200-, 206-, 209-, AND 211-TYPE SELECTORS AND 10-, 26-, AND 32-TYPE BANKS REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers 200-, 206-, 209-, and 211-type selectors and 10-, 26-, and 32-type banks.

1.02 This section is reissued to add requirements covering the 206 CM, 206 CN, and 206 CP selectors and to revise the requirement and procedure covering lubrication. Detailed reasons for reissue will be found at the end of the section.

1.03 Reference shall be made to Section 020-010-711 covering general requirements and definitions for additional information necessary for the proper application of the requirements listed herein.

1.04 *Asterisk (*):* Requirements are marked with an asterisk when to check for them would necessitate the dismantling or dismounting of apparatus or would affect the adjustment involved or other adjustments. No check need be made for 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 *Preparation of KS-16832 L2 Lubricant:* This lubricant is provided in 2-ounce and 1-pint containers. A small wide-mouth container, such as the 2-ounce jar in which the lubricant is available, should be used as a receptacle from which to dispense the lubricant. If allowed to stand more than 1 day without agitation, the lubricant ingredients tend to separate; therefore, before each day's use, shake the container of lubricant for approximately 30 seconds to insure mixing of the ingredients. The proper method of shaking the lubricant consists of repeated, rapid turning of the container to an upside down position and back to the upright position. If lubricant is to be used from a 1-pint container, the lubricant must be mixed as just described before it is poured into the smaller container. Under storage conditions, the cover should be tight on the container.

1.06 *One dip of KS-16832 L2 lubricant,* for the purpose of this section, is the amount of lubricant retained on the KS-14164 brush after being dipped into the lubricant to a depth of approximately 3/8 inch and scraped once against the side of the container as the brush is removed.

1.07 *Make-Busy Information:* Before making any of the inspections or readjustments specified herein, ascertain whether or not it is necessary to make any of the circuits busy. Circuits which are so affected should be made busy in the approved manner, and the necessary relays should be held operated or nonoperated to isolate the selector circuit.

1.08 *Method of Connecting Selectors for Electrical Tests:* For the methods of connecting the test set to the selector in checking and readjusting to meet the electrical requirements specified herein, refer to Sections 026-706-711 and 026-706-712.

1.09 *Steady and Uniform Operation:* A selector operates steadily and uniformly when it operates regularly under self-interruptions for not less than ten revolutions. If the selector is wired so that it cannot be rotated under self-interruptions, it shall be rotated under control of the relay wired to its interrupter contacts for at least ten revolutions. A slight hesitation or momentary change of speed at or about the time the rotor brushes engage the feeder brushes is not objectionable if it recurs regularly. A distinctive click indicating the failure of the pawl to latch up over a tooth shall not be present. It is satisfactory to rotate the selector for approximately 1 minute and to judge its operation by ten consecutive revolutions thereafter.

1.10 *Selector Circuit:* The selector circuit referred to herein ordinarily consists of the selector magnet coil. However, when apparatus

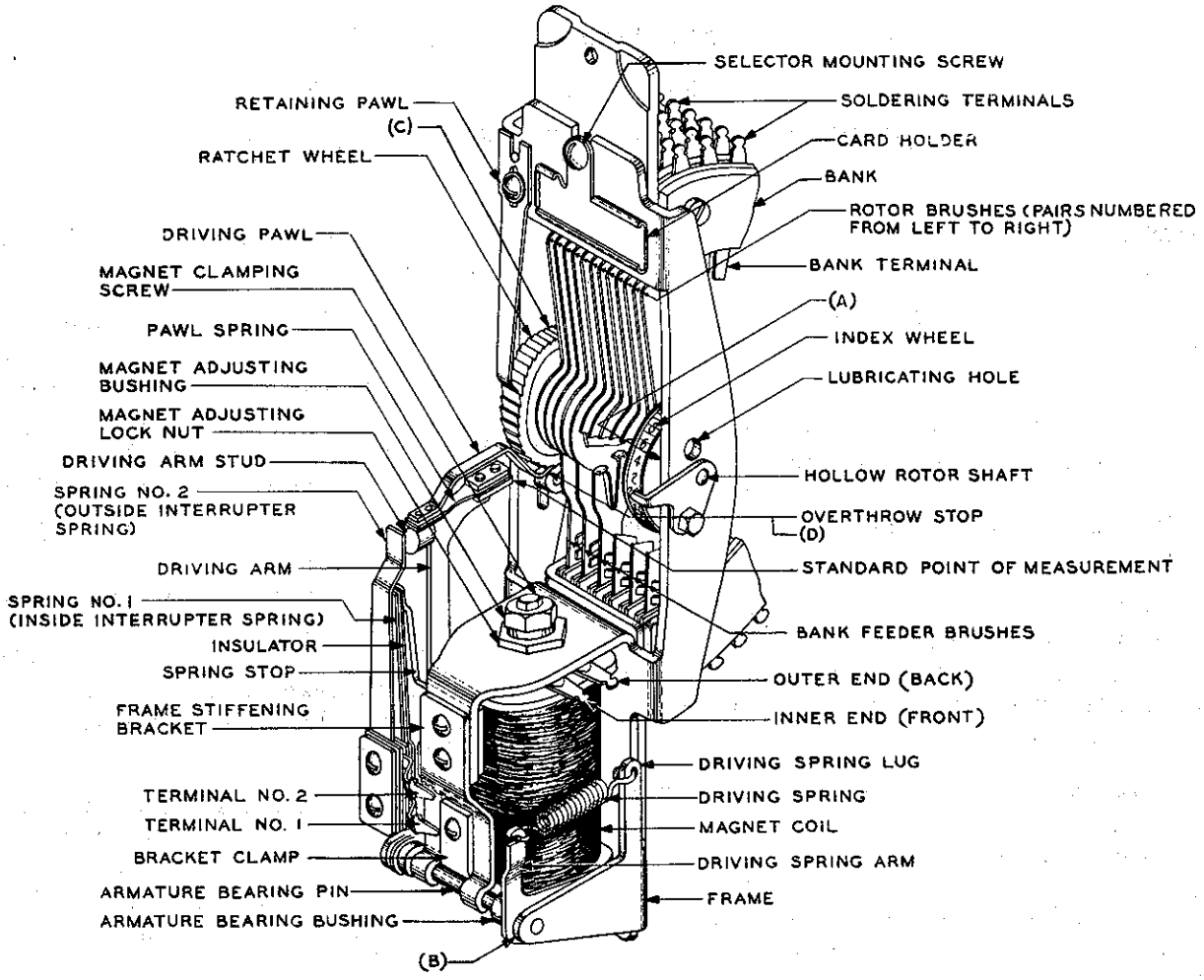

Fig. 1 – 206-Type Selector and 26-Type Bank

such as a lamp, resistance, or relay, or any combinations thereof is wired into the circuit to be in series with the selector coil during normal circuit operation, it shall be considered part of the selector circuit. For requirements 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), and 2.33 (Low-Voltage Interrupter Contact Test), the selector circuit shall be extended to include the interrupter contacts with spark protection.

1.11 High or low voltage refers to the potential drop or closed circuit voltage across the selector circuit with the test set connected to the interrupter spring which is wired to the magnet coil. The specified potential drop must be regulated as far as possible by the use of the auxiliary battery used with the selector test set. A series resistance may be used to obtain the correct potential when necessary, but this resistance must always be less than that which would be sufficient to correct for a difference of one cell.

1.12 ***Numbering of Rotor Brushes:*** The rotor brush pairs are numbered from left to right, facing the front of the selector, beginning with the No. 1 pair, which is the nearest to the ratchet wheel.

1.13 ***Numbering of Interrupter Contact Springs:*** The interrupter contact springs are numbered consecutively, starting at the interrupter spring nearest the spring stop which is spring No. 1.

1.14 ***Bank feeder brushes*** are those feeder brushes which are part of the 10-, 26-, or 32-type bank.

1.15 ***Detachable feeder brushes*** are those feeder brushes which are mounted as a detachable unit by a stud used in place of the top selector mounting screw.

1.16 ***The standard point of measurement*** is a point on the driving arm beneath the pawl spring to which the driving pawl is fastened. (See Fig. 1.)

1.17 ***Selectors*** which do not meet the test requirements for 2.30 (Step Test), 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), or 2.33 (Low-Voltage Interrupter Contact Test) shall be exercised for approximately 1 minute and then, if necessary, they shall be cleaned and relubricated and then retested for these requirements.

1.18 ***Position of Selector When Requirements Are Met:*** Unless otherwise specified, all requirements shall be met with the parts in the position which they assume after being operated electrically.

1.19 ***All rotor brush requirements*** shall be met on both ends of the rotor brush assembly.

1.20 ***"Running" and "Stepping":*** In the circuit requirement table, test clip data is given to indicate the method of connecting the test set to the selector in checking and readjusting to meet the requirements specified herein. "For Running" (previously "Requirements for Running") and "For Stepping" (previously "Requirements for Stepping") appear in the "Remarks" column and are associated with the test clip data. The data "For Running" is for use in cleaning and lubricating the selector and for checking requirements 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), and 2.33 (Low-Voltage Interrupter Contact Test) on those selectors where these requirements apply or wherever it is necessary to rotate the selector under self-interruptions or under control of the relay wired to its interrupter contacts. The data "For Stepping" is for use in cleaning and lubricating in case the selector is not wired for operation on self-interruptions, and in checking requirements 2.09 (Armature Airgap), 2.29 (Magnet Pull Test), 2.30 (Step Test), or wherever it is necessary to operate the selector step by step.

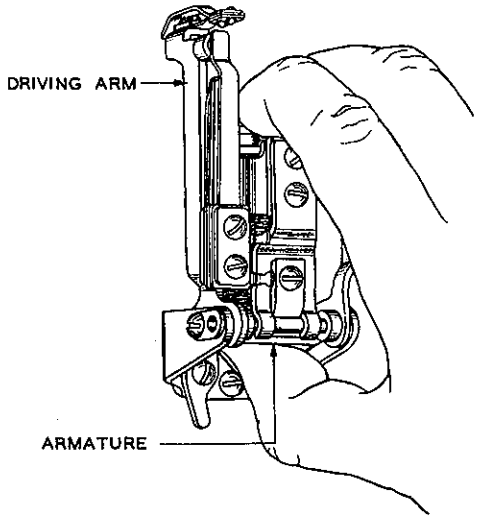

Fig. 2 – Method of Stepping a Selector Manually

1.21 ***Use of Portable Lamp and Dental Mirror:*** The 510C portable lamp and 376A dental mirror may be used in connection with the visual inspections specified in Part 2, Requirements. In using the 510C portable lamp, make sure that the proper cord is used for the available voltage.

1.22 ***Moving Rotor Brushes by Hand:*** In all cases where it is necessary to move the rotor brushes by hand, do this by manually holding the armature against the core and grasping the free ends of the rotor brushes between the contact portion and the hub.

1.23 ***To step the selector manually,*** apply sufficient pressure to the bottom of the armature, as shown in Fig. 2, to force it upward against the core and then release the armature. In some cases it may be necessary to apply the force with a snap in order to obtain a slight whip of the driving arm so that the driving pawl will engage a tooth of the ratchet wheel. Never step the selector manually by means of the driving arm.

2. REQUIREMENTS

2.01 *Cleaning*

(a) The ratchet wheel and armature bearings and the surfaces of the magnet core and armature adjacent to each other shall be cleaned, when necessary, in accordance with approved procedures.

(b) The interrupter contacts shall be cleaned, when necessary, in accordance with Section 069-306-801.

2.02 ***Treatment of Banks and Rotors:*** Bank terminals and rotors shall be treated in accordance with Section 069-330-801.

Before Turnover

(a) ***Bank terminals*** (32-type bank associated with 211-type selectors) shall be treated with No. 30 (oiled) sleeving.

(b) ***Rotors*** (211-type selectors) shall be treated with No. 33 (oiled) sleeving.

After Turnover

(c) ***Bank terminals*** (200-, 206-, and 209-type selectors) shall be initially cleaned with No. 29 (aloxite) sleeving followed by treating with No. 30 (oiled) sleeving. Subsequently, the bank terminals shall be treated with No. 30 (oiled) sleeving.

(d) ***Bank terminals*** (211-type selectors) shall be treated with No. 30 (oiled) sleeving.

(e) ***Rotors*** (200-, 206-, and 209-type selectors) shall be cleaned using No. 32 (aloxite) sleeving, followed by treating with No. 33 (oiled) sleeving.

(f) ***Rotors*** (211-type selectors) shall be treated with No. 33 (oiled) sleeving.

(g) ***Recommended Interval for Treatment of Bank Terminals and Rotors:*** Ordinarily bank terminals and rotors should not require treatment more frequently than at yearly intervals. For 200-, 206-, and 209-type selectors and associated banks, this interval may be extended if local conditions are such as to insure that the parts are satisfactory during the extended interval. On 211-type selectors and associated banks, the interval shall not exceed 1 year. Immediately after such treatment, the bank terminals equipped with precious metal shall be inspected for wear. Where evidence of wear of the precious metal in the brush track is present, future treatments shall be made at 6-month intervals instead of 1 year.

2.03 ***Lubrication*** (selectors only): The 200-, 206-, 209-, and 211-type selectors shall be lubricated with KS-16832 L2 lubricant as follows.

(a) ***Before turnover,*** the installer shall lubricate parts of the selector in accordance with Table A if more than 6 months has elapsed between the date of manufacture (as indicated by the date stamped on the selector frame in front of the magnet adjusting bushing locknut).

(b) ***After turnover,*** the selectors shall be lubricated as specified in Table A at 3-year intervals except for those selectors subjected to high temperature conditions such as may prevail near hot air ducts, radiators, etc. Selectors so situated shall be lubricated at 2-year intervals. However, the 2- and 3-year intervals may be extended if periodic inspections have indicated that local conditions are such as to insure that the selectors will be adequately lubricated during the extended interval.

