**BELL SYSTEM PRACTICES**
**Outside Plant Construction and Maintenance**

**SECTION G50.699.1**
**Issue 3, April, 1958**
**AT&TCo Standard**

# CABLE SPLICING — GENERAL
## POLYETHYLENE INSULATED CABLE

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## 1. GENERAL

1.01 This section covers various details of splicing polyethylene insulated conductor cables which differ from those of paper insulated conductor cables.

1.02 This issue of the section is a general revision to provide new information on preparation of cable ends, bonding to auxiliary sleeves, removing insulation, color code splicing, and other changes.

## 2. LIST OF MATERIALS AND TOOLS

2.01 The following tools and materials should be available for splicing these cables:

### TOOLS

| | |
|---|---|
| Scissors, Splicer's, C | Scissors with stripping notches. |
| Scissors, Splicer's, D | Scissors with stripping jaws and notches. |

### MATERIALS

| | |
|---|---|
| Sleeves, Plastic, B<br>Sleeves, Plastic, Filled | Available in various diameters, in cardboard boxes. For insulating twisted joints at splices. |
| Screw, Machine, Brass 1/4 in. 8-32 | For connecting bond wire to aluminum shield. Two required per splice. |
| Washer, Post, Binding | For use with brass screw. Four required per splice. |
| Tape, Polyethylene, B | Polyethylene tape 3 inches wide. For wrapping completed splices. |
| Tape, Vinyl, B | Adhesive vinyl tape 2 inches wide. For wrapping lead sleeves in buried cable. |
| Tape, Vinyl, D | Adhesive vinyl tape 1 inch wide. For repairing punctured polyethylene insulation. |
| Wire, Lashing, Copper Tinned, 16 Ga. | For bonding aluminum to lead sleeve. |

## 3. PRECAUTIONS

3.01 **Low Melting Point:** The polyethylene insulation in these cables begins to soften at temperatures about 175° F. and melts at about 230° F. (boiling point of water is 212° F.). Therefore, it is important to avoid overheating. A mechanical bond to the aluminum is specified to avoid a soldering operation.

3.02 When wiping on an auxiliary sleeve joint, the solder pouring time should be as short as practicable, to avoid overheating the insulation. Continuous heating of the auxiliary sleeve during joint wiping should be restricted to no more than five minutes.

3.03 **Use of Test Pick:** If a test pick is used in identifying conductors confine the puncturing to a short length of the insulation. Then cover the puncture holes by means of a short length of D Vinyl Tape, to restore the dielectric strength.

3.04 **Split Pairs:** Because of the springiness of the plastic insulation and the length of spiral used on some pairs, the pairs in these cables have more tendency to split than pulp insulated pairs. Care should be taken to avoid split pairs.

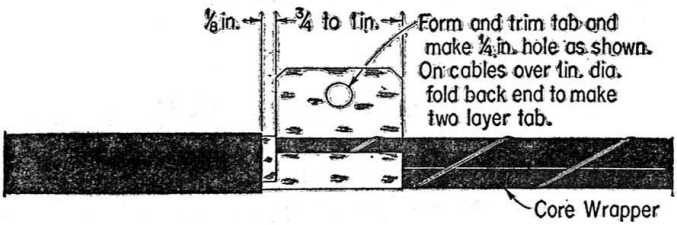
## 4. SHEATH PREPARATION

4.01 **Splice Case Method:** PIC cable splices should preferably be closed with splice cases. The sheath ends should be prepared as outlined in the sections covering the type of case being used.

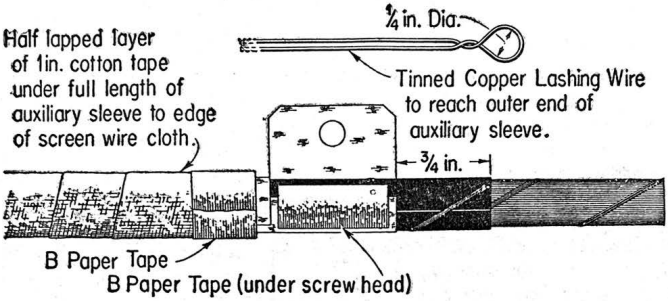
4.02 **Lead Sleeve Method:** If a lead sleeve is used to protect the splice (with or without auxiliary sleeves) the bond between the aluminum and the sleeve at each end of the splice is made as follows:

