

BURIED PLANT
TROUBLE INVESTIGATION, SPLICING AND REPAIR
OF BURIED WIRE

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1. GENERAL

1.01 This section outlines trouble investigation procedures to be followed for all types of buried wire. Detailed splicing, and repair procedures for B Service Wire also contained in this section.

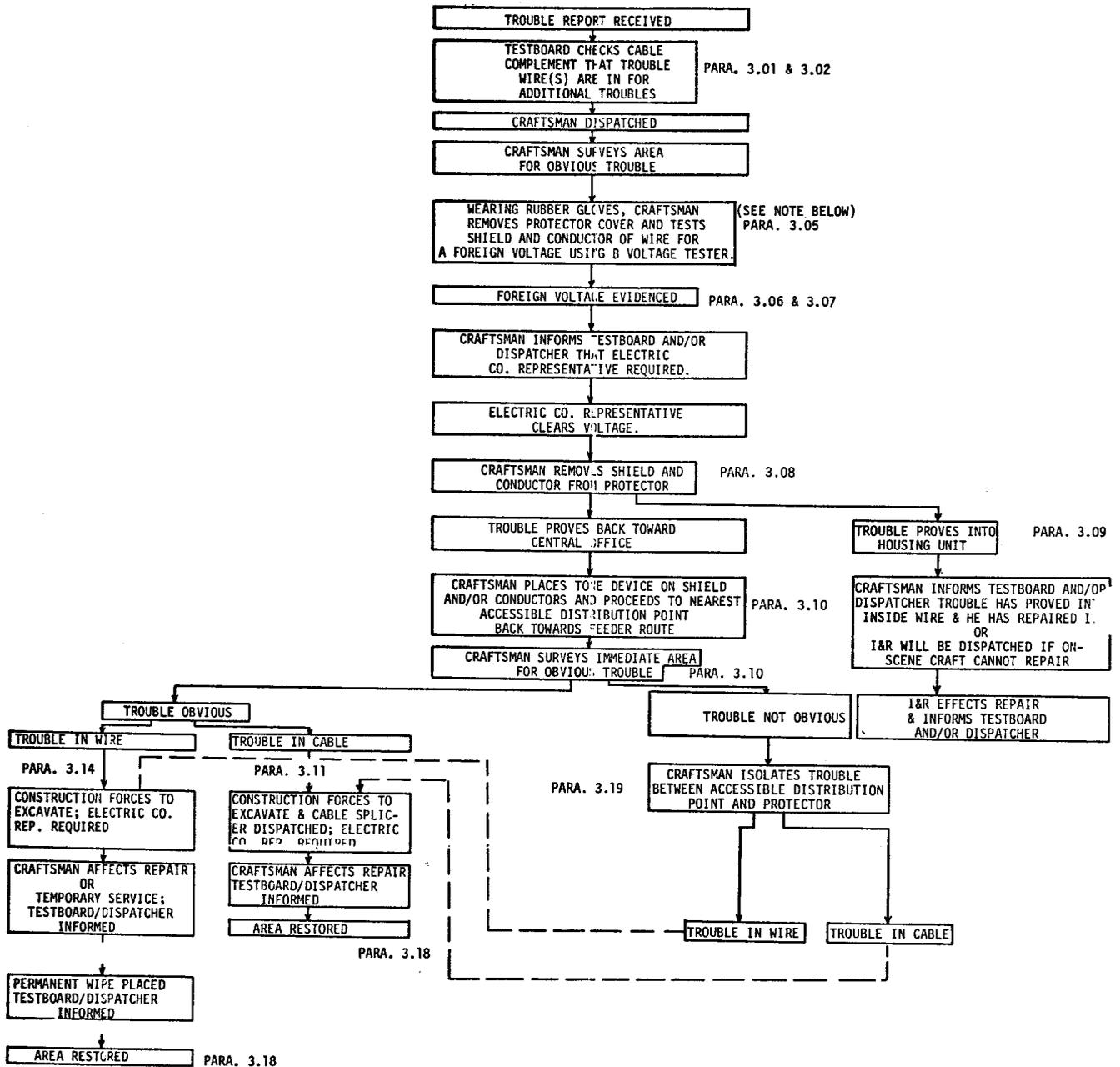
NOTE: THE PROCEDURES OUTLINED IN THIS PRACTICE PERTAINING TO TROUBLE INVESTIGATION FOR BURIED WIRE MAY BE APPLIED TO THE 19 AWG BURIED WIRE OR THE 2, 3, and 6 PAIR BURIED DISTRIBUTION WIRE SUPPLIED BY BRAND REX. SPLICING PROCEDURES FOR B SERVICE WIRE ARE DETAILED IN THIS SECTION AND MAY ALSO BE APPLIED TO E BURIED WIRE (REPLACES D UNDERGROUND WIRE). SEE SECTION 629-030-115 FOR A COMPLETE DESCRIPTION OF E BURIED WIRE. THE REPAIR OF THE 2, 3 and 6 PAIR, SUPPLIED BY BRAND REX, IS OUTLINED IN 629-030-900SN.

