

**REPLACING PAGE ADDENDUM**  
**Filing Instructions:**

1. REMOVE FROM THE SECTION THE PAGES NUMBERED THE SAME AS THOSE ATTACHED TO THIS PINK SHEET.
2. INSERT THE ATTACHED PAGES INTO THE SECTION IN THEIR PLACE.
3. PLACE THIS PINK SHEET AHEAD OF PAGE 1 OF THE SECTION.

**197- AND 198-TYPE SWITCHES**  
**BANKS, COMMUTATORS, WIPERS, JACK SPRINGS**  
**AND SWITCH OPERATION**  
**REQUIREMENTS AND ADJUSTING PROCEDURES**

**1. GENERAL**

**1.001** This addendum supplements Section 030-705-704, Issue 8. The attached pages must be inserted in the section in accordance with the filing instructions above.

**1.002** This addendum is reissued to:

- Include a general statement in 1.07 covering inspection of wiper cords.
- Revise 2.06
- Revise 2.10(b)
- Revise Table which is part of 2.10(b)
- Revise 3.11 to reflect a better method of adjusting the wiper spring.

**Attached:**

**Page 1 dated June 1971, revised**  
**Page 2 dated October 1971, revised**  
**Page 3 dated October 1971, revised**  
**Page 4 dated June 1971, revised**  
**Page 9 dated June 1971, revised**  
**Page 10, dated June 1971, reissued**

**1. GENERAL**

The following change applies to Part 1 of this section:

- (a) 1.07—revised

**2. REQUIREMENTS**

The following changes apply to Part 2 of this section:

- (a) 2.06—revised
- (b) 2.10(b)—revised
- (c) Table in 2.10(b)—revised

**3. ADJUSTING PROCEDURES**

The following change applies to Part 3 of this section:

- (a) 3.11—revised

## 197- AND 198-TYPE SWITCHES

### BANKS, COMMUTATORS, WIPERS, JACK SPRINGS

### AND SWITCH OPERATION

### REQUIREMENTS AND ADJUSTING PROCEDURES

#### 1. GENERAL

**1.01** This section covers requirements and adjusting procedures for banks, commutators, wipers, jack springs, and switch operation for 197- and 198-type switches.

**1.02** This section is reissued to add 1.04, to revise requirements of cleaning, to revise list of tools and gauges, and to revise procedures covering centering of wipers with bank levels.

**1.03** *Make-Busy Information:* Before checking or adjusting for any requirements covered in this section, make the switch busy in accordance with Section 030-705-701.

**1.04** *Asterisk (\*):* Requirements are marked with an asterisk when to check for them would necessitate dismantling or dismounting of apparatus, or would affect the adjustment involved, or other adjustments. No check need be made of these requirements unless the apparatus or part is made accessible for other reasons, or its performance indicates that such a check is advisable.

**1.05** *Vertical normal position of the shaft* (197-type switches only) is that position in which the normal pin clamp rests on the upper shaft bearing.

**1.06** *Rotary normal position of the shaft* is that position in which the normal pin is in contact with the shaft spring bracket.

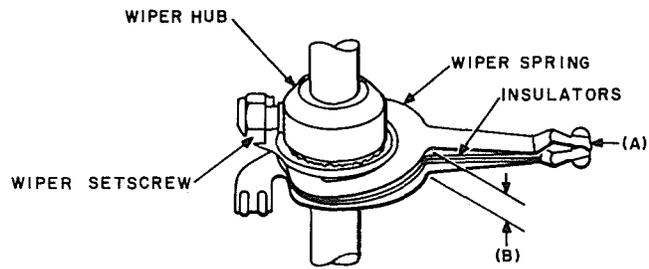
**1.07** Each time a switch cover is removed for any purpose, wiper cords shall be inspected for wear and for proper dress, and replaced or redressed as necessary as outlined in Section 030-705-804. When any adjustments are made on the switch which may affect the switch operation, requirement 2.26 shall be checked.

**1.08** The following index lists the requirements covered in this section:

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Tightness of Wiper Springs on Hub	2.04	2
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<b>COMMUTATOR WIPERS (197-TYPE SWITCHES ONLY)</b>		
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**SECTION 030-705-704**

TITLE	REQT	PAGE
<b>SHELF JACK SPRINGS</b>		
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<b>SLEEVE CUT-OFF JACKS (197-TYPE SWITCHES ONLY)</b>		
Clearance Between Springs and Mounting Bracket	2.21	6
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<b>TEST JACKS</b>		
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Switch Operation	2.26	6



**Fig. 1—Bank Wiper**

**2. REQUIREMENTS**

**2.01 Cleaning:** The parts shall be cleaned when necessary in accordance with Section 069-501-801 covering cleaning and treating of 197- and 198-type switches.

