

710 MODULAR SPLICING SYSTEM

WIRE JOINING

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5. SPLICING TOOLS — USE	21	1. GENERAL	
6. SPLICING TOOLS — HAND TOOLS AND ACCESSORIES	28	1.01 This section covers the description and use of the tools and connectors of the 710 connector system for making 25 pair modular splices in any combination of 17- through 26-gauge copper or aluminum conductor cables with polyethylene-insulated conductor (PIC), pulp or paper insulation.	
7. MODULAR SPLICE CONFIGURATIONS	29	1.02 (Reserved for future use.)	
8. CABLE SPLICING — INLINE METHOD	34	1.03 This section updates the 710 connector system for Pacific Company (PAC) and includes new tools, connectors, procedures, and information originally contained in Sections 081-852-132, 632-205-219, 632-205-220, 632-205-221, 632-205-222, 632-205-223, and 632-205-224.	
9. STRAIGHT SPLICES	44	1.04 This section provides information for connectors, tools, and methods used in the 710 connector system. The following are items covered:	
10. JUNCTION SPLICES	47	(a) 710 connector codes and their proper application.	
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SECTION 632-205-902PT

- (b) Description, use and maintenance of the 710 cutter-pressers, B support frame, 710A and 710B tool mountings, and hand tools for mounting and assembling 710 connectors.
- (c) Splice configurations such as straight, junction, half-tap, loading and deloading, re-entries and rearrangements of existing splices.
- (d) Special applications such as building use and setup for vertical splices.

2. SAFETY PRECAUTIONS

2.01 Prior to starting any splicing operation, review the safety precautions outlined in the following sections:

Section	Title
620-135-100	Outside Plant — Guarding Work Area — Standard Warning Device — Description and Installation
620-140-501	Testing and Ventilating Manholes

3. CONNECTOR MODULES — DESCRIPTIONS AND USE

3.01 Generally, there are three type of connector modules used in PAC:

(a) The PIC Connector module consists of the same components as the regular splicing/half tap connector. However, modules used on PIC are filled with encapsulant for moisture repency.

(b) The Bridge connectors consist of a bridge module and cap. It is used in conjunction with a splicing connector to permit three way splicing.

(c) The splicing connector consists of an index strip, connector module, and cap. It is used to join two 25 pair groups. This connector also permits joining on cable to through conductors in working or nonworking cable without interrupting service (*half tap*).

Note: Although not limited to these particular modules, these are most often used in day to day splicing activity. The additional modules used can be referenced in Table A, which includes various gauge types and building environment modules.

3.02 The connector components' use and description are as follows:

(a) Index Strip (Fig. 1) — Holds the 25 pair group from the Central Office (CO) cable. It has peaked projections, which are sometimes color-coded, used to separate the tip and ring conductors of each pair. The batwing grippers are used to hold the wire in the index strip, as well as for conductor alignment.



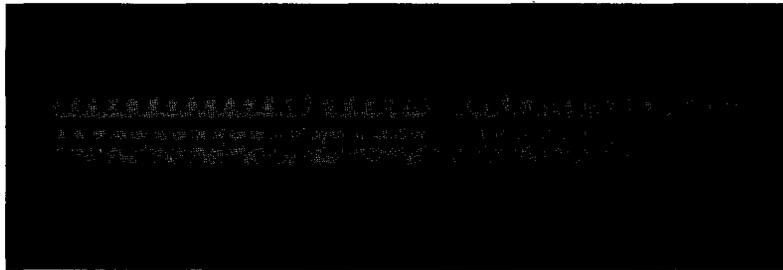
The Index Strip
Fig. 1

(b) Connector Module (Figs. 2 and 4) — Contains the double-ended slotted beam contact for cutting through insulation to contact the metallic conductor. The top of the module is similar to the index strip and holds the 25 pair group from the field cable. Connector modules used on PIC cable are filled with encapsulant. The connector module is also used as a half tap module.

(c) Bridge Module (Fig. 3) — The top of the bridge module is similar to the connector

module except the slotted beams are exposed in the bottom portion of the connector.

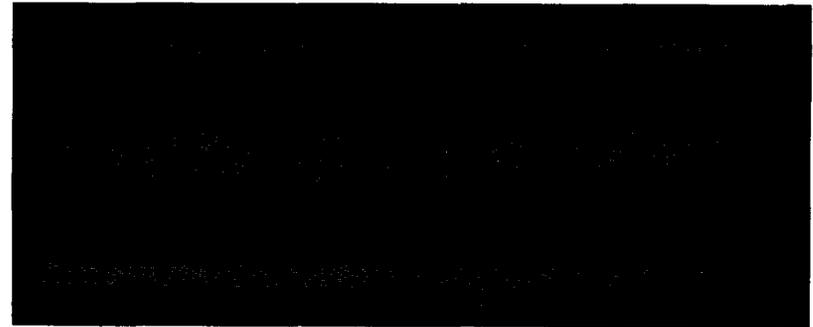
(d) Caps (Fig. 5) — Provides the final wire retention when pressed onto the connector or bridge module. The caps of connectors used on PIC cable are filled with encapsulant. The "Holey" Caps are used in facility or load type splices. These will allow the use of the transfer shoe for cut closed transfers and loading/deloading of working lines.



Connector Module
Fig. 2



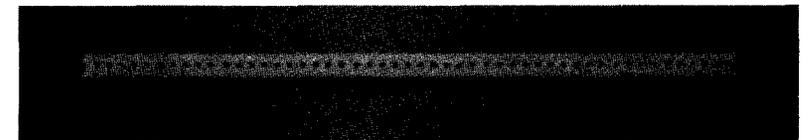
Bridge Module
Fig. 3



Splicing Connector / Half Tap Module
Connector Module
Fig. 4



Caps
Fig. 5



4. SPLICING TOOLS — DESCRIPTION
710A and 710B Mountings

4.01 The 710A and 710B Tool mountings (Fig. 6) are used for mounting cutter-pressers.

Note: Section 632-205-220 describes other approved mounting tools.

4.02 Two methods of mounting exist. The vise clamp can grip a solid object in the work area as shown in Fig. 7 or the base can be permanently attached to the surface as shown in Fig. 8. The other required parts can then be assembled on the vise clamp or base to fit the needed configuration to mount the tool.

TABLE A

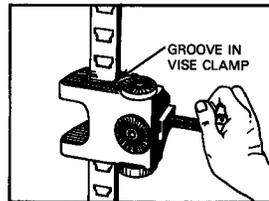
710 CONNECTOR CODES (25 PAIR)

CONNECTOR CODES	TYPE SPLICE	COLOR	TYPE CABLE	TYPE INSULATION	ENCAPSULATED	GAUGE
710-BB1-25†	Bridge	Green	Copper	Pulp	No	19-26
710-BC1-25†	Bridge	Green	Copper	PIC	Yes	19-26
710-BD1-25†‡	Bridge	Gray	Copper	PIC, Polyvinyl Chloride (PVC), Pulp and Paper	No	19-26
710-SCL-25†§	Straight	Green/Blue	Aluminum or Copper	PIC	Yes	17-24§
710-SB1-25†	Straight or Half-Tap	Green	Copper	Paper or Pulp	No	22-26
710-SC1-25†	Straight	Green	Copper	PIC	Yes	22-26
710-SD1-25†‡	Straight or Half-Tap	Gray	Copper	PIC, PVC, Pulp and Paper	No	22-26
710-TCL-25†	Half-Tap	Green/Blue	Aluminum or Copper	PIC	Yes	17-24§
710-TC1-25†	Half-Tap	Green	Copper	PIC	Yes	22-26

* All bridge modules will mate all connector and half-tap modules.
 † Component parts for two-letter codes are not interchangeable with three-letter codes.
 ‡ Fire retardant codes for use in building and cable entrance facilities.
 § Excluding 19-gauge solid polypropylene (PP) and high density polyethylene (HDPE) insulated conductor for waterproof (WP) and Locap cable.



710A and 710B Tool Mountings
Fig. 6



Cable Rack
Fig. 7

835-Type Tool — Description

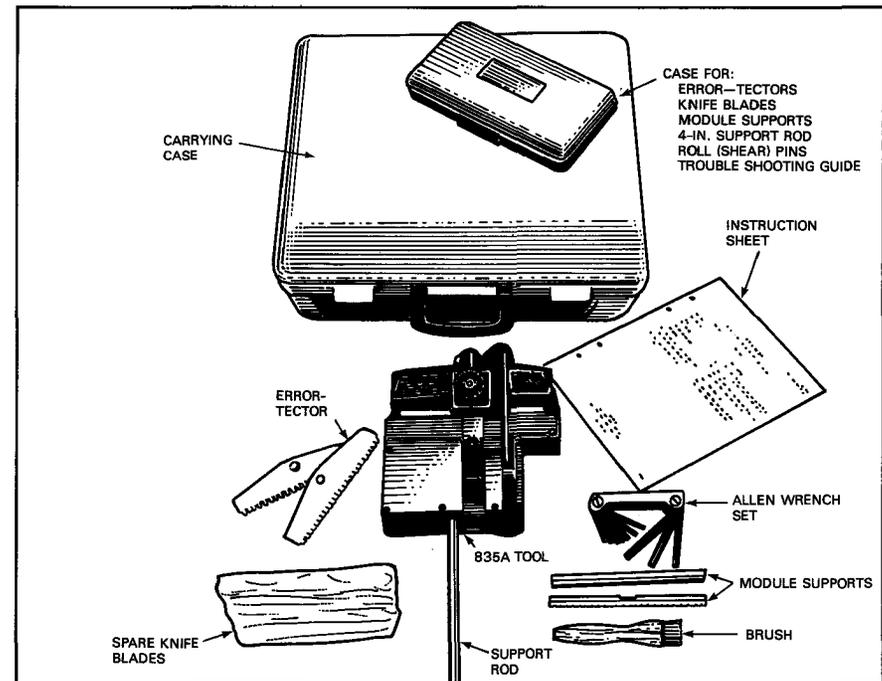
4.03 The Communication Technology Corporation (CTC) type cutter-presser and 835A1 cutter-pressers are manually operated cutter-pressers which use a lever system instead of a hydraulic system for power to assemble 710 connectors. The

835A1 tool is shown in Fig. 9. The 835A1 tool is an improved version of the 835A tool.

4.04 The use of the 835A tool to assemble the 710 connector module is covered in Part 9, Steps 1 through 14. When splicing two sections of cable together, the shortest section of cable must be placed in index strip to enable testing of splice using 152A test set as covered in Part 5.



Tool Seat
Fig. 8



835 Tool
Fig. 9

TABLE B

835-TYPE TOOL TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	REMEDY
1. T-bar will not spring back to upright position after the cutting and pressing operation.	Slide out of adjustment.	Adjust slide mechanism. (Step 1)
Problem persists or there is no more travel left on the adjusting screw.	Bent or broken roll pin.	Replace roll pin. (Step 2)
2. T-bar will not move up and down freely.	Burred knife blade holder.	Remove knife blade holder from the T-bar. Lightly file the burrs until the part is able to slide freely in the end post slots. Replace the knife blade holder. (Steps 9 to 13)
Problem persists.	Slide out of adjustment.	Adjust slide mechanism. (Step 1)
	Bent or broken roll pin.	Replace roll pin. (Step 2)
3. Tool will not completely cut through the conductors.	Dull knife blade.	Replace knife blade. (Steps 9 to 13)
	Bent or broken roll pin.	Replace roll pin. (Step 2)
4. Knife blades breaking on the ends of the knife blade assembly.	Shim located behind knife blade.	Remove shim. (Step 3)
	Connector holding bracket assembly is located too high.	Readjust height. (Step 4)
Knife blades breaking in the middle of the knife blade assembly.	Connector is bowed during the cutting and pressing operation.	Make sure the connector components are properly seated.
5. Knife blades cut deep and the handle pressure required to cut the wires seems excessive.	Connector holding bracket assembly is located too high.	Readjust height. (Step 4)
6. Index strip lift up.	(1) Cutting into cathedral window. (2) Interference with stuffers. (3) Deep cutting knife blade.	Improper placement of index strip. Grease stuffer. (Step 5) Replace blades. (Steps 9 to 13)
G. Should some other problem be encountered or the tool still not function after attempted repair, send the tool in for repair in accordance with the local practices and include a description of the problem.		
7. The problems caused by the slide being out of adjustment or a bent or broken roll pin or a burred knife blade support is the result of the T-bar not being properly positioned while seating a cap.		

Step 1 — Unlocking and Adjusting Slide Mechanism

1. To unlock the T-bar, insert an index strip or screwdriver through the grommet on the right side of the housing and push the slide to the left. (See Fig. 10A.)
2. Remove the 11 screws from the cover and remove the cover from the housing. (See Fig. 10A.)
3. Have the tool tilted back slightly while working on it so the slide does not jump out of its track. (See Fig. 10B.)
4. For easier access to the adjusting screw, push the T-bar down all the way and pull the handle to let the slide index to the right. (See Fig. 10B.)
5. Loosen the locking nut and adjust the screw using a trial and error method move the slide to within .010/.030 inches (approximate thickness of 24 gauge bare wire) of the inside wall of the housing when the handle is returned to its closed position. Turning the screw in (clockwise) will move the slide to the left and correct Problem A; turning the screw out (counterclockwise) will move the slide to the right and correct Problem B

(see Table B). The adjustment should require only one or two turns of the adjusting screw. Over adjustment when trying to solve Problem A will cause Problem B and vice-versa. (See Fig. 10B.)

6. Once the adjustment has been made, secure the adjusting screw in place with the locking nut and recheck the clearance between the slide and the housing. Readjust if necessary, repeating the above procedure. Replace the cover on the housing and install the screws. The four short screws go along the top of the cover. (See Fig. 10C.)

Step 2 — Replacing the Roll Pin

1. Before removing the roll pin, check to see if the holes in the handle collar and the cam shaft are aligned by pulling handle down and inserting a wire into the roll pin. If the wire does not go through, rotate the handle on the shaft until the wire goes all the way through the roll pin. (See Fig. 11A.)
2. If the holes cannot be aligned, remove the cover. Place a screwdriver into the mechanism on the opposite end of the cam shaft to prevent the shaft from rotating when the handle is moved. Now rotate the handle until the hole in the handle collar is lined up with the pin on the opposite end of the shaft. (See Fig. 11B.)

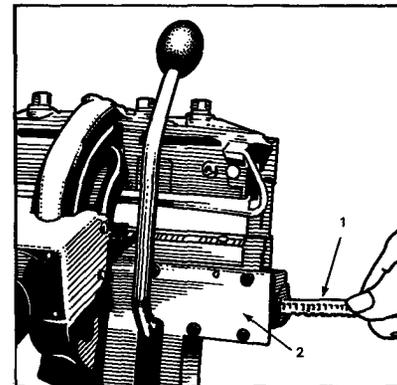


Fig. 10A

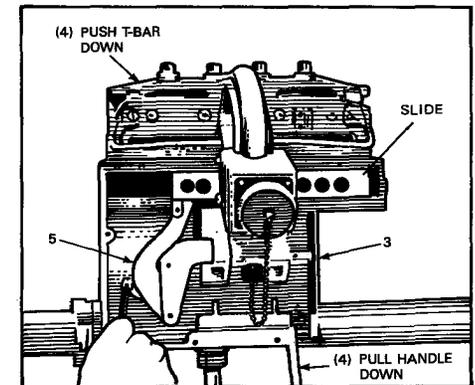


Fig. 10B

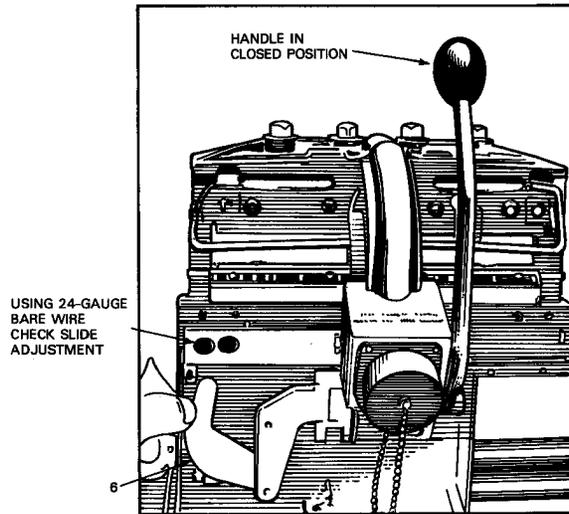


Fig. 10C

3. The alignment is correct when a wire can be inserted completely through the roll pin. Remove the screwdriver from the mechanism. (See Fig. 11C.)
4. Pull the handle down all the way and put a screwdriver underneath it for support. *Do not remove the pin with the handle in its position as this will cause damage to the tool.* (See Fig. 11D.)
5. With a hammer and punch, knock the pin out about halfway and drive one of the new pins supplied with the tool in until it is *flush* with the groove in the collar. The new pin will drive out the broken pieces of the old pin. The tool should now be checked to see if it functions properly. If Problems A or B are encountered, the slide should be adjusted (Step 1). Ordering information for the pin is: Roll Pin, 420 stainless steel, .125 diameter by .75 long, Comcode No. 900477514.

