

## 197- AND 198-TYPE SWITCH BANKS

### PIECE-PART DATA AND REPLACEMENT PROCEDURES

#### 1. GENERAL

**1.01** This section covers the replacement of parts of banks associated with 197- and 198-type switches.

**1.02** This section is reissued to:

- Include information contained in the Addendum, Issue 1, dated January 1971
- Revise the List of Tools, Gauges, and Materials by adding the B long-nose pliers and a new insulator
- Place Notes 1 and 2 after Fig. 2
- Reverse Fig. 3 and Fig. 4, putting each with the correct Fig. title.

**1.03** Procedures for replacing the insulators (supply bank insulators) to which the terminals are attached in banks having silver-plated bank contacts are covered in Section 030-705-807.

**1.04** The 20-, 21-, 22-, 24-, 25-, 30-, and 31-type banks are nonmechanized banks and can be identified by the five roundhead bolts and hexagonal nuts used to clamp the parts together. The 40-, 41-, 42-, 50-, 51-, 52-, 53-, and 62-type banks are mechanized banks, and can be identified by the hexagonal head screws used to clamp the parts together and which thread into the lower clamping plate. The present practice is to use three hexagonal head screws in mechanized banks and, therefore, if a mechanized bank with five screws is disassembled, two of them may be omitted in the reassembly. Where three screws are used, make certain that they are placed in the center and two end screw holes. In nonmechanized banks, five bolts and nuts should always be used in the assembly.

**1.05** Because of the potential hazard of loosening contacts from the insulators to which they are attached, the replacement of bank parts should be undertaken only by a person who is thoroughly familiar with this practice.

**1.06** The present type separators, when mounted in the bank, extend to the eleventh rotary step, whereas earlier type separators extend only to the tenth rotary step. When a separator of the earlier type requires replacement, it is desirable that all separators of this type in the bank be replaced at the same time. This will involve very little additional effort while the bank is disassembled. Similarly, when replacing a separator because of silver migration, it is desirable to replace all those separators in the bank that have not previously been replaced by the P-290445 insulator (separator). Otherwise, when a separator is replaced due to wear or dielectric failure, only separators so involved need be changed.

*Caution: The mechanized banks with mylar separators use two different 10 mil separators. Banks with narrow contacts (codes 42, 62, and 50 lower five levels) use insulator 840052112 and banks with wide contacts (codes 51, 52, 53, 62D and 62E use P-48D065 insulators.*

#### 2. PIECE-PART DATA

**2.01** The figures included in this part show the various piece parts in their proper relation to other parts. The piece-part numbers of the various parts are given together with the names of the parts as listed by the Western Electric Company Merchandise Department. When these names differ from those in general use in the field, the latter names, in some cases, are shown in parentheses.

**2.02** When ordering parts for replacement purposes, the piece-part number as well as the name of the part should be given, for example, P-290445 Insulator. Do not refer to the BSP number or to any information shown in parentheses following the piece-part numbers.

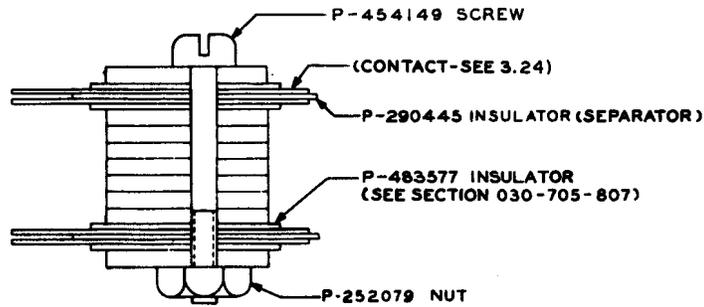


FIG. 1A-20A BANK

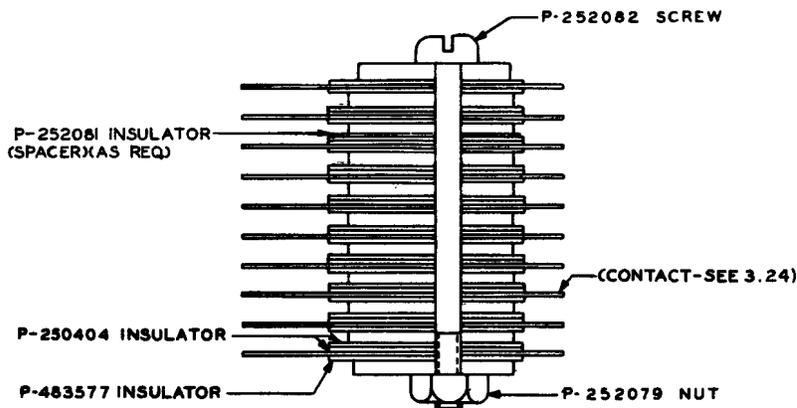
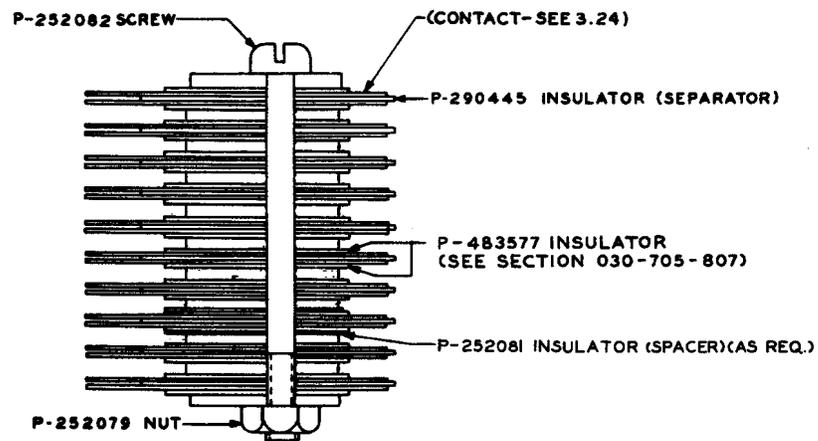


