ELEVATOR APPARATUS

PANEL TRANSLATOR

1. GENERAL

1.01 This section covers panel translator elevator apparatus (Nos. 11-B and 11-E and 15 type multiple brushes, 6 and 11 type brush rods, 7 type trip rods, No. 1-A guides and 3 type and No. 4-B bearings) and replaces specification X-70288-01, Issue 2-B. It is issued to revise the requirements covering No. 1-A guide location and vertical location of tip, ring and sleeve springs of 11 type brushes. 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 Multiple brush contact spring pressure is that which it is necessary to overcome to start a tripped brush contact spring away from its associated bank terminal when the gauge is applied at a point on the spring approximately 1/4" from the end of the spring.

1.05 Reference Terminal Alignment A visual inspection shall be made before checking or readjusting any 11 type multiple brush to insure that the reference sleeve terminal and the associated tip and ring terminals of the same circuit group of terminals by which the brush is to be set are correctly aligned horizontally and vertically with respect to the other terminals in the bank. Before checking or readjusting a 15 type brush the associated reference terminal shall also be checked to insure that it is correctly aligned horizontally and vertically with respect to the other terminals in the bank.

2. REQUIREMENTS

2.01 Lubrication

(a) Before the installer starts the operation test, the following points shall be lubricated with one application of Western Electric Lubricating Compound No. 3.

(1) On rotating levers and trip armature extensions, the surfaces of these parts where they come in contact with each other.

(2) On multiple brush reset levers, the underside of the lever for a distance of approximately 1/2" from the end.

(3) On reset (bearing) plates, the surface with which the reset lever comes in contact.

(b) Take care that none of the lubricant gets on the racks or the cork rolls of the drive.

(c) After turnover, it is recommended that the parts mentioned in (a) be lubricated as required by local conditions.

2.02 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.

2.03 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 2.02 being transmitted to the rod. Gauge by eye.

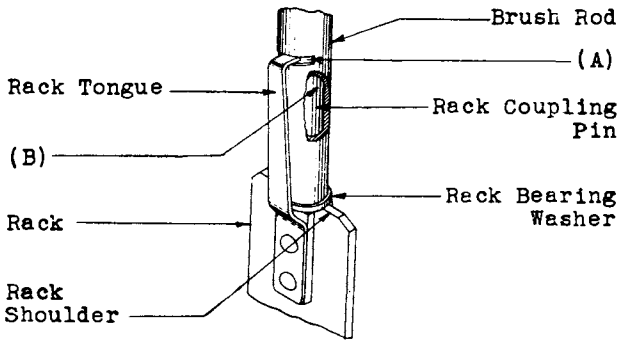


Fig. 1

2.04 No. 1-A Guide Location

(a) Fig. 2 (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 trip rod, but shall not bind at these points. Gauge by eye.

(b) Fig. 2 (B) - The closed side of the No. 1-A guide shall clear the trip rod with any brush tripped throughout the length of travel but the trip rod shall be wholly within the prongs of the guide. Gauge by eye.

(c) With the up-stop collar located in accordance with requirement 2.29 and with all other brush rods in the normal (down) position, the No. 1-A guide shall clear the bearing parts when the associated brush rod is raised to its topmost position. Gauge by eye.

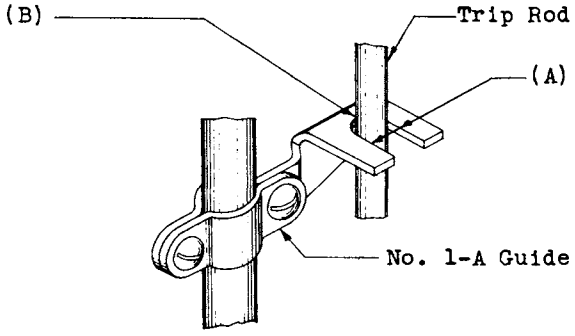


Fig. 2

2.05 Freedom of Movement of Brush Rod - Fig. 3 (A) - A brush rod shall be sufficiently free in its bearings to return to the normal (down) position due to its own weight plus the weight of the rack when lowered slowly from any position except the brush restoring position with the pawl lifted and with any two 11 type brushes tripped which would be tripped in the normal operation of the apparatus. Gauge by eye and by feel.

2.06 Brush Rod Bearing Gap - Fig. 3 (B) - The bearing halves of 3 and 4 type 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.

2.07 11 Type Brush Stud Gap - Fig. 4 (A) - With the brush tripped and centered on the reference terminal of the bank, the stud gap shall be:

Test - Min. .005"

Readjust - Min. .008"

Use the No. 86 gauge.

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

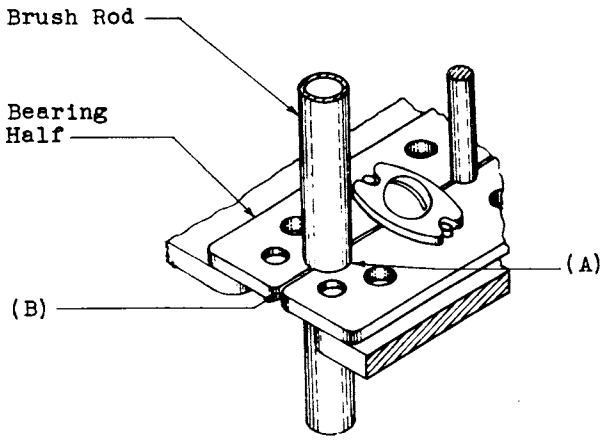


Fig. 3

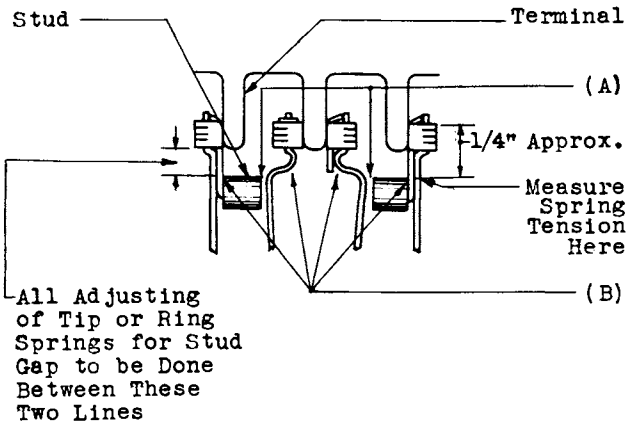


Fig. 4

2.08 Horizontal Centering of 11 Type Multiple Brushes - Fig. 5 (A) - With the multiple brush in the reset position at the reference terminal of the bank, the clearance between the sleeve spring shoes and the tip and ring terminals shall be:

Min. .010"

Gauge by eye.

If one shoe touches its adjacent terminal, this requirement shall be considered as having been met if the minimum clearance can be obtained in the following manner. Move the springs of the brush to the left or right until the back of the other shoe touches its adjacent terminal. Then release the pressure slowly and allow the brush to assume its normal position.

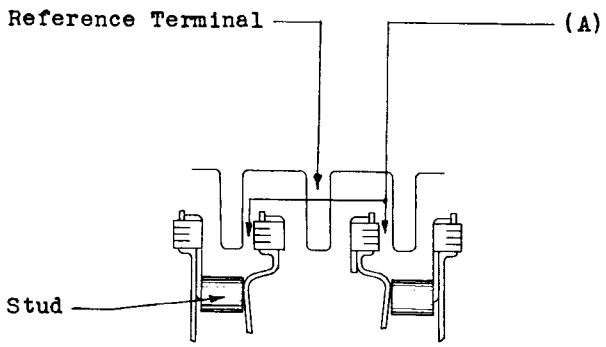


Fig. 5

2.09 Tip and Ring Spring Clearance of 11 Type Multiple Brushes - Fig. 6 (A) - With the brush in its reset position and with the weight of the brush rod assembly resting on the clutch pawl for any position of the bank, and with the brush held so that the back of the sleeve spring further from the tip or ring spring being tested is touching its adjacent tip or ring terminal, the clearance between either the tip or ring spring and its associated terminal shall be:
Min. 1/64"
Gauge by eye.

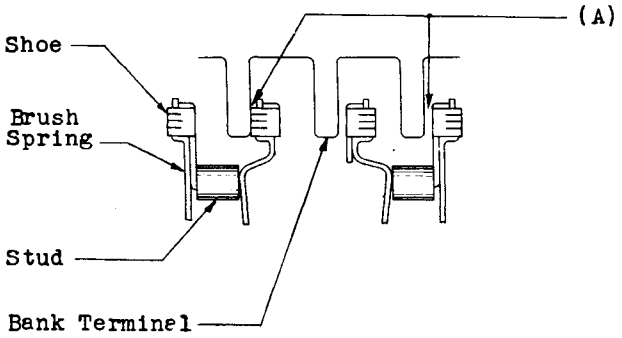
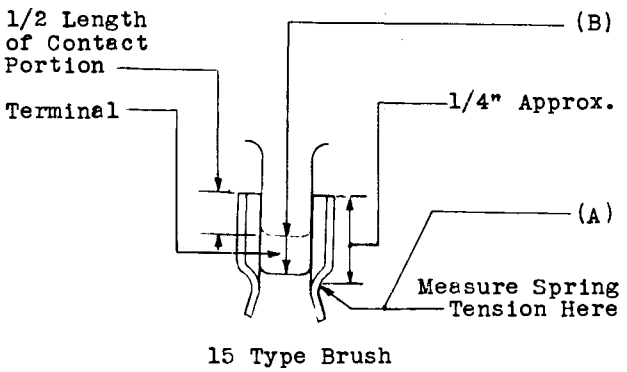


Fig. 6

2.10 Brush Spring Tension - Figs. 4 (B) and 7 (A) - With the brush tripped and centered on the reference terminal of the bank, the tension of each spring shall be:
Test - Min. 25 grams, Max. 50 grams
Readjust - Min. 30 grams, Max. 45 grams
Use the No. 68-B gauge.

