ELEVATOR APPARATUS
REPAIR OF BRUSH RODS

1. GENERAL

1.01 This section covers the procedures for repairing brush rods which have become worn at the bottom where they rest on the associated racks or which are cracked or broken at the rack tongue slot.

1.02 When repairing a cracked or broken rod, use the parts specified in Table A. When ordering these parts, give both the part number and the name of the part. For example, P-290266 sleeve. Brush rod reinforcing sleeves are available in two lengths. The P-290265 sleeve is 2-27/64 inches long and the P-290266 sleeve is 2-1/64 inches long, the sleeve to be used depending on the type of frame and rod involved as specified in Table A.

1.03 When reconditioning a rod worn by a rack the P-220210 washer (bronze finish, 0.025 inch thick) or P-298984 washer (nickel finish, 0.013 inch thick) should be ordered as required to obtain the proper clearance between the rack tongue and the slot in the brush rod.

1.04 Information enclosed in parentheses ( ) is not ordering information. It may be references to notes, parts referred to in other portions of the section and not considered replaceable, and where the name in general use in the field differs from the part name assigned by the manufacturer.

TABLE A — REPAIR OF CRACKED AND BROKEN RODS

TYPE OF FRAME	USE CLAMP	USE **SLEEVE	USE CLAMP (DOWNSTOP COLLAR)
Line Finder and Trunk Finder	—	P-290266	D-159665
Translator	—	P-290266	—
Selector	—	P-290266	—
Cordless B Link	—	P-290266	—
Subscriber Link			
District Finder	*P-290399	P-290266 – TINNED	
Sender Selector	—	P-290265 – BRASS	
Call Distributing B Link			
Trunk Finder	*P-290399	P-290266	—
Sender Selector	—	P-290265	—
Sender Tandem Link			
District Finder	*P-290399	P-290266	—
Sender Selector	—	P-290265	—

* When repairing a broken rod, the P-290399 clamp is not required.

** When repairing a cracked rod, use either the newer type sleeve which is provided with two round holes or the older type sleeve which is without holes. When repairing a broken rod, use only sleeve provided with two round holes. (P290266)

2. TOOLS, GAUGES, AND MATERIALS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
240	Scriber
555A	Wrench
KS-2630	Wrench
KS-8740,L1	Soldering Copper
R-1051	File
—	Smooth Cut Flat File
—	3-inch Cabinet Screwdriver
GAUGES	
108A	Brush Rod Gauge
MATERIALS	
KS-2423	Cloth
KS-7404	Abrasive Cloth
KS-7860	Petroleum Spirits
KS-14666	Cloth
—	E Rosin Solder or equivalent
(3 reqd)	Spring Clothespin

3. PROCEDURE FOR RECONDITIONING BRUSH ROD WORN BY RACK

3.01 Uncouple the brush rod from the rack by inserting the blade of the 3-inch cabinet screwdriver between the rack tongue and brush rod, as shown in Fig. 1, and turn the screwdriver just enough to disengage the tongue from the brush rod slot.

> ***Caution: Insert the blade of the screwdriver just below the horizontal portion or lip of the rack tongue so as to affect the tension of the rack tongue as little as possible.***

3.02 Lift the brush rod away from the rack with the other hand. The rod now has no means of support so it will be necessary to hold it in place by clamping it with a spring clothespin just above a bearing plate, as shown in Fig. 2.

3.03 Lower the rack to its normal position. Lower the brush rod until it is about 2 inches above its normal (down) position. Spread a KS-2423 or KS-14666 cloth directly beneath the worn rod to catch falling filings. Slip the No. 108A brush rod gauge over the bottom end of the rod with the latch end upward and move it up along the rod until the latch engages the coupling slot. Hold the gauge firmly and move the brush rod in until the contact ends of the multiple brush springs lightly touch the bank and, with a smooth cut flat file, file off the portion of the rod protruding from the bottom of the gauge, as shown in Fig. 3. Exercise care not to bend the brush rod.

