

GENERATORS — TYPE "M" REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of the M-type generators per KS-5009. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Part 2 of this section is called "Replacement Parts" and covers the various parts which may be replaced in the field in the maintenance of this equipment. Aside from screws, nuts, bolts and other small parts which can be obtained locally the parts not designated herein are of a character which should ordinarily not be replaced by the regular maintenance forces. Part 2 also contains explanatory figures showing the different parts.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts listed under 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 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 also the complete nameplate data of the machine, e.g.; (1) brush holder assembly complete for the generator having the following nameplate data: type M-5, form 4, shunt wound, amperes 225, volts 33, rpm 1200. serial number 1382465, kw 7.43.

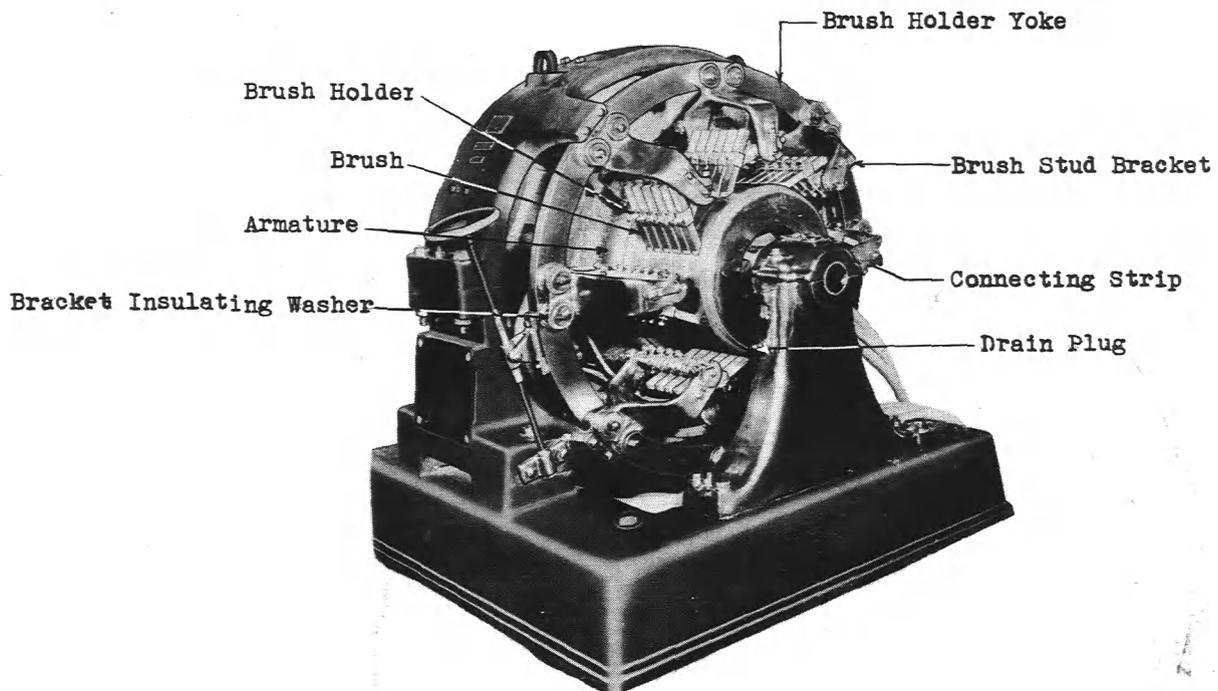


FIG. 1 - M-15 GENERATOR (FRAME MOUNTED BRUSH RIGGING)