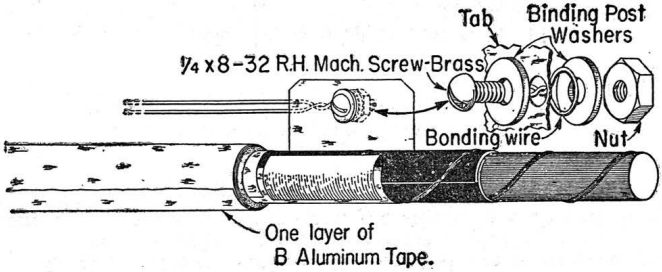
**Alpeth Shield**

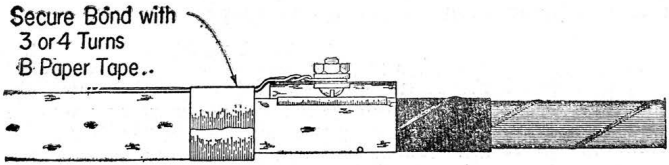
(1) Remove the polyethylene sheath and prepare the end of the cable as illustrated below.



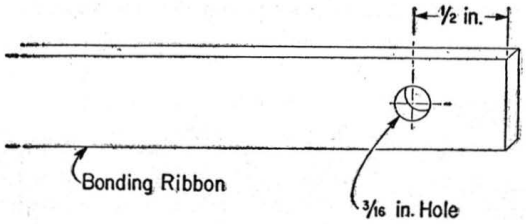
(2) Unless otherwise specified, a loop of tinned copper lashing wire can be used for the bond, as illustrated below.



(3) **Heavy Current Bond:** When stray current or other local conditions make it necessary, the plans may call for the use of bonding ribbon in place of lashing wire. The arrangement is the same except that the ribbon is prepared as shown below:




4.03 **PAP Sheath:** Splice cases should be used on cables having PAP sheath.

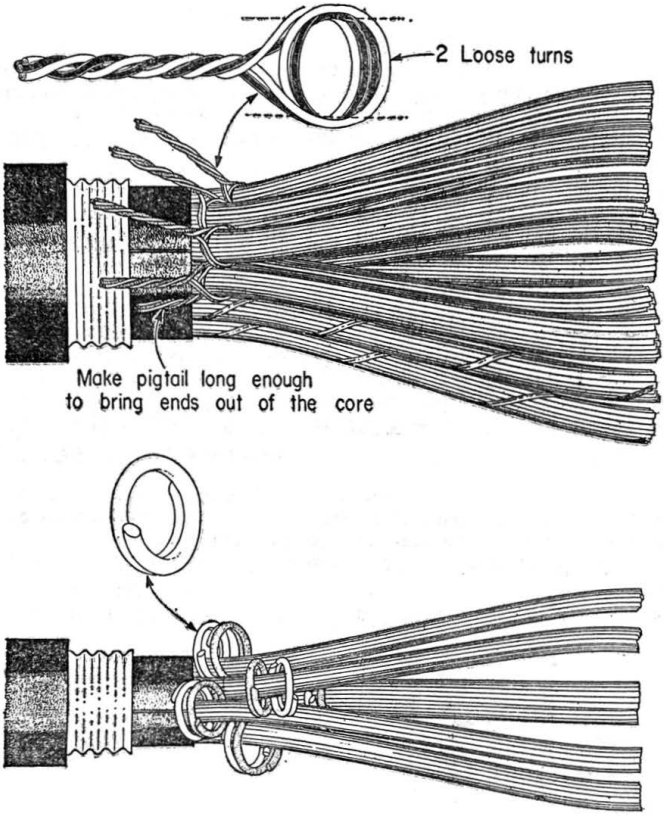
4.04 **Ready-Access Terminals:** The preparation of the sheath and method of bonding across the splice is described in the sections covering the installation of the 49-type and other ready-access type terminals.

## 5. CORE PREPARATION

5.01 **BHB, BHA, BKM, and BKT — EVEN PIC Cables:** These are fully color coded, with pairs arranged in 25-pair binder groups. On opening the cables, each binder group to be worked on should be individually marked to keep the pairs permanently associated. This can be done as illustrated below, using short lengths of paired polyethylene insulated conductors of the same color combination as the binder, or by means of colored plastic rings.

5.02 If the binder group consists of 2 or 3 units, remove the binding strings from each of these units and combine the pairs of the binder group, using one of the marking methods illustrated.

5.03 The insulated wire method can be used at splices or ready-access terminals. It is particularly well adapted for use in the larger cables. Colored plastic rings can be used at ready-access terminals or in small cables.




5.04 At straight splices all binder groups should be marked.

5.05 At ready-access terminals it is preferable to mark only the binder group to which blocks are connected.

5.06 **AHB, AHA, AKM, and AKT — ODD PIC Cables:** These cables are made from units of 8 to 51 pairs, with color coded unit binders to permit identification of individual pairs. The units should be marked with appropriately colored polyethylene insulated conductors as illustrated above.

