

**REPLACING PAGE ADDENDUM**

***Filing Instructions:***

1. REMOVE FROM THE SECTION THE PAGES NUMBERED THE SAME AS THOSE ATTACHED TO THIS PINK SHEET.
2. INSERT THE ATTACHED PAGES INTO THE SECTION IN THEIR PLACE.
3. PLACE THIS PINK SHEET AHEAD OF PAGE 1 OF THE SECTION.

ADDENDUM 159-424-801  
Issue 1, September, 1964  
AT&TCo Standard

**AC-DC DUPLEX MOTORS  
REPLACEMENT PARTS AND PROCEDURES**

**1. GENERAL**

1.001 This addendum supplements Section 159-424-801, Issue 7. The attached pages must be inserted in the section in accordance with the filing instructions above.

1.002 This addendum is issued to revise the List of Tools and Materials.

**3. REPLACEMENT PROCEDURES**

The following change applies to Part 3 of the section.

(a) 3.01 revised.

**Attached:**

Page 7 dated September 1964, revised

Page 8 dated September 1964, reissued

## AC-DC DUPLEX MOTORS REPLACEMENT PARTS AND PROCEDURES

### 1. GENERAL

1.01 This section covers the 1/16- and 1/12-hp 60-cycle, and the 1/16-hp 25-cycle ac-dc duplex motors, KS-5407, KS-5020, and KS-5021, respectively, and repaired duplex motors KS-5440.

1.02 This section is reissued to bring the piece-part information up to date with the latest ordering information, and to remove information covering the replacement of separable bearings with inseparable bearings. In addition, the title of this section was revised.

1.03 Part 2 of this section covers the various parts which it is practicable to replace in the field in the maintenance of this equipment. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Replacement Parts.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

### 2. REPLACEMENT PARTS

2.01 The figures included in this part show the various replacement parts in their proper relation to other parts of the apparatus, together with their corresponding names.

2.02 When ordering replacement parts, give the name of the part as shown in the figures of this section and the complete nameplate data of the motor, including the manufacturer's name, for example, one AC Stator for General Electric Company Duplex Motor, Model No. 32885, Serial No. 1266969, hp 1/16, rpm 1725, normal side amps 0.8, volts 200, 60 cycles; emergency side amps 1.85, volts 45-52, KS-5407, List 2. Do not refer to the section number.

2.03 Brush replacements shall be ordered in accordance with Section 171-110-802.

2.04 Fine-threaded screws used on earlier vintages of Duplex motors are no longer furnished by the General Electric Company. If any difficulty is encountered in procuring fine-threaded screws, the matter should be referred to the manufacturer's local representative. Coarse-threaded screws used on later vintages of Duplex motors can be ordered by describing the part and giving the complete nameplate data as referred to in 2.02.