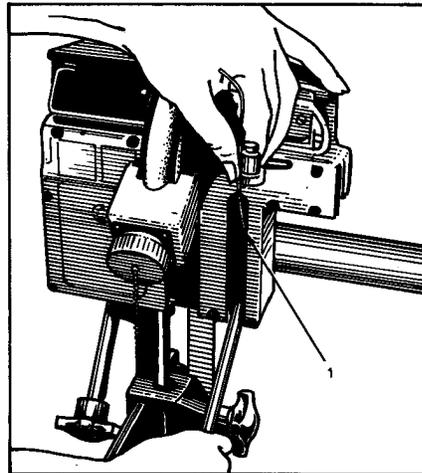


Fig. 11A

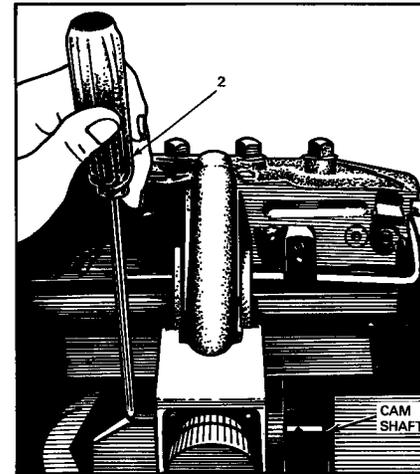


Fig. 11B

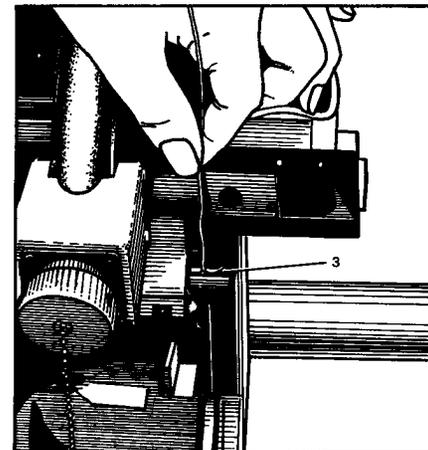


Fig. 11C

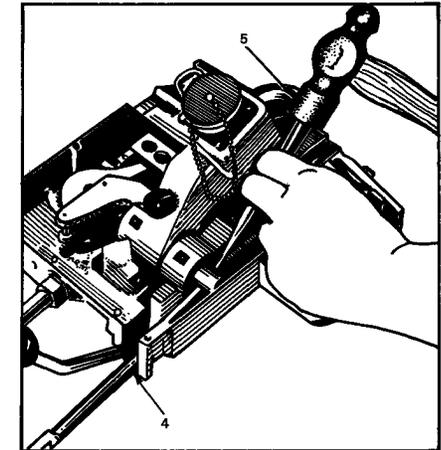


Fig. 11D

Step 3 — Removing Shim from Knife Support Pocket

Remove the knife support from the tool and take out the knife blade assembly from the knife support (Steps 9 and 10).

1. Remove any brass shims that might be in the knife support pocket. Replace the knife blade assembly in the support, then place in the tool (Steps 11 through 13). See Fig. 12.

Step 4 — Adjusting Height of Connector Holding Bracket

1. Remove the connector holding bracket assembly from the tool by unscrewing the two attaching screws and lifting it straight up. There should be a thin and a thick brass shim remaining on top of the tool (if there is only one shim and the problem is acute, send the tool in for repairs). Remove the thin shim and attach the holding bracket on the tool. Assemble a connector module onto an index strip. Cut and press 25 pairs of 22 gauge wire (scrap) on the connector module. If the wire conductors are not completely cut, the bottom of the pulp insulation may not be cut all the way through, (see 4.07) and additional shims must be added. (See Fig. 13A.)

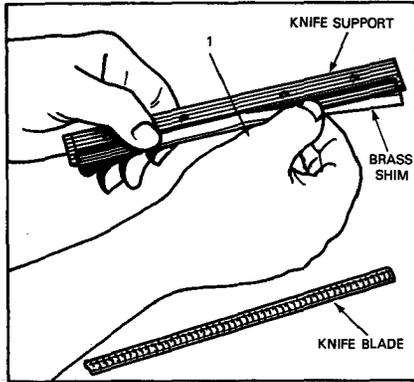


Fig. 12

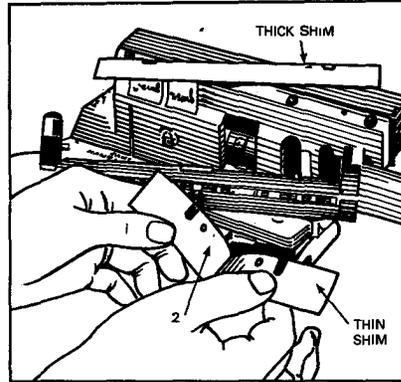


Fig. 13B

T-bar on and off the index strip 4 or 5 times to transfer some jelly to the stuffer blades. (See Fig. 14A.) Remove and discard the index strip, or

2. Lubricate stuffer blades by applying KS-21446 solvent. *Do not use substitute solvent.* (See Fig. 14B.)

Cleaning

4.05 Cleaning of the cutter-pressers as outlined in Steps 6 and 7 may be required, especially when splicing with filled connectors and waterproof cable.

Note: Clean the tool after splicing with filled connectors. Assure tool is clean before splicing with unfilled connectors.

Step 6 — Cleaning End Spring

1. Spray and brush the end spring with KS-21446 solvent or KS-7860 petroleum spirits. Work the solvent into end spring to assure the springs are thoroughly cleaned. Problems are caused by buildup behind the end spring when using filled connector. (See Fig. 15A.)

WARNING: *Do not use B cleaning fluid or other unapproved fluids to clean the tool as some residue will remain on tool causing damage to the connectors and cutting blade.*

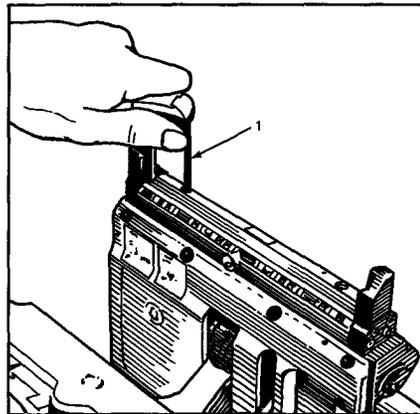


Fig. 13A

2. Peel a few layers off of the thinner shim which is laminated and reinstall it with the thick shim. Repeat the above procedure to check for completeness of cut. Add or remove shims as necessary until the wire conductors are completely cut. (See Fig. 13B.)

Step 5 — Lubricating Stuffers of Pressing Tool

1. Apply petroleum jelly such as vaseline across length of index strip, then operate the

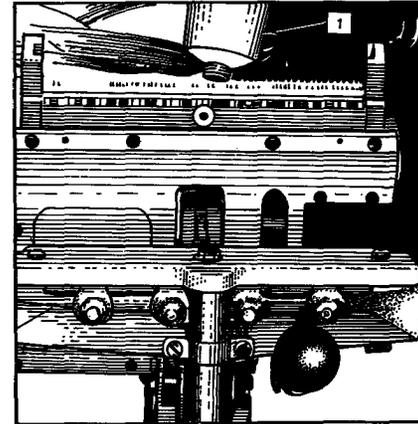


Fig. 14A

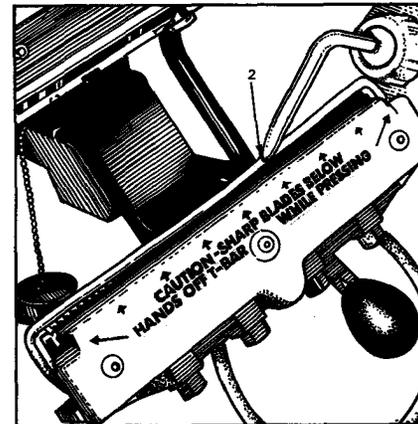


Fig. 14B

2. With a cloth, depress the springs several times to loosen the buildup, then clean and dry. (See Fig. 15B.)

Step 7 — Cleaning Guide and Blade Assembly (Fig. 16).

1. Pull T-bar back in horizontal position.

2. Using KS-21446 solvent, spray the knife blade and guide area.
3. Brush the guide and blade thoroughly to clean and remove all wire scraps left in the guide area to prevent any false defective pair indication when using 152A test set.
4. Using a cloth, clean and dry.

WARNING: *Extreme caution must be exercised when cleaning and drying guide assembly as the blade is very sharp.*

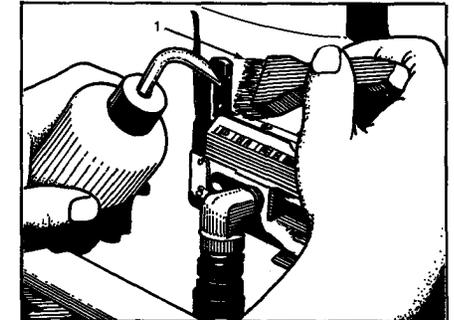


Fig. 15A

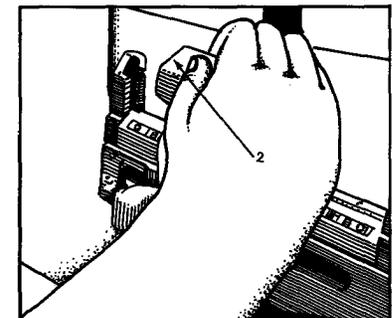


Fig. 15B

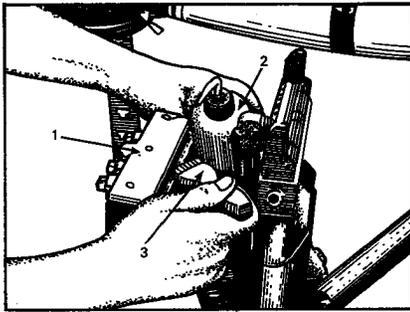


Fig. 16

Lubrication

4.06 If operation of the T-bar becomes difficult, apply grease to the flat closing spring as outlined in Step 8. The grease is available in the tool kit.

Step 8 — Lubricating Cutter-Presser (Fig. 17)

1. Insert screwdriver between T-bar and spring to deflect the spring 1/16 inch.
2. Place lubricant into opening.

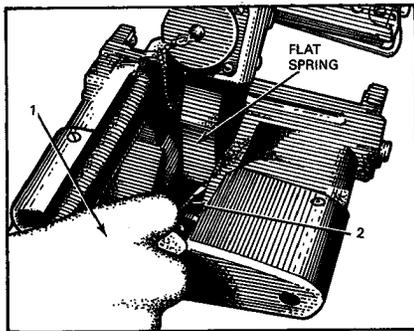


Fig. 17

Knife Blade Replacement

DANGER: Exercise care when handling knife blade as the blade is very sharp.

4.07 Knife blades should be replaced when they become dull or damaged and will not cut the conductors. A sign of a dull or broken knife blade is the ragged and incomplete cutting of the conductors.

Note: A sharp knife blade may not cut all the way through the bottom of pulp or paper insulation or through 17- or 19-gauge conductors. Unless the conductor shows ragged cutting, the blade does not need replacing.

4.08 Procedures for replacing knife blade in D, E, and F cutter-pressers are outlined in Steps 9 through 13.

Step 9 — Loosening Screws (Fig. 18)

1. Push T-Bar in the upright position.
2. Using the allen wrench set *loosen, DO NOT REMOVE*, the four allen head screws on the back of the T-bar. The screws secure the holder assembly and blade in place. If the screws are removed while the T-bar is in the up position, the holder assembly and blade will fall out.

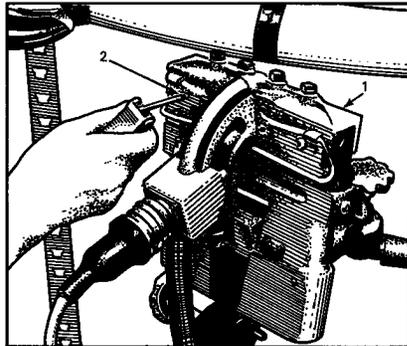


Fig. 18

Step 10 — Removing Blade (Fig. 19)

1. Pull the T-bar back to its rest position and remove the four allen head screws.
2. It may be necessary to loosen (do not remove) the screws securing the wire cover to the T-bar to relieve pressure on the blade.
3. Push down the knife blade guard and slide the old blade and the support out of the side of the T-bar. Be careful not to drop any other parts of the T-bar.

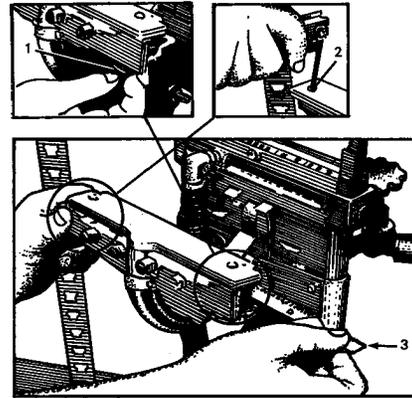


Fig. 19

Step 11 — Placing Blade in Knife Blade Support

1. Place blade in knife support as shown in Fig. 20.

Step 12 — Replacing Knife and Support (Fig. 21)

1. Slide support into space provided until knife blade is centered.
2. Replace allen head screws into the T-bar and FINGER TIGHTEN. Blade has to be aligned before tightening with allen wrench.

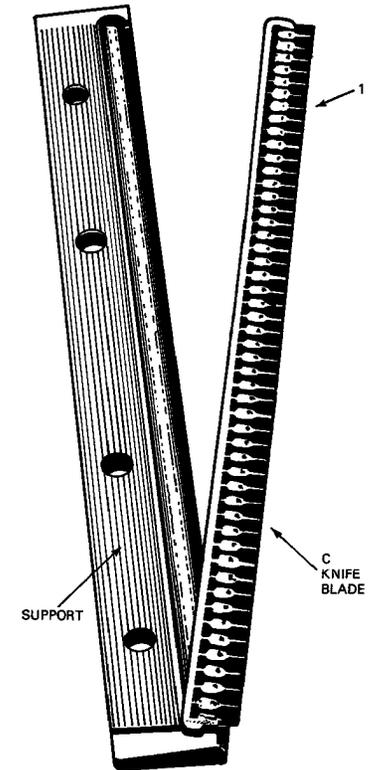


Fig. 20

Step 13 — Aligning Blade

1. Insert index strip into holder of cutter-presser with arched wire grip facing T-bar. Assure index strip is secure beneath the L-spring in the center of the holder. (See Fig. 22A.)
2. Push T-bar to the upright position. Connect air pressure.
3. Operate the hydraulic pump. This brings the blade in contact with the index strip and aligns the blade properly.

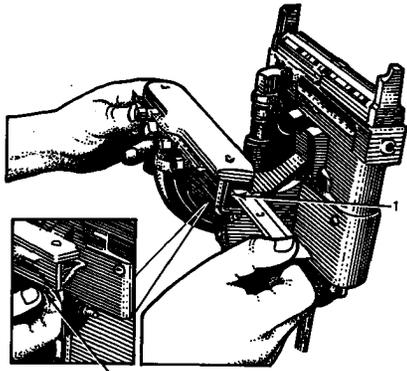


Fig. 21

4. With the T-bar in the down position, tighten all four allen screws snugly until the lock-washers around the screws are fully compressed. *Do not overtighten, the plastic guard could be damaged.*
5. Release the hydraulic pump, then check index strip to ensure a slight knife cut is visible. Disconnect air pressure.

Note: Refer to Fig. 22B for 2 through 5, above.

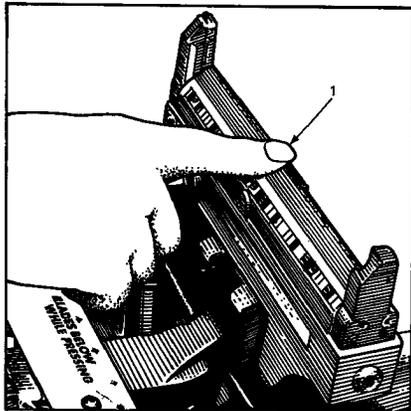


Fig. 22A

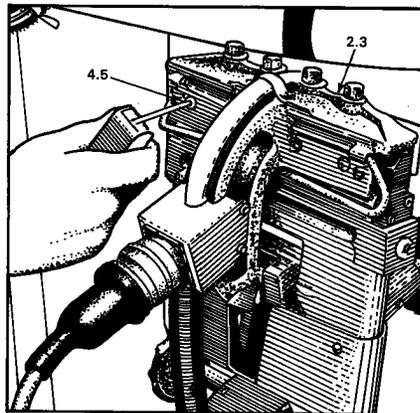


Fig. 22B

6. Tighten screws to secure wire cover.

Enerpac Unit (Checking Oil Level)

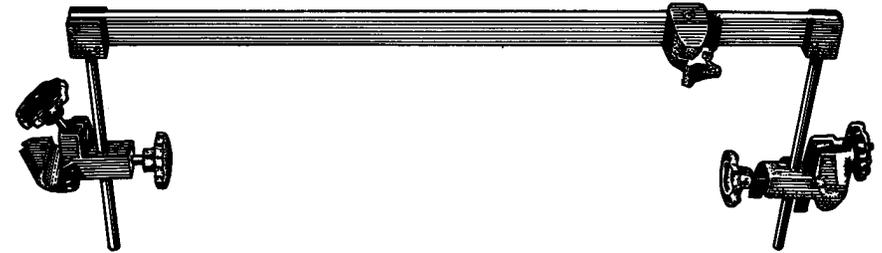
- 4.09 Check all hydraulic and air connections to be sure they are tight and not leaking. Loose or leaking connections may cause erratic and/or loss of operation.