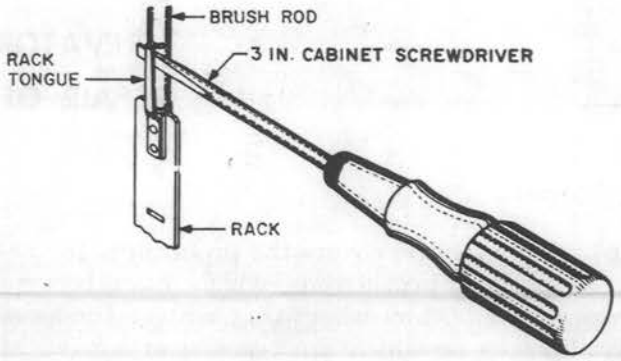

Fig. 1 – Method of Uncoupling Rack From Brush Rod

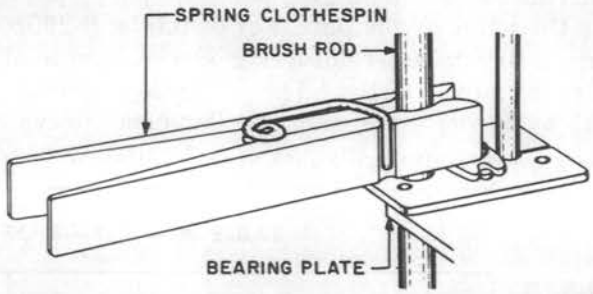

Fig. 2 – Method of Placing Spring Clothespin

3.04 Remove the gauge by releasing the latch. Raise the rod to its top position and inspect the bottom edge of it for burrs. If necessary, remove any burrs by scraping the rod with the side of the screwdriver blade. Remove the cloth, taking care not to spill any filings on other apparatus. Slip a P-220210 or P-298984 washer as required down on the rack coupling pin and see that it seats on the rack shoulder.

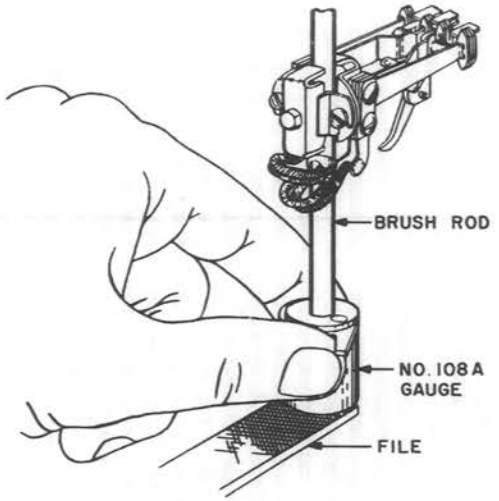

Fig. 3 – Method of Filing Brush Rod Using No. 108A Gauge

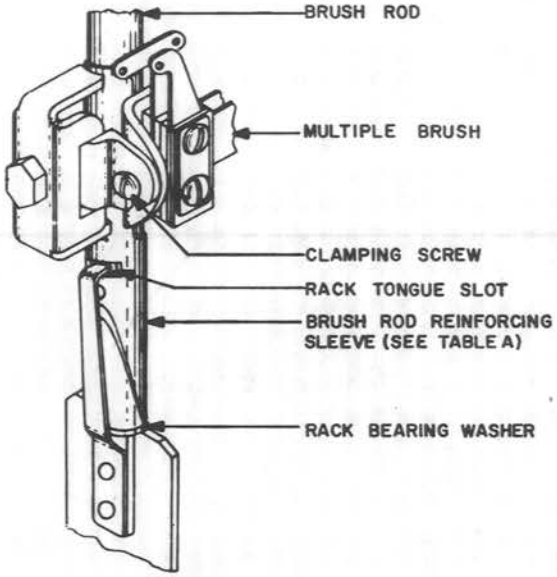

Fig. 4 – Multiple Brush, Rack Bearing Washer, and Brush Rod Reinforcing Sleeve

3.05 Couple the rack to the rod, inserting the blade of the 3-inch cabinet screwdriver between the tongue and rack coupling pin just below its horizontal portion or lip, forcing out the tongue so as to permit the rack coupling pin to enter the brush rod.

3.06 Check for the rack tongue position and rack coupling pin engagement, as covered in the section covering the type of apparatus involved.

3.07 After performing the above operations, check the adjustment of the associated multiple brushes and commutator brush as covered in the section covering the type of apparatus involved and readjust these brushes if necessary.

4. PROCEDURE FOR REPAIRING CRACKED BRUSH RODS

Rod With the Lower Multiple Brush Mounted Immediately Above the Rack Coupling Slot

4.01 Scribe a mark on the brush rod with the No. 240 scriber to indicate the proper position of the 0 multiple brush. The line must be scribed on the surface of the rod nearest the bank as the outer surface of the rod will later be covered by the reinforcing sleeve.

