

## TEMPORARY SPLICE PROTECTION USING CR TAPE

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### 1. GENERAL

1.01 This section describes the method of using CR tape to provide a temporary protective covering over incomplete splices, trouble openings, etc.—It also describes the operations required to ensure the CR tape cover is adequately reinforced to withstand the pressures normally encountered on cables maintained under air pressure.

**Note:** All splices in working cables must be tightly wrapped to prevent circulation of air. Otherwise there is danger of the splice catching

fire in case an arc occurs between conductors. This applies to splices in buildings, vaults, manholes, tunnels, pits, aerial splices, and splices at ground level.

1.02 This section is reissued to include information concerning the placement of CR tape on 2-type closures. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 This section illustrates a splice with a single cable at one end and a Y-joint at the other. The methods described can be applied to straight splices and double Y splices.

1.04 Oil, dirt, or water reduces the adhesive qualities of the white rubber layer of tape. CR tape should be kept clean and dry and handled as little as possible to preserve this adhesive quality. Sunlight tends to shorten the service life of CR tape, so it is advisable to keep the tape covered during transportation and storage.

1.05 When CR tape is exposed to freezing temperatures, it tends to lose its adhesive strength. The loss of adhesiveness is temporary and can be corrected by raising the temperature of the tape. The condition of the tape can be determined by bending a sample piece and removing the separator. If the tape seems to be stiff and the separator does not peel cleanly, the tape needs warming. Cut the piece required for the job and place it in a warm room, a heated tent, or motor vehicle cab for several minutes immediately prior to using. **Do not warm the tape over an open flame.** If no other warm place is available, the tape can be warmed by placing it inside the coat, against the body of the employee.

### NOTICE

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## 2. PREPARATION OF CR TAPE

**2.01** On lead sheath cable, where the splice will be permanently closed with a lead sleeve, allow a 3-1/2 inch overlap at each end beyond the splice opening in determining the length of CR tape. An additional 3-1/2 inches must be added to the length of the tape for *each* time the splice is to be opened and closed.

**Note:** On Y-joints allow a 5-inch overlap.

**2.02** On plastic sheath cables, allow a 3-1/2 inch overlap beyond the longitudinal tab cuts or inner sheath clamps. If auxiliary sleeves are being used, allow a 3-1/2 inch overlap on each end. (See Note, paragraph 2.01.)

**2.03** On existing lead sheath cables where end plates were used, allow approximately 5 inches overlap beyond the outside face of the end plate.

**2.04** The width of the CR tape cover is determined by adding 4 inches to the greatest circumference of the wrapped splice. This width may be determined by centering the proper length of CR tape over the splice opening with the ends hanging down. Press the ends together so the CR tape is contoured around the wrapped splice at the widest point and mark the location where the ends meet directly under the splice. Add 2 inches to each side and

cut off excess tape. Before removing the CR tape cover from the splice opening, mark the air valve location.

**2.05** If the CR tape cover is to be used only once, score the separator with splicing scissors as shown in Fig. 1. Score additional 3-1/2 inch strips as necessary for second and third reuse of the cover. **Do not remove the separator** until the CR tape is in place over the splice. The purpose of scoring the separator is to facilitate its removal after the tape cover is placed over the splice opening.

**Note:** If one side of the splice has a Y-joint, score the separator on that particular side for 5 inches to accommodate a crotch saddle. For the second or third reuse of the cover, the separator will be removed as required.

## 3. METHOD OF INSTALLING AIR VALVES

**3.01** An air valve (Fig. 2) must be installed on the CR tape cover to provide:

- (1) An entrance point to admit air to flash test the completed cover for leaks.
- (2) A vent to bleed off air pressure during the installation of the CR tape cover on pressurized cables.