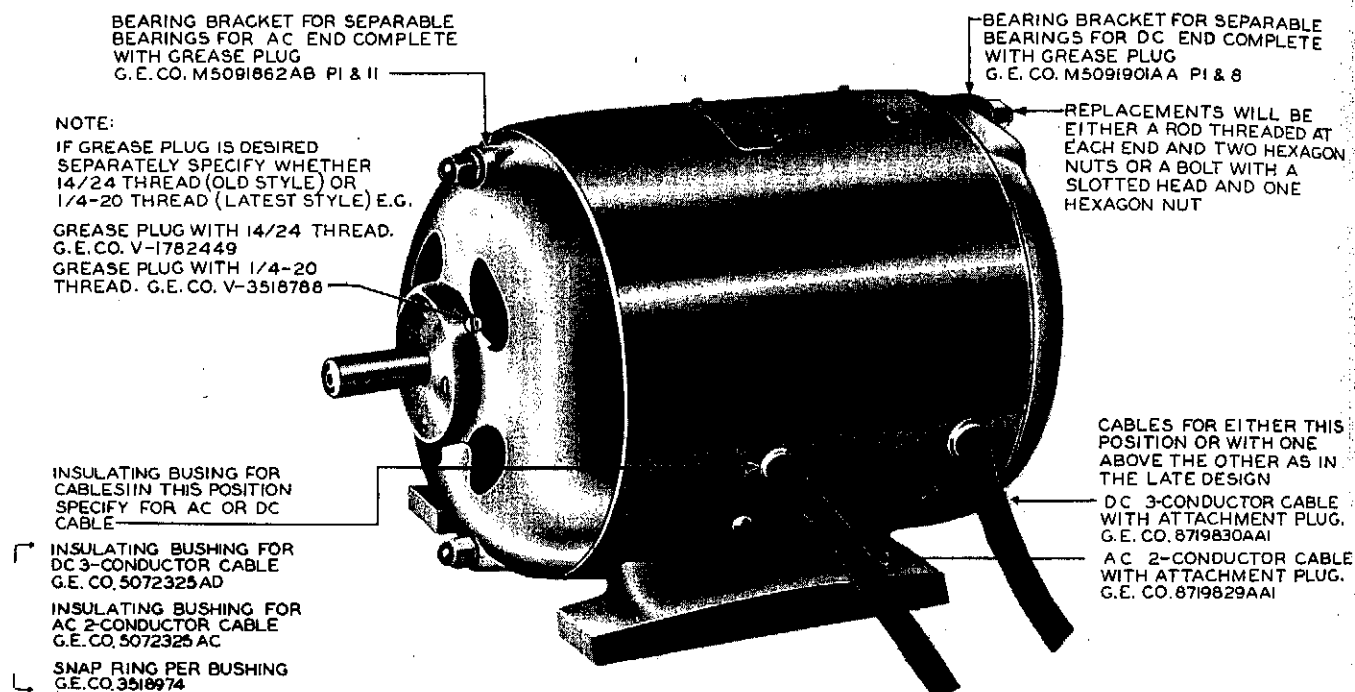
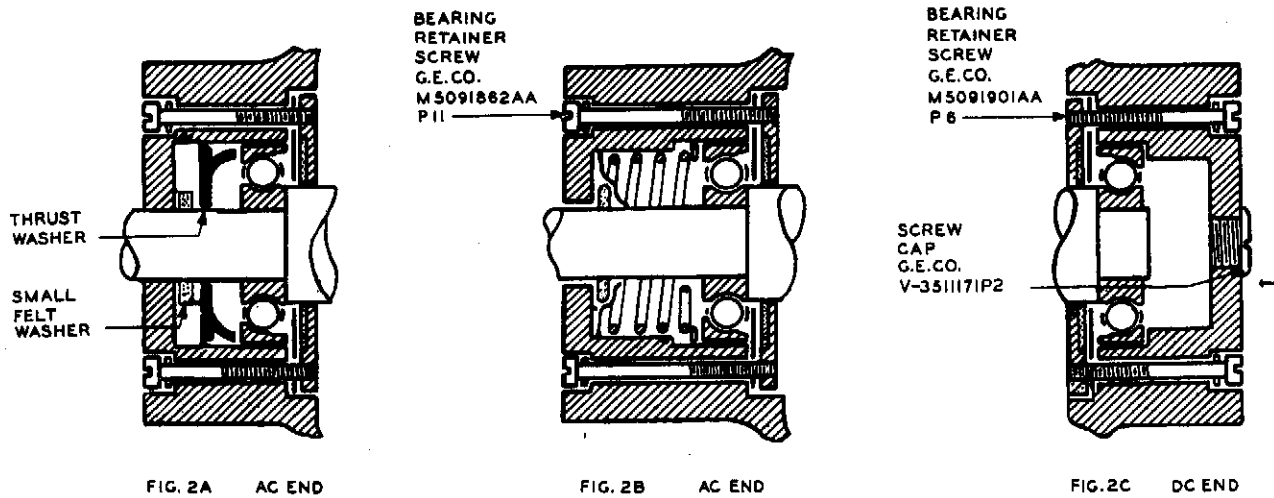


Fig. 1 - Duplex Motor (Old Design With Separable Bearings)



NOTES: 1. IF THE THRUST WASHER IS OF THE DESIGN SHOWN IN FIG. 2A AND A NEW ONE IS REQUIRED, ORDER THE THRUST SPRING AND ASSOCIATED FELT WASHER, FELT WASHER RETAINER AND STEEL THRUST WASHER SHOWN IN FIG. 2B.