2.04 ***Record of Lubrication:*** During the period of installation, a record shall be kept, by date, of the lubrication of the selector, and this record shall be turned over to the telephone company with the equipment. If no lubrication has been done, the record shall so state.

TABLE A — LUBRICATION

PART	AMOUNT
Right Rotor Bearing Fig. 1(A)	1 dip at end of rotor
Left Rotor Bearing	1 dip at end of rotor
Right Armature Bearing Fig. 1(B)	1 dip, distributed between both sides of the bearing
Left Armature Bearing	1 dip, distributed between both sides of the bearing
Ratchet Wheel Fig. 1(C)	4 dips, distributed over the teeth of the ratchet wheel while the selector is being rotated
Overthrow Stop Fig. 1(D)	1 dip, applied between the overthrow stop and the driving pawl while the selector is held operated

2.05 ***Alignment of Tips of Rotor Brushes***

(a) Fig. 3(A) — The trailing edges or tips of all nonbridging brush members shall be in approximate (±0.010 inch) alignment. The reference line used as a basis for this measurement shall be parallel to the axis of the rotor shaft.

Gauge by eye.

(b) Fig. 3(B) — The tips of the bridging brushes shall overlap the line of contact of the nonbridging brushes by 0.025 inch ±0.015 inch.

Gauge by eye.

(The rotor brush members are 0.013 inch thick.)

2.06 ***Armature Backstop Position:*** Fig. 4(A)— At the time of turnover, the armature backstop shall be positioned on the selector so that the straight portion of the stop designated (B) in Fig. 4 inclines upward to the right.

Gauge by eye.

2.07 ***Position of Rotor Brushes on Bank Terminals***

(a) ***Bridging Brushes:*** Fig. 5(A) — With the armature against the backstop, the retaining pawl disengaged, and the play of the rotor assembly taken up alternately in the backward and forward directions, bridging brushes shall not touch adjacent terminals. See (c).

Gauge by eye.

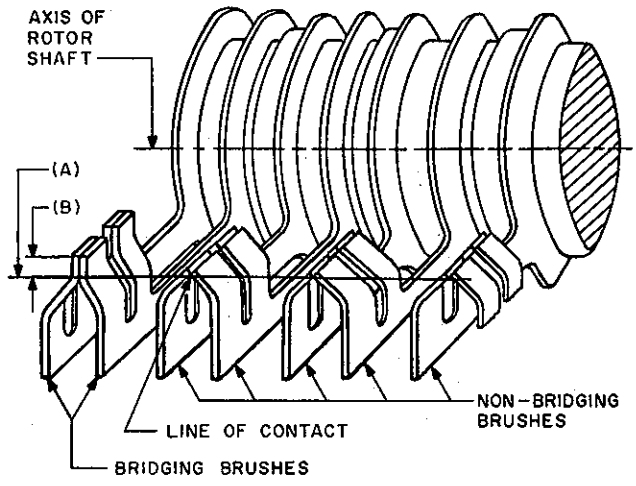

Fig. 3 – Alignment of Tips of Rotor Brushes

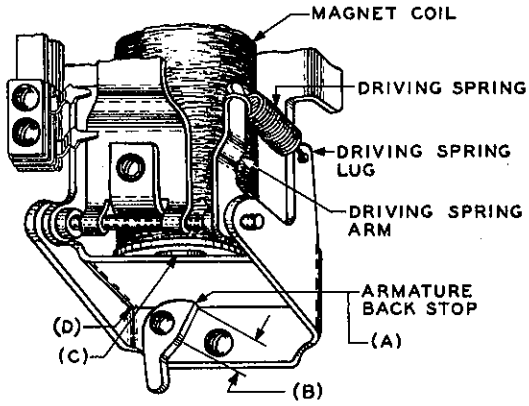

Fig. 4 – Armature Backstop Position

(b) ***Nonbridging Brushes:*** Fig. 6(A)

Test — With the armature against the backstop, the retaining pawl disengaged, and the play of the rotor assembly taken up alternately in the backward and forward directions, the tips (trailing edges) of nonbridging brushes shall be

Min 1/64 inch

from the respective edges of the bank terminals. See (c).

Gauge by eye.

Readjust — With the armature against the backstop, the retaining pawl disengaged, and the rotor assembly rotated in a backward direction to take up the play between the driving pawl and any ratchet wheel tooth, the tips (trailing edges) of all nonbridging brushes shall be

1/32 inch

from the leading edges of their respective bank terminals. See (c).

Gauge by eye.

The bank terminals are approximately 1/64 inch thick.

This requirement shall be checked on all nonbridging brushes when the brushes are on the bottom terminals and also on the pair of nonbridging brushes nearest the index wheel when these brushes are at the middle and uppermost positions of the bank.

(c) In checking, apply pressure against the driving spring arm where the driving spring is attached to insure that the armature is against the backstop.

2.08 ***Overthrow Stop Position:*** Fig. 7(A) — With the armature against the backstop [see requirement 2.07(c)] and the rotor assembly rotated in a backward direction to take up the play between the driving pawl and any ratchet tooth:

(a) The driving pawl shall not bind between the ratchet wheel and the overthrow stop.

Gauge by eye.

This requirement shall be checked at four positions of the ratchet wheel with the rotor brushes in a vertical position and a horizontal position in each half cycle of the rotor. Operate the selector (step by step) to the required positions. Take up the play between the driving pawl and any ratchet tooth by moving the rotor in a backward direction and then releasing the rotor. Grasp the upper end of the driving arm between the thumb and forefinger and move the driving arm gently from side to side. Binding will be indicated if the driving pawl does not return to approximately its original position.

(b) The clearance between the driving pawl and the overthrow stop shall be such that the motion of the rotor brush assembly at the brush tips is

Max 1/32 inch

Gauge by eye.

This requirement shall be checked as follows. Disengage the retaining pawl and, with the rotor brush assembly in a convenient position, rotate the rotor brush assembly back and forth. Repeat this check with the opposite ends of the brushes contacting the bank terminals.

2.09 ***Armature Airgap:*** Fig. 4(C)

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(a) With the magnet electrically operated on low voltage and the overthrow or whip removed, the airgap between the armature and the magnet core shall be such that the driving pawl will engage all ratchet wheel teeth throughout a complete revolution. This requirement shall be checked in all positions of rotation.

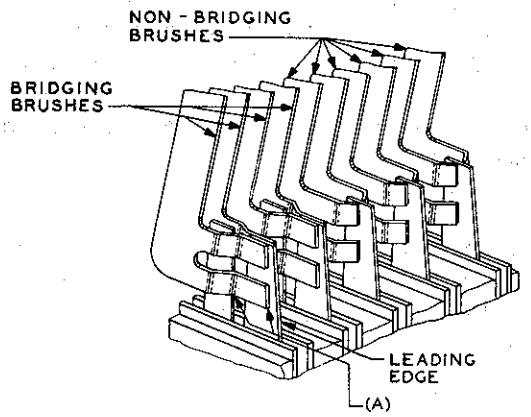

Fig. 5 – Position of Bridging Brushes on Terminals

Gauge by eye and remove the overthrow or whip as follows.

Apply sufficient pressure against the outside interrupter spring above the offset to prevent the armature from operating when the magnet is electrically energized. Remove the finger pressure gradually, permitting the armature to operate slowly thereby eliminating overthrow or whip of the armature arm. The requirement is met if the selector steps when the finger pressure has been removed and the magnet de-energized.

(b) With the magnet electrically operated on low voltage, the gap between the armature and the backstop shall not exceed

0.030 inch

Use the 92J gauge.

209-Type Selectors

(c) The airgap between the armature and core shall be such that the driving pawl will engage any tooth of the ratchet wheel when a 0.010-inch gauge is placed between the armature and the magnet core and the selector is electrically energized on low voltage. This requirement shall be checked in all positions of rotation.

Use the KS-6909 gauge and eliminate the overthrow or whip as described in (a).

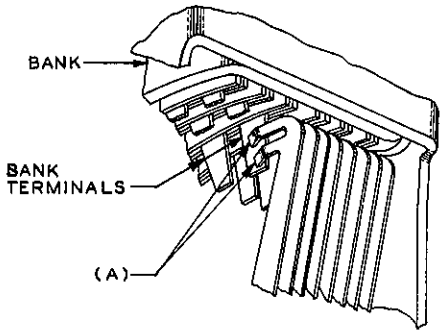

Fig. 6 – Positioning of Nonbridging Brushes on Terminals

2.10 *Retaining Pawl Position and Tension*

(a) Fig. 7(B) — The retaining pawl shall just drop over the radial face of the ratchet wheel teeth when the armature is operated manually and slowly released against the backstop. See requirement 2.07(c).

Gauge by eye.

This requirement shall be checked in at least four positions of the ratchet wheel approximately 90 degrees apart.

(b) Fig. 7(C) — The tension of the retaining pawl against the ratchet wheel teeth measured at the bend in the pawl shall be

Test — Min 40 grams, Max 80 grams
Readjust — Min 50 grams, Max 70 grams

Use the 79C gauge.

The application of the gauge may be facilitated by using a small loop of twine looped around the pawl and the end of the gauge.

2.11 ***Rotor Brush Alignment:*** Fig. 8(A) — The junction between each pair of rotor brush springs shall line up with the center line of the associated bank feeder brush within 0.014 inch when the brushes are in the position in which they are about to pass onto the feeder brushes. In case the bank feeder brushes have been cut away, this requirement shall apply to the first row of bank terminals.

Gauge by eye.

Bank terminals and single-piece-type feeder brushes are 0.014 inch thick.

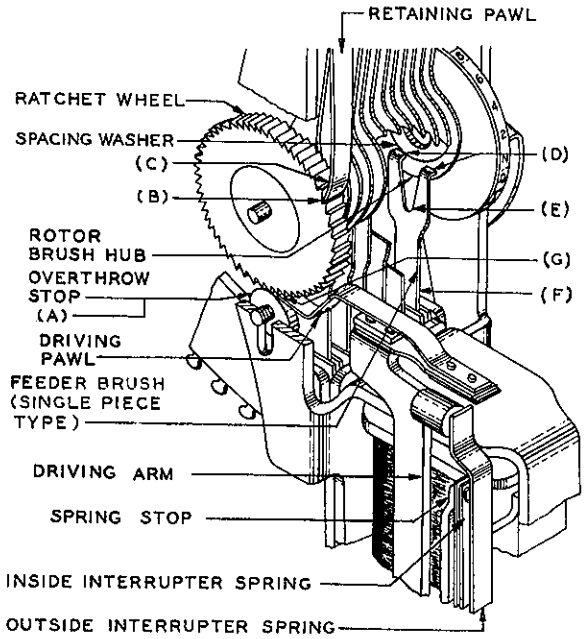

Fig. 7 – Ratchet Wheel and Associated Parts — (206- and 211-type selectors illustrated)

2.12 ***Feeder Brush Position:*** Each feeder brush shall meet the requirement listed in Table B for the particular type of feeder brushes involved.

TABLE B

BANK FEEDER BRUSHES			DETACHABLE FEEDER BRUSHES		
SINGLE PIECE TYPE (Fig. 9, 10, 11)	SINGLE PIECE TYPE (Fig. 12)	TWO PIECE TYPE (Fig. 13)	SINGLE PIECE TYPE (Fig. 11)	SINGLE PIECE TYPE (Fig. 12)	TWO PIECE TYPE (Fig. 13)
(a)	(a)	(a)	(a)	(a)	(a)
	(b)			(b)	
					(c)
(d)	(d)	(d)	(d)	(d)	(d)
(e)	(e)	(e)			
(f)	(f)	(f)	(f)	(f)	
			(g)	(g)	(g)

(a) Fig. 7(D) — The prongs of the feeder brush shall not touch the spacing washers on the rotor at any point in the revolution of the rotor.

Gauge by eye.

(b) Fig. 7(E) — When the feeder brush is pushed away from the rotor with pressure applied on the center line of the feeder

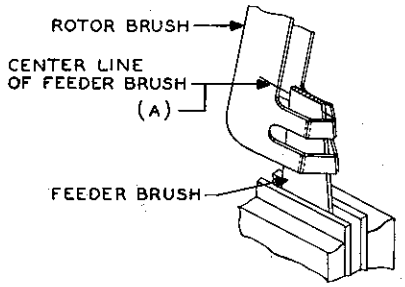

Fig. 8 – Rotor Brush Alignment

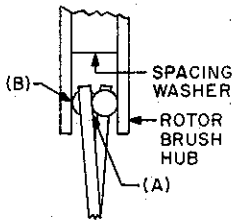

Fig. 9 – Single-Piece-Type Feeder Brush — Balanced Type With Two Welded Contacts

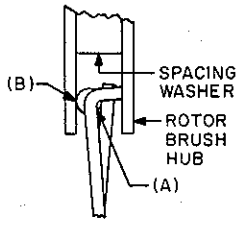

Fig. 10 – Single-Piece-Type Feeder Brush — Balanced Type With One Welded Contact and One Formed Tip

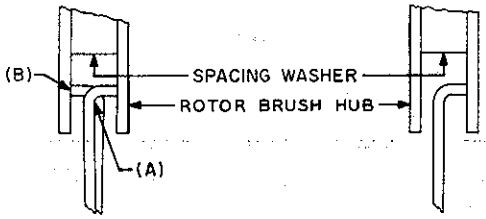

Fig. 11 – Single-Piece-Type Feeder Brush — Balanced Type With Two Formed Tips

Fig. 12 – Single-Piece-Type Feeder Brush — Nonbalanced Type With Two Formed Tips

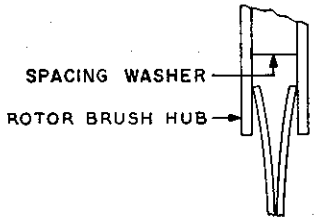

Fig. 13 – Two-Piece-Type Feeder Brush

brush and close to the crotch, the two prongs shall leave the rotor at the same time.