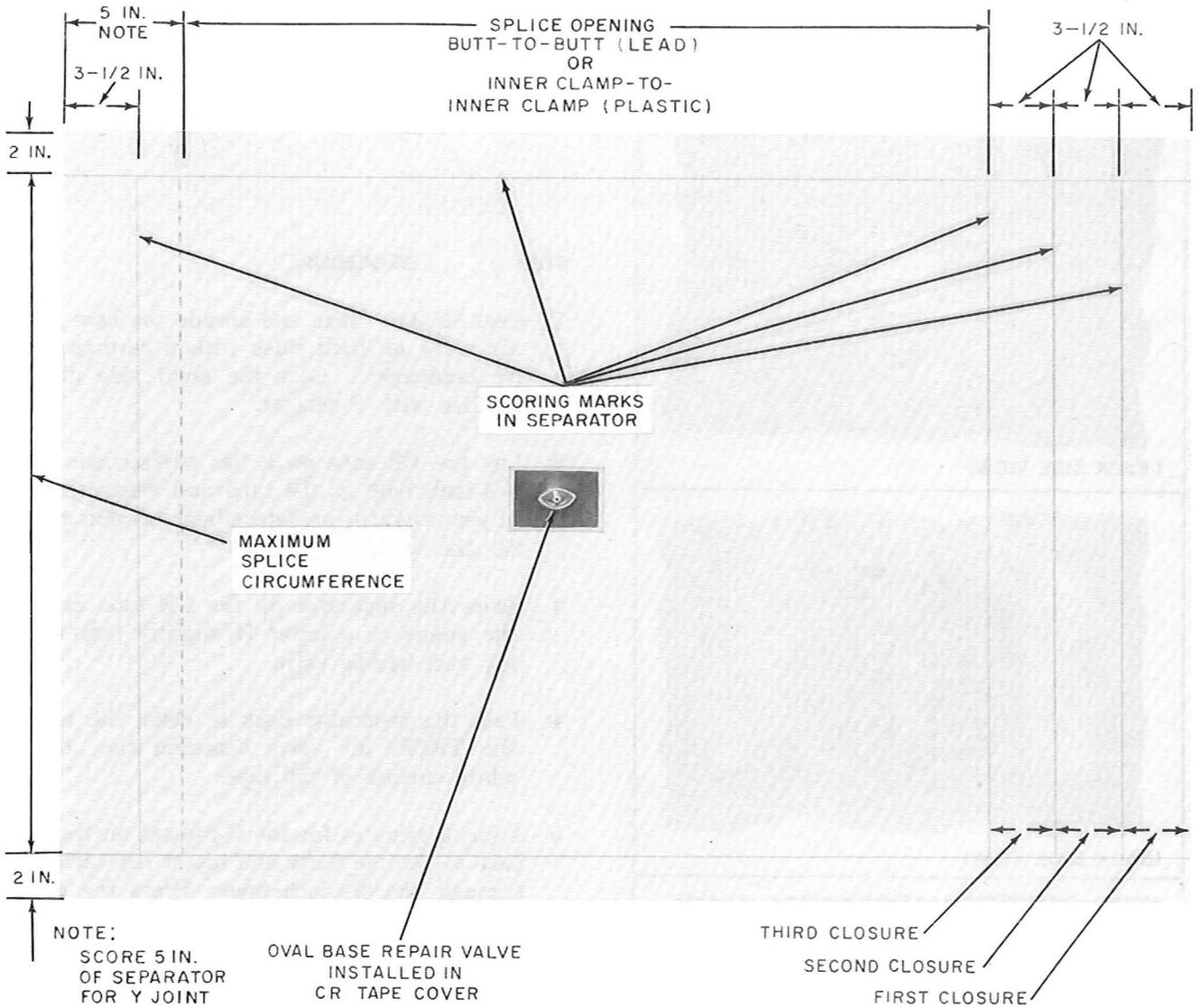


Fig. 1—Scoring CR Tape Separator

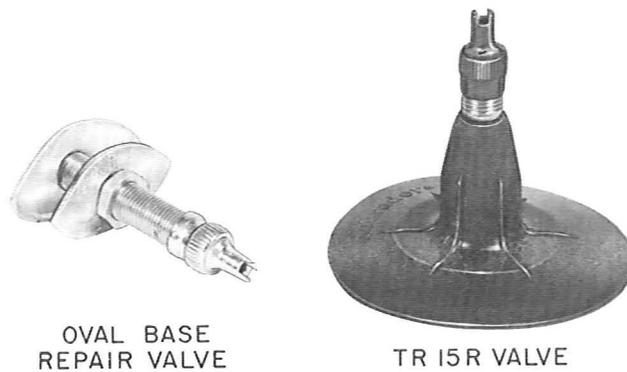
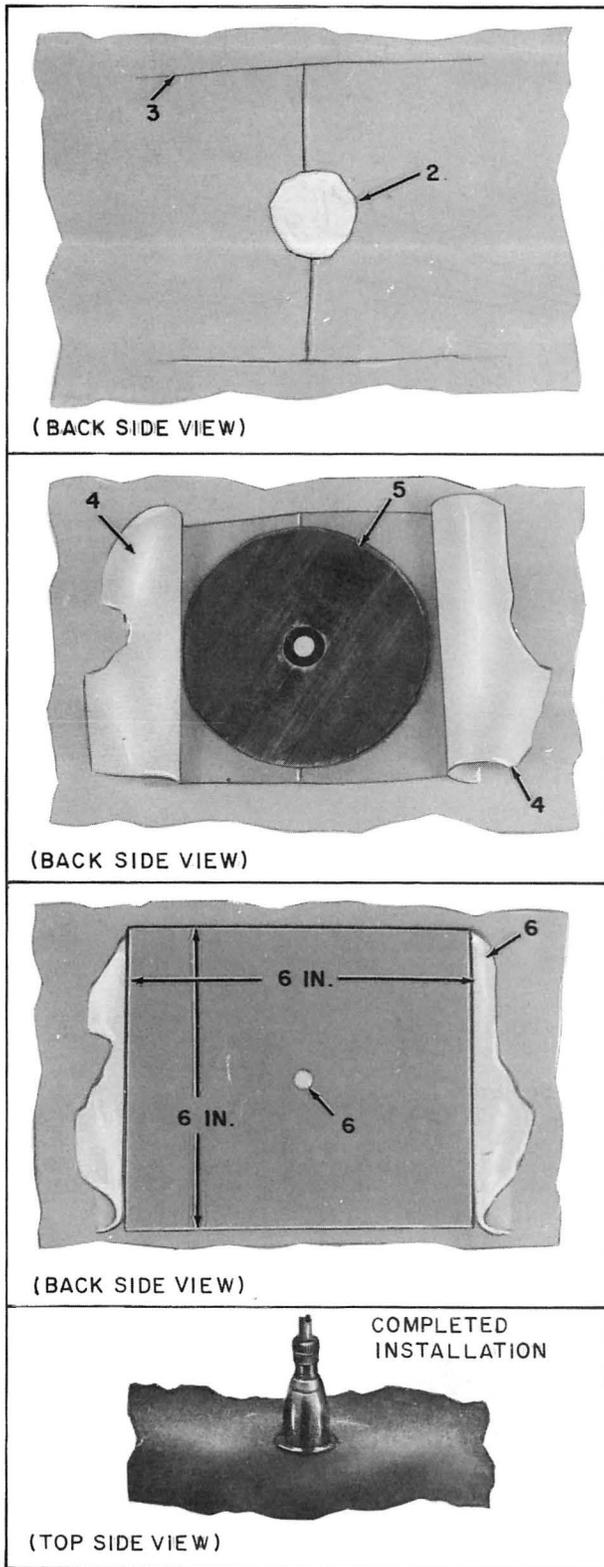


Fig. 2—Types of Air Valves

3.02 Install the TR15R air valve in the CR tape as shown in Fig. 3.

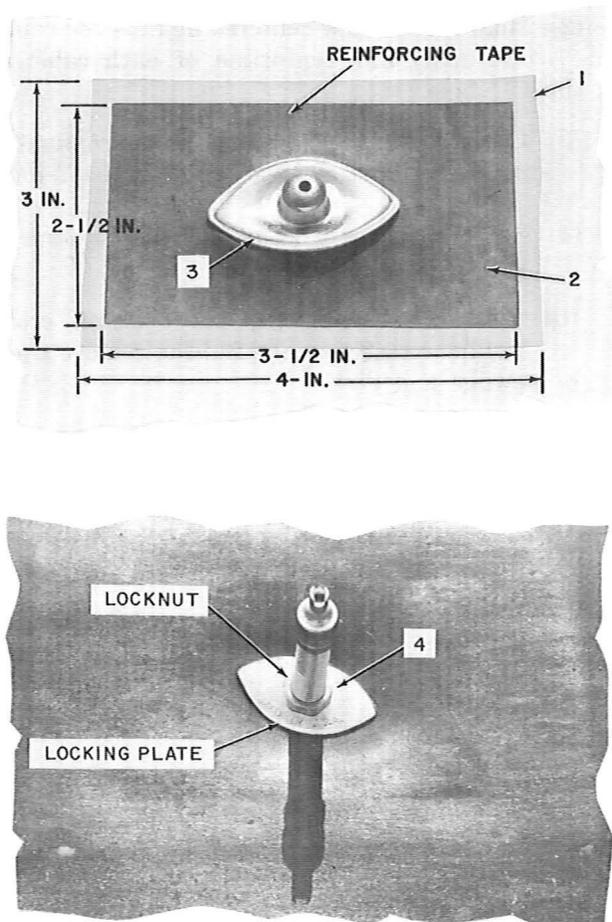


STEP	PROCEDURE
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- (Not Shown) Clean and abrade the base of the air valve on both sides with a carding brush or sandpaper. Coat the stem side abraded surface with C cement.
- Lay the CR tape on a flat surface and cut a 3/4-inch hole in the tape and separator (size of penny) at the predetermined location marked for the valve.
- Score the separator on the CR tape cover in the shape of a letter H slightly larger than the base of the valve.
- Peel the separator back to clear the base of the TR15R air valve exposing the adhesive white surface of the tape.
- Allow 3 minutes for the C cement on the valve base to become tacky and insert the valve stem through the 3/4-inch hole. Press the cement coated valve base firmly against the exposed white surface of the CR tape. Use care to prevent wrinkles from developing in the tape.
- Cut a piece of CR tape 6 inches square. Place the CR tape on a flat surface and cut a hole the size of a penny in the center. Coat the exposed side of the inserted valve with C cement.
- Peel the separator back enough to accommodate the 6 inches of CR tape.
- Carefully place the CR tape over the valve with the hole in line with the valve stem.

Fig. 3—Method of Installing TR15R Air Valve

**3.03** Install the oval base repair valve in the CR tape as shown in Fig. 4.



- | STEP | PROCEDURE  |
|------|--|
| 1.   | Score and remove a 3-inch by 4-inch piece of the separator on the CR tape from the predetermined valve location.   |
| 2.   | Cut a piece of CR tape approximately 2-1/2 inches by 3-1/2 inches from another roll of tape. Remove the separator from this small piece and press the white adhesive side to the exposed white surface of the CR tape cover. |
| 3.   | Cut a 3/8-inch hole in the center of the reinforced area of the CR tape and insert the valve stem.   |
| 4.   | Place the locking plate and locknut on the stem and securely tighten the locknut.  |

**Fig. 4—Oval Base Repair Valve Installed in CR Tape**

#### **4. PREPARATION OF SPLICE OPENING**

**4.01** The cable sheath should be smooth and round. Dress the sheath of lead cable if necessary to remove any irregularities. Clean about 4 inches of the cable sheath and smooth with carding brush or lead rasp. On plastic sheath cables, remove any nicks or score marks which may cause air leaks.

**4.02** At Y-joints, remove any lead wedge and increase the space between the cables to about 2 inches. A roll of 4-inch muslin may be used for the purpose of maintaining this separation. Place three or four figure 8 servings of muslin wrapping in the space between the cables and against the roll of muslin. This provides a firm surface for later application of the crotch saddle and CR tape covering.

4.03 Place two firmly wrapped half-lapped layers of muslin over the entire splice (Fig. 5).

5. PREPARING AND INSTALLING CROTCH SADDLE

5.01 The purpose of the crotch saddle is to reinforce the CR tape at the Y-joint of a splice, where the cover placed under air pressure is most susceptible to air leaks and blowout.

5.02 The height and width of the crotch saddle is determined by measuring the distance between the top of the upper cable and the bottom of the lower cable in the Y-joint. Add 1 inch to each end for overlap.

5.03 Prepare a crotch saddle for a Y-joint as follows: (See Fig. 6.)

- (1) Cut a piece of CR tape to the required size (paragraph 5.02).
- (2) Hold the CR tape centered against the cables and mark the centerline of each cable on the CR tape.
- (3) Cut holes in the piece of tape approximately one-half the size of the cables in the Y-joint.
- (4) Slit the top and bottom of the CR tape to the cable holes.
- (5) Clean the back side of the prepared crotch saddle with B cleaning fluid to remove traces of powder and dirt.