2. IF A NEW ROTOR IS REQUIRED, ALSO ORDER NEW BEARINGS.

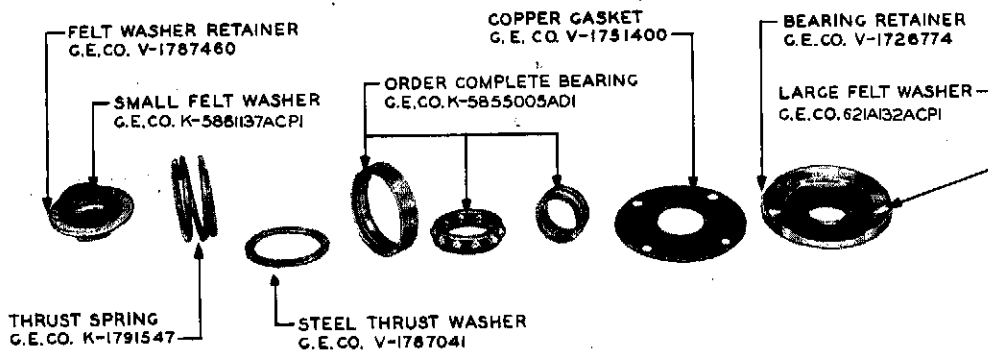
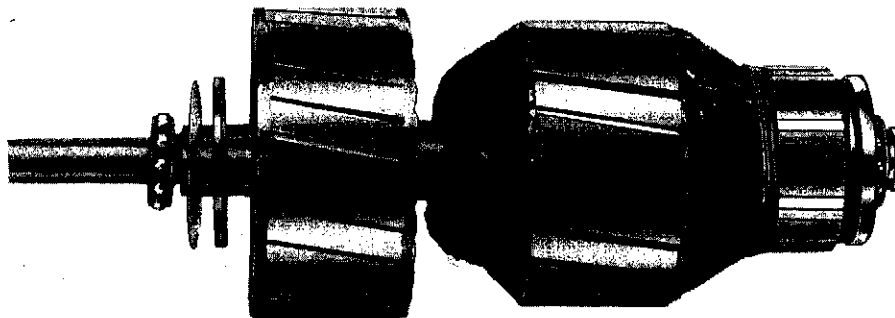


Fig. 2 - Rotor, Separable Bearings, and Associated Parts

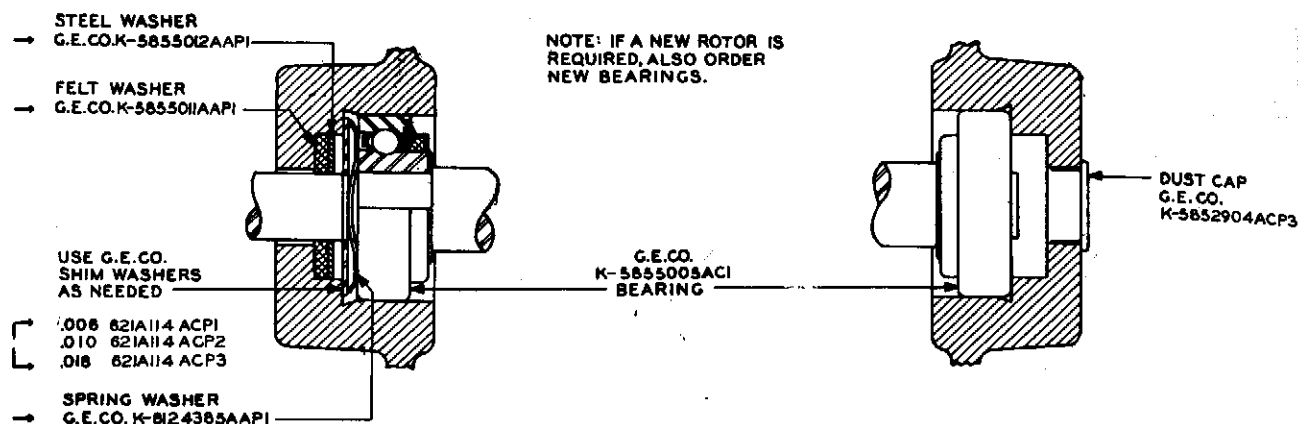
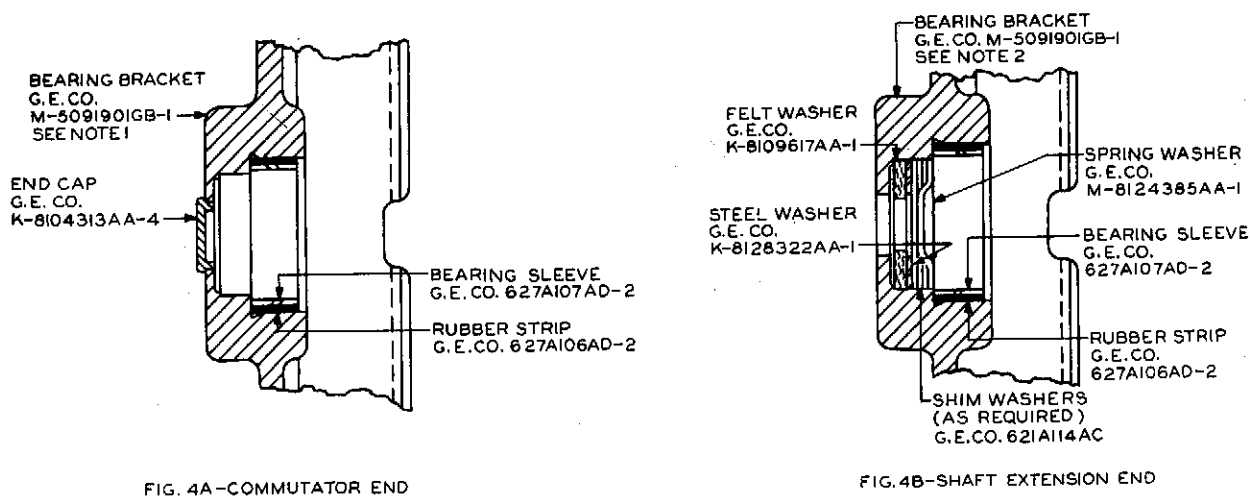


