ELEVATOR APPARATUS

PANEL CORDLESS "B" LINK

1. GENERAL

1.01 This section covers panel cordless "B" link elevator apparatus (Nos. 12-B and 12-D (bridging) and Nos. 12-A and 12-C (non-bridging) multiple brushes, 2 and 9 type brush rods, 5 type guide rods, No. 1-A guides, 2 type compensators and Nos. 3-A and 4-B bearings) and replaces specification X-70299-01, Issue 2-B. It is issued to revise the requirements covering rack coupling pin engagement, brush spring tension and tip, ring and non-bridging sleeve spring location. Detailed reasons for issue will be found at the end of the parts affected.

1.02 Reference shall be made to Section A400.001 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.03 Part 1, "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department handbook.

1.04 Reference terminals are those in the same circuit group as the nickel dipped terminal. For the purposes of this section they are the terminals with which a multiple brush makes contact when the brush rod is raised so that the rack index number 32 (on a 65 point bank) or 49 (on a 100 point bank) shows just above the clutch sighting plate and the weight of the brush rod assembly rests on the clutch pawl.

1.05 Reference Terminal Alignment A visual inspection shall be made before checking or readjusting any multiple brush to insure that the reference terminals by which the brush is to be set are correctly aligned horizontally and vertically with respect to the other terminals in the bank.

1.06 The No. 1-A guide, which is mounted in an inverted position on the brush rod, serves as an up-stop collar.

REASON FOR ISSUE - CHANGE IN GENERAL

1. To include a definition for the reference terminal. (1.04)

2. REQUIREMENTS

2.01 Rack Tongue Position - Fig. 1 (A)

(a) The rack tongue shall have sufficient tension to hold it against the rack coupling pin. Gauge by feel.

(b) There shall be a perceptible (min. .005") clearance between the rack tongue and all sides of the slot in the brush rod. Gauge by eye.

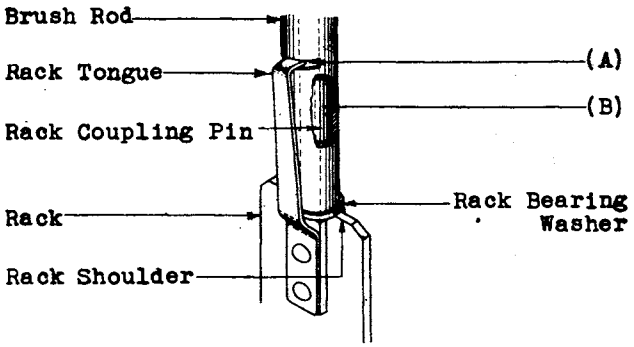

Fig. 1

2.02 Rack Coupling Pin Engagement - Fig. 1 (B) - The rack coupling pin shall be sufficiently free in the brush rod to allow the rod to rest on the rack bearing washer or the shoulder of the rack and to prevent any twisting motion of the rack within the limits permitted by requirement 2.01 being transmitted to the rod. Gauge by eye.

2.03 Freedom of Movement of Brush Rod - Fig. 2 (A) - A brush rod equipped with its associated compensator shall be sufficiently free in its bearings to return to normal due to its own weight plus the weight of the rack when lowered slowly from any position on the bank with the pawl lifted. Gauge by eye and by feel.

2.04 Brush Rod Bearing Gap - Fig. 2 (B) - The bearing halves of Nos. 3-A and 4-B bearings shall be placed as closely together as possible without causing the brush rod to bind, and the gap between the bearing halves at both front and rear of the bearing shall be

Max. .005"

Gauge by eye.

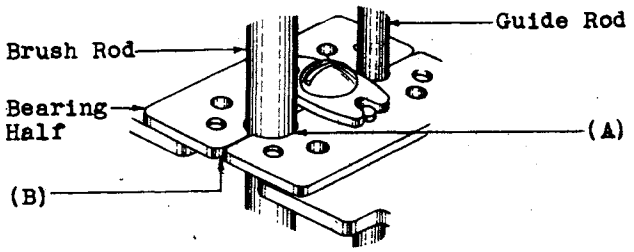

Fig. 2

2.05 No. 1-A Guide (Up Stop Collar) Location

(a) Fig. 3 (A) - Throughout the length of travel of the brush rod, the prongs of the No. 1-A guide may touch the front or the rear of the guide rod, but shall not bind at these points. Gauge by eye.

(b) Fig. 3 (B) - The closed side of the No. 1-A guide shall clear the guide rod throughout the length of travel but the guide rod shall be wholly within the prongs of the guide. Gauge by eye.

(c) Fig. 3 (C) - With the rack index number 66 (on a 65 point bank) or 101 (on a 100 point bank), showing just above the clutch sighting plate, and with the weight of the brush rod assembly resting on the clutch pawl, the clearance between the top of the No. 1-A guide and the bearing parts shall be
Min. 1/32"
Max. 1/16"
Gauge by eye.

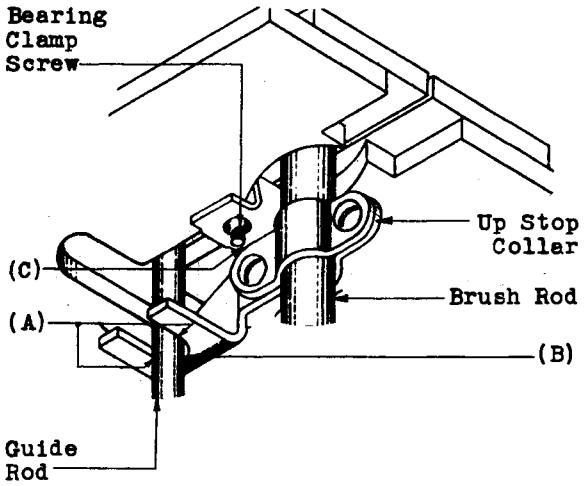

Fig. 3

2.06 Brush Stud Gap - Fig. 4 (A)

(a) With the brush centered on the reference terminal of the bank, the stud gap shall be:
Test - Min. .005"
Readjust - Min. .008"
Use the No. 86 gauge.

(b) The stud shall not touch the adjacent sleeve spring at any other terminal of the bank. Gauge by eye.

2.07 Brush Spring Tension - Fig. 4 (B) - With the brush centered on the reference terminal of the bank, the tension of each spring as it leaves the terminal shall be:
Test - Min. 25 grams, Max. 50 grams
Readjust - Min. 30 grams, Max. 45 grams
This tension shall be measured at a point approximately 1/4" from the end of the spring. Use the No. 68-B gauge.