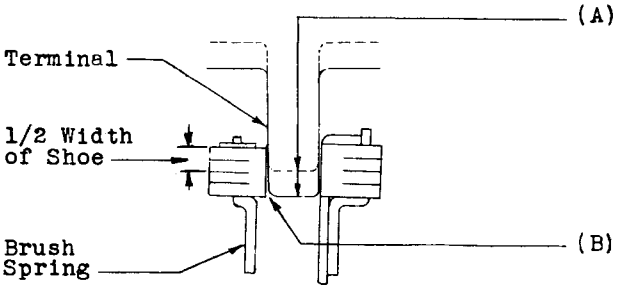
2.11 Brush Intrusion - Figs. 7 (B) and 8 (A) When the brush is tripped on any terminal in the bank, the contacting surfaces of the springs shall project in from the end



15 Type Brush

Fig. 7

of the terminal not less than half and not more than the full width of the shoe for the 11 type brush, and not less than half and not more than the full length of the contact portion of the spring for the 15 type brush. 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.



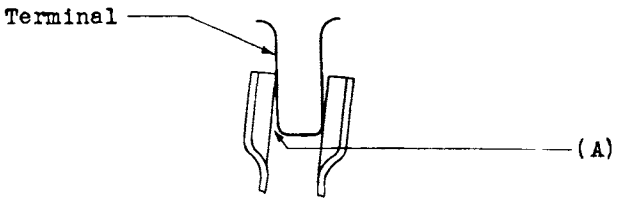
11 Type Brush

Fig. 8

2.12 Parallelism of Brush Springs - Figs. 8 (B) and 9 (A) - When the 11 type brush is tripped on the reference terminal of its associated bank and the 15 type brush is contacting with the reference terminal of its associated bank, the deviation from parallel between the contacting surfaces of the springs and the contacting surfaces of the terminals shall be as small as possible. In any case, when the brush intrusion of the 11 type brush equals the full width of the shoe or when the brush intrusion of the 15 type brush is approximately 5/32", this divergence from parallel shall be:
Max. .005"

2.12 (Continued)

If the brush intrusion of the 11 type brush is less than the full width of the shoe or if the brush intrusion of the 15 type brush is less than approximately 5/32", 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 of the 11 type brush, or 5/64" from the tip of the 15 type brush. Gauge by eye.



15 Type Brush

Fig. 9

2.13 15 Type Brush Location

(a) Fig. 10 (A) - With the rack index number "18" showing just above the clutch sighting plate, with the weight of the brush rod assembly resting on the clutch pawl and the hunting brush resting on the 33rd terminal, the clearance between the contacting surface of the higher brush spring and the lower edge of the reference terminal shall be:
Test - Min. .025", Max. .045"
Readjust - Min. .030", Max. .040"
For the purpose of maintenance, it will be satisfactory if, upon inspection, the brush meets the following requirement: The top edge "C" of the contacting portion of the higher bridging spring shall be aligned approximately with the lower edge of the 34th or reference terminal with the brush in contact with the 33rd terminal. This top edge, however, shall not be more than .010" (half width of terminal) above, nor more than .010" below the lower edge of this terminal, provided the terminal is in its theoretically correct position. Gauge by eye.

(b) With the brushes adjusted as specified above, and with the proper amount of stagger in the spring, there shall be a reliable clearance between the lower contact edge of the lower brush spring and the upper edge of the 32nd terminal. Gauge by eye.

2.14 15 Type Brush Spring Stagger - Fig. 10 (B) - This stagger shall be:
Max. .030" (1-1/2 thickness of terminal)
Gauge by eye.

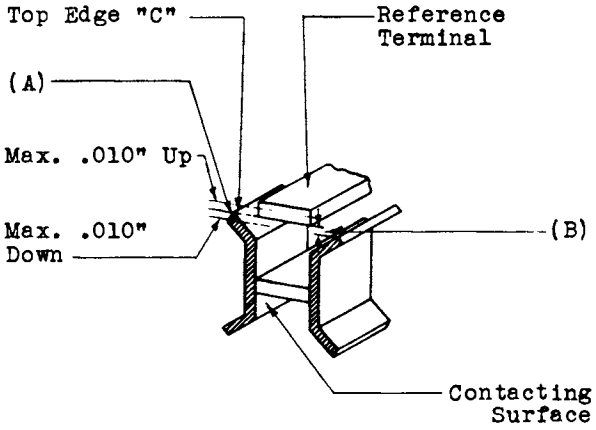


Fig. 10

2.15 Tip, Ring and Sleeve Spring Location of 11 Type Brushes - Fig. 11 (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 pawl engaging the notch in the rack corresponding to 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.

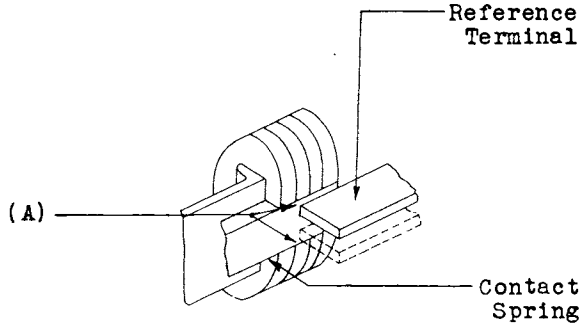


Fig. 11

2.16 Point of Contact Between Trip Armature Extension and Rotating Lever With the trip magnet armature in its normal position the point of engagement between the rounded surface of the tip of the trip armature extension and the rotating lever shall be:

(a) Early Type (One Piece) Rotating Lever - Fig. 12 (A) - Inside the rounded corner at the front edge of the rotating lever. Gauge by eye.

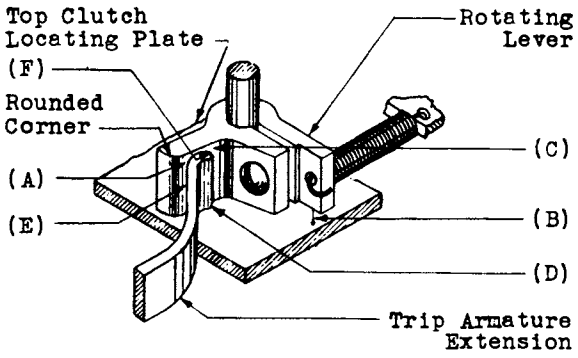


Fig. 12

(b) Later Type (Two Piece) Rotating Lever - Fig. 13 (A)
Test Inside the corner at the front edge of the rotating lever.
Readjust Min. 1/32" from the corner at the front edge of the rotating lever. Gauge by eye.

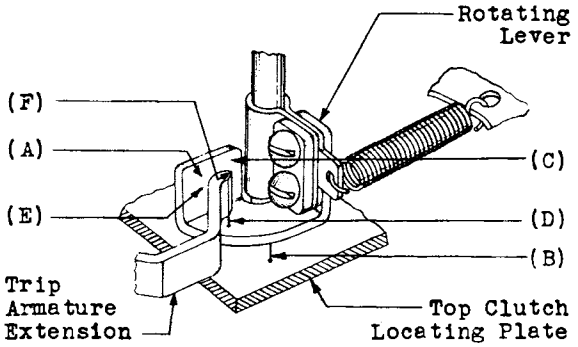


Fig. 13

2.17 Clearance Between Rotating Lever and Top Clutch Locating Plate - Fig. 12 (B) and Fig. 13 (B) - This clearance shall be:
Min. .020"
Gauge by eye.

2.18 Vertical Location of Trip Armature Extension with Respect to Rotating Lever The tip of the trip armature extension shall not:

(a) Fig. 12 (C) and Fig. 13 (C) - Project above the contacting surface of the rotating lever. Gauge by eye.

(b) Fig. 12 (D) - Project below the contacting surface of the one piece rotating lever. Gauge by eye.

(c) Fig. 13 (D) - Come in contact with the top surface of the horizontal section of the two piece rotating lever directly below it in any position of rotation of the rotating lever. Gauge by eye.

2.19 Parallelism of Contact Between Trip Armature Extension and Rotating Lever Fig. 12 (E) and Fig. 13 (E) - The deviation from parallel between the trip armature extension and the rotating lever surfaces where they come in contact with each other shall be:
Max. .005"
for the full width of the trip armature extension. Gauge by eye.

2.20 Location of Sharp Edge of Trip Armature Extension - Fig. 12 (F) and Fig. 13 (F) With the trip armature in its fully operated position, the sharp edge at the end of the rounded portion of the trip armature extension shall not come into contact with the rotating lever. Gauge by eye.

2.21 Clearance Between Trip Armature Extension and Rack - Fig. 14 (A) - With the trip armature fully operated there shall be a reliable (min. 1/64") clearance between the trip armature extension and the rack for all positions of the rack. Gauge by eye.

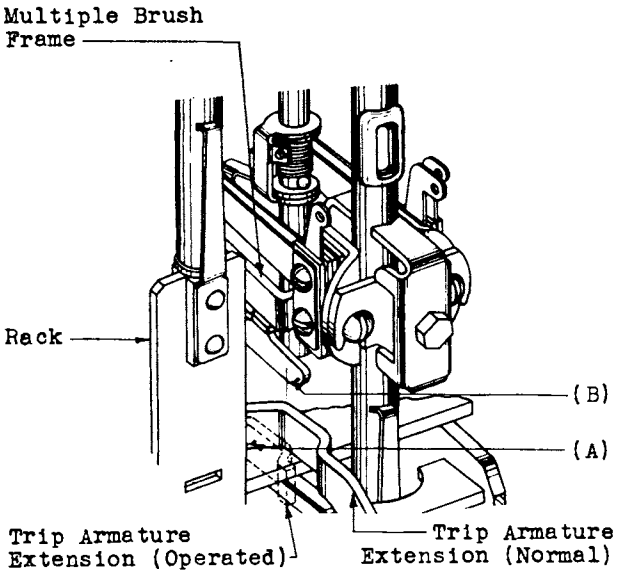


Fig. 14

2.22 Clearance Between Trip Armature Extension and Adjacent Multiple Brush Frames

(a) Fig. 14 (B) - With the trip armature in the normal position, the trip armature extension shall clear the frame of the multiple brush to the right of it. Gauge by eye.