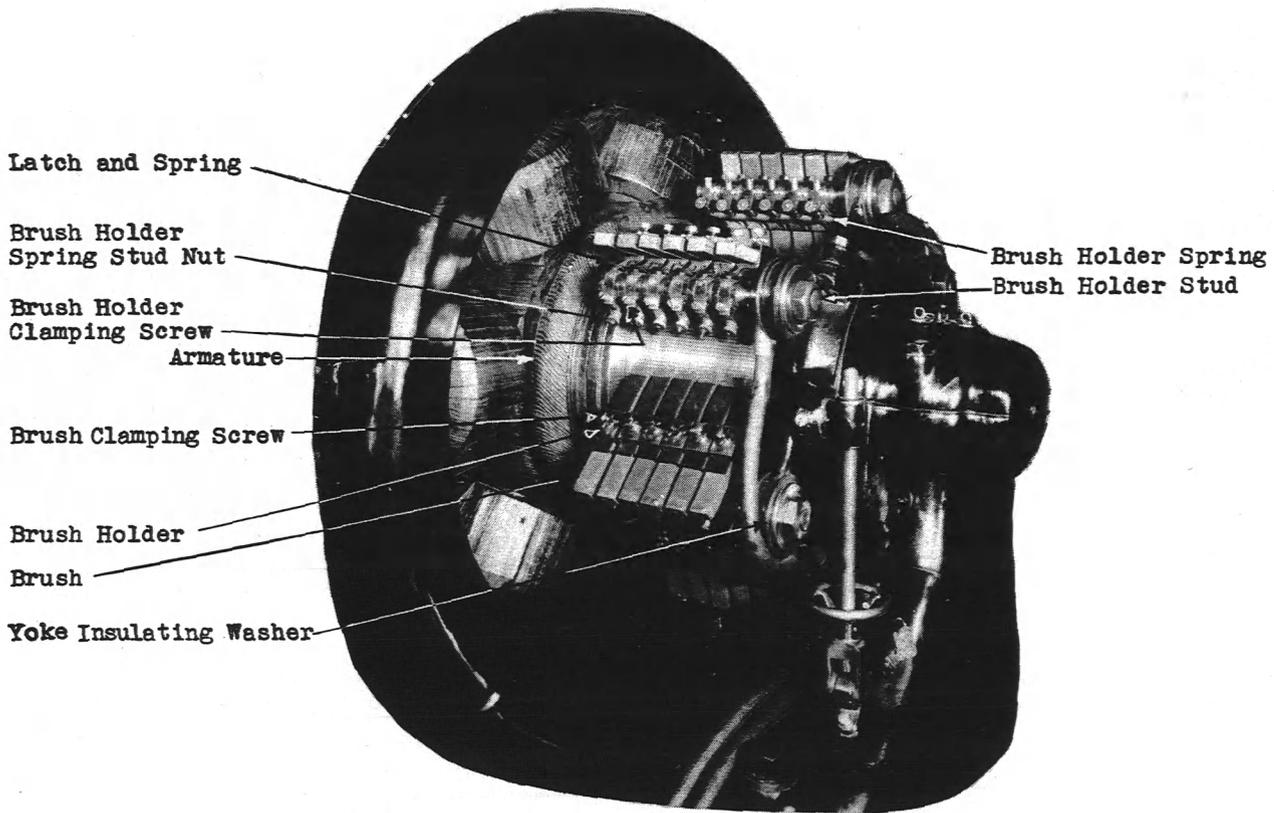


FIG. 2 - M-8 GENERATOR (PEDESTAL MOUNTED BRUSH RIGGING)

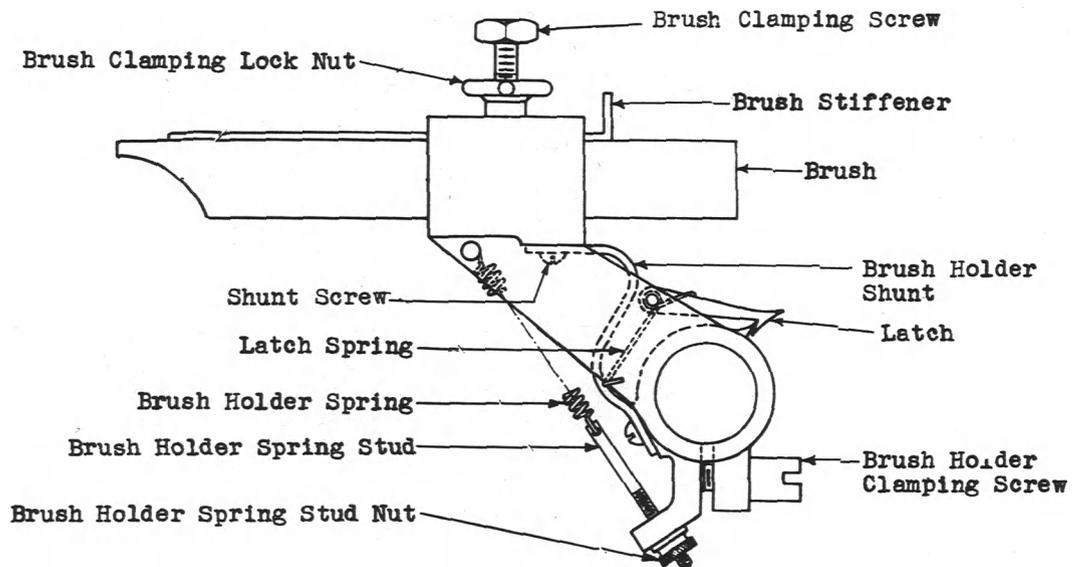
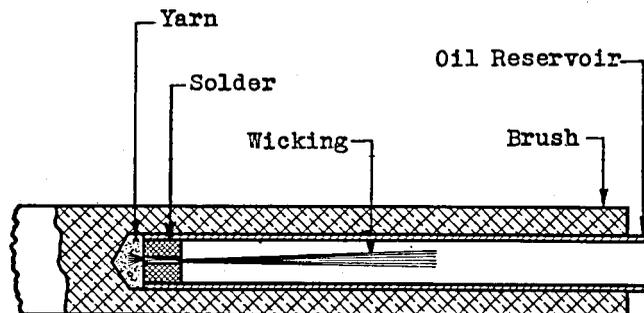
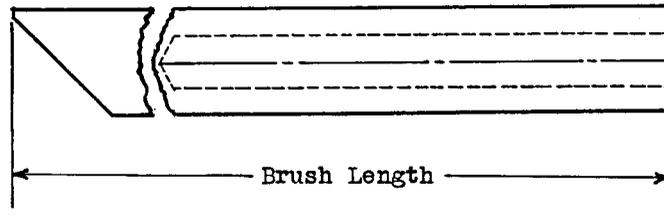