FIG. 1B-2I TYPE BANKS



NOTE: P-253105 INSULATOR USED WITH 200 POINT BANKS BETWEEN WIRING LEVELS AT REAR OF BANK, NOT ILLUSTRATED

FIG. 1C-22, 24, 25, 30, AND 3I TYPE BANKS

Fig. 1—Cross Section of Nonmechanized Banks

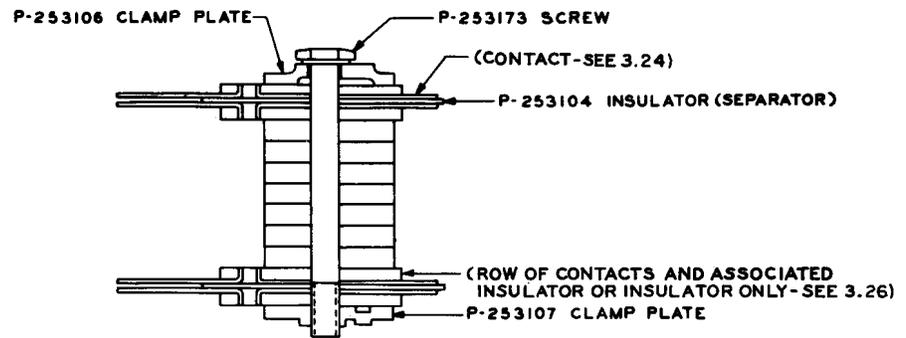


FIG. 2A - 40D BANK

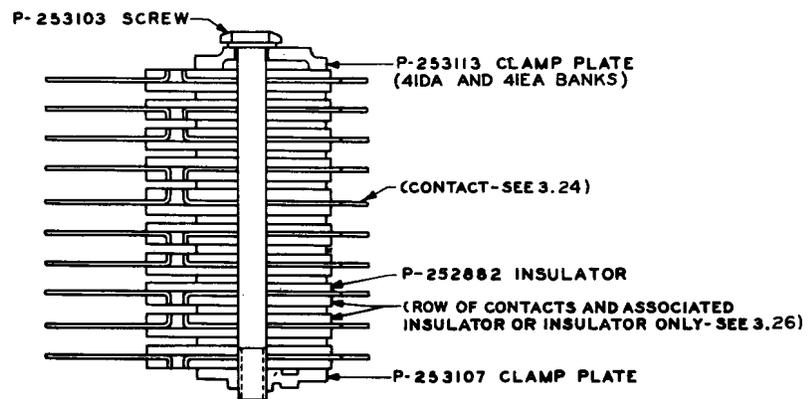
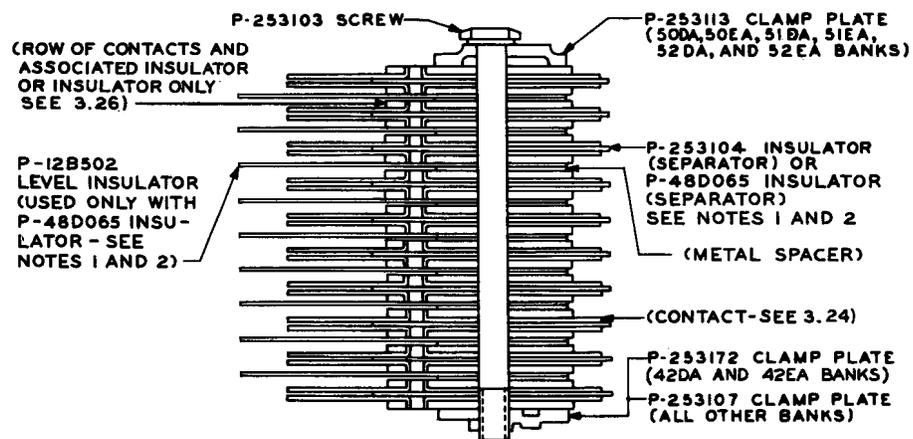


FIG. 2B - 4I TYPE BANKS



NOTES 1 AND 2 ON FOLLOWING PAGE

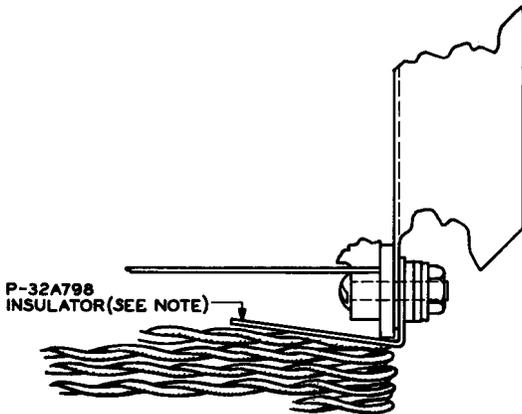
FIG. 2C - 42, 50, 51, 52, 53, AND 62 TYPE BANKS

Fig. 2—Cross Section of Mechanized Banks

**SECTION 030-705-806**

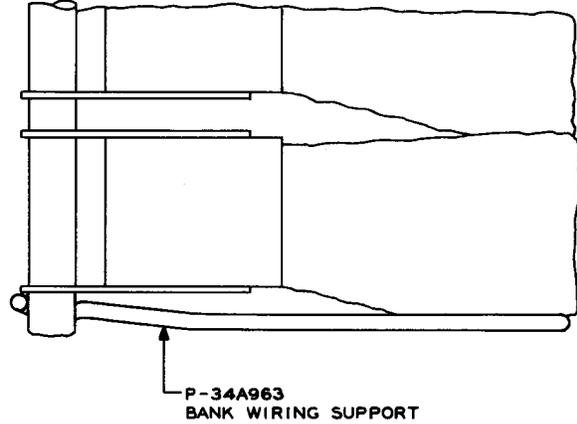
**Notes for Fig. 2C** (42-, 50-, 51-, 52-, 53-, and 62-type banks)

1. Initially, these banks were furnished with brown phenol fabric separators (P-253104 insulators) approximately 0.016 inch thick. For banks with these separators, external insulators for use between wiring levels at rear of banks are available — P-253224 insulator for solder-type 200-point banks and P-253105 insulator for solderless 200-point banks. Subsequently, the phenol fabric separators were superseded by gray Mylar separators (P-48D065 insulators) approximately 0.010 inch thick plus Mylar level insulators (P-12B502 level insulators) approximately 0.005 inch thick. The Mylar level insulators are inserted in the bank between bank levels as shown in Fig. 2C.
  
2. Replace a Mylar separator with another Mylar separator (P-48D065 insulator). A phenol fabric separator may be replaced with either another phenol fabric separator (P-253104 insulator) or a Mylar separator (P-48D065 insulator) plus a Mylar level insulator (P-12B502 level insulator) depending on which are available.