1.02 This section is reissued to: change the title, reorganize and clarify parts on trouble investigation. As this is a complete revision, marginal arrows have been omitted.

1.03 B Service Wire is a 2-pair, quadded, polyethylene insulated wire used for underground service connections. It is now furnished with inner and outer jacket slitting cords. Earlier type wire does not have the slitting cords. The new wire can be distinguished from the earlier wire by a slight ridge made in the outer jacket by the slitting cord.

FLOW CHART

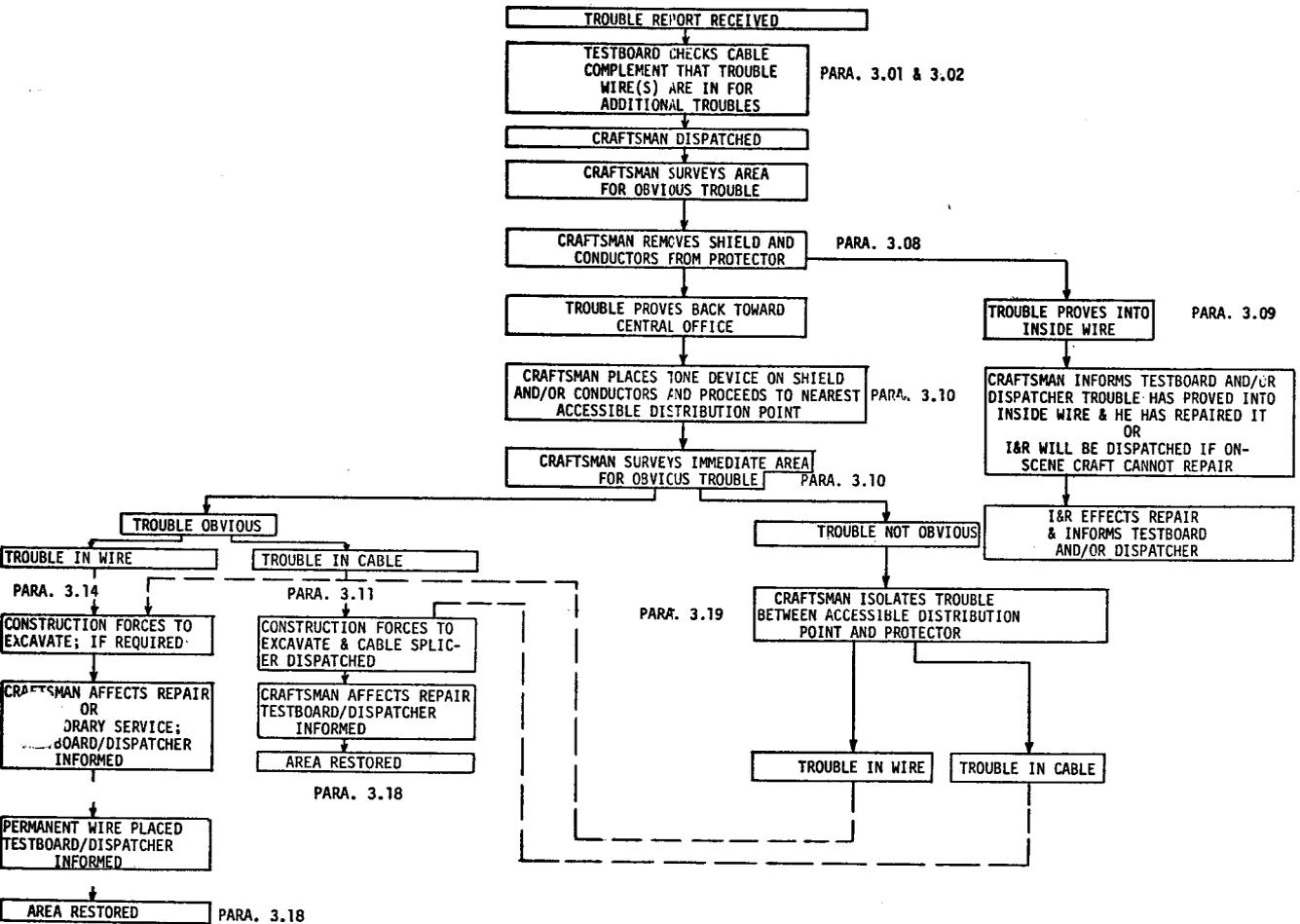
TROUBLE REPAIR JOINT ELECTRIC AND TELEPHONE BURIED CONSTRUCTION



NOTE: IF NO FOREIGN VOLTAGE EVIDENCED, CRAFTSMAN WILL PROCEED WITH REPAIR UNTIL IT IS DETERMINED THAT EXCAVATION IS REQUIRED. AT THIS TIME POWER COMPANY REPRESENTATIVE WILL BE SUMMONED.

FLOW CHART

TROUBLE REPAIR BURIED CONSTRUCTION OTHER THAN JOINT ELECTRIC



SECTION 629-760-211SN

1.04 The conductors are made from 20 AWG copper steel wire. The insulation of the conductors are colored for purposes of identification. The opposite wires of the quad, red-green and yellow-black, are the pairs. The red wire and the yellow wire are the ring conductors of the two pairs.

2. TOOLS AND MATERIAL

2.01 Following is a list of tools and materials needed for the encapsulation method of splicing B Service Wire.

TOOLS

USE

Pliers, Diagonal, SW 6"	For cutting jackets and conductors and for skinning insulation from conductors.