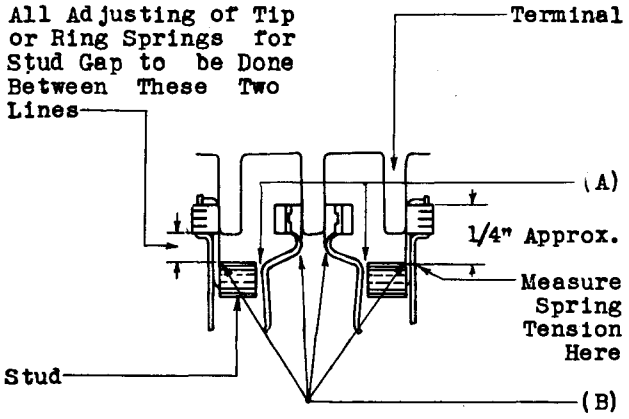

Fig. 4

2.08 Brush Intrusion - Fig. 5 (A) - When the brush is contacting with any terminal in the bank, the contacting surfaces of the springs shall project in from the end of the terminal not less than half and not more than the full width of the shoe. This requirement may be checked at the top, bottom and middle of the bank. It will be satisfactory if this requirement is slightly exceeded at the top or bottom of the bank in isolated cases, provided these cases are not due to any general misalignment of the bank. Gauge by eye.

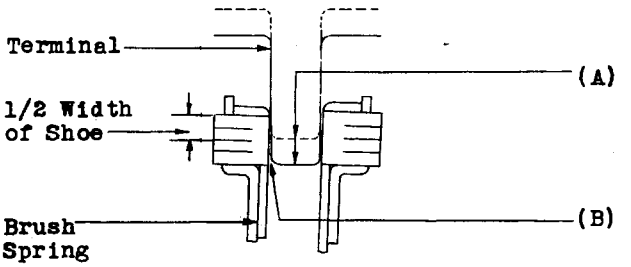

Fig. 5

2.09 Parallelism of Brush Springs - Fig. 5 (B) - When the brush is contacting with the reference terminal the deviation from parallel between the contacting surface of the spring and the contacting surface of the terminal shall be as small as possible. In any case this divergence from parallel, when the brush intrusion equals the full width of the shoe, shall be
Max. .005"
If the brush intrusion is less than the full width of the shoe, the amount that the spring and terminal may be out of parallel is proportional to the amount of brush intrusion, being max. .0025" when the brush intrusion equals one half the width of the shoe. Gauge by eye.

2.10 Bridging Sleeve Spring Location

(a) Lower Spring With the multiple brush contacting with the reference terminal and with the weight of the brush rod assembly resting on the clutch pawl, the upward travel of the lower sleeve spring from the rest position to the point of break with the reference terminal shall be .100" ± .005".

(b) Higher Spring - Fig. 6 (A) - With the rack index number 35 (on a 65 point bank) or 52 (on a 100 point bank) showing just above the clutch sighting plate and with the weight of the brush rod assembly resting on the clutch pawl, the top edge "C" of the higher sleeve spring shall not be above the center line of terminal No. 36 (on a 65 point bank) or 53 (on a 100 point bank). Gauge by eye.

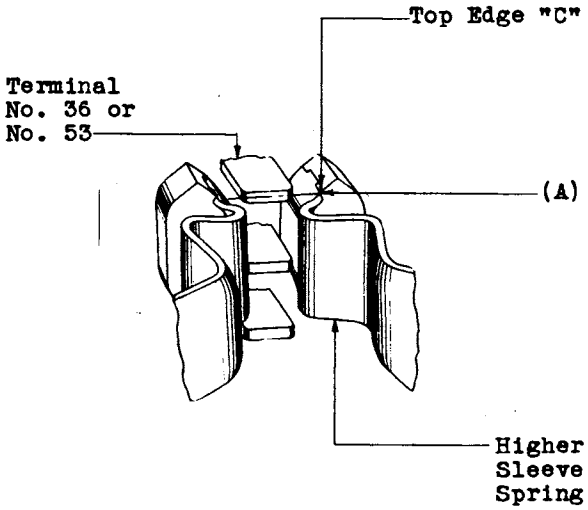

Fig. 6

2.11 Tip, Ring and Non-Bridging Sleeve Spring Location - Fig. 7 (A)

(a) Test The upper edge of the contact portion of the spring shall not be below the upper edge of the terminal and the lower edge of the contact portion of the spring shall not be above the lower edge of the terminal when the weight of the brush rod assembly is resting on the clutch pawl for any position on the bank. Gauge by eye.

(b) Readjust With the multiple brush contacting with the reference terminal and with the weight of the brush rod assembly resting on the clutch pawl, the upper edge of the contact portion of the multiple brush spring shall be min. .015" (3/4 thickness of terminal) above the upper edge of the reference terminal and the lower edge of the contact portion of the multiple brush spring shall be min. .015" below the lower edge of the reference terminal. Gauge by eye.

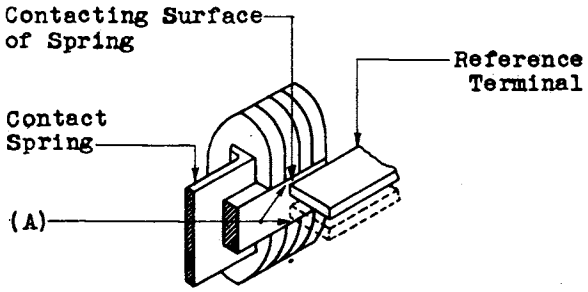

Fig. 7

2.12 Down Stop Collar Location - Fig. 8 (A) The down stop collars shall be so placed that when they rest upon the brush rod bearings, the upper edge of the "XY" commutator spring shall be approximately 3/16" below the upper edge of the "Y" commutator segment. Gauge by eye.

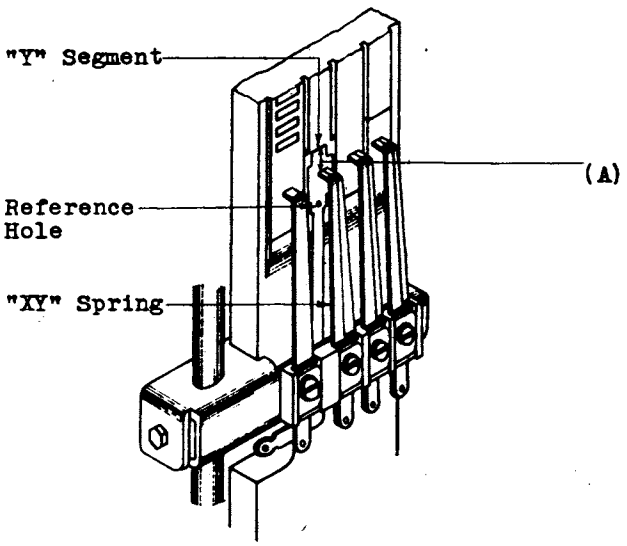

Fig. 8

2.13 Compensator Location

(a) Fig. 9 (A) - The compensator shall be clamped securely to the brush rod and there shall be no clearance between it and the down stop collar. Gauge by eye and by feel.