709A Tool Mounting

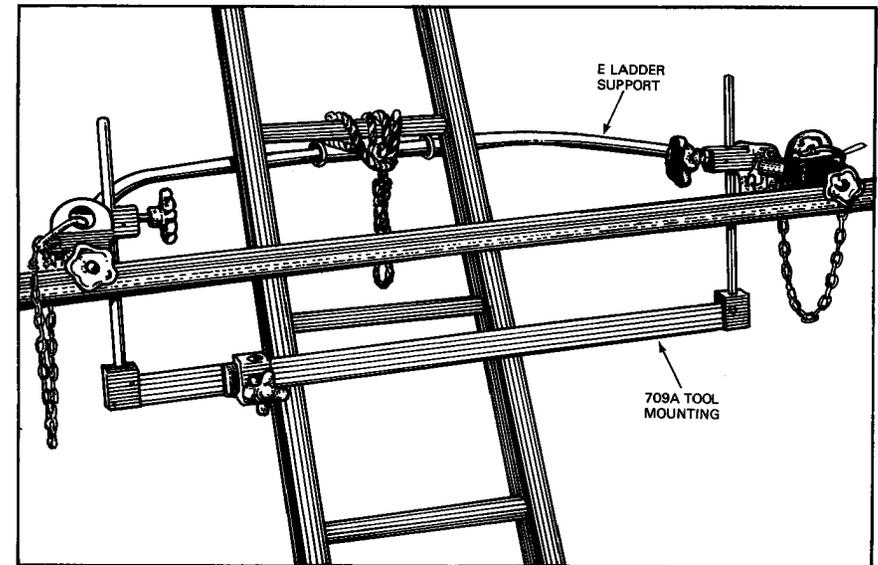
- 4.10 The 709A tool mounting (Fig. 23) is an aerial tool mounting used with an E ladder support as shown in Fig. 24.

945A Tool — Description

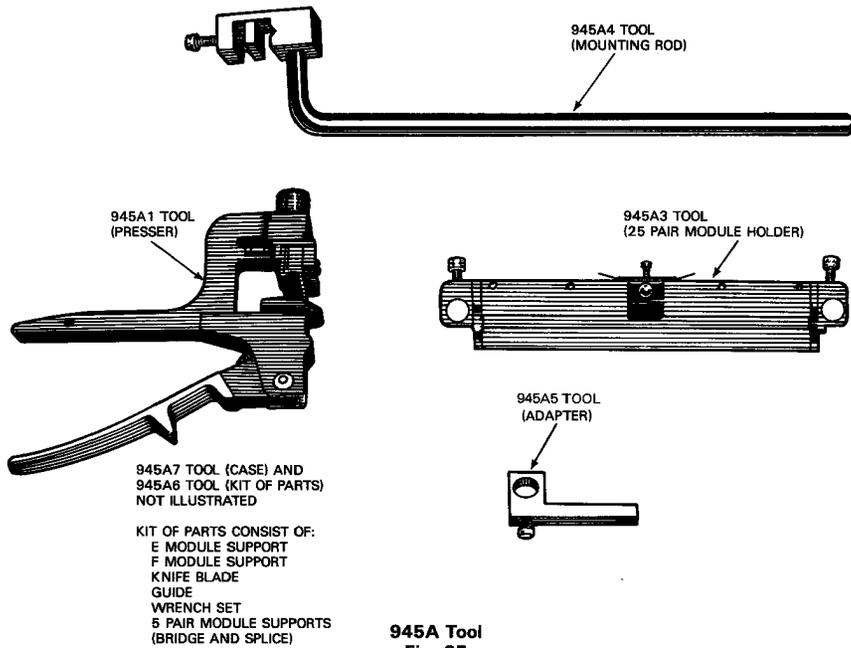
- 4.11 The 945A tool (Fig. 25) is a manually operated tool to assemble the 25-pair or 5-pair (not standard in Pacific Company) 710 connector module. Five cut/press positions are provided along the length of the 25-pair module holder to allow positioning of the presser to press and cut five pairs at a time throughout the length of the module. The tool is equipped with a mounting rod (Fig. 26) for aerial mounting or it can be used with any of the other tool mounts similar to those described in 4.01.



709A Tool Mounting
Fig. 23



709A Tool Mounting on E Ladder Support
Fig. 24



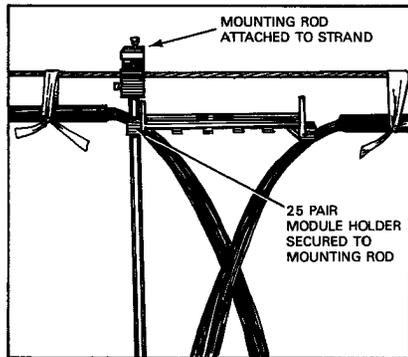
945A Tool
Fig. 25

Installation

4.12 Installation of 25-pair module holder on a strand for splicing 25-pair is shown in Fig. 26. The 945A tool can also be mounted on the B support frame with press clamp assembly or 710A tool mounting as previously illustrated for the other tools.

Step 1 — Conductors Placed Into Index Strip (Fig. 27)

- Using the thumb and forefinger of each hand, grasp a pair from the binder group. Separate the tip and ring conductor on the colored peaked (^) projections of the index strip, tip side to the left and ring side to the right. Dress the conductors into the wire grips leaving approximately 3/8-inch slack behind index strip. *In dressing pulp and*



25-Pair Module Holder Mounted on Strand
Fig. 26

noncolor-coded PIC conductors, select the pairs at random and place them into the index strip starting at end of tool nearest the cable being placed. In dressing PIC, select the pairs at random and place them into the index strip in proper color code sequence using color strip and colored peak projections as a guide.

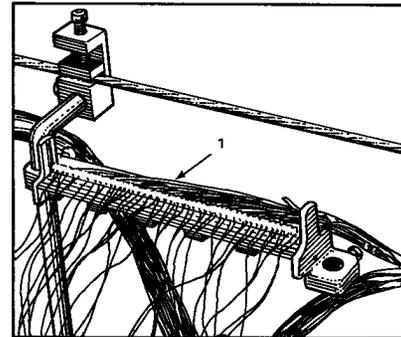


Fig. 27

Step 2 — Checking Placed Conductors (Fig. 28)

- Use the error-tector to check for splicing errors, such as two conductors in one slot, va-

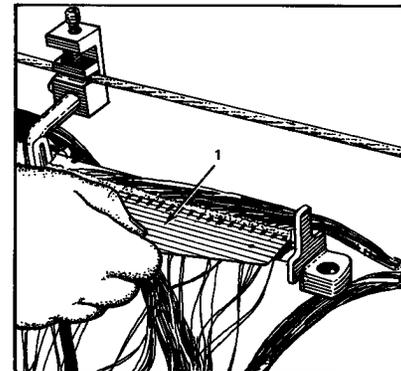


Fig. 28

cant slots, tip and ring reversals, or transposed pairs as follows:

- Place the error-tector over the index strip and slide to the left — only the tip conductors should show. Slide the error-tector to the right — only ring conductors should show.
- If an error is found, make the correction and check the conductors again with error-tector.

Step 3 — Adjusting Tool for Seating and Cutting Conductors From Index Strip (Fig. 29)

- Push button and pull height adjustment slide forward.

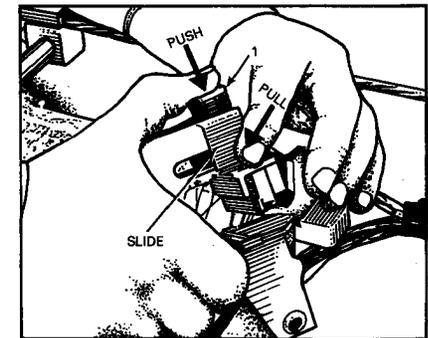


Fig. 29

Step 4 — Cutting Conductors From Index Strip (Fig. 30)

- Position tool in groove underneath module holder and slide forward until it hits stop.
- Press handle to seat and cut conductors.
- Release handle and remove tool from module holder and repeat 1 and 2, above, until all conductors are cut.

Note: There is no set sequence of cutting and pressing conductors.

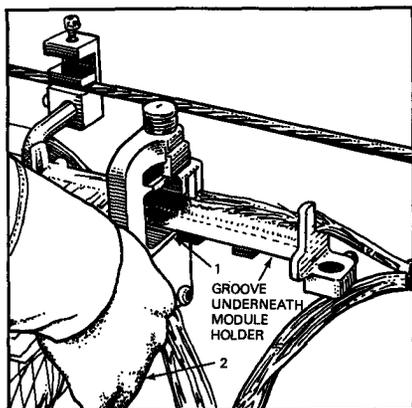


Fig. 30

Step 5 — Cut Conductors (Fig. 31)

1. After cutting all conductors, remove tool from module holder.

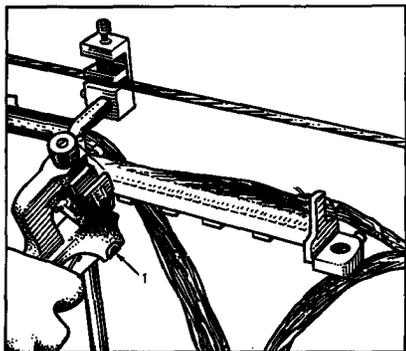


Fig. 31

Step 6 — Place Connector Module (Fig. 32)

1. Place a connector module between the end keys of the base with the arched wire grip facing front of module holder. Guide the module down the end springs keeping it parallel to the index strip.

WARNING: If connector module not lowered parallel to index strip it may be damaged causing open, shorts, or crosses in end pairs 1, 2, or 24, 25.

2. Pull slide back to raise head of presser.
3. Seat the connector module on the index strip by indexing across for five presses following the same procedures used for cutting conductors from index strip except slide remain in back position (Step 4).

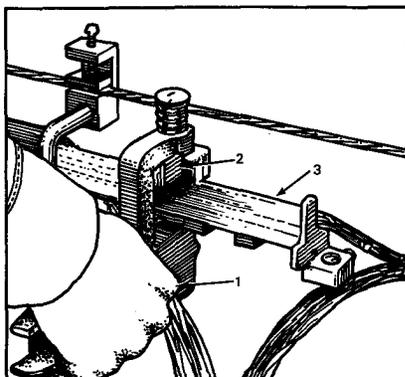


Fig. 32

Step 7 — Conductors Placed in Connector Module (Fig. 33)

1. Place the conductors from the matching binder group of the second cable into the slots of the connector module.
2. Using the error-tector as shown in Step 2, check the placed conductors.

Step 8 — Seating and Cutting Conductors (Fig. 34)

1. Seat and cut conductors following the same procedures used in cutting the conductors as outlined in Step 4. Keep height adjustment slide in rear position.

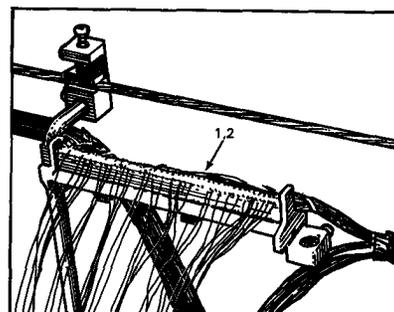


Fig. 33

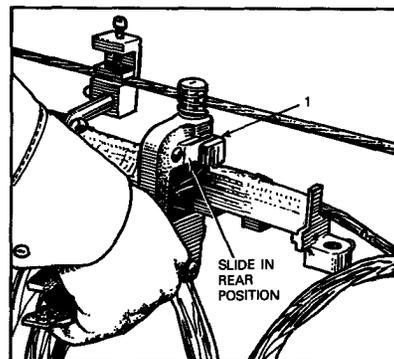


Fig. 34

Step 9 — Placing Cap (Fig. 35)

1. With latches of cap facing tool, place cap on connector module. Using finger, partially seat cap on connector module by running finger across length of cap.
2. Seat the cap on the connector module by pressing five times across the length of the cap. The tool is not required to be inserted fully into the module holder to seat cap.

Note: To prevent cap from rising during seating operation, it is suggested that one end of cap be pressed; position tool at opposite end and press cap, then make the intermediate presses.

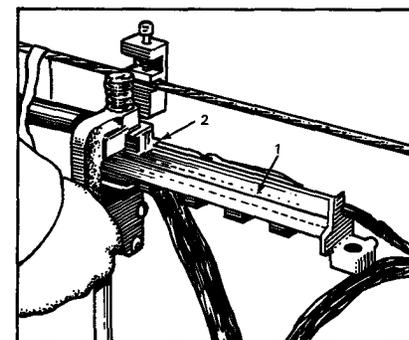


Fig. 35

Step 10 — Removing Completed Module (Fig. 36)

1. Push spring to release module and remove completed module. Identify spliced unit by marking with felt marker or by using a binder group identification tie.
2. Repeat Steps 1 through 10 until cable is completely spliced.

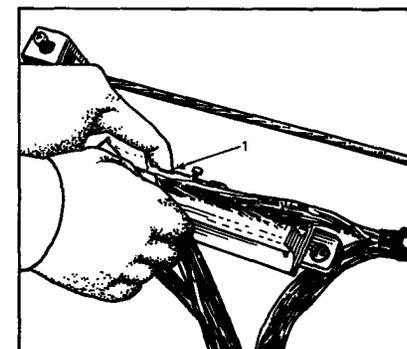


Fig. 36

Maintenance**A. Cleaning**

4.13 Cleaning of the 945A tool as outlined in Step 12 may be required especially when splicing with filled connector.

Step 11 — Cleaning Knife Blade

1. Using KS-21446 solvent spray the knife blade and guide area, then brush the guide thoroughly clean. (See Fig. 37A.)
2. Using a cloth, clean and dry the knife blade and guide area. (See Fig. 37B.)

Danger: Extreme caution must be exercised when cleaning and drying knife blade as the blade is very sharp.

B. Knife Blade Replacement

4.14 Knife blades should be replaced as outlined in Step 12 when they become dull.

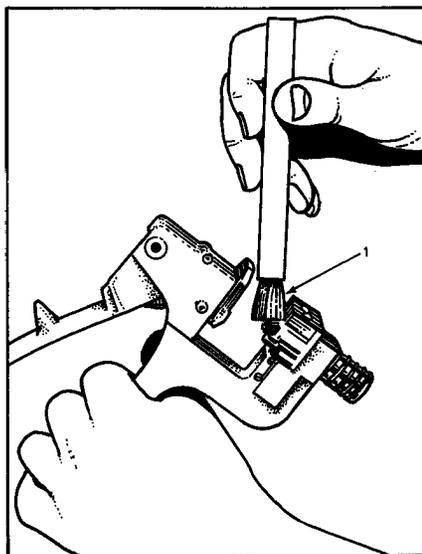


Fig. 37A

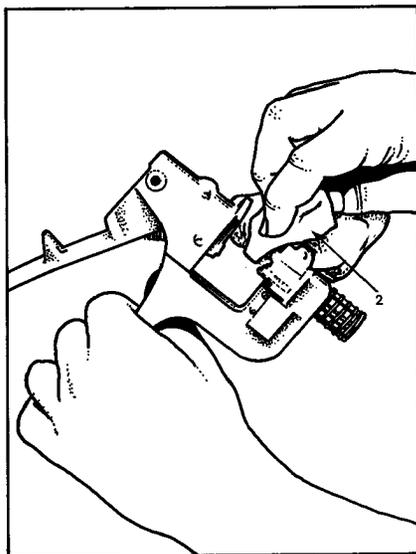


Fig. 37B

Step 12 — Knife Blade Replacement (Fig. 38)

DANGER: Exercise care when handling knife as blade is very sharp.

1. Loosen and remove two screws and remove clamp plate, guide, knife blade and knife blade holder.
2. Place new knife blade in holder and reassemble.

5. SPlicing TOOLS — USE

5.01 Once the cables have been prepared for the type of splice and closure to be used, mark the groups with either Thomas Betts Group markers for pulp, or Panduit Plastic Colored Ties for PIC insulated cables. Fold the binder groups back along their respective cables and place into protective sleeves, to open the splice area.