(b) With the trip magnet fully operated, the trip armature extension shall clear the frame of the multiple brush directly above it. Gauge by eye.

2.23 Clearance Between End of Trip Finger and Sleeve Springs - Fig. 15 (A) - With the multiple brush in the normal (reset) position and with the trip finger in either the operated or the non-operated position, this clearance shall be:
Min. 1/16"
Use the No. 89 gauge.

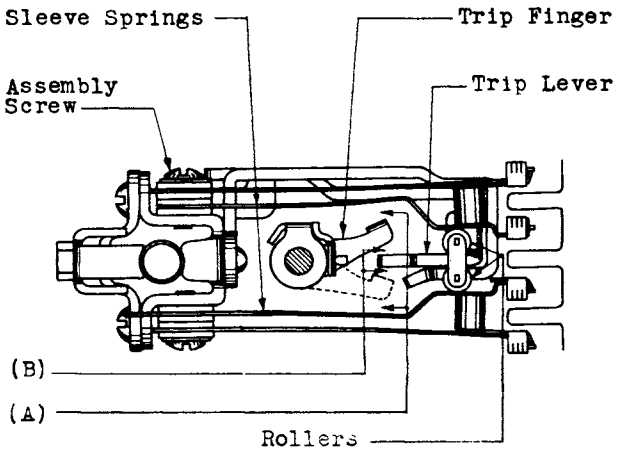


Fig. 15

2.24 Horizontal Clearance Between Trip Finger and Trip Lever - Fig. 15 (B) - With the trip finger in the operated or the non-operated position and with the brush in the normal (reset) position, the clearance between the trip finger and the associated multiple brush trip lever shall be:
Min. 1/64"
Use the No. 89 gauge.

2.25 Trip Finger Return to Normal - Fig. 16 (A) - Trip fingers shall not be sluggish when allowed to return very slowly from the trip position to the normal position. Gauge by eye and by feel.

2.26 Freedom of Movement of Trip Rod There shall be no tendency for the trip rod to fail to operate or be sluggish in operation or in returning to its normal position when the trip magnet armature is slowly operated manually and slowly released. Gauge by eye and by feel.

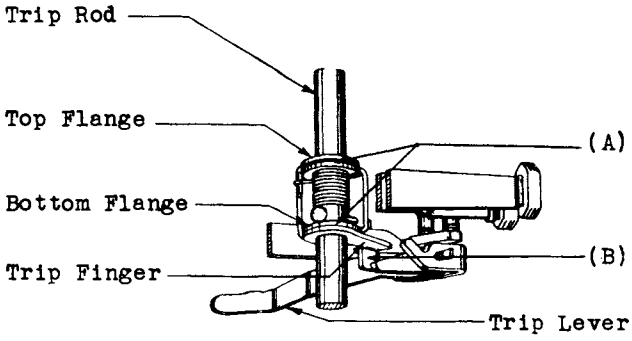


Fig. 16

2.27 Vertical Clearance Between Bottom of Horizontal Flange of Trip Finger and Trip Lever - Fig. 16 (B) - With the trip finger engaging the trip lever and with the trip rod down against the top channel of the friction roll drive, this clearance shall be:
Test - Min. 1/64", Max. 5/64"
Readjust - Min. 1/64", Max. 1/16"
Use the No. 89 gauge and gauge by eye.

2.28 Down Stop Collar Location

(a) Figs. 17 (A) and 18 (A) - Location of Down Stop Collars with Respect to Bearings The down stop collars shall rest upon the brush rod bearings when the brush rod is in the normal or lowest position. In the case of earlier type collars, only one collar need rest on the brush rod bearing in the normal position but the clearance between the other collar and the bearing shall be:
Test - Max. .006"
Readjust - Max. .005"
Gauge by eye.

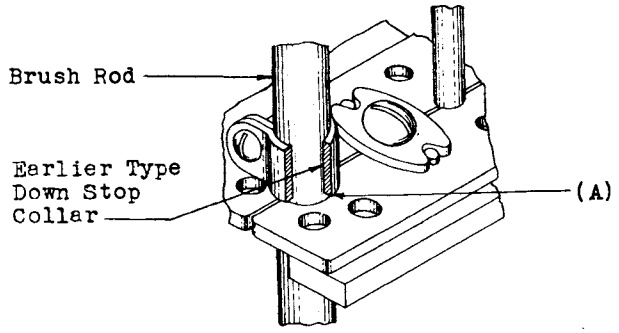


Fig. 17

2.28 (Continued)

(b) 11 Type Multiple Brush Reset - Fig. 18 (A) - When the brush rod is lowered under power, any tripped brush shall reset with a snap with a
Test - .010" (No. 85-B gauge)
Readjust - .020" (No. 85-C gauge)
placed below the nearest down stop collar.

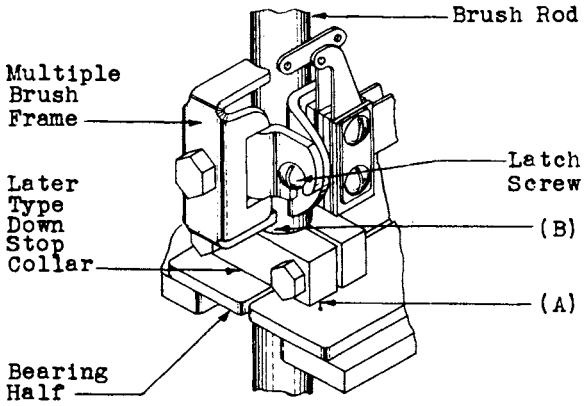


Fig. 18

(c) Down Stop Collar and 11 Type Multiple Brush Frame Clearance This clearance shall be:

(1) For earlier type collars
Test - Min. .004"
Readjust - Min. 1/64"
Max. 3/64"

(2) For later type collars - Fig. 18(B)
Test - Min. 1/64"
Readjust - Min. 1/16"
Max. 1/8"

Gauge by eye.

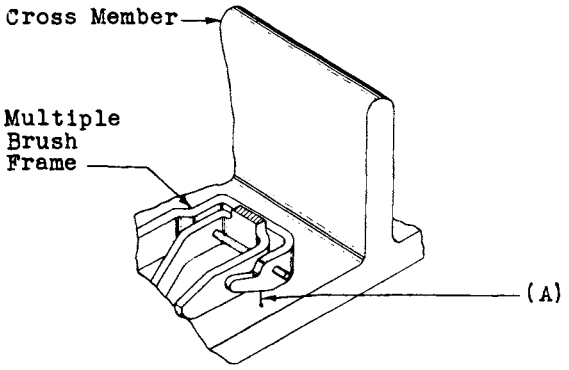


Fig. 19

(d) Clearance Between Each 11 Type Multiple Brush Frame and Cross Member - Fig. 19 (A) - With the brush rod in its normal (down) position, this clearance shall be:
Test - Perceptible (Min. .005")
Readjust - Min. 1/64"
Gauge by eye.

(e) Clearance Between 15 Type Brush Springs and Bank Angle Supports on Front Side of Frame - Fig. 20 (A) - With the brush rod down stop collar resting on the bearing, this clearance shall be:
Min. 1/32"
Gauge by eye.

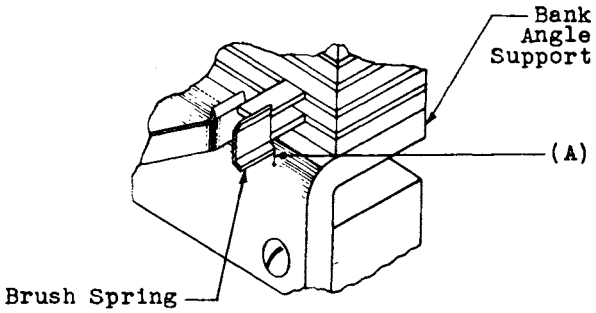


Fig. 20

2.29 Up Stop Collar Location - Fig. 21 (A) - With the rack index number "41" showing just above the clutch sighting plate, and with the weight of the brush rod assembly resting on the clutch pawl, this clearance shall be:
Min. 1/32", Max. 1/16"
Gauge by eye.

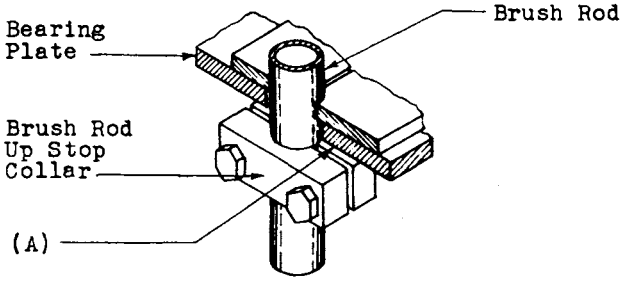


Fig. 21

2.30 Clearance Between Trip Rod Stop Collar and Bottom of Bearing Plate - Fig. 22
(A) - This clearance shall be:
Test - Min. .008", Max. .025"
Readjust - Min. .010", Max. .020"
Gauge by eye.