NOTE: THE P-32A798 BANK WIRING INSULATOR IS USED ON SWITCHES ASSOCIATED WITH BANK MULTIPLES HAVING 200 POINT BANKS OF THE CLINCHED SOLDERLESS TYPE IN THE UPPER POSITION AND WHERE THE MULTIPLE WIRING DOES NOT HAVE LONGITUDINAL TIES BETWEEN BANKS.

**Fig. 3—Bank Wiring Insulator**



**Fig. 4—Bank Wiring Support Mounted on Bank Rods**

**3. REPLACEMENT PROCEDURES**

**3.01 List of Tools, Gauges, and Materials**

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
46	3/8-Inch hex. socket wrench
376A	Dental mirror
418A	5/16-Inch and 7/32-inch hex open double-end flat wrench
514A	1/4-Inch 12-point double-end box wrench
555A	3/16-Inch hex single-end socket wrench
670A	Double-end screwdriver
KS-6320	Orange Stick (as reqd)
KS-8237	5/16-Inch ratchet socket wrench equipped with detail 3
KS-20704	L1 Tool, trimming
R-1051	File
—	W1U Cord (20 inches long, equipped with suspender clips) (as reqd)
AT-7860	◆B long-nose pliers◆
—	3-Inch C screwdriver (or the replaced 3-inch cabinet screwdriver)

—	6-Inch C screwdriver (or the replaced 6-inch screwdriver)
79F	0-6000 Gram push-pull gauge or
R-2771	0-6 Pound gauge
181A	1-3/16 Inch and 1-5/32 inch limiting gauge (for use on nonmechanized banks only)
KS-20606	Bank height gauge (for use on mechanized banks with mylar separators only)

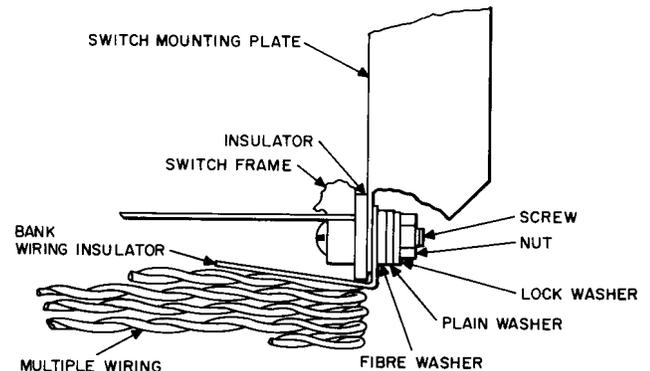
**MATERIALS**

KS-6824	Sealing compound
KS-7851	No. 9 sleeving or equivalent
P-252081	Spacers
P-12B502	Spacers (as reqd)
840052112	◆Mylar insulator◆
—	Duco household cement
—	0.180-Inch drill rod, 3 inches long (2 reqd)
—	No. 000 sandpaper
—	Hardwood toothpicks, flat at one end and point at other
—	No. 6 cable lacing cord

**BANK WIRING INSULATOR****3.02 Switch Mounted on Single-Sided Frame:**

To replace the bank wiring insulator, remove the lower mounting nut of the switch with the 46 socket wrench. In order to prevent the associated screw from turning, the services of an assistant will be required to hold the screw with the 6-inch C screwdriver from the front of the frame. Where an assistant is not available, proceed as covered in 3.03. Where commutator wiring interferes with removal of the insulator, move the wiring to one side. Remove the washers from the screw and remove the insulator. Before mounting the new insulator, dress the multiple wiring down away

from the lower part of the switch with the KS-6320 orange stick. Insert the insulator between the bottom of the switch and the multiple wiring with the lower mounting screw of the switch in the notch in the insulator, as shown in Fig. 5. Avoid pushing the screw through the switch mounting plate. Make sure that the insulator is above all of the multiple wiring. While the mounting screw is being held from the front of the switch with the 6-inch C screwdriver, place the washers and nut on the screw in reverse order of removal. Before tightening the nut, press upward on the bank wiring insulator and make certain that it is held firmly against the insulator at the bottom of the switch mounting plate as shown in the figure. Tighten the nut securely. On switches where the commutator wiring has been disturbed, dress this wiring.



**Fig. 5—Method of Mounting Bank Wiring Insulator**

**3.03 Switch Mounted on Double-Sided Frame:**

To replace the bank wiring insulator, first remove the switch from the frame as described in Section 030-705-801. Hold the lower mounting screw with the 6-inch C screwdriver and loosen the mounting nut with the 46 socket wrench sufficiently to remove the insulator. Remove the insulator. Mount and secure the new insulator in a manner similar to that described in 3.02. Remount the switch on the frame in accordance with Section 030-705-801.

**SWITCH BANK PARTS****Preparation**

*General*

**3.04** Where a switch is equipped with a commutator mounted on the banks, remove the commutator mounting screws with a 3-inch C screwdriver and remove the commutator.

**3.04.1** On banks with damaged mylar overhang that is causing snagged wipers, the damaged section can be removed by trimming with the KS-20704 L1 trimming tool per the following instructions:

All reference surfaces are identified by a vinyl insulation coating. Insert the trimming tool over the damaged mylar overhang until the front edge of the bottom jaw references against the leading edge of the bottom contact and the side of the jaw is against the bank pileup. Now hold the trimming tool parallel with the tip and ring contacts and apply\* pressure to the handles of the trimming tool to clip off the mylar overhang. After clipping, release the pressure on the handles and remove the trimming tool from the bank. When the damaged mylar overhang has been removed, verify vertical wiper adjustment per Section 030-705-704, requirement 2.10(b).

**\*Caution:** *Prior to pressure being applied to the trimming tool handles, check the tool jaws to guarantee they are on the mylar and not on the bank terminal.*

**3.05** Remove the switch in accordance with Section 030-705-801.

**3.06** Sand down the left rear corner of a spare insulator to a sharp edge with a long taper. Use No. 000 sandpaper.

**3.07** *Before opening a 200-point nonmechanized bank* to make any replacement of separators, check the overall height of the bank using the 181A gauge applied as follows. Attempt to place the 1-3/16 inch end and then the 1-5/32 inch end of the gauge on the bank so that it spans contacts in the top and bottom levels. The 1-3/16 inch end of the gauge should go on but the 1-5/32 inch end should not. If the bank height does not conform with the gauge openings, the amount the bank height differs from the openings can be estimated by comparison with the thickness of a bank contact (approximately 0.016 inch thick) or by the use of thickness gauges. Compensate for the difference

by adding or removing P-252081 spacers, as required. After reassembling the bank, recheck the overall height using the 181A gauge.