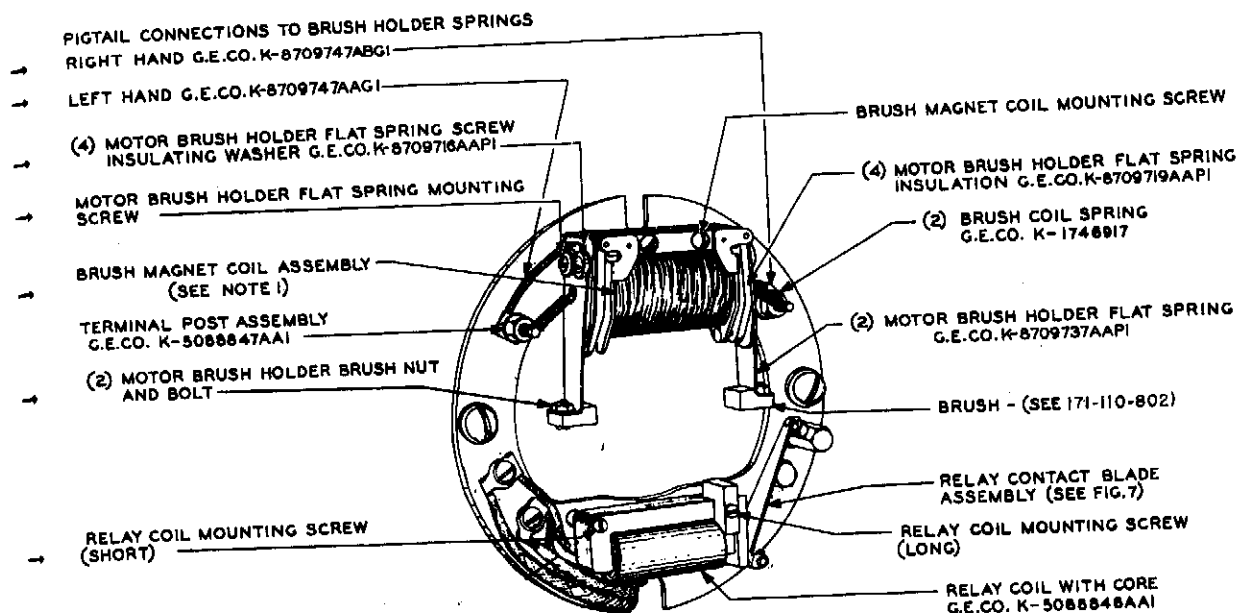
Fig. 3 - Inseparable Bearings and Associated Parts



NOTE 1: THE BEARING BRACKET, COMPLETE WITH END CAP, BEARING SLEEVE AND RUBBER STRIP, MAY BE ORDERED AS A G.E.CO. M-8145775AB BEARING BRACKET ASSEMBLY.

NOTE 2: THE BEARING BRACKET, COMPLETE WITH BEARING SLEEVE, RUBBER STRIP, STEEL WASHER, FELT WASHER, SPRING WASHER AND SHIM WASHERS, MAY BE ORDERED AS A G.E.CO. M-8145776AC BEARING BRACKET ASSEMBLY.

Fig. 4 - Rubber Mounting Assemblies for Inseparable Bearings  
(KS-5407 Duplex Motor)



## NOTE:

1. IF A NEW BRUSH MAGNET COIL IS REQUIRED, IT IS RECOMMENDED THAT THE COMPLETE BRUSH MAGNET ASSEMBLY G.E.CO. 68X562, CONSISTING OF FRAME, CORE, COIL AND ARMATURES, BE REPLACED.
2. REFER TO 2.04 FOR ORDERING INFORMATION FOR SCREWS.