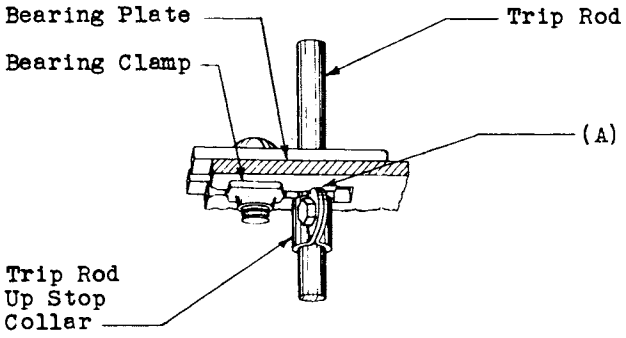


Fig. 22

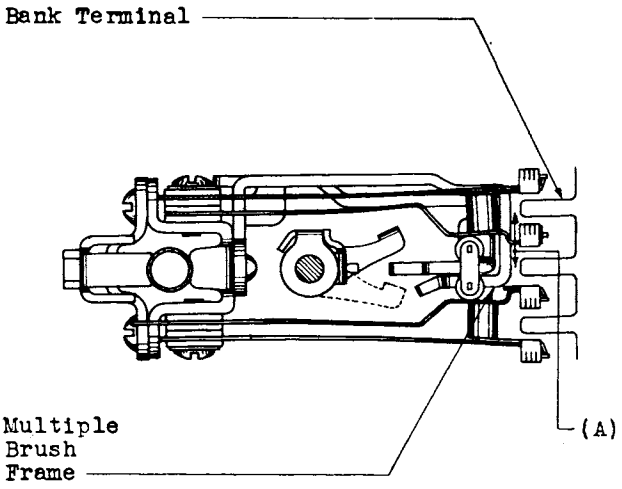


Fig. 23

2.31 Clearance Between 11 Type Multiple Brush Frame and Bank Terminals - Fig. 23 (A)
With the rack index number "10" showing just above the clutch sighting plate and with the weight of the brush rod assembly resting on the clutch pawl, this clearance on No. 0 banks shall be:
Min. 1/32"
On earlier type frames only which do not have a bearing plate above the No. 9 bank, this clearance shall also be met at the top terminal of the No. 9 bank when the brush rod is raised so that the rack index number "41" shows just above the clutch sighting plate and the weight of the brush rod assembly rests upon the clutch pawl. Gauge by eye.

2.32 Smooth Brush Travel With the brush tripped and as the selector travels 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.

REASON FOR ISSUE - CHANGES IN REQUIREMENTS

1. To change the requirement covering No. 1-A guide location (2.04). (Previously covered by addendum to Section A446.005 (X-70288-01, Issue 2-B)).

2. To change the maximum test limit of the requirement covering brush spring tension (2.10). (Information for W.E.Co. covered by CO-127405).

3. To change the requirement covering tip, ring and sleeve spring location of 11 type brushes (2.15).

4. To add a requirement covering the point of contact between the trip armature extension and the two piece rotating lever. (2.16).

5. To add a requirement covering the vertical location of the trip armature extension with respect to the two piece rotating lever (2.18).

6. To change the requirement covering down stop collar location (2.28).

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Materials and Test Apparatus

Code No.	Description
Tools	
38-B	Lamp Socket with 802 Cord
206	Screw-driver - 30 Degree Offset
207	Screw-driver - 90 Degree Offset
220	Wrench 3/16" Hex. Socket
325-B (or the replaced 325)	Adjuster
326-B (or the replaced 326)	Adjuster
327	Adjuster
328	1-A Guide Adjuster
329	1-A Guide Holder
331	Spring Adjuster
376-A	Dental Mirror
380-A	Brush Spring Adjuster
KS-2631	Screw-driver - 4-1/2"
KS-2632	Reading Glass
KS-6320	Orange Stick
KS-6854	Screw-driver - 3-1/2"
-	Bell System Cabinet Screw-driver - 3-1/2" per A.T.& T.Co. Drawing 46-X-40
-	Bell System Cabinet Screw-driver - 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
-	No. 4 Artist's Sable Rigger Brush
Gauges	
68-B (or the replaced 68)	70-0-70 Gram Gauge
80-B (or the replaced 80)	.010"-.020"-.030" and .015"-.035" Double End Thickness Gauge
85-B	.010" Thickness Gauge
85-C	.020" Thickness Gauge
86	.005" and .008" Double-end Right Angle Offset Thickness Gauge
89	1/16" and 1/64" Round Thickness Gauge
Materials	
D-89026	Cloth
KS-2423	Cloth
KS-6815	C.P. Carbon Tetrachloride
-	Western Electric Lubricating Compound No. 3

3.002 Use of Reading Glass and Dental Mirror The KS-2632 reading glass and the 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 sender circuit busy in the approved manner. In the case of a tandem translator, make the tandem translator circuit busy in the approved manner.

3.004 Location of Tip and Ring Springs 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 Lubrication (Rq.2.01)

M-1 Lubrication of Rotating Levers and Trip Armature Extensions Raise the brush rod associated with the rotating lever to be lubricated so that it is in position to trip the lowest two brushes on the selector.

M-2 Operate the trip rod manually so as to open up a space between the rotating lever and the trip armature extension. Dip the No. 4 artist's sable rigger brush into Western Electric Lubricating Compound No. 3, removing the excess lubricant from the brush before withdrawing it from the container, and apply it to the rotating lever and the trip armature extension as shown in Fig. 24.

M-3 Take care that the lubricant does not get on the racks or cork rolls of the drive. After applying the lubricant it is advisable, if service conditions permit, to allow the parts lubri-

3.01 (Continued)

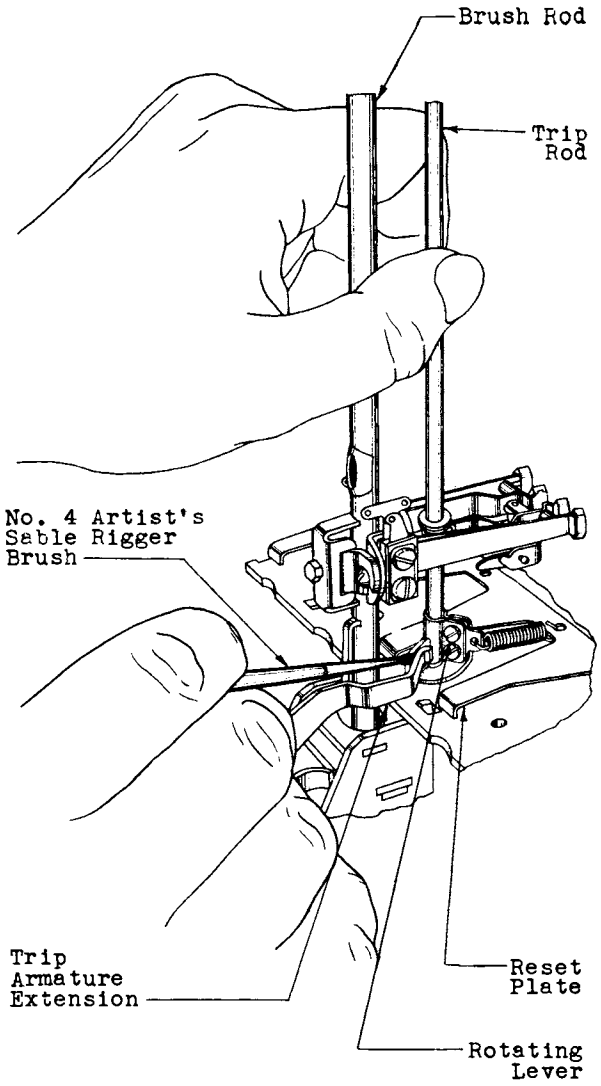


Fig. 24 - Method of Lubricating Trip Rod Rotating Levers and Trip Armature Extensions

cated to remain idle for approximately 15 minutes to permit the carbon tetrachloride to evaporate.

M-4 Lubrication of Reset Levers, and Reset or Bearing Plates If the reset lever, or the reset or bearing plate with which it comes in contact shows signs of wear or if the reset lever snags against the reset or bearing plate as the multiple brush restores to its normal position, apply Western Electric Lubricating Compound No. 3 to the surface of the reset or bearing plate where the reset lever comes in contact with it and 1/2" of the under surface of the reset lever at the end of the lever where it comes in contact with the reset or bearing plate as follows:

M-5 Dip the No. 4 artist's sable rigger brush into the container holding the lubricant and, making sure to remove the excess lubricant from the brush before withdrawing the brush from the container, apply the lubricant to the surfaces referred to in M-4. After applying the lubricant it is advisable, if service conditions permit, to keep the reset lever from rubbing on the reset plate for 15 minutes to allow the carbon tetrachloride to evaporate.

M-6 If necessary, clean the surfaces referred to in M-4 with a dry KS-2423 cloth. If it is found that, due to the presence of a gummy or sticky deposit, the surfaces cannot be cleaned with a dry cloth, the cloth may be saturated with C.P. carbon tetrachloride. If it is found necessary to use C.P. carbon tetrachloride for cleaning purposes, do not apply the lubricant until the cleaning fluid has evaporated.

3.02 Rack Tongue Position (Rq.2.02)

M-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 a pair of 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.

3.03 Rack Coupling Pin Engagement (Rq.2.03)

M-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. When checking for this requirement, make sure that no multiple brush is tripped.

M-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 M-1 above, first make certain that this is not caused by a binding or bowed brush rod. (See procedure 3.05). 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 are no short bends in the lower end of the brush rod. Check to 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.

3.03 (Continued)

M-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 translator elevator apparatus.

3.04 No. 1-A Guide Location (Rq.2.04)

M-1 To readjust a brush rod guide which binds against the trip rod in the ascent or descent of the brush 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. 25 and adjust the guide with the No. 328 adjuster.

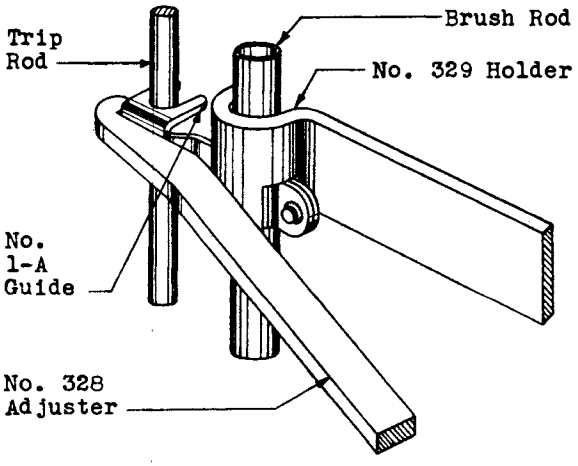


Fig. 25 - Method of Adjusting No. 1-A Guide

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

M-3 If it is found that the guide comes in contact with any of the bearing parts when at the topmost limit of its travel, loosen the clamping screws which hold it to the brush rod with the 6-1/2" cabinet screw-driver, and lower the guide assembly so that it clears the bearing parts. Tighten the clamping screws, making sure that parts (a) and (b) of the requirement are met.