Pliers, Nose, Long	For grasping slitting cords.
Presser, Connector, B	For compressing B connectors.
Pliers, Pressing, B	For use with B Bond clips.

MATERIALS

USE

Connector, Wire B	For splicing conductors.
Tape, Vinyl, F	For securing the B bond clip and aluminum tabs.
Clip, Bond, B	For maintaining continuity of aluminum shield.
Wire, Service, B	For the piecing out or cutting in of a section of defective service wire.
Kit, Capping, CK137	For capping ends of B service wire splice.

3. TROUBLE INVESTIGATION, BURIED CONSTRUCTION-JOINT TELEPHONE AND ELECTRIC

3.01 These joint trench installations are of two types (1) Joint Buried = (J.B.), Telephone and Electric cable(s) in the same trench with a 12 inch minimum separation and (2) Joint Buried Random = (J.B.R.), Telephone and Electric cables in the same trench with no physical separation.

NOTE: The craftsman initially dispatched on the trouble should request the testboard to determine if (1) all the pairs serving a particular housing unit are in trouble and/or (2) are there numerous conductors in the buried cable in trouble. Although it should never be assumed, until all of the isolation operations are complete, if the only pairs in trouble are the ones feeding a particular dwelling unit, it is a good possibility that the fault is somewhere in the wire (or entrance cable) between the distribution cable and that housing unit.