FIG. 3 - GAUZE TYPE BRUSH HOLDER



Note (1): In the past, copper gauze brushes were furnished in some instances but in all cases the proper brushes to be furnished for replacement are the brass gauze brushes listed in Section 171-110-802.

Note (2): A ball of yarn sufficient for renewal of the wicking of the brushes of a number of machines should be ordered by specifying (1) ball of yarn per group 10, ED-80672-01. (The drawing referred to is an ordering code and is not required by the maintenance forces.)

3. REPLACEMENT PROCEDURES3.001 List of Tools and MaterialsTools

Chisel, Wood, 1-1/4 inches (R-1454)
 Hoist, Chain, 10 foot lift, one ton,
 (R-1496) or equivalent
 Screw-driver, 4 inch (Regular)
 A.T.& T.Co. Std. Dwg. 46-X-34
 Wrench, Double-End Flat, 1/4 inch and
 3/8 inch openings (417-A Tool)
 Wrench, Double-End Flat 1/2 inch and
 5/8 inch openings
 Wrench, Double-End Flat 13/16 inch and
 7/8 inch openings
 Wrench, Double-End Flat 1-1/16 inch and
 1-1/4 inch openings
 Wrench, Double-End Flat 1-7/16 inch and
 1-5/8 inch openings
 Wrench, Crescent, Adjustable Double-End,
 Flat (R-2512)

Materials

Burlap
 Canvas
 Cloth, KS-2423 or equivalent
 Compound, Sealing KS-6824
 Cord
 Felt Pad or equivalent
 Fibre Sheet, 1/16 inch thick
 Kerosene
 Lubricating Oil (One of the following)
 Western Electric KS-2245
 Texas Regal Oil "A"
 Standard Renown Engine Oil
 Gulf Security Oil A
 Sinclair Speed Engine and Dynamo Oil
 Squire's Brand Royal Dynamo Oil
 Vacuum Oil "DTE" Light
 Measure, 1 qt. (funnel attached) or
 equivalent
 Pail or equivalent receptacle for oil
 Rope Sling, 1 inch diameter rope or
 equivalent
 Sandpaper or Abrasive Cloth No. 1 1/2
 or No. 2, No. 0 or No. 00
 Waste, Wool Yarn
 Wooden Blocks
 Wooden Wedges
 Water-proof Paper
 Yarn per ED-80672-01

3.002 Remove the apparatus from service before making any replacements.

3.003 After making any replacement of parts the apparatus shall be checked and where necessary, readjusted to meet the requirements specified in the Section covering the Apparatus Requirements and Adjusting Procedures for this equipment.

3.004 No replacement procedures are specified for screws or other small parts when the procedure consists of a simple single operation.

Brush Rigging3.01 Brushes (See Fig. 4)

(1) To replace a gauze type brush, place the brush and brush holder in the latched back position. Loosen the brush clamping screw and remove the old brush. Insert the new brush in the brush holder and tighten the brush clamping screw.

(2) To insert new yarn in the oil well of a lubricating type gauze brush, remove the oil well from the brush, take a strand of waxed cord folded in the middle and insert the looped end through the hole in the soldered end of the oil reservoir and push through until it projects above the top of the oil well. Take three strands of yarn for wicking, each strand being 3 inches long for the small diameter tube or 5 inches long for the large diameter tube, pass the strands through the loop of the waxed cord, even off the end of the strands, place the loop in the middle of these strands and draw them down inside the well and through the hole in the solder until the strands project approximately 1/4 inch. Then cut off the strands 1/8 inch from the hole in the bottom of the oil reservoir.