3.05 Freedom of Movement of Brush Rod (Rq.2.05)

3.06 Brush Rod Bearing Gap (Rq.2.06)

M-1 Check to 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.

M-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.

M-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.

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

M-5 If the brush rod still fails to meet requirement 2.05 (Freedom of Movement of Brush Rod) proceed as follows.

M-6 To check the freedom of movement of the brush rod, first raise the brush rod to its highest position, that is, with an up stop collar touching the under side of its associated bearing locating plate, and trip any two multiple brushes which would be tripped in the normal operation of the apparatus. Exercise care when raising a brush rod which has a tendency to bind. Do not force the rod upward, but first check to see that the bind is not caused by a multiple brush being tripped below its normal tripping position. If all the brushes are reset and still the brush rod binds, correct as covered in the following methods. Failure to observe this warning may result in either bending the trip finger out of alignment or bending or breaking the rollers on the trip lever assembly. It may also result in injury to the brush rod.

M-7 Hold back the pawl of the associated clutch with a KS-6320 orange stick and at the same time place a finger under the frame of the lowest multiple brush below the mounting screw so as to support the brush rod in its descent.

M-8 Lower the brush rod slowly and evenly. See that the brush rod follows

3.05-3.06 (Continued)

the movement of the finger without sticking or binding during its entire travel; that is, until the reset lever of a tripped brush touches the associated reset or bearing plate. It is not necessary that the tripped brush be reset by the combined weight of the rod and rack alone. See part (b) of requirement 2.28 (Down Stop Collar Location) for brush reset requirement.

M-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, or both. 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 3.04. 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.

M-10 If the clutch appears to be 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, and recheck the brushes on the No. 0 and No. 1 banks for horizontal centering, as the adjustment for alignment will have changed the position of the clutch. Also recheck requirements 2.16 (Point of Contact Between Trip Armature Extension and Rotating Lever), 2.18 (Vertical Location of Trip Armature Extension with Respect to Rotating Lever), 2.19 (Parallelism of Contact between Trip Armature Extension and Rotating Lever), 2.20 (Location of Sharp Edge of Trip Armature Extension), 2.21 (Clearance Between Trip Armature Extension and Rack), 2.22 (Clearance Between Trip Armature Extension and Adjacent Multiple Brush Frames), and 2.24 (Horizontal Clearance Between Trip Finger and Trip Lever).

M-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 bearings meet requirement 2.06 (Brush Rod Bearing Gap).

M-12 Before separating the halves of a bearing, make sure that the bind is not caused by misalignment of the bearing halves. To check for it, move the rod first from side to side and then from front to rear. Such misalignment 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.

M-13 Close bearings open more than the permissible amount by tapping the bearing half into the correct position 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 lamp held below the bearing locating plate will be found of considerable help in checking for open bearings.

M-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 3.10 and to the section covering panel selector commutators and commutator brushes when it is necessary to make the above check or adjustment.

M-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 heavy brush tension, interference with the No. 1-A guide or a misaligned clutch, examine the rod carefully to ascertain whether 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. Be careful to leave the rod straight and not to produce any kinks in it. After straightening the rod check for requirements 2.08, (Horizontal Centering of 11 Type Multiple Brushes), 2.11 (Brush Intrusion), 2.13 (15 Type Brush Location), 2.15 (Tip, Ring and Sleeve Spring Location of 11 Type Brushes) and 2.31 (Clearance Between 11 Type Multiple Brush Frame and Bank Terminals). If the fault cannot be discovered

3.05-3.06 (Continued)

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.

3.07 11 Type Brush Stud Gap (Rq.2.07)

M-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.

M-2 Unless the sleeve springs are distorted, adjust the stud gap, adjusting the outside springs as shown in Fig. 26 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.

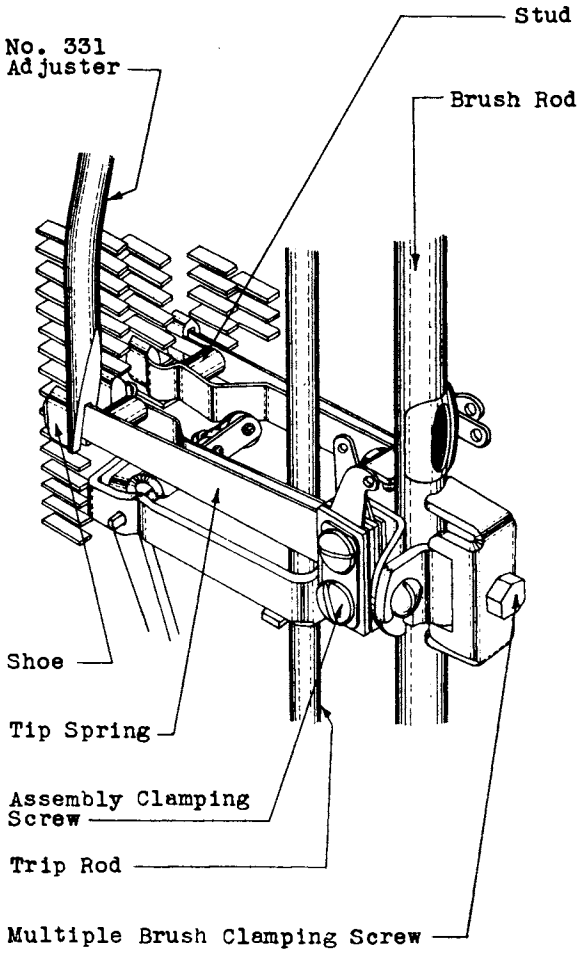


Fig. 26 - Method of Adjusting for Brush Rod Stud Gap

3.08 Horizontal Centering of 11 Type Multiple Brushes (Rq.2.08)

M-1 If there is no clearance between the back of one sleeve shoe and a tip or ring terminal, and a large clearance between the back of the other sleeve shoe and its associated tip or ring terminal; this condition will usually be caused by the whole brush assembly being twisted sideways. To correct this, loosen the multiple brush clamping screw slightly with the No. 220 wrench and twist the brush assembly so that both sleeve springs will be approximately equidistant from the adjacent sleeve terminal. Then retighten the multiple brush clamping screw.

M-2 If it is found impossible to obtain the desired clearance by following M-1 and either or both of the sleeve spring shoes still make contact with the tip or ring terminals it will generally be found that the gap between the sleeve spring at fault and the adjacent tip or ring spring at the first bend of the sleeve spring will be much greater than the normal one. To correct this condition, apply the 380-A adjuster to the sleeve spring close to its base and push it toward the contact end of the spring while exerting a slight twisting pressure that will bow the spring outward. It may be necessary to repeat this operation to obtain the perceptible clearance.

3.09 Tip and Ring Spring Clearance of 11 Type Multiple Brushes (Rq.2.09)

M-1 To check for this clearance, raise the brush rod until the brush is in line with the reference terminal and press the brush first to the right and then to the left until the back of the sleeve spring touches the tip or ring terminal and observe the clearance between the tip and ring springs and their associated terminals. In checking on the reference terminal to insure that the requirement will be met on any other terminal in the bank, make allowance for any lateral offset of the bank terminals.

M-2 Examine the brush to see if it is in accordance with Fig. 27 for the purpose of determining what condition is responsible for this lack of clearance and the necessary means to be used in correcting it. Pay particular attention to the clearance between the sleeve springs and the outside springs at the point where the first bend occurs on a sleeve spring.

M-3 If the tip, ring or sleeve springs are not distorted, but the stud gap is too large, adjust this as covered in procedure 3.07.

M-4 After adjusting for this requirement,

3.09 (Continued)

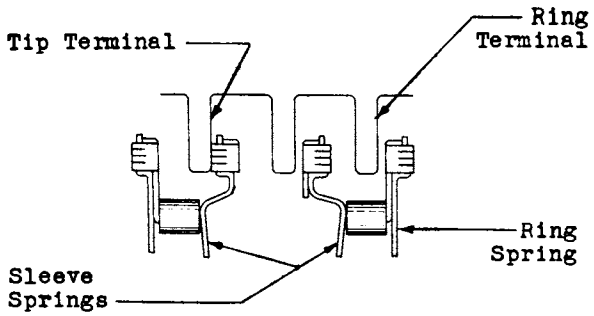


Fig. 27 - Showing That a Clearance Should Still Exist Between the Ring Spring and its Associated Terminal, When the Brush Springs Are Pressed to the Left Until the Back of the Sleeve Spring Makes Contact with the Tip Terminal.

check and readjust if necessary, for requirements 2.07 (Brush Stud Gap), 2.08 (Horizontal Centering of 11 Type Multiple Brushes) and 2.12 (Parallelism of Brush Springs), and other features that may have been disturbed.

3.10 Brush Spring Tension (Rq.2.10)

M-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. The No. 68-B gauge may be used in checking this tension as shown in Fig. 28.

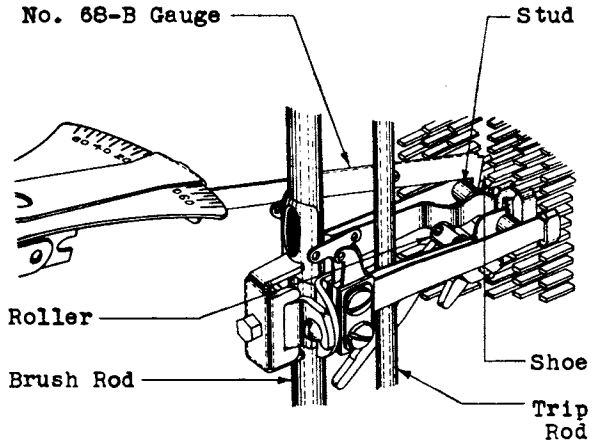


Fig. 28 - Method of Checking Brush Spring Tension Using No. 68-B Gauge

M-2 When making any adjustment of brush springs, exercise care not to reduce the clearance between the sleeve springs and the rollers and also to prevent any distortion or kinking of the springs, thereby affecting their relation with the corresponding terminals. Note that with the multiple brush tripped the rollers do not touch the sleeve springs.