Gauge by eye.

(c) Fig. 14(A) — The points of contact between the feeder brushes and the rotor brush hub shall be

Min 0.015 inch

within the outside edge of the rotor brush hub.

Gauge by eye.

The single-piece-type feeder brushes are 0.014 inch thick. Each spring of the chromium-plated, 2-piece-type feeder brush is approximately 0.009 inch thick, and each spring of the nonchromium-plated, 2-piece-type feeder brush is 0.007 inch thick.

(d) The unformed portions of the feeder and rotor brushes shall clear each other at all positions of the rotor by

Min 0.010 inch

Gauge by eye.

(e) Fig. 7(F) — That part of the feeder brush over which the rotor brushes pass shall be in alignment with the bank terminals within 0.010 inch.

Gauge by eye.

(f) The contacting portion of the feeder brushes shall make contact with and be approximately parallel to the face of the rotor brush hub throughout a complete revolution

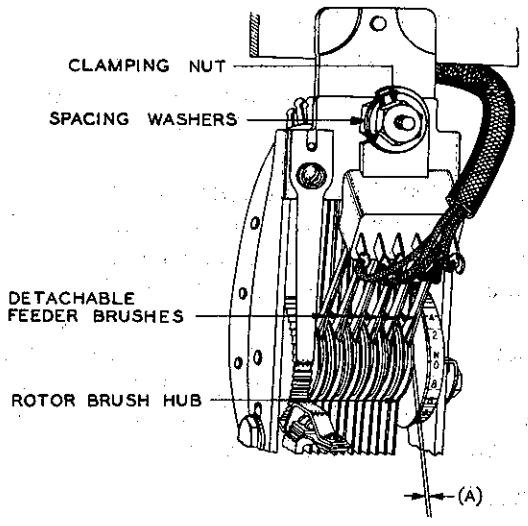

Fig. 14 – Detachable Feeder Brushes

of the rotor brushes and shall meet the following requirements with relation to the periphery of the hub.

(1) ***Single-Piece-Type Feeder Brushes*** (Fig. 9, 10, 11, 12) — The contacting portion of the tip shall not extend beyond the periphery of the hub more than 0.015 inch.

Gauge by eye.

(2) ***Two-Piece-Type Feeder Brushes*** (Fig. 13) — The contacting portion of the tip shall not extend beyond the periphery of the hub.

Gauge by eye.

(g) With one end of the rotor brushes resting on the fifth row of bank terminals, the center line of that part of the feeder brush over which the rotor brush passes shall line up with the junction of the associated pair of rotor brush springs within 0.010 inch.

Gauge by eye.

The single-piece-type feeder brushes are 0.014 inch thick. Each spring of the chromium-plated, 2-piece-type feeder brush is approximately 0.009 inch thick and each spring of the nonchromium-plated, 2-piece-type feeder brush is 0.007 inch thick.

2.13 *Feeder Brush Tension*

Single-Piece-Type Feeder Brushes per Fig. 9, 10, 11

(a) Fig. 9(A), 10(A), 11(A) — The tension of the front prong of the feeder brush against the associated rotor brush hub, measured on the prong just below the contact or tip, shall be

Test — Min 20 grams, Max 45 grams
Readjust — Min 25 grams, Max 40 grams

Use the 70J gauge.

To check this requirement, step the selector electrically to a position where the rotor brushes are approximately 60 degrees from the upper vertical part of the frame. Block the rotor brush assembly by placing the 0.012-inch blade of the 74D gauge between the right side of the selector frame and the end of the rotor projecting beyond the nut and a toothpick between the left side of the frame and the adjacent end of the rotor above the shaft. Measure the tension of the front prong. Remove the gauge blade and the toothpick, step the selector electrically 180 degrees, and repeat the check.

(b) Fig. 9(B), 10(B), 11(B) — The rear prong shall reliably contact the rotor brush hub.

Gauge by eye and feel.

To check this requirement, block the rotor brush assembly as covered in (a) and apply the KS-6320 orange stick to the rear prong to check that the prong is making contact with the hub.

Single-Piece-Type Feeder Brushes per Fig. 12

(c) Fig. 7(E) — The tension of each feeder brush against the associated rotor brush hub measured at a point on the center line of the feeder brush and close to the crotch shall be

Test — Min 65 grams, Max 90 grams
Readjust — Min 70 grams, Max 90 grams

Use the 70J gauge.

To check this requirement, step the selector electrically to a position where the rotor brushes are approximately 60 degrees from the upper vertical part of the frame. Block the rotor brush assembly by placing the 0.012-inch blade of the 74D gauge between the right side of the selector frame and the end of the rotor projecting beyond the nut and a toothpick between the left side of the frame and the adjacent end of the rotor above the shaft. Measure the tension. When checking the tension of the No. 1 brush, the 70J gauge cannot be used. Therefore, the requirement on this brush is met if the tension as determined by feel, using the KS-6320 orange stick, is approximately the same as the tension of another brush which meets the requirement when checked with the 70J gauge. Remove the gauge blade and toothpick, step the selector electrically 180 degrees, and repeat the check.

Two-Piece-Type Feeder Brushes per Fig. 13

*(d) With adjacent brushes held away, the spread of the contact ends of the 2-piece-type brushes shall be approximately 3/8 inch.

Gauge by eye.

The clamped part of the retaining pawl is 3/8 inch wide.

2.14 ***Rotor Brush Tension:*** Fig. 15(A) — The tension of each member of a brush pair, measured at a point approximately midway between the prongs of the brush member with the brushes on the topmost row of terminals, shall be within the limits specified in the charts on pages 16 through 22.

Use the 70J gauge.

To check this requirement, step the selector electrically so that the brushes are on the topmost row of terminals. Block the rotor brush assembly by placing the 0.012-inch blade of the 74D gauge between the right side of the selector frame and the end of the rotor projecting beyond the nut and a toothpick between the left side of the frame and the adjacent end of the rotor above the shaft. Apply the 70J gauge between the prongs of each brush member. Remove the blade and toothpick, step the selector 180 degrees, and repeat the check. On selectors equipped with detachable feeder brushes, it will be satisfactory to check this requirement with the rotor brushes on the detachable feeder brushes instead of on the topmost row of terminals.

2.15 ***Rotor Brush Prong Contact:*** Fig. 15(B) — At least one of the two prongs of each individual brush member shall make contact with the associated bank feeder brush. The other prong shall not be away from the feeder brush more than 0.005 inch. In case the bank feeder brushes have been cut away, this requirement shall apply to the first row of bank terminals.

Gauge by eye.

In doubtful cases, touch the prongs of the brushes with the end of the KS-6320 orange stick and note whether or not both prongs make contact with the bank feeder brush or bank terminal in cases where the feeder brushes are cut away. The feel of the tool will be an aid to the visual check for the requirement.

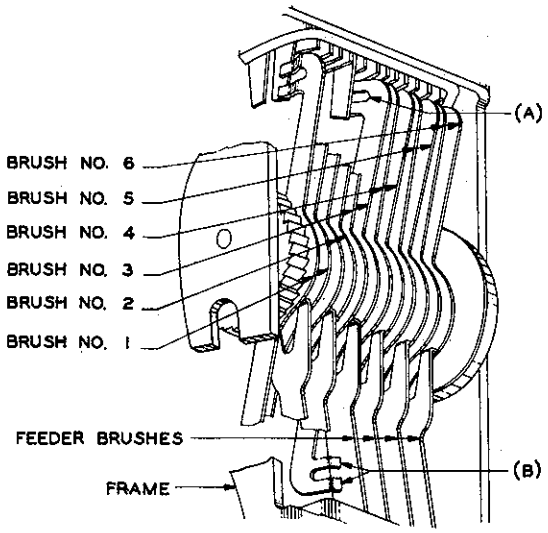

Fig. 15 – Rotor and Feeder Brushes

2.16 ***Toeing of Bridging Brushes:*** Fig. 16(A) — When a bridging rotor brush is not contacting with the feeder brush or bank terminals, both pairs of trailing edges of tips of the brush shall toe out, but the maximum separation between each pair of tips shall not exceed 0.010 inch when the brush members are making contact with each other.

Gauge by eye.

Note: At least one pair of contacting surfaces of the brush shall make contact with each other.

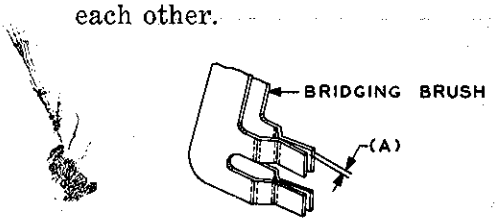

Fig. 16 – Bridging Brush

2.17 ***Heel Spacing***

(a) Fig. 17(A)—The clearance between brush members of adjacent pairs when the brushes are in contact with the bank terminals shall be

Min 0.030 inch

Gauge by eye.

The bank terminals are 0.014 inch thick.

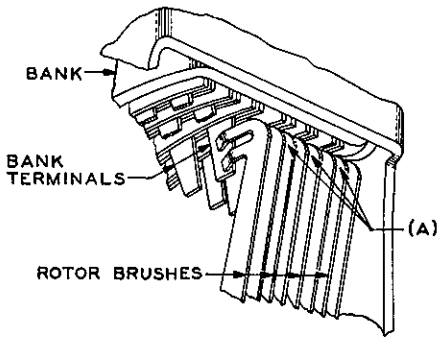

Fig. 17 – Heel Spacing Between Brush Members of Adjacent Pairs

This requirement shall be checked on the topmost row of terminals. On selectors equipped with detachable feeder brushes, it will be satisfactory to check for this requirement on the detachable feeder brushes.

(b) Fig. 18(A) — The heels of the rotor brush members shall clear the sides of the bank feeder brushes just before the rotor brushes engage the feeder brushes by

Min 0.015 inch

Gauge by eye.

The bank terminals are 0.014 inch thick.

In case the bank feeder brushes have been cut away, this requirement shall apply to the first row of bank terminals.

2.18 *False Contacting*

(a) ***Nonbridging Brushes:*** Fig. 19(A) — The clearance between the heels of nonbridging brush members and their associated bank terminals when their contacting edges are in contact with each other between the bank feeder brush and the first bank terminal, the eleventh and twelfth terminals, and the second and third terminals from the top of the bank shall be

Min 0.015 inch

Gauge by eye.

The bank terminals are 0.014 inch thick.

In case the bank feeder brushes have been cut away, this requirement shall apply between the first and second bank terminals.

(b) ***Bridging Brushes:*** Fig. 20(A) — The heels of bridging brushes shall clear the first bank terminal just before the rotor brushes engage the feeder brushes by

Min 0.015 inch

Gauge by eye.

The bank terminals are 0.014 inch thick.

In case the bank feeder brushes have been cut away, this requirement shall apply to the second row of terminals.

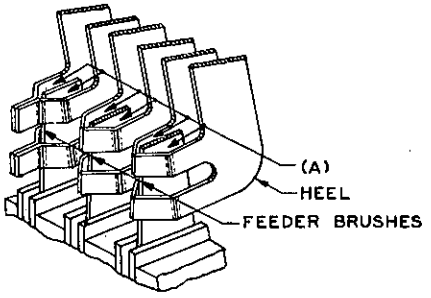

Fig. 18 – Heel Spacing Between Brush Members and Bank Feeder Brushes

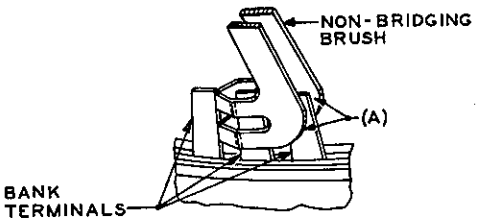

Fig. 19 – Nonbridging Brush

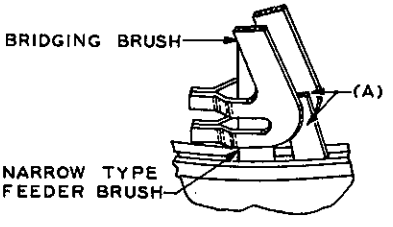

Fig. 20 – Bridging Brush

2.19 ***Clearance Between No. 1 Rotor Brush and Driving Arm:*** The clearance between the No. 1 brush and the driving arm with the rotor brush assembly in the position it assumes after being operated electrically and with the side-play of the armature taken up toward the right as viewed from the front shall be

Min 0.015 inch

Gauge by eye.

The rotor brush members are 0.013 inch thick.

To check this requirement, operate the selector electrically until the No. 1 rotor brush is adjacent to the top edge of the driving arm. Take up the side play of the armature to the right as viewed from the front. Observe the clearance of the No. 1 rotor brush and the top edge of the driving arm. Check the requirement on both halves of the rotor brush assembly.

2.20 ***Driving Spring Tension:*** Fig. 21(A) and 22(A)—The driving spring tension, measured at the standard point of measurement as the driving pawl drops over a ratchet wheel tooth, shall be within limits specified in the charts on pages 16 through 22.

Use the 79B gauge as follows:

> ***Note:*** Fig. 21(B) and 22(B) —The outside interrupter spring shall not be in contact with the driving arm stud when the above requirement is met.

To check this requirement, place a toothpick between the interrupter springs just below the contact point to force the outside interrupter spring away from possible contact with the driving arm stud when the armature is fully operated. Apply the 79B gauge to the standard point of measurement and hold the gauge horizontally. Measure the tension at the instant the driving pawl drops over the next tooth of the ratchet wheel. It is advisable to check the measurement two or three times because of the possibility of the gauge twisting at the point where it is attached to the driving arm.

2.21 ***Armature Bearing Pin Position*** (armature bearing pin without clamp plate): The armature bearing pin shall be approximately centered with respect to the sides of the frame and securely held in position by the frame stiffening bracket and bracket clamp.