(b) 2-A Compensator - Fig. 9 (B) - There shall be a clearance of at least .005" between the top of the compensator and the adjacent multiple brush frame. Gauge by eye.

2.14 Smooth Brush Travel When making contact with the bank terminals and travelling up and down in normal operation, each brush shall meet the following conditions:

(a) It shall run smoothly over the bank terminals without chattering.

(b) It shall not snag against the bank terminals.

(c) It shall not ride off the bank terminals.

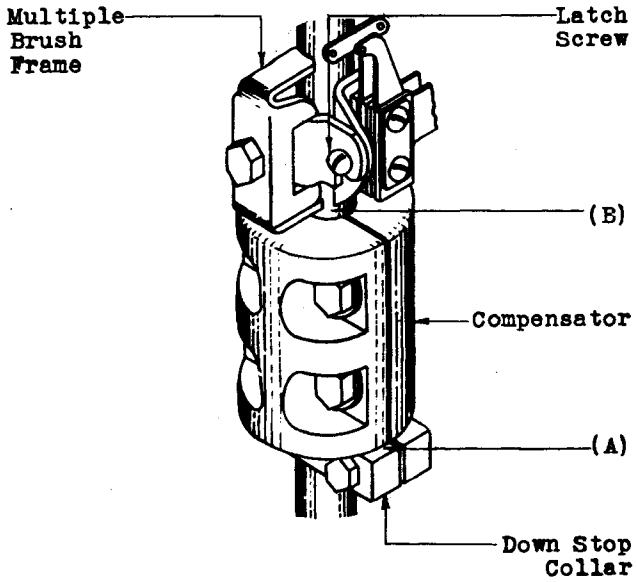

Fig. 9

REASON FOR ISSUE - CHANGES IN REQUIREMENTS

1. To revise the requirement for rack coupling pin engagement (2.02).

2. To revise the test requirement for brush spring tension (2.07). (Information for W.E.Co. covered by CO-127405).

To revise the requirement for tip, ring and non-bridging sleeve spring location (2.11).

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Materials and Test Apparatus

Code No.	Description
Tools	
38-B	Lamp Socket with No. 802 Cord
206	Screw-driver - 30 Degree Offset
207	Screw-driver - 90 Degree Offset
220	Wrench 3/16" Hex. Socket
328	1-A Guide Adjuster
329	1-A Guide Holder
331	Spring Adjuster
357 (2 Required)	Spring Contact Clip and Insulator
365	Suspender Clip
376-A	Dental Mirror
380-A	Brush Spring Adjuster
404-A	Rack Locater
KS-2631	Screw-driver - 4-1/2"
KS-2632	Reading Glass
KS-6320	Orange Stick
-	Bell System Cabinet Screwdriver - 3-1/2" per A.T.& T.Co. Drawing 46-X-40
-	Bell System Cabinet Screwdriver - 6-1/2" per A.T.& T.Co. Drawing 46-X-40
-	Bell System P-Long Nose Pliers - 6-1/2" per A.T.& T.Co. Drawing 46-X-56
Gauges	
68-B	70-0-70 Gram Gauge
86	.005" and .008" Double-end Right Angle Offset Thickness Gauge
Materials	
D-89026	Cloth
KS-2423	Cloth
Test Apparatus	
E-1 (2 Required)	Lamps
13 (2 Required)	Lamp Sockets
893	Cord (Equipped with No. 360 Tool at Both Ends)
-	Dry Cells (4 Required)

3.002 Use of Reading Glass and Dental Mirror The KS-2632 reading glass and the No. 376-A dental mirror may be used in connection with the visual inspection specified in Part 2 - Requirements and the corresponding adjusting procedures.

3.003 Make-Busy Information Before making any of the inspections or readjustments covered in this section, make the associated link circuit busy in the approved manner.

3.004 Location of Tip and Ring Springs Selector multiple brushes on standard coded banks and the front side of "D" specification banks have their tip springs on the left-hand side of the brush assembly. Brushes used on the rear of "D" specification banks have their tip springs on the right-hand side and their ring springs on the left-hand side of the brush assembly.

3.01 Rack Tongue Position (Rq.2.01)

(1) If the rack tongue does not assume its correct position in the brush rod, it is either distorted or the brush rod is twisted. If the rack tongue is distorted straighten it with the long-nose pliers. If the brush rod is twisted, loosen the multiple brushes and the commutator brush with the No. 220 wrench and turn the rod to its correct position; then relocate the multiple and commutator brushes in accordance with the requirements for this apparatus specified herein or in the section covering panel selector commutators and commutator brushes.

3.02 Rack Coupling Pin Engagement (Rq.2.02)

(1) With the brush rod coupled to the rack, raise the rod away from the rack as far as permitted by the play of the rack tongue in its slot, and notice that the rod, when released, drops back against the shoulder of the rack or the rack bearing washer due to its own weight plus the weight of the associated compensator.

(2) If the rod appears to bind on the rack coupling pin, that is, if the rod does not return to the shoulder of the rack or the rack bearing washer when raised and released as specified in (1) above, first make certain that this is not caused by a binding or bowed brush rod. (See procedure 3.03). If the brush rod is not binding or bowed uncouple the rack and examine the coupling pin to see that it is not bent; also see that there

3.02 (Continued)

are no short bends in the lower end of the brush rod. See that there are no burrs or dirt in the hole in the brush rod, and that the hole is large enough to permit the rack coupling pin to enter freely.

(3) If the brush rod is worn at the bottom so that it does not twist freely on the rack shoulder, it will be necessary to recondition the brush rod as covered in the section covering piece part data and replacement procedures for panel cordless "B" link elevator apparatus.

3.03 Freedom of Movement of Brush Rod (Rq.2.03)

3.04 Brush Rod Bearing Gap (Rq.2.04)

(1) See that there is no interference caused by the commutator brush local cable form coming in contact with a commutator or the form snagging on an adjacent brush frame.