4.02 Uncouple the brush rod from the rack, as covered in 3.01 and 3.02.

4.03 Loosen the clamping screw of the 0 multiple brush two or three turns with the No. 555A socket wrench. Hold the reinforcing sleeve with the bevelled end down and slide it up over the end of the brush rod so that the upper part of the reinforcing sleeve will be engaged by the brush clamp. Position the reinforcing sleeve as shown in Fig. 4, lining up the top of the slot in the sleeve with the top of the slot in the brush rod. Make sure that the brush is approximately in its original position, as indicated by the previously scribed mark on the brush rod, then temporarily tighten the multiple brush clamping bracket screw. If the brush rod has been reconditioned, as covered in Part 3, the reinforcing sleeve will project below the brush rod. In this case, spread a KS-2423 or KS-14666 cloth directly beneath the rod to catch the filings and file the lower end of the reinforcing sleeve with a smooth cut flat file until the sleeve is flush with the brush rod, taking care not to file any metal from the brush rod. Remove the cloth taking care not to spill any filings on other apparatus. Securely tighten the multiple brush clamping screws. Couple the rack to the brush rod as covered in 3.05.

4.04 Check for rack tongue position and rack coupling pin engagement, as covered in the section covering the type of apparatus involved.

4.05 After performing the above operations, check the adjustment of the associated multiple brushes, downstop collar, and commutator brush as covered in the section covering the type of apparatus involved, and readjust these brushes if necessary.

Rod With Clamp (Downstop Collar) Mounted Above the Rack Coupling Slot

4.06 Scribe a mark on the brush rod with the No. 240 scriber to indicate the top edge of the downstop collar. The line must be scribed on the surface of the rod nearest the bank as the outer surface of the rod will later be covered by the reinforcing sleeve.

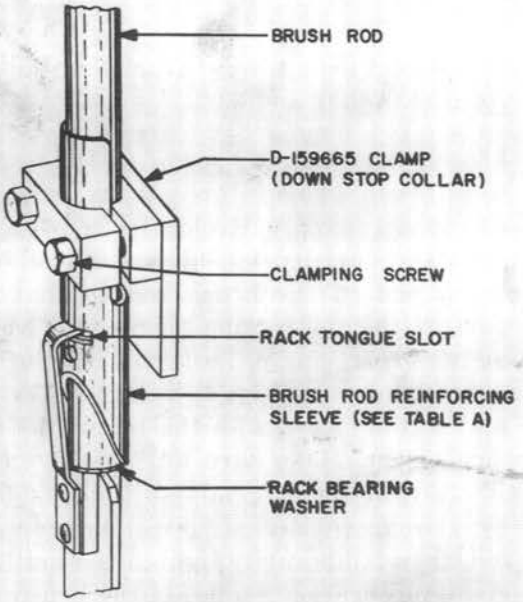

Fig. 5 – Clamp (Downstop Collar) and Brush Rod Reinforcing Sleeve

4.07 Uncouple the brush rod from the rack as covered in 3.01 and 3.02.

4.08 Loosen the clamp (downstop collar) screw with the KS-2630 wrench or the No. 555A wrench, as required, and push the downstop collar off the bottom end of the rod. Discard the old collar since it cannot be used with the brush rod reinforcing sleeve.

4.09 Loosen the clamping screws of the D-159665 clamp (downstop collar) with the No. 555A wrench and slide the downstop collar up over the end of the brush rod. Then hold the reinforcing sleeve with the bevelled end down and slide it up over the end of the brush rod so that the upper part of the reinforcing sleeve will be engaged by the collar. Position the reinforcing sleeve, lining up the top of the slot in the sleeve with the top of the slot in the brush rod as shown in Fig. 5. Position the top of the new downstop collar approximately 1/16 inch below the position occupied by the old collar since the new part is 1/16 inch shorter than the one previously used. Then temporarily tighten the clamping screws with the No. 555A wrench. In case the brush rod has been reconditioned as covered in Part 3, the reinforcing sleeve will project below the bottom of the brush rod. In this case, spread a KS-2423 or KS-14666 cloth directly beneath the rod to catch the filings and file the lower end of the sleeve with a smooth cut flat file until the sleeve is flush with the brush rod taking care not to file any metal from the brush rod. Remove the cloth taking care not to spill any filings on other apparatus. Securely tighten the clamping screws. Couple the rack to the brush rod as covered in 3.05.