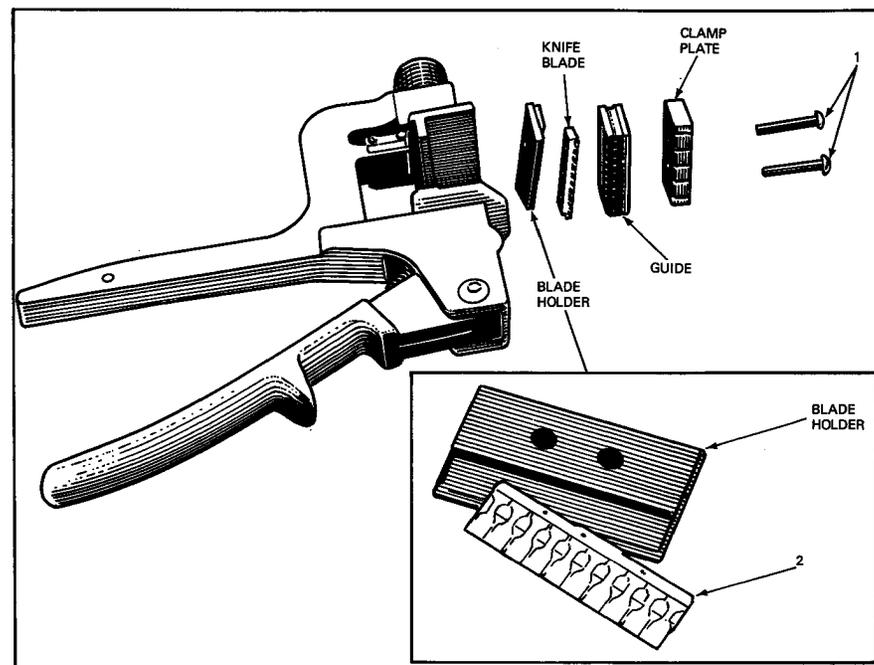


Fig. 38

5.02 Install the cutter-presser on the tool mount and position it in the open splice area (Fig. 39).

DANGER: Exercise care when operating the cutter-presser as the knife blade is very sharp.

5.03 The use of a cutter-presser to assemble the 710 connector module is covered in Steps 1 through 13. When splicing two sections of cable, the shortest section must be placed in the index strip to enable accurate testing with the 152A test set. When splicing a new CO termination, the splices should be worked from the field end toward the CO as outlined in the 5C Job Plan.

Step 1 — Placing the Index Strip

1. With the cathedral windows facing the T-bar, place the index strip into the connector holding bracket assembly. Assure the ends of the index strips are keyed into the end springs and center is locked firmly beneath the "L" spring (Fig. 41).

Step 2 — Placing the Conductors in the Index Strip

Note: Check splice type guidelines for proper configuration and wire length.

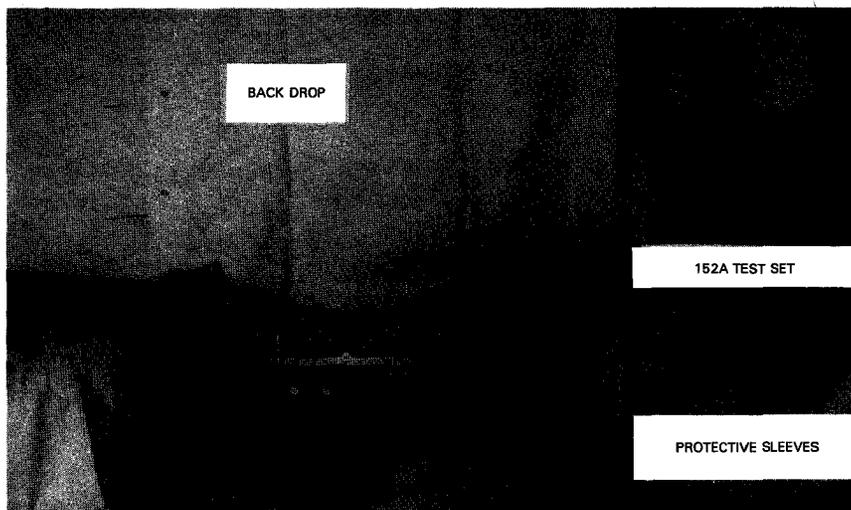
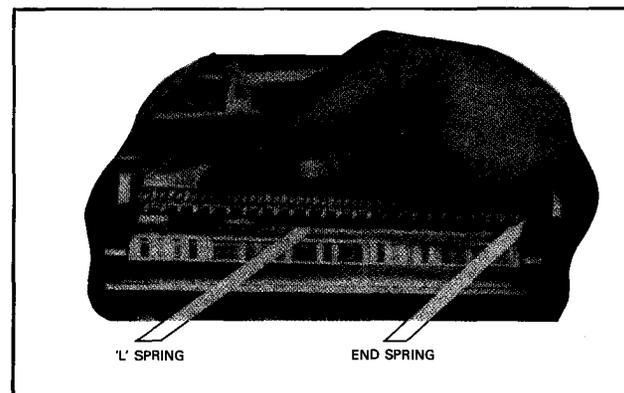


Fig. 39

Splicers Test Set
Fig. 40"L" Spring
Fig. 41

1. Take 25 pair from the CO cable and hold them in the palm of your hand behind the index strip. Peel off one pair at a time, and with your thumb and forefinger, bring the pair across the index strip.
2. Separate the pair, using the peaked projections. Remember: The tip conductor goes to the left of the peaked projection and the ring conductor goes to the right.
3. When dressing the pulp conductors, select the pairs at random, starting with side of the cutter-presser that is nearest the CO.
4. In PIC cable, select the pairs at random and place them in the strip in proper color-coded sequence. The color-coded strip on the front of the cutter-presser will help in following this sequence. (See Fig. 42.)

Note: Leave about 3/8 inch of slack in the conductors at the rear of the module so they will not have a tendency to pull out after being cut. Allow 1/4 inch of untwisted wire directly behind the module.



Fig. 42

Step 3 — Checking the Placed Conductors

1. Once the pairs have been dressed in the index strip (Fig. 43A), place the error-tector over the conductors to check for vacant slots, two wires in one slot, reversals or misplaced pairs. (See Fig. 43B.)
2. Place the error-tector over the index strip and slide it to the left — only the tip conductors should show; slide it to the right — only the ring conductor should show.
3. If an error is found, make the correction and check the conductors again with the error-tector.

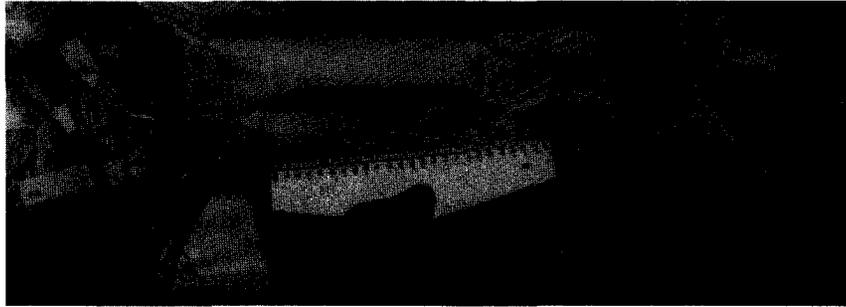


Fig. 43A

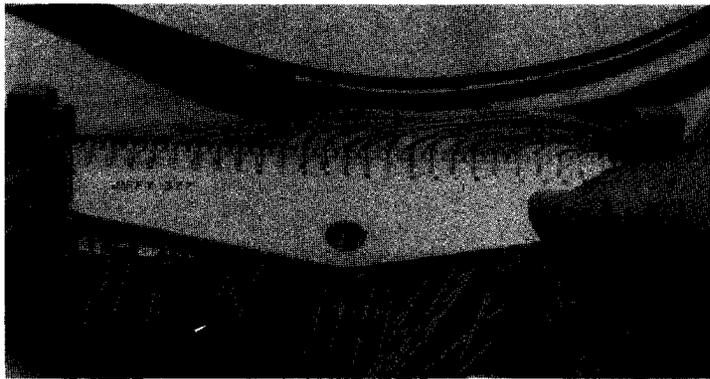


Fig. 43B

Step 4 — Placing the T-Bar Over the Index Strip

1. Gently lift the T-bar over the index strip to an upright position.

Note: Do not handle the cutter-presser with fingers underneath the T-bar and *do not* put your fingers in back of the base while operating.

Step 5 — Positioning Cutter-Presser for Cutting Operation

1. Push down on the T-bar for proper positioning over the index strip (Fig. 44).
2. Hold the T-bar in the down position.
3. Grasp the hand lever.

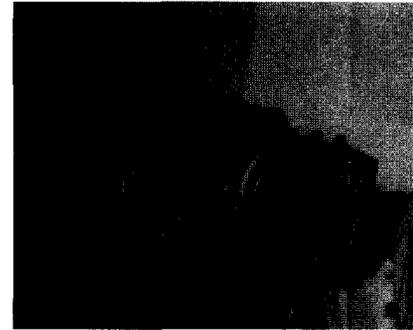


Fig. 44

Step 6 — Seating, Cutting, and Removing Conductor

1. With the T-bar held in the down position, pull the lever down until it hits the stop. All conductors should be seated and cut.

Step 7 — Returning the T-Bar to its Horizontal Position (Figs. 45 to 47)

1. Push the hand lever back to its original latched position.
2. Pull the T-bar back to its horizontal position.



Fig. 45

Step 8 — Placing the Connector Module

1. With the cathedral windows of the connector module facing the T-bar, insert the connector module into the cutter-presser keeping it parallel to the index strip.

WARNING: If the connector module is not lowered parallel to the index strip, it may be damaged causing opens, shorts, or crosses in end pair positions 1, 2 or 24, 25.

2. Push the connector module down until the latches on the connector partially engage in slots in the index strip.

Step 9 — Seating the Connector Module

1. Position the T-bar over the connector module as in Steps 4 and 5.

Note: If the connector module does not seat properly, repeat Steps 4 and 5.

Step 10 — Testing the Pairs Using 152A Test Set

1. With the lever in the down position and the 152A test set connected to the cutter-presser, test the pairs as outlined in Section 634-400-530.



Fig. 46



Fig. 47

Step 11 — Conductors Placed in the Connector Module

1. Select 25 pair from the field cable which match the conductors spliced in the index

strip. Press the wire (Fig. 48) onto the connector module as in Step 2.

2. Using the error-tector as shown in Step 3, check the placed conductors.

3. Cut the conductors as shown in Steps 4, 5, and 6. With the lever in the down position, and using the 152A test set, test the pairs as outlined in Step 10.

Step 12 — Placing the Cap on the Connector Module

1. With the latches facing the T-bar, place the cap on the connector module; then using your fingers, partially seat the cap on the connector module by pressing down with your fingers across the length of the cap (Fig. 49).
2. Seat the cap by placing the T-bar over the cap, push down on the T-bar and pull the

hand lever down until it hits the stop. Return the T-bar to its horizontal position.

Step 13 — Removing Completed Module

1. Push the button to release the completed module and remove it from the tool. (See Fig. 50.)

6. SPlicing TOOLS — HAND TOOLS AND ACCESSORIES

- 6.01 This part lists the splicing tools and their usage. Refer to Fig. 51.



Fig. 48



Fig. 49



Fig. 50

6.02 3/4 TIER MODULE HOLDER — Used to hold index strips during tagging operations. The 3 Tier Holder is used in conjunction with the 710 machine.

6.03 VELCRO GROUP HOLDERS — Attached to each side of the 710 machine to secure conductors during splicing operations.

6.04 E MODULE SUPPORT — Used in place of the index strip on the 710 machine to hold a bridge module while dressing the conductors into it.

6.05 F MODULE SUPPORT — Used the same way as an E Module Support except to support a connector-half tap module while dressing the conductors.

6.06 ERROR-TECTOR — Used to check placement of conductors in the modules before they are pressed and cut. This will indicate reversed, missing, or misplaced pairs.

6.07 CAP REMOVAL TOOL — This tool removes caps off the connector module once the module has been put together.

6.08 C BRIDGE REMOVAL TOOL — Removes bridge (male) modules from connector (female) modules.

6.09 L CONNECTOR PRESSER/JAWS II CONNECTOR PRESSER — Both are used to connect bridge modules to connector modules without using the 710 machine.

6.10 945A1 TOOL — Used to manually cut/press 5 pair at a time on a 25 pair module.

6.11 D INSERTION TOOL — Used to seat and cut a single pair on all type modules.

6.12 CLOSE CUTTING PLIERS — Used to trim out pairs that have been half tapped.

6.13 840A TRIMOUT TOOL — Used to trim out pairs that have been half tapped.

Note: Use the primary group color mylar entrapment method of group identification. For filled cable, identify the group number by using binder group identification tie approximately 3 inches from the module (Fig. 52).

7. MODULAR SPLICE CONFIGURATIONS

7.01 Modular splicing allows five basic splice types. These five basic types are \textcircled{S} (straight), \textcircled{J} (junction), \textcircled{F} (facility), \textcircled{L} (load), and \textcircled{D} (distribution). Each splice type is designed to meet individual needs for engineering job design. Splice type, feeder cable size, and total number of pairs determine the number of banks construction will build in each splice. (See Table C.)

7.02 \textcircled{S} Straight Splice: A straight splice is constructed within an allocation area. It is built in a one-bank configuration through 1800 pair, and two banks over 1800 pair. In the straight splice, the bridgeports remain open for multiplying a count through a stub. Reentry is limited to plug and unplug of nonworking pairs. All the pairs in the feeder cable must be spliced to the end of the allocation area (Figs. 53 and 54).

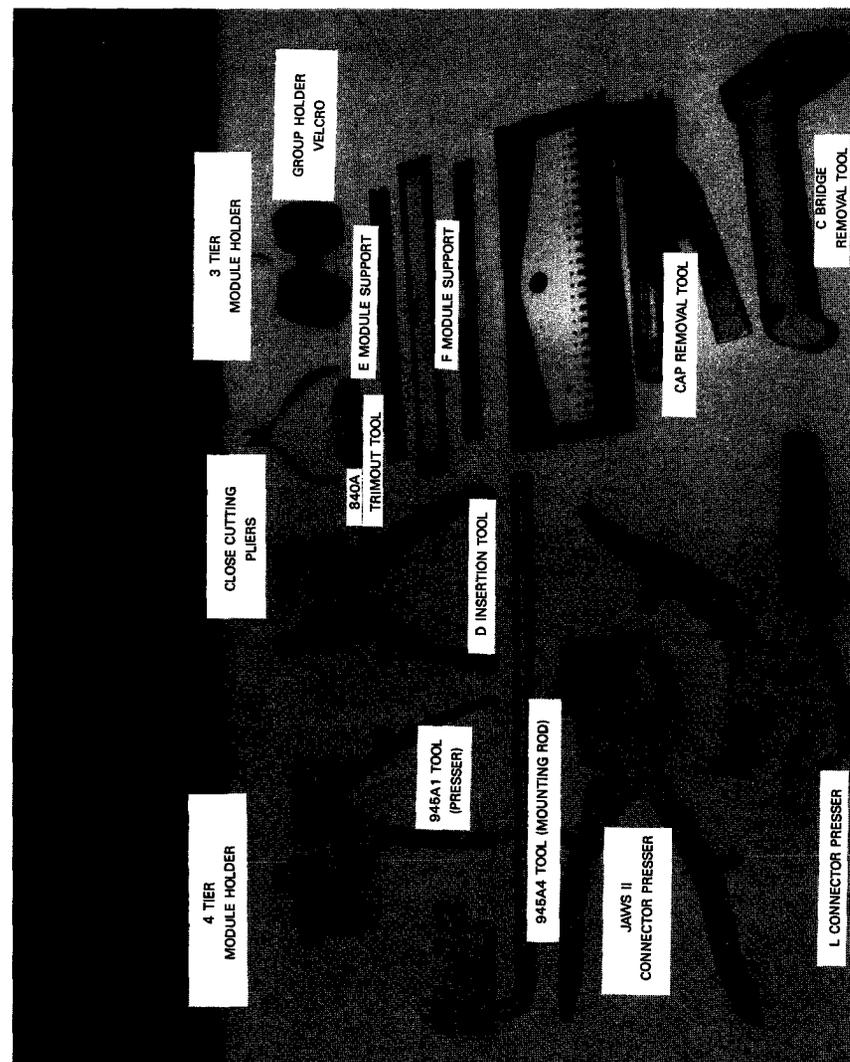
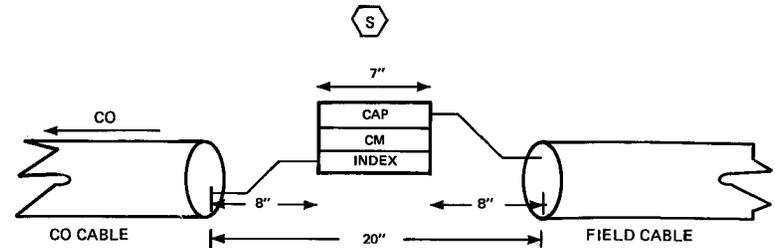
Splicing Tools
Fig. 51

