely backfilled at this time, protect the closure from sunlight. Ultraviolet exposure may deteriorate the cover and then the encapsulant in less than one month.

**Fig. 13—Completed Installation**



1. Install B bond clamps and No. 6 ground wire to provide continuity across UM-type protection as outlined in Section 081-852-118 and cut off stud flush to nut.
2. Wrap bond clamps with D sealing tape.
3. Wrap D sealing tape with DR tape and vinyl tape. This provides corrosion protection.
4. When bonding the cable sheath to power company ground is required, remove approximately 2 inches of insulation from No. 6 ground wire providing continuity for UM-type protection. Then using an AT-7796X connector, connect ground wires as shown.
5. Protect connector from corrosion as outlined in Steps 2 and 3 above.

Fig. 14—Providing Continuity for UM-Type Protection

## 9. REENTRY

**9.01** *Planned reentry is not recommended, but if the 16-type closure is reentered (Fig. 15) it will be necessary to have a new kit of parts (see table, Fig. 1, for appropriate kit) for enclosing splice.* The cover is reusable; however, it will have to be cleaned and the foam strip replaced with new strip from kit.

**Note:** Disposable gloves are not required when reentering splice.

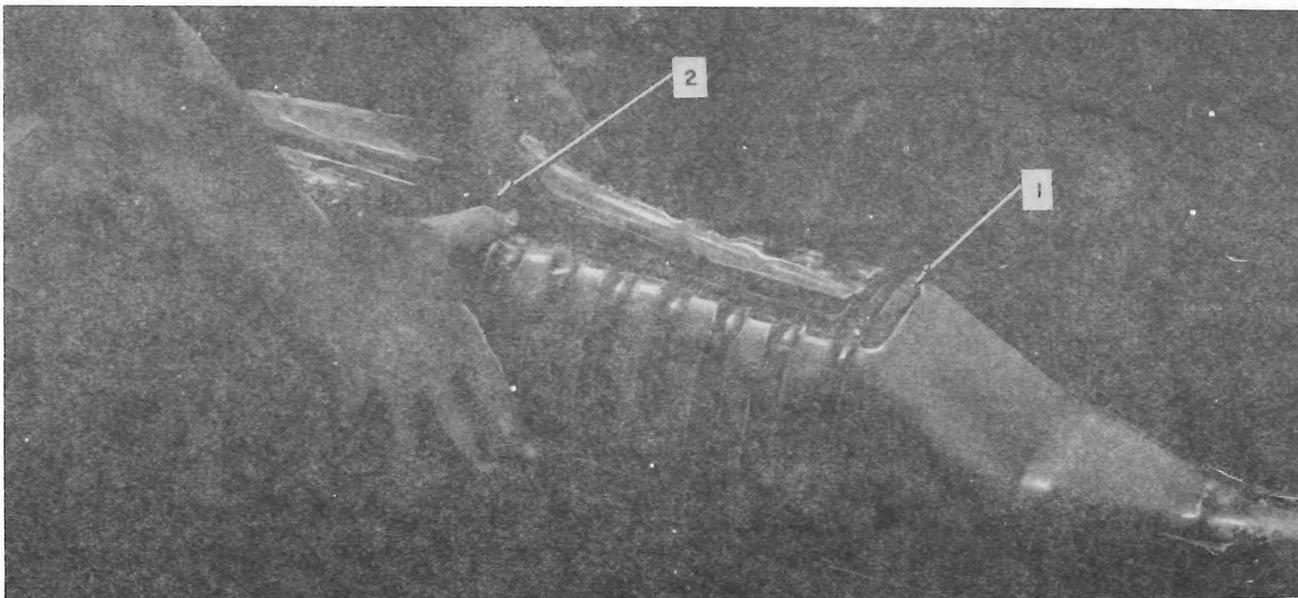
**9.02** Perform the necessary wirework. If the splice is wet, remove as much D encapsulant as possible, D sealing tape, and DR tape collar. Replace all connectors because connectors cannot be

successfully dried out. Dry out the splice by pouring KS-21446 solvent over the wires using a ladle and let it flow back into bucket for reuse. Completely rebuild and replace 16-type closure as previously discussed.