4.10 Check for rack tongue position and rack coupling pin engagement, as covered in the section covering the type of apparatus involved.

4.11 After performing the above operations, check the adjustment of the downstop collar, the associated multiple brushes, and commutator brush as covered in the section covering the type of apparatus involved and readjust these brushes, if necessary.

Rod With No Brush or Clamp (Downstop Collar) Mounted Immediately Above the Rack Coupling Slot

4.12 A clamp will be necessary to secure the sleeve to the brush rod. The P-290399 clamp may be used or similar clamping parts can be obtained by removing the springs from an old 12-type multiple brush.

4.13 Uncouple the brush rod from the rack, as covered in 3.01 and 3.02.

4.14 Place the P-290399 clamp over the end of the brush rod. Hold the reinforcing sleeve with the bevelled end down and slide it up over the end of the brush rod so that the upper part of the reinforcing sleeve will be engaged by the clamp. Position the reinforcing sleeve so that the top of the slot lines up with the top of the slot in the brush rod. Then temporarily tighten the clamping screw. In case the brush rod has been reconditioned as covered in Part 3 the reinforcing sleeve will project below the brush rod. In this case, spread a KS-2423 or KS-14666 cloth directly beneath the rod to catch the filings and file the lower end of the reinforcing sleeve with a smooth cut flat file until the sleeve is flush with the brush rod, taking care not to file any metal from the brush rod. Remove the cloth taking care not to spill any filings on other apparatus. Securely tighten the clamping screws. Couple the rack and the brush rod as covered in 3.05.

4.15 Check for rack tongue position and rack coupling pin engagement, as covered in the section covering the type of apparatus involved.

4.16 After performing the above operations, check the adjustment of the associated multiple brushes and commutator brush as covered in the section covering the type of apparatus involved and readjust these brushes, if necessary.

5. PROCEDURE FOR REPAIRING BROKEN BRUSH ROD

All Rods

5.01 Look for the broken off piece of rod. If the piece is found examine it. If the end opposite the slot had been worn by the rack proceed to square it as follows. Slip the No. 108A gauge over the end of the rod piece until the latch enters the coupling slot. File off the end protruding from the bottom of the gauge with the smooth cut flat file. Remove the gauge by releasing the latch. Inspect the filed off edge for burrs. If necessary, remove burrs by scraping the rod with the side of the screwdriver blade. Thoroughly clean the outside surfaces of the broken off piece of rod with the KS-7404 abrasive cloth. If the broken off part is missing, proceed as follows to replace it. Square off one end of a discarded elevator rod using the No. 108A gauge. Inspect the filed edge for burrs and if necessary, remove burrs. Then cut a 3/4-inch long piece from the squared off end of rod. Thoroughly clean the outside surfaces of the piece of rod with the KS-7404 abrasive cloth.

5.02 Cover the clutches on the side of the frame being worked on with the KS-14666 cloth to protect against falling solder or screws.

5.03 Raise the brush rod about halfway up the bank. The rod now has no means of support. To hold it in place fold a 6-inch piece of the KS-7404 abrasive cloth in half with the abrasive side on the outside, wrap it around the brush rod above the bearing plate, and clamp a spring clothespin over the abrasive cloth just above the bearing plate.

Rod With Multiple Brush Mounted Immediately Above the Rack Coupling Slot

5.04 Scribe a mark on the brush rod with the No. 240 scriber to indicate the approximate position of the "0" multiple brush, The line must be scribed on the surface of the rod nearest the bank as the outer surface of the rod will later be covered by the reinforcing sleeve.

5.05 Unsolder the wires at the brush terminals. If colors of wire are not distinguishable tag them. Loosen the brush clamping bracket screw with the No. 555A socket wrench and proceed as follows. Slide the brush off the lower end of the brush rod. Carefully pull back the right hand springs just far enough to permit the trip rod or guide rod to clear the sleeve spring and remove the brush.

5.06 Using KS-7404 abrasive cloth, thoroughly clean the surfaces of the brush rod for about 1 inch above the rack tongue slot.

5.07 Hold the reinforcing sleeve with the bevelled end down and slide it up over the end of the brush rod. Place a clothespin on the upper part of the sleeve to hold it in place.

5.08 Place the square end of the piece of rod on the rack coupling pin. Holding the brush rod with one hand remove the clothespin and abrasive cloth from the rod above the bearing plate and proceed as covered in (a) or (b) as applicable.