TABLE C

SPLICE TYPE	SYMBOL	SPLICE CONFIGURATION	APPLICATION						
STRAIGHT	S	MAX STUB SIZES IN STRAIGHT SPLICES							
		CABLE SIZE	SINGLE BANK	TWO BANK	FOUR BANK				
			ONE STUB	TWO STUBS	ONE STUB	TOTAL OF TWO STUBS	ONE STUB	TOTAL OF TWO STUBS	
		UP TO 1800 PAIR	1500 PAIR	1200 TOTAL PAIR	—	—	—	—	
		2100 PAIR	—	—	1500 PAIR	TOTAL 2100 PAIR	—	—	
		2400 PAIR	—	—	1500 PAIR	TOTAL 1800 PAIR	—	TOTAL 3000 PAIR	
		2700 PAIR	—	—	1500 PAIR	TOTAL 1500 PAIR	—	TOTAL 3000 PAIR	
3000 PAIR	—	—	1500 PAIR	TOTAL 1200 PAIR	—	TOTAL 3000 PAIR			
3600 PAIR	—	—	NONE	NONE	1500 PAIR	2400 PAIR			
JUNCTION (Feeder Plant only)	J	<table border="1"> <tr> <td>SINGLE BANK</td> <td>TWO BANK</td> <td>FOUR BANK</td> </tr> <tr> <td>—</td> <td>MAX 2400 PR 4800 TOTAL PR</td> <td>OVER 2400 PR 9600 TOTAL PR</td> </tr> </table>	SINGLE BANK	TWO BANK	FOUR BANK	—	MAX 2400 PR 4800 TOTAL PR	OVER 2400 PR 9600 TOTAL PR	<ol style="list-style-type: none"> End allocation area. Plug and unplug at nonworking 100 pair groups. No multiple is allowed. Pairs are not identified.
SINGLE BANK	TWO BANK	FOUR BANK							
—	MAX 2400 PR 4800 TOTAL PR	OVER 2400 PR 9600 TOTAL PR							
FACILITY	F	<table border="1"> <tr> <td>—</td> <td>MAX 2400 PR 4800 TOTAL PR</td> <td>OVER 2400 PR 9600 TOTAL PR</td> </tr> </table>	—	MAX 2400 PR 4800 TOTAL PR	OVER 2400 PR 9600 TOTAL PR	<ol style="list-style-type: none"> Transition from pulp to PIC in feeder plant. Pair administration point in distribution plant. Working line transfer (TRF) allowed. No multiple allowed. Pairs are identified. Pairs administered in 25 pair groups. 			
—	MAX 2400 PR 4800 TOTAL PR	OVER 2400 PR 9600 TOTAL PR							
LOAD	L	<table border="1"> <tr> <td>SINGLE BANK</td> <td>TWO BANK</td> <td>FOUR BANK</td> </tr> <tr> <td>—</td> <td>MAX 1200 PAIR</td> <td>OVER 2400 PR 9600 TOTAL PR</td> </tr> </table> <p>RULE: 22-GAUGE CABLE OVER 900 PAIR WILL REQUIRE A FOUR BANK SPLICE.</p>	SINGLE BANK	TWO BANK	FOUR BANK	—	MAX 1200 PAIR	OVER 2400 PR 9600 TOTAL PR	<ol style="list-style-type: none"> Used for lattice networks and apparatus cases as well as loads.
SINGLE BANK	TWO BANK	FOUR BANK							
—	MAX 1200 PAIR	OVER 2400 PR 9600 TOTAL PR							
DISTRIBUTION	D	SINGLE BANK DISTRIBUTION PLANT ONLY	<ol style="list-style-type: none"> Main cable 300 pair or smaller. Use when absolutely last resort. Can multiple two ways (temporary only). 						
<p>RULES:</p> <ol style="list-style-type: none"> Total pair must include all cables. Transfers must be made in the facility splice. Junction splices are limited to plug in and unplugging dead pairs. In a new CO termination, a total cable transfer may be made in a junction splice. For straight splices with stubs, see the chart "MAX STUB SIZES IN STRAIGHT SPLICES". Cables 1800 pair and smaller must be single bank. No stub can be larger than 1500 pair. When splicing 22 gauge cable, double the cable size before referring to the chart. To accommodate capacitors, splices may be built in a four bank configuration. Note: A 3600 pair build out capacitor stub can be placed in a four bank 3600 pair cable straight splice. 									



Fig. 52



SINGLE BANK

Fig. 53

7.03 J Junction Splice: A junction splice is constructed at the end of an allocation area. (See Figs. 55 and 56.)

- It is also used when there is a change in cable size or gauge.

- Junction splices must contain all noncolor-coded cable because the pairs are spliced at random.

- The CO cable is placed in female module.

- Junction splices are constructed in two banks through 2400 pair; the four banks over 2400 pair.
- Field cables and stubs are placed in male modules, leaving 27 inches of loopback wire in a two-bank splice and 40 inches of loopback wire in a four-bank splice.

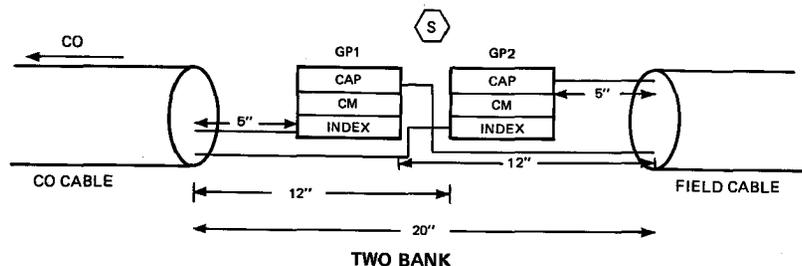
7.04 (F) Facility Splice: A facility splice is located between the feeder cable and the distribution plant. In PIC distribution plant, the facility splice is used as an administrative point. (See Figs. 57 and 58.)

- The cable pairs are placed in the module in numerical order.
- The CO feed cables are placed in female modules (2400 pair and below in two banks, above 2400 pair in four banks).

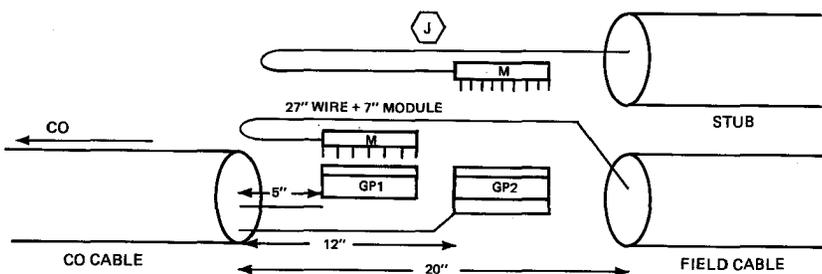
- The field cables are placed in male modules: two banks — 27 inches of loopback wire, four banks — 40 inches of loopback wire.
- Holey caps should be placed on each module.
- The facility splice is designed for cable transfers.

7.05 (L) Load Splice: All load splices must be built for ultimate load requirements. (See Fig. 59.)

- All CO pairs are terminated on female modules.
- All field pairs are terminated on male modules.
- Holey CAPS should be placed on all modules.



TWO BANK
Fig. 54



TWO BANK
Fig. 55

- Splice configurations are based on cable pair size.
- Maximum feeder cable size for a two-bank configuration is 1200 pair. Cables larger than 1200 pair will be spliced in four banks.
- All load tails will have male modules on pairs entering the load and female modules on pairs leaving the load.
- Load splices must be built in a male-female configuration to facilitate deloading.

7.06 (D) Distribution Splice: A distribution splice (D) is used to multiple counts in more than one field cable. It is to be used in PIC distribution plant of 300X and smaller. The splice should be used when there are no other feasible alternatives available. All field cables will have 27 inches of wire from the module to the butt of the cable. The field cables will be built in a loopback configuration with bridge modules for plugging and unplugging as necessary.

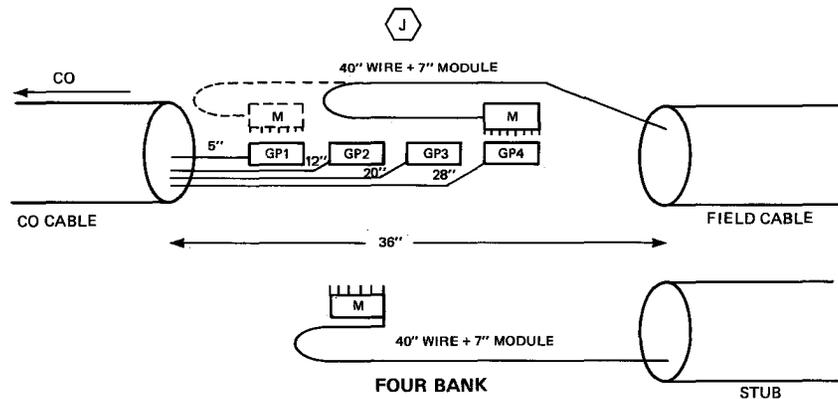
- (a) The CO cable has 27 inches of loopback wire to the module. A 710-SB1-25 (straight) module will be used on the CO cable. This leaves the bridgeports open for the first field cable placed. A half-tap module can be placed on the CO cable 12 inches from the butt to allow the second field cable to be plugged in.

Note: The one exception is the third field cable. (See Note 3 on Fig. 60.)

- (b) Remember, this splice is to be used as a temporary splice until relief is provided, or the splice is converted to a facility or a straight splice.

8. CABLE SPLICING — INLINE METHOD

8.01 Cable Setup — Once the manhole (MH) is open and all safety procedures are observed,



FOUR BANK
Fig. 56

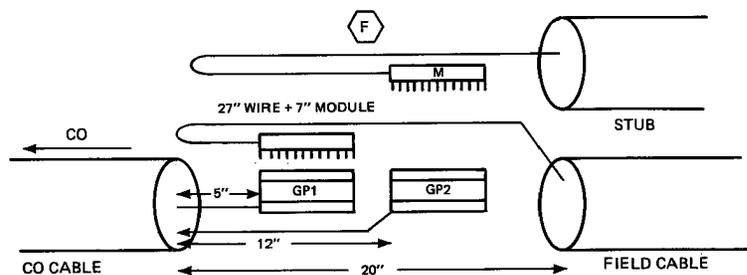
the splicer is ready to set up the cable. Close attention must be kept as far as measurement and splice location.

Rule: Engineering will attach a copy of the man-hole diagrams to the construction prints. These forms will show where the cable enters the man-hole and the splice location.

1. Place cable hangers in the cable rack at the splicing and racking location.

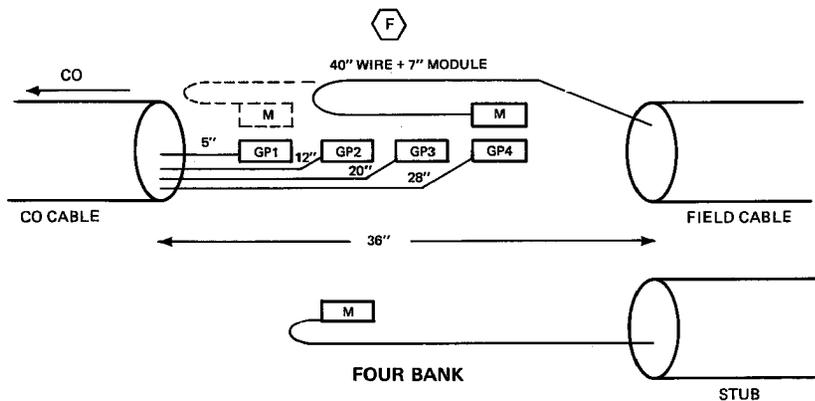
2. Place the cable on the cable hangers using associated tools for proper forming, bending and tying.
3. Cut away excess cable leaving enough ends to overlap the splice by 4 feet.

8.02 Backdrops — Standard backdrops are used to protect the pulp or paper insulation from water or moisture damage. Backdrops are made of vinyl or plastic material to protect the splice from moisture on MH walls and racks.



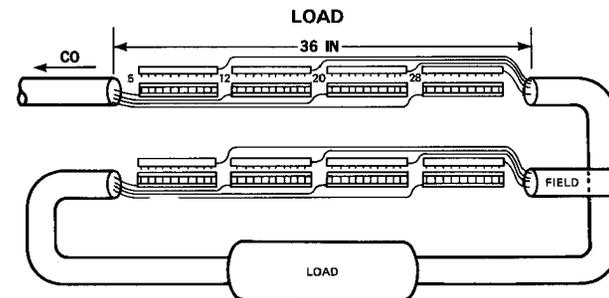
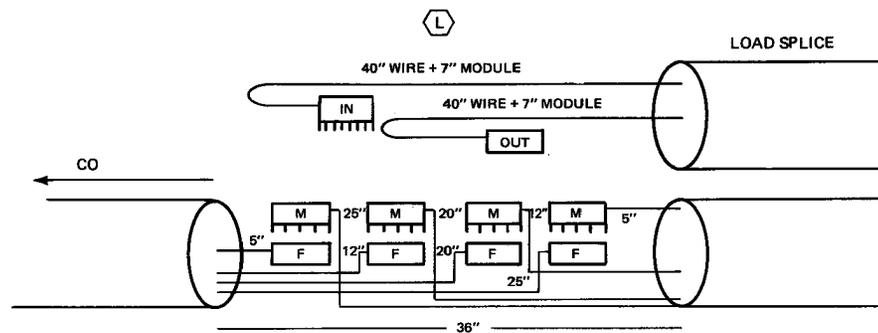
TWO BANK

Fig. 57

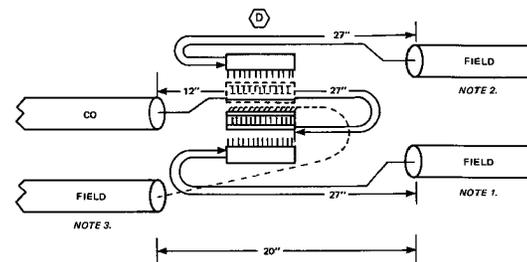


FOUR BANK

Fig. 58



In-Line Load Splice
4 Bank
Fig. 59



Notes:

1. First field cable placed plugs into female module on the CO cable.
2. Additional field cables will require a half-tap module to be placed on the CO cable 12 inches from the butt. Plug second cable into this module.
3. If third cable is required, remove cap from the female module on the CO cable and place the pairs in the top of the module. Seat and cut the pairs with a D insertion tool. Replace the cap.

Distribution Splice
Fig. 60

Rule: Always place a backdrop behind opening cable sheath. Retain the backdrop in position during the entire splicing operation including installing the closure.

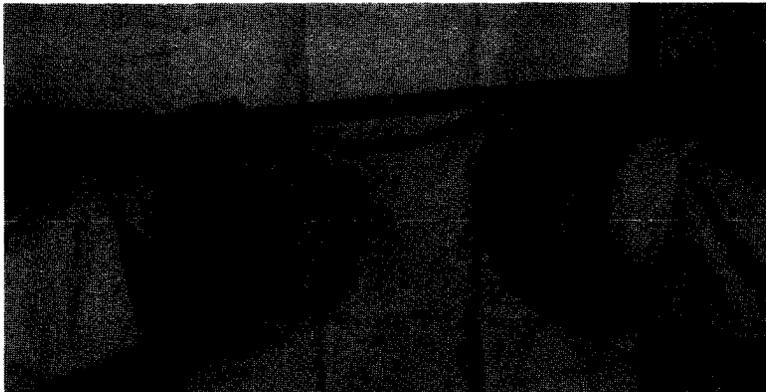
1. Place a backdrop behind the cable racks in which the splice is to be made.
2. Tie string or scrap wire around the upper corners of the backdrop and secure it to the racks approximately 12 inches above the splice location allowing the bottom to hang down below the splice.

8.03 Open Sheath — Before opening the cable sheath, decisions must be made concerning which closure should be used. Sheath openings can range from 20 inches to 36 inches. (See chart below.)

CLOSURE	OPENING
2D2A	20"
2D2B*	28"
2D2C	36"

* 2D2B closure use is limited to maintenance openings and rebuild splices that require 28" openings.

Note: The last letter indicates the opening (A=20 inches, B=28 inches, C=36 inches).



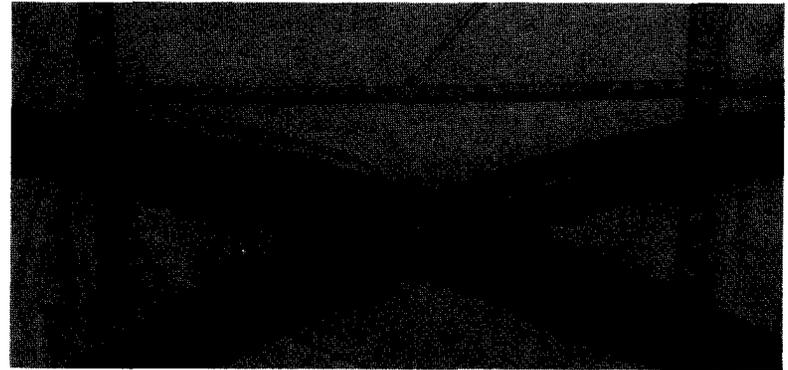
20-Inch Sheath Opening (Example)
Fig. 61

1. Locate the center of the bay and mark the cables at that point. This will be the center of the splice. (See Fig. 62.)
2. After the decision is made on the splice opening, and the center of the splice is located, divide the distance of the opening in half. Measure back from the center of splice and mark each cable using 1/2-inch paper tape. (See Fig. 63.)
3. Using a sheath knife, ring the cable sheath at the tape marker and remove the sheath. (See Fig. 64.)