**3.08** Mark the bank rods to indicate the left and right rod and the rotary position of each rod so that after they are removed they can be remounted in their original positions.

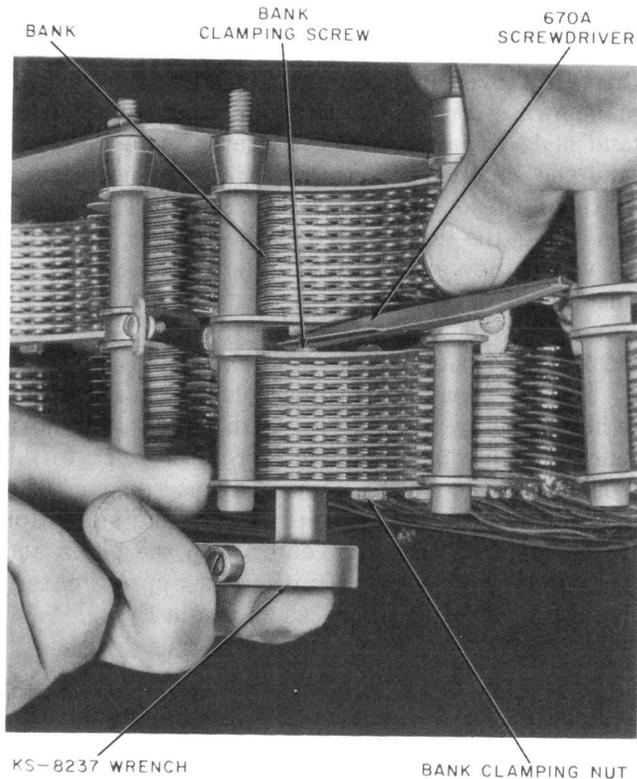
**3.09** Loosen the clamping screws on all the bank rod collars, using the 3-inch C screwdriver or 555A wrench, as required and rotate the collars toward the center of the banks. Remove from the bank rods the banks below the bank to be worked on, raising the bank rods, as required. Take care not to damage the leads. After removing the banks, lower the rods in the remaining banks.

**3.10** Slightly lower the bank to be worked on to provide clearance for inserting the tool used to loosen the bank clamping screws. Then, sufficiently tighten the bank rod collar clamping screws to prevent the banks from sliding on the bank rods.

**Opening Nonmechanized Bank**

**3.11** Insert the large end of the 670A screwdriver, marked L, in the slot of the bank clamping screw. If this end of the screwdriver is too wide for the slot, use the small end marked S. Do not wedge the screwdriver between the head of the bank clamping screw and the bank clamping nut on the bank above, since this may cause bending of the clamping plate deformation of the bank.

**3.12** If the bank clamping screws are not staked or are only lightly staked, hold each screw securely with the 670A screwdriver and remove its clamping nut with the 418A wrench. If the clamping screws are heavily staked, tighten each clamping nut with the KS-8237 wrench as shown in Fig. 6. Hold the screwdriver until the nut grabs, and then allow the screwdriver to move with the screw until it rests against the bank rod. After the nut has been tightened, further tighten the nut until the screw is twisted off. Repeat this operation on each clamping screw and remove the bottom bank clamping plate. During these operations exercise extreme caution to prevent damage to the equipment due to accidental slippage of the tools.



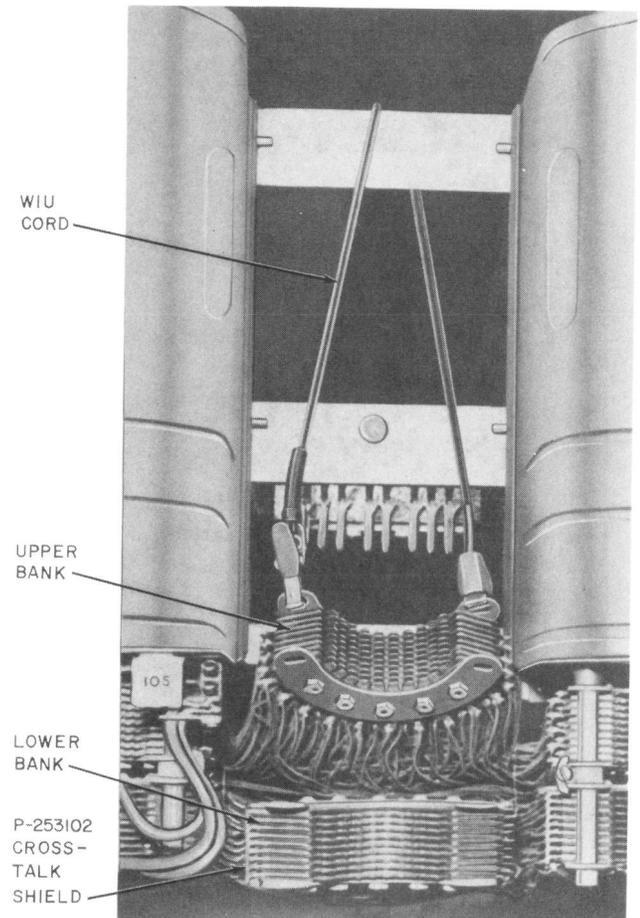
**Fig. 6—Method of Tightening Bank Clamping Screws**

**3.13** If the bank is equipped with soldered crosstalk shield bonds, open these bonds with a soldering copper on any level in which parts are to be replaced. (See Fig. 7 and 8.) A KS-6320 orange stick wedged between the bonds will aid in breaking the soldered connections.

**3.14** Before opening a mechanized bank having mylar separators, check the overall bank height with a KS-20606 gauge. With the switch removed, insert the gauge on the first bank contact by spanning the contacts on the top and bottom levels, starting with the largest gauge opening (1.177 inches). Turn the gauge and decrease the opening size until the gauge will no longer fit on the bank easily. (1.127 inches is the minimum opening.) Then read the number of additional spacers (P-12B502 level insulator) required under the last gauge opening that spanned the top and bottom levels. Refer to 3.23 for the location of the spacers.