3.02 The employee dispatching the craftsman to work in telephone plant that is joint buried (J.B. or J.B.R.) will inform the craftsman of the type of installation. The presence of these joint trench installations will be shown on plant records, i.e., Work Orders, cable plates, assignment records and line cards.

3.03 The precautions to be observed when working on buried cable and service wire in systems of this type are outlined in BSP 629-795-900SN. The general precautions concerned with buried telephone plant are outlined in BSP 629-100-010.

NOTE 1: In joint trench installations, the installer-repairmen shall not perform excavation operations.

NOTE 2: The construction crew shall not excavate the buried trouble in joint trench installations until a representative of the Electric Company is present.

3.04 As outlined in BSP's 629-760-205SN and 629-030-900SN the conductors and shield of the buried wire will have been terminated on the appropriate station protector or fused (7 amp) type protectors. Red Binding Post insulators will have been placed over each terminal lug of the protector and red KS-6660 indicators will have been placed over each of the wires when they were initially terminated. The combination of these two items will alert the craftsman that he is working in a joint buried installation.

NOTE: Always replace these insulators and indicators if they were removed during the trouble location procedures outlined in the following paragraphs.

SECTION 629-760-211SN

3.05 WEARING HIS RUBBER GLOVES, THE CRAFTSMAN INITIALLY DISPATCHED ON THE BURIED TROUBLE (NORMALLY THE INSTALLER-REPAIRMAN), SHALL REMOVE THE COVER OF THE PROTECTOR AT THE DWELLING UNIT AND PERFORM THE NECESSARY TESTS USING THE B VOLTAGE TESTER. SEE SECTION 620-105-905SN FOR THE DESCRIPTION, USE AND MAINTENANCE OF THE B VOLTAGE TESTER.

FOREIGN VOLTAGE EVIDENT AT PROTECTOR

3.06 If a foreign voltage is evident during this test, the craftsman shall immediately call the testboard and/or dispatcher informing him of this and further advising him that an electric company representative will be required at the job site.

3.07 The craftsman shall remain at or near the job site until he is relieved. In no case shall the craftsman leave the location where the foreign voltage was evidenced until he has been relieved by another telephone representative or the electric company representative has arrived and cleared the trouble.

NO FOREIGN VOLTAGE EVIDENT AT PROTECTOR

3.08 If no foreign voltage is evidenced, the craftsman shall remove the shield and conductors from the protector and prove the trouble into the housing unit or back towards the central office.

NOTE 1: *By going across the trouble pair with the 1011 hand set or appropriate meter, the craftsman will be able to determine; (1) whether the trouble is clear between the protector and the central office and what type of trouble exists or (2) whether the trouble is in the inside wire and what type of trouble exists.*

NOTE 2: *See Section 462-800-500 for additional testing and fault locating procedures that may be of assistance in the isolating and location of the trouble.*

TROUBLE PROVES INTO INSIDE WIRE

3.09 If the trouble proves into the inside wire, the craftsman should clear the trouble as outlined in the appropriate practice(s). If he is not qualified to perform this operation, he shall advise the testboard of this so the appropriate craftsman can be dispatched on the trouble.

TROUBLE PROVES BACK TOWARD CENTRAL OFFICE

3.10 If the trouble proves to be back towards the central office, the craftsman shall place the appropriate device on the shield and/or conductors of the wire and proceed to survey the immediate area for an obvious trouble (i.e., recent excavation).

TROUBLE IS AN OBVIOUS BURIED CABLE TROUBLE

3.11 IF THE TROUBLE IS AN OBVIOUS BURIED CABLE TROUBLE, THE CRAFTSMAN, WEARING HIS RUBBER GLOVES, SHALL PERFORM THE NECESSARY TEST ON THE SHEILD AND CONDUCTORS OF THE BURIED CABLE FOR EVIDENCE OF FOREIGN VOLTAGE.

NOTE: If no shield or conductors are exposed, the craftsman, wearing his rubber gloves, can remove a short length of outer jacket to perform this test.