(2) Binding of the brush rod may be caused by dirt on the rod or mechanical adjustment. To clean the rod, use D-89026 cloth. Take the cloths out of the container from the center of a roll one at a time and as required. Fold the cloth crosswise to three thicknesses and then fold double. Use a fresh side of the cloth when necessary as determined by experience.

(3) With the rod in the normal position, rub the cloth over it several times, taking care to keep on that portion of the rod at least 1" from the multiple brushes and the bearings. Repeat this operation for each section of the rod. Then rub the rod dry with a dry KS-2423 cloth, taking care to cover the accessible portions of the rod. This guards against oil being deposited on the brushes or on the bearings.

(4) As soon as the cloths become dirty, place them in the metal container approved for discarded oily materials.

(5) If the brush rod still fails to meet requirement 2.03 (Freedom of Movement of Brush Rod) proceed as follows.

(6) To check for freedom of movement of a brush rod, first raise the brush rod to its highest position, that is, until the up stop touches the bearing parts. Exercise care when raising a brush rod which has a tendency to bind. Do not force the rod upward, but see whether or not the bind can be corrected as covered in the following procedures. Failure to observe this warning may result in injury to the multiple brushes or the brush rod.

(7) Hold back the pawl of the associated clutch with the KS-6320 orange stick and, at the same time, place a finger under the compensator so as to support the brush rod in its descent.

(8) Lower the brush rod slowly and evenly. See that the brush rod follows the movement of the finger without sticking or binding during its entire travel.

(9) If a bind sufficient to prevent the brush rod from meeting this requirement occurs at or near the top of the brush rod travel, the cause may be a misaligned clutch, or a binding No. 1-A guide. To determine the true cause, uncouple the rack and raise the brush rod as high as it will go. If the bind is still present, it may be caused by the No. 1-A guide, in which case inspect it, and if it is found to be out of adjustment, correct as specified in procedure 3.05. If the bind has been removed, it may have been caused by a misaligned clutch or a bowed brush rod. A visual check will generally serve to determine whether the clutch or the rod is at fault.

(10) If the clutch is out of alignment refer to the section covering the particular type of clutch involved. If it is found necessary to realign the clutch, do so, and then recheck the commutator brush and all the multiple brushes on the rod for height, as the adjustment for alignment will have changed the position of the clutch.

(11) If the brush rod binds only in spots throughout its travel, the binding may be caused by interference between the bearings and bumps or spots of paint or shellac on the brush rod. Stop the rod on one of the binding spots and check each bearing, in turn, for play in a straight front to rear direction by grasping the rod in the fingers directly below the bearing and moving it backwards and forwards and then from side to side. If the bearing does not show a perceptible play, examine the rod carefully to determine the cause of the bind. Remove spots of paint or shellac by scraping the rod with the side of a screw-driver blade taking care not to nick the rod. If the bind is still present see that the brush rod bearing gap requirement is met.

(12) Before separating the halves of a bearing, make sure that the bind is not caused by the misalignment of the bearing halves. This may be checked by moving the rod first from side to side and then from front to rear. This is generally due to the front and rear displacement of one-half of the bearing with respect to the other half. Correct by lightly tapping the bearing halves with the screw-driver handle.

(13) Close the bearings open more than the permissible amount by tapping the bearing half into the correct position

3.03-3.04 (Continued)

with the 3-1/2" cabinet screw-driver. Always dress the bearing halves to the left and to the rear. Do not pry against the adjacent bearing. A light held below the bearing locating plate will be found of considerable help in checking for open bearings.

(14) What may seem to be a uniform bind throughout the travel of the brush rod is probably caused by excessive multiple brush or commutator brush spring tension. Check the tensions of the multiple brush springs and the commutator brush springs and where they are found to be excessive or close to the maximum requirements reduce them slightly. Try to apportion the adjustment so as to set each spring approximately at its mean requirements rather than to reduce any one spring to its minimum requirements. Refer to procedure 3.07 and to the section covering panel selector commutators and commutator brushes when it is necessary to make the above check or adjustment.

(15) Such binds as are caused by kinks and bends in the brush rod will also be noticed as occurring only in certain spots during the travel of the rod. If there is front to rear and side play in every bearing, and if there is no bind due to interference with the No. 1-A guide or a misaligned clutch, or what seems to be a bind due to heavy brush tension, examine the rod carefully to ascertain whether or not it is straight throughout its entire length. If kinks or bends are located, straighten the rod by grasping it in the fingers above and below the bent portion and bowing the rod in a direction to correct the bend. After straightening the rod check for requirements 2.08 (Brush Intrusion), 2.10 (Bridging Sleeve Spring Location), 2.11 (Tip, Ring and Non-Bridging Sleeve Spring Location) and 2.05 (No. 1-A Guide Location). If the fault cannot be discovered in any other way, remove one pair of bearings at a time and replace them. With a bearing removed in this manner, that part of the rod that is bowed will be plainly shown by its position with respect to the bearing supporting plate.

3.05 No. 1-A Guide (Up Stop Collar) Location (Rq.2.05)

(1) To readjust a No. 1-A guide which binds against the guide rod in the ascent or descent of the rod, place the No. 329 holder with its slot down over the back end of the guide and over the rod to secure it firmly as shown in Fig. 10 and adjust the guide with the No. 328 adjuster.

(2) Should the guide rod appear bent so as to cause the guide to bind in only one or two points, straighten the guide rod at these points.

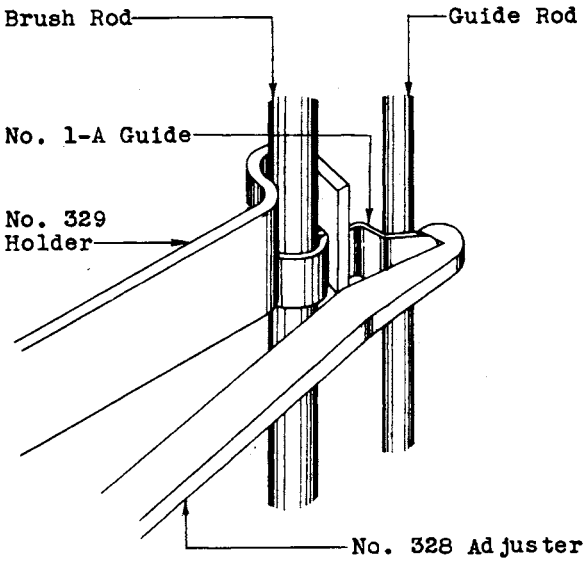

Fig. 10 - Method of Adjusting No. 1-A Guide

(3) If the clearance between the inverted No. 1-A guide and the bearing parts is not as specified, slightly loosen the guide clamping screws with the KS-2631 screw-driver and slide the guide up or down as required.

