I. & M. REQUIREMENTS SPECIFICATION
BELL TELEPHONE LABORATORIES, INC.
SYSTEMS DEVELOPMENT DEPARTMENT, NEW YORK

X-70302-01, ISSUE 1
APRIL 30, 1927

INSTALLATION AND MAINTENANCE REQUIREMENTS

FOR

PANEL LINK DISTRICT FINDER AND SENDER SELECTOR

ELEVATOR APPARATUS

(NO. 12 TYPE MULTIPLE BRUSHES, NO. 9 TYPE BRUSH RODS, NO. 2 TYPE COMPENSATORS AND NO. 1-A GUIDES)

SECTION 1 - GENERAL

1.1 This specification covers the installation and maintenance requirements for panel link district finder and sender selector elevator apparatus (No. 12 type multiple brushes, No. 9 type brush rods, No. 2 type compensators and No. 1-A guides). Unless otherwise specified herein or in the "Circuit Requirement Tables" the requirements covered by this specification apply to all apparatus mentioned above.

1.2 Section 2 of this specification covers the requirements for the inspection of mechanical adjustments which shall be used to determine whether the multiple brush, brush rod, compensator or guide, is in proper condition for delivery to the customer and for service. These are called "Test Requirements" and are listed on Sheets 1 and 2 attached hereto.

1.3 Section 3 of this specification covers the mechanical requirements which must be met in readjusting a multiple brush, brush rod, compensator or guide, which fails to meet the test requirements. These are called "Readjust Requirements" and are listed on Sheets 1 and 2 attached hereto. In addition to the readjust requirements, Section 3 also gives the approved maintenance methods of meeting these requirements.

1.4 The tensional and dimensional requirements set up in this specification should be met unless otherwise specified, regardless of the method of test or adjustment employed. Facilities for meeting these requirements are provided in the form of standard tools and gauges. However, if it is found by experience that certain requirements can be met satisfactorily by "feel" or by "eye", these methods may be employed. It is suggested that checking with tools and gauges be made often enough to insure that proper test and adjustment requirements are being met. Furthermore, where requirements are close, it would be advisable to use tools and gauges to obtain adjustments.

1.5 Tools KS-2632 (Reading Glass) and 376-A (Dental Mirror) may be used in connection with the visual inspections specified on attached Sheets 1 and 2 and corresponding adjusting procedures.

1.6 Whenever it is found necessary to check for, or readjust to meet any of the requirements in this specification, the make-busy plug should be inserted into the make-busy jack associated with the associated sender selector and district finder.

1.7 A visual inspection shall be made before checking or readjusting any multiple brush to insure that the reference 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.

1.8 The following is a list of the tools and gauges specified in Section 2 and Section 3 for use in testing and readjusting the multiple brushes, brush rods, compensators and guides.

Tools

Code No.	Description
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 (Part of tool 221)
328	1-A Guide Adjuster
329	1-A Guide Holder
331	Spring Adjuster
376-A (or the replaced R-1623)	Dental Mirror
KS-2631	Screw-driver - 4-1/2"
KS-2632	Reading Glass
R-55760	Brush Spring Adjuster
R-58442	"T" Handled Screw-driver for Mounting Clutches
-	Bell System Cabinet Screw-driver - 3-1/2"
-	Bell System P-Long Nose Pliers - 6-1/2"
-	Orange Stick
-	Knife

Gauges

68	70-0-70 Gram Gauge
86	.005" and .008" Double-end Right Angle Offset Thickness Gauge

SECTION 2 - TEST REQUIREMENTS

2.01 Unless otherwise specified, any multiple brush, brush rod, compensator or guide, of the types covered by this specification when used on panel link district finder and sender selector frames, shall meet the test requirements given on Sheets 1 and 2, attached hereto.

SECTION 3 - READJUST REQUIREMENTS

3.0 General

3.01 Multiple brushes, brush rods, compensators and guides, used on panel link district finder and sender selector frames should be readjusted in accordance with the following methods to meet the readjust requirements specified on Sheets 1 and 2, attached hereto.

3.02 Where two or more requirements are covered by one set of methods the requirement headings in this section will be connected together with a bracket. The readjustments

for meeting these requirements are more or less interdependent and in making readjustments to meet any one requirement consideration should be given to the others.