(a) ***If the piece of rod is the part that was broken off,*** lower the brush rod and position the piece of rod, being careful to bring the surfaces of the sutures together in the original position. Position the sleeve so that the slot is lined up with the slot in the brush rod.

(b) ***If the piece of rod is a new piece,*** lower the brush rod and position the sleeve so that the upper side of the slot and the sides of the slot are in line with that part of the slot in the upper part of the rod. Also position the lower end of the sleeve slightly higher than the lower end of the piece of rod and place a clothespin on the lower part of the sleeve to hold the parts in place.

5.09 Place the clothespin and abrasive cloth just above the bearing plate as covered in 5.04. Remove the clothespin when provided from the lower part of the sleeve. Check to make sure that the parts are positioned as specified above.

5.10 Heat the lower part of the reinforcing sleeve and brush rod to soldering temperature with the KS-8740,L1 soldering copper. Apply the tip of a piece of rosin core solder through the lower hole in the reinforcing sleeve so that molten solder will flow into the splice. Allow to cool.

5.11 Remove the clothespin from the upper part of the reinforcing sleeve. Heat the upper part of the sleeve and brush rod to soldering temperature with the KS-8740,L1 soldering copper. Apply the tip of a piece of rosin core solder through the upper hole in the reinforcing sleeve so that molten solder will flow into the splice. Allow to cool. Raise the brush rod about halfway up the bank.

5.12 If necessary remove any surplus solder from the surfaces of the reinforcing sleeve at the points where the solder was applied, using an R-1051 file.

5.13 To replace the brush proceed as follows. Carefully pull back the right-hand springs just far enough to permit the trip rod or guide rod to clear the sleeve spring. Slip the brush up over the bottom of the reinforcing sleeve. Locate the brush springs so that they are in their proper positions with respect to their associated bank terminals and slide the brush up on the reinforcing sleeve to approximately its proper location as indicated by the mark previously scribed on the rod. Tighten the clamping bracket screw sufficiently to hold it in place.

5.14 Couple the rack to the brush rod by inserting the blade of the 3-inch cabinet screwdriver between the rack tongue and rack coupling pin just below the horizontal portion or lip of the tongue. Force out the tongue so as to permit the rack coupling pin to enter the brush rod. If the rack tongue does not engage the coupling slot it might be due to an additional rack washer which was used with a reconditioned rod and which is no longer required. Remove the washer.

5.15 Lower the brush rod to its lowest position and solder the wires to the brush terminals. If the wires were not tagged, the proper colors can be ascertained by referring to a similar brush on an adjacent rod.

5.16 Check for rack tongue position and rack coupling pin engagement, as covered in the section covering the type of apparatus involved.

5.17 After performing the above operations, check the adjustment of the associated multiple brushes and commutator brush as covered in the section covering the type of apparatus involved and readjust these brushes as required.

Rod With Clamp (Downstop Collar) Mounted Above the Rack Coupling Slot

5.18 Scribe a mark on the brush rod with the No. 240 scriber to indicate the top edge of the downstop collar. The line must be scribed on the surface of the rod nearest the bank as the outer surface of the rod will later be covered by the reinforcing sleeve.

5.19 Loosen the clamp (downstop collar) screw with the KS-2630 wrench or the No. 555A wrench, as required, and push the downstop collar off the bottom of the rod. Discard the old collar since it cannot be used with the brush rod reinforcing sleeve.

5.20 Proceed as covered in 5.06 to 5.12, inclusive.

5.21 Loosen the clamping screws of the D-159665 clamp (downstop collar) with the No. 555A wrench and slide the downstop collar up over the end of the sleeve. Position the top of the D-159665 clamp (downstop collar) over the reinforcing sleeve approximately 1/16 inch below the position occupied by the old collar since the new part is 1/16 inch shorter than the one previously used. Then temporarily tighten the clamping screws with the No. 555A wrench. Couple the rack to the brush rod as covered in 5.14. Securely tighten the clamping screws. Check the requirements specified for rack tongue position and rack coupling pin engagement as covered in the section covering the type of apparatus involved. After performing the above operations, check the adjustment of the associated multiple brushes, downstop collar, and commutator brush as covered in the section covering the type of apparatus involved and readjust as required. Securely tighten the downstop collar clamping screws.

Rods With No Brush or Downstop Collar Mounted Immediately Above the Rack Coupling Slot

5.22 Proceed as covered in 5.06 to 5.12, inclusive, 5.14, 5.16, and 5.17.