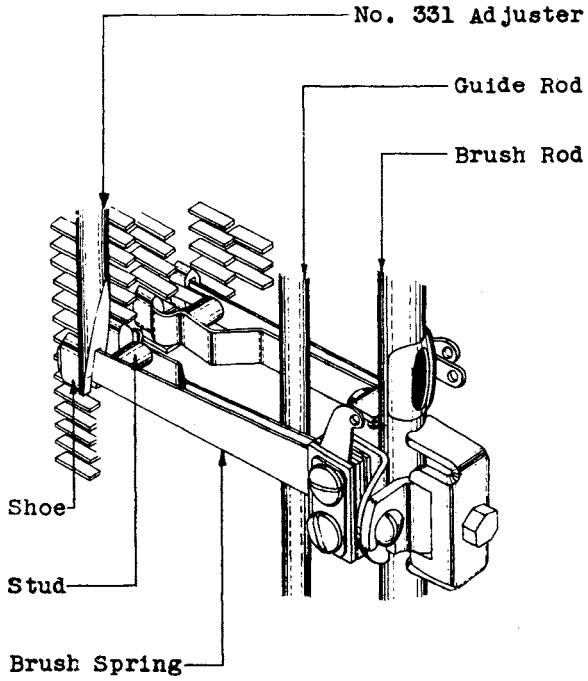

Fig. 11 - Method of Adjusting for Brush Stud Gap

3.06 Brush Stud Gap (Rq.2.06)

(1) The stud gap may be checked with the No. 86 gauge or visually by pushing the inner spring outward with the KS-6320 orange stick and noting the amount of travel of the inner spring before the outer spring starts to move.

(2) Unless the sleeve springs are distorted, adjust the stud gap by adjusting the outside springs as shown in Fig. 11 using the No. 331 adjuster. Use extreme care in making the necessary corrections and make an effort to restore the spring to its correct condition as shown in Fig. 4.

3.07 Brush Spring Tension (Rq.2.07)

(1) Readjust the spring tension with the No. 380-A adjuster close to the point where the spring leaves the assembly clamping plates and insulators. Use the No. 68-B gauge in checking this tension as shown in Fig. 12.

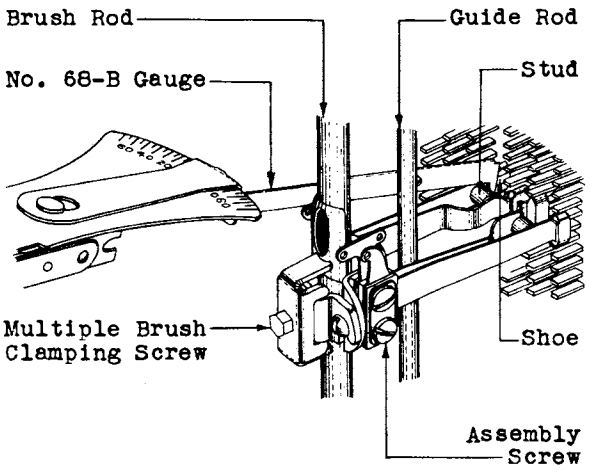

Fig. 12 - Method of Checking Brush Spring Tension Using No. 68-B Gauge

(2) When making any adjustment of brush springs, exercise care to prevent any distortion or kinking of the springs, thereby affecting their relation with the associated bank terminals.

3.08 Brush Intrusion (Rq.2.08)

(1) If failure to meet the brush intrusion requirement is common to several adjacent brushes on one bank, it is an indication that the bank is out of alignment. Where the cases of failure are isolated, see whether or not the brush rod is bent in or out and, if so, straighten the brush rod. If, however, the brush rod is straight and this condition exists, do not bend the brush rod to correct it. It is sometimes possible to correct the above conditions by moving the brush rod bearings. Since the multiple brush itself is not involved in this adjustment, do not readjust it to meet this requirement. If, however, any of the adjustments covered above are made, check the multiple brushes for requirements 2.10 (Bridging Sleeve Spring Location), 2.11 (Tip, Ring and Non-Bridging Sleeve Spring Location) and 2.05 (No. 1-A Guide Location). It is satisfactory if in isolated cases a brush only approximately meets the requirement at the top or the bottom of the bank provided it meets it at the reference terminal and provided a check is made with other brushes to insure that the failure to meet the requirement is not due to misalignment of the bank.

3.09 Parallelism of Brush Springs (Rq.2.09)

(1) To aid in determining whether or not the contacting surfaces of the multiple brush springs are parallel to the contact surfaces of the bank terminals, use the No. 38-B lamp socket equipped with a suitable lamp or a regular 110 volt extension lamp. Hold the lamp so that the light shines upward from beneath the terminal. By looking down on the terminal, the amount that the brush spring may be out of parallel with the terminal can be easily discerned.

(2) To bring the brush springs within the limits specified for parallelism, adjust them at a point in front of the studs with the No. 331 adjuster. Correct any distorted spring at this time.

3.10 Bridging Sleeve Spring Location (Rq.2.10)

(1) If this requirement is not met, and the brush rod is coupled to a No. 1-A rack, first ascertain that the brush rod is not worn excessively at the bottom where it rests on the shoulder of the rack. If necessary, recondition the lower end of the brush rod as covered in the section covering piece part data and replacement procedures for panel cordless "B" link elevator apparatus.

(2) To adjust for the bridging sleeve spring location make busy the circuit associated with the brush rod on which the brush to be adjusted is mounted as well as the circuits associated with those brush rods immediately adjacent to it.

(3) Raise the brush rod until the multiple brush under test is approximately two-thirds of the way up the bank, and make sure that the weight of the brush rod assembly rests on the clutch pawl.

3.10 (Continued)

(4) With the brush in this position, make sure that the contacting surface of either sleeve spring is not tilted from the vertical plane of the contacting portion of the bank terminal enough to interfere with the proper bridging of the brush springs. A tilted brush spring is shown in Fig. 13. If any springs are found tilted away from the terminals in this manner, straighten them with the No. 380-A adjuster, and then recheck them for requirement 2.09 (Parallelism of Brush Springs).