3.1 Rack Tongue Position (See Requirement 2.1 on Sheet 1)

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 a No. 220 socket 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 "X" specification covering commutator brushes.

3.2 Rack Coupling Pin Engagement (See Requirement 2.2 on Sheet 1)

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 drops back against the shoulder of the rack due to its own weight plus the weight of the associated compensator when released.

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 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 paragraph 3.3.) 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.

3.3 Freedom of Movement of Brush Rod (See Requirement 2.3 on Sheet 1)

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 To check for freedom of movement of a brush rod, first raise the brush rod to its highest position; on sender selectors this will be determined by the point where the up stop touches the bearing clamp screw; on district finders where the up stop collar touches the bearing plate. Care should be exercised when raising a brush rod which has a tendency to bind. Do not force the rod upward, but first check to see whether or not the bind can be corrected as covered in the following methods. Failure to observe this warning may result in injury to the multiple brushes or the brush rod.

M-3 Hold back the pawl of the associated clutch with an orange stick, at the same time placing a finger under the compensator so as to support the brush rod in its descent.

M-4 Lower the brush rod slowly and evenly. The brush rod should follow the movement of the finger without sticking or binding during its entire travel.

M-5 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, on sender selectors, a binding 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 and the guide should be inspected and when found out of adjustment, corrected as specified in paragraph 3.4. If the bind has disappeared, 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-6 If the clutch is out of alignment loosen the mounting screw at the bottom of the clutch with the R-58442 screw-driver and swing the bottom of the clutch in the proper direction necessary to bring the coupling pin on the rack into line with the hole in the brush rod. Make sure that the clutch meets all the requirements for alignment specified in the specification covering the installation and maintenance requirements for Nos. 1, 2, 3, 4, 5 and 6 type clutches, and then securely retighten the mounting screw. The commutator brush and all the multiple brushes on the rod must now be rechecked for height, as the adjustment for alignment may have changed the position of the clutch.

M-7 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 plate and moving it backwards and forwards. If the bearing does not show a perceptible play, examine the rod carefully to determine the cause of the bind. Spots of paint or shellac may be removed by scraping the rod with the blunt edge of a knife taking care not to nick the rod.

M-8 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 paragraph 3.7 and to the "X" specification covering the installation and maintenance requirements for commutator brushes when it is necessary to make the above check or adjustment.

M-9 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 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 2.8 (Brush Intrusion), 2.10 (Vertical Location of Sleeve Springs of Upper Brush on District Finder and Sender Selector Brush Rods) and 2.11 (Vertical Location of Sleeve Springs of Lower Brush on District Finder and Sender Selector Brush Rods and Tip and Ring Springs of All Brushes). 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.

M-10 To insure that a brush rod does not bind in a bearing see that the bearings meet requirement 2.5 (Brush Rod Bearing Gap).

3.4 1-A Guide Location (Sender Selectors Only) See Requirement 2.4 on Sheet 1)

M-1 To adjust a brush rod guide which binds against the guide rod in the ascent or descent of the rod, bend the guide with a No. 328 adjuster, placing 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 Figure A.

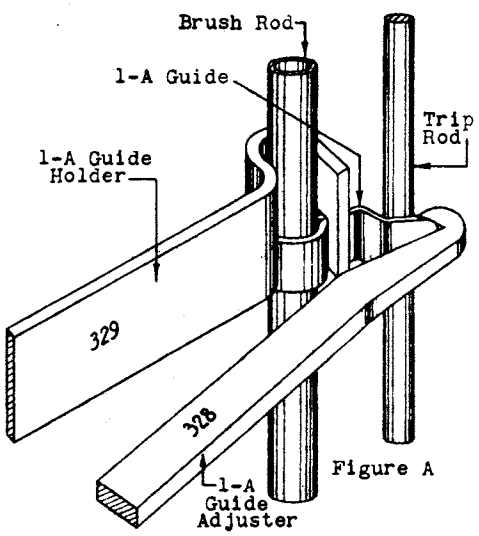

Figure A

Method of Adjusting 1-A Guide

M-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.

3.5 Brush Rod Bearing Gap (See Requirement 2.5 on Sheet 1)

M-1 In order to insure that the bearing is not binding on the rod, there should be a perceptible movement of the rod at each bearing. To check for this, grasp the rod in the fingers directly below the bearing and move it first from side to side and then from front to rear. By so doing, the play, if present, can be detected.