Fig. 5 - Circular Yoke Assembly

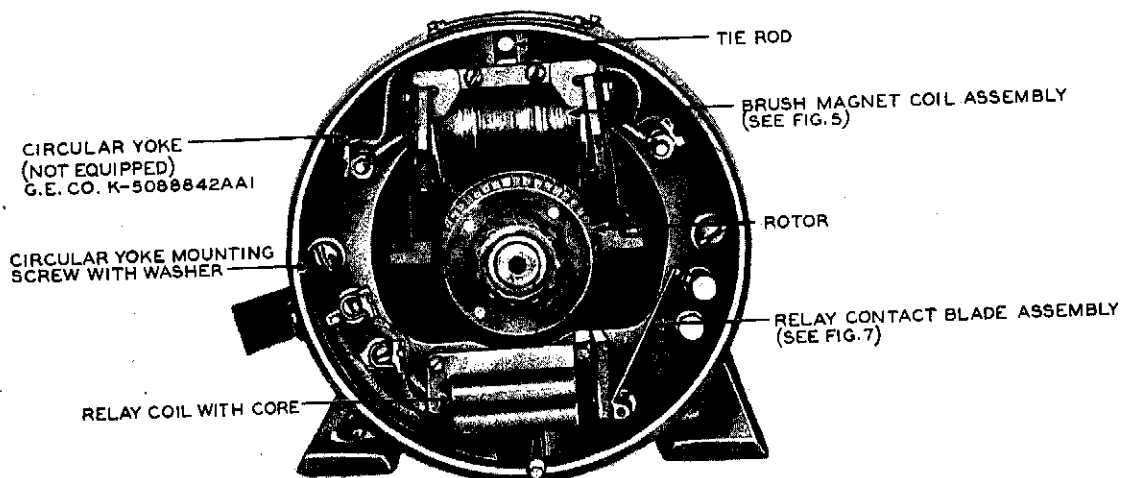


Fig. 6 - DC Motor End Assembly

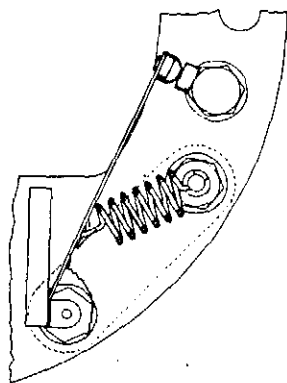


FIG. 7A

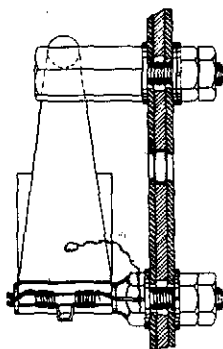


FIG. 7B

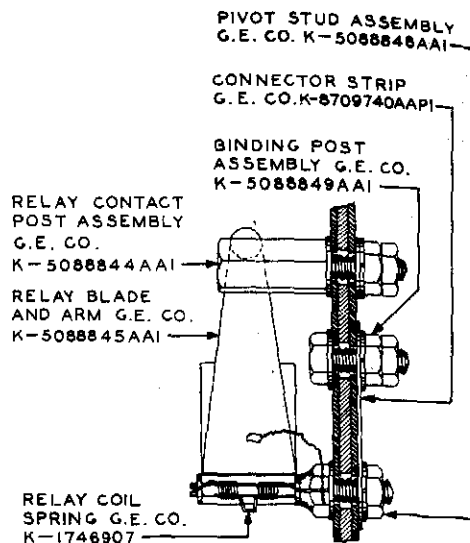
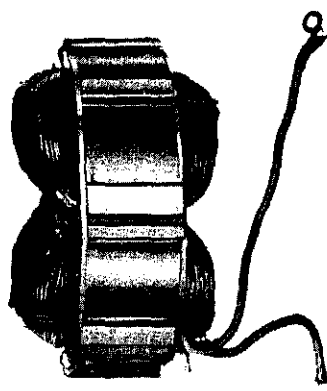


FIG. 7C

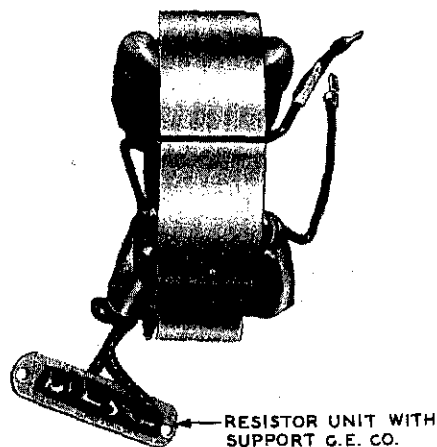
NOTE 1: IF THE RELAY IS OF THE DESIGN SHOWN IN FIG. 7A AND A NEW PART IS REQUIRED, ORDER A COMPLETE NEW CIRCULAR YOKE ASSEMBLY THAT HAS A RELAY ASSEMBLY AS SHOWN IN FIG. 7C.