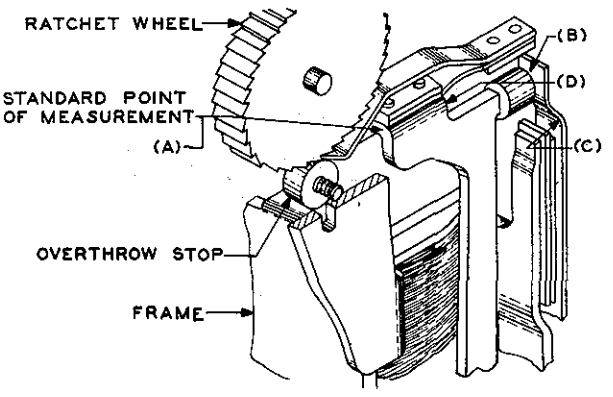

Fig. 21 – Driving Pawl and Associated Parts — 200-, 206-, and 211-Type Selectors

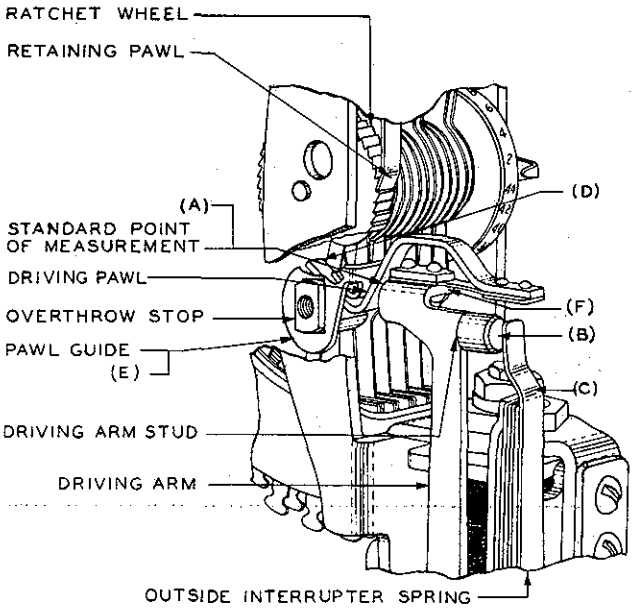

Fig. 22 – Driving Pawl and Associated Parts — 209-Type Selector

2.22 ***Armature Endplay:*** The armature shall have an endplay on its shaft of

Min 0.005 inch

Gauge by eye and feel.

To check this requirement, move the armature from one side to the other and observe the clearance between the armature bearing bushings and the lugs of the frame.

2.23 ***Clearance Between Rear Corners of Armature and Lugs of the Frame:*** Fig. 4(D) — The clearance between the rear corners of the armature and the lugs of the frame shall be

Test — Min 0.003 inch
Readjust — Min 0.005 inch

Use the 74D gauge.

To check this requirement, move the armature toward one lug as far as possible and insert the 74D gauge in the gap between the armature and this lug to measure the clearance at the rear corner. Using the 376A dental mirror, observe the clearance. Move the armature toward the other lug and recheck at that lug.

2.24 ***Contact Alignment:*** The point of contact shall fall wholly within the boundary of the opposing contact.

Gauge by eye.

2.25 ***Position of Inside Interrupter Spring (spring No. 1):*** The long insulator shall be held against the offset end of the bracket by the pressure of the No. 1 contact spring.

Gauge by eye and feel.

2.26 ***Tension of Outside Interrupter Spring (spring No. 2):*** Fig. 21(C) and 22(C) — The tension of the outside interrupter spring (spring No. 2) measured in line with the outside interrupter spring contact shall be within the limits specified in the charts on pages 16 through 22.

Use the 79B gauge.

A small loop of twine may be used to attach the end of the gauge to the outside interrupter spring.

2.27 ***Driving Pawl Tension and Position***

Driving Pawl Tension

(a) The tension of the driving pawl against the ratchet wheel or pawl guide, measured at the bend near the ratchet wheel end of the pawl with the armature in the electrically operated position, shall be

Test — Min 90 grams, Max 150 grams
Readjust — Min 100 grams, Max 140 grams

Use the 70J gauge applied at the right-hand side of the pawl.

Driving Pawl Position

(b) The sides of the driving pawl along its length shall be parallel with the sides of the ratchet wheel.

Gauge by eye.

(c) Fig. 22(D) — The driving edge of the pawl shall be parallel to the axis of the rotor brush assembly.

Gauge by eye.

Check this requirement by observing the motion of the pawl as it is clamped between the ratchet wheel tooth and the overthrow stop by intermittently forcing the rotor brush assembly in the direction of rotation and noting whether or not there is twisting motion of the pawl.

(d) Fig. 7(G) — The tip end of the driving pawl shall in no case extend beyond either edge of the ratchet wheel.

To check this requirement, operate the selector electrically for a complete revolution and then check at four positions approximately 90 degrees apart after stepping the selector electrically to these positions.

2.28 ***Pawl Guide Position, 209-Type Selectors:*** Fig. 22(E)

(a) With the rotor brush assembly rotated forward to take up all rotary play, the following conditions shall be met.

(1) The driving pawl shall advance the rotor assembly only one step with each operation of the armature.

(2) As the armature is slowly released manually from its operated position, the tip of the driving pawl shall clear the top of the tooth adjacent to the tooth which the pawl is about to engage.

Gauge by eye.

(b) With the rotor brush assembly rotated backward to take up all rotary play, the following condition shall be met.

(1) As the armature is slowly released manually from its operated position, before the tip of the pawl strikes the radial face

of the tooth to be engaged it shall contact the front slope of the adjacent tooth.

Gauge by eye.

2.29 ***Magnet Pull Test:*** Fig. 21(D) and 22(F) — When the low voltage specified in the charts on pages 16 through 22, is applied, the selector magnet shall be capable of drawing up the armature so that the driving pawl falls into the next tooth when the pull of the driving spring is supplemented by the pressure specified in the charts applied horizontally with a push gram gauge at a point opposite the standard point of measurement.

Use the 79B or 79C gauge.

> ***Note:*** When checking 209-type selectors, if any difficulty is experienced in meeting this requirement it may be due to heating of the magnet coil, in which case the magnet should be allowed to cool.

2.30 ***Step Test:*** Fig. 21(A) and 22(A) — The selector shall be capable of taking a full step where the rotor brushes step onto the feeder brushes when the load on the driving spring is increased by the application of the tension specified in the charts on pages 16 through 22 applied at the standard point of measurement in a horizontal direction opposed to the pull of the driving spring. This requirement shall be met at both ends of the rotor brushes.

Use the 79B or 79C gauge.

2.31 ***Speed:*** The rotor brushes shall pass over not less than the specified number of terminals per second when the low voltage specified in the charts on pages 16 through 22 is applied across the selector circuit. Determine the speed of the selector by timing five complete revolutions (220 steps) of the rotor brush assembly with the stop watch or equivalent. If the terminals per second (TPS) are not specified in the charts, this requirement shall not apply.

2.32 ***High-Voltage Interrupter Contact Test:*** The selector shall start from the normal position and continue to operate steadily and uniformly when the high voltage specified in the charts on pages 16 through 22 is applied across the selector circuit and when a gauge of the thickness specified in the charts is held between the micarta insulator and the spring stop directly behind the contact on the No. 1 interrupter spring. If no information appears in the charts, this requirement shall not apply.

Use the 74D gauge.

Where "(No Gauge)" appears in the charts, this requirement shall apply, but no gauge shall be inserted behind the contact on the No. 1 interrupter spring.

2.33 ***Low-Voltage Interrupter Contact Test:*** The selector shall start from the normal position and continue to operate steadily and uniformly on the low voltage specified in the charts on pages 16 through 22 when a gauge of the thickness specified in the charts is held between the lip of the No. 2 interrupter spring and the driving arm stud. If no information appears in the charts, this requirement shall not apply.

Use the 74D gauge.

Take care to hold the gauge parallel to the lip of the interrupter spring and not to apply any pressure which would tend either to lift the spring away from the stud or to impede its action.

> ***Note:*** Where "(No Gauge)" appears in the charts, this requirement shall apply, but no gauge shall be held between the lip of the No. 2 interrupter spring and the driving arm stud. All interrupter operation requirements 2.31, 2.32, 2.33, and any special requirements covered by the notes following the charts should be met with the same interrupter adjustment.

2.34 ***Interrupter Contact Break — 209A Selector:*** Fig. 22(B) — With the rotor brush assembly rotated backward far enough to take up all the play between the retaining pawl and the ratchet wheel tooth and with the driving pawl latched in a tooth of the ratchet wheel after manually operating and releasing the selector, the interrupter contacts shall not be open, but shall open with a 0.006-inch gauge between the outside interrupter spring and the driving arm stud. This requirement shall be checked in

four positions of the selector approximately 90 degrees apart.

Use the 74D gauge as follows.

Remove the circuit fuse which supplies battery to the selector circuit. Connect the pin terminals of the KS-14250 L1 flashlight to the interrupter spring terminals by means of two 1W13B cords. Operate the flashlight switch. The flashlight should light. Take up all the play between the retaining pawl and the ratchet wheel tooth by pressing against the rotor brushes in a direction opposite normal rotation. While holding the rotor in this position, manually operate and then partially release the selector armature so that the driving pawl engages the next ratchet wheel tooth. The flashlight should light. Remove the 0.006-inch blade from the holder of the 74D gauge and insert it between the driving arm stud and the outside interrupter spring. Do not hold the blade as this might affect the position of the outside interrupter spring. The flashlight should be extinguished. Remove the flashlight connections and replace the circuit fuse when the requirement is met.

Caution: If the selector test set is connected across the battery bus bar fuse screw and the fuse post stud, as in making voltage tests, do not operate the HV or LV keys of the test set while the flashlight is connected across the interrupter contacts.

2.35 ***Clearance Between Driving Arm Stud and Interrupter Spring*** (applies only to those selectors listed below.)

(a) Fig. 21(B) — Where the interrupter spring (spring No. 2) is connected in a circuit, the clearance between the driving arm stud and this spring shall be:

(1) ***200AA, 200AM, 200AN, 200AS, 200BA, 206S, 206AE, 206AF, 206AJ, 206AN, 206AU, 206AW, 206BA, 206BE, 206BF, 206BN, 206BP, 206BR, 206CK, 209B, 211A, D-78143, D-160593, and D-178258 Selectors Only***

Test — Min 0.035 inch, Max 0.056 inch

Readjust — Min 0.041 inch, Max 0.050 inch

Use the 131A gauge.

(2) ***200E and 206D Selectors Only***

Test — Max 0.012 inch

Readjust — Min 0.004 inch, Max 0.012 inch

Use the 74D gauge.

(b) The selectors covered in (a) shall rotate step by step for two complete revolutions on low voltage.

2.36 ***Variable Requirements:*** The values listed in the following charts shall apply in checking any requirements calling for the application of high or low voltage and in checking 2.14 (Rotor Brush Tension), 2.20 (Driving Spring Tension), 2.26 (Tension of Outside Interrupter Spring), 2.29 (Magnet Pull Test), 2.30 (Step Test), 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), and 2.33 (Low-Voltage Interrupter Contact Test). In addition, any requirements covered in the notes on page 23 shall apply to selectors as indicated in the charts.