## 6. COLOR CODE SPLICING

### EVEN PIC Cables

6.01 The core make-up, color coding and pair numbering in BHB, BHA, BKM and BKT type cables are covered in Section G50.607.3.

6.02 **Subscriber and Trunk Use:** In general, EVEN PIC cable pairs are spliced color to color throughout their length, unless otherwise specified in the detail plans. Splices should be made in accordance with the following rules.

6.03 **EVEN PIC to EVEN PIC:**

(a) **Cables of the Same Size:** Splice like colored binder groups only. Join pairs color to color.

(b) **Taper Points and Bridge Points:** Splice complete binder groups only.—In joining binder groups of unlike color, the normal sequence of binder colors should be maintained.—Join the pairs color to color.

(c) **Exception:** In splicing 6, 11, or 16-pair cable to a binder group, splice color to color at the start of the group, otherwise in color code sequence.

6.04 **EVEN PIC to Superseded PIC, Pulp or Strip Paper:**

(a) The binder group color and pair count sequence of the EVEN PIC cable is controlling and should be maintained.

(b) The pair count sequence in EVEN PIC cable should agree with the pair number sequence in existing superseded type PIC, pulp, or paper cables.

### SUPRESEDED TYPE PIC CABLES

6.05 **AHB, AHA, AKM and AKT Type:** The core make-up, color coding and pair numbering of these cables are covered in Section G50.607.2. These cables are fully color coded and have extra pairs (complements of 51, 76, 101, 202-pair, etc.).

6.06 **Subscriber and Trunk:** In general, the pairs in these cables can be spliced color to color throughout their length, unless otherwise specified in the detail plans. Splices in these cables should be made in accordance with the following rules.

6.07 **PIC to PIC:**

(a) **Cables of the Same Size:** Splice like colored units only. Join pairs color to color.

(b) **Taper Points and Bridge Points:** The unit binder color sequence and pair number sequence shown in Section G50.607.2 should be followed in each cable.

6.08 **PIC to Pulp or Strip Paper:** The color code pair count sequence in the PIC cable should agree with the pair number sequence of pulp or paper insulated cables.

6.09 **CA-1813 and CA-1814 Type:** The make-up and color code is covered in Section G50.607.1. These cables have an individual pair color code in the 6, 11, 16, and 26-pair cables and the 25 and 26-pair units of the 152-pair cable. These are also extra pair cables.

6.10 The method of splicing is generally the same as that covered in Paragraphs 6.07 and 6.08.

(a) **Exception:** If random splicing is specified in these superseded cables, one of the color coded pairs in the outer layer of layer type cables or of one of the units, should be made continuous throughout the length of the cable for convenience in testing and maintenance.

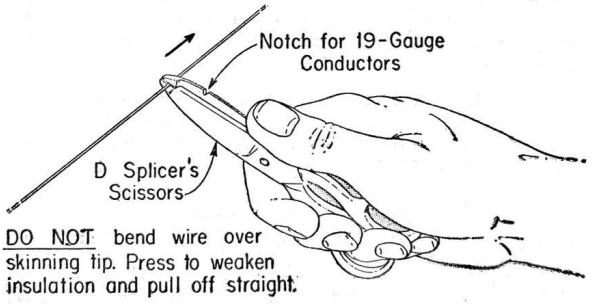
(b) The remaining pairs should be spliced at random as directed, in accordance with the color random or bunch random splicing methods described in Section G50.650.1.

## 7. LOW CAPACITANCE PIC—CA-1727 TYPE

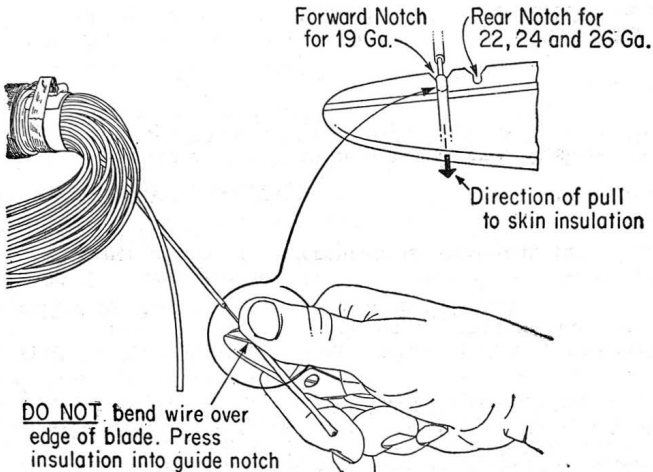
7.01 The make-up of these cables is covered in Section G50.607.4. These cables are used primarily for intercity trunk and toll purposes. The method of splicing is generally covered by special instructions.