NOTE 2: IF THE RELAY IS OF THE DESIGN SHOWN IN FIG. 7B AND A NEW PART IS REQUIRED, ORDER IN ADDITION TO THE REQUIRED PARTS, THE PIVOT STUD ASSEMBLY, INCLUDING NUT, WASHERS, AND RELAY RETRACTILE SPRING; THE BINDING POST ASSEMBLY, INCLUDING NUTS AND WASHERS; AND THE CONNECTOR STRIP AS SHOWN IN FIG. 7C, LISTING THE NAME AND CODE NUMBER OF EACH ITEM ILLUSTRATED.

Fig. 7 - Transfer Relay Assemblies



AC STATOR



DC STATOR

Fig. 8 - Stator Assemblies



**3. REPLACEMENT PROCEDURES****3.01 List of Tools and Materials**

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
46	3/8-Inch Hex. Single-End Socket Wrench
110	9/32- and 5/16-Inch Hex. Double-End Socket Wrench
209	5/16-inch Hex. Open Single-End Offset Wrench
295	Bristo Setscrew Wrench
309	Threaded Stud
R-1482	File
R-2969	Typewriter Brush
—	No. 1002 Grip-O-Matic Puller, Owatonna Tool Co
—	No. 950 Bearing Pulling Attachment, Owatonna Tool Co
—	†E13-IRP-1 Inner Race Puller
—	†E13-ORP-1 Outer Race Puller (or No. MD-955 Pilot Bearing Puller, Owatonna Tool Co)
—	†DMSP-1 Stator Puller
—	†DMSR-1 Stator Replacer
—	3-Inch C Screwdriver
—	4-Inch E Screwdriver
—	5-Inch Diagonal Pliers
—	1-Pound Soldering Copper, Pyramid Point
—	1-Pound Ball Peen Hammer
—	Hack Saw

**MATERIALS (See Sections 065-330-101 and 065-370-101)**

KS-7860	Petroleum Spirits
KS-14666	Cleaning Cloth
—	310-330P Grease
—	Pail

† The following tools are no longer available on order from the Western Electric Company.

E13-IRP-1 Inner Race Puller  
E13-ORP-1 Outer Race Puller  
DMSP-1 Stator Puller  
DMSR-1 Stator Replacer

Where these tools are not available in the telephone company and cannot be obtained locally, it is suggested that the motor be sent out for repair.

**3.02** Remove the apparatus from service before making any replacements.

**3.03** After making any replacement of parts, the part or parts replaced shall meet the readjust requirements involved, as specified in Section 159-424-701. Other parts, whose adjustments may have been disturbed by the replacing operations, shall be checked to the readjust requirements and an over-all operation check shall be made of the motor before restoring it to service.

**3.04** When using petroleum spirits for cleaning purposes in a power room, provide as much ventilation as practicable. After using the petroleum spirits, the commutators of all dc machines in the power room should be burnished in accordance with approved procedures for the machines involved, since the fumes from the petroleum spirits may soften commutator film and thus adversely affect commutation.

**3.05 Rotor, Bearings, and Associated Washers and Springs****Machines With Inseparable-type Bearings (Distinguished Externally by Absence of the Four Small Screws in Each Bearing Bracket)**

(1) Remove the coupling head and through bolt nuts and pry off the bearing brackets by inserting a screwdriver alternately in the two slots between the frame and bearing bracket. The parts should be removed from the bearing bracket and cleaned using a cloth moistened with petroleum spirits and then a dry cloth. If a new rotor is required, use new bearings in view of possible damage to the old bearings in removing them from the shaft. Bearings may be removed with the 1002 puller and the 950 attachment, where required. The new bearing should have a snug sliding fit in the bearing bracket and a driving fit on the shaft. Slip the new bearing on the shaft and, using a short piece of clean pipe having a smooth end which will push against the inner but not the outer ball race, tap the bearing into place against the shoulder on the shaft. New bearings are normally lubricated when received.