3.12 If a foreign voltage is evident, the craftsman shall proceed as outlined in Paragraphs 3.06 and 3.07.

3.13 If no foreign voltage is evident, the craftsman shall call the testboard and/or dispatcher and inform him that the trouble is in the buried cable and there was no foreign voltage evident. Further, he shall inform him as to what extent the cable is damaged, i.e., cut in half, dug up, etc. and whether major or minor excavation is required so that the appropriate construction representative(s) and equipment can be dispatched if he is not equipped to perform all the necessary operations. When repair is completed, inform the testboard or dispatcher and restore the area.

TROUBLE IS AN OBVIOUS SERVICE WIRE TROUBLE

3.14 IF THE TROUBLE IS AN OBVIOUS SERVICE WIRE TROUBLE, WEARING HIS RUBBER GLOVES, THE CRAFTSMAN SHALL PERFORM THE NECESSARY TEST ON THE SHIELD AND/OR CONDUCTORS OF THE SERVICE WIRE WITH THE B VOLTAGE TESTER.

NOTE: If no shield or conductors are exposed, the craftsman, wearing his rubber gloves, can remove a short length of outer jacket to perform this test.

3.15 If a foreign voltage is evident, the craftsman shall proceed as outlined in Paragraphs 3.06 and 3.07.

3.16 If no foreign voltage is evident but excavation operations are required and the craftsman is not qualified to perform excavation operations in joint electric construction, the craftsman shall call the testboard and/or dispatcher and inform him that no foreign voltage was evident but excavation (major or minor) is required and the electric company representative, the qualified construction representative(s) and equipment should be dispatched.

3.17 If no foreign voltage was evident, and no excavation is required, the craftsman shall affect the repair if he has sufficient material available to him. If necessary, temporary service may be provided (see notes below).

NOTE 1: Supervisory approval shall be obtained before any attempt is made to provide temporary service. Extreme caution shall be used in these instances so as not to create a hazardous condition. Under no circumstance shall wires be placed on the ground. Permission of property owners shall also be obtained before placing temporary attachments.

NOTE 2: Temporary service may be provided in the following manner once supervisory and subscriber approval has been obtained.

- (a) If a good spare conductor is available at a nearby housing unit, this pair may be temporarily utilized by running a drop wire aerially from one dwelling to the other utilizing the necessary attachments. In no case shall the wire be placed on the ground.
- (b) If permission to place temporary attachments cannot be obtained and frozen terrain precludes immediate placing of a new service wire, a 25 foot class 5 pole shall be used to provide temporary service.

3.18 Once these repair operations are complete or temporary service has been provided, the craftsman shall inform the test-board and/or dispatcher and relate to him what operations are necessary to complete the job, i.e., new service wire must be run, repair splice must be buried, grass area restored, etc.

TROUBLE NOT OBVIOUS

3.19 If the trouble has proved back towards the central office and is not obvious, it will be necessary for the craftsman to isolate his trouble between the protector and the last accessible distribution point, (if one exists) i.e., interface cabinet, terminal, above ground closure, hand hole, etc.

- (a) INTERFACE CABINET - Isolate the central office side from the buried side. If the trouble proves into the central office side, continue to pursue the trouble using standard procedures. If the trouble proves into the buried side, notify testboard/dispatcher who will contact the appropriate construction force.

(b) ABOVE GROUND CLOSURE - Isolate the service wire from the cable pair. If the trouble proves into the buried cable or service wire side, notify testboard/dispatcher who will contact the appropriate construction representative. If necessary, temporary service may be provided if the trouble proves into the buried wire. See Paragraph 5.17.

NOTE: In many cases the trouble may be within the closure itself. Examine the wires and terminations carefully to determine this.