3.02 Brush Holder Assembly (See Fig. 3)

Brush Clamping Screw
Brush Clamping Lock Nut
Brush Stiffener
Brush Holder Spring Stud
Brush Holder Spring
Brush Holder Spring Stud Nut
Latch
Latch Spring
Brush Holder Shunt
Shunt Screw

(1) To replace a brush holder assembly on the M-1 to M-8 type Generators, remove the brush as outlined in procedure 3.01, (1). Loosen the brush holder clamping screw which holds the brush holder assembly on the brush holder stud and work the assembly off the stud. If it binds on the stud, place a screw-driver between the edges of the clamp as near the clamping screw as possible and spread the clamp slightly. Slip the new complete brush holder assembly, consisting of the brush clamping screw, brush clamping lock nut, brush stiffener, brush holder spring stud, spring and nut, latch and spring, brush holder shunt and screws, on the brush holder stud and reassemble in the reverse order, making sure that the clamping screw and shunt screw are tight.

(2) To replace a brush holder assembly on the M-10 or M-15 type generators, remove the brushes as outlined in procedure 3.01 (1). Loosen the brush holder stud set screws on both ends of the brush holder stud. Remove the connecting strip. This will enable the brush

3.04 Bearings (See Figs. 1 & 2)

holder stud and brush holder assemblies to slip out of its slot in the brush stud bracket. Then remove the brush holder assembly as outlined in (1).

(3) To replace a brush clamping screw, brush clamping lock nut, or brush stiffener, loosen the brush clamping screw and replace any defective parts. Reassemble in the reverse order.

(4) To replace a brush holder spring stud, brush holder spring, brush holder stud nut, latch, latch spring, brush holder shunt or shunt screw, loosen the brush holder clamping screw so as to enable the brush holder assembly to turn on the brush holder stud. Release the tension of the brush holder spring or latch spring and replace any defective part and reassemble in the reverse order.

3.03 Brush Holder Stud Insulating Washer
Brush Holder Stud Insulating Bushing
Brush Holder Stud (See Figs. 1 & 2)
Bracket Cap Screw Insulating Washer
Bracket Cap Screw Insulating Bushing

(1) To replace an outer brush holder stud insulating washer or brush holder stud insulating bushing on the M-1 to M-8 type generators, merely remove the hexagonal nut and brush washer. Remove the defective part and replace with a new one. Be sure that the hexagonal nut is firm.

(2) To replace an inner brush holder stud insulating washer or brush holder stud on the M-1 to M-8 type generators remove the brush holder assemblies as outlined in procedure 3.02 (1). Then remove the hexagonal nut and brass washer. Remove the brush holder stud. Remove the defective part and replace with a new one in the reverse order making sure that the hexagonal nut is firm.

(3) To replace a brush holder stud on the M-10 or M-15 type generators remove the brush assemblies as outlined in procedure 3.02 (2). Replace with a new brush holder stud and reassemble in the reverse order.

(4) To replace an outer or inner bracket cap screw insulating washer or bracket cap screw insulating bushing on the M-10 or M-15 type generators remove the bracket cap screw. Loosen the outer bracket cap screw and remove it and the bracket if necessary.

CAUTION If it is necessary to remove the bracket remove the brushes as outlined in procedure 3.01.

Replace the defective part with a new part and reassemble in the reverse order.

(1) For all direct connected generators except the M-15 which has split bearings, when a bearing at the coupling end is to be removed, it will be necessary first to move the generator on the sub-base so that the coupling end of the shaft is clear and then remove the coupling half which is keyed on the shaft. If the set is belted it will be necessary with the exception of M-15 generators to remove the pulley before removing the bearing at the pulley end. When removing the bearing at the commutator end of the generator it will not be necessary to move the generator on the sub-base. The commutator and as much of the armature as is exposed should be wrapped with canvas for protection. After draining the oil from the bearing chambers into a pail or other receptacle the bearings may be removed as follows:

(2) On generators having a bearing housing in two halves, remove the two holding down screws, the yoke (if this is mounted on the bearing) and the upper half of the bearing housing. The generator shaft should then be raised just far enough to take the weight of the armature off of the bearing taking care not to injure the commutator or armature windings in so doing. This may be done by a rope sling looped around the generator shaft, the rope sling being hooked into a block and tackle or chain hoist. If more convenient a bar may be placed underneath the shaft as near the bearing as possible and the shaft raised with the aid of blocks, and