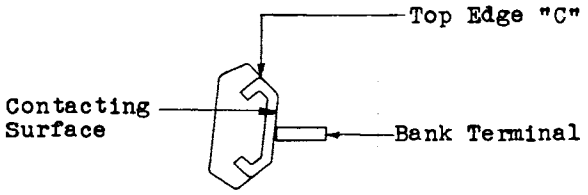

Fig. 13 - Illustrating Tilted Brush Condition

Lower Sleeve Spring

(5) Insert the spring of the No. 404-A rack locater into the rack notch corresponding to rack index number 28 (on a 65 point bank) or 45 (on a 100 point bank). With the rack locater in the position shown in Fig. 14 exert a slight downward pressure on the horizontal arm to snap the stud into its associated notch. Lower the brush rod until the shoulder of the rack locater rests tightly down against the clutch pawl.

(6) If the adjustment is to be made on an individual brush only, raise a brush rod adjacent to the one being worked on, so that the rack index number 32 (on a 65 point bank) or 49 (on a 100 point bank) shows just above the clutch sighting plate. If the adjustment is to be applied on a number of brush rods, or if it is more convenient, make the circuit busy and raise an end selector to this position instead of raising the one adjacent to the selector containing the brush under test.

(7) The make busy preparation required and the method of connecting the lamp test circuit before adjusting the lower bridging sleeve spring vary with the apparatus involved. The following methods comprise the necessary make-busy information and methods of connecting the test circuit for the different conditions encountered.

(8) Sender Selectors In accordance with the wiring of the testing circuit as shown in Fig. 15 connect the negative side of the battery to ground and securely attach the No. 357 clip to the sleeve spring of the bridging brush associated with the brush rod which was raised as covered in (6). This is done for the purpose of making the reference terminal busy to any hunting selector.

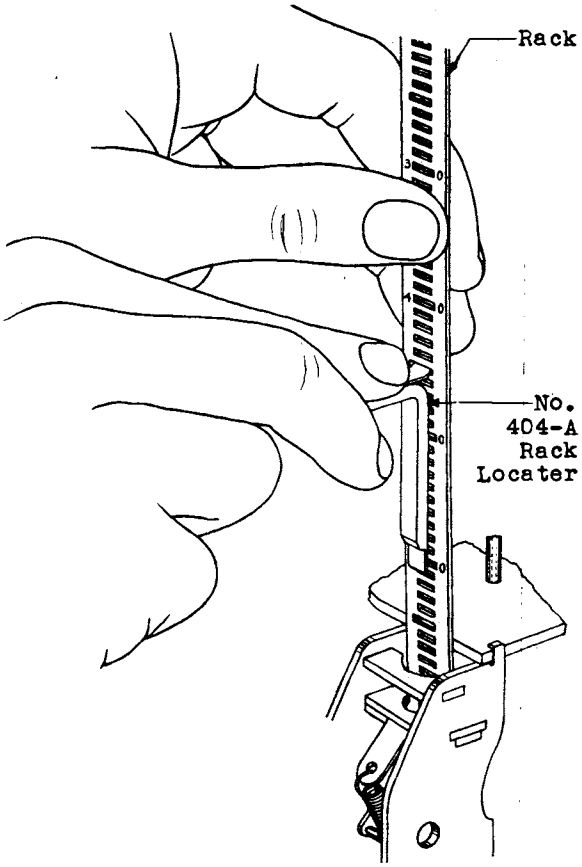

Fig. 14 - Method of Inserting No. 404-A Rack Locater into Rack

(9) If the lamps light, it is an indication that the reference terminal is busy. When the terminal becomes idle and the lamps go out, connect the end of the No. 893 cord equipped with the No. 365 tool to ground and with the No. 357 clip connect the other end of the cord to the sleeve spring of the brush being adjusted.

(10) Trunk Finder (Hunting for Open Terminal) Make busy the trunks associated with the reference terminal and the terminal above the reference terminal. Connect the test circuit as covered in (8). The lamps should light. Remove

3.10 (Continued)

the make-busy ground from the incoming trunk circuit associated with the reference terminal. Connect the No. 893 cord as covered in (9).

(11) Trunk Finder (Hunting for Grounded Terminal) Make busy the trunk associated with the reference terminal. In accordance with the wiring of the testing circuit as shown in Fig. 16, connect the No. 357 clip to the sleeve spring of the bridging brush associated with the brush rod which was raised as covered in (6). Then connect the end of the No. 893 cord equipped with the No. 365 tool to the negative side of the battery and with the No. 357 clip connect the other end of the cord to the sleeve spring of the brush being adjusted.

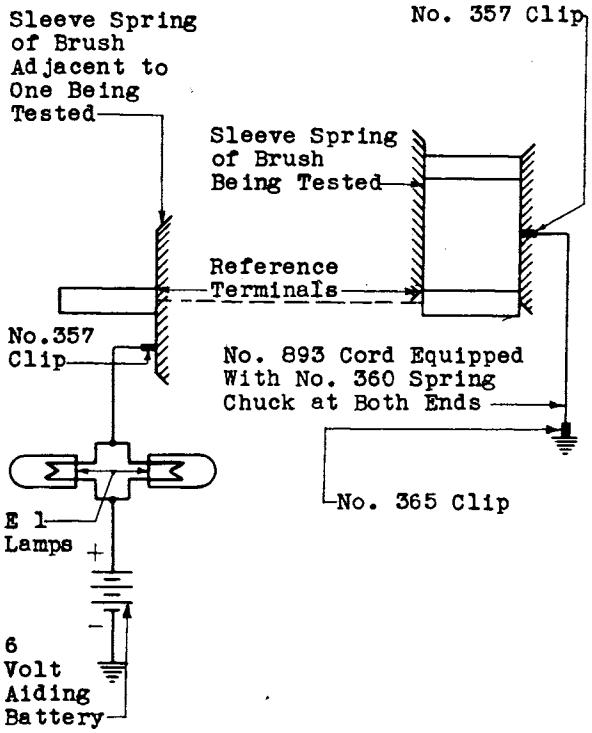

Fig. 15 - Lamp Circuit to be Used with the No. 404-A Rack Locater when Adjusting the Lower Bridging Sleeve Spring of Trunk Finders which Hunt for an Open Terminal, and of Sender Selectors

(12) After proceeding as set forth in the previous methods covering three different circuit conditions, the test set lamps should light providing the brush being adjusted makes contact with the reference terminal.

(13) To determine whether or not the sleeve spring is set within the limits specified raise or depress the spring with the KS-6320 orange stick approximately .005" depending on whether the lamps do or do not light, respectively. If the lamps go out when the spring is raised or light when the spring is depressed this distance, it is an indication that the spring is in adjustment. Fig. 17 shows how the spring may be raised in this manner. If the spring is found to be outside the limits specified as determined by the above test adjust it as covered by the following methods.