**BANKS AND BANK WIPERS**

**2.02 Position of Banks:** The bank rod collars shall secure all banks firmly, and the topmost bank shall be in contact with at least one of the two bank rod assembly locating shoulders.

Gauge by eye and by feel.

**2.03 Wiper Position:** Bank wipers shall set at approximately right angles to the shaft.

Gauge by eye.

**2.04 Tightness of Wiper Springs on Hub:** The wiper springs shall be tight on the wiper hub.

Gauge by feel.

**2.05 Vertical Alignment of Wiper Springs:** Fig. 1(A)—As viewed facing the end of the wiper springs, the wiper spring tips shall be within 0.012 inch of vertical alignment.

Gauge by eye.

**2.06 Wiper Spring Forming:** Fig. 1(B)

(a) From the point on each spring where the straight portion forms into the hub portion, the two springs shall converge in approximately straight lines to the free end of the insulator.

(b) From the point on each spring where the straight portion forms into the hub portion, the dimension from the outer surface of one spring to the outer surface of the other spring shall be:

**Test:** Min 5/64 inch, Max 5/32 inch

**Readjust:** Min 3/32 inch, Max 5/32 inch

Use a rule graduated in 1/64ths of an inch

**2.07 Position of Wiper Tips on Bank Contacts**

(a) **Fig. 2(A):** The wiper shall rest on the bank contacts on their tips only and the upper and lower tips shall rest on the bank contacts at approximately equal angles.

Gauge by eye.

(b) **Fig. 2(B):** The wiper tips shall overlap the end of each associated bank contact by at least 3/64 inch.

This requirement shall be gauged by eye on the first and tenth contacts of the lowest bank level with which the wiper makes contact.

**2.08 Normal Position of Wiper Tips**

(a) **Single Conductor Wipers** (197-type switches only): Fig. 1(A)

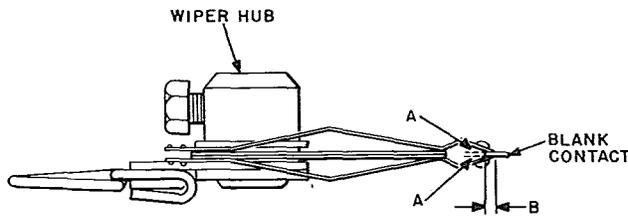


Fig. 2—Wiper Tips on Bank Contact

- (1) The springs of all single conductor wipers shall touch at their tip ends.

Gauge by eye.

- (2) **Wipers Having One Insulator:** There shall be a clearance between at least one wiper spring and the end of the insulator.

Gauge by eye.

This requirement is met if, with the insulator pressed lightly against one spring, there is a clearance between the other spring and the free end of the insulator.

- (3) **Wipers Having Two Insulators:** There shall be a clearance between at least one wiper spring and the ends of the insulators with the insulators held together.

Gauge by eye.

This requirement is met if, with the insulators pressed lightly against one spring, there is a clearance between the other spring and the face end of the nearer insulator.

- (b) **Two Conductor Wipers:** Fig. 1(A)—The separation between the tip ends of the springs of all two conductor wipers when not contacting the banks shall be

**Test** Min 0.008 inch Max 0.020 inch

**Readjust** Min 0.008 inch Max 0.018 inch

Use the 92D, 92G, and 92W gauges.

**2.09 Wiper Spring Tension:** Wiper springs shall be so tensioned that when the pressure of one spring in the pair is removed its mate will follow 1/8 inch.

Gauge by eye.

On 197-type switches, this is approximately the distance between two adjacent bank levels.

**2.10 Alignment of Wipers With Bank Levels:** Fig. 3

- (a) **197-Type Switches Only:** With the play between the shaft spring bracket and the left side of the normal post taken up by applying a light pressure to the shaft spring bracket near the normal post, the wipers shall not touch the banks when moving vertically.

Gauge by eye.

- (b) The horizontal centerline between the tips of the wiper springs shall coincide with the centerline of the bank contact levels when the wiper is about to cut in on the bank.

The thickness of the bank contacts is 0.016 inch.