#### Opening Mechanized Bank

**3.15** Loosen the bank clamping screws with the 541A wrench and remove the lower clamping



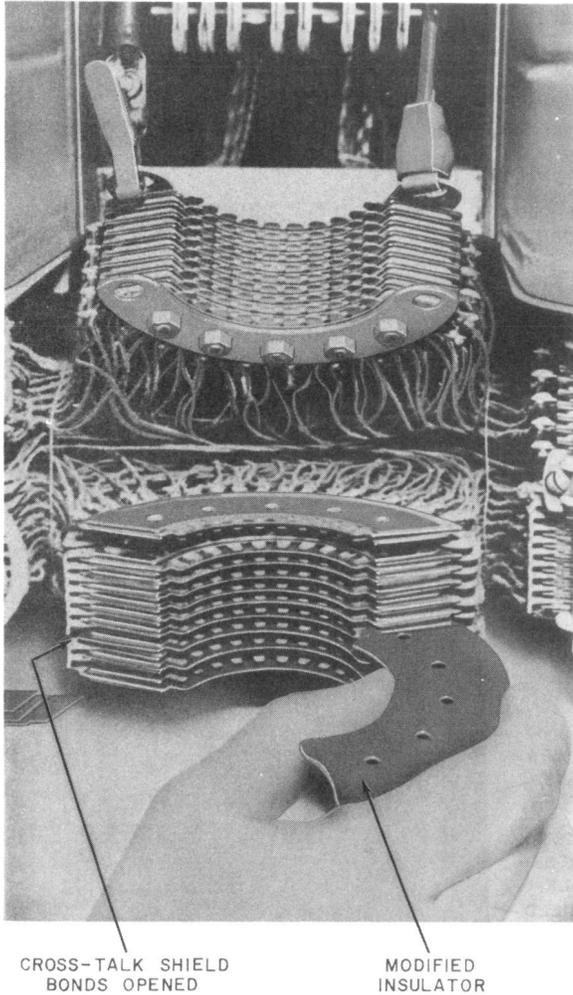
**Fig. 7—Method of Supporting Upper Bank**

plate. If the bank is equipped with soldered crosstalk shield bonds, open these bonds as covered in 3.13.

#### Replacement of Parts in Mechanized and Nonmechanized Banks

**3.16** Loosen the bank rod collar clamping screws with the 3-inch C screwdriver or the 555A wrench, as required and remove the bank rods.

**3.17** Tilt upward the bank or banks above the bank being worked on and with a W1U or similar cord hold the upper banks out of the way, making use of the upper angle iron as shown in Fig. 7. If the bank being worked on is at the end of the multiple, an additional cord may be required to support the outer end of this bank.



**Fig. 8—Method of Separating Bank Contacts From Separator**

One cord will be required for each bank to be supported.

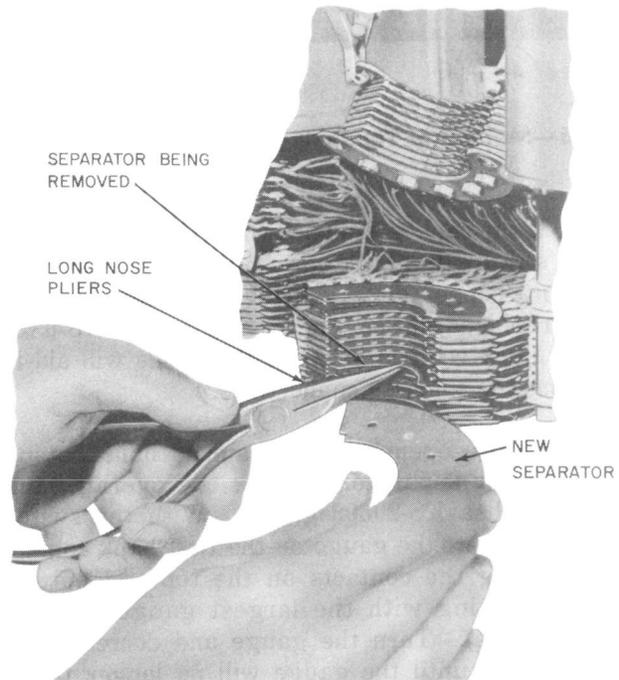
**3.18** Remove the bank clamping screws and at the same time maintain pressure on the bank with the fingers. Removal of screws may be facilitated by turning each screw in a counterclockwise direction while it is being removed. Remove the top clamping plate.

**Replacement of Separators**

**3.19** Free the separator to be replaced from the contacts above and below it as follows. The contacts are not secured to this separator but may adhere slightly to it. Support the bank with one

hand and slide the insulator with the tapered edge (modified as described in 3.06) between the separator to be removed and the contacts directly above it, as shown in Fig. 8. Remove the modified insulator and slide it between the separator to be removed and the contacts directly below it. In performing both of these operations, exercise care to avoid loosening the contacts from the narrow insulator to which they are attached. Remove the modified insulator from the bank.

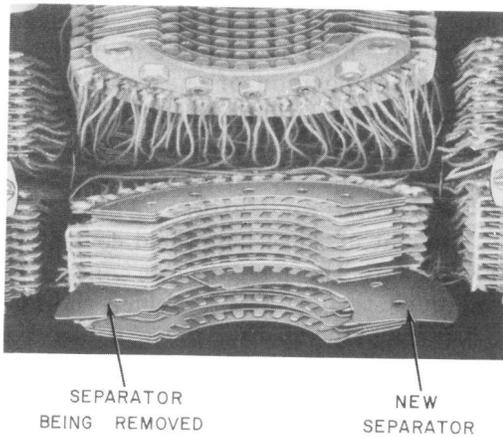
**3.20** With the KS-6320 orange stick, slightly shift the separator to be replaced to a position where it may be grasped with the B long-nose pliers. If any bank contacts are still stuck to the separator, repeat the operation described in 3.19 until the separator is free. Grasp the separator to be replaced near the center with the pliers and pull it gently forward until it is approximately half way out of the bank, as shown in Fig. 9.



**Fig. 9—Method of Pulling Separator Forward**

**3.21** Insert the new separator immediately above the one being replaced, as shown in Fig. 10, and slide it into the bank. Remove the old separator and properly position the new one. If all separators in a bank are to be replaced, repeat the operations

described on all levels working from the bottom to the top.



**Fig. 10—Method of Placing New Separator in Bank**

**3.22** Where it is necessary to use the P-252081 spacer referred to in 3.07, place the first of these spacers adjacent to the crosstalk shield, P-253102, between the fourth and fifth levels. If a second one is required, place it adjacent to the crosstalk shield between the fifth and sixth levels. If a third one is required, place it adjacent to the crosstalk shield between the third and fourth levels.

**3.23** When necessary to add spacers (P-12B502 level insulators), they should be placed in the preferred positions as noted in Table A.