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS) BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6	2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							45- to 50- Volt Selectors												
206A 200B	26A,26D 10B,10E	1	T	Min		50	20	20	20	20	20	20	800	100	50	150	20	0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300	20		
				Max	44		40	40	40	40	40	40		400					
206A 200B	26A 10B	2	T	Min		50	30	20	20	20	20	20	800	100	45	150	20	0.003 inch	0.003 inch
				Max	45		50	40	40	40	40	40		400					
			R	Min		51	35	25	25	25	25	25	800	100	50	300	20		
				Max	44		50	40	40	40	40	40		400					
206B 200A	26A,26B 10A,10B		T	Min		50	15	15	25	25	15	15	800	100	50	150	40	(No Gauge)	0.002 inch
				Max	45		35	35	45	45	35	35		400					
			R	Min		51	20	20	30	30	20	20	800	100	50	300	40		
				Max	44		35	35	45	45	35	35		400					
206C 200D	26D 10E		T	Min		50	15	15	15	15	15	15	500	100	225	75		(No Gauge)	0.002 inch
				Max	45		35	35	35	35	35	35	600	400					
			R	Min		51	20	20	20	20	20	20	500	100	250	150			
				Max	44		35	35	35	35	35	35	600	400					
206D 200E	26C 10D		T	Min			20	20					550	45	300	150			
				Max	45		40	40					650	65					
			R	Min			25	25					550	45	300	300			
				Max	44		40	40					650	65					
206E 200F	26A 10B	3	T	Min		50	20	20	20	20	20	20	700	100	150	100	30	(No Gauge)	0.002 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	700	100	150	200	30		
				Max	44		40	40	40	40	40	40		400					
206G 200H	26A,26D 10E	3	T	Min		50	30	20	20	20	20	20	750	100	45	150	20	0.003 inch	0.003 inch
				Max	45		50	40	40	40	40	40		400					
			R	Min		51	35	25	25	25	25	25	750	100	50	300	20		
				Max	44		50	40	40	40	40	40		400					
206J 200K	26D 10E	4	T	Min		50	15	15	15	15	15	15	500	100	225	75		(No Gauge)	0.002 inch
				Max	45		35	35	35	35	35	35	600	400					
			R	Min		51	20	20	20	20	20	20	500	100	250	150			
				Max	44		35	35	35	35	35	35	600	400					
206J 200K	26D 10E	5	T	Min		50	25	15	15	15	15	15	500	100	135	75		(No Gauge)	0.002 inch
				Max	45		50	35	35	35	35	35	700	400					
			R	Min		51	35	20	20	20	20	20	500	100	150	150			
				Max	44		50	35	35	35	35	35	700	400					
206K 200L	26A,26D 10B,10E		T	Min		50	20	20	20	20	20	20	800	100	50	150		(No Gauge)	0.002 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206L 200M	26A,26D 10B,10E		T	Min		50	20	20	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206M 200P	26A 10B		T	Min		50	20	20	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206N 200R	26E 10F		T	Min		50	20	20	20	20			800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40				400					
			R	Min		51	25	25	25	25			800	100	50	300			
				Max	44		40	40	40	40				400					
206P 200S	26A,26D 10B,10E		T	Min		50	25	25	25	25	25	25	800	100	50	150	20	0.003 inch	0.003 inch
				Max	45		45	45	45	45	45	45		400					
			R	Min		51	30	30	30	30	30	30	800	100	50	300	20		
				Max	44		45	45	45	45	45	45		400					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS) BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6	2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							45- to 50-Volt Selectors (cont)												
200T	26A,26D 10B,10E		T	Min		50	20	20	20	20	20	20	500	100	150	75		(No Gauge)	0.002 inch
				Max	45		40	40	40	40	40	40	700	400					
			R	Min		51	25	25	25	25	25	25	500	100	150	150			
				Max	44		40	40	40	40	40	40	700	400					
206R 200U	26A,26D 10B,10E		T	Min		50	20	20	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206S 200AA	26A 10B		T	Min			20	20	20	20	20	20	800	100	50	150			
				Max	45		40	40	40	40	40	40		400					
			R	Min			25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206W 200AE	26D 10E		T	Min		50	15	15	15	15	15	15	500	100	150	75		(No Gauge)	0.002 inch
				Max	44		35	35	35	35	35	35	600	400					
			R	Min		51	20	20	20	20	20	20	500	100	150	150			
				Max	43		35	35	35	35	35	35	600	400					
206Y 200AF	26D 10E		T	Min		50	30	20	20	20	20	20	800	100	50	150	20	(No Gauge)	0.002 inch
				Max	45		50	40	40	40	40	40		400					
			R	Min		51	35	25	25	25	25	25	800	100	50	300	20		
				Max	44		50	40	40	40	40	40		400					
206AA 200AG	26D 10E		T	Min		50	15	15	15	15	15	15	500	100	150	75		(No Gauge)	0.002 inch
				Max	44		35	35	35	35	35	35	600	400					
			R	Min		51	20	20	20	20	20	20	500	100	150	150			
				Max	43		35	35	35	35	35	35	600	400					
206AB 200AH	26A,26D 10B,10E		T	Min		50	20	20	20	20	20	20	800	100	50	150		(No Gauge)	0.002 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206AD 200AK	26E 10F		T	Min		50	20	20	20	20			800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40				400					
			R	Min		51	25	25	25	25			800	100	50	300			
				Max	44		40	40	40	40				400					
206AE 200AM	26E 10J		T	Min			20	20	20	20			550	100	50	75			
				Max	45		35	35	35	35			650	400					
			R	Min			25	25	25	25			550	100	50	150			
				Max	44		40	40	40	40			650	400					
206AF 200AN	26A,26D 10B,10E		T	Min			30	20	20	20	20	20	800	100	50	150			
				Max	45		50	40	40	40	40	40		400					
			R	Min			35	25	25	25	25	25	800	100	50	300			
				Max	44		50	40	40	40	40	40		400					
206AJ 200AS	26E 10J		T	Min			20	20	20	20			550	100	50	75			
				Max	45		40	40	40	40			650	300					
			R	Min			25	25	25	25			550	100	50	150			
				Max	44		40	40	40	40			650	300					
206AL 200AW	26F 10K		T	Min		50	20	20	20	20	20		800	100	50	150	20	0.003 inch	0.003 inch
				Max	45		40	40	40	40	40			300					
			R	Min		51	25	25	25	25	25		800	100	50	300	20		
				Max	44		40	40	40	40	40			300					
206AM 200AY	26D 10E		T	Min		50	20	20	20	20	20	20	700	100	200	100		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40	800	300					
			R	Min		51	25	25	25	25	25	25	700	100	200	200			
				Max	44		40	40	40	40	40	40	800	300					
206AP 200BB	26C 10D		T	Min		50	20	20					800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40						300					
			R	Min		51	25	25					800	100	50	300			
				Max	44		40	40						300					
206AU	26H		T	Min			20	20	20	25	25	30	800	100	50	150			
				Max	45		40	40	40	45	45	50		300					
			R	Min			25	25	25	30	30	35	800	100	50	300			
				Max	44		40	40	40	45	45	50		300					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS) BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6	2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							45- to 50-Volt Selectors (cont)												
206AW	26G		T	Min			30	25	25				800	100	50	150			
				Max	45		50	45	45					300					
			R	Min			35	30	30				800	100	50	300			
				Max	44		50	45	45					300					
206BC	26F		T	Min		50	30	25	25	25	25		1000	100	50	100	30	0.002 inch	0.002 inch
				Max	45		50	45	45	45	45			300					
			R	Min		51	35	30	30	30	30		1000	100	50	200	30		
				Max	44		50	45	45	45	45			300					
206BD	26G		T	Min		50	30	25	25				1000	100	50	150	30	0.002 inch	0.002 inch
				Max	45		50	45	45					300					
			R	Min		51	35	30	30				1000	100	50	300	30		
				Max	44		50	45	45					300					
206BL	26F		T	Min		50	30	25	25	25	25		1000	100	50	100	30	0.002 inch	0.002 inch
				Max	45		50	45	45	45	45			300					
			R	Min		51	35	30	30	30	30		1000	100	50	200	30		
				Max	44		50	45	45	45	45			300					
206BP	26A		T	Min			25	25	25	25	30	30	800	100	50	150			
				Max	45		45	45	45	45	50	50		300					
			R	Min			30	30	30	30	35	35	800	100	50	300			
				Max	44		45	45	45	45	50	50		300					
206BR	26A		T	Min			25	25	25	25	30	30	1000	100	50	150			
				Max	45		45	45	45	45	50	50		300					
			R	Min			30	30	30	30	35	35	1000	100	50	300			
				Max	44		45	45	45	45	50	50		300					
206CE	26A		T	Min		50	25	25	25	25	25	25	750	100	90	150	35	0.003 inch	0.003 inch
				Max	45		45	45	45	45	45	45		300					
			R	Min		51	30	30	30	30	30	30	750	100	90	300	35		
				Max	44		45	45	45	45	45	45		300					
206CF	26A	3	T	Min		50	20	20	20	20	20	20	800	100	150	100	30	(No Gauge)	0.002 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	150	200	30		
				Max	44		40	40	40	40	40	40		400					
206CJ	26A	12	T	Min			30	30	20	20	20	20	800	100	50	150			
				Max	45		50	50	40	40	40	40		200					
			R	Min			35	35	25	25	25	25	800	100	50	300			
				Max	44		50	50	40	40	40	40		200					
206CK	26A		T	Min			30	20	20	20	20	20	800	100	50	150			
				Max	45		50	40	40	40	40	40		400					
			R	Min			35	25	25	25	25	25	800	100	50	300			
				Max	44		50	40	40	40	40	40		400					
206CL	26E		T	Min		50	20	20	20	20			800	100	50	100		(No Gauge)	0.002 inch
				Max	45		40	40	40	40				300					
			R	Min		51	25	25	25	25			800	100	50	200			
				Max	44		40	40	40	40				300					
206CM	26A	9	T	Min		50	20	20	20	20	20	20	800	150	50	100		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		300					
			R	Min		51	25	25	25	25	25	25	800	150	50	200			
				Max	44		40	40	40	40	40	40		300					
206CN	26A		T	Min		50	20	20	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	45		40	40	40	40	40	40		400					
			R	Min		51	25	25	25	25	25	25	800	100	50	300			
				Max	44		40	40	40	40	40	40		400					
206CP	26A	10	T	Min		50	25	25	25	25	25	25	800	100	50	150		0.003 inch	0.003 inch
				Max	45		45	45	45	45	45	45		200					
			R	Min		51	30	30	30	30	30	30	800	100	50	300			
				Max	44		45	45	45	45	45	45		200					
211A	32A		T	Min			20	20	20	25	25	30	800	100	50	150			
				Max	45		40	40	40	45	45	50		300					
			R	Min			25	25	25	30	30	35	800	100	50	300			
				Max	44		40	40	40	45	45	50		300					
211C	32C		T	Min		50	25	25	25	25	25	25	750	100	90	150	30	0.003 inch	0.003 inch
				Max	45		45	45	45	45	45	45		300					
			R	Min		51	30	30	30	30	30	30	750	100	90	300	30		
				Max	44		45	45	45	45	45	45		300					
D-178258	26F	11	T	Min			30	25	25	20	20		1000	150	50	100			
				Max	45		50	45	45	40	40			300					
			R	Min			35	30	30	25	25		1000	150	50	200			
				Max	44		50	45	45	40	40			300					
209A	26A	13	T	Min		50	25	25	25	25	25	25	800	100	50	150		(See Note 13)	(No Gauge)
				Max	35		45	45	45	45	45	45		300					
			R	Min		51	30	30	30	30	30	30	800	100	50	300			
				Max	33		45	45	45	45	45	45		300					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS) BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6	2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							45- to 50-Volt Selectors (cont)												
209B D-160593	26D		T	Min			20	20	20	20	20	20	900	100	100	200			
				Max	45		40	40	40	40	40	40		300					
			R	Min			25	25	25	25	25	25	900	100	100	400			
				Max	43		40	40	40	40	40	40		300					
D-78143	D-78142		T	Min			20	20	20	20			550	100	50	75			
				Max	45		35	35	35	35			650	400					
			R	Min			25	25	25	25			550	100	50	150			
				Max	44		35	35	35	35			650	400					
D-78677	D-78676		T	Min		50	15	15	15	15	15	15	500	100	180	75		(No Gauge)	0.002 inch
				Max	45		35	35	35	35	35	35	600	400					
			R	Min		51	20	20	20	20	20	20	500	100	200	150			
				Max	44		35	35	35	35	35	35	600	400					
							45- to 52-Volt Selectors												
D-80449	26A 10B		T	Min		52	25	25	20	20	20	20	950	100	50	75	30	0.002 inch	0.002 inch
				Max	45		45	45	40	40	40	40		300					
			R	Min		53	30	30	25	25	25	25	950	100	50	150	30		
				Max	44		45	45	40	40	40	40		300					
D-161367	26F		T	Min		56	30	25	20	20	25		800	100	50	100	30	0.002 inch	0.002 inch
				Max	40		50	45	40	40	45			300					
			R	Min		57	35	30	25	25	30		800	100	50	200	30		
				Max	39		50	45	40	40	45			300					
							44- to 52-Volt Selectors												
206BW	26G		T	Min		52	30	20	20				800	100	50	150		0.003 inch	0.003 inch
				Max	44		50	40	40					300					
			R	Min		53	35	25	25				800	100	50	300			
				Max	43		50	40	40					300					
206BY	26E		T	Min		52	30	20	20	20			800	100	50	150		0.003 inch	0.003 inch
				Max	44		50	40	40	40				300					
			R	Min		53	35	25	25	25			800	100	50	300			
				Max	43		50	40	40	40				300					
206CA	26F		T	Min		52	20	20	20	20	20		800	100	50	150		0.003 inch	0.003 inch
				Max	44		40	40	40	40	40			300					
			R	Min		53	25	25	25	25	25		800	100	50	300			
				Max	43		40	40	40	40	40			300					
206CC	26F		T	Min		52	20	20	20	20	20		800	100	50	100		0.003 inch	0.003 inch
				Max	44		40	40	40	40	40			300					
			R	Min		53	25	25	25	25	25		800	100	50	200			
				Max	43		40	40	40	40	40			300					
211B	32B		T	Min		52	30	20	20	20			800	100	50	150		0.003 inch	0.003 inch
				Max	44		50	40	40	40				300					
			R	Min		53	35	25	25	25			800	100	50	300			
				Max	43		50	40	40	40				300					
							40- to 56-Volt Selectors												
206G 200H	26A,26D 10E	6	T	Min		56	20	20	20	20	20	20	750	100	50	150	20	0.003 inch	0.003 inch
				Max	40		40	40	40	40	40	40		400					
			R	Min		56	25	25	25	25	25	25	750	100	50	300	20		
				Max	40		40	40	40	40	40	40		400					
206H 200J	26A,26D 10B,10E		T	Min		56	20	20	20	20	20	20	750	100	50	150	20	0.003 inch	0.003 inch
				Max	40		40	40	40	40	40	40		400					
			R	Min		56	25	25	25	25	25	25	750	100	50	300	20		
				Max	40		40	40	40	40	40	40		400					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS) BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6	2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							40- to 56-Volt Selectors (cont)												
206J 200K	26D 10E	7	T	Min		56	15	15	15	15	15	15	500	100	45	75		(No Gauge)	0.002 inch
				Max	40		35	35	35	35	35	35	650	400					
			R	Min		56	20	20	20	20	20	20	500	100	50	150			
				Max	40		35	35	35	35	35	35	650	400					
206AY	26D		T	Min		56	15	15	15	15	15	15	550	100	75	100		(No Gauge)	0.002 inch
				Max	40		35	35	35	35	35	35		300					
			R	Min		56	20	20	20	20	20	20	550	100	75	200			
				Max	40		35	35	35	35	35	35		300					
206BS	26E		T	Min		56	15	15	15	15			550	100	75	100		(No Gauge)	0.002 inch
				Max	40		35	35	35	35				300					
			R	Min		56	20	20	20	20			550	100	75	200			
				Max	40		35	35	35	35				300					
206CB	26D		T	Min		56	15	15	15	15	15	15	550	100	75	100		(No Gauge)	0.002 inch
				Max	40		35	35	35	35	35	35		300					
			R	Min		56	20	20	20	20	20	20	550	100	75	200			
				Max	40		35	35	35	35	35	35		300					
							36- to 44-Volt Selectors												
206T 200AB	26A 10E		T	Min		44	20	20	20	20	20	20	800	100	50	150	20	(No Gauge)	0.002 inch
				Max	36		40	40	40	40	40	40		400					
			R	Min		45	25	25	25	25	25	25	800	100	50	300	20		
				Max	35		40	40	40	40	40	40		400					
206U 200AC	26D 10E		T	Min		44	15	15	15	15	15	15	600	100	50	125		(No Gauge)	0.002 inch
				Max	36		35	35	35	35	35	35	700	300					
			R	Min		45	20	20	20	20	20	20	600	100	50	250			
				Max	35		35	35	35	35	35	35	700	300					
							20- to 25-Volt Selectors												
206E 200F	26A 10E	8	T	Min		25½	30	20	20	20	20	20	700	100	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		400					
			R	Min		25½	35	25	25	25	25	25	700	100	150	200	30		
				Max	20		50	40	40	40	40	40		400					
206F 200G	26D 10E	9	T	Min		25	30	20	20	20	20	20	700	150	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		300					
			R	Min		25	35	25	25	25	25	25	700	150	150	200	30		
				Max	20		50	40	40	40	40	40		300					
206AC 200AJ	26D 10E		T	Min		25½	30	20	20	20	20	20	700	100	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		400					
			R	Min		25½	35	25	25	25	25	25	700	100	150	200	30		
				Max	20		50	40	40	40	40	40		400					
206CF	26A	8	T	Min		25½	30	20	20	20	20	20	800	100	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		400					
			R	Min		25½	35	25	25	25	25	25	800	100	150	200	30		
				Max	20		50	40	40	40	40	40		400					
206CG	26D	9	T	Min		25	30	20	20	20	20	20	800	150	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		300					
			R	Min		25	35	25	25	25	25	25	800	150	150	200	30		
				Max	20		50	40	40	40	40	40		300					
206CH	26D		T	Min		25½	30	20	20	20	20	20	800	100	135	100	30	(No Gauge)	0.002 inch
				Max	20		50	40	40	40	40	40		400					
			R	Min		25½	35	25	25	25	25	25	800	100	150	200	30		
				Max	20		50	40	40	40	40	40		400					
D-78683 D-87398	10L D-78684 26G		T	Min		25	30	25	25				550	100	50	75		(No Gauge)	0.002 inch
				Max	20		45	40	40				650	400					
			R	Min		26	35	30	30				550	100	50	150			
				Max	19		45	40	40				650	400					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS)						2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6							
							20- to 28-Volt Selectors												
206AG 200AP	26E 10F		T	Min		28	30	25	25	25			800	100	50	100	20	0.003 inch	0.003 inch
				Max	20		50	45	45	45				300					
			R	Min		29	35	30	30	30			800	100	50	200	20		
				Max	19		50	45	45	45				300					
206AH 200AR	26C 10D		T	Min		28	30	30					600	100	150	75		0.003 inch	0.003 inch
				Max	20		50	50					700	300					
			R	Min		29	35	35					600	100	150	150			
				Max	19		50	50					700	300					
206AK 200AU	26D 10E		T	Min		28	15	15	15	15	15	15	650	200	200	75		0.005 inch	(No Gauge)
				Max	20		30	30	30	30	30	30	700	300					
			R	Min		29	20	20	20	20	20	20	650	200	200	150			
				Max	19		35	35	35	35	35	35	700	300					
206AN 200BA	26G 10L		T	Min			30	25	25				800	100	50	150			
				Max	20		50	45	45					300					
			R	Min			35	30	30				800	100	50	300			
				Max	19		50	45	45					300					
206AR 200BC	26E 10F		T	Min		28	20	20	20	30			800	100	50	150		0.003 inch	0.003 inch
				Max	20		40	40	40	50				300					
			R	Min		29	25	25	25	35			800	100	50	300			
				Max	19		40	40	40	50				300					
206AS 200BD	26A 10B		T	Min		28	30	30	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	20		50	50	40	40	40	40		300					
			R	Min		29	35	35	25	25	25	25	800	100	50	300			
				Max	19		50	50	40	40	40	40		300					
206AT 200BE	26D 10E		T	Min		28	30	20	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	20		50	40	40	40	40	40		300					
			R	Min		29	35	25	25	25	25	25	800	100	50	300			
				Max	19		50	40	40	40	40	40		300					
206BA	26A		T	Min			25	25	25	25	30	30	800	100	50	150			
				Max	20		45	45	45	45	50	50		300					
			R	Min			30	30	30	30	35	35	800	100	50	300			
				Max	19		45	45	45	45	50	50		300					
206BB	26A		T	Min		28	25	25	25	25	25	25	900	100	50	150		0.003 inch	0.003 inch
				Max	20		45	45	45	45	45	45		300					
			R	Min		29	30	30	30	30	30	30	900	100	50	300			
				Max	19		45	45	45	45	45	45		300					
206BE	26A		T	Min			25	25	25	25	25	25	900	100	50	150			
				Max	20		45	45	45	45	45	45		300					
			R	Min			30	30	30	30	30	30	900	100	50	300			
				Max	19		45	45	45	45	45	45		300					
206BF	26A,26K		T	Min			30	30	30	30	30	30	800	100	50	150			
				Max	20		50	50	50	50	50	50		300	150				
			R	Min			35	35	35	35	35	35	800	100	50	300			
				Max	19		50	50	50	50	50	50		300	150				
206BG	26D,26J		T	Min		28	30	30	20	20	20	20	900	100	50	150		0.003 inch	0.003 inch
				Max	20		50	50	40	40	40	40		300					
			R	Min		29	35	35	25	25	25	25	900	100	50	100			
				Max	19		50	50	40	40	40	40		300					
206BH	26D,26J		T	Min		28	30	30	20	20	20	20	900	100	50	150		0.003 inch	0.003 inch
				Max	20		50	50	40	40	40	40		300					
			R	Min		29	35	35	25	25	25	25	900	100	50	300			
				Max	19		50	50	40	40	40	40		300					
206BK	26C		T	Min		28	20	20					550	100	50	150		0.003 inch	0.003 inch
				Max	20		40	40						300					
			R	Min		29	25	25					550	100	50	200			
				Max	19		40	40						300					
206BM D-81007	26A		T	Min		28	20	20	20	20	20	20	900	100	50	150		0.002 inch	0.002 inch
				Max	20		40	40	40	40	40	40		300					
			R	Min		29	25	25	25	25	25	25	900	100	50	300			
				Max	19		40	40	40	40	40	40		300					