M-2 Bearings open more than .005" should be closed by tapping the bearing half into the correct position with the 3-1/2" cabinet screw-driver. The bearing halves should always be dressed to the left and to the rear. Do not pry against the adjacent bearing. A light held just below the bearing locating plate will be found of considerable help in checking for open bearings.

M-3 Before separating the halves of a bearing, make sure that the bind is not caused by the misalignment of the bearing halves. (See M-1.) This is generally due to the front and rear displacement of one-half of the bearing with respect to the other half. This may be corrected by lightly tapping the bearing halves with the screwdriver handle.

3.6 Stud Gap (See Requirement 2.6 on Sheet 1)

M-1 The No. 86 thickness gauge may be used for the purpose of checking this stud gap. The stud gap may also be checked visually by forcing the inner spring outward with an orange stick and noting the amount of travel on the inner spring before the outer spring starts to move.

M-2 If the stud gap requires readjustment, the multiple brush should be examined to see that it is in accordance with the figure accompanying requirement 2.6 on Sheet 1 for the purpose of determining what condition is responsible for the lack of stud gap. Unless the sleeve springs are distorted, the adjustment should be made by bending the outside springs between the points indicated on the drawing, using the No. 331 spring adjuster. Extreme care should be used in making the necessary corrections. The adjuster's efforts should be to restore the spring to its original correct condition and not to add additional distortion.

3.7 Brush Spring Tension (See Requirement 2.7 on Sheet 1)

M-1 Multiple brush contact spring tension should be measured at the point indicated in the figure accompanying requirement 2.7 on Sheet 1. The No. 68 gram gauge may be used in checking this tension.

M-2 Spring adjusting for tensioning should be done with the R-55760 spring adjuster close to the point where the spring leaves the pileup clamping plates and insulators.

M-3 When making any adjustment of brush springs, care should be taken to prevent any distortion or kinking of the springs, thereby affecting their relation with the corresponding terminals.

3.8 Brush Intrusion (See Requirement 2.8 on Sheet 2)

M-1 Inspect for the brush projecting in from the edge of the terminals, on the top, bottom and reference terminals.

M-2 If failure to meet this requirement is general on one bank, it is an indication that the bank is out of adjustment. Where there are only individual cases, a check should be made to see whether or not the brush rod is bent in or out and, if so, the brush rod should be straightened. If, however, the brush rod is straight and this condition exists, the brush rod should not be bent to correct it. It is sometimes possible to correct the above conditions by moving the brush rod bearings. The multiple brush itself should not be readjusted to meet this requirement but the multiple brushes should be checked for requirements 2.10 and 2.11. 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.

3.9 Parallelism of Brush Springs (See Requirement 2.9 on Sheet 2)

M-1 Check to insure that the contacting surfaces of the springs are not out of parallel with the bank terminals more then .005" for the full width, or .0025" for one-half the width of the shoe. To facilitate in checking this requirement, use should be made of the 38-B 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 rubber separators with the No. 331 spring adjuster. Any distorted spring should be corrected at this time.

M-3 Caution Deviation from parallel should be kept as small as possible to prevent the snagging or chattering of the brushes.

3.10 Vertical Location of Sleeve Springs of Upper Brush on District Finder and Sender Selector Brush Rods (See Requirement 2.10 on Sheet 2

M-1 If the top contact edge of the spring is not at least .015" but not more than .035" above the top edge of the reference terminal, loosen the multiple brush clamping screw with the No. 220 socket wrench sufficiently to permit the adjustment to be made by tapping the shank of the socket wrench up or down as required with the spring adjuster. The frame of the brush should not be tapped in making this adjustment as this will be likely to mar the finish or distort some part of the brush assembly.

M-2 At this time, observe the setting of the tip and ring springs. As a rule it is possible to set the sleeve spring so that all springs will satisfactorily meet their requirements.

M-3 Center the multiple brush as accurately as possible in its horizontal position.

M-4 Securely tighten the multiple brush clamping screw.