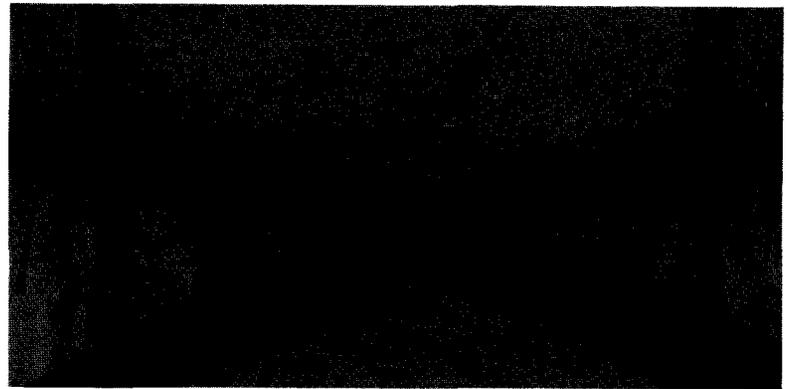
Rule: When opening cable sheath, always wear gauntleted gloves to protect the hands and forearm area from cuts caused by sharp terneplate and sheath knife.

8.04 Bond Cable — Proper installation of the bond clamp is vital. It establishes sheath continuity and provides electrical protection allowing the installation to meet transmission objectives. Install proper bond clamp and follow correct procedure as outlined in Section 633-506-201. (See Fig. 65.)

8.05 Counting and Aligning the Units — Pulp cables are composed of 100-pair groups. These



Locate Center of Bay
Fig. 62



Marking Cable Opening
Fig. 63

groups are contained by means of a binder tie made of cotton string or mylar tape. Multiunit Pulp (MUP) cable breaks these 100 pair groups into 25 pair primary units. Pulp cable ranges in size from 300 to 3600 pair. The cable is counted by 100 pair

groups starting with the center unit and working to the outside. The CO cable counts counterclockwise and the field cable counts clockwise. If the cable groups do not align, the entire core can be turned in either direction to make adjustments. (See Fig. 66.)



Fig. 64



Fig. 65

1. Remove the paper from the outer layer. (See Fig. 67.)
2. Determine which cable is the CO cable and which is the field.
3. Starting with the center core, locate the starter group (group number 1). This group is identifiable by its tie color. If you are counting MUP cable, the starter group will

have a black and green mylar tie. Mark this group No. 1 using Thomas and Betts group numbering identification or reverse wrap glass tape marked with the appropriate number. Count the remainder of the groups in numerical order, clockwise or counter-clockwise depending if the cable is a CO or field cable. If you are counting AD-type cable, the starter group will be composed of white-green pairs. This will give the group a

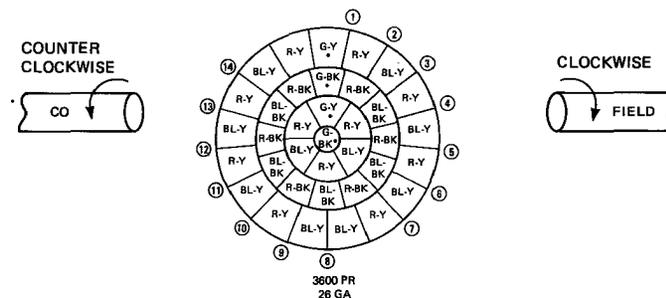


Fig. 66



Fig. 67

greenish color. After completing the core groups, count the second layer. This layer has a starter group identifiable in the same manner as the core. It is located directly in line with the center core starter. Number this group with the next consecutive number and continue the counting through the second layer.

4. After the second layer is counted, count the third. This layer counts the same as the second, starting with the starter group first. (See Fig. 68.)

Note: Alternate Method — After the outer layer is marked, count from the last outside

group backwards. After each layer is marked and the identification is placed, the whole layer should be folded back placed into protective sleeve and the process repeated on the next layer.

8.06 Mark Layers for Module Placement

- (a) Single Bank — When building a single bank splice, care must be taken to properly measure inner and outer groups. The inner groups will be shorter than the outer groups by 1/2 inch. This will allow the center layer to fill the void in the middle of the splice.

1. After the cable groups have been identified, wrap a length of scrap wire or string

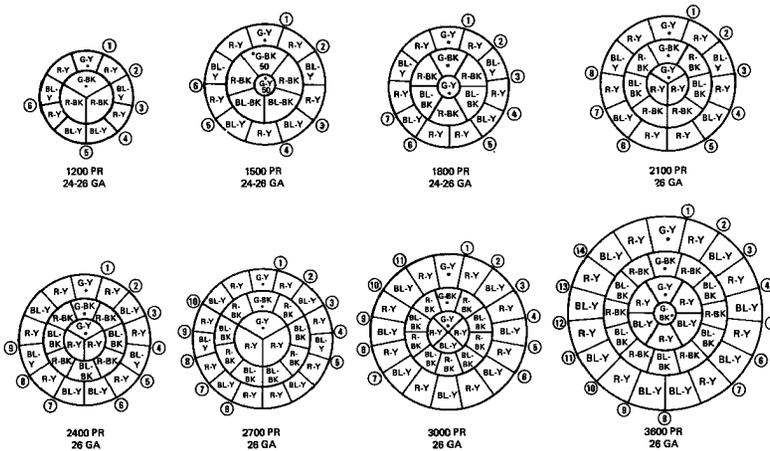


Fig. 68

around each cable at a point 8 inches from the butt of the cable. (See Fig. 69.)

2. Using the wire wrap or string for a guide, mark each group in the outer layer with a marking pen, then remove the guide. (See Fig. 70.)
3. After the outer layer is marked, fold it back over the sheath placing groups into the protective sleeve exposing the next layer.
4. Wrap a length of scrap wire or string around each cable at a point 7 1/2 inches from the cable butt. (See Fig. 71.)



Fig. 70

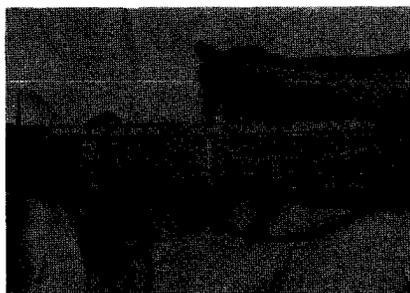


Fig. 69



Fig. 71

5. Using the wire wrap or string as a guide, mark each group in the inner layer, then remove the guide. (See Fig. 72.)



Fig. 72

6. After the inner layer is marked, fold the inner layer back, place into the protective sleeve exposing the core. Wrap a length of wire or string around both cables at a point 7 inches from the butt of the cable and mark using the same procedure as in Steps 4 and 5.

- (b) Two-Bank — When building a two-bank splice, care must be taken in measuring the groups. A two-bank splice is required when straight splicing cables larger than 1800 pair. The two-bank system allows the odd groups to be spliced on the CO side and the even groups to be spliced on the field side. There is only one inch of wire separating the two banks.

Note: If the module banks overlap, insulation damage may occur, as well as difficulty in closing the splice.

1. After the cable groups have been identified, wrap a length of scrap wire or string around each cable at 5 and 12 inches from the butt of the cable. Using the guide, mark each unit in the outer layer at the 5-inch and 12-inch locations. (See Fig. 73.)
2. Remove wire scrap from the cable.
3. Fold the outer layer back over the cable sheath place into the protective sleeves and repeat Steps 1 and 2, reducing the

measurements by 1/2 inch, ie, 4-1/2 inches and 11-1/2 inches. (See Fig. 74.)

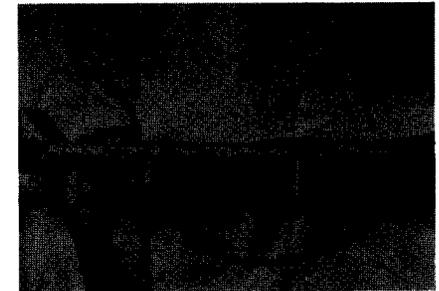


Fig. 73



Fig. 74

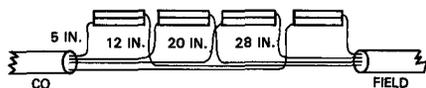
4. Fold the inner layer back over the cable sheath, exposing the core. Repeat Steps 1 and 2, reducing the measurements by 1/2 inch, ie, 4 inches and 11 inches.

- (c) Four-Bank Straight Splice — When building a four-bank splice, the same care with wire dimensions is required. The groups in a four-bank splice will count from the CO side to the field side. Group 1 will be closest to the CO side. (See Fig. 75.)

Note: If the module banks overlap, insulation damage may occur as well as difficulty in closing the splice.

1. After the cable groups have been identified, wrap a length of scrap wire or string

around each cable at 5, 12, 20 and 28 inches from the cable butt. Using the guide, mark each group in the outer layer at the 5-, 12-, 20-, and 28-inch locations. (See Fig. 76.)



4-Bank Splice
Fig. 75

2. Remove the guide from the cable.
3. Fold the outer layer back over the cable sheath and place into the protective sleeve. Repeat Steps 1 and 2, reducing the measurements by 1/2 inch, ie, 4-1/2, 11-1/2, 19-1/2, 27-1/2 inches.
4. Fold the inner layer back over the cable sheath, place into protective sleeve, exposing the core. Repeat Steps 1 and 2, reducing the measurement by 1/2 inch, ie, 4, 11, 19 and 27 inches.

8.07 Binder Entrapment

1. Loosen the group binder ties but do not remove. If placing conductors in the index strip, first place the group binder tie in the nearest slot. Then you can begin placing the conductors in the index. For connector and bridge modules place the conductor into the module before the group binder tie. (See Fig. 77.)



Fig. 76

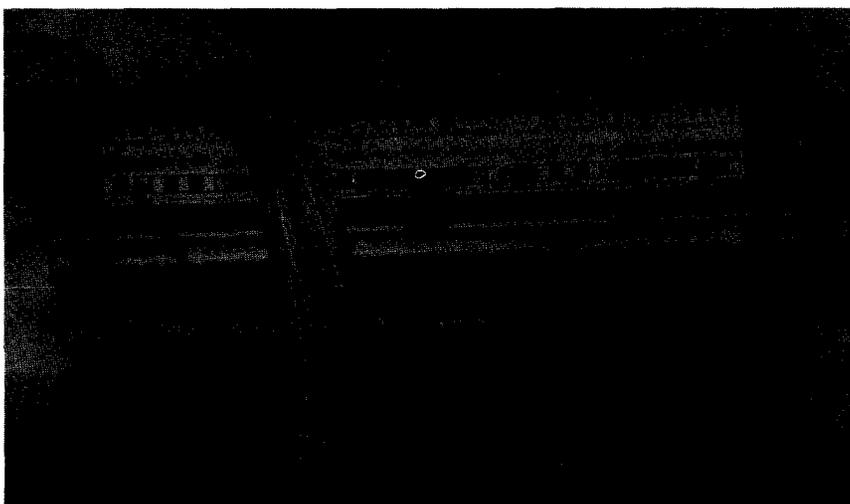


Fig. 77

2. In MUP cable, each group contains four primary units to allow 25 pair integrity.
3. Fold the binder groups back along their respective cables place into the protective sleeves and open the splice area. (See Fig. 78.)

8.08 Setting Up the Cutter-Presser — Set up the cutter-presser using a 710A or 710B mount (or other approved tool mounts). See Fig. 79.

1. Position the cutter-presser so the marks on the cable groups align with the end springs. (See Fig. 80.)
2. Secure the first group to be spliced with a group slack holder. Tie the groups gently using the velcro. Make sure the marks on the groups align with the end springs on the cutter-presser. (See Fig. 81.)

9. STRAIGHT SPLICES

9.01 Modular splicing is a system requiring a high level of quality. When it comes to module placement, exact measurements are mandatory. Different splice configurations will require different

wire measurements. By following Steps 1 through 18, you will be able to successfully complete a single, two- or four-bank straight splice.

1. Insert an index strip into the cutter-presser. (See Figs. 82 and 83.)

Note: Be sure the ends of the index strip are caught in the tool's end springs and the strip is firmly locked beneath the "L" spring.

2. Select the first group to be spliced.

Note: It is important that you begin with the lower rear groups and work up and to the front. Otherwise, completed groups will be in the way.

3. When inline splicing, the order in which you splice the groups is very important. The primary concern is that you splice the groups in such an order as to never have to work behind completed modules. A schematic of the splicing order is shown in Fig. 84. Start with the lower rear group and work up to the front.

Note: Splice one layer at a time starting with the lowest group in that layer and working to

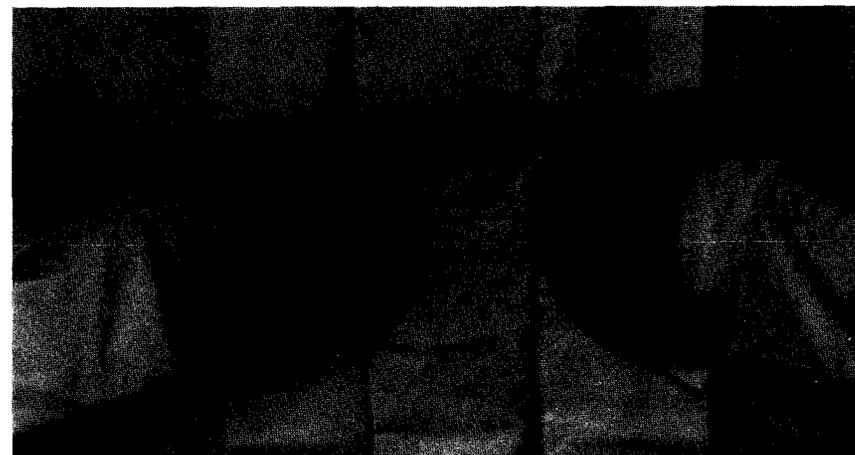


Fig. 78

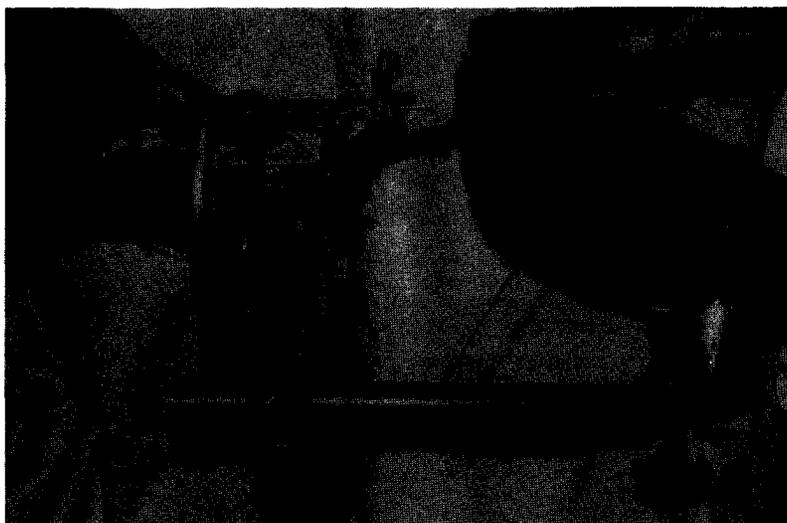


Fig. 79

the top group. Move forward to the next layer, again starting with the lowest group and working to the top. Place color binder in the position closest to the CO — place conductor on top of binder in slot.

4. Take the 25 pair from the first group to be spliced and place them into the index strip. (See Fig. 85.)

Rules

1. Always place the CO cable in the index strip starting with the pair closest to the CO.

Note: Use your thumb and forefinger to bring the pairs across the strip. Separate the tip and ring conductors on the peaked projections.

2. When placing pairs in a module, remember the tip conductor goes to the left and the ring conductor goes to the right.

Note: Leave about 3/8 to 1/2 inch of slack in the conductors at the rear of the module so they will not have a tendency to pull out after being cut. Allow 1/4 inch of untwisted wire directly behind the module.



Fig. 80

5. After the 25 pair is placed into the index strip, use the error-tector to check for vacant slots, two wires in one slot, reversals or misplaced pairs. (See Fig. 86.)



Fig. 81

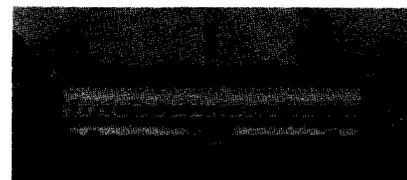


Fig. 82

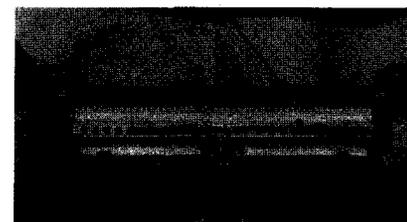


Fig. 83

Note: With the error-tector in the left position, you should see only the tip conductors, and when in the right position, you should see only the ring conductors.

6. If no discrepancies are found, continue to the next step. If you locate trouble, remove the wire and correct the discrepancies. After discrepancies are repaired, recheck with the error-tector.
7. Before closing the T-bar over the index strip, move the excess wire in front of the cutter-presser to one side of the T-bar. (See Fig. 87.)
8. If no discrepancies are found after the second check with the error-tector, press and cut.
9. Insert a connector module into the cutter-presser holder with the cathedral windows facing the T-bar, keep it parallel to the index strip and press. (See Fig. 88.)

Note: If you feel resistance, remove the module and reinsert it to avoid damaging the module.