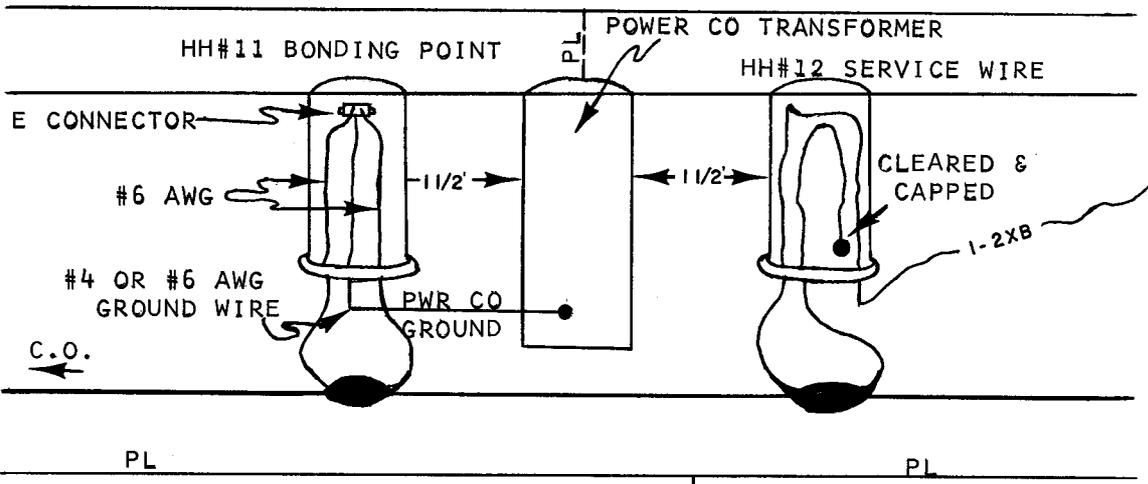
(c) SERVICE WIRE HAND HOLE - The hand hole primarily used to store loops of service wire is normally located within the 10 foot strip between the street line and the front property line 1 1/2 feet off the electric company transformer (or corner property line where no transformer exists or in 100% telephone construction OUT from the central office. See BSP 631-600-911SN). When the hand hole has been located, remove the loop of service wire tagged with the corresponding number that was at the protector, cut the wire in half and prove the trouble into the cable end of the wire or the station end of the wire.

NOTE: If the craftsman initially dispatched on the trouble was an installer-repairman, he shall not perform any isolation or testing operations in the wire hand hole. He shall proceed to the next accessible distribution point and continue the required isolation operations.

In some cases there will be two service wire Hand Holes associated with the same service wires, one on the cable side of the road and an associated one on the other side of the road. In recently completed developments, the H.H. on the cable side of the road will have a number followed by the letter A. The associated H.H. on the other side of the road will have the same number followed by the letter B. In older installations the H.H. will have been stenciled with a number only. The H.H. on the cable side of the road should be located first and the service wire cut at this point. If the trouble is in a service wire feeding a dwelling unit on the other side of the road the associated H.H. on the other side of the road shall be located, the appropriate service wire cut, and the trouble proved under the road or towards the station.

NOTE: In all cases the cut end that is untagged shall be retagged with the appropriate number (and letter as required).

CAUTION: IN JOINT BURIED RANDOM CONSTRUCTION, BONDS ARE REQUIRED AT EVERY TRANSFORMER AND AT 1000 FOOT INTERVALS. THESE BONDS ARE INTERCONNECTED IN SERVICE WIRE HAND HOLES WHICH ARE ALWAYS LOCATED WITHIN THE 10 FOOT STRIP, BETWEEN THE STREET LINE AND THE FRONT PROPERTY LINE, THEY ARE 1 1/2 FEET OFF THE ELECTRIC COMPANY TRANSFORMER (OR CORNER PROPERTY LINE IN 100% TELEPHONE CONSTRUCTION OR WHERE NO ELECTRIC COMPANY TRANSFORMER EXISTS) BACK TOWARDS THE CENTRAL OFFICE. SEE FIGURE 1.



- (d) NO ACCESSIBLE POINT - If an accessible closure is not available or cannot be located, the craftsman will so inform the testboard/dispatcher. If qualified, the craftsman will isolate the trouble by opening the cable sheath or non-accessible closure, otherwise the appropriate craftsman will be dispatched.