3.11 Vertical Location of Sleeve Springs of Lower Brush on District Finder and Sender Selector Brush Rods and Tip and Ring Springs of All Brushes (See Requirement 2.11 on Sheet 2)

M-1 To adjust for the vertical location of sleeve springs of lower brushes on district finder and sender selector brush rods and tip and ring springs of all brushes, proceed as follows:

1. Tip and Ring Springs of Upper Brushes The tip and ring springs of upper brushes can usually be brought into correct adjustment by shifting the brush assembly inside the limits which are set by the requirement for the vertical location of the sleeve springs (2.10). If the correct adjustment cannot be obtained by this method, shift the individual spring at fault by loosening one assembly screw with the No. 206 or No. 207 offset screw-driver and raising or lowering the spring with the R-55760 spring adjuster until there is at least .015" contact metal of the spring showing above or below the reference terminal. After this adjustment tighten the assembly screw securely and recheck the sleeve spring adjustment providing the ring spring has been shifted.

2. Tip, Ring and Sleeve Springs of Lower Brushes To adjust the sleeve springs of lower brushes, shift the brush assembly as covered in paragraph 3.10. An effort should be made to locate the brush so that the tip and ring springs as well as the sleeve spring are in adjustment. If this cannot be done, shift the individual spring at fault as covered above.

3.12 Down Stop Collar Location (See Requirement 2.12 on Sheet 2)

3.13 Compensator Location (See Requirement 2.13 on Sheet 2)

M-1 If the clearance between the bottom of the down stop collar and the bearing plate is not approximately 1/8" adjust the down stop collar to meet requirement 2.12, loosen the down stop collar and compensator clamping screws with the No. 220 socket wrench and shift the collar and compensator up or down, as required. Before securely tightening the clamping screws see that the compensator fits down snugly upon the down stop collar.

3.14 Up Stop Collar Location (See Requirement 2.14 on Sheet 2)

M-1 If the clearance between the up stop collar and the bearing plate (on the 22 and 42 point district finder) or the inverted 1-A guide and the bearing clamp screw on the 100 point sender selector is not at least 1/32", but not more than 1/16" proceed as follows:

M-2 Sender Selector Brush Rod If the adjustment is to be made on a sender selector rod, the inverted 1-A guide will act as an up stop collar. Slightly loosen the guide clamping screws with the screw-driver per KS-2631 and slide the guide up or down until there is at least 1/32" but not more than 1/16" between the top edge of the clamping portion of the guide and the bottom of the bearing clamp screw. With the guide held so that it meets requirement 2.4, securely tighten the guide clamping screws.

M-3 District Finder Brush Rod If the adjustment is to be made on a 22 or 42 point district finder rod, slightly loosen the up stop collar clamping screws with the No. 220 socket wrench and slide the collar up or down the rod until the clearance between the top edge of the collar and the bottom of the bearing plate is within the limits specified in the requirement. With the collar in this position securely tighten the clamping screws.

3.15 Snagging and Chattering of Multiple Brushes
(See Requirement 2.15 on Sheet 2)

M-1 Run the brush rod up and down slowly and note if any of the spring contacts catch slightly on the terminals on any part of the bank.

M-2 An attempt should be made to correct chattering or snagging by adjusting the springs causing the trouble so that their contact surfaces are as parallel as possible to the contact surfaces of the bank terminals. The R-55760 spring adjuster may be used for this purpose.

M-3 If the brush still chatters or snags it should be removed and replaced.

3.16 Final Inspection

M-1 After all adjustments have been made check to make sure that all screws and nuts are securely tightened.

3.17 Multiple Brush Replacements

3.171 To Remove a Multiple Brush

M-1 The associated circuit of the brush to be removed or placed, also the one on each side of it, shall be made busy, except where the brush to be changed is on an end rod, in which case only two circuits shall be made busy.

M-2 Cover the clutches on the side of the frame being worked on with a piece of canvas to protect against falling solder or screws.

M-3 Raise the brush rod until the brush to be removed is approximately in the middle of the bank and mark the brush rod as an aid in properly locating the new brush.

M-4 Unsolder the wires at the brush terminals.

M-5 If the brush to be removed is on the No. 0 bank of the sender selector, uncouple the rack and return it to normal. Hold the brush and rod and loosen the multiple brush clamping screw with the No. 220 socket wrench and then slide the brush off the lower end of the rod. Separate the sleeve springs of the brush enough to allow them to pass by the guide rod. The brush rod may then be lowered.