## 8. REMOVING INSULATION

8.01 **D Splicer's Scissors:** The stripping tip is intended primarily for removing insulation from 22, 24, and 26-gauge conductors. A notch is provided on one blade for removing insulation from 19-gauge high or low capacitance pairs. The method of using the stripping tip is illustrated below.



8.02 **C Splicer's Scissors:** These scissors have two skinning notches, the larger for 19-gauge, the smaller for 22, 24, and 26-gauge. These scissors are useful in wire trimming operation in which the cutting must be done with the extreme end of the blade. The method of using the blade is illustrated below.




## 9. CONDUCTOR JOINTS

9.01 Twisted, twisted and soldered or pressed sleeve joints can be used, depending on the types of circuits involved and tools available. Circuits which require soldered or equivalent joints are listed in Section G50.636.1.

9.02 The method of making and insulating twisted joints and pressed joints made with 032-025 S Brass Sleeves and No. 17-2 Nicopress Tool is covered in Sections G50.699.2 and G50.699.3.

9.03 The method of making pressed sleeve joints using H Splice Sleeves and the B Sleeve Presser is covered in Section G32.127.1.

9.04 **Plastic Sleeves:** The use of plain and filled plastic sleeves for insulating joints in PIC cable is covered in Sections G32.127.1, G50.699.2 and G50.699.3.

9.05 **Sleeving Joints in PIC to Pulp or Strip Paper:** Either plastic sleeves or prepared cotton sleeves can be used at these junction splices.

## 10. LOADING SPLICES

10.01 Specially insulated loading coils with plastic insulated leads are available for loading PIC cables. These coils are available for splice loading and in steel cases. The method of installation for aerial, underground and buried use is similar to that described in the G59.600 Sections, except for soldering or pressing the joints if called for, and using plastic sleeves to insulate them.

10.02 If splice loading is used and the number of coils required cannot be placed in the splice case, a lead sleeve closure should be made, using auxiliary sleeves as covered in Paragraph 4.02, and tape wrapped joints.

## 11. WRAPPING COMPLETED SPLICE

11.01 On completion of the wire work at splices to be enclosed in splice cases or lead sleeves, the splice is protected with one half-lapped layer of B Polyethylene Tape, the end turn of which is secured with B Paper Tape, followed by one half-lapped layer of muslin.

11.02 If PAP sheath is being used for lightning protection reasons, the splice should be wrapped in the manner specified for Lepeth sheath in Section G50.673.1.

11.03 The arrangement of the conductors in 49-type and other ready-access terminals is covered in the G56.600 and G61,600 series.

## 12. LEAD SLEEVE SIZES

12.01 The sizes of sleeves to be used as auxiliary sleeves and for enclosing straight and bridged splices in these cables are covered in Section G50.623.3.

## 13. CLOSING THE SLEEVE

13.01 **Splice Cases:** If a splice case is used, the case can be closed as outlined in the G50.700 and G52.600 series.

13.02 **Wrapped Joints:** Alpeth type wrapped joints should be made as outlined in Section G50.679.3 or G50.679.5, depending on whether an auxiliary sleeve is used.

13.03 If auxiliary lead sleeves are used, it is important to prepare the cable ends as covered in Part 4 of this section and to wipe the joints as quickly as practicable in order to avoid overheating the polyethylene insulation on the conductors.

13.04 **Protection:** Lead sleeves and splice cases on buried cables should be protected against corrosion as covered in the G50.700 and G56.600 series.

## 14. PRESSURE PLUGS

14.01 Under some conditions a pressure plug must be made in the PIC cable where it joins a strip paper or pulp insulated cable.

14.02 The purpose of the gas plug is to prevent low insulation resistance in the paper or pulp cable due to movement of moist air from the PIC cable, or actual flow of water as a result of a sheath break in the PIC cable sheath.

14.03 **Plug the PIC cable** under the following conditions:

(a) When there is a Ready-Access terminal (aerial or pedestal type) near the junction in non-pressurized plant.

(b) When specified in preparation for continuous pressure testing.

(c) When necessary in clearing water from buried PIC cable.

(d) When specified in detail plans.

14.04 **No Plug is Required** under the following conditions:

(a) When the strip paper or pulp cable is maintained under continuous gas pressure.

(b) When the length of the PIC cable involved does not exceed 100 to 200 feet and no Ready-Access terminal is involved.

(c) When the junction is a connection to a sealed chamber terminal through a splice covered by a lead sleeve or splice case.

(d) If otherwise indicated on the work plans or other instructions.

14.05 The method of plugging PIC cable is covered in the G73 series.