**3.24** Check whether any wires have broken loose from the terminals. If so, on banks with

soldered connections, skin the wires if necessary, wrap them on the terminal with one turn, and then resolder them. On solderless banks, if both wires have broken loose from a terminal, tin the terminal, skin both wires, wrap them around the terminal with one turn, and then solder them to the terminal. If only one wire has broken loose from a terminal, cut the other wire, tin the terminal, skin both wires, wrap both wires around the terminal with one turn, and then solder them to the terminal.

**3.25** Check whether any bank contact has become loosened from the insulator to which it was attached. Position and cement loose contacts in place as covered in 3.27(4)(a) for nonmechanized banks and in 3.27(4)(b) for mechanized banks.

**3.26** Obtain replacement contacts from a spare unwired bank in accordance with Table B.

**Notes:**

1. All replacement contacts shall have terminals for solder connections.
2. In replacing a contact from a mechanized bank, select the replacement contact from a spare mechanized bank.
3. In replacing a silver-plated or brass contact from a nonmechanized bank, select a brass contact from either a spare mechanized or nonmechanized bank.
4. If a contact from a mechanized bank is selected for use in a nonmechanized bank, remove the eyelet extrusions which fastened

**TABLE A**  
**LOCATION OF SPACERS (P-12B502 LEVEL INSULATORS) BETWEEN LEVELS**

NUMBER OF SPACERS REQUIRED	PREFERRED POSITION BETWEEN LEVELS								
	1 & 2	2 & 3	3 & 4	4 & 5	5 & 6	6 & 7	7 & 8	8 & 9	9 & 10
9	X	X	X	X	X	X	X	X	X
7	X	X		X	X		X	X	X
5	X		X			X		X	X
2	X							X	

TABLE B  
INFORMATION FOR OBTAINING  
REPLACEMENT CONTACTS

TYPE OF INDIVIDUAL CONTACT OR ROW OF CONTACTS TO BE REPLACED	BANK FROM WHICH REPLACEMENT CONTACTS AND INSULATOR MAY BE OBTAINED	TYPE OF REPLACEMENT CONTACT - SEE NOTES 1 AND 4
Silver-inlay contact	62D bank	Silver-inlay contact
No. 1 metal-inlay contact	62DL bank	No. 1 metal-inlay contact
Silver-plated or Brass, line (narrow) contact -  See notes 2 and 3	Any of following banks: 20A, 22A, 25A, 31A, 31B, 40D, 42D, 42DA, 42DB, the lower five levels of a 30A or 50DA, or the upper contacts of each level on a 51D or 51DA	Brass line contact
Brass sleeve (wide) contact -  See notes 2 and 3	Any of following banks: 21A, 21B, 22B, 24A, 41D, 41DA, 52D, 52DA, the upper five levels of a 30A or 50DA, or the lower contacts of each level on a 51D or 51DA	Brass sleeve contact

the contact to the insulator by filing them with the R-1051 file.

**3.27** To replace individual bank contacts, proceed as follows.

- (1) If the contact to be replaced has a solder-type terminal, unsolder the leads from the terminal. If the contact has a solderless-type terminal, cut the leads as close to the terminal as practicable.
- (2) Take care to maintain continuity of the multiple. If continuity is broken, restore it as quickly as possible. Take care that the bare wire does not touch any contact or other bare wire.
- (3) Remove the contact to be replaced.
- (4) Mount the new contact as covered in (a) for nonmechanized banks or (b) for mechanized banks.

(a) **Nonmechanized Banks:** Apply a small amount of Duco household cement with a toothpick to the part of the contact which will touch the insulator. Carefully place the contact in its correct position. The insulator will usually have an imprint on it indicating the original position of the contact. If the position cannot be determined by an imprint, position the contact carefully by eye.

(b) **Mechanized Banks:** Apply a small amount of Duco household cement with a toothpick to the part of the contact which will touch the insulator. Place the contact on the insulator so that the extruded eyelets of the contact are in the corresponding holes in the insulator.

**Caution:** *If any contact of a mechanized bank is not correctly positioned, the bank cannot be properly clamped.*

- (5) Solder the leads to the terminal and check for broken wires as covered in 3.24.
- (6) Reassemble the bank as covered in 3.33 through 3.41 for nonmechanized banks and 3.42 through 3.47 for mechanized banks.

#### Replacement of Horizontal Row of Contacts and Associated Insulator

**3.28** A row of contacts with associated insulator for use as a replacement may be obtained from a spare unwired bank in accordance with Table B. If dielectric failure has occurred in the insulator to which a row of contacts is attached, the insulator with the contacts is usually replaced, provided this is simpler than replacement of the insulator only.

**3.29** To replace a row of contacts and associated insulators, proceed as follows.

- (1) Tag the leads to each contact terminal in the row.
- (2) If the contacts are equipped with solder-type terminals, unsolder the leads from the terminals. If the contacts have solderless-type terminals, cut the leads as close to the terminals as practicable.

- (3) Take care to maintain continuity of the multiple. If continuity is broken, restore it as quickly as possible.
- (4) Remove the row of contacts and associated insulator from the bank.
- (5) Substitute the new row of contacts with associated insulator, solder the leads to the proper terminals, and remove the tags from the leads.
- (6) Reassemble the bank as covered in 3.33 through 3.37.

#### **Replacement of Bank Insulator Only**

**3.30 *Mechanized Banks:*** To replace an insulator in a mechanized bank equipped with solderless contacts, proceed as follows.

- (1) Obtain a replacement insulator from a spare unwired mechanized bank of a corresponding type (as covered in Table B). To do this, remove the insulator with contacts from the spare bank. Remove the contacts from this insulator.
- (2) Tag all contact terminals on the insulator to be replaced to indicate the terminal positions on the insulator. Do not disconnect the leads from the terminals.
- (3) Remove the contacts from the insulator to be replaced. As each contact is removed, cover it with a piece of KS-7851 sleeving.
- (4) Remove the insulator.
- (5) Remove the KS-7851 sleeving from one contact, properly locate the contact on the replacement insulator, and attach the contact to this insulator as covered in 3.25. Repeat this procedure for all contacts.
- (6) Check for broken wires as covered in 3.24 and reassemble the bank as covered in 3.42 through 3.47.