M-6 If the brush to be removed is on the No. 1 bank of the sender selector or is located on the upper part of the district finder bank, raise the brush rod to its highest position, loosen the brush clamping screw with the No. 220 socket wrench and the latch screws with the 3-1/2" cabinet screw-driver. Remove the latch. Move the brush up on the rod until the springs clear the bank terminals and remove the brush tipping the wiring end downward to facilitate this operation.

M-7 If the brush to be removed is on the lower part of the district finder bank, see that the brush occupies its lowest position. Loosen the brush clamping screw and remove the latch as covered in M-6 above. Move the brush down on the rod until the springs clear tne bank terminals and remove the brush tipping the contact end of the brush down to facilitate this operation.

3.172 To Place a Multiple Brush

M-1 If the brush is to be placed on the No. 0 bank of the sender selector, loosen the brush clamping screw with the No. 220 socket wrench. Raise the rod so that the multiple brush may be slipped up over the bottom end. Care should be taken to see that the sleeve springs are spread enough to permit them to pass easily around the guide rod. Locate the brush springs properly on the bank and slide the brush up on the rod to approximately its proper location as indicated by the mark previously placed on the rod. Tighten the clamping screw sufficiently to hold it in place. Couple the rod and rack.

M-2 If the brush is to be placed on the No. 1 bank of the sender selector or is located on the upper part of the district finder bank, loosen the brush clamping screw and remove the latch. Raise the brush rod to the top position, and set the brush in place by pressing the brush springs down over the top terminals, spreading the sleeve springs so that they pass easily over the sleeve terminals. Slide the brush down on the rod to approximately its correct location. Attach the latch and tighten the clamping screw sufficiently to hold it in place.

M-3 If the brush is to be placed on the lower part of the district finder bank, loosen the brush clamping screw and remove the latch. With the brush rod at its lowest position, set the brush in place by pressing the brush springs up over the bottom terminals. Slide the brush up on the rod to approximately its correct location. Attach the latch and tighten the clamping screw sufficiently to hold it in its place.

M-4 Solder the wires to the brush terminals. The proper colors can be ascertained by referring to a similar brush on an adjacent rod.

M-5 Adjust the brush just placed in accordance with the requirements and methods specified herein.

Attached:

X-70302-01, Sheet 1, Issue 1
X-70302-01, Sheet 2, Issue 1
X-70302-01, Sheet 3, Issue 1

BELL TELEPHONE LABORATORIES, INC.

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DEPT. 332-B-4

DEFINITIONS AND GENERAL INFORMATION

2.001 Multiple Brush Contact Spring Pressure is that which it is necessary to overcome to start a 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.

2.002 The 1-A guide, which is mounted in an inverted position on the sender selector brush rod, serves as an up-stop collar.

2.003 Unless otherwise specified, the requirements given on Sheets 1 and 2 are both test and readjust requirements.

2.004 Unless otherwise specified, where the test requirement is the same as the readjust requirement and where there is a maximum and a minimum limit for the requirement, an effort should be made in readjusting a brush rod to work to the mean of the limits.

2.005 Unless otherwise specified, where a readjust requirement specifies only one limit (either a maximum or a minimum limit) it is advisable, if possible, to readjust inside of the limit.