4. TROUBLE INVESTIGATION, BURIED CONSTRUCTION-OTHER THAN JOINT TELEPHONE AND ELECTRIC, I.E., 100% TELEPHONE, JOINT TEL, AND TV CABLE, ETC.

4.01 The trouble investigation procedures to be followed in systems other than those containing electric facilities are similar to those outlined in Part 3 of this section. The test(s) outlined in Part 3, using the B Voltage Tester, may be excluded as well as any requirements that an electric company representative be present prior to the start of any excavation operations.

5. SPLICING AND REPAIR OF B SERVICE WIRE

5.01 If the B Service Wire is not severed, and not in service at the time, the wire may be cut to facilitate the splicing operations.

5.02 If service is being fed through the B Service Wire to the residence, advise the subscriber, if possible, before proceeding with work.

5.03 The encapsulation method of splicing B Service Wire requires approximately 6 inches of B Service Wire to be placed in the encapsulation tube. If there is not a sufficient amount of slack in the existing B Service Wire, it will be necessary to cut in an extra piece of B Service Wire. Two splices will therefore be required for each B Service Wire being spliced.

6. PREPARING WIRE ENDS

6.01 Remove outer (black) and inner (gray) jackets as follows:

- (a) Using diagonal pliers, make approximately a 1/2 inch slit in the end of the outer jacket along the ridge to expose the outer slitting cord.
- (b) Grasp the slitting cord firmly between the flat jaw portions of the long nose pliers and slit the outer jacket back approximately 4 inches from the end of the wire as shown in Figure 2. Remove the slit portion of the jacket, using the diagonal pliers.

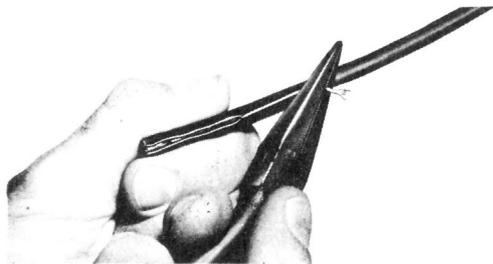


FIGURE 2 - SLITTING OUTER JACKET, USING SLITTING CORD

- (c) Unwind the aluminum shield to the end of the outer jacket. If the free end of the shield lies under the preceding wrap, it can be released by twisting the entire wire opposite to the lay of the shield near the free end. This will cause the shield to bulge so that it can be grasped with long nose pliers. Be careful not to rip or remove the aluminum shield.
- (b) Flatten and leave approximately 6 inches of aluminum shield for bonding.
- (e) Slit and remove the inner jacket for a distance of 3 inches from the end of the wire, as shown in Figure 3, using the procedures in (a) and (b).



FIGURE 3 - SLITTING INNER JACKET, USING SLITTING CORD

- (f) Measure 2 inches from the end of the inner jacket and cut off excess portion of the conductors, as shown in Figure 4. When repairing B service wire that is defective, the length of the conductors will depend on the extent of damage to the wires.

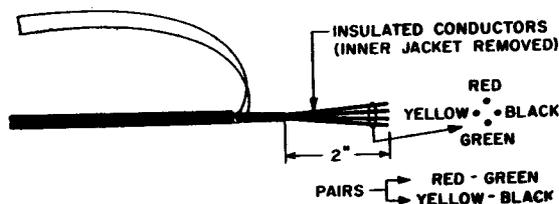


FIGURE 4 - B SERVICE WIRE WITH INNER AND OUTER JACKETS REMOVED

- 6.02 Repeat the procedures described in 6.01 with the end of the other wire to be spliced.
- 6.03 If the earlier type B Service Wire without slitting cords is encountered, use diagonal pliers to remove the outer and inner jackets, being careful not to damage the aluminum shield or the conductors. Follow the same procedures as with B Service Wire with slitting cord for preparing the wire ends.