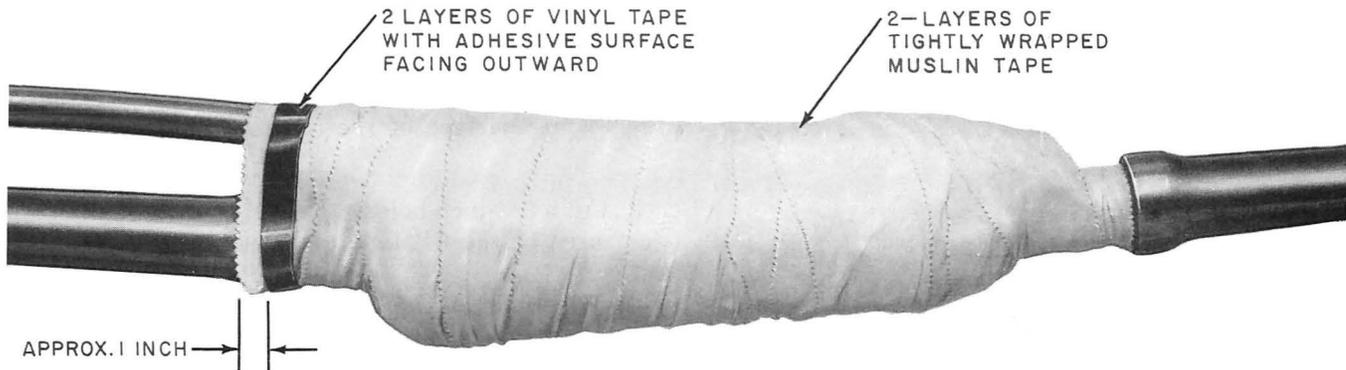


Fig. 5—Splice Prepared for Crotch Saddle

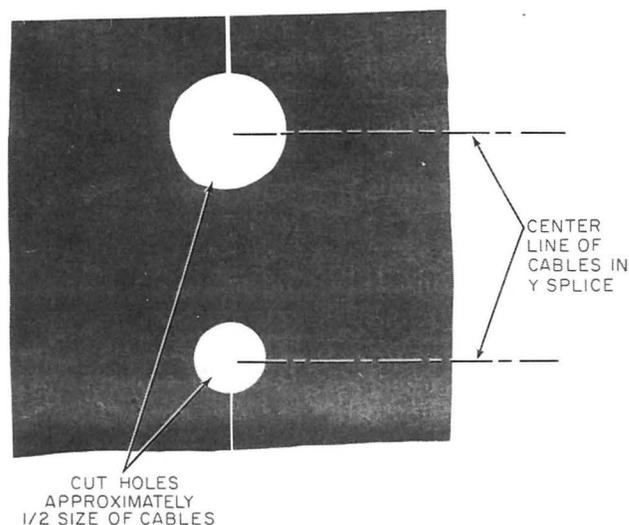


Fig. 6—Prepared Crotch Saddle

5.04 Install crotch saddle as follows: (See Fig. 7.)

- (1) Place two reverse laps of vinyl tape over the muslin wrapping, 1 inch from end of splice bundle at Y-joint (Fig. 5). **Adhesive surface must be facing outward.**
- (2) Remove separator from prepared crotch saddle.
- (3) Carefully place crotch saddle between the two cables with white rubber adhesive surface facing outward.
- (4) Overlap the two slitted edges of the upper hole around the upper cable and press down firmly against the vinyl tape stretching lightly against the muslin wrapping.

- (5) Repeat the process on the lower cable making certain the outer edges of the crotch saddle are in firm contact with the vinyl tape and the crotch saddle is snug against the contour of the splice.

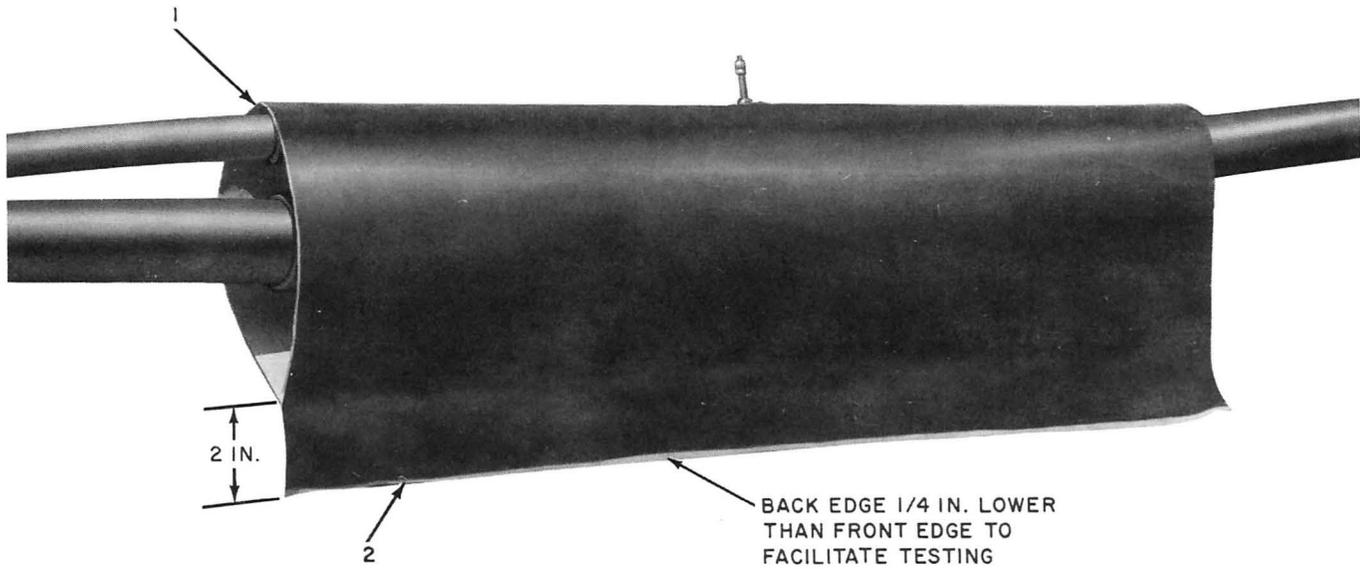
## 6. APPLICATION OF CR TAPE FOR SINGLE USE

- 6.01 If the temporary CR tape cover is to be used only once, place two layers of B sealing tape on each cable as shown in Fig. 7. For lead sheath cable, place the B sealing tape 1 inch from the muslin wrapping on the straight end.



Fig. 7—Crotch Saddle and B Sealing Tape Installed (Single Use)

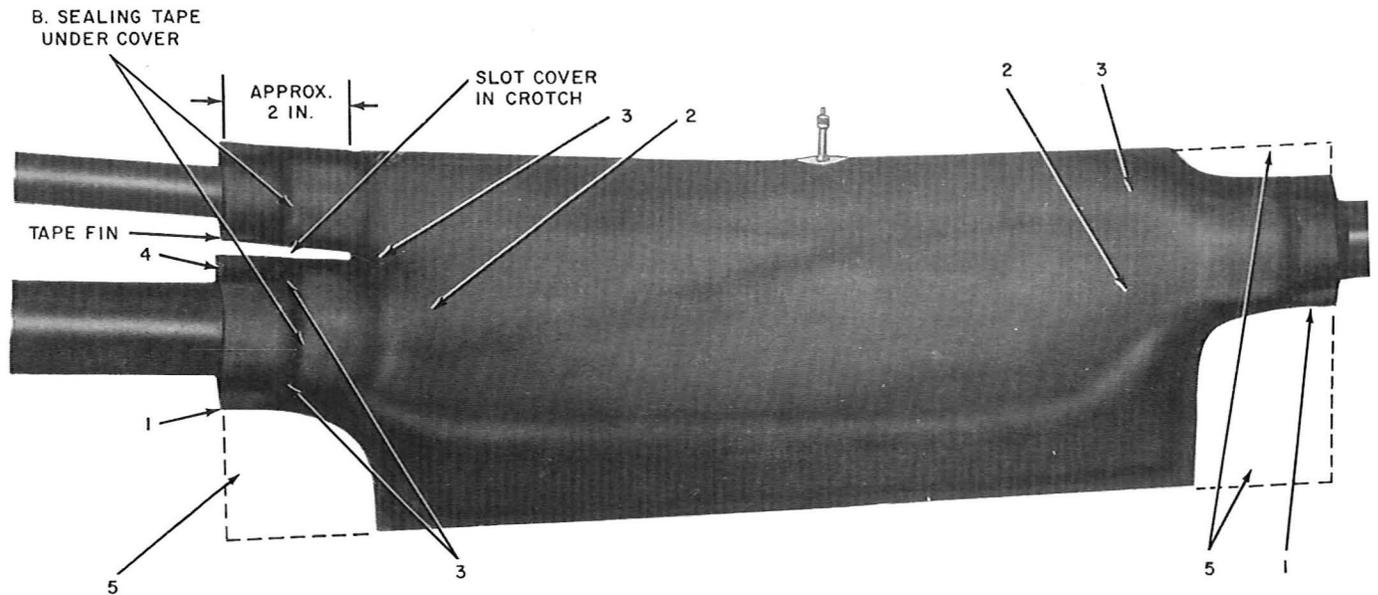
6.02 Form CR tape cover over splice opening as shown in Fig. 8.