2.006 Requirements are given in the order in which adjustments should be made by the Telephone Company.

2.007 Gauges and methods are listed for the use of the Telephone Company.

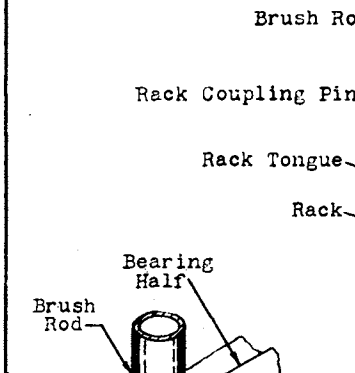


Figure 1

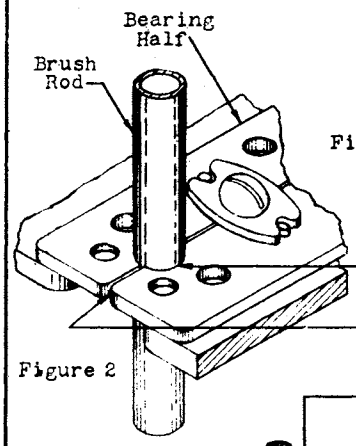


Figure 2

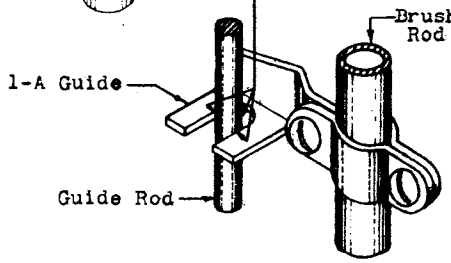


Figure 3

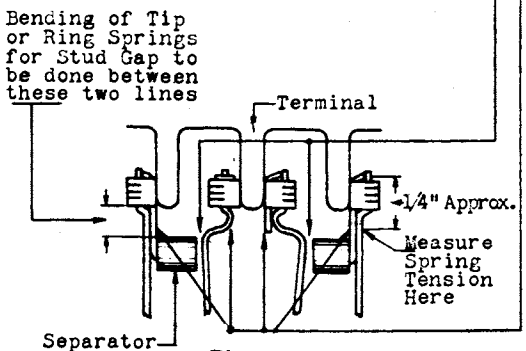


Figure 4

REQUIREMENTS

2.1 Rack Tongue Position The rack tongue shall have sufficient tension to hold it against the rack coupling pin and shall engage with the slot in the brush rod in such a manner as to prevent any twisting motion in the rack being transmitted to the rod. There shall be a perceptible clearance between the rack tongue and all sides of the slot in the brush rod. Gauge by eye.

2.2 Rack Coupling Pin Engagement The rack coupling pin shall be sufficiently free in the brush rod to allow the rod to rest on the shoulder of the rack and to prevent any twisting motion of the rack being transmitted to the rod. Gauge by eye.

2.3 Freedom of Movement of Brush Rod 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.

2.4 1-A Guide Location (Sender Selectors Only) Throughout the length of travel of the sender selector brush rod, the prongs of the 1-A guide may touch the front or rear of the guide rod, but shall not bind at these points and the closed side of the 1-A guide shall clear the guide rod reliably but the guide rod shall be wholly within the prongs of the guide. Gauge by eye.

2.5 Brush Rod Bearing Gap The bearing halves 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 not be more than .005". Gauge by eye.

2.6 Stud Gap With the brush centered on the reference terminal of the bank, the stud gap shall be:

Test - At least .005"
Readjust - At least .008"

and there shall be perceptible stud gap at every other terminal of the bank. Use the No. 86 gauge.

2.7 Brush Spring Tension With the brush centered on the reference terminal of the bank the tension of each spring shall be:

Test - Min. 25 gs., max. 60 gs.
Readjust - Min. 30 gs., max. 45 gs.

Use the No. 68 gauge.

TEST AND READJUST REQUIREMENTS
FOR
PANEL LINK DISTRICT FINDER AND SENDER SELECTOR ELEVATOR APPARATUS
(NO. 12 TYPE MULTIPLE BRUSHES, NO. 9 TYPE BRUSH RODS, NO. 2 TYPE COMPENSATORS AND NO. 1-A GUIDES)