**9.03** Install a new kit of parts and cover as outlined in Fig. 8, 10, 11, 12, and 13.



*Reentered splices will tend to increase in size and loose pieces of cured encapsulant may further increase the bulk to a point where the next larger size cover may be required.*



1. Remove vinyl tape, black plastic clamp, and cover from splice to expose D encapsulant.
2. Tear encapsulant with fingers to expose seam of corrugated liner, cut the cable tie, and peel off liner to expose connectors. Work from the ends of the splice and handle units carefully to prevent damage to wirework. Complete removal of encapsulant is not necessary. Remove cable ties from wire bundle (cut the cable ties over the modules to prevent cutting wirework.)

**Fig. 15—Reentering Splice**

**10. USE OF CLOSURE AT CABLE END LOCATION**

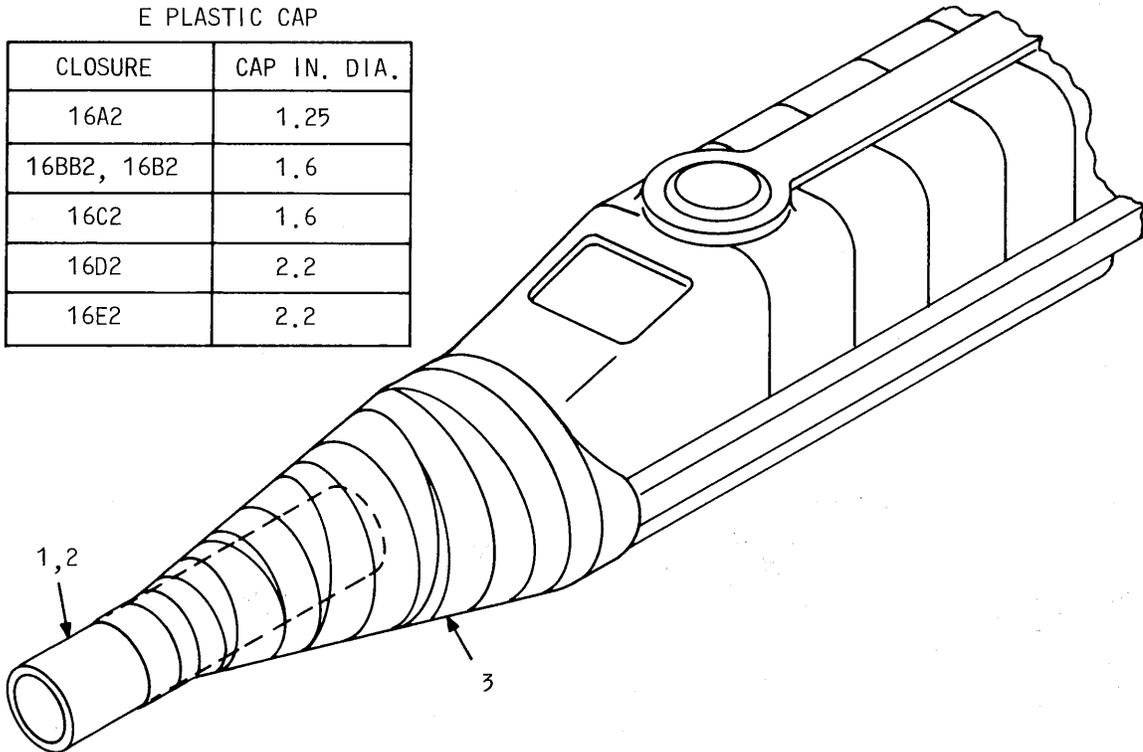
**10.01** After the cable ends have been cleared, install the 16-type closure as outlined herein.

**10.02** Install E plastic cap as shown in Fig. 16.

**10.03** Set the closure in position and pour the encapsulant as outlined in Fig. 12.

E PLASTIC CAP

| CLOSURE     | CAP IN. DIA. |
|-------------|--------------|
| 16A2        | 1.25         |
| 16BB2, 16B2 | 1.6          |
| 16C2        | 1.6          |
| 16D2        | 2.2          |
| 16E2        | 2.2          |



1. Obtain appropriate plastic cap as listed in Table.
2. Place plastic cap in vacant end of the closure with the open end toward the outside.
3. Wrap the nozzle with vinyl tape starting on the plastic cap and extending to the edge of plastic clamps, assuring all foam tape is covered to prevent leakage.