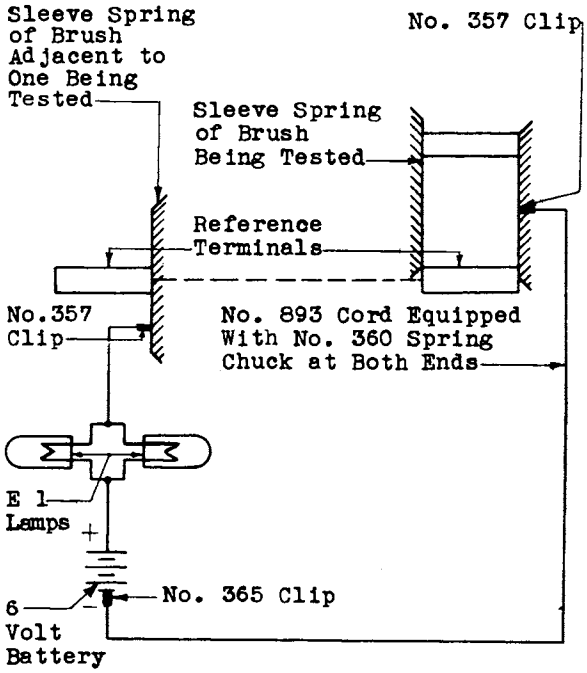

Fig. 16 - Lamp Circuit to be Used with the No. 404-A Rack Locater when Adjusting the Lower Bridging Sleeve Spring of Trunk Finders which Hunt for a Grounded Terminal

(14) Adjustment of No. 12-D Brush The No. 12-D brush is manufactured with the correct relation between the sleeve springs and the tip and ring springs to permit making the adjustment for the .100" contact travel without raising or lowering an individual spring in the spring assembly. Accordingly, if the brush is not in adjustment, loosen the multiple brush clamping screw with the No. 220 wrench sufficiently to permit the adjustment to be made. Holding the wrench on the clamping screw, tap the shank of the wrench up or down as required with a screw-driver blade until the sleeve spring just makes or breaks contact with the reference terminal as indicated by the

3.10 (Continued)

flickering of the test lamps, at the same time centering the brush as accurately as possible in its horizontal position. Tighten the clamping screw and check the brush spring tensions and, if necessary, readjust as covered in procedure 3.07. Due to the forward and backward movement permissible in the brush rods, take care when adjusting the brushes to hold the brush rod as near as possible to its normal vertical position in order not to affect the height of the brush setting. Do not tap the frame of the brush in making this adjustment as this will be likely to mar the finish or distort some part of the brush assembly.

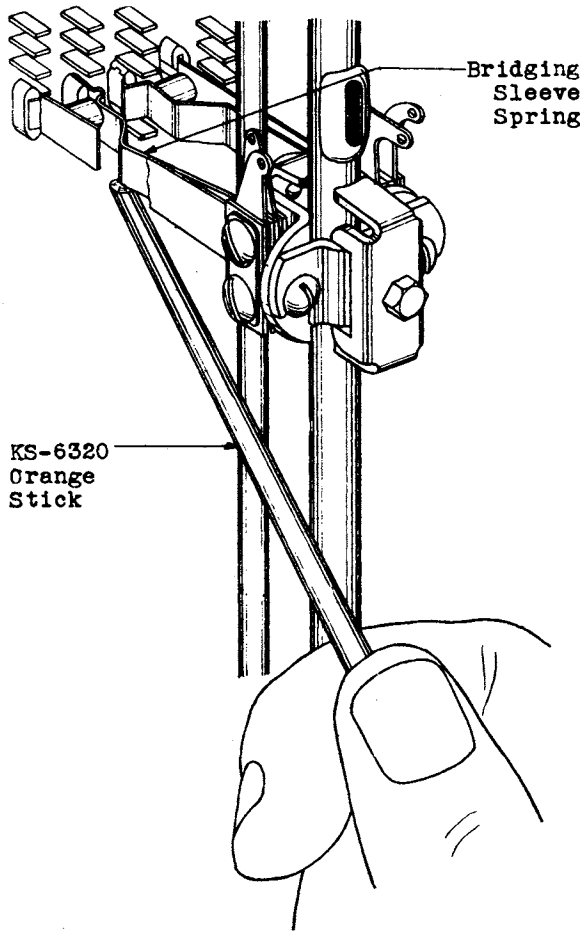

Fig. 17 - Method of Raising Bridging Sleeve Spring to Check Vertical Adjustment

(15) If it is found that by tapping the brush frame down requirement 2.13 (Compensator Location) cannot be met, it will be necessary to lower the lower sleeve spring, and recheck and readjust, if necessary, the tip or ring spring associated with the same spring assembly as covered in (16) and (17).

(16) Adjustment of No. 12-B Brush This brush has been replaced by the No. 12-D brush and the relation between its sleeve springs and the tip and ring springs makes it necessary in adjusting for the .100" contact travel to raise or lower the lower sleeve spring as follows. Determine the lower sleeve spring by eye and loosen the lower screw associated with the spring assembly containing the spring, with the No. 206 or No. 207 screwdriver. Lower or raise the spring with the No. 380-A adjuster until it just makes or breaks contact with the terminal as shown by the flickering of the test lamps.

(17) If the tip or ring spring associated with this assembly has been thrown out of adjustment by this operation check it approximately at this time by noting that the upper edge of the contact portion of the tip or ring spring lines up approximately with the upper edge of the respective tip or ring terminal above the reference terminal. If the spring does not line up with the terminal in this manner, make it do so by adjusting it with the No. 380-A adjuster, taking care not to throw out the sleeve spring adjustment.

(18) Tighten the spring assembly clamping screws.

(19) Recheck the sleeve spring adjustment since the tightening of the screws may change the location of the springs slightly. If necessary, readjust as covered in (14) for the 12-D brush.

Higher Sleeve Spring

(20) If the brush being adjusted is associated with a trunk finder hunting for a dry terminal it is necessary, before proceeding with the adjustment of the higher sleeve spring as covered in the following methods, to remove the No. 357 clip from the sleeve spring of the brush being adjusted.