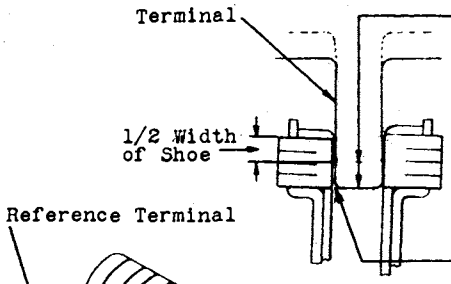


Figure 5

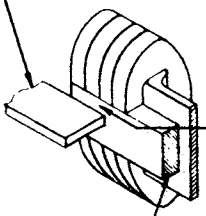


Figure 6

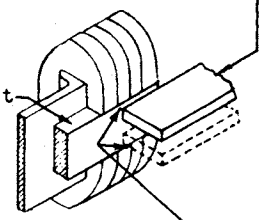


Figure 7

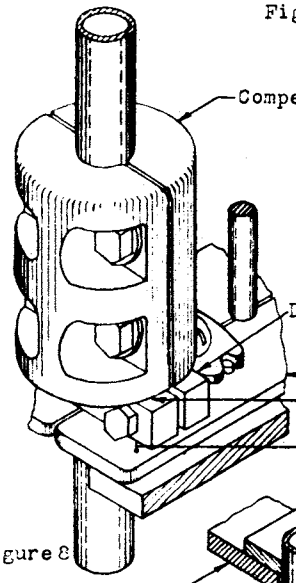


Figure 8

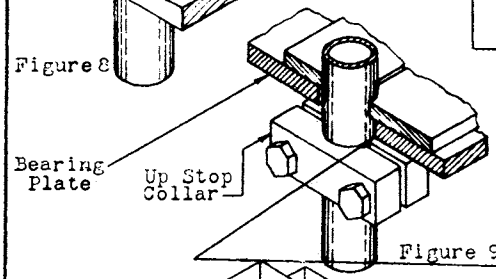


Figure 9

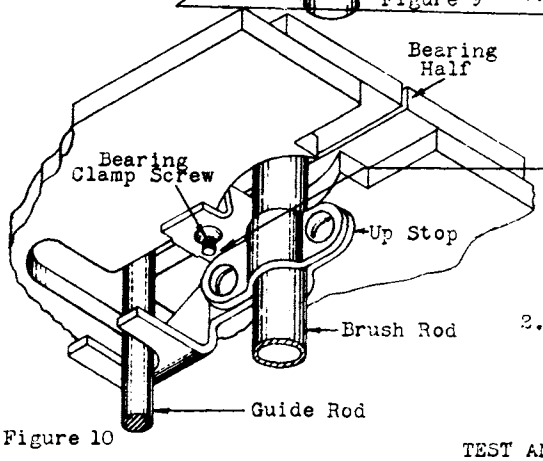


Figure 10

2.8 Brush Intrusion 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, when the brush is on any terminal in the bank. The intrusion requirement shall be met 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.

2.9 Parallelism of Brush Springs When the brush is on the reference terminal, the contacting surfaces of the springs shall be approximately parallel to the contacting surfaces of the terminal. Any divergence from this parallel condition shall not exceed .005" when the brush engages the bank terminal the full width of the shoe. If the brush engages the bank terminal 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 .0025" when the brush spring engages the terminal only one-half the width of the shoe. Gauge by eye.

2.10 Vertical Location of Sleeve Springs of Upper Brush on District Finder and Sender Selector Brush Rods With the index number "49" for the 100 point sender selector, number "20" for the 42 point district finder or number "10" for the 22 point district finder showing just above the clutch sighting plate and with the weight of the brush rod assembly on the pawl, the top edge of the contact portion of the spring shall be at leest .015" but not more than .035" above the top edge of the terminal. Gauge by eye.

2.11 Vertical Location of Sleeve Springs of Lower Brush on District Finder and Sender Selector Brush Rods and Tip and Ring Springs of All Brushes 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 rack is resting on the pawl for any position on the bank. If the vertical spacing of the multiple bank terminals is within requirements this requirement may be checked as follows: With the pawl engaging the notch in the rack corresponding to the reference terminal, the upper edge of the contact portion of the multiple brush spring shall be above the top edge of the reference terminal, and the lower edge of the contact portion of the multiple brush spring shall be below the bottom edge of the reference terminal,

Test - At least .010" (1/2 width of terminal)
Readjust - At least .015" (3/4 width of terminal)

Gauge by eye.

2.12 Down Stop Collar Location With the index number "0" showing just above the clutch sighting plate and with the weight of the brush rod assembly on the pawl, there shall be a clearance between the bottom of the down stop collar and the bearing of approximately 1/8". Gauge by eye.