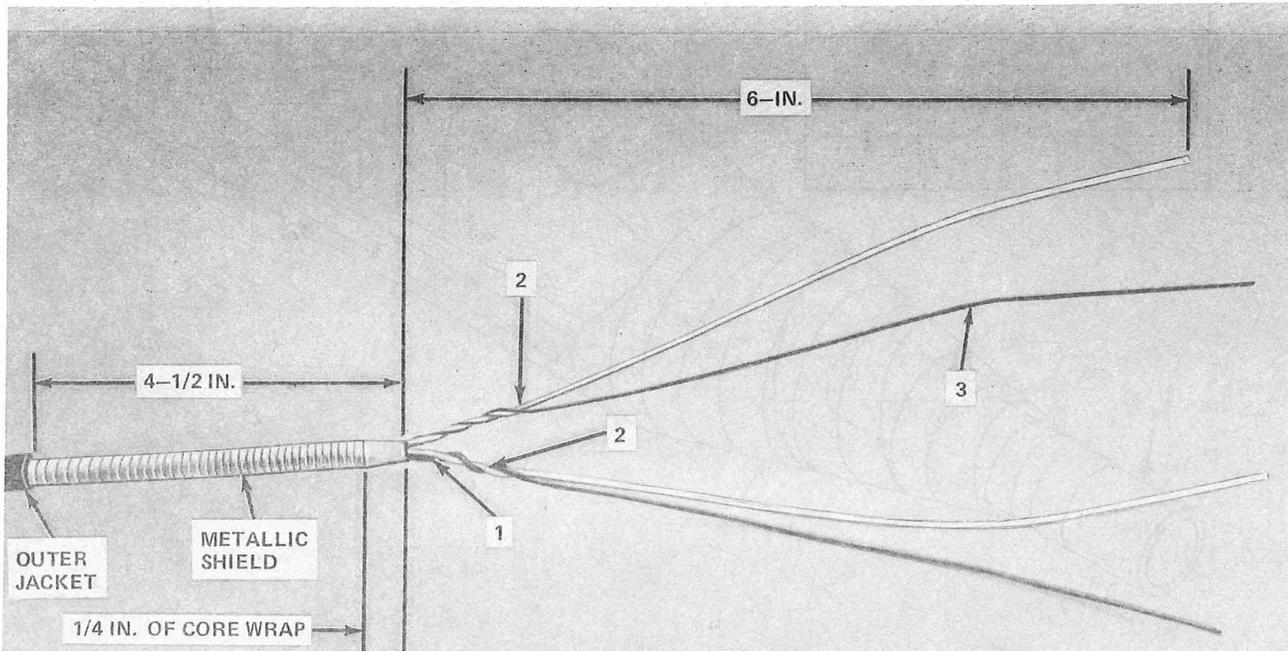
**Fig. 16—Installation of Plastic Cap at Cable End Location**

### 11. TERMINATION OF BURIED SERVICE WIRE

11.01 Termination of buried service wire within the closures covered herein is not recommended. This procedure is covered in Section 631-600-214. However, if it becomes necessary to provide a service wire termination at a splice location, follow the procedures outlined in Fig. 17 and 18.