- | STEP | PROCEDURE  |
|------|--|
| 1.   | Locate the CR tape over the splice opening so the cover extends 1/2 inch beyond the B sealing tape at each end of the splice. Make certain the air valve will be readily accessible.   |
| 2.   | Remove the prescored 2-inch separator strips from the edges hanging down. Starting at either end of the cover, work across the bottom, carefully pressing the adhesive surfaces of the CR tape together to avoid wrinkles. Allow rear surface to extend 1/4 inch below front surface for soaping and testing purposes. |

Fig. 8—Forming CR Tape Cover Over Splice Opening

6.03 Fit CR tape cover on cables as shown in Fig. 9.



**STEP**

**PROCEDURE**

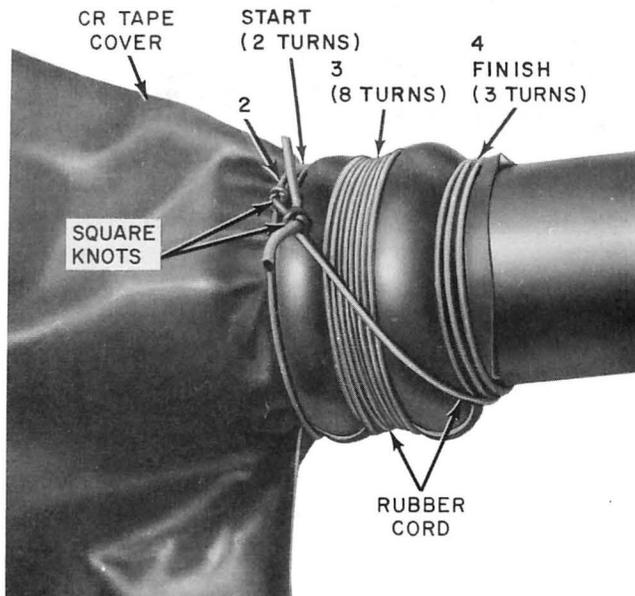
1. Remove the 5-inch prescored strip of separator (paragraph 2.05) from the end of the CR tape at the Y-joint.
2. Press the adhesive surface of the CR tape firmly and smoothly against the adhesive surface of the crotch saddle between the cables. Press the CR tape against the crotch saddle above and below the cables following the contour of the splice bundle.
3. Pinch the CR tape tightly together around the cables and the B sealing tape to form a tight seal.
4. Cut and remove a strip of the CR tape fin 1/4 inch wide and 2 inches long between the cables in the Y-joint and from the fins. ***Make certain that a minimum of 1 inch remains between the end of the cut and the crotch saddle.***
5. Trim off corners of CR tape cover.

Fig. 9—Fitting CR Tape Cover on Cables

6.04 Secure the ends of the CR tape cover with rubber cord as shown in Fig. 10.

6.05 If the cable in the splice being covered is under air pressure, the valve core must be removed from the stem prior to and left out during tying operations to bleed off air pressure until the CR tape cover is reinforced with muslin (paragraphs 9.02 and 9.03).

6.06 Where both ends of the splice are Y-joints, each end must be prepared with a crotch saddle as described in Part 4.



**STEP PROCEDURE**

1. Cut off a length of rubber cord approximately eight times the circumference of the cable to be tied.
2. Fold the fins of CR tape and wrap with two turns of stretched rubber cord. Secure with square knot approximately 2 inches from free end of cord.
3. Stretch cord and make eight turns over area of B sealing tape.
4. Wrap three turns of stretched rubber cord in front of B sealing tape area and secure to end of cord (Step 1) with a square knot.

Fig. 10—Tying CR Tape Cover

**7. APPLICATION OF CR TAPE ON 2-TYPE CLOSURE END PLATES**

7.01 If the splicing operation cannot be completed in the normal work day, it may be necessary to install a temporary watertight cover as shown in Fig. 11 through Fig. 19.

**Note:** Where grounding is required, follow procedures outlined in Section 633-506-201.

**8. APPLICATION OF CR TAPE FOR REUSE**

8.01 If a splice containing at least one non-Y-joint is to be covered more than one time before it is permanently closed, it is possible to reuse the CR tape by adding 3-1/2 inches to the single use length for each time the cover is to be opened. All operations are identical to those used for single closings and include the placing of the crotch saddle at any Y-joint. The only two changes from single use are: the separator should be scored 3-1/2 inches for each opening (Fig. 1), and the location of the B sealing tape on the single cable side of the splice. Use new B sealing tape each time the CR cover is opened and closed.

8.02 Only a single cable end of a CR tape cover can be satisfactorily opened and reclosed. To open the CR tape cover proceed as follows:

- (1) Cut the rubber cord.
- (2) Cut and remove the outer 3-1/2 inch portion of CR tape from which the separator had been previously removed.
- (3) Remove the used B sealing tape.