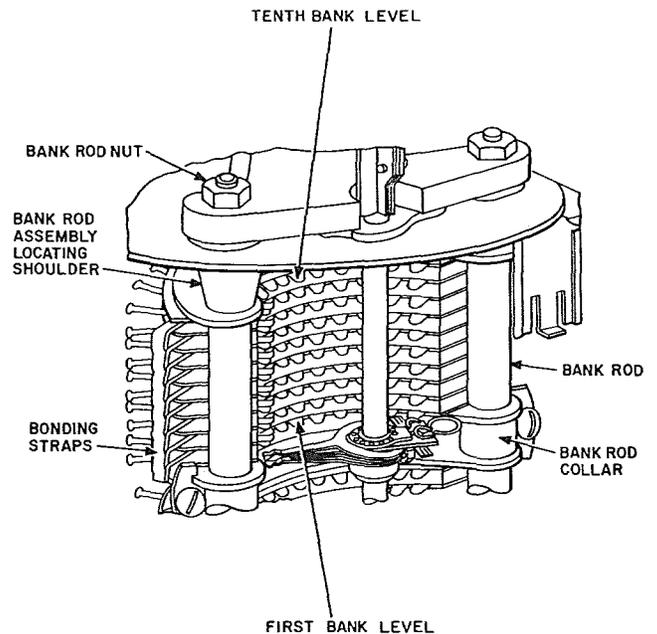


Fig. 3—Alignment of Wipers with the Bank Levels

Gauge by eye as covered in the following table.

TYPE OF SWITCH	SWITCH ARRANGED TO TAKE		CHECK REQUIREMENT ON	
	VERTICAL STEPS	ROTARY STEPS	CONTACTS	BANK LEVELS
†197	10	11	1	5
197	10	10	1	5
†197	5	11	1	3 & 8
197	5	10	1	3 & 8
198	—	—	1	Operating

† On 200-point banks having the insulators extending to the eleventh rotary position, the requirement shall be checked on the first contact only.

**2.11 Centering of Wipers on Bank Contacts:**

Fig. 4(A)—The upper springs of the wipers shall center within 1/64 inch on the sixth contacts of the first and tenth levels. If, when placed on the first and tenth contacts of these levels, the springs do not so center, they shall rest either approximately as far to the right of the center on the tenth as they do to the left of the center on the first or approximately as far to the left of the center on the tenth as they do to the right of the center on the first.

Gauge by eye.

**COMMUTATOR WIPERS (197-TYPE SWITCHES ONLY)**

**2.12 Tightness of Wiper Spring on Hub:** The wiper spring shall be tight on the commutator hub.

Gauge by feel.

**2.13 Horizontal Alignment of Wiper:** The centerline of the wiper spring shall be approximately at right angles to the shaft.

Gauge by eye.

**2.14 Centering of Wiper on Commutator Contacts:** Fig. 5(A)—With the shaft in position to cut in on any level, the centerline of the wiper spring shall line up with the centerline of the commutator contact corresponding to that level within the limits of

Max 1/32 inch above, Max 1/64 inch below.

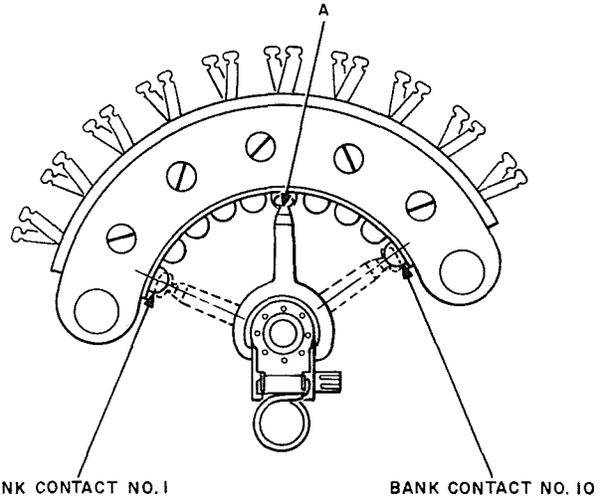


Fig. 4—Centering of Wipers on Bank Contacts

This requirement shall be met on all levels.

Gauge by eye. (The distance between commutator terminals is approximately 1/32 inch.)