(2) Before assembling, lubricate the bearing housings lightly with grease so that the bearings will slide into place better. It is suggested that the parts for the ac end be inserted in the bearing bracket before inserting the rotor in that bearing bracket. The bearing brackets may be pulled into place by taking up on the through bolt nuts and by tapping the bearing brackets with the hammer, using a soft material against the bearing bracket to protect the finish. Pull the shaft outward and release to see that the thrust spring or the thrust washer pushes the shaft back into place.

(3) If the bearing sleeve and rubber strip (see Fig. 4) of the KS-5407 duplex motor are being assembled in the bearing bracket, they should be inserted so that they are against the shoulder in the bearing bracket, and the split in the bearing sleeve and the split in the rubber strip are approximately 180 degrees apart. On the shaft extension end of the motor, the felt washer, steel washer, shim washers (as required), and the spring washer should be assembled as indicated in Fig. 4B. If a bearing bracket not equipped with the rubber mounting shown in Fig. 4 is being replaced with a bearing bracket equipped with a rubber mounting, the inseparable bearings should also be replaced. Reassemble motor as described in (2).

**Machines With Separable-type Bearings (Distinguished Externally by Four Small Screws in Each Bearing Bracket)**

(4) Remove the four small screws from the dc bearing bracket. It is not necessary to remove the coupling or take the screws out of the ac bearing bracket unless work is to be done on the ac end as the rotor and ac bearing bracket may be removed together. Remove the nuts from the bearing brackets. If the bearing brackets stick, pry them off by inserting a screwdriver in the slot between the frame and the bearing bracket.

(5) The outer race at each end and the parts in the ac bearing bracket are usually removable with the fingers. If necessary, either outer race can be removed with the outer race puller by sliding the 4-prong collet in back of the race and turning the small hand nut to expand the collet. Turning the large hand nut

pulls out the race. The balls and retainer may be slipped off the inner race to permit removal of the parts behind the bearing. The inner race should not be removed unless the bearing is to be replaced. The bearing bracket and re-used parts should be cleaned with petroleum spirits and wiped with a clean dry cloth. A typewriter brush is convenient for cleaning out the grease. If a new rotor is required also, use new bearings in view of possible damage to the old bearings in removing them from the shaft. If several sets of bearings are being cleaned, it may be more convenient to let the bearings and washers soak in a pail of petroleum spirits for a few minutes before cleaning and wiping. If the bearing is not to be replaced, reassemble as covered in (8).

(6) If the bearing is to be replaced, remove the inner race with the inner race puller. Place the jaws in the bearing groove and slip up the clamping collar to clamp the jaws in position. Turn the jack screw clockwise against the end of the shaft to remove the race. The race may then be removed from the puller by unclamping the jaws and continuing the forward motion of the jack screw.

(7) Select a bearing so that the inner race will be a driving fit on the shaft and the outer race a snug sliding fit. The housings should not be filed, scraped, or otherwise defaced in order to make a bearing fit. It is believed that field selection of bearings, that is, trying different bearings until a reasonably satisfactory fit is obtained, will take care of all infrequent cases where housings and bearings are at opposite extremes of their tolerances. Place the recessed surface of the bearing retainer outward on the shaft followed by the large felt washer and the copper gasket. Slip the inner ball race on the shaft and, using a short piece of clean pipe which is a free fit on the shaft and has a smooth end to put against the inner ball race, tap the race into place against the shoulder on the shaft. Care should be taken not to damage the ball race surface.

(8) Before reassembling the machine, fill the spaces between the inner and outer ball races of separable bearings with a moderate amount of grease. To facilitate inserting the outer race, lubricate the inside of the bearing chamber lightly with grease. The bearing bracket on the ac end may be put on the shaft

before the rotor is inserted in the frame. Make certain that all parts are in the proper positions. The screws may be put in easily by using a No. 309 tool, which is a stud similar to one of the regular screws, except that it is longer and headless. It should be screwed into the bearing retainer through the copper gasket before putting the bearing bracket on the shaft. After the bearing bracket is in place, three screws may be inserted (long ones in ac end) and then the stud removed and the other screw inserted and all screws tightened. It may be necessary to tap the bearing bracket lightly to make it fit properly. Use a soft material to protect the finish in this case. Screw on the bearing bracket nuts. All screws and nuts should then be securely tightened. Pull the shaft outward on the ac end and make certain that the thrust spring (or thrust washer) returns the shaft to its original position when released. Replace the coupling head in the proper position.