7. PREPARING THE ALUMINUM BOND

- 7.01 Holding both prepared ends of the B Service Wires together, with conductors facing in same direction (see Figure 6) place the two aluminum shields together and make two complete wraps around the inner jacket of both wires.
- 7.02 Having approximately 3 inches of aluminum shield left, fold it back on itself to form a 1/2 inch tab.
- 7.03 To modify the B Bond Clip, when bonding two ends of B Service Wire, remove the closed end of the clip as shown in Figure 5.

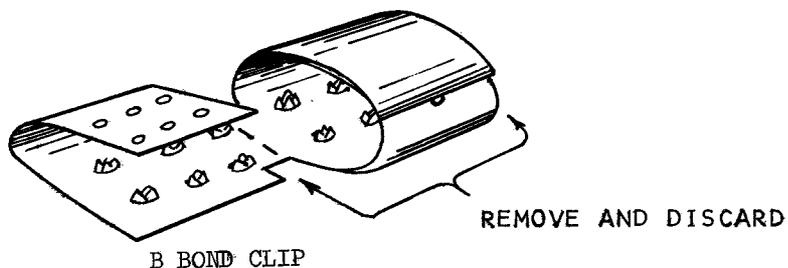


FIGURE 5

7.04 Place the open end of the B Bond Clip over 1/2 inch tab and press it closed with the B Pressing Pliers. Wrap two layers of vinyl around tab to keep in place.

8. SPLICING CONDUCTORS

8.01 Using the skinning notch in the diagonal pliers, remove 1/2 inch of insulation from the ends of the conductors of both B service wires to be spliced. See Figure 6.

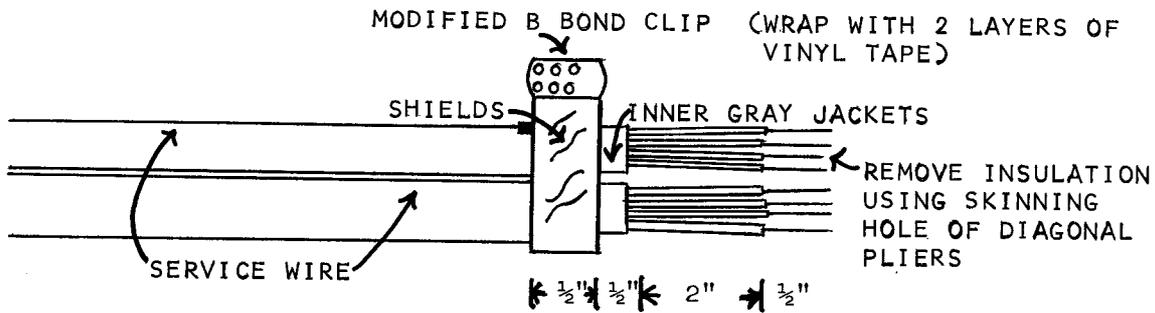


FIGURE 6

8.02 Join the like colored conductors using the B Wire Connectors and the B Connector Presser.

9. COMPLETION OF SPLICE

9.01 Using the Hyseal Capping Kit CK 137 proceed as follows:

CAUTION: *Avoid skin contact or prolonged breathing of fumes and vapors. If skin contact occurs, wash thoroughly with soap and water.*

- (a) Hold the tube horizontally (heat sealed end away from you).
- (b) With the thumb, flip the barrier between the two components and work the barrier to the heat sealed end and hold there.
- (c) Holding the tube upright (heat sealed end up) cut the sealed end off and remove the barrier with the paddle and discard it.
- (d) Vigorously stir the components with the paddle in a circular as well as a scooping motion for one minute. The compound will change to a dark color. The tube will become warm.

- (e) Insert the foam centering spacer (open end up) into the open end of the tube. This spacer will center splice in tube.
- (f) Insert the prepared splice into foam spacer and push the spacer to bottom of tube. Hold for 1 1/2 minutes until compound gels.

NOTE: This compound will set up in 3 minutes.

- (g) Place the completed splice in the ground and cover as required.