**2.15 Wiper Spring Tension:** Fig. 5(B)—The tension of the wiper spring against the bottom commutator contact measured at the offset in the wiper spring between the straight portion and the tip shall be

**Test** Min 25 grams, Max 50 grams

**Readjust** Min 30 grams, Max 50 grams

Use 79C gauge.

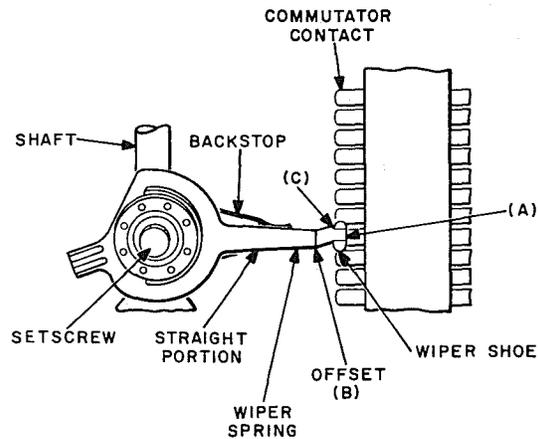


Fig. 5—Commutator Wiper and Associated Parts Bumping

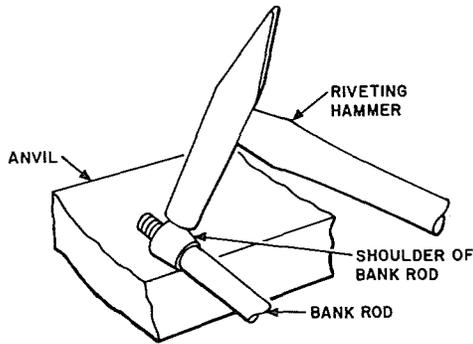


Fig. 13—Method of Bumping Bank Rod

mately 0.010 inch is raised on the edge of the bank rod shoulder. Then remount the rod so that the bumped edge is toward the rear of the switch and remount the banks on the switch. Tighten all parts securely. Note whether a satisfactory overlap is obtained. If the overlap is satisfactory at the end nearest the bumped rod but not at the other end, remove the banks and repeat the operation on the other rod. After reassembling the parts, recheck for alignment of wipers with bank levels and also check centering of wipers on bank contacts. Also check requirements 2.14 through 2.18.

**3.10 Alignment of Wipers With the Bank Levels** (Reqt 2.10)

**3.11 Centering of Wipers on Bank Contacts** (Reqt 2.11)

- (1) If requirement 2.10(b) is not met, adjust the wiper springs in accordance with (a) or (b).

**SWITCHES STEPPING 10 BANK LEVELS**

(a) The shaft will be raised to the fifth level, then loosen the setscrew in the wiper hub with either the 3-inch C screwdriver or the 555A wrench. Turn the shaft and wiper in to the first bank contacts, adjust the wiper up or down until the wiper tips rest on the bank contacts at equal angles. Now tighten the setscrew with the fingers and return the switch to rotary normal. Then recheck the wiper at cut-in on the fifth level to make sure the wiper does not duck upward

or downward at cut-in. If ducking occurs, readjust the wiper to eliminate all ducking. Wiper blades will now deflect equal amounts to accept the bank contacts at cut-in.

**SWITCHES STEPPING 5 BANK LEVELS**

(b) The shaft will be raised to the third level, then loosen the setscrew in the wiper hub with either the 3-inch C screwdriver or the 555A wrench. Turn the shaft and wiper in to the first bank contacts, adjust the wiper up or down until the wiper tips rest on the bank contacts at equal angles. Now tighten the setscrew with the fingers and return the switch to rotary normal. Then recheck the wiper at cut-in on the third level to make sure the wiper does not duck upward or downward at cut-in. If ducking occurs, readjust the wiper to eliminate all ducking. Wiper blades will now deflect equal amounts to accept the bank contacts at cut-in. Repeat the above described procedure for the second wiper except adjust to the eighth level.

(2) Center the wipers on the sixth contact. To do this, loosen the setscrew in the wiper hub and turn the wiper to the right or left as required. It is advisable to support the shaft and hold the wiper firmly while loosening or tightening the wiper setscrew. After the wipers have been centered properly, carefully restore the shaft to rotary normal and see that the vertical alignment has not changed. If any change is required in the vertical alignment, exercise care not to disturb the horizontal alignment. Check the horizontal alignment. Tighten the wiper setscrew. Take care to limit the force exerted in tightening the screw since excessive force may cause bending of the shaft.