2.13 Compensator Location The compensator shall rest on the down stop collar.

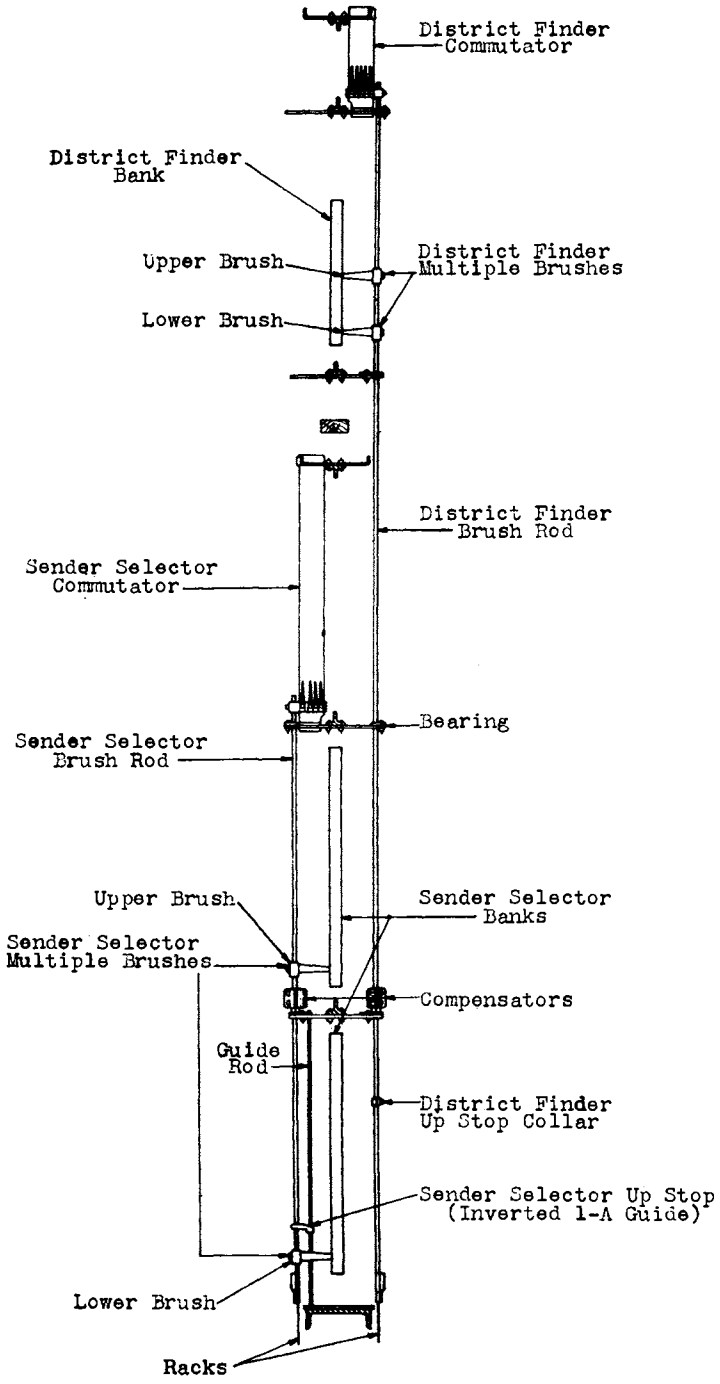
2.14 Up Stop Collar Location

22 and 42 Point District Finders With the index number "23" for the 22 point district finder or the index number "43" for the 42 point district finder showing just above the clutch sighting plate, and with the weight of the brush rod assembly on the pawl, there shall be a clearance of at least 1/32" but not more than 1/16" between the top of the up stop collar and the bottom of the bearing plate.

100 Point Sender Selector With the index number "101" showing just above the clutch sighting plate, and with the weight of the brush rod assembly on the pawl, there shall be a clearance of at least 1/32" but not more than 1/16" between the top of the up stop and the bearing clamp screw. Gauge by eye.

2.15 Snagging and Chattering of Multiple Brushes Brushes shall not snag against terminals as the selector travels up or down in normal operation. Brushes shall run smoothly over the terminals without chattering. They shall not ride off the terminals.

TEST AND READJUST REQUIREMENTS
FOR
PANEL LINK DISTRICT FINDER AND SENDER SELECTOR ELEVATOR APPARATUS
(NO. 12 TYPE MULTIPLE BRUSHES, NO. 9 TYPE BRUSH RODS, NO. 2 TYPE COMPENSATORS AND NO. 1-A GUIDES)



Arrangement of Panel Link Sender Selector and District Finder Elevator Apparatus

Figure 11

TEST AND READJUST REQUIREMENTS
FOR
PANEL LINK DISTRICT FINDER AND SENDER SELECTOR ELEVATOR APPARATUS
(NO. 12 TYPE MULTIPLE BRUSHES, NO. 9 TYPE BRUSH RODS, NO. 2 TYPE COMPENSATORS AND NO. 1-A GUIDES)