**3.31 *Nonmechanized Banks:*** In the case of nonmechanized banks equipped with silver-plated contacts, the replacement of the insulator is covered in Section 030-705-807. However, that section specifies the use of a special tool kit which may not be available. Furthermore, that section does

not cover replacement of the insulator in sleeve banks. Therefore, if it is not practicable to replace the insulator only, obtain a row of replacement contacts with associated insulator in accordance with Table B and replace the row of contacts with defective insulator as covered in 3.28 and 3.29.

#### **Replacement of Other Parts**

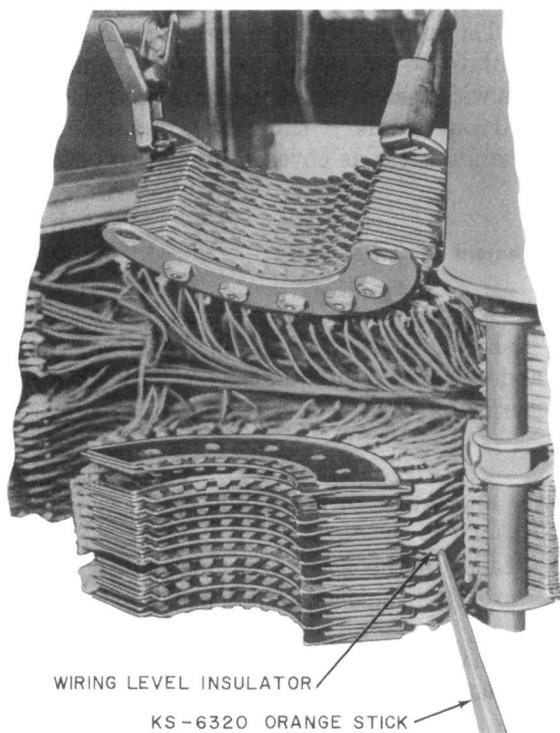
**3.32** To replace other parts such as a crosstalk shield, spacer, or clamp plate, remove the part and substitute the new part. Check the wiring as described in 3.24.

#### **Reassembly of Nonmechanized Bank**

**3.33** Line up the separator, insulators, spacers, crosstalk shields, and top clamping plate in a clamping position. Insert KS-6320 orange sticks, which have been whittled to a diameter of approximately 1/8 inch, into the screw holes second from the left and second from the right. Insert screws into the middle and two end screw holes of the bank. Turning them in a clockwise direction will facilitate this operation. Position the wiring level insulators, where provided, with the KS-6320 orange stick as shown in Fig. 11. Make sure that this insulator will be free of parts that will be clamped.

**3.34** Fit the lower clamping plate over the screws and place the nuts on the screws fingertight. Then use the 670A screwdriver and the KS-8237 wrench to tighten the nuts. During reassembly make sure that the alignment of the contacts is satisfactory. Take care while doing this to obtain an approximately even distribution of the pressure on the clamping plates. At this time, do not tighten the nut more than one-half turn after it has seated itself against the clamping plate. Remove the orange sticks from the two screw holes, place screws in these holes, and place nuts on the screws. Tighten them in the same manner as described for the other nuts in this bank.

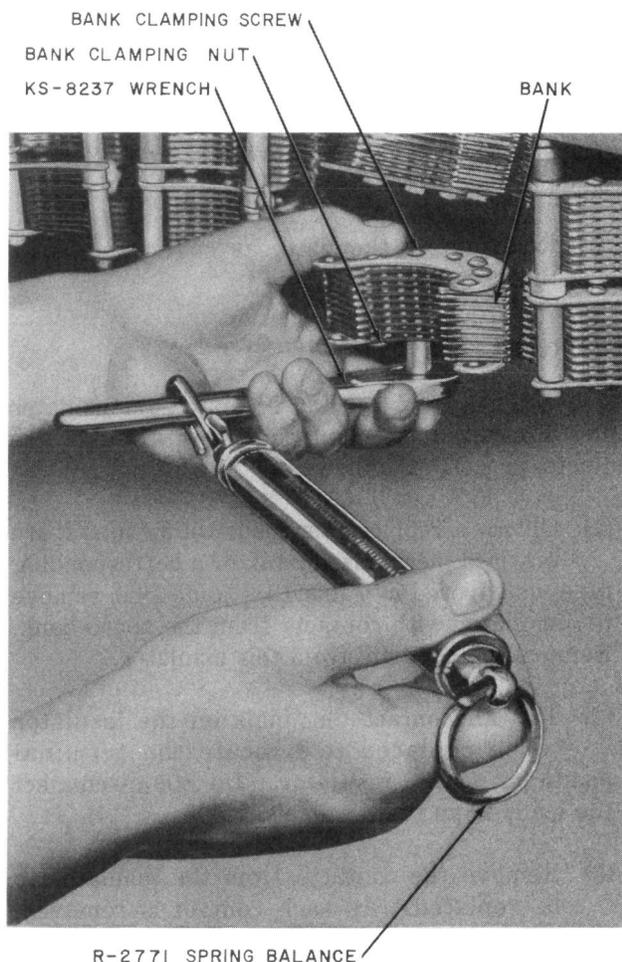
**3.35** Check the alignment of the contacts on all levels. To check alignment of contacts on the lower levels, use the 376A dental mirror. If any of them are out of alignment, reopen the bank, recement these terminals in their correct positions as described in 3.25, check for broken wires as described in 3.24, and reclamp the bank.



**Fig. 11—Method of Positioning Wiring Level Insulator**

**3.36** Tighten the nuts to between 16- and 18-pound/inch torque. To check this, apply the R-2771 gauge approximately 2-inches back of the free end of the KS-8237 wrench as shown in Fig. 12. If a hole is provided at this point in the handle of the wrench, insert the hook of the gauge in the hole. Pull on the gauge at right angles to the handle of the wrench. A pull of 4 to 4-1/2 pounds in a tightening direction without moving the nut indicates that the nut is tight enough. Exert a pull of 5 pounds on the wrench and observe whether the nut moves. If it does not move, it is too tight. In this case, loosen the nut enough so that it will move on a pull of 5 pounds but not enough so that it will move on a pull of 4 pounds. A 79F gauge may be used instead of the R-2771 gauge. In this case, attach a loop of cable lacing cord around the handle of the wrench approximately 2 inches back of the free end or through the hole in the handle and apply the gauge to this loop. A pull of 1800 to 2050 grams without moving the nut indicates that the nut has been satisfactorily tightened. Exert a pull of 2200 grams on the wrench and observe whether the nut moves. If it does not move, it is too tight. In this case,

loosen it enough so that it will move on a pull of 2200 grams but not on a pull of 1800 grams.