3.11 Brush Intrusion (Rq.2.11)

M-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, make a check to 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 2.08 (Horizontal Centering of 11 Type Multiple Brushes), 2.09 (Tip and Ring Spring Clearance on 11 Type Multiple Brushes), 2.10 (Brush Spring Tension), 2.13 (15 Type Brush Location), 2.15 (Tip, Ring and Sleeve Spring Location of 11 Type Brushes) and 2.31 (Clearance Between 11 Type Multiple Brush Frame and Bank Terminals). It is satisfactory if, in isolated cases, a brush only approximately meets the requirement at the top or 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.

3.12 Parallelism of Brush Springs (Rq.2.12)

M-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.

M-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.

3.13 15 Type Brush Location (Rq.2.13)

M-1 If this requirement is not met, and the brush rod is coupled to a No. 1-A or No. 2-A rack, first ascertain that

3.13 (Continued)

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 translator elevator apparatus.

M-2 With the brush resting on the reference terminal, and with the weight of the brush rod assembly resting on the clutch pawl, make sure that the contacting surface of either spring is not tilted from the vertical plane of the contacting portion of the brush terminal enough to interfere with the proper bridging of the brush springs. A tilted brush spring is shown in Fig. 29. If any springs are found tilted away from the terminals in this manner, straighten them with the No. 380-A spring adjuster, and then recheck for requirement 2.12 (Parallelism of Brush Springs).

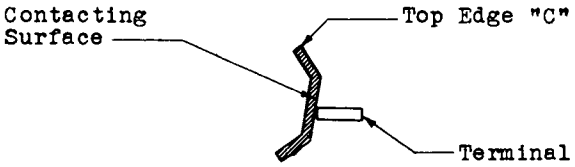


Fig. 29 - Illustrating Tilted Brush Condition

M-3 If the top edge "C" is outside of the required limits loosen the multiple brush clamping screw with the No. 220 wrench sufficiently to permit the adjustment to be made by tapping the shank of the wrench up or down as required with the spring adjuster. 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.

M-4 Securely tighten the multiple brush clamping screw.

3.14 15 Type Brush Spring Stagger (Rq.2.14)

M-1 To adjust the stagger of the 15 type brush, loosen one assembly screw with the No. 206 or No. 207 screw-driver and raise or lower the spring as required by means of the No. 380-A adjuster. Tighten the assembly screw after the spring is in the correct position and then ascertain that requirement 2.13 (15 Type Brush Location) is met.

3.15 Tip and Ring and Sleeve Spring Location of 11 Type Brushes (Rq.2.15)

M-1 If this requirement is not met, and the brush rod is coupled to a No. 1-A or No. 2-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 translator elevator apparatus.

M-2 Before adjusting for this requirement on a tip, ring or sleeve spring, first determine that the associated 15 type brush has its 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 it is located in accordance with requirement 2.13 (15 Type Brush Location). If, after this adjustment, it is found that the tip, ring or sleeve springs fail to meet the limits specified, adjust the springs at fault as follows:

M-3 Loosen the lower assembly screw with the No. 206 or No. 207 screw-driver and raise or lower the spring at fault with the No. 380-A adjuster until it is within the specified limits. After this adjustment, tighten the assembly screws securely. After making this adjustment check to see that part (a) of the requirement can be met at other points in the bank. If the brush fails to meet this requirement it is probably due to a displacement of the bank terminals. Correct this in accordance with the section covering panel multiple banks.

3.16 Point of Contact Between Trip Armature Extension and Rotating Lever (Rq.2.16)
3.17 Clearance Between Rotating Lever and Top Clutch Locating Plate (Rq.2.17)
3.18 Vertical Location of Trip Armature Extension with Respect to Rotating Lever (Rq.2.18)
3.19 Parallelism of Contact Between Trip Armature Extension and Rotating Lever (Rq.2.19)
3.20 Location of Sharp Edge of Trip Armature Extension (Rq.2.20)
3.21 Clearance Between Trip Armature Extension and Rack (Rq.2.21)
3.22 Clearance Between Trip Armature Extension and Adjacent Multiple Brush Frames (Rq.2.22)

M-1 In adjusting for requirements 2.16, 2.18, 2.19, 2.20, 2.21, and 2.22, adjust the trip armature extension with the No. 325-B adjuster while holding it with the No. 326-B adjuster as outlined in 3.23, M-2, taking care that requirements 2.23 and 2.24 can still be met.

M-2 In adjusting to meet requirement 2.18, it may also be necessary to raise or lower the rotating lever. To do this, slightly loosen the clamping screws with the 3-1/2" cabinet screw-driver and shift the rotating lever up or down, making sure that requirement 2.17 can be met.

3.16-3.22 (Continued)

Exercise care when shifting the rotating lever not to move it in a rotary direction about the trip rod, since this would affect the requirement governing the adjustment of the trip fingers and the trip armature extension of the clutch. In resetting the rotating lever see that it is nearly horizontal with the retractile spring as possible.

M-3 See that the retractile spring has sufficient tension to restore the rotating lever firmly back to normal and check the operation of the retractile spring by manually operating and releasing the trip magnet armature.

3.23 Clearance Between End of Trip Finger and Sleeve Springs (Rq.2.23)

M-1 To check for this clearance, locate the brush rod so that the trip lever of the associated brush is just below the trip finger being checked. Operate the trip armature electrically when gauging the operated clearance. Make use of the No. 89 gauge in checking for this requirement.

M-2 To change the position and the angular travel of all the trip fingers on a trip rod to meet this requirement, one or a combination of the methods given in M-3 to M-6, inclusive, may be used.

M-3 Adjust the trip armature extension as shown in Figs. 30 and 31 so as to engage the rotating lever nearer to its center and thus increase the swing of the lever.

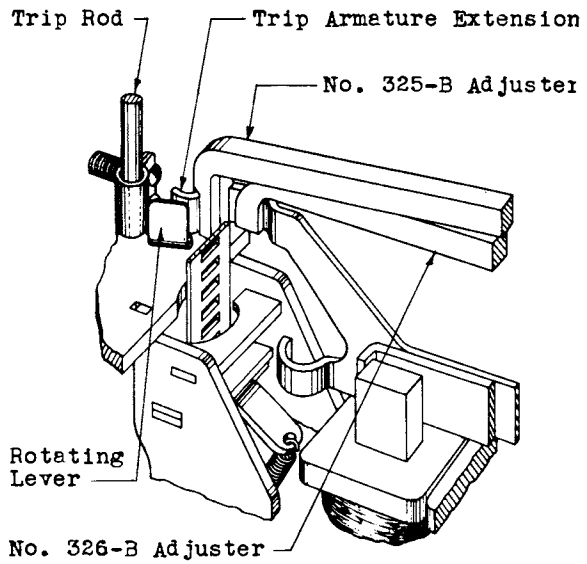


Fig. 30 - Method of Adjusting Trip Armature Extension

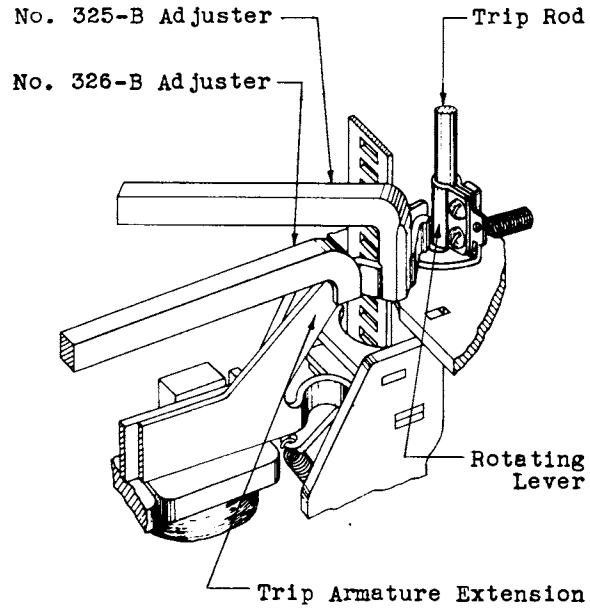


Fig. 31 - Method of Adjusting Trip Armature Extension

M-4 Adjust the trip armature extension directly over the semi-circular stop to change the position of the trip finger swing without changing the amount of swing as shown in Fig. 32. Use the No. 326-B adjuster for holding the trip magnet armature while adjusting it with a No. 325-B adjuster.

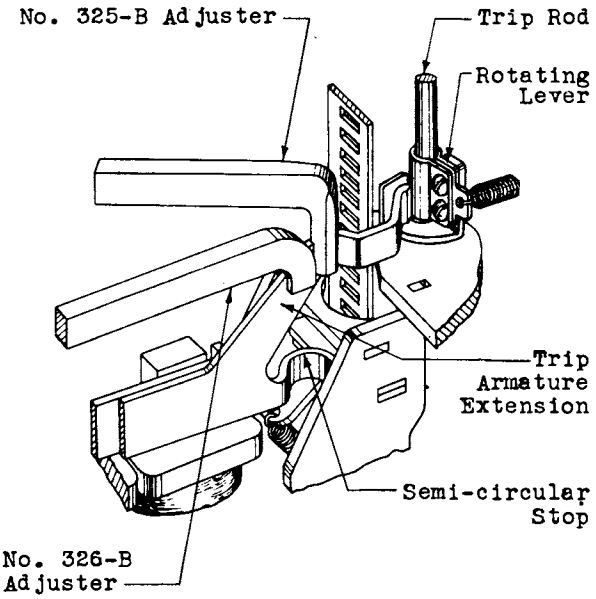


Fig. 32 - Method of Adjusting Trip Armature Extension

3.23 (Continued)

M-5 Adjust the semi-circular portion of the trip armature extension as necessary with long nose pliers as shown in Fig. 33, taking care not to adjust it to such an extent as to cause interference between the trip armature extension and the rack or the reset lever of the adjacent multiple brush.