(3) After aligning an upper wiper whose hub is turned up, operate the switch to the tenth level and note whether or not the wiper strikes against the lower shaft bearing. If the wiper strikes against the bearing, it will be necessary to invert the wiper so that the hub will be below the springs. In certain cases it may also be necessary to invert the wiper adjacent to the commutator wiper.

**SECTION 030-705-704**

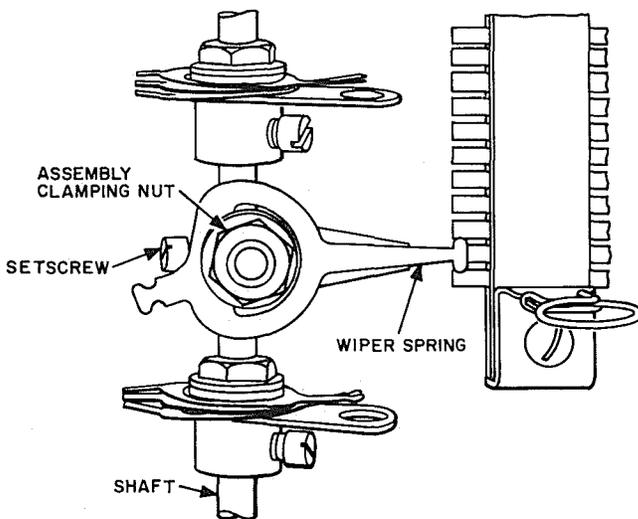
(4) Where wipers cannot be centered properly, it will be necessary to loosen the bank rod nuts and shift the bank slightly to meet these requirements. If this is done, recheck requirements 2.14, 2.15, 2.16, 2.17, and 2.18.

**COMMUTATOR WIPERS (197-TYPE SWITCHES ONLY)**

**3.12** *Tightness of Wiper Spring on Hub* (Reqt 2.12)

**3.13** *Horizontal Alignment of Wiper* (Reqt 2.13)

(1) Where commutator wiper springs are assembled to the hub with an assembly clamping nut, as shown in Fig. 14, align the commutator wiper horizontally as follows. Loosen the assembly clamping nut with the 417A wrench and move the tip of the wiper spring up or down until the center line of the spring is at right angles to the shaft. Then tighten the clamping nut securely. On the later type of commutator wipers, the position of the wiper spring with respect to the hub is not adjustable; therefore, where the wiper is not in proper horizontal alignment, replace the wiper as covered in Section 030-705-804.



**Fig. 14—Commutator Wiper Alignment**

**3.14** *Centering of Wiper on Commutator Contacts* (Reqt 2.14)

**3.15** *Wiper Spring Tension* (Reqt 2.15)

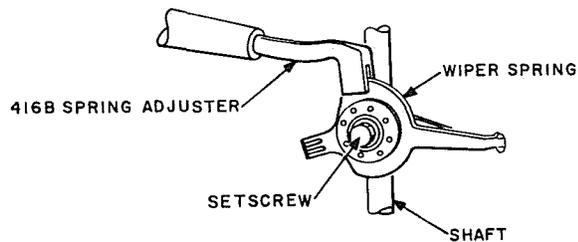
**3.16** *Clearance Between Wiper and Associated Commutator Contact* (Reqt 2.16)

**3.17** *Relation of Wiper Tip to Commutator Contacts* (Reqt 2.17)

**3.18** *Clearance Between Back Stop and Wiper Spring* (Reqt 2.18)

(1) To change the position of the commutator wiper spring, loosen the setscrew in the wiper hub with the 3-inch C screwdriver or the 555A wrench. Move the wiper upward or downward as required.

(2) To adjust the tension of the wiper spring against the commutator contacts, proceed as follows. Step the switch manually to the third or fourth rotary position. Apply the 416B spring adjuster to the upper circular part of the wiper spring, as shown in Fig. 15, and twist the tool to the right or left as required. Then apply the tool to the lower circular portion of the spring and twist the tool an equal amount to the right or left as required. Where lack of tension between the wiper spring and the commutator contacts is due to improper location of the wiper on the switch shaft, loosen the setscrew in the wiper hub with the 3-inch C screwdriver or the 555A wrench. Turn the wiper assembly on the shaft, moving the tip of the wiper spring toward the commutator to increase the tension. After making this adjustment, recheck the centering of the wiper spring on the commutator contacts.



**Fig. 15—Method of Adjusting Spring Tension Commutator Wiper**