SELECTOR	BANK	SEE NOTE			LOW VOLTAGE	HIGH VOLTAGE	2.14 (ROTOR BRUSH TENSION) (GRAMS)						2.20 (DRIVING SPG TENS.) (GRAMS)	2.26 (TENS. OF OUT. INT SPG)	2.29 (MAGNET PULL TEST) (GRAMS)	2.30 (STEP TEST) (GRAMS)	2.31 (SPEED) (TPS)	2.32 (HIGH-VOLT. INT CONT TEST) (GAUGE)	2.33 (LOW-VOLT. INT CONT TEST) (GAUGE)
							BR No. 1	BR No. 2	BR No. 3	BR No. 4	BR No. 5	BR No. 6							
20- to 28-Volt Selectors (cont)																			
206BN	26F		T	Min			30	20	20	20	20		900	100	50	150			
				Max	20		50	40	40	40	40			300					
			R	Min			35	25	25	25	25		900	100	50	300			
				Max	19		50	40	40	40	40			300					
206BT	26G		T	Min		28	30	25	25				800	100	50	150		0.003 inch	0.003 inch
				Max	20		50	45	45					300					
			R	Min		29	35	30	30				800	100	50	300			
				Max	19		50	45	45					300					
206BU	26A	10	T	Min		28	30	30	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	20		50	50	40	40	40	40		200					
			R	Min		29	35	35	25	25	25	25	800	100	50	300			
				Max	19		50	50	40	40	40	40		200					
D-87399	26E		T	Min		28	25	20	20	25			800	100	50	100	20	0.003 inch	0.003 inch
				Max	20		45	40	40	45				300					
			R	Min		29	30	25	25	30			800	100	50	200	20		
				Max	19		45	40	40	45				300					
D-88325	26A	10	T	Min		28	30	30	20	20	20	20	800	100	50	150		0.003 inch	0.003 inch
				Max	20		50	50	40	40	40	40		200					
			R	Min		29	35	35	25	25	25	25	800	100	50	300			
				Max	19		50	50	40	40	40	40		200					
15- to 21-Volt Selectors																			
206BJ	26C		T	Min		21	20	20					650	100	100	125		0.003 inch	0.003 inch
				Max	15		40	40					750	300					
			R	Min		22	25	25					650	100	100	250			
				Max	14		40	40					750	300					

Notes

1. These requirements shall apply for all uses other than as sender selector and district selector in district and suburban sender selector circuits.

2. These requirements shall apply only when selector is used as sender selector and district selector in district and suburban sender selector circuits.

3. These requirements shall apply only when selector is used in offices where the rated voltage is 45 to 50 volts.

4. These requirements shall apply only when selector is used as a numerical register switch in subscriber sender circuits.

5. These requirements shall apply only when selector is used as a hunting switch in local tandem sender circuits.

6. These requirements shall apply only when selector is used in offices where the rated voltage is 40 to 56 volts.

7. These requirements shall apply for all uses other than as a numerical register switch in subscriber sender circuits and as a hunting switch in local tandem sender circuits.

8. These requirements shall apply only when selector is used in offices where the rated voltage is 20 to 25 volts.

9. (a) The contacts of springs No. 3 and 4 shall make before the contacts of springs No. 1 and 2 break. This requirement may be omitted if springs No. 3 and 4 are not used in the circuit.

   (b) The tension of spring No. 3 against its stop, measured approximately 3/64 inch from the free end of the spring, shall be

   Min 40 grams, Max 60 grams

   Use the 79C gauge.

   (c) The contact pressure between springs No. 3 and 4 measured when the selector is operated, shall be

   Min 50 grams, Max 150 grams

   Use the 79C gauge.

10. (a) The pressure of spring No. 4 measured at the contact shall be

    Min 45 grams, Max 65 grams

    Use the 79C gauge.

    (b) The clearance between the rubber stud and spring No. 4 shall be

    Min 0.030 inch, Max 0.040 inch

    Use the 87B and 112A gauges.

    (c) When the armature is operated, the clearance between springs No. 2 and 3 shall be approximately 1/16 inch.

    Gauge by eye.

    Clamp plate on interrupter-spring pile-up is 1/16 inch thick.

11. (a) The tension of spring No. 3 against its stop, measured approximately 3/64 inch from the free end of the spring, shall be

    Min 40 grams, Max 60 grams

    Use the 79C gauge.

    (b) The contact pressure on spring No. 4, measured when the selector is operated, shall be

    Min 50 grams, Max 150 grams

    Use the 79C gauge.

12. (a) The pressure of spring No. 3 against the driving arm stud measured just above the stud shall be

    Min 30 grams, Max 100 grams

    Use the 79C gauge.

    (b) The separation between the contacts of the No. 2 and 3 springs when the selector is normal shall be

    Min 0.030 inch, Max 0.050 inch

    Use the 112A and KS-6938 gauges.

13. While making the high-voltage interrupter contact test (requirement 2.32), a gauge of the value specified below shall be held between the armature and core.

    Test — 0.003 inch
    Readjust — 0.004 inch

    Use the KS-6909 gauge.

3. ADJUSTING PROCEDURES

3.001 *List of Tools, Gauges, Materials, and Test Apparatus*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
243	3/16- and 5/8-Inch Hex. Closed Double-End Flat Wrench
303	Spring Adjuster
325B	Adjuster
344	Offset Screwdriver
359	Magnet Core and Armature Cleaning Tool
363 (2 reqd)	Spring Adjuster
376A	Dental Mirror
379A	Adjuster
417A	1/4- and 3/8-Inch Hex. Open Double-End Flat Wrench
425A	Selector Holder
456A	Adjuster
485A	Smooth-Jaw Pliers
510C	Portable Lamp [must be equipped with 561A straight tip and W2CB (24V) or W2BL (48V) cord]
541A	1/4-Inch 12-Point Double-End Box Wrench
573A	3/4-Inch Single-End Box Wrench
622A	Selector Holder
KS-6320	Orange Stick
KS-7782	Parallel-Jaw Pliers
KS-8097	7/16- and 5/8-Inch 12-Point Offset Box Wrench
KS-14164	Brush
KS-14250 L1	Flashlight (equipped with two dry cells)
R-1760	Frame and Armature Adjuster
—	3-Inch C Screwdriver
— (2 reqd)	P-Long-Nose Pliers
GAUGES	
70J	0-150 Gram Gauge
74D	Thickness Gauge Nest (consists of a nest of 75-type gauges)
79B	0-1000 Gram Push-Pull Tension Gauge
79C	0-200 Gram Push-Pull Tension Gauge
87B	0.030- and 0.045-Inch Double-End Thickness Gauge
92J	0.030-Inch Nonmagnetic Offset Thickness Gauge
112A	0.040- and 0.050-Inch Double-End Thickness Gauge
131A	Thickness Gauge Nest (consists of a nest of 132-type gauges)
KS-3008	Stopwatch (or equivalent watch with second hand)
KS-6909	Thickness Gauge Nest
KS-6938	Thickness Gauge Nest
MATERIALS	
KS-7860	Petroleum Spirits
KS-14666	Cloth
KS-16832 L2	Lubricant
—	Hardwood Toothpick, Flat at One End and Pointed at Other
—	No. 29 Aloxite Sleeving
—	No. 30 Oiled Sleeving
—	No. 32 Aloxite Sleeving
—	No. 33 Oiled Sleeving

CODE OR SPEC NO.	DESCRIPTION
TEST APPARATUS	
32A	Test Set
J94706	200- and 206-Type Selector Test Set per SD-90013-01
1W13B (2 reqd)	Cord
—	Battery Control Test Set (wagon type) for Testing 200- and 206-Type Selectors in Panel Offices
—	Portable Test Set for Testing 200- and 206-Type Selectors in Key Indicator and Step-by-Step Call Indicator Offices

3.002 ***Use of 425A and 622A Selector Holders:*** In general, when making adjustments on selectors which are nonrigidly mounted, which necessitates placing an excessive strain on the mounting, such as in adjusting the driving spring lug for requirement 2.20 (Driving Spring Tension), use the 425A selector holder on flat-type mounting plates or the 622A selector holder on channel-type mounting plates to hold the selector by putting the selector holder in place as shown in Fig. 23 or 24 and tightening the thumbscrew.