10. With the cutter-presser head in the down position, test the pairs with a 152A test set.
11. If all pairs are clear, release the presser head.
12. Take 25 pair from the corresponding field cable group and place them into the connector module starting with the pair nearest the field. Separate the tip and ring conductors on the peaked projection on the top of the module. (See Fig. 89.)
13. Once all the pairs are placed into the module, place the error-tector over the conductors to check for errors in placement. (See Fig. 90.)

Note: In the left position, you should see only the tip conductors. In the right position, you should see only the ring conductors.

14. If no errors are found, close the T-bar over the module and cut and press.

Note: Do not pull on the excess conductor ends until the handle reaches full pressure.

15. With the T-bar in the down position, test the pairs with the 152A test set. If all pairs are clear, release the presser head.

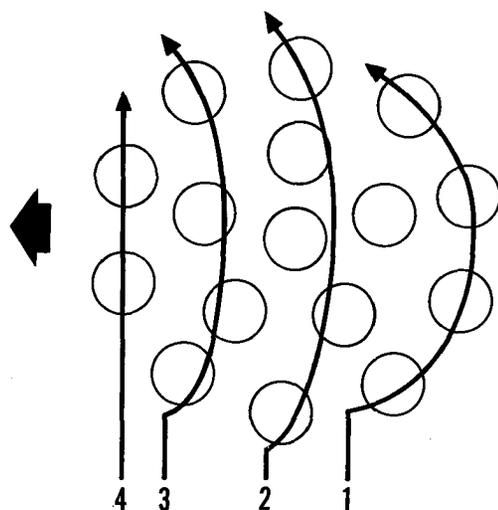


Fig. 84



Fig. 85

Note: If trouble is indicated during testing, refer to Section 632-020-900PT.

16. With the latches facing the T-bar, insert a cap into the cutter-presser. (See Fig. 91.)
17. Close the T-bar over the cap and cut and press, seating the cap.

18. Remove the module from the cutter-presser and mark it with an indelible marker, the group number first, a dash, then the primary unit number. (See Fig. 92.)

- 9.02 Continue this operation (Steps 1 through 18) until the entire cable is spliced.

10. JUNCTION SPLICES

10.01 Junction splices do not have sequential pair identity. Pairs are spliced at random in 100 pair groups. These groups will be placed in female modules on the CO side and male modules on the field side. Pairs cannot be multiplied in a junction splice.

1. After the cable is set up and the groups have been identified, mark the groups on the CO side the same as you did in 8.06.

Notes:

1. CO cable through 2400 pair will be built in two banks. CO cables over 2400 pair will be built in four banks, see 8.06.

2. The term "female module" refers to a splice module with wire in the index strip only.

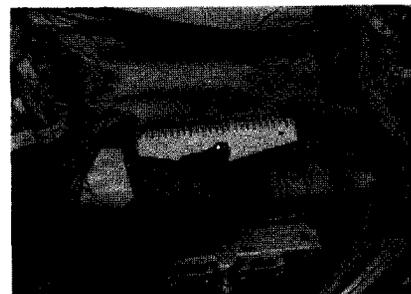


Fig. 86

2. Once the units have been marked on the CO cable, set the cutter-presser into place.
3. Line the cutter-presser so the 5-inch marks on the groups are in line with the closest end post.

4. Place the color binder in slot with the conductor on top.
5. Splice the units starting with the lower rear unit and working toward the front as outlined in 9.01, Step 3.
6. When the 5-inch units are completed, move the cutter-presser to the 12-inch units and repeat Steps 4 and 5.
7. After the CO cable is completely spliced, mark and identify the field cable by measuring 27 inches from the cable butt for a two-bank and 40 inches for a four-bank.
8. Lay the groups across the splice and fold back the ends of the groups so the marks on the groups line up with the end springs of the cutter-presser.
9. Place an E module support in the cutter-presser.
10. Place a bridge module in the E module support so the cathedral windows face the T-bar.



Fig. 87

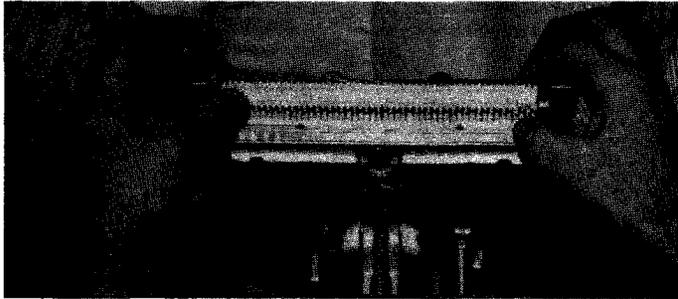


Fig. 88

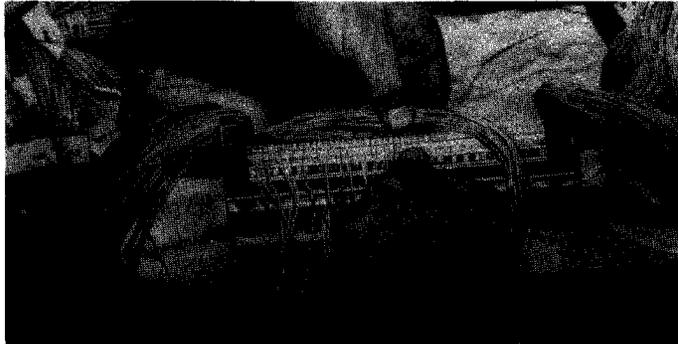


Fig. 89

11. Follow binder entrapment procedures.
12. Place the wire in the bridge module, with the color binder on top, cut, press and test.
13. Place a cap on the bridge module and press.
14. Remove the bridge module from the cutter-presser and place a protective cap over the blades of the module until needed.
15. Repeat Steps 7 through 14 until the field cable is completely spliced. Leave unidentified CO ends with 27 inches of loop and place into a female module for future use.

Note: Connectorize all pairs whether you use them or they have a dead count.

11. FACILITY SPLICES

11.01 A facility splice is used between the feeder cable and distribution plant and in place of junctions in color-coded cable. A facility splice is the only point where cable rearrangements and working pair transfers can be made without replacing the splice. The CO cable is placed in female modules in numerical order. The field cables are placed in bridge modules in numerical order. The splice makeup and total pair size are the same as the junction splice.

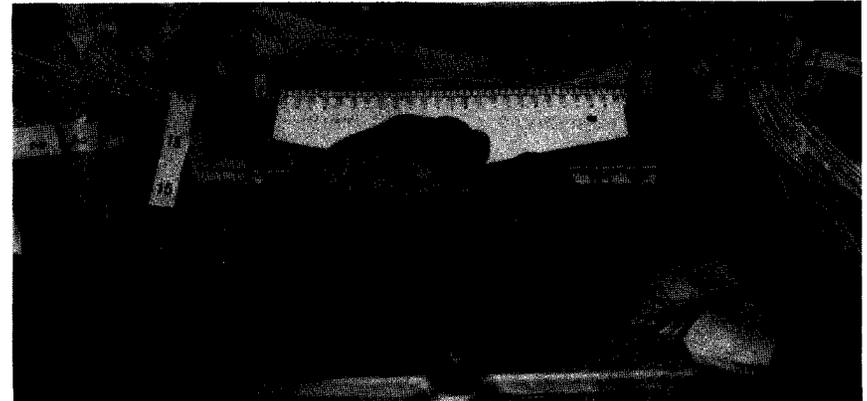


Fig. 90



Fig. 91

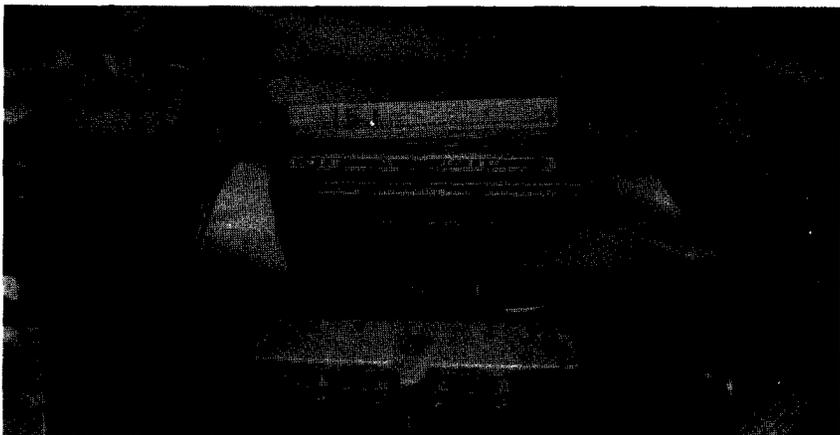


Fig. 92

1. After the cable is set up and the groups have been identified, mark the group on the CO side the same as in Step 8.06(b).
2. Once the groups have been marked on the CO cable, set the cutter-presser into place.
3. Line up the cutter-presser so the marks on the 5 inch groups are in line with the end springs.
4. Follow binder entrapment procedures.
5. Tag the pairs in each group with an automatic pair identifier or other approved method and place the pairs in numerical order.

Notes:

1. If splicing MUP cable, place the wire in an index strip as you are tagging. If in AD cable, use a four-tiered tagging module holder and place the wire in the index strips in numerical order. Remove the index strips and place them one at a time in the cutter-presser to complete the module.

2. Be sure to test after pressing the connector module with the 152A test set.
6. When the 5 inch units are complete, move the cutter-presser to the 12 inch units and repeat Steps 4 and 5.
7. After the CO cable is completely spliced, mark and identify the field cable by measuring 27 inches from the field cable butt for a two-bank splice and 40 inches for a four-bank splice.

Note: Splice all field pairs in bridge modules whether being plugged into female modules or not.

8. Lay the groups across the splice and loopback ends so the marks on the groups line up with the end spring of the cutter-presser.
9. Place the E Module Support in the cutter-presser instead of an index strip. (See Fig. 93.)

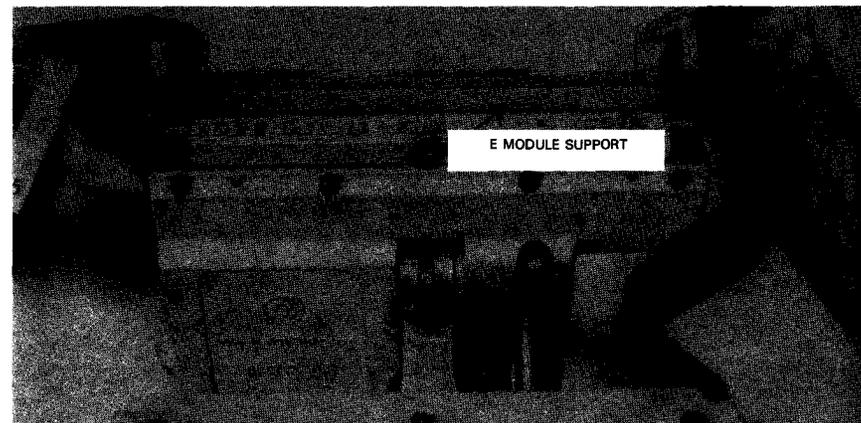


Fig. 93

10. Place a bridge module in the E Module Support so the cathedral windows face the T-bar.
11. Follow binder entrapment procedures for bridge modules.
12. Place the wire in the bridge module placing color binder on top of conductor, check with error-tector. (See Fig. 94.) Cut, press and test.



Fig. 94

13. Place a cap on the bridge module, cut, press and remove the module from the E Module Support. (See Fig. 95.)

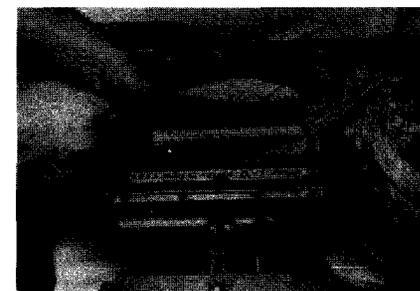


Fig. 95

12. STANDARD LOAD SPLICES

12.01 Load splices are configured in two or four banks, depending on size of the entrance cable. Load splices are built in a male-female configuration. The CO cable is placed in female modules

and the field cable is placed in male modules. The load stubs are also built in a male-female configuration. The "in" pairs are placed in male modules and the "out" pairs are placed in female modules. This combination of male-female modules will allow the plugging and unplugging of the load pairs, commonly referred to as loading and deloading.

Notes:

1. CO cables through 1200 pair will be built in two banks. Cables larger than 1200 pair will be built in four banks. A load splice must be constructed initially for the ultimate number of cable pairs to be loaded in the splice.
2. 22-gauge cables over 900 pair will be built in four banks.
1. After the cable is set up and the groups have been identified, mark the groups on the CO side the same as in 8.06.
2. Once the groups have been marked on the CO cable, set the cutter-presser into place.
3. Follow binder entrapment procedures for connector modules.
4. Splice the groups, starting with 5-inch bank, working from the lower rear group and working from the bottom to the top, CO to field. After splicing the 5-inch groups, move the cutter-presser to the 12-inch bank, splicing from bottom to top, CO to field. The CO cable will be spliced with female modules.
5. When the CO cable is completed, mark the field cable, the same as in 11.01, Step 7.
6. Follow binder entrapment procedures in 8.07.

Note: The field cable is built with male modules, at 5 inches and 12 inches in two-bank splices, and 5, 12, 20 and 28 inches on four-bank splices. Be sure to line the group so group 1 on the field side will plug into group 1 on the CO side.

7. When both cables have been preterminated, open the sheath on the load stubs.
8. Mark the in and out groups. Be sure you mark them correctly to avoid improper load direction that could cause service failure.

Note: A load stub has no specific count. Choose your groups at random.

9. Set the cutter-presser in place.
10. All pairs in a four-bank load will have 40 inches of loopback wire, and 27 inches of loopback wire in a two-bank load.
11. Place an index strip in the cutter-presser and line up marks with the end springs.
12. Splice the out pairs first, using female modules.
13. After the female modules have been completed, place the E Module Support in the cutter-presser and splice the "in" portion of the load using male connectors.
14. When all wires have been preterminated, plug a 25 pair "in" unit into a 25 pair CO unit using the Jaws II Presser or the cutter-presser.
15. Trace the "in" group back toward the butt of the load stub and locate the "out" group.
16. Plug the male module of the corresponding field group into the female module of the "out" group of the load stub.
17. Continue this operation until the splice is completed.

13. PRETERMINATING STUBS

13.01 Stubs are used to join the feeder cable from a junction or straight splice to a facility or junction splice.

1. Open and prepare the sheath as described in Part 8.
2. Leave 48 inches of wire to make a 27-inch loopback to the module, 60 inches are required for a 40-inch loopback.
3. Place an E Module Support in the cutter-presser.
4. Place a 710-BB1-25 module, if pulp, in the module support.

5. Dress the pairs randomly into the module, cut and press.
6. Seat the cap and remove the completed module from the cutter-presser.
7. After all modules are completed, plug into the open bridgeports of the female modules in the splice as directed by the work print.

14. CONVERTING AND REBUILDING OF EXISTING SPLICES

14.01 Due to the extent of the proposed new work, many existing splices will need to be converted to a standard configuration the first time they are entered. Some existing splices will have more than one type of wire connection method and will require complete rebuilding before new work can be started.

Note: A splice should be considered for conversion or rebuilding when the proposed work in the splice is of such an extent that not rebuilding the entire splice initially would do irreparable damage and/or cause uneconomical future rearrangement.

14.02 Splice conversion is the complete or partial reconstruction of an existing properly built loopback splice (old method of splicing) into one of the four basic splice types. This splice would not require the "piecing out" of cable pairs to accomplish the conversion. Complete conversion may not be necessary or desirable the first time the splice is entered (straight splices are an exception).

14.03 Splice rebuilding is the initial complete reconstruction of an existing splice in which additional wire is required, or has deteriorated due to excessive past activity or poor maintenance record. This splice may have several wire joining devices and it will require "piecing out" the cable and module pairs before the proposed splice type can be completed. This splice can never conform completely to the standard splice type due to the additional piece out modules. It will be shown on record as a combination "X" splice: (SX), (FX), (JX), or (LX).

14.04 When entering an existing splice for conversion, the extent of the conversion work will not be known until the splice is opened. For this reason, the engineer will give the splice a combination "X" designation. The combination "X" designation will be used whether the splice is a total or partial rebuild or conversion. The splicing supervisor is responsible to remove the "X" designation from the splice symbol after the splice is totally converted to a standard configuration via the marked print. (See Fig. 96.)

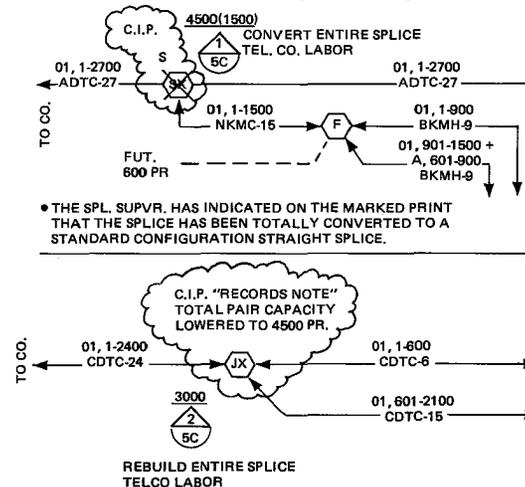


Fig. 96

15. NONSTANDARD SPLICE CONFIGURATION

15.01 Due to physical or economic limitations, it will not always be possible to enter an existing splice and convert it to one of the standard splice configurations. Some nonstandard splice configurations within specific guidelines will at times be economically desirable. The nonstandard splice designation indicates that only a portion of the splice is constructed in a standard configuration.