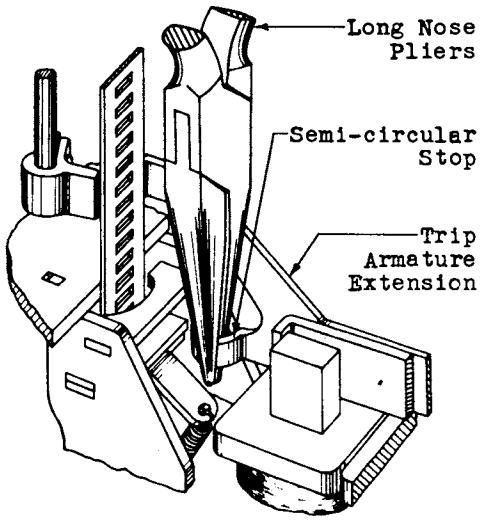


Fig. 33 - Method of Adjusting Semi-circular Stop of Trip Armature Extension

M-6 When the rotating lever is not located on the trip rod in a position to allow the proper swing of the trip lever, loosen the rotating lever clamping screw slightly with the 3-1/2" cabinet screw-driver and relocate the rotating lever on the trip rod. Tighten the clamping screw after relocating the rotating lever.

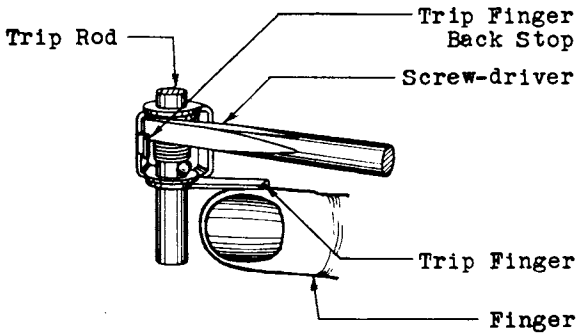


Fig. 34 - Method of Adjusting Trip Finger Back Stops

M-7 If the normal position of one trip finger is out with respect to the others, adjust the trip finger back stop. The back stop may be adjusted to the right by means of the blade of the 3-1/2" cabinet screw-driver placed between it and the trip rod as shown in Fig. 34. Adjust it forward with a pair of long nose pliers as shown in Fig. 35. Exercise care in making this adjustment to prevent injury to the trip finger.

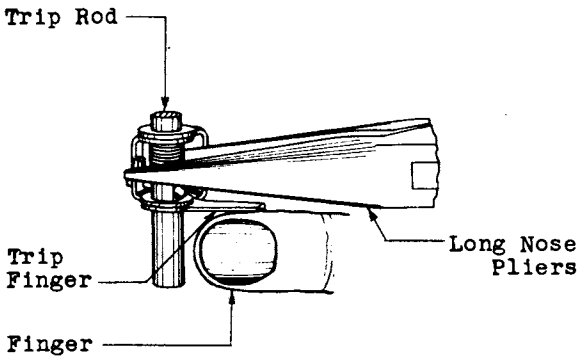


Fig. 35 - Method of Adjusting Trip Finger Back Stops

3.24 Horizontal Clearance Between Trip Finger and Trip Lever (Rq.2.24)

M-1 With the trip rod in its normal position, raise the brush rod until the brush is in the position in which the trip lever of the associated brush would be engaged by the trip finger if the trip finger were operated. Then note the clearance between the trip finger in its normal position and the trip lever of the brush. Gauge the gap with a No. 89 gauge.

M-2 Next lower the brush rod sufficiently to permit the trip rod to be fully operated and then raise the brush rod to the position referred to in M-1 and again note the clearance between the trip finger and the brush trip lever.

M-3 If readjustment is necessary and the trouble is found to exist on all of the trip fingers of the trip rod, change the position or the angular travel of all the trip fingers as outlined in 3.23, M-2, taking care to see that the requirement covering the clearance between the end of the trip fingers and the sleeve springs can still be met.

M-4 If the trouble is not due to a general misalignment of all the trip fingers, check the location of the multiple brush to see that it meets requirement 2.08 (Horizontal Centering of 11 Type Multiple Brushes). If the brush is set correctly, change the normal position of the individual trip finger in

3.24 (Continued)

question as outlined in 3.23, M-3. After making this adjustment, see that requirement 2.23 (Clearance Between End of Trip Finger and Sleeve Springs) can be met.

3.25 Trip Finger Return to Normal (Rq.2.25)

M-1 To check for the trip finger return to normal, pull the trip finger back about 30° and allow it to return very slowly to normal.

M-2 Adjust a trip finger which binds by inserting the edge of the KS-6854 screw-driver between the horizontal flanges of the trip finger frame and yoke, either top or bottom, and then twisting the screw-driver slightly as shown in Fig. 36. Where it is found necessary to free the trip fingers in this manner, take care not to adjust the trip finger frame or yoke to such an extent as to cause excessive end play, because of its effect on trip finger height adjustments.

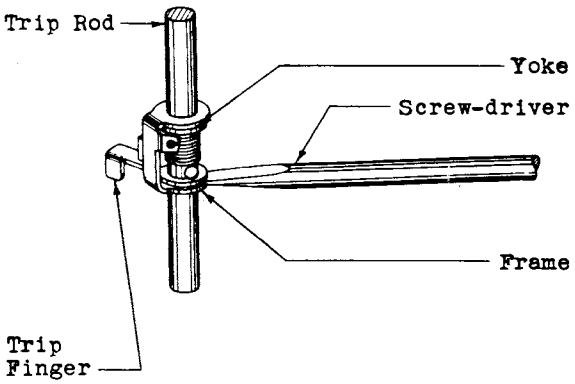


Fig. 36 - Method of Adjusting Binding Trip Finger

M-3 If the top and bottom flanges are spread too far, causing a bind, pinch them together with a pair of long-nose pliers as shown in Fig. 37.

3.26 Freedom of Movement of Trip Rod (Rq.2.26)

M-1 To check for the freedom of movement of the trip rod, operate the trip magnet manually by grasping the trip magnet armature and the core further from the fulcrum between the thumb and fore-finger, squeezing them together and then allowing the armature to release slowly under pressure.

M-2 If it is noted that the trip rod is sluggish when operated and released in this manner first make sure that requirements 2.16 (Point of Contact Between

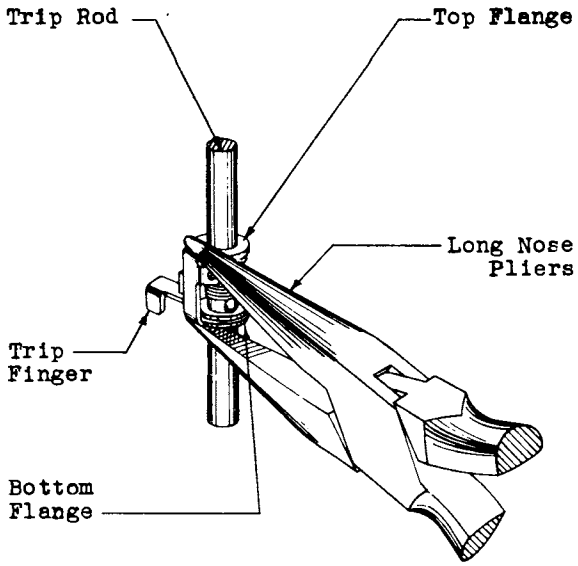


Fig. 37 - Method of Adjusting Binding Trip Finger

Trip Armature Extension and Rotating Lever), 2.17 (Clearance Between Rotating Lever and Top Clutch Locating Plate), 2.20 (Location of Sharp Edge of Trip Armature Extension) and 2.30 (Clearance Between Trip Rod Stop Collar and Bottom of Bearing Plate) have been met, then check the freedom of movement of the bearings and make sure that the trip rod does not bind at its lower end due to dirt in the mounting hole. Loosen the stop collar with the 3-1/2" cabinet screwdriver, lift out the trip rod and clean out the trip rod mounting hole in the top clutch locating plate when the bind is due to dirt as this point. After the hole has been cleaned out replace the trip rod and adjust the stop collar as covered in procedure 3.30.

M-3 If the cause of the sluggish return of the trip rod is a weak retractile spring, replace the spring.

3.27 Vertical Clearance Between Bottom of Horizontal Flange of Trip Finger and Trip Lever (Rq.2.27)

M-1 To obtain this clearance, adjust the trip finger very slightly up or down as required with a No. 327 adjuster as shown in Fig. 38.

M-2 Take care that this adjustment does not throw the horizontal flange out of square with the trip rod.

M-3 At the time this requirement is being checked make a visual check for excessive trip finger end play, that is,

3.27 (Continued)

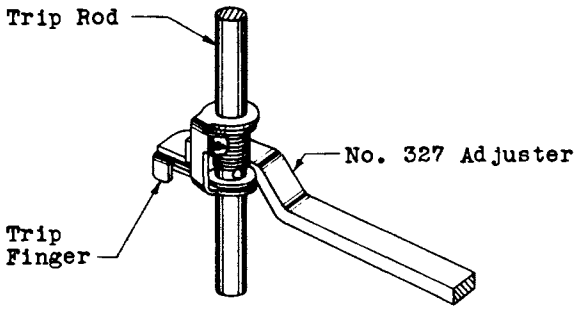


Fig. 38 - Method of Adjusting Clearance Between Bottom of Trip Finger Flange and Trip Lever

excessive gap between the top or bottom horizontal flange of the trip finger frame and the yoke. If the trip finger is adjusted near the minimum or maximum height adjustment, see that the requirement is met with the end play of the trip finger taken up in either direction.