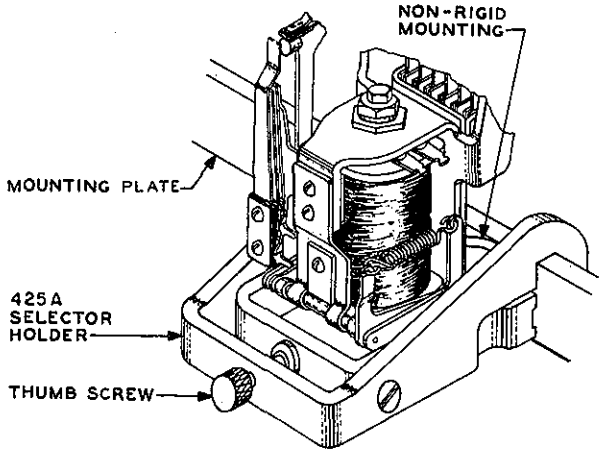

Fig. 23 – 425A Selector Holder in Place on Nonrigidly Mounted Selector on Flat-Type Mounting Plate

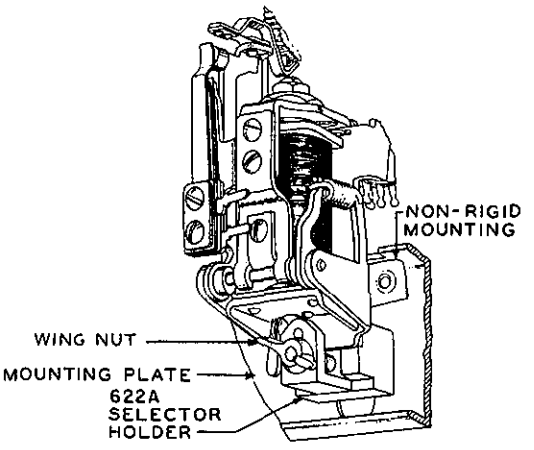

Fig. 24 – 622A Selector Holder in Place on Nonrigidly Mounted Selector on Channel-Type Mounting Plate

3.01 ***Cleaning*** (Reqt 2.01)

(1) ***Ratchet Wheel and Armature Bearing:*** If there is an accumulation of gummy oil or foreign matter on the ratchet wheel or armature bearings, apply KS-7860 petroleum spirits very sparingly with the KS-16164 brush to soften this matter. Take care to keep the petroleum spirits from coming in contact with the spoolheads of the magnet or with any part of the bank or rotor brush assemblies. Use a clean, dry KS-14666 cloth to remove this matter from the armature bearings and from the teeth and sides of the ratchet wheel. Wipe off any accumulation of old lubricant below the overthrow stop. Then lubricate parts as covered in 3.03.

(2) ***Magnet Core Gap:*** Insert the 359 cleaning tool between the armature and the core and apply sufficient pressure to the bottom of the armature to force it upward against the cleaning tool, as shown in Fig. 25. Then forcibly withdraw the cleaning tool. Repeat this operation several times, using first one flat surface of the tool and then the other, to remove dust and loose galvanizing scales that may have accumulated between the armature and the core.

Note: If a new 359 cleaning tool is to be used, check whether the tool is covered with a protective film of oil. If this condition exists, remove the film with KS-7860 petroleum spirits applied on a KS-14666 cloth.

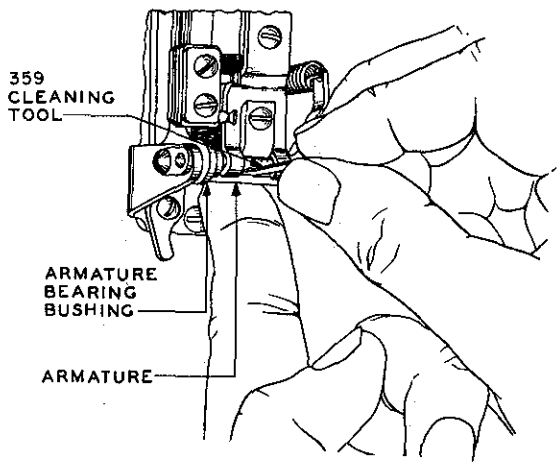

Fig. 25 – Method of Cleaning Adjacent Surfaces of Magnet Core and Armature

(3) ***Interrupter Contacts:*** Clean the interrupter contacts as covered in Section 069-306-801.

3.02 ***Treatment of Banks and Rotors*** (Reqt 2.02)

(1) If necessary, clean and treat the rotor and bank terminals as covered in Section 069-330-801.

3.03 ***Lubrication*** (Reqt 2.03)

(1) Make sure the container of KS-16832 L2 lubricant has been shaken as covered in 1.05.

(2) Before applying lubricant, clean and remove accumulations from the selector parts as covered in 3.01(1).

(3) ***Rotor Bearings:*** Shift the rotor on the shaft to take up the endplay of the rotor toward one side of the selector and apply the specified quantity of lubricant through the hole in the side of the frame. Press the rotor from side to side a few times to aid the lubricant in reaching the bearing surfaces. On selectors not provided with this hole, apply the lubricant as shown in Fig. 26. Take up the endplay of the rotor in the opposite direction and similarly apply the specified quantity of lubricant to the other bearing.

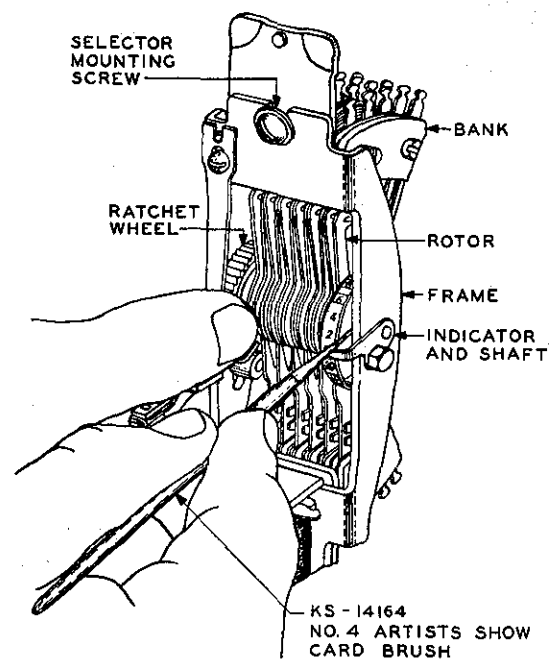

Fig. 26 – Method of Lubricating Rotor Bearing When Lubricating Hole Is Not Provided

(4) ***Armature Bearings:*** Apply the specified quantity of lubricant to each side of each bearing.

(5) ***All Bearings:*** After lubricant has been applied, rotate the selector several revolutions under self-interruptions or step by step, depending upon the wiring arrangement of the selector circuit, in order to distribute the lubricant more evenly over the bearings

Surfaces of Ratchet Wheel Teeth

(6) Apply the specified quantity of lubricant to the surfaces of the ratchet wheel teeth just below the retaining pawl while the selector is rotating. Exercise care in applying the lubricant to prevent its getting on the rotor brushes.

(7) ***Overthrow Stop:*** Electrically energize the selector and apply the specified quantity of lubricant to the overthrow stop.

3.04 ***Record of Lubrication*** (Reqt 2.04) (no procedure)

3.05 ***Alignment of Tips of Rotor Brushes*** (Reqt 2.05)

(1) If the requirement is not met, the indications are that the rotor brushes are loose in the assembly. In this case, replace the rotor brush assembly with a new one as covered in Section 026-706-801.

3.06 ***Armature Backstop Position*** (Reqt 2.06)

(1) If the armature backstop is incorrectly mounted on the selector, remove the mounting screw, using the 3-inch C screwdriver and remount the backstop correctly. Then check that requirements 2.07 to 2.10, inclusive, are met.

3.07 ***Position of Rotor Brushes on Bank Terminals*** (Reqt 2.07)

3.08 ***Overthrow Stop Position*** (Reqt 2.08)

(1) ***General:*** With the armature against the backstop and the retaining pawl disengaged, the two extreme positions of the rotor brushes on the bank terminals are determined by the positions of the backstop and the overthrow stop. The armature backstop determines the extreme backward positions of the brushes on their respective terminals, and the overthrow stop determines their extreme forward positions. Meeting the requirements may be facilitated by adjusting the position of the tips of the nonbridging brushes with respect to the leading edge of their respective terminals to approach the minimum 1/64 inch requirement. When an adjustment is made to meet any of these requirements, the other requirements should be checked, and readjustment made if necessary.

(2) To change the position of the rotor brushes with respect to the leading edge of their respective terminals, adjust the position of the armature backstop as follows. For a slight change in the position of the armature backstop, tap the bottom of the backstop with the R-1760 adjuster to move it in the required direction. If considerable movement of the backstop is required, loosen the backstop mounting screw slightly with the 3-inch C screwdriver and reposition the backstop. Tighten the mounting screw securely and recheck the requirement.

(3) If the back and forth motion of the rotor brush assembly or the position of the overthrow stop is unsatisfactory, reposition the overthrow stop as follows. Loosen the overthrow stop mounting screw with the 417A wrench. Reposition the overthrow stop as required. Tighten the mounting screw securely and recheck the requirement.

3.09 ***Armature Airgap*** (Reqt 2.09)

(1) To adjust the armature airgap, loosen the magnet clamping screw with the 541A wrench where the screw has a hexagonal head, otherwise use the 344 offset screwdriver. Then loosen the magnet adjusting locknut with the 573A wrench (209-type selectors) or the 243 wrench (other-type selectors). Adjust the airgap as required by moving the magnet adjusting bushing up or down with the KS-8097 wrench. Hold the bushing with the KS-8097 wrench and then tighten the locknut with the 243 or 573A wrench as required. Retighten the magnet clamping screw. Recheck the adjustment. Repeat the operation, if necessary, until the required adjustment is obtained. After tightening the magnet, make sure there is clearance between the magnet spoolhead and the driving arm. Make sure requirements 2.29 (Magnet Pull Test), 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), and 2.33 (Low-Voltage Interrupter Contact Test) are met.

3.10 ***Retaining Pawl Position and Tension*** (Reqt 2.10)

(1) Adjust the retaining pawl position by slightly loosening the retaining pawl mounting screw with the 3-inch C screwdriver and moving the pawl up or down as required. Tighten the mounting screw. Make sure that the end of the pawl falls wholly within the face of the ratchet wheel.

(2) Adjust the retaining pawl tension by applying the 303 adjuster to the base of the pawl as near as possible to the point where the pawl is fastened to the selector frame and then recheck the retaining pawl position.

3.11 ***Rotor Brush Alignment*** (Reqt 2.11)
3.12 ***Feeder Brush Position*** (Reqt 2.12)
3.13 ***Feeder Brush Tension*** (Reqt 2.13)
3.14 ***Rotor Brush Tension*** (Reqt 2.14)
3.15 ***Rotor Brush Prong Contact*** (Reqt 2.15)

Rotor Brush Alignment

(1) In case the majority of the rotor brushes is found to be out of alignment in the same direction with respect to the bank feeder brushes or bank terminals, loosen the selector mounting screws with the 3-inch C screwdriver and shift the selector to the right or left as required, and then retighten the screws.

(2) Adjust an individual rotor brush spring as required with the 363 adjuster. Exercise care not to produce any sharp bends or kinks or otherwise distort the brushes.

(3) Advance the rotor brush assembly electrically for a half revolution, or until the opposite ends of the rotor brushes are about to pass onto the bank feeder brushes or bank terminals, and repeat the above adjustment.

Feeder Brush Position

(4) Adjust the feeder brushes as required with the 363 adjuster or with the KS-7782 parallel-jaw pliers.

(5) In the case of detachable feeder brushes, it may be necessary to loosen the detachable feeder brush unit mounting nut with the 417A wrench and shift the unit, making use of play in the mounting hole. If this does not permit the required adjustment, remove the detachable feeder brush assembly from the mounting stud and change the number of spacing washers as required.

Feeder Brush Tension

(6) ***Single-Piece-Type Feeder Brushes per Fig. 9, 10, 11 (balanced type):*** If necessary to adjust the brush, apply the 363 adjuster to the front prong just above the crotch and adjust as required. In case the rear prong does not make contact with the rotor brush hub, insert the 456A adjuster between the feeder brushes and adjust the rear prong Then recheck the tension of the front prong. Make an effort to have the pressure of the two prongs approximately equal. This may be accomplished if the feeder brush is kept free of bows or kinks.

(7) ***Single-Piece-Type Feeder Brushes per Fig. 12:*** Place the 363 adjuster close to the base of the brush and apply a turning motion, taking care not to distort the brush. Make sure that the part of the bank feeder brush over which the rotor brush passes is not out of alignment with the first row of bank terminals by more than the specified amount and, if necessary, readjust with the KS-7782 pliers by grasping the brush above the point at which the rotor brushes make contact. Move the pliers toward the top, at the same time giving them a twisting motion in the direction of the desired tension.