15.02 The engineer must exercise sound economic judgment when determining the need of a nonstandard splice. The ultimate goal is to continually build toward maximum utilization of the plug and unplug feature of the modular splicing concept.

15.03 The engineer will need to identify the splices that are not completely constructed to one of the four basic splice types, by using the symbol "X". The "X" symbol can be shown alone or in combination with one of these basic splice type symbols of: (S), (F), (J), (L).

15.04 A nonstandard splice will only occur when adding to or rearranging existing plant. By combining the "X" symbol with a standard Modular Splicing (MS) type, (SX), (FX), (JX), and (LX), the engineer is identifying how the cable pairs in the

splice will ultimately be administered. Identifying how the pairs are to be administered tells construction what splice configuration to build.

16. EXISTING SPLICE CONVERSION PROCEDURE

16.01 Straight Splice Conversion

1. Follow all safety rules and regulations prior to entering the splicing area.
2. Remove the existing splice case or closure.
3. Adjust the splice opening to 20 inches.

Note: Place backdrop behind the splice.

Note: If the cable has less than a 20-inch opening, remove what sheath is required to gain the proper opening.

4. Rebond the cables.
5. Remove all ties from the splice and unwrap the core. (See Fig. 97.)



Fig. 97

6. If building a single bank splice, place the cutter-presser in the center of the cable opening. (See Fig. 98.)
7. Select the first group to be converted.

Note: It is important that you begin with the lower rear unit and work from bottom to top, back to front.

8. Mark the groups with a marker at a distance of 8 inches from the cable butt. (See Fig. 99.)
9. Place the first group to be spliced into the group slack holder. Tie the groups gently using the velcro. Make sure the marks on the groups align with the end springs on the cutter-presser.
10. Insert an index strip into the cutter-presser.

Note: The 710-SB1 connector must be used when converting pulp splices, and 710-TC1 when converting PIC splices.

11. Place 25 pair from the CO side into the index strip.

Note: If the cable is spliced in 100 pair groups, use the shorter wire on the left side of the module and the longer on the right side.

12. After the 25 pair is placed into the index strip, use the error-tector to assure proper wire placement.

Note: Do not cut the wire at this time.

13. Place a connector module into the cutter-presser and press. (See Fig. 100.)

Note: This will result in the CO side being half-tapped.

14. Starting with the wire in slot one, trace the pairs from the CO side to the field side and place into the corresponding slots of the connector module. (See Fig. 101.)

15. After the field side is placed into the connector module, check for proper wire placement with the error-tector.



Fig. 98

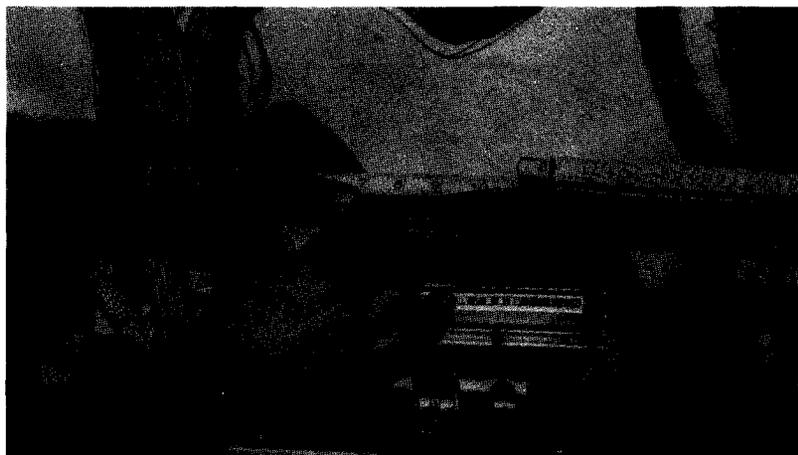


Fig. 99



Fig. 100

16. If no errors are found, cut and press. (See Fig. 102.)

Note: Care must be taken with the wire ends to prevent shorting and grounding because they are still on half-tap.

17. Place a cap on the connector module and press.

18. Remove the module from the cutter-presser.



Fig. 101



Fig. 102

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19. Use a trimout tool to remove the excess wire remaining in the index strip and repeat the above procedures until the entire group is spliced. (See Fig. 103.)
20. Place the 710B1 cover over the modules to protect the exposed ends.
21. Repeat Steps 7 through 20 until the splice is completed.

Note: All groups must be identified with an indelible marker.

17. CONVERTING TO A TWO-BANK STRAIGHT SPLICE

17.01 Two-Bank Straight Splice Conversion

1. Follow Part 16, Steps 1 through 5.
2. Mark the groups on the CO side.

Note: One half of the groups will have short wire, approximately 10 inches to 19 inches long before the splice bundle. Mark these groups at

5 inches. The other groups should reach across the splice and halfway back. Mark these groups at 12 inches.

3. Mark the groups from the field cable.

Note: Trace the groups from the CO side to the field side and mark them 5 inches or 12 inches depending on the CO. (See Fig. 104.)

4. Place the cutter-presser in place so the lower back group can be spliced first.
5. Align the mark on the group with the end spring nearest the cable butt. (See Fig. 105.)
6. Secure the first group to be spliced with the group slack holder. Tie the groups gently using the velcro.
7. Follow Part 16, Steps 10 through 20.
8. Move the cutter-presser toward the field splice and repeat Steps 4 through 6 above.
9. Identify all groups with an indelible marker. (See Fig. 106.)



Fig. 104



Fig. 105



Fig. 103

18. REBUILDING TO JUNCTION AND FACILITY SPLICES

18.01 Junction and Facility Splices Rebuilding Procedures

1. Follow Part 16, Steps 1 through 5.

2. Mark the groups on the CO side, the same as in Part 17, Step 2.
3. Place the cutter-presser in position for splicing the lower rear groups.
4. Align the 5-inch marks with the end spring nearest the CO cable.

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5. Tie the group using the velcro, located at the end of the group slack holder.
6. Place an index strip in the cutter-presser.
7. Place the wire from the CO cable in the index strip.
8. Use the error-tector to check for misalignment.

- Note: Do not cut the wire at this time.*
9. Place the half-tap connector module on top of the index strip, (cut) and press. (See Fig. 108.)
- Note: This group is now half-tapped.*
10. Place a cap on the connector module, cut and press.



Fig. 106



Fig. 107

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11. Repeat Steps 4 through 10 above until all 5' groups have been half-tapped.
 12. Move the cutter-presser toward the field cable and align the end spring nearest the CO cable with the 12-inch marked groups. (See Fig. 109.)
 13. Repeat Steps 4 through 10 until all 12-inch groups have been half-tapped.
 14. Count the groups on the field cable.
 15. Select the half-tapped group located in the lower, rear area of the CO cable and plug in a 710 tagging connector. (See Fig. 110.)
- Note: The tagging connector is used when identifying cable conductors in pulp 710 splices. It consists of 40 inches of PIC connected to a 710-BB-25 (male) module.*
16. Place an index strip in the cutter-presser.
 17. Place the cutter-presser into place in line with one of the half-tapped groups.

18. Place the loose wire from the 710 tagging connector in the index strip in the cutter-presser. (See Fig. 111.) Cut and press.

Notes:

1. All field groups must maintain 27 inches of wire from the butt of the field cable to the bridge module. All groups will have to be pieced out and should be divided equally between the two banks.
2. The 710 tagging connector is constructed of PIC which will require placing the wire numerically into the index strip.
19. Place a connector module in the index strip, cut and press. (See Fig. 112.)
20. Trace the half-tapped pairs from the CO side to the butt of the field cable and place it into the corresponding slot on the top of the piece out connector. (See Fig. 113.)
21. After the wires are traced and placed into their corresponding slot, cut and press.

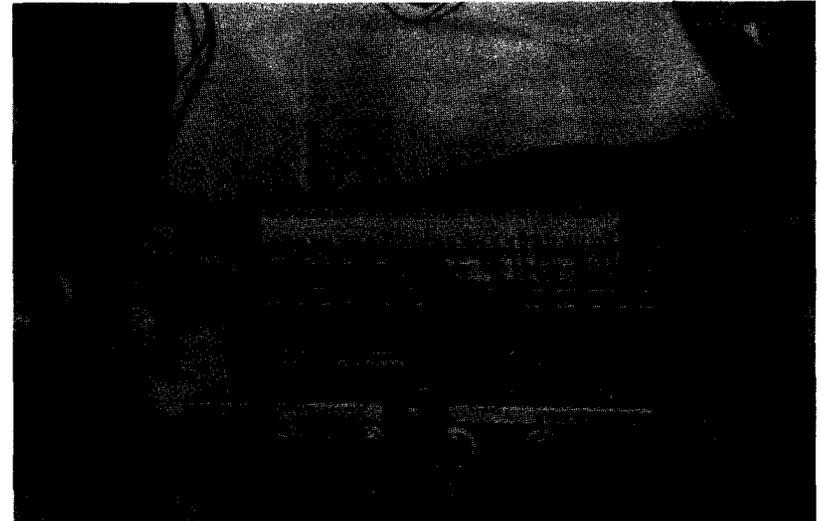


Fig. 108



Fig. 109



Fig. 110

Note: Care should be taken with the wire ends which were just cut, not to short, ground or cross them.

22. Place a cap on the "piece out" module.

23. Use a trimout tool to remove the excess wire from the female module. (See Fig. 114.)

24. Place a 710B1 cover over the female module to prevent the severed ends from crossing.



Fig. 111



Fig. 112

25. Repeat Steps 2 through 24 until the splice is completed.

19. REBUILDING LOAD SPLICES

19.01 The following procedures are for rebuilding load splices:

1. To deload in an existing load splice, start by placing a half-tap connector module on the CO cable. (See Fig. 115.)

2. Rotate the module 90° and place it back in the cutter-presser with the bridgeports facing up. (See Fig. 116.)



Fig. 113



Fig. 114

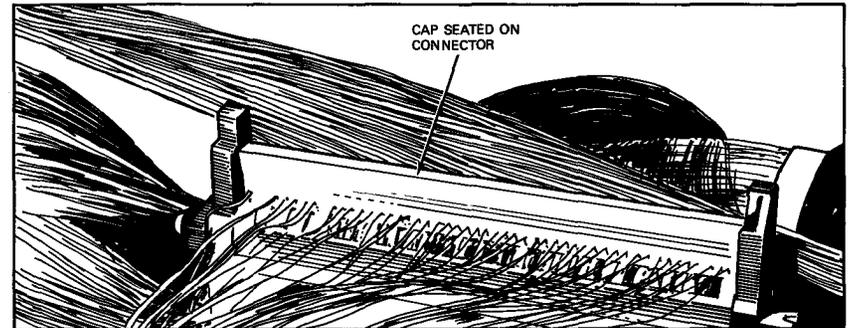


Fig. 115

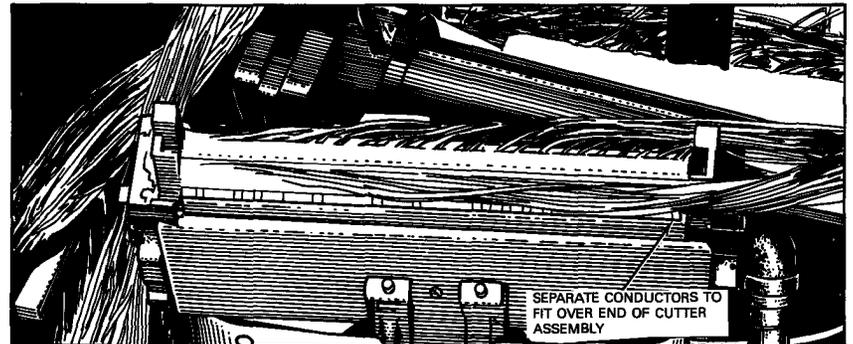


Fig. 116

3. Insert a bridge module into the connector module and operate the cutter-presser to seat. (See Fig. 117.)
4. Dress the pairs from the field cable into the bridge module and cut and press. Pairs will require identification through the load. (See Fig. 118.)
5. Trim off the half-tap with a trimout tool.
6. If the load "in" and "out" pairs have not been previously identified, do so at this time. Future loading will require this procedure.

Note: If the field pairs are too short, it may be necessary to piece out the pairs by adding a module.

20. JUNCTION/FACILITY BACKWARDS SPLICE TYPES

20.01 The Junction Backwards (JB) and Facility Backwards (FB) splice is used to prevent

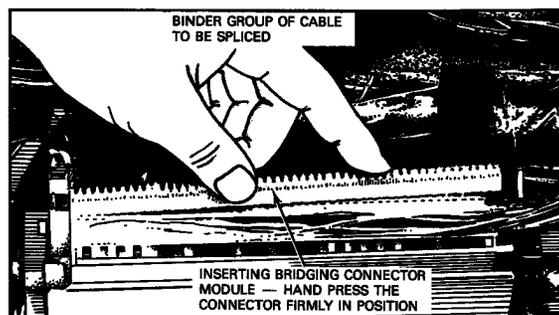


Fig. 117

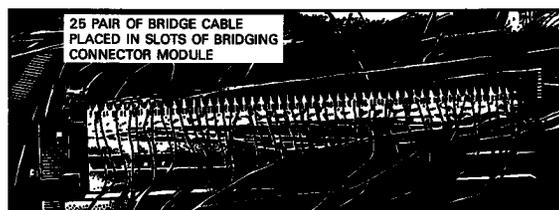


Fig. 118

the piecing-out of the CO or field cable. The JB and FB is normally used when a new CO feed is placed in an existing bean or Amp splice.

20.02 A Junction Backwards or Facility Backwards splice is a splice where wire dimensions are reversed. The CO cable is built with 27 inches of loopback wire in two bank splices or 40 inches of loopback wire in four bank splices. The CO cable is built with bridge modules. (See Fig. 119.)

Rule: All loopback wire will be spliced with bridge connectors. All short wire (eg 5 inches to 12 inches) or 5-12-20-28 inch wire will be built with female connectors (see Fig. 119).

20.03 JB and FB Splice Procedures

1. Tag the new CO wire and place it in bridge modules with 27 or 40 inches of loopback wire.

2. Tag the existing wire on the field side and half-tap it in 710 SB1 modules.
3. Buzz around the half tapped pairs with the new CO pairs.

Note: Some special circuits cannot operate with excessive bridge tap. These pairs will have to be transferred one pair at a time.

4. After all pairs have been verified, plug the 25 pair module in the bridge ports of the corresponding module.
5. Trim out all half tapped pairs and place a 710 B1 cover over the 710 SB1.
6. Repeat Steps 2 through 5 until all pairs have been transferred.

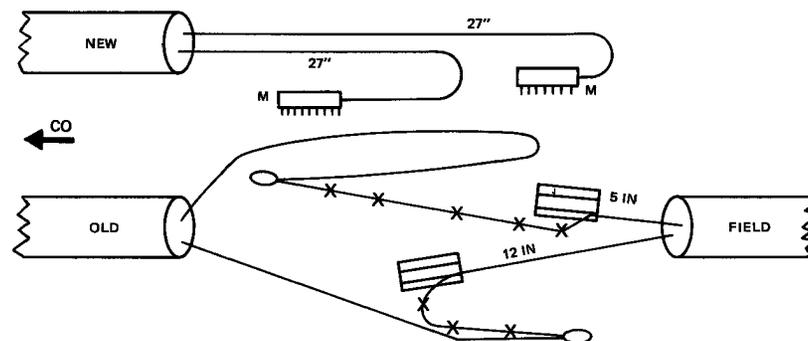


Fig. 119

21. SPLICE WRAPPING

21.01 After wire work has been completed and the splice is to be wrapped, it is important that it be done in the correct manner. The basic rules are:

- Place the correct amount of C desiccant in the splice.
- The modular splice is to be wrapped loosely — do not pull so tight as to cause insulation damage.

in Section 633-506-201. For other type splice closures requiring the use of muslin or B polyethylene tape refer to Section 632-490-200.

7. Splices in building and cable entrance facilities should be wrapped with a B-Cable wrap. For additional information, see Section 081-851-102.

21.02 Splice Wrapping Procedures

1. Check splice to ensure that all wire work has been completed. This includes all spare pairs that are to be expressed through the splice, and defective pairs that are to be shorted to No. 1 spare pair.
2. Use the correct amount of C desiccant in pulp cable (see Table D).
3. Begin by placing one or four bags of C desiccant in the core of the splice (see Table D).
4. Rotating splice is necessary to reduce slack.
5. Place the remainder of C desiccant in the front and back of the splice.
6. Wrap the splice using the corrugated splice wrap included with the closure as outlined

TABLE D

TOTAL NUMBER OF PAIRS	19 AND FINER GA. EXCHANGE* CA. C DESICCANT (BAGS)
300	1
400	1
450	1
600	1
900	2
1200	2
1500	3
1800	3
2100	4
2400	4
2700	4
3600	5