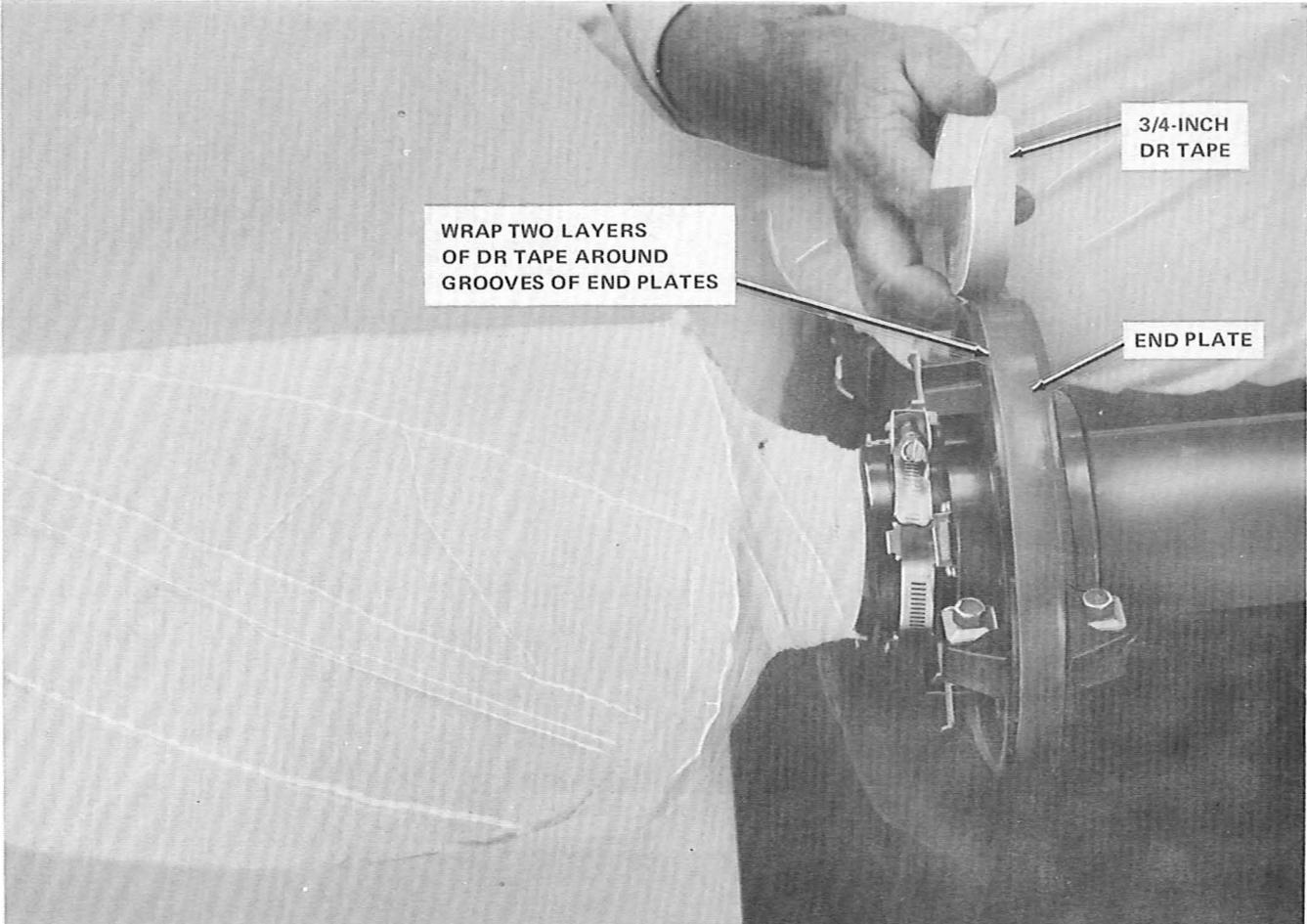


Fig. 11—Applying DR Tape to End Plate

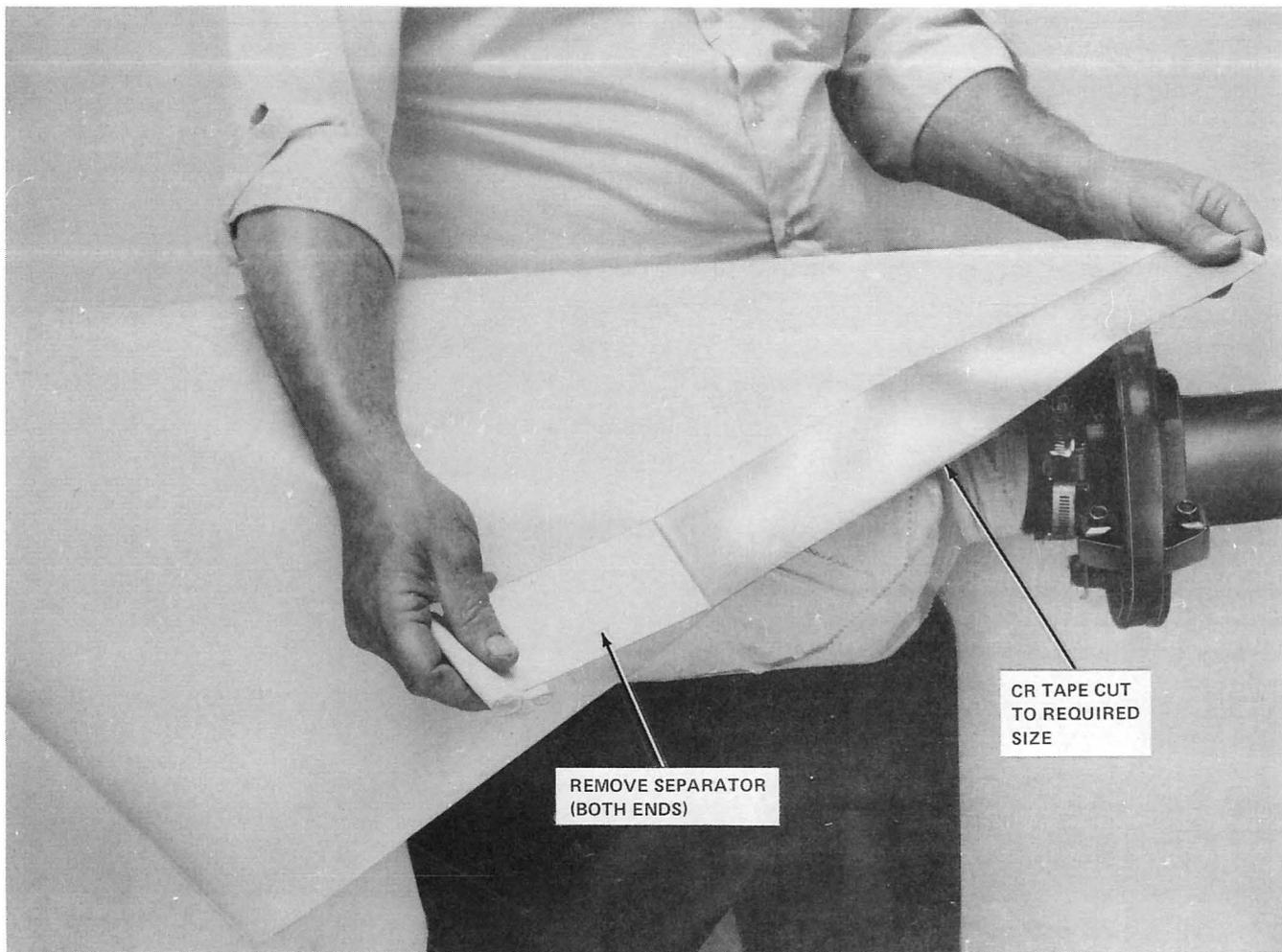


Fig. 12—Removing Separator From CR Tape

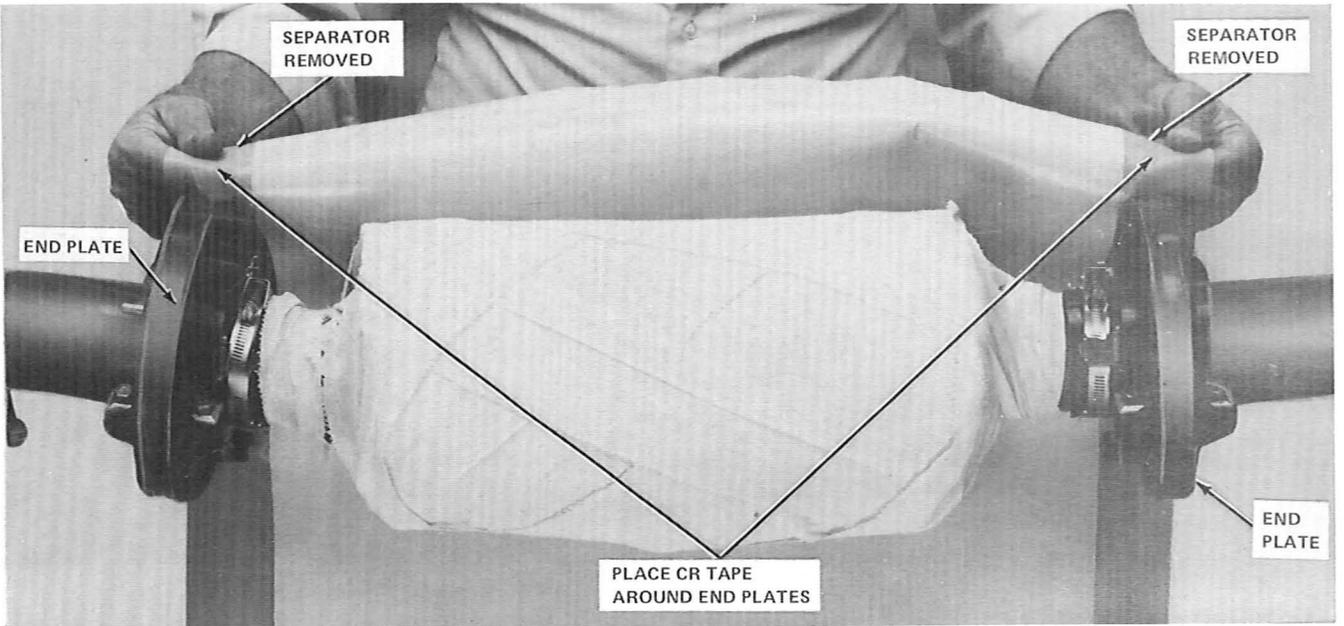


Fig. 13—Placing CR Tape Over End Plates

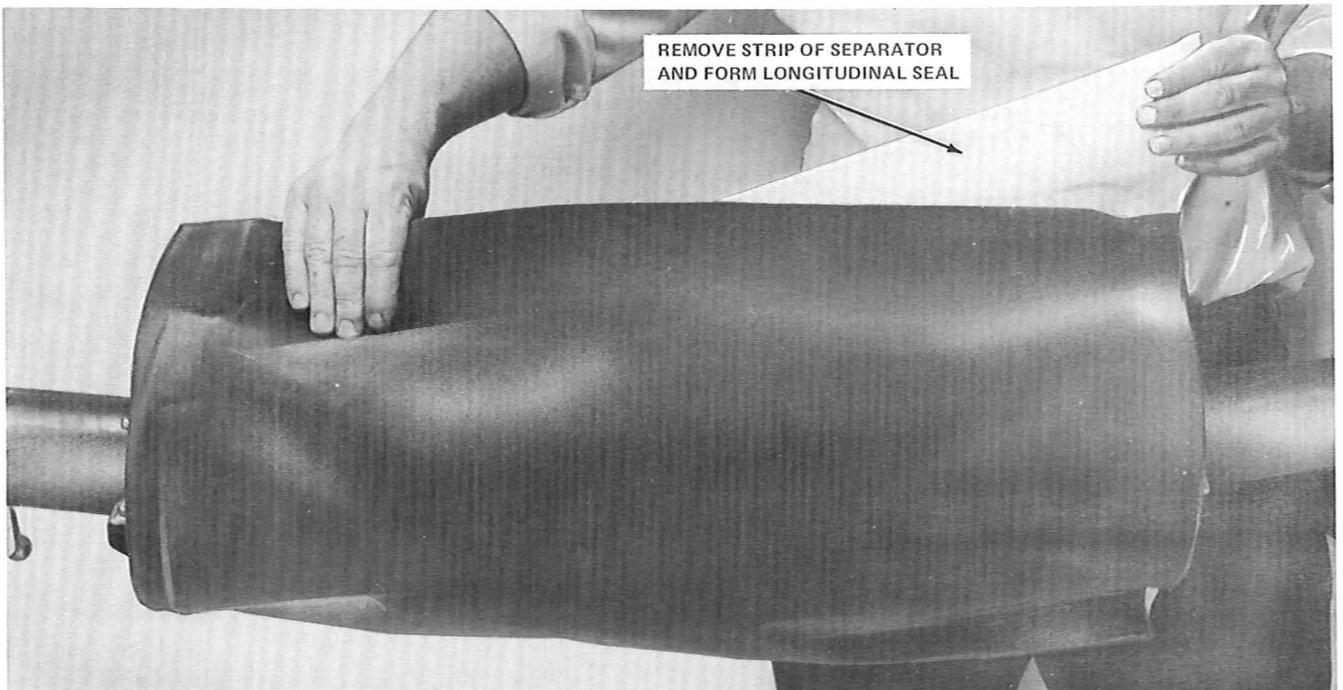


Fig. 14—Sealing CR Tape

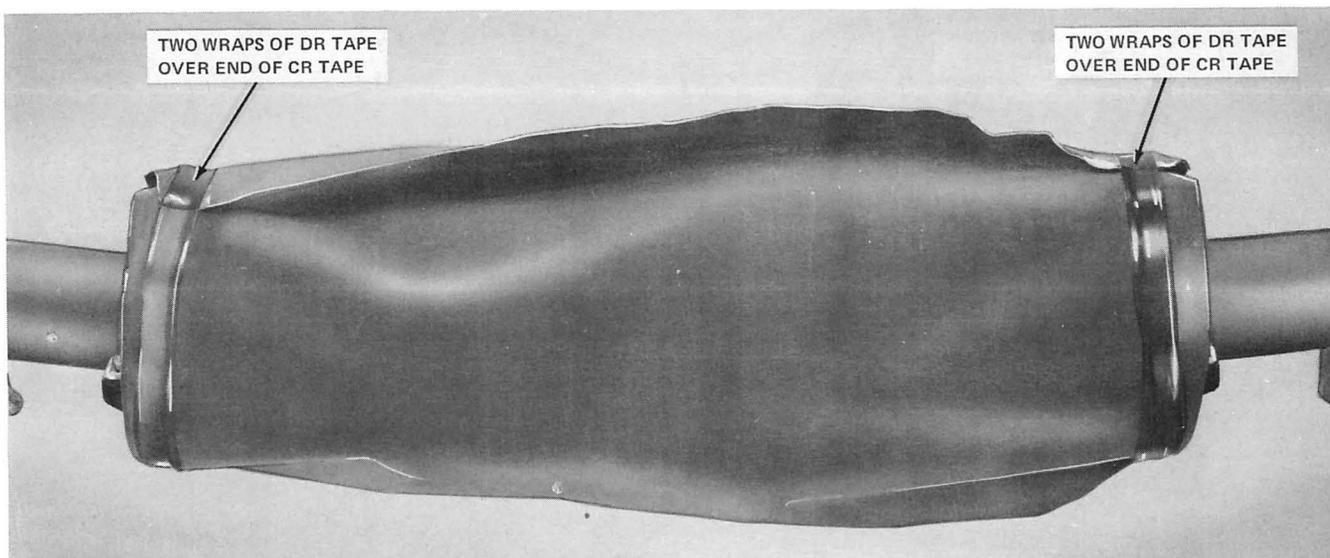


Fig. 15—Wrapping Ends With DR Tape

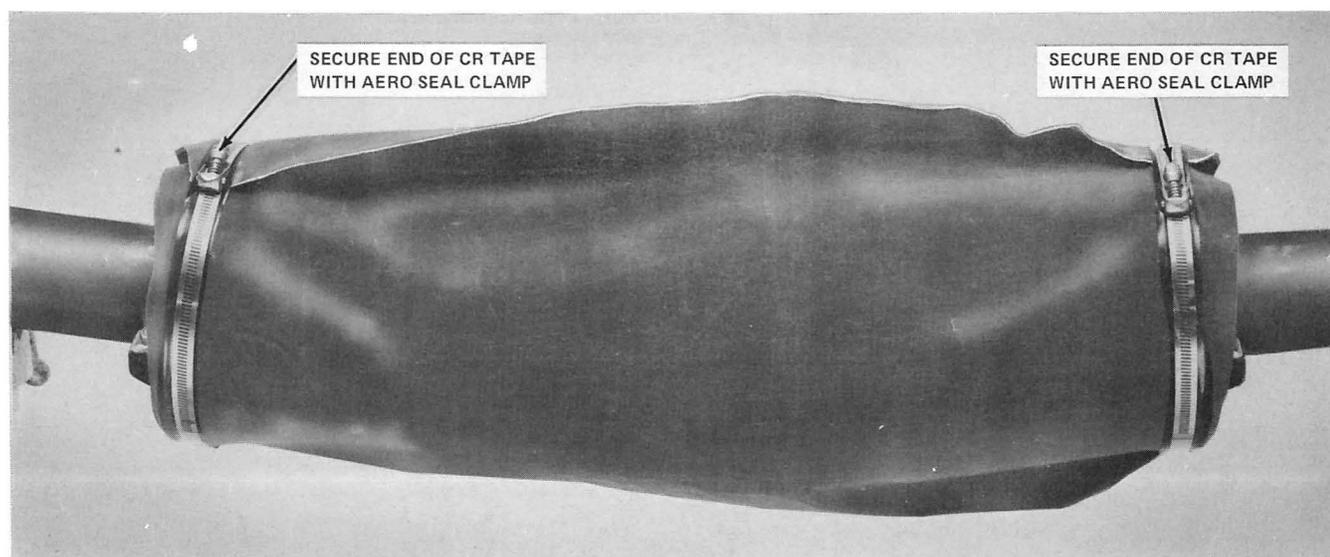


Fig. 16—Installed Aero Seal Clamps

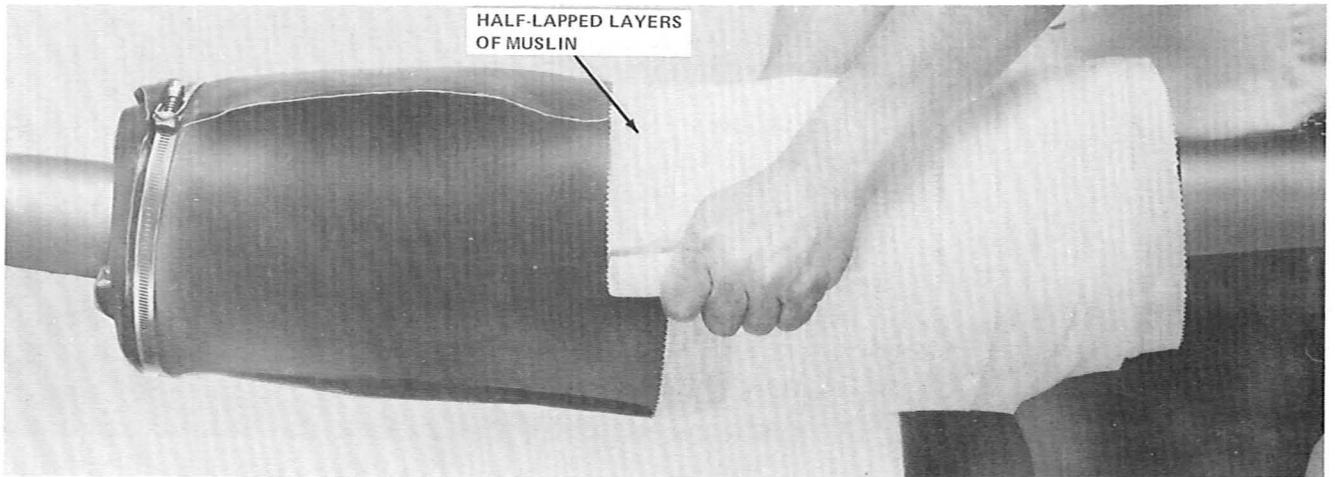


Fig. 17—Wrapping CR Tape With Muslin

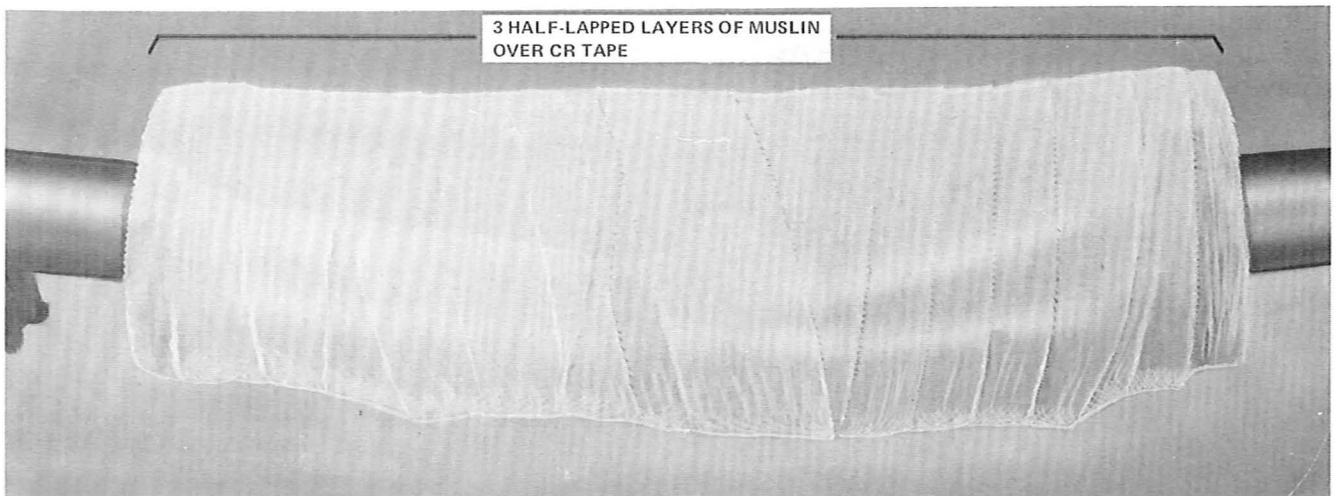
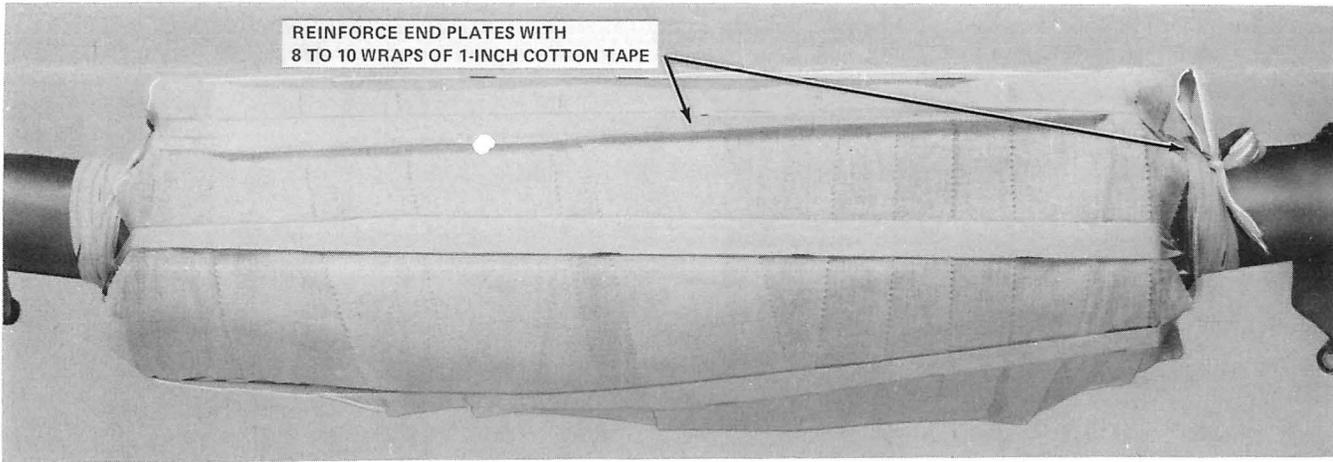


Fig. 18—Muslin Applied



**Fig. 19—Completed Wrap Reinforced With Cotton Tape**

(4) Place both hands at the center of the covering and pull gently toward the end opposite the opened end of the splice cover. Tuck the slack

in to make a reverse fold. Continue pulling and tucking until the splice is fully exposed (Fig. 20).



**Fig. 20—Cover Folded Back for Access to Splice**

**8.03** To reclose the CR tape over the splice:

- (1) Grasp the CR tape cover on both sides of the splice as shown in Fig. 21 and pull the cover slowly back into place.
- (2) Place two layers of 1-1/2 inch B sealing tape on the cable sheath so the outer edge is 1/2 inch inside the end of the CR tape.
- (3) Strip the 3-1/2 inch prescored separator from the CR tape (Fig. 1, second closure).
- (4) Press the adhesive surfaces of the CR tape together, trim off the fins, and tie the end with rubber cord as described in Part 6 to complete the closing.

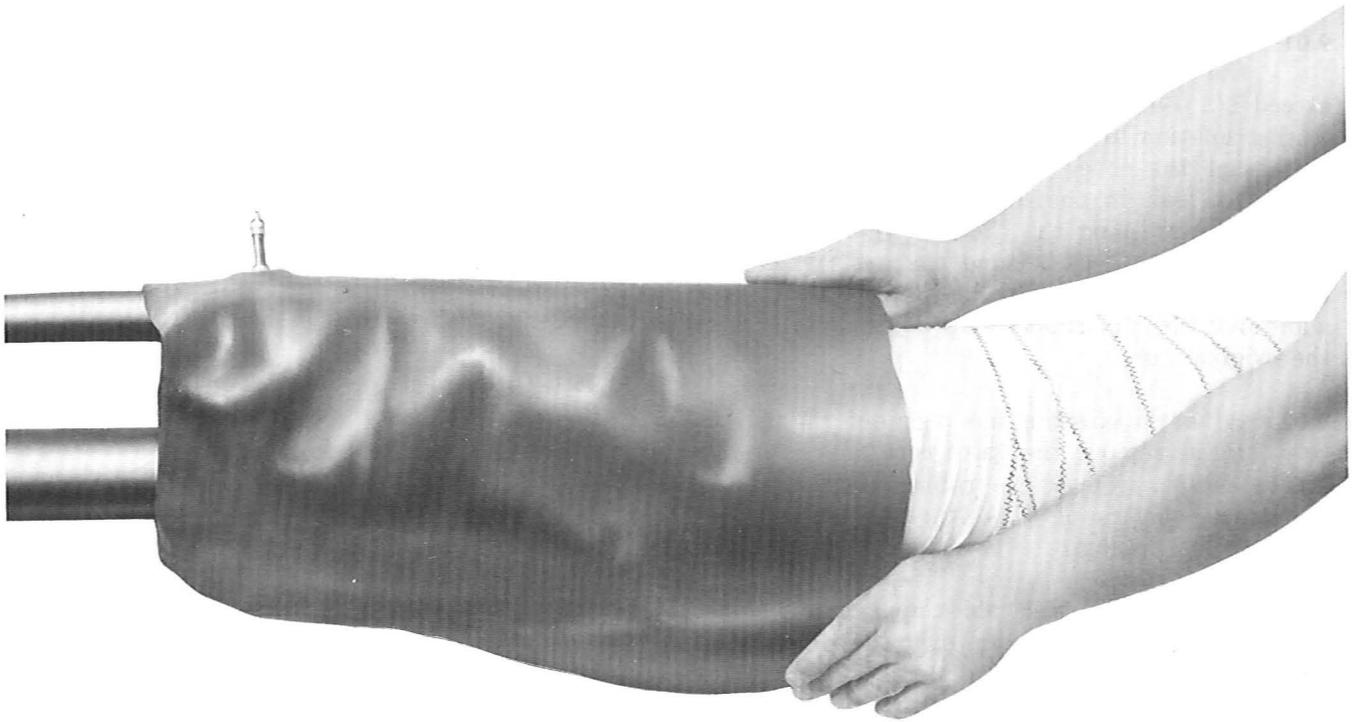


Fig. 21—Reclosing CR Tape Cover

8.04 For the third opening and closing, follow the procedure outlined in paragraphs 7.02

and 7.03. Figure 22 illustrates the CR tape cover installed and prepared for testing.

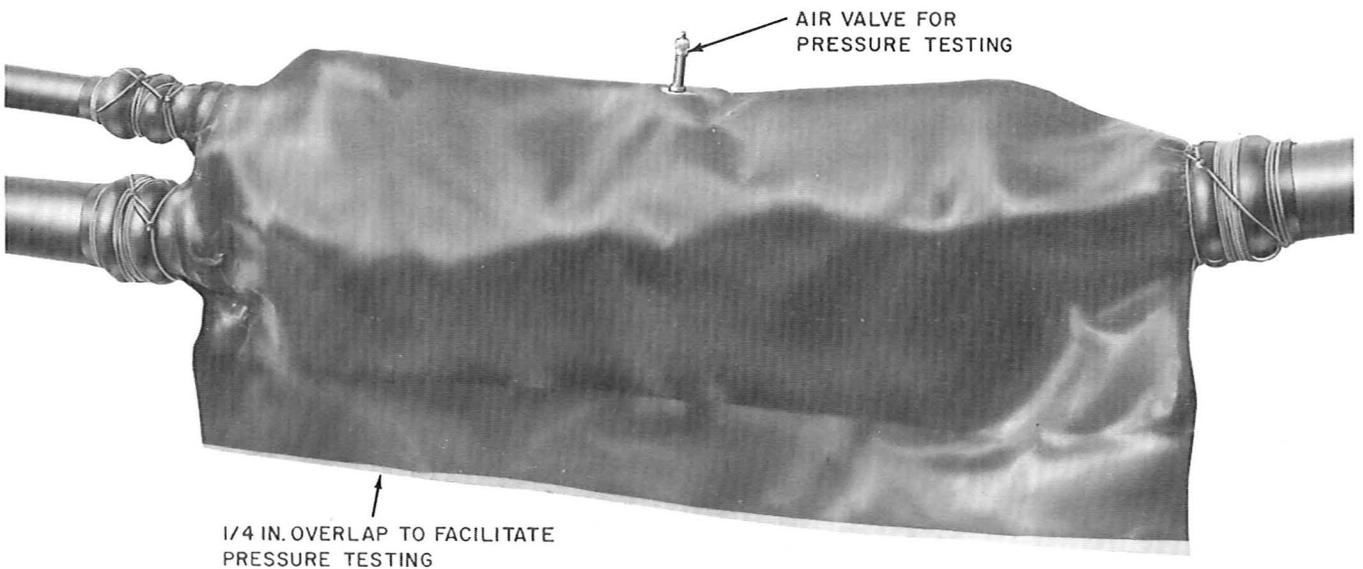


Fig. 22—CR Tape Cover Prepared for Testing

**9. TESTING CR TAPE COVER**

**9.01** Admit air through the air valve installed in the CR tape cover at a pressure not to exceed 1/2 pound per square inch. Apply pressure testing solution to the longitudinal seam along the bottom of the cover and along each of the end seals. A leak in the long seam can usually be stopped by pressing the CR tape tightly together at the leak. A leak around the cable sheath at the end seals can usually be stopped by placing additional turns of rubber cord adjacent to or over the original turns.

**9.02** After the covering has been determined airtight, remove the valve core and allow the air to escape. Cover the rubber cord with two half-lapped layers of vinyl tape to prevent the knots from slipping.

**9.03** On nonpressurized cables, apply a half-lapped layer of 4-inch muslin over the CR tape for mechanical protection and replace the valve core and cap.

**10. CABLES UNDER CONTINUOUS AIR PRESSURE**

**10.01** On cables maintained under continuous air pressure, the CR tape cover must be reinforced to prevent a blowout. The valve core should not be replaced until the reinforcing operations are completed.

**10.02** Pack and reinforce the crotch between the cables in the Y-joint with rags or muslin. Secure the packing with three or four tight figure 8 wrappings of 4-inch muslin to prevent bulging.

**10.03** If the maximum diameter of the splice is 4 inches or less, apply two tightly wrapped layers of half-lapped 4-inch muslin over the entire CR tape cover. If the diameter is greater than 4 inches apply three half-lapped layers of muslin. Carry each layer into a figure 8 wrapping at the crotch for additional reinforcement.

**10.04** Secure the finished wrapping by using 4-inch muslin horizontally back and forth across the vertical wrappings. Use a figure 8 turn on the Y end of the splice as shown in Fig. 23.

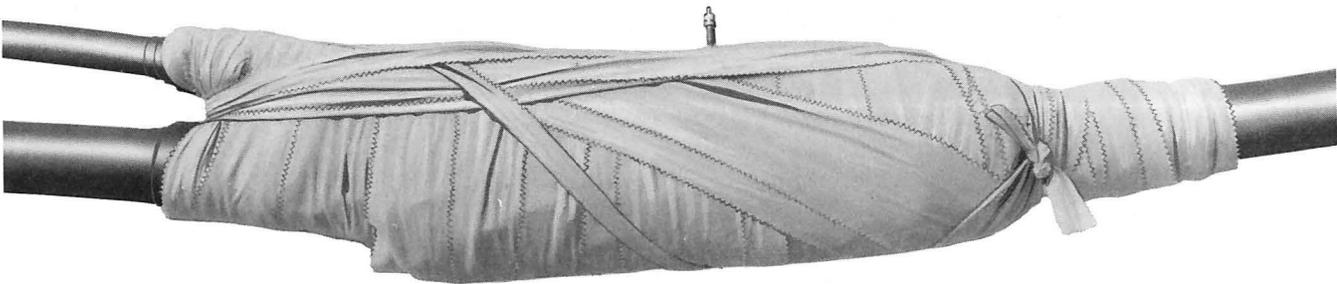
**10.05** On double Y-splices, serve the muslin back and forth horizontally between the cables.

**10.06** Replace the valve core and valve cap and permit the air to rise to the normal pressure in the cable. Examine the covering to determine if there are any bulges or weak areas. If a bulge occurs or the wrapping does not appear safe, apply one or two additional layers of muslin to make certain the covering will withstand the air pressure.

**11. REMOVING PROTECTION**

**11.01** The muslin wrappings should be removed from the splice and, if the muslin is in good condition, it should be rolled for reuse. Rubber cord, vinyl tape, and the CR tape cover should be removed from the splice by cutting them. The tapes and rubber cord should not be reused.

**11.02** The oval base repair valve may be recovered by disassembling the unit.



**Fig. 23—Reinforcing CR Tape Cover**