(8) ***Two-Piece-Type Feeder Brush per Fig. 13:*** Place the 363 adjuster on one of the individual springs of the feeder brush to be positioned as near the base of the spring as possible and with an upward wiping motion of the adjuster, tension the spring in the proper direction. Repeat for the other spring of the feeder brush.

Rotor Brush Tension

(9) To adjust an individual rotor brush spring, apply the 363 adjuster to the base of the brush spring close to the shaft of the rotor brush assembly. In the case of detachable feeder brushes, it may be necessary to advance the selector one or two steps to adjust the springs close to the shaft of the rotor brush assembly; then restore the rotor brush assembly to its previous position to check the adjustment. Take care in adjusting the brush springs not to change the alignment of the brush contact edges. This is especially important in bridging brushes where such improper adjusting would shorten the contact surfaces. Also, take care in meeting this requirement to hold the tension of each brush as close as possible to the minimum pressure specified, in order that the friction of the brush load will not prevent the selector from meeting requirements 2.30 (Step Test), 2.31 (Speed), 2.32 (High-Voltage Interrupter Contact Test), and 2.33 (Low-Voltage Interrupter Contact Test). In making adjustments of brush spring tensions, give the adjuster a turning motion, not a side motion.

(10) When adjustments have been completed on one brush end of the rotor brush assembly, step the selector electrically (step by step) to a position where the opposite brush end is in the proper position and make the necessary readjustments as covered in (9).

(11) ***Rotor Brush Prong Contact:*** Set the rotor brush assembly approximately in a horizontal position. Apply a 363 adjuster near the base of the prongs to hold the brush steady and adjust the outer prongs as required with another 363 adjuster and the inner prongs with the 456A adjuster. Make an effort to adjust the prongs of the individual brush member so that both prongs contact the feeder brush.

3.16 ***Toeing of Bridging Brushes*** (Reqt 2.16)

(1) Set the rotor brush assembly approximately in a horizontal position. Then hold the heel of the brush with one 363 adjuster and use a second 363 adjuster on the contact portion of the brush to produce the required toeing out. Take care not to distort the brush when applying this adjustment.

3.17 ***Heel Spacing*** (Reqt 2.17)
3.18 ***False Contacting*** (Reqt 2.18)

(1) Step the selector electrically to each of the specified positions.

(2) Adjust the brushes close to the heels as required with the 363 adjuster. When detachable feeder brushes are installed, it will be necessary to advance the selector beyond these brushes to adjust the springs; then return the rotor assembly to its previous position and recheck the adjustment. Recheck requirements 2.11 (Rotor Brush Alignment), 2.14 (Rotor Brush Tension), and 2.16 (Toeing of Bridging Brushes).

3.19 ***Clearance Between No. 1 Rotor Brush and Driving Arm*** (Reqt 2.19)

(1) If the No. 1 rotor brush meets requirement 2.11 (Rotor Brush Alignment), failure to meet requirement 2.19 is probably due to a bent driving arm. Adjust the driving arm with the R-1760 adjuster applied to the driving arm directly beneath the point where the pawl spring is attached to the driving arm. After adjusting the driving arm, make sure that the end of the driving pawl will strike the overthrow stop squarely.

3.20 ***Driving Spring Tension*** (Reqt 2.20)

(1) Adjust the driving spring lug on the selector frame with the 379A adjuster. (Do not adjust the driving spring arm.) Exercise care in adjusting this lug, as it is possible to spring the whole selector frame, thereby affecting many of the other adjustments. Also take care not to throw the lug out of alignment with the arm on the armature to which the other end of the driving spring is attached and thus cause unnecessary friction in the armature bearings. Make sure that requirements 2.29 (Magnet Pull Test) and 2.30 (Step Test) are met.

3.21 ***Armature Bearing Pin Position*** (armature bearing pin without clamp plate) (Reqt 2.21)

(1) If the requirement is not met, reposition the armature bearing pin as follows. Referring to Fig. 1, remove the frame stiffening bracket mounting screw nearer the rotor brush assembly and slightly loosen the other mounting screw using the 3-inch C screwdriver. Swing the interrupter spring assembly to gain access to the bracket clamp mounting screw and temporarily tighten the stiffening bracket mounting screw. Loosen the bracket clamp mounting screw and position the armature bearing pin as required. Position the bracket clamp against the pin and securely tighten the bracket clamp mounting screw. Reposition the interrupter spring assembly and securely tighten the stiffening bracket mounting screws.

3.22 ***Armature Endplay*** (Reqt 2.22)
3.23 ***Clearance Between Rear Corners of Armature and Lugs of the Frame*** (Reqt 2.23)

(1) If the armature endplay is not satisfactory or if there is insufficient clearance between either rear corner of the armature and a lug of the frame, proceed as follows.

Armature Endplay

(a) ***200-, 206-, and 211-Type Selectors:*** Before adjusting a lug to correct for unsatisfactory endplay, check the clearance

between the rear corners of the armature and the frame lugs as follows. Move the armature to one side until the armature bushing touches the lug. Using the 376A dental mirror, note the clearance between the rear corner and the lug at that side. If the clearance is approximately the same at both corners, adjust both lugs equally. If, however, one clearance is greater than the other, adjust the lug on the side having the greater clearance. To do this, place the R-1760 adjuster on the lug as far back as possible and bend the lug outward. After making this adjustment, check that the clearance as covered by requirement 2.23 is met.

(b) ***209-Type Selectors:*** Proceed as covered in (a) to check the clearance at the rear corners and to determine the lug to be adjusted. Before adjusting the lug, remove the driving spring from the driving spring arm with the P-long-nose pliers and remove the frame stiffening bracket mounting screws with the 3-inch C screwdriver. Remove the frame stiffening bracket and spring assembly. Allow the contact spring assembly to hang by the wires, taking care that the wires are not broken off. Remove the armature bearing pin clamp mounting screw with the 3-inch C screwdriver, and remove the bearing pin and clamp. If the mounting of adjacent apparatus does not permit the removal of these parts, loosen the selector mounting screw at the top and remove the mounting screw at the bottom with the 3-inch C screwdriver. Tilt the selector outward from the bottom so that the parts may be removed. Remove the armature and pawl assembly. Adjust the lug to be adjusted as covered in (a). Then reassemble the parts that were removed as follows. Remount the armature and pawl assembly, taking care that the pawl is between the ratchet wheel and overthrow stop. Insert the bearing pin and insert and securely tighten the armature bearing clamp mounting screw. Remount the spring assembly and frame stiffening bracket. Insert and securely tighten the mounting screws. Mount the driving spring in place on the driving spring arm. Insert the lower mounting screw of the selector and securely tighten this screw and the mounting screw at the top of the selector. After reassembling the parts, recheck the clearance as covered above. Make sure that armature endplay is satisfactory and that other requirements are satisfactorily met.

Clearance Between Rear Corners of Armature and Lugs of the Frame

(c) ***200-, 206-, and 211-Type Selectors:*** To increase the clearance between a rear corner and the adjacent lug, adjust inwardly the lug on the side with insufficient clearance, using the R-1760 adjuster as covered in (a). Adjusting the lug in this manner will reduce the armature endplay. If the endplay is less than 0.010 inch, adjust the opposite lug outwardly and recheck for clearance.

(d) ***209-Type Selectors:*** Proceed as covered in (c) after disassembling parts as covered in (b). After making the necessary adjustments, reassemble the parts and then recheck for endplay and clearance.

3.24 ***Contact Alignment*** (Reqt 2.24)

(1) If the contacts do not line up properly, slightly loosen the spring pile-up screws with the 3-inch C screwdriver, adjust the position of the contact springs, and then securely tighten the pile-up screws.

3.25 ***Position of Inside Interrupter Spring (spring No. 1)*** (Reqt 2.25)

(1) To adjust the inside interrupter spring (spring No. 1), loosen the spring assembly screws with the 3-inch C screwdriver sufficiently to permit the application of the 303 adjuster as near the base of the spring as possible. Adjust the spring as required, taking care not to damage the insulator. Tighten the screws securely, taking care that the long insulator is lined up with the interrupter spring and that the contact point falls wholly within the boundary of the opposing contact.

3.26 ***Tension of the Outside Interrupter Spring (spring No. 2)*** (Reqt 2.26)

(1) Readjust the tension of the outside interrupter spring with the 303 adjuster applied close to the base of the spring.

3.27 ***Driving Pawl Tension and Position*** (Reqt 2.27)

Driving Pawl Tension

(1) Hold the portion of the driving pawl which is riveted to the pawl spring with the 485A pliers. Apply the 325B adjuster to the sloping portion of the driving pawl adjacent to the reed spring as shown in Fig. 27. Adjust the driving pawl until the required tension is obtained. Adjusting the pawl upward increases the tension, and downward decreases the tension. Recheck requirements 2.06 (Armature Backstop Position) and 2.08 (Overthrow Stop Position).

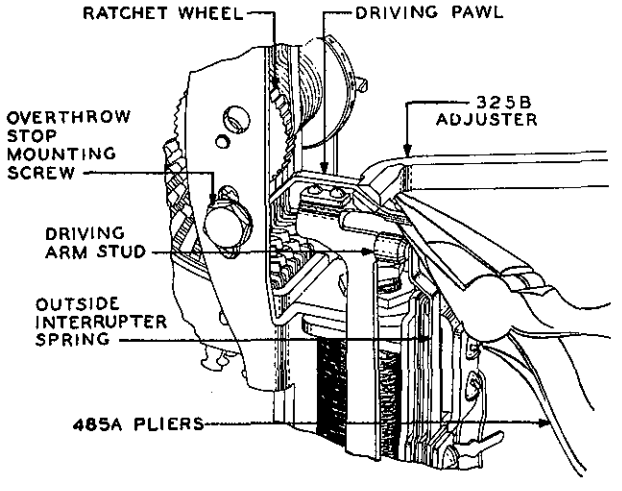

Fig. 27 – Method of Adjusting Driving Pawl Tension

Driving Pawl Position

(2) If the sides of the driving pawl along its length are not parallel with the sides of the ratchet wheel or if the tip end of the driving pawl extends beyond either edge of the ratchet wheel, apply the R-1760 adjuster to the driving arm beneath the point where the pawl spring is attached to the driving arm and adjust the driving arm so that this part of the requirement is met.

(3) If the driving edge of the pawl is not parallel with the bottom of the tooth, hold the driving pawl and the pawl spring at the rivets with a pair of P-long-nose pliers and apply another pair of P-long-nose pliers to the horizontal portion of the pawl spring and adjust this portion with a rotary motion of the pliers.

3.28 ***Pawl Guide Position, 209-Type Selectors*** (Reqt 2.28)

(1) To adjust the position of the pawl guide, move the rotor until the brushes are out of the way and then bend the guide as required with the 485A pliers.

3.29 ***Magnet Pull Test*** (Reqt 2.29)

(1) If the requirement is not met, it indicates that either the armature airgap is too large or the spring tension is too high, in which case adjust the driving spring tension as covered in 3.20 or the armature airgap as covered in 3.07.

3.30 ***Step Test*** (Reqt 2.30)

(1) Failure to meet this test is an indication that the driving spring tension is too close to the specified minimum or that the brush load is excessive.

(2) When necessary, check and readjust for 3.14 (Rotor Brush Tension) and 3.20 (Driving Spring Tension).

3.31 ***Speed*** (Reqt 2.31)
3.32 ***High-Voltage Interrupter Contact Test*** (Reqt 2.32)
3.33 ***Low-Voltage Interrupter Contact Test*** (Reqt 2.33)
3.34 ***Interrupter Contact Break — 209A Selector*** (Reqt 2.34)
3.35 ***Clearance Between Driving Arm Stud and Interrupter Spring*** (Reqt 2.35)

(1) When a considerable amount of adjusting is required, adjust the spring stop with the 379A adjuster but, when a slight adjustment is required, adjust the interrupter spring with the 303 adjuster. To use the 379A adjuster, apply it to the spring stop from the side nearest the magnet coil as shown in Fig. 28 and adjust the spring stop as required. In making this adjustment, exercise care to keep from throwing the lip perceptibly out of parallel with the face of the driving arm stud.

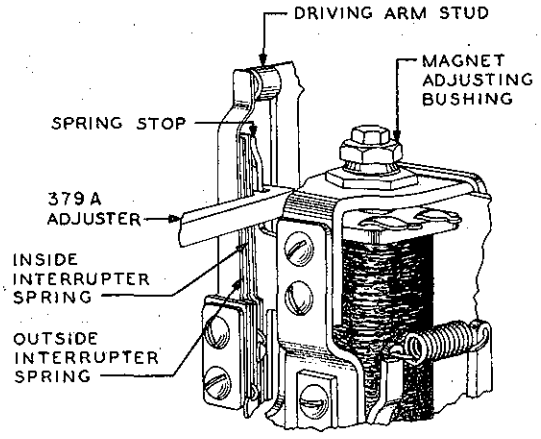

Fig. 28 – Method of Adjusting Spring Stop

(2) When adjusting the spring stop, attempt to obtain the correct adjustment with the least number of adjusting operations because the spring stop has a tendency to lose its adjustment if it is subjected to too many adjusting operations.

Caution: The position of the interrupter spring will be affected when the outside spring is adjusted as specified in (1) and (2) above. Do not attempt to readjust the interrupter spring, but make sure that it rests flat against its insulator.

3.36 ***Variable Requirements*** (Reqt 2.36)

(1) Adjust the parts having variable requirements listed in the charts on pages 16 through 22, in accordance with the prescribed procedures.

REASONS FOR REISSUE

1. To revise the requirement covering lubrication (2.03).
2. To add the 206 CK selector in the requirement covering clearance between driving arm stud and interrupter spring (2.35).
3. To add the 206 CM, 206 CN, and 206 CP selectors in the charts covering variable requirements (2.36).
4. To revise the procedure covering cleaning (3.01).
5. To revise the procedure covering lubrication (3.03).