**Fig. 12—Method of Checking Tightness of Bank Clamping Nut On Nonmechanized Bank**

**3.37** After the nuts have been tightened, seal them by applying KS-6824 sealing compound with a toothpick to the part of the screw projecting beyond the nut. Resolder the crosstalk shield bonds.

**3.38** Remount the bank rods. Make certain that the left and right bank rods are mounted on the left and right, respectively, and in the same rotary position as they were before being removed. Remount the banks. Tighten the bank rod collar clamping screws with the 3-inch C screwdriver or the 555A wrench, as required.

**3.39** Remount the switch as described in Section 030-705-801. Remount the commutator with the 3-inch C screwdriver if it was removed.

**3.40** Check the bank and wiper adjustments as described in Section 030-705-704. Especially check that the wipers cut in properly on each level. When certain line finders are made busy, raising and rotating the shaft manually may result in a resistance battery being placed on a bank terminal by the wipers. Where this condition may occur, insulate the proper contacts of the vertical off-normal spring assembly to remove this condition from the wipers.

**3.41** Clean and treat the bank as described in Section 069-501-801 covering cleaning and treating of 197- and 198-type switches.

#### Reassembly of Mechanized Banks

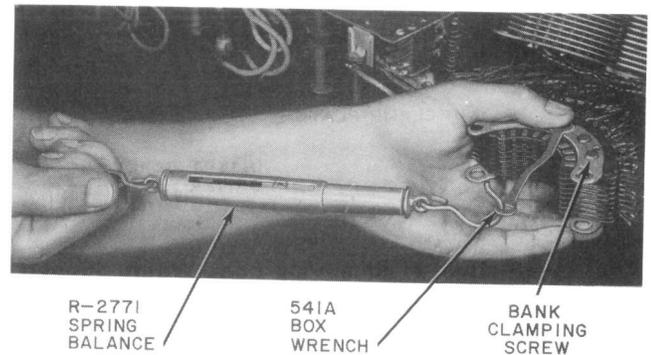
**3.42** Line up the separators, insulators, spacers, crosstalk shields, and top clamping plate in clamping position. Use a 0.180-inch drill rod in each pilot hole to perform this operation. Insert screws into the middle and two end screw holes of the bank. Turning the screws in a clockwise direction will facilitate this operation.

**3.43** Position the wiring level insulators, where provided, with the KS-6320 orange stick as shown in Fig. 12. Make sure that this insulator is free of parts that will be clamped.

**3.44** Fit the lower clamping plate over the clamping screws. Turn the screws so that they are fingertight, then tighten them with the 541A wrench. During reassembly make sure that the alignment of contacts is satisfactory. Take care while doing this to obtain an approximately even distribution of the pressure on the clamping plates. At this time, do not tighten the screws more than the amount necessary to firmly hold the bank together.

**3.45** Check the alignment of the soldering terminals and contacts on all levels. To check the alignment of contacts on the lower levels, use the 376A dental mirror. If any of them are out of alignment, reopen the bank, recement these terminals in their correct positions as described in 3.25, and check for broken wires as described in 3.24. Reclamp the bank.

**3.46** Tighten the screws to between 16- and 18-pound/inch torque. To check this, apply the 541A wrench on the head of the clamping screw and insert the hook of the R-2771 gauge in the hole at the free end of the wrench as shown in Fig. 13. A pull of 4-1/2 to 5 pounds without moving the screw in an indication that the screw has been satisfactorily tightened. A 79F gauge may be used instead of the R-2771 gauge. In this case, attach a piece of cable lacing cord in the hole at the free end of the wrench and apply the gauge to this loop. A pull of 2050 to 2275 grams without moving the screw indicates that the screw has been satisfactorily tightened.



**Fig. 13—Method of Checking Tightness of Bank Clamping Screw on Mechanized Bank**

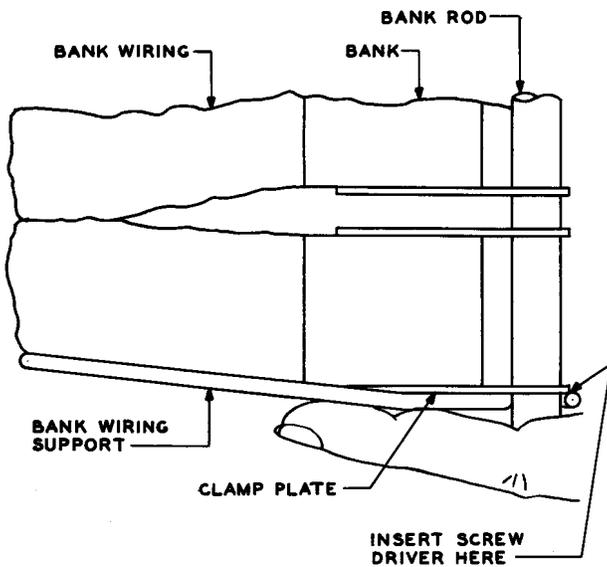
**3.47** Check that the embossing in each crosstalk shield tang is in contact with the tang on the next lower crosstalk shield. If necessary, bend the tang with the B long-nose pliers so that it will make contact.

**3.48** Remount the bank rods and the switch as described in 3.38 and 3.39. Check the wiper adjustments and clean and treat the bank as described in 3.40 and 3.41.

#### BANK WIRING SUPPORT

**3.49** To remove a bank wiring support, push upward on the left leg as shown in Fig. 14 to relieve the downward pressure on the support. Insert the blade of the 3-inch C screwdriver between the mounting loop on this leg and the bank clamp plate as shown in the figure. Pry

the loop off the bank rod and slip the other mounting loop off the other rod.



**3.50** To mount the support, hold it below the bottom bank so that the mounting loop ends are approximately horizontal and the rear portion tilts upward. Take care that all wires associated with this bank are above the bank wiring support. Place the loop of one leg of the support on the corresponding bank rod and push it up against the bank clamp plate. Press the other leg of the support toward the switch shaft until the loop is directly under the other bank rod. Then move the loop upward to engage the bank rod and rest against the bank clamp plate, taking care not to exert sufficient upward pressure to loosen the switch from the jack. After releasing the upward pressure against the support, check that it is securely mounted by pushing upward on the rear portion of both legs as indicated in Fig. 14. Under this condition, the loop should remain in position against the clamp plate.

**Fig. 14—Method of Removing Bank Wiring Support**