### 3.06 *Brush Magnet*

(1) Remove the dc bearing bracket and rotor as covered in 3.05. The entire relay or parts may then be readily replaced. Note the position of all washers involved and mark all leads before disconnection to insure proper replacement. The yoke is held in place with the two large screws. Resolder and tape any splices opened. Care must be exercised to avoid bending or stretching the coil spring sufficiently to prevent it from pulling the brushes away from the commutator satisfactorily. Be sure that all screws are retightened.

**Caution:** *Make sure that the flat spring insulation and insulating bushings are placed in their proper position between the flat spring and armature.*

### 3.07 *AC Transfer Relay and Parts*

(1) The contact blade and post, with associated studs, retractile spring, shunt, and nuts should be replaced together. If a new relay coil is required, the other parts of the relay should also be replaced. This may be done readily after removing the dc bearing bracket as covered in 3.05 and releasing the yoke by taking out the two holding screws. Be sure to put the leads and washers back in their proper positions. Adjust the position of the pivot stud and contact post to obtain proper contact adjustment.

### 3.08 *Circular Yoke Assembly*

(1) This can be readily replaced after removing the bearing bracket on the dc end and the two yoke screws. Mark all leads to insure proper reconnection.

### 3.09 *Resistor Unit With Support*

(1) The resistor is located under one leg and can be replaced readily. Connect to taps corresponding to those used previously.

### 3.10 *Cables and Stators*

(1) The dc cable splice is accessible after removing the rotor as outlined in 3.05, and removing the yoke which is held in place by two large screws. On the latest design, the ac cable enters the frame on the dc end and the splice is also accessible on that end. Mark the leads to insure proper reconnection. Resplice and secure the cables inside of the frame similar to the previous method.

(2) With the old design, the ac cable enters the frame on the ac end. In this case, it is also necessary to remove the ac stator which is normally a shop job unless stator puller and replacing tools are available.

(3) To remove the ac stator, take out the two stator mounting screws at the right and left of the stator pileup and disconnect the connections to the ac relay. The two hook-ended draw bars of the DMSP-1 puller should be inserted in the through bolt slots at the top and bottom of the stator pileup. When the hooks are in the stator pileup, they should be turned approximately 90 degrees, or until the stop hits the puller bridge, so that they engage the back of the stator pileup. If it is difficult to insert the draw bars in the through bolt slots, try the stator mounting screw slots at the right and left of the stator pileup. In rare cases, it may be necessary to clean the stator impregnating material out of one pair of slots before inserting the draw bars. A 4- or 5-inch rattail file obtained locally or any small reaming tool that is available may be used to clear out the impregnating material. After the draw bars are hooked back of the stator pileup, brace the ends of the puller bridge against the motor frame and turn the large hand nuts on the ends of the draw bars uniformly until the stator is clear of the frame. The cable clamp on the inside of the motor frame may

be loosened by using a screwdriver on the screw head which appears on the outside of the motor frame, slightly below and to the left of the cable entrance hole in the frame. The leads should be spliced as before and the cables resecured.

(4) In replacing the ac stator, place it in front of the motor frame in its correct position. Insert the two guide rods of the DMSR-1 replacer through the stator mounting screw slots in the right and left sides of the stator and turn the small knurled heads to screw the guide rods into the mounting screw tapped holes in the frame. Pass the clamping rods around the motor frame and hook the ends over the motor frame on the dc end. Turn the two large hand nuts on the clamping rods uniformly to draw the stator into position. Care shall be exercised to avoid the possibility of the windings becoming grounded, shorted, or otherwise damaged by the cable clamp on the inside of the frame. Fish the two leads for the ac relay through the slot in the dc yoke, but leave them disconnected. Push all internal wiring into such a position that it will not rub on the armature after assembly, will not interfere with the insertion of the through bolts, or will not be wedged between the ac and dc

stators. It may prove convenient to place the through bolts in position temporarily from the dc end while the stator is being drawn into position to insure their proper fit between the stator and the frame after the stator is in place. Continue the operation of the hand nuts on the clamping rods until the stator is drawn firmly into position against the frame shoulder. Replace and tighten the two stator mounting screws being sure that the lock washers are in place under the heads of the screws. Reconnect the two leads at the ac relay on the yoke at the dc end of the motor.

(5) The dc stator can be replaced as covered above after removing the yoke and dc cable (also ac cable on latest design) and disconnecting the resistor.

(6) Assemble the rotor, bearings, and bearing brackets as outlined in 3.05. If a new plug is installed on the dc cable, connect it so that the motor will rotate in a counterclockwise direction when facing the coupling end.

### 3.11 *Tie Rods or Bolts and Nuts*

(1) Rods or bolts should not project through hexagonal nuts. If necessary, cut off with a hack saw and smooth them flush.