3.28 Down Stop Collar Location (Rq.2.28)

M-1 The stop collars now in use are of two types; the earlier type of which two up and two down stop collars are used for each brush rod, and the later type of which only one up and one down stop collars are required. The procedure used in adjusting stop collars of either type is essentially the same.

M-2 Down Stop Collar and 11 Type Multiple Brush Frame Clearance See that the required clearance exists between the bottom of the multiple brush frame and the top surface of the down stop collar. If this clearance is not within the limits specified in parts (c1) and (c2) of the requirement, adjust for the clearance by slackening the down stop collar clamping screws with the KS-2631 screw-driver, if the clamping screws are of the earlier type, or with the No. 220 wrench, if the clamping screws are of the later type, and move the down stop collar away from the multiple brush frame until the required clearance is obtained. With the down stop collar or collars in this position, tighten the clamping screws sufficiently to prevent the collar or collars from slipping on the brush rod.

M-3 Multiple Brush Reset If the multiple brush will not reset under the conditions specified in the requirement, loosen the multiple brush clamping screw with the No. 220 wrench and lower the multiple brush, taking care that there is the specified clearance between the multiple brush frame and the top of the down stop collar. If it is found necessary to lower the multiple brush, relocate the brush springs as required as covered in procedures 3.08 and 3.15. If the multiple brush resets properly under the conditions specified, and there is not the specified clearance between the down stop collar and the multiple brush frame, lower the down stop collar or collars. When checking to see that the reset lever restores with a snap with the proper gauge inserted between the down stop collar and the bearing plate, make sure that the reset lever does not ride off of the side of the bearing or reset plates when the brush resets.

M-4 If the reset lever is sluggish or fails to restore fully to its normal position, this may be caused by friction between the rollers and the connecting plate on the trip lever assembly. To remedy this condition, lubricate the surfaces of the rollers which come in contact with the connecting plate with Western Electric Lubricating Compound No. 3. To do this,

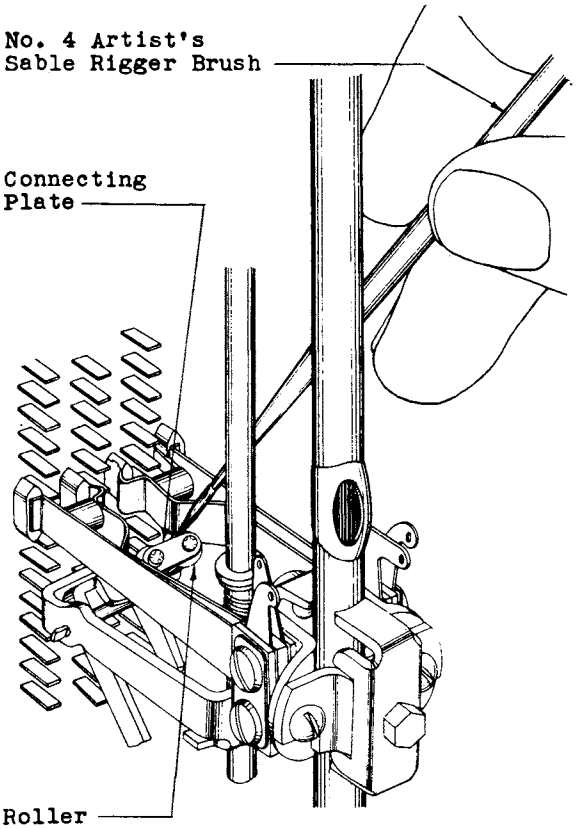


Fig. 39 - Method of Lubricating the Connecting Plate and Rollers on the Trip Lever Assembly

3.28 (Continued)

raise the brush rod and trip the multiple brush. Dip a No. 4 Artist's sable rigger brush in the lubricant, remove the excess lubricant from the brush before withdrawing the brush from the container and apply the lubricant as shown in Fig. 39. After the lubricant has been applied restore and trip the multiple brush a few times manually to insure that the lubricant will reach the entire surfaces of the rollers where they come in contact with the connecting plate.

M-5 If the reset lever snags against its associated reset or bearing plate when the brush restores lubricate the reset lever and the reset or bearing plate as covered in 3.01, M-4.

M-6 Clearance Between Each 11 Type Multiple Brush Frame and Cross-Member If the lack of clearance is general for all brushes on the rod, correct by lowering the down stop collar or collars. If the lack of clearance is not general, raise the brush and lower the springs as covered in M-4. In any case, if an adjustment is necessary, recheck for the brush reset and adjust for it, if necessary.

M-7 Location of One Earlier Type Down Stop Collar with Respect to Bearing When the final location of the earlier type down stop collars has been obtained as outlined above, lower the brush rod until one of the down stop collars rests against the bearing plate. Loosen the clamping screw of the other down stop collar, slide it down snugly against its associated bearing and fasten it in place.

M-8 Clearance Between 15 Type Brush Springs and Bank Angle Supports on Front Side of Frame If it is found that with the brush rod resting on the down stop collar the spring is too close to the angle support, check the brush for requirements 2.13 (15 Type Brush Location) and 2.14 (15 Type Brush Spring Stagger). If these requirements are met and still the brush spring is too close to the angle support, lower the brush rod down stop collar.

M-9 See that the clamping screws of all the down stop collars are securely tightened.

3.29 Up Stop Collar Location (Rq.2.29)

M-1 To make the adjustment, raise the brush rod until the rack index number "41" shows just above the clutch sighting plate, making sure that the weight of the brush rod assembly rests on the clutch pawl.

M-2 To adjust the later type up stop collars shift them on the rod as required using the No. 220 wrench to loosen and tighten the clamping screw.

M-3 If the earlier type up stop collars are used, see that both of the collars are the same distance away from the bearing plate as set forth above for the later type collar.

M-4 To adjust the earlier type up stop collars, shift one of them on the rod as required using the KS-2631 screw-driver or the No. 220 wrench to loosen and tighten the stop collar clamping screw. Raise the brush rod until the adjusted collar touches against the underside of the bearing plate. Then, securely fasten the other earlier type up stop collar so that its top surface fits snugly against the underside of the associated bearing plate. Check the setting by lowering the brush rod and raising it under power as far as it will go. See that with one stop collar resting against the bearing plate, the gap between the other stop collar and its associated bearing plate is not more than approximately .005". Remove the up drive power and notice that the rack index number "41" shows just above the clutch sighting plate with the weight of the brush rod assembly resting on the clutch pawl. With the rod in this position, see that the required clearance between the up stop collars and the bearing plate is present.

3.30 Clearance Between Trip Rod Stop Collar and Bottom of Bearing Plate (Rq.2.30)

M-1 To adjust for this clearance, slacken the stop collar clamping screw with the KS-2631 screw-driver if the clamping screw is of the earlier type; or with a No. 220 wrench if the clamping screw is of the later type, and insert the .015" step of the No. 80-B gauge between the bearing plate and the top edge of the collar. Raise the collar until the gauge is snug against the under side of the plate, then secure the collar.

M-2 The adjustment should insure the collar sufficient clearance from the bearing plate, so that the rod will be free to turn in its bearings and will not be great enough to disturb the trip finger adjustment when the rod is lifted while the brush is being tripped. Note that with the trip rod in its normal position, the stop collar does not touch the bearing clamp, and when the trip rod is allowed to return to normal slowly after being operated and raised, that the stop collar does not catch in the slot in the bearing plate.

3.31 Clearance Between 11 Type Multiple Brush Frame and Bank Terminals (Rq.2.31)

M-1 If it is found that the requirement

3.31 (Continued)

is not being met on the "0" bank, determine if this condition is caused by a bowed rack.

M-2 If it is, straighten it, by following the procedures outlined in the section covering the particular type of clutch involved.

M-3 If the necessary clearance is not now visible, inspect the brush rod for kinks, bows or a bent condition at the rack tongue slot. Remove any bowing or kinking of the rod as covered in procedure 3.05. If the required clearance is still unobtainable, move the bearing closest to the faulty part of the rod so as to obtain the required clearance. Take care, however, not to move the bearing enough to prevent the brush from meeting requirements 2.11 (Brush Intrusion) and 2.05 (Freedom of Movement of Brush Rod).

M-4 If the required clearance cannot be met on the No. 9 banks on earlier type frames which are not equipped with a bearing plate between the No. 9 bank and the hunting bank, the trouble is due to a bent or bowed brush rod. Correct this condition as outlined in procedure 3.05.

3.32 Smooth Brush Travel (Rq.2.32)

M-1 See that the 11 type brushes are so centered that they reliably clear all the terminals of the banks when in a reset condition, as the selector travels up and down.

M-2 Trip the 11 type brush and run it to its topmost position under power. Watch the brush reset lever and if it jiggles or vibrates, check the brush in question further. Trip it and run it up and down slowly by hand and note if any of the spring contacts catch slightly on the terminals at any part of the bank. A heavy tension on the clutch pawl spring will sometimes cause the zero brush reset lever to vibrate. This can be eliminated by holding the down-drive armature operated enough to remove the pawl while the rod is being driven up.

M-3 Correct chattering or snagging by adjusting the springs causing the trouble so that their contact surfaces are within the parallelism requirement. Use the No. 380-A adjuster for this purpose. At this time, check the correct location of the multiple bank terminals in accordance with the section covering panel multiple banks.

M-4 If the brush still chatters or snags, replace it in accordance with the section covering piece part data, and replacement procedures for panel translator elevator apparatus.

M-5 If the 15 type brush, which is permanently in a tripped position, chatters or snags, check and correct as set forth in M-2 to M-4 inclusive.

REASON FOR ISSUE - CHANGES IN ADJUSTING PROCEDURES

1. To revise the list of tools, gauges, materials and test apparatus.

2. To add to the adjusting procedures for No. 1-A guide location (3.04).

3. To add methods to cover brush rod cleaning (3.05).

4. To change the adjusting procedures for tip, ring and sleeve spring location (3.15).

5. To revise the adjusting procedures for down stop collar location (3.28).

6. To omit the procedures covering final inspection and multiple brush replacement.

APPROVED:

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