(21) Adjustment of 12-B and 12-D Brushes Raise the brush rod until the rack index number 35 (on a 65 point bank) or 52 (on a 100 point bank) shows just above the clutch sighting plate, making sure that the weight of the brush rod assembly rests on the clutch pawl. Check to see that the top edge "C" of the contacting portion of the higher sleeve spring does not extend above the centerline of terminal No. 36 (on a 65 point bank) or No. 53 (on a 100 point bank). If the top

3.10 (Continued)

edge "C" of the contact portion of the higher sleeve spring extends above the center of the terminal, loosen the lower spring assembly clamping screw with the No. 206 or No. 207 screw-driver and lower the sleeve spring as required with the No. 380-A adjuster. Check the tip or ring spring associated with the assembly to see whether or not it has been thrown out of adjustment by this operation. If it has been, center it approximately on the No. 35 terminal (on a 65 point bank) or the No. 52 terminal (on a 100 point bank) using the method similar to that covered above.

(22) Tighten the spring assembly clamping screws.

(23) Disconnect the lamp circuit, remove the No. 404-A locater from the rack and lower to the normal position all brush rods which were raised in making this adjustment.

(24) Remove the busy conditions imposed on the selector circuits and trunks as covered in (2) and (8) to (11) inclusive above.

3.11 Tip, Ring and Non-Bridging Sleeve Spring Location (Rq.2.11)

(1) If this requirement is not met, and the brush rod is coupled to a No. 1-A rack, first ascertain that the brush rod is not worn excessively at the bottom where it rests on the shoulder of the rack. If necessary, recondition the lower end of the brush rod as covered in the section covering piece part data and replacement procedures for panel cordless "B" link elevator apparatus.

(2) Before adjusting the tip and ring springs, first determine that the sleeve springs have their correct setting. If this setting is incorrect, loosen the multiple brush clamping screw with the No. 220 wrench, and raise or lower the brush until the sleeve spring is located properly. If, after this adjustment, it is found that the tip and ring springs fail to meet the limits specified, adjust the springs at fault as follows:

(3) Loosen the lower assembly screw with the No. 206 or No. 207 screw-driver and raise or lower the spring with the No. 380-A adjuster until it is within the specified limits. Tighten the assembly screw and recheck the adjustment of the other spring in the same assembly. After making this adjustment, see that part (a) of the requirement is met at other points on the bank. If the brush fails to meet this requirement it is probably due to a displacement of the bank terminals. Refer to the section covering panel multiple banks.

3.12 Down Stop Collar Location (Rq.2.12)
3.13 Compensator Location (Rq.2.13)

(1) To adjust for the down stop collar setting, first make sure that the commutator brush springs are in the correct adjustment as specified in the section covering panel selector commutators and commutator brushes.

(2) Slightly loosen the stop collar (if one of the present type) with a No. 220 wrench, or (if one of an earlier type) with a KS-2631 screw-driver, and, after loosening the compensator clamping screws with the No. 220 wrench, shift the stop collar on the brush rod until the upper edge of the "XY" commutator spring is the required distance from the upper edge of the "Y" commutator segment when the stop collar is resting against the brush rod bearings. Shift the stop collar upward on the rod by raising the rod slightly and lowering it so that the stop collar will strike the bearings and be forced upward. Lower the stop collar by tapping it with a screw-driver.

(3) After the desired adjustment has been obtained, securely tighten the stop collar.

(4) After the down stop collar is adjusted, make sure that the compensator is set tightly down against it. Tighten the clamping screws with the No. 220 socket wrench.

(5) With the compensator adjusted to the position referred to in (4) if it is found that the necessary clearance between the bottom of the brush frame and the top of the compensator does not exist, determine whether or not it is possible to lower the down stop collar or raise the multiple brush in order to provide the desired clearance.

3.14 Smooth Brush Travel (Rq.2.14)

(1) Insert the KS-6320 orange stick in back of the left side of the clutch pawl, and draw the pawl forward, freeing it from the rack. Push the orange stick downward, wedging it in place between the pawl and the upper clutch locating plate, so that it takes the position shown in Fig. 18. Make sure that the flat surface of the orange stick is tight against the left clutch side frame. Run the brush rod up and down slowly by hand and note if any of the spring contacts catch on the terminals on any part of the bank.

(2) Correct chattering or snagging by adjusting the springs causing the trouble so that their contact surfaces meet requirement 2.09 (Parallelism of Brush Springs). Use the No. 380-A adjuster for this purpose. At this time,

3.14 (Continued)

check the correct location of the multiple bank terminals in accordance with the section covering panel multiple banks.

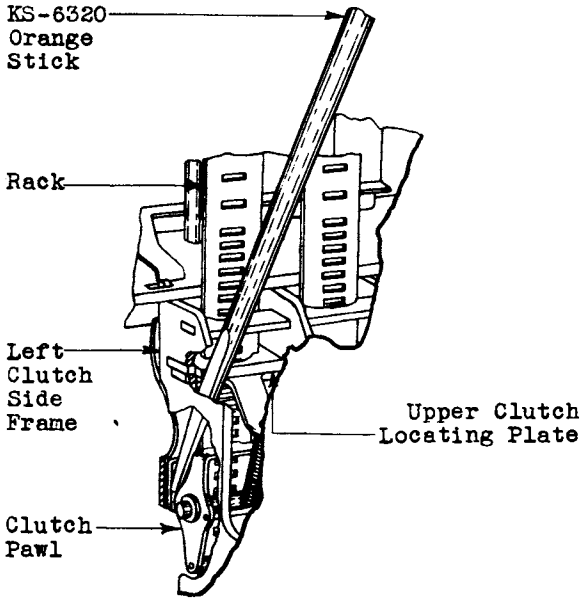

Fig. 18 - Method of Holding Clutch Pawl Away from Rack Using KS-6320 Orange Stick

(3) If the brush still chatters or snags, replace it in accordance with the section covering piece part data and replacement procedures for panel cordless "B" link elevator apparatus.

REASON FOR ISSUE - CHANGES IN ADJUSTING PROCEDURES

1. To revise the list of tools, gauges, materials and test apparatus (3.001).
2. To add procedures to provide for the change made in the requirement covering rack coupling pin engagement (3.02, 3.10 and 3.11).
3. To add procedures for cleaning of brush rods with the D-89026 cloth to conform with the latest practice (3.04).
4. To change the procedures for tip, ring and non-bridging sleeve spring location to agree with the change made in the corresponding requirement (3.11).
5. To include a procedure covering the use of the KS-6320 orange stick to hold the clutch pawl away from the rack (3.14).
6. To omit the procedures covering multiple brush replacements, since this information is given in the section covering piece part data and replacement procedures for this apparatus.

APPROVED:

Bell Telephone Laboratories, Inc. FAC 4-27-32
Department of Development and Research GWK 4-27-32