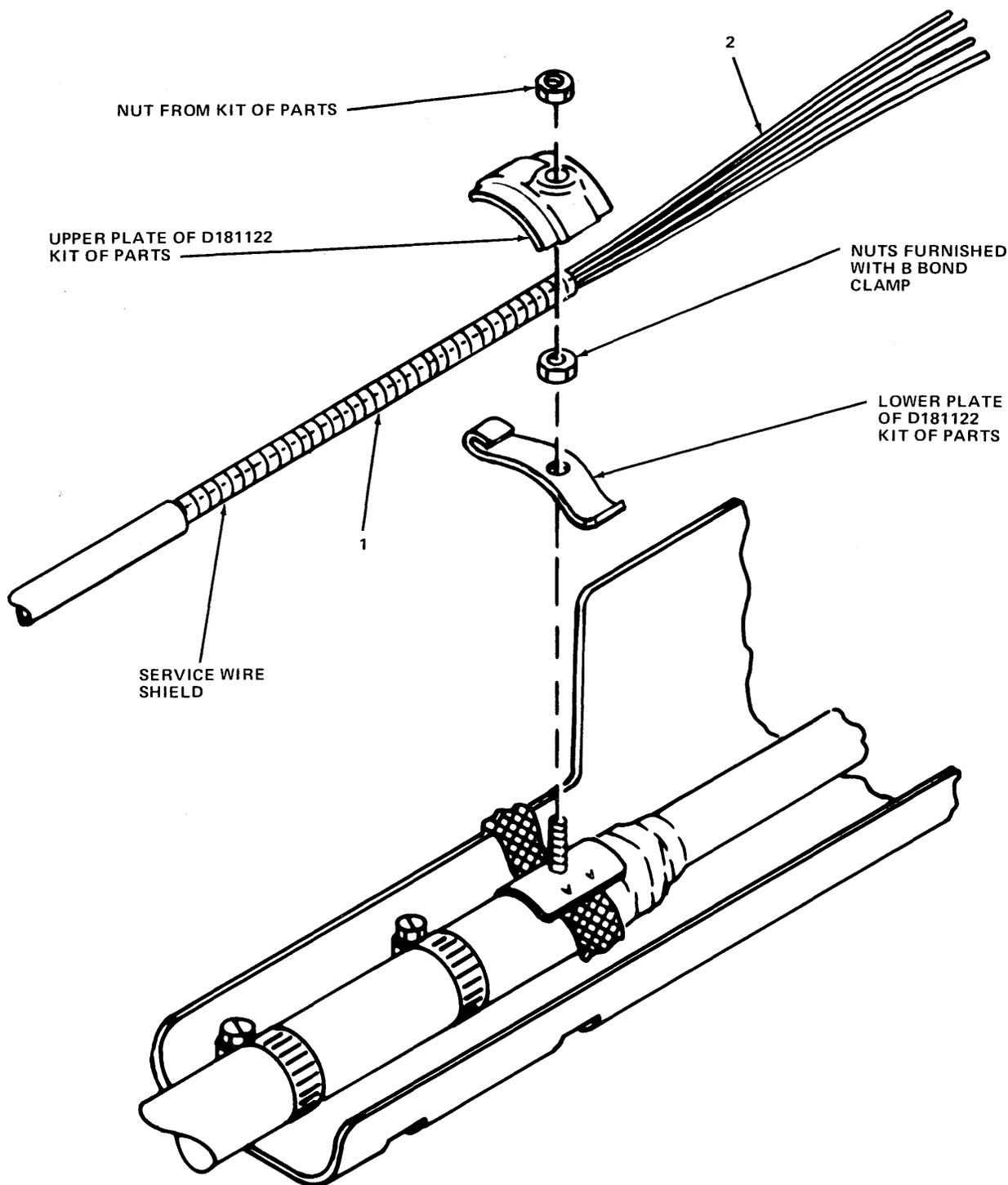
11.02 After the wirework has been completed, isolate the service wire connection from the splice by notching the corrugated liner and sandwiching the service wires between layers of the liner as outlined in Section 631-600-214.

11.03 Clean and place shield of service wires between layers of sealing tape and wrap with DR tape as outlined in Section 631-600-214.



1. Prepare service wire as shown.
2. Twist pairs to maintain identity.
3. Remove **all** filling compound from conductors. Waterproof cable filled with FLEXGEL filling compound (indicated by the letter "F" or "G" in the cable code) does not require cleaning. In those cases where petroleum jelly (PJ) filled cable (indicated by the letter "L" or "J" in the cable code) is used on new construction and in reentry and rehabilitation, solvent cleaning must be used, since petroleum jelly (PJ) filling compound must be removed thoroughly. This is required to assure a watertight seal between the D encapsulant and the conductor insulation. Solvent cleaning, as outlined in Section 632-410-200, is the most effective method.

Fig. 17—Preparation of Service Wire



1. Bond the metallic shield of service wire using D-181122 Kit of Parts.
2. Splice the service wire conductors to the assigned cable pairs as outlined in Section 631-600-214.♦

Fig. 18—♦Bonding Service Wire Shield♦