21D4 CENTRAL OFFICE SPLICE CASE
DESCRIPTION AND INSTALLATION

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1. GENERAL

1.01 This section covers the installation of the 21D4 Splice Case (Fig. 1), used to enclose the splice between the central office connector stub cables and feeder cable. See Section 633-400-200 for descriptive information of other 20- and 21-type splice cases that can be used in this manner, when a case as large as the 21D4 is not required.

1.02 This section contains information formerly contained in Section 636-370-201, which is canceled.

1.03 The use of the P-21E642 Bonding Harness Assembly (Fig. 2) is introduced in this practice.

1.04 ***Splice cases installed as outlined herein are not intended to withstand continuous air pressure, and a pressure plug will be required in the feeder cable between the splice and the source of air for the cable. However, these splice cases will prevent moisture or water from entering the splice, if the work is performed carefully as outlined in this section.***

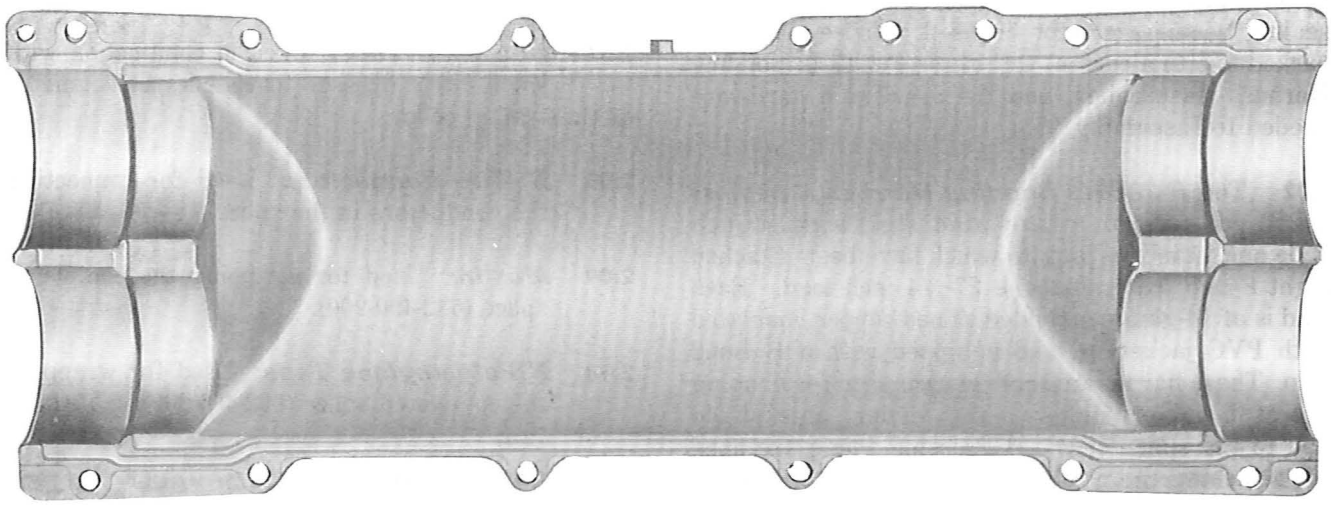

Fig. 1—21D4 Splice Case

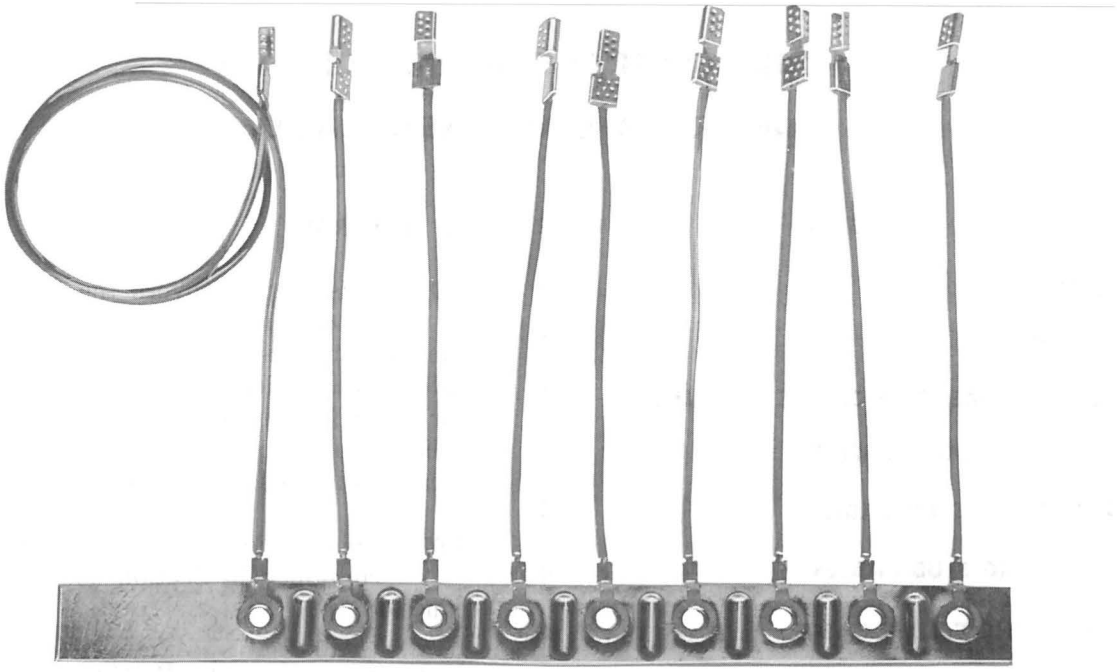

Fig. 2—P-21E642 Bonding Harness Assembly

2. MATERIAL

2.01 The ***21D4 Splice Case*** is intended to be used with feeder cables having a diameter between 2.3 and 3 inches, and will accommodate as many as eight stub cables in each of three splice case openings. The 21D4 Splice Case is not designed for use in locations other than central offices, since no sealing corrugations have been provided and sealing washers cannot be used. These cases are packed two to a carton, with three P-21E642 Bonding Harness Assemblies, and the associated hardware needed for assembly.

2.02 The ***P-21E642 Bonding Harness Assembly*** consists of a tin-plated steel strip 1 inch wide and 11 inches long to which have been attached eight 8-inch leads and one 27-1/4 inch lead. Each lead is of 14-gauge stranded tinned copper, insulated with PVC jacketing, and equipped with a B Bond Clip. These harness assemblies are used for bonding the stub cable shields to the feeder cable shield and to the splice case. B Pressing Pliers are used for attaching the B Bond Clips to the cable shields.

2.04 3/4-inch ***Vinyl Tape:*** Used for electrical and mechanical protection.

2.04 3/8-inch ***B Paper Tape:*** Used for marking the cable sheaths for work operations.

2.05 ***B Sealing Tape:*** Used for building sealing collars.

2.06 ***B Sealing Cord:*** Used for filling the interstices between stub cables at the sealing collars, and for sealing the splice case flanges.

2.07 ***2-inch DR Tape:*** Used in conjunction with wood cable dresser to reduce the diameter of the sealing collar.

2.08 ***B Wire Connectors:*** Used for connecting the conductors in the splice.

2.09 ***Muslin:*** Used for wrapping the completed splice (632-490-200).

2.10 ***B Polyethylene Tape:*** Used for wrapping the completed splice (632-490-200).

3. ARRANGEMENT OF CABLES IN VAULT

3.01 The splice should be positioned to minimize bends in the main feeder cable. It is easier

to handle the fairly flexible stub cables than to attempt elaborate setups with the main feeder cable.

3.02 Group all stub cables which enter the same splice case opening. This can usually be done immediately after the stub cables enter the vault. Bind the group together and tie to the first horizontal frame member encountered.

3.03 Where the stub cable run is perpendicular to a horizontal racking member, either tubing clamps, as shown in Fig. 3, or lashed cable supports may be used to attach the stub cables to the framework. The size of the tubing clamps used is determined by the number of stub cables being supported. Refer to Section 622-700-100 for clamp sizes.

3.04 Where the stub cable run parallels the framework, lashed cable supports can be used to attach the stub cables to the framework.

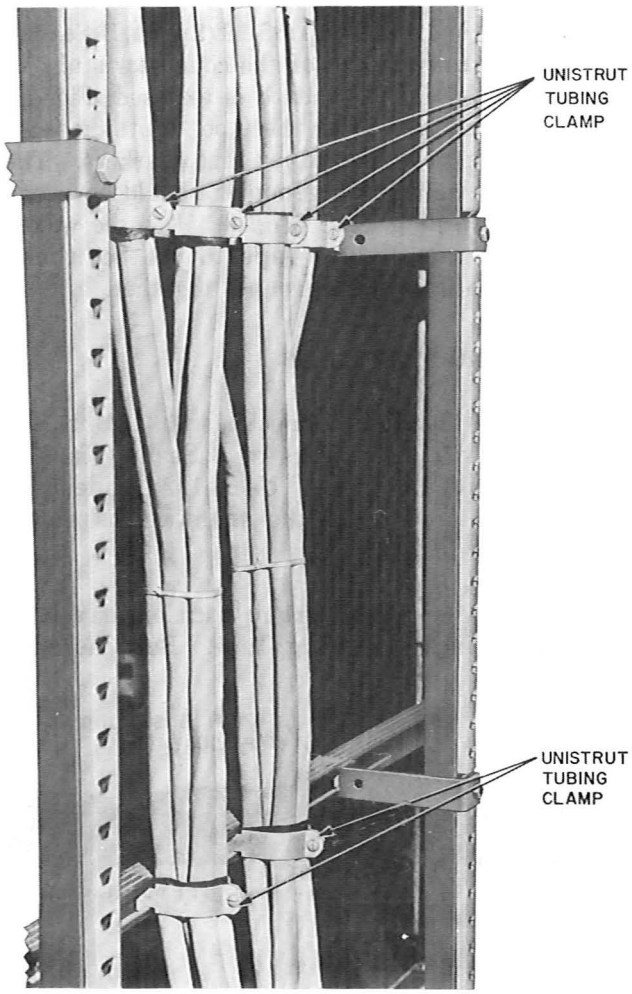

Fig. 3—Stub Cables Attached to Framework

3.05 Arrange the feeder cable and stub cables in position for splicing.

4. MARKING CABLE SHEATHS

4.01 Position a splice case back of the cables in the bay to be used for the splice.

4.02 Using B Paper Tape, mark the cable sheaths on both ends of the splice for the location of the outer edge of the 1-1/2 inch B Sealing Tape collar.

4.03 Measure 1-3/4 inch toward the center of the splice from the first tape marker and place a second tape marker on each cable. This marker indicates the end of the tab cut on the feeder cable, and the extent of the outer jacket removal on the connector stubs.

4.04 Measure another 2-1/4 inches toward the center of the splice and mark the feeder cable with a paper tape marker to indicate the extent of removing the sheath (Fig. 4).

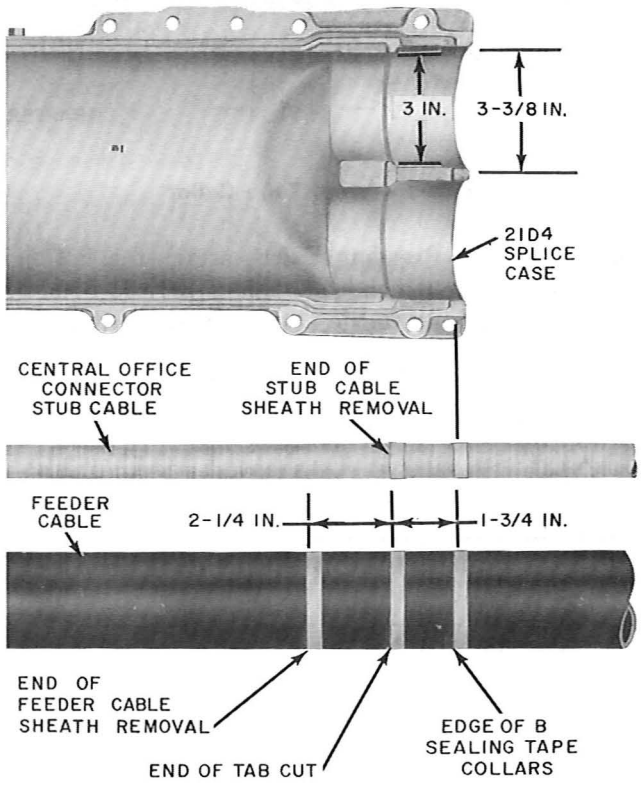

Fig. 4—Marking Cables

5. PREPARING STUB CABLES

5.01 Use the cable stripper or the R-2761 Skinning Knife to cut around the PVC sheath at the proper paper tape marker. Slit the sheath from this cut to the end of the stub and remove the sheath.

5.02 Place a snug wrap of lashing wire around the aluminum shield one inch from the end of the PVC sheath. Tear and remove the aluminum shield at this point. Wear gloves while removing the shield. Remove the lashing wire wrap.

5.03 Make a collar over the core wrapper with two layers of 3/4-inch vinyl tape; place the first layer with the adhesive side out, and the second layer with the adhesive side in. Do not stretch the tape.

5.04 Slide the collar so that one half of the collar is under the aluminum shield. This will help to prevent damage to the conductors (Fig. 5).

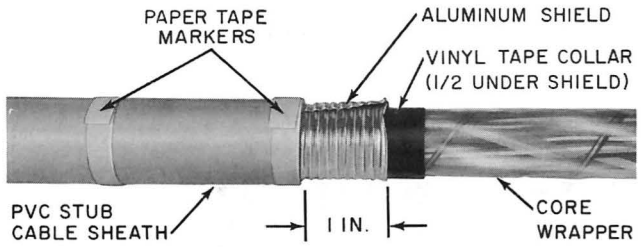

Fig. 5—Vinyl Tape Collar

5.05 Using B Pressing Pliers, attach the B Bond Clip of an 8-inch lead of the P-21E642 Bonding Harness Assembly to the aluminum shield (Fig. 6).

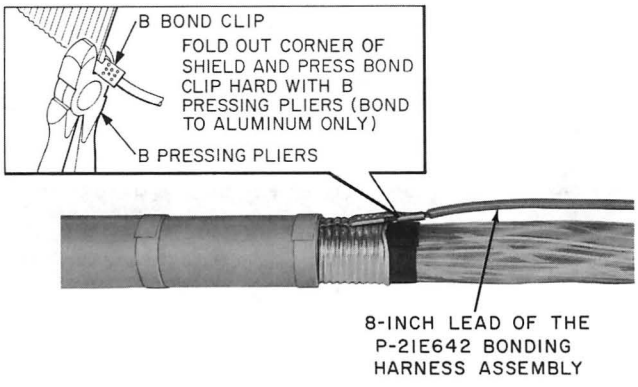

Fig. 6—Bonding Stub Cable Shield

5.06 Wrap the shield and the inner vinyl tape collar with two half-lapped layers of tightly stretched vinyl tape. One end of the wrapping should overlap the vinyl core wrapper by 1/4 inch, and the other end should extend to the butt end of the PVC sheath.

5.07 Remove the core wrapper to within 1/4 inch of the vinyl wrap (Fig. 7).

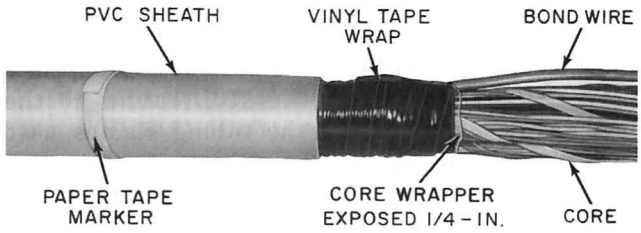

Fig. 7—Vinyl Tape Wrap

5.08 Prepare all connector stub cables as described in 5.01 through 5.07.

5.09 Place one full wrap of 1-1/2 inch B Sealing Tape around each of the connector stubs so that 1/8 inch of PVC sheath is exposed (Fig. 8). Do not stretch or overlap the tape. Butt the ends together. Remove the paper tape markers. The center stub of an 8-stub grouping should have two layers of B Sealing Tape (Fig. 9). Use the waxed paper with the sealing tape to protect these wrappings until they are grouped together.

6. GROUPING STUB CABLES

6.01 Group the eight connector stubs so that the stub with two layers of B Sealing Tape is in the center of the group. Use 1-1/2 inch lengths of B Sealing Cord to fill the interstices as shown in Fig. 9 and 10.

6.02 Wrap the 8-stub group with one layer of 1-1/2 inch B Sealing Tape. Butt the ends

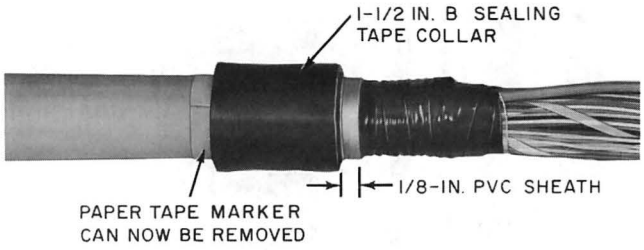

Fig. 8—Sealing Tape Collar

of the sealing tape (Fig. 9 and 11). Keep the B Sealing Tape and cord as clean as possible and do not stretch them. Do not handle tape or cord with damp or oily hands.

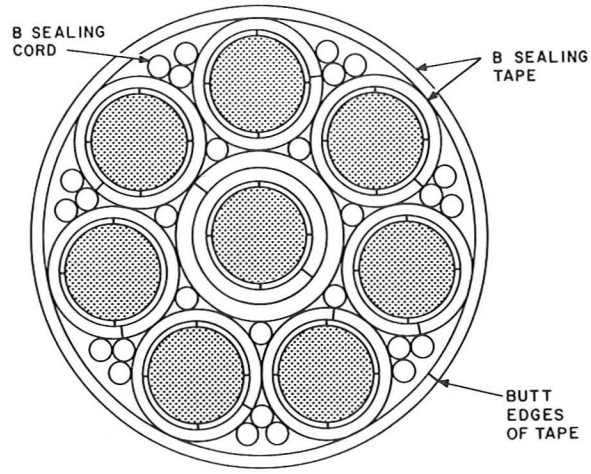

Fig. 9—Eight-Stub Cable Arrangement

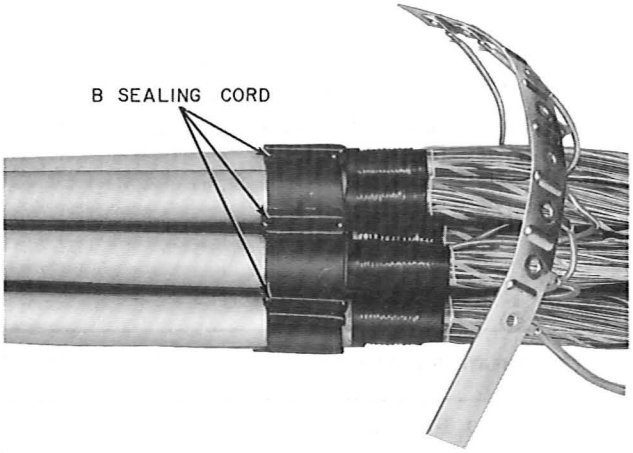

Fig. 10—Stub Cable Group

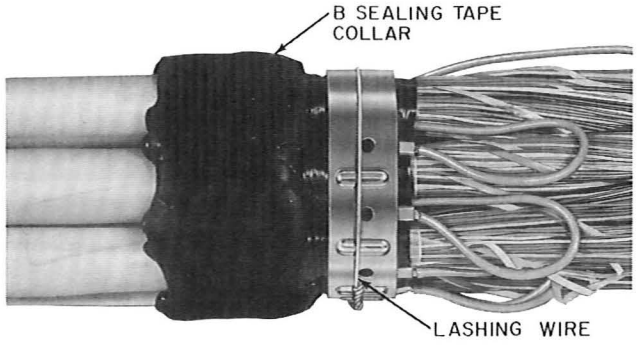

Fig. 11—Completed Stub Cable Group

6.03 Wrap the group with several layers of the waxed paper in which the sealing tape was packed. Tightly wrap this paper coverd collar with several overlapped layers of 2-inch DR Tape (Fig. 12). This protects the sealing tape from debris during the work operation.

6.04 Place a muslin tie around the group of cables, approximately 6 inches from the DR Tape, to hold the cables in place.

6.05 Use a Wood Cable Dresser (No. 46L113) to form the group of stub cables down to a maximum diameter of four inches measured over the B Sealing Tape collar. Use the B Measuring Tape (AT-8234) to measure the diameter.

6.06 The "C" Series of splice cases is intended for use with feeder cables having diameters between 1.7 and 2.2 inches. These cases will accommodate a maximum of three stub cables in each cable opening. The stub cables should be arranged as shown in Fig. 13. One complete layer of B Sealing Tape should be wrapped around each stub cable. The interstices should be filled with

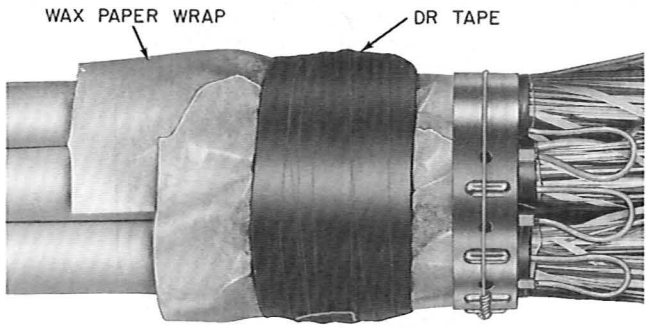

Fig. 12—DR Tape Wrap

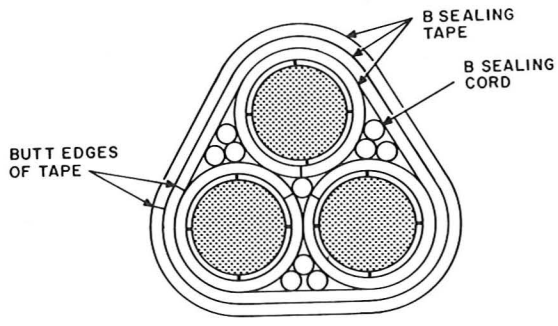

Fig. 13—Three-Stub Cable Arrangement for 20C1 or 21C1 Splice Case

1-1/2 inch lengths of B Sealing Cord. Two layers of B Sealing Tape should be wrapped around the cable group and then covered and secured as in 6.03 and 6.04. Diameter of wrapped group should be dressed down to approximately 3 inches. Measure over the B Sealing Tape Collar.

6.07 The "D" range of splice cases (except the 21D4 Splice Case) is intended for use with feeder cables having a diameter between 2.2 and 2.9 inches. These cases will accommodate as many as 7 connector stub cables in each cable opening. These stub cables should be arranged as shown in Fig. 14. One complete layer of B Sealing Tape should be wrapped around each stub cable. The interstices should be filled with 1-1/2 inch lengths of B Sealing Cord. One layer of B Sealing Tape should be wrapped around the cable group and then covered and secured as in 6.03 and 6.04. Diameter of wrapped group should be dressed down to approximately 3-3/4 inches measured over the B Sealing Tape collar.

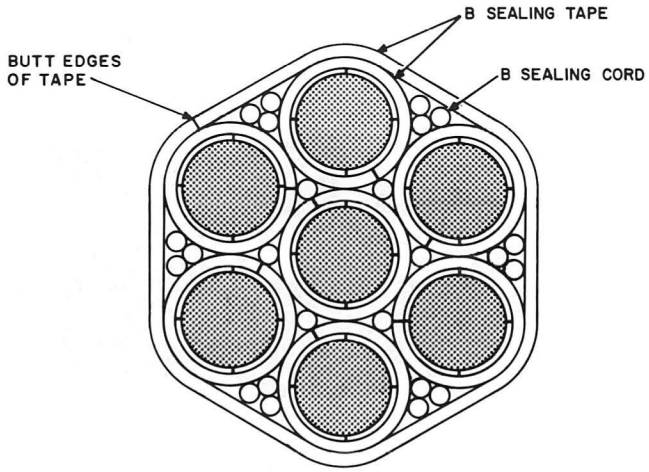

Fig. 14—Seven-Stub Cable Arrangement for 21D1 Splice Case

6.08 When less than the maximum number (3, 7, or 8) of stub cables are used as a group, substitute a B Plug (AT-7855) wrapped with a layer of B Sealing Tape for the missing stub cable. The B Plug is a varnished hard maple rod 5 inches long and 7/8 inch in diameter and chamfered on each end.

6.09 Wrap the metal band portion of each bonding harness around the associated stub cable group, over the vinyl tape wrapping around the B Bond Clips. It may be necessary to hold this in place with one wrap of lashing wire until the groups are worked into the splice case (Fig. 11). Fold back out of the way any leads not used because of the presence of one or more B Plugs.

7. PREPARING FEEDER CABLE

7.01 Cut a ring around the poly-sheath at the innermost paper tape marker (Fig. 4). Slit the sheath from this cut to the end of the sheath. Remove the poly-sheath.

7.02 Remove the corrugated steel shield and the corrugated aluminum shield from the end of the feeder cable to the end of the poly-jacket.

Warning: Use extreme caution to avoid injury to the workman and damage to the cable.

7.03 Tape the paper core wrapper to keep it from unwrapping.

7.04 Cut equally-spaced tabs in the poly-jacket and the metal shields. See Table A. One half of the tab on the front side of the splice should be cut away to make room for the inner sheath clamp (Fig. 15).

TABLE A

TAB REQUIREMENTS

SHEATH DIAMETER	NUMBER OF TABS REQUIRED
Up to 1 inch	3
1 to 1.6 inch	4
1.7 to 2.2 inch	6
Over 2.2 inch	8

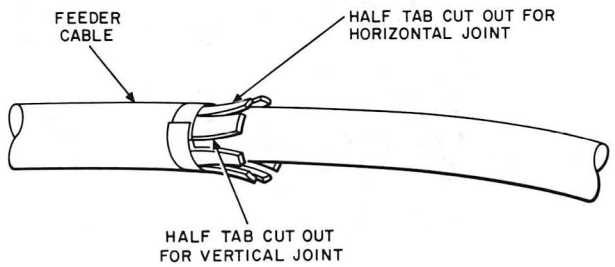

Fig. 15—Tab Cutout for Ears of Inner Sheath Clamp

7.05 Make a collar over the core wrapper with two layers of two inch wide vinyl tape; place the first layer with the adhesive side out and the second layer with the adhesive side in. Do not stretch the tape.

7.06 Slide the collar under the tabs so that approximately 1/4 inch of the collar extends beyond the tab ends.

7.07 Attach the B Bond Clips of the 27-1/4 inch leads of the P-21E642 Bonding Harness Assemblies to the aluminum shield. Each clip should be attached to a different aluminum tab (Fig. 16).

7.08 Place the inner sheath clamp under the tabs, with the ears of the clamp in the notch cut in the front tab for this purpose. The ears of the clamp extend to the outside of the sheath to make contact with the splice case for bonding purposes (Fig. 16). Place linen tags on the feeder cable to identify the cable units.

7.09 Bind down the ends of the tabs with vinyl tape. Do not cover the ears of the inner sheath clamp. This will hold the inner sheath clamp in proper position (Fig. 17).

7.10 With a B Carding Brush, thoroughly scuff the sheath in the area where the sealing tape collar will be applied (Fig. 18) to the length of the cable. File away any ridges which may be present.

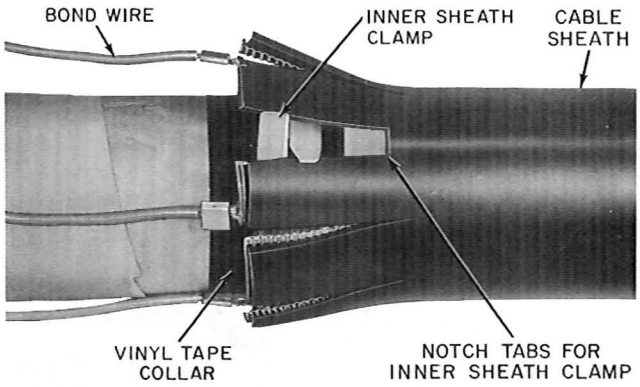

Fig. 16—Preparing Feeder Cable

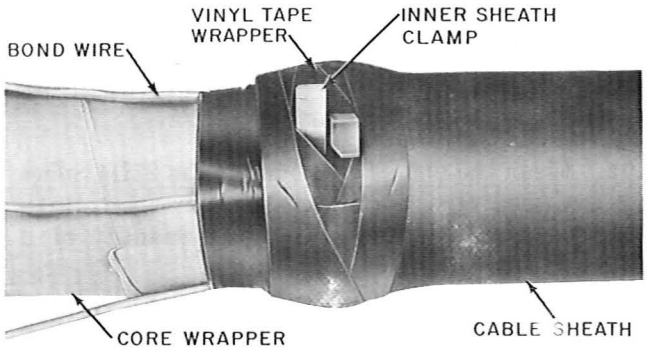

Fig. 17—Vinyl Tape over Tabs

7.11 Build up a collar of 1-1/2 inch B Sealing Tape to a diameter of from 3.8 to 4 inches. Do not stretch the tape while placing the collar.

7.12 Wrap this collar with waxed paper to protect the collar until the splice case is installed.

7.13 Remove all except approximately 1/4 inch of the remaining exposed core wrapper.

8. SPLICING

8.01 Secure the feeder cable and stub cable groups in position at the final splice location, using the splice case as a template.

8.02 Make the splice, using B Wire Connectors or soldered joints. Join the units in the feeder cable to the associated central office connector stub cables.

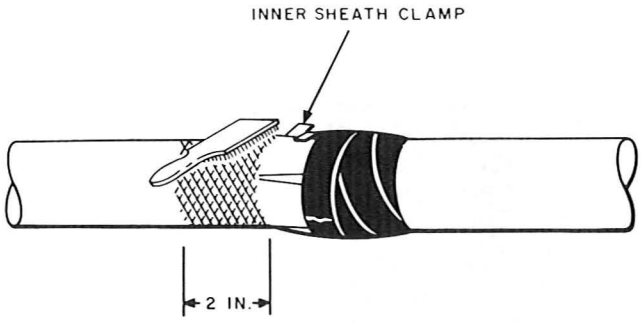

Fig. 18—Scuffing Sheath

8.03 Wrap the splice in accordance with Section 632-490-200 (Fig. 19).

9. INSTALLING CABLES IN SPLICE CASE

9.01 Clean the end seal cavities of the 21D4 Splice Case with a clean, dry, lintfree cloth (KS-14666) moistened with a small quantity of B Cleaning Fluid.

9.02 Place a splice case in back of the completed splice to ensure that the inner sheath clamp ears, the bonding harness bands, and the sealing collars are properly aligned in the splice case.

9.03 Remove the DR tape wrapper from the collars of the stub cable groups.

9.04 Remove the waxed paper wrapping from all B Sealing Tape collars. Be sure that the waxed paper is completely removed.

9.05 Carefully work the sealing collars into the back splice case.

9.06 Place unstretched B Sealing Cord in the grooves provided, along the entire length of the top and bottom of the splice case and in the crotch between the cables (Fig. 20). Do not handle with wet or oily hands.

9.07 Make certain that the exposed ears of the inner sheath clamp, and the metal bands of the P-21E642 Bonding Harness Assemblies will make good contact with the proper area of the splice case. Remove the lashing wire from around the harness band.

10. ASSEMBLING SPLICE CASES

10.01 Place the second splice case in front of the splice, being careful to position it accurately over the sealing tape collars.

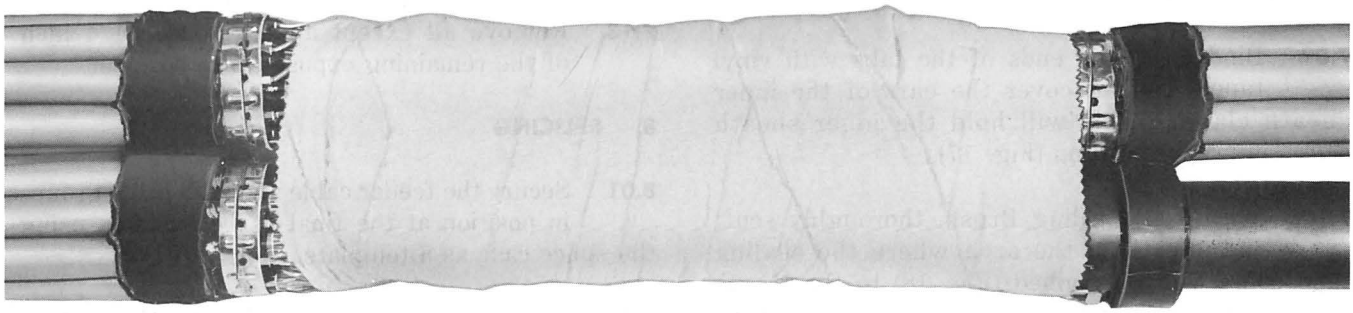

Fig. 19—Completed Splice

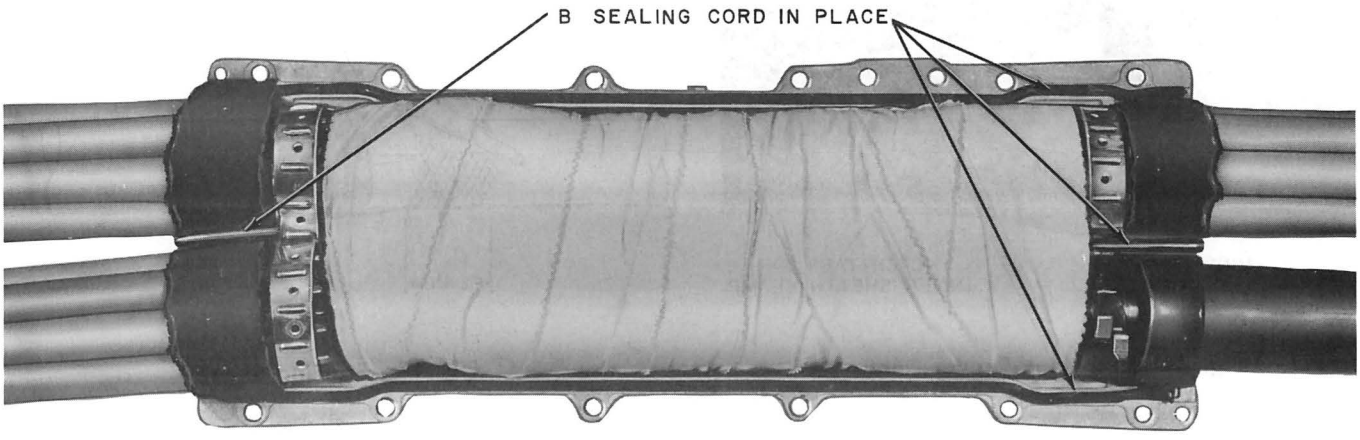

Fig. 20—Cables in Splice Case

10.02 Place the bolts in the holes in the cases provided for this purpose. Place nuts finger-tight on each bolt.

10.03 Place the bolts in positions 1, 2, 3, 4, 5, 6, 7, and 8 (Fig. 21).

Note: The cases are now ready for the all-important bolt-tightening operation. Only a very light pull on the wrench is required to bring the two splice case halves together. If the bolts do not tighten with an easy pull, check the alignment of the bonding harnesses or the inner sheath clamp. In either instance a heavy pull on the wrench will cause damage. Only when two splice case halves are metal-to-metal is it safe to apply a heavy torque to the bolts.

10.04 Tighten bolts 1, 2, 5, 6, 3, 4, 7, and 8 in that sequence until the splice cases are about 1/8 inch apart. ***Bring the cases together evenly, tightening each bolt no more than two turns at a time. If at any time a bolt requires more than an easy turning effort, go to the next bolt. Then if turning is still difficult, check for misalignment of sheath clamps and bonding harness bands in the case.***

10.05 Place remaining bolts in sides of cases and tighten hand-tight, then tighten all bolts no more than one turn at a time until ***metal-to-metal contact is obtained at each bolt location.***

10.06 After the splice cases are in metal-to-metal contact, with a B Torque Wrench tighten the bolts to a torque of 300 inch-pounds minimum to 450 inch-pounds maximum.

11. SUPPORTING SPLICE CASES

11.01 Install two ground lugs on the top of the splice case.

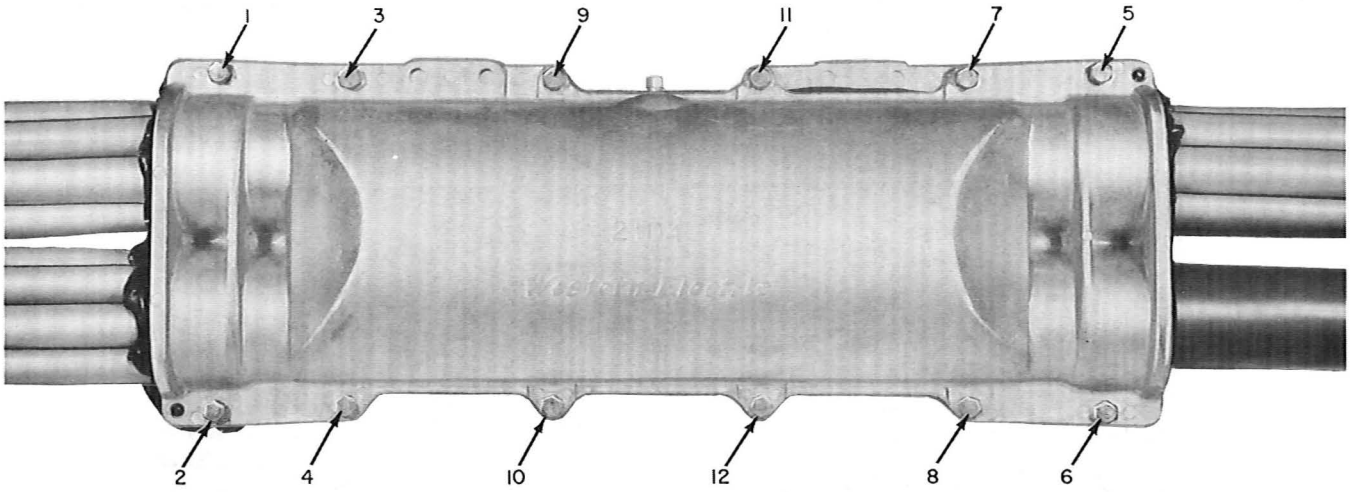

Fig. 21—Completed Splice Case Assembly

11.02 Support the entire weight of the completed splice on a 3/4-inch rod or equivalent, placed across two cable hooks (Fig. 22).

- Place two lashed cable supports (Section 627-340-101) around the rod.
- Place both ends of the support straps through the spaces between the ground lugs and the splice case.
- Tighten the bolts evenly.
- Trim and fold back the strap ends so that they do not create a hazardous condition.
- This support should be rigid to prevent disrupting the seal created between the cables.

12. PRESSURE TESTING

12.01 This splice case and the central office stub cables are not designed for containing continuous air pressure. The pressure test is only for determining that the splice case is watertight.

12.02 Flash test each splice case installation after a back pressure of 5 pounds is indicated on a pressure gauge at the splice case.

Note: Connector stubs manufactured prior to 1964 do not have factory installed pressure plugs. Therefore, flash testing of these splices cannot be performed.

12.03 Apply E Pressure Testing Solution to all possible leak-path areas. Check the case for leaks. The use of ultrasonic leak detecting equipment is desirable because it is difficult to apply concentrate between the stub cables.

12.04 After pressure testing is completed, recheck and tighten all nuts and bolts with a B Torque Wrench to the torque specified in 10.06.

13. GROUNDING

13.01 The shield of the incoming cable must be connected to the central office ground either as the cable enters the building or at the splice location. The ground connection at the splice location should be made at the ground lug on the completed splice case.

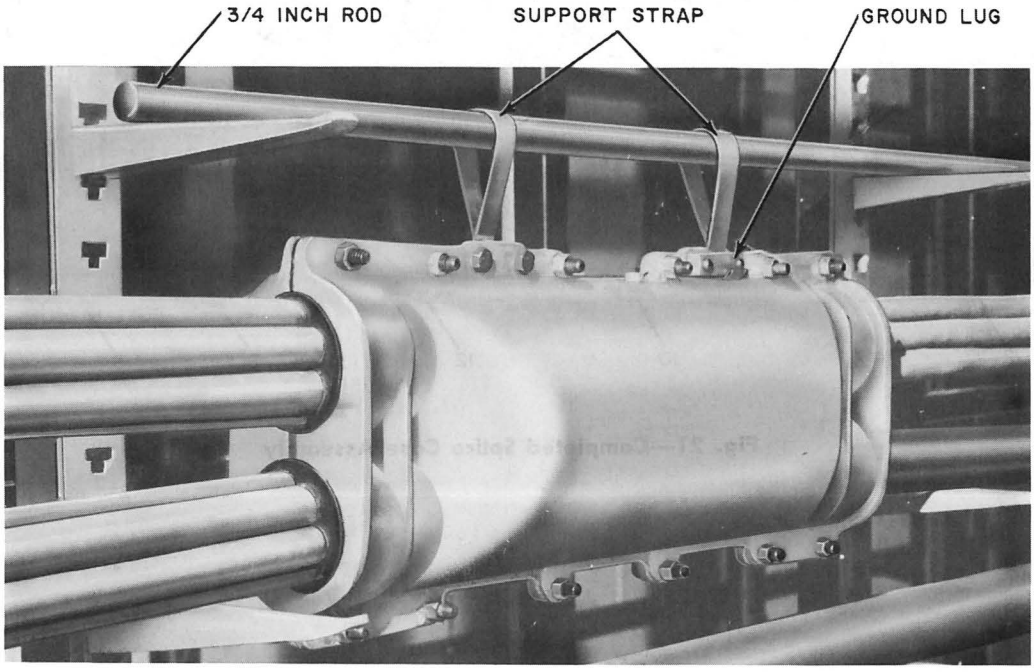

Fig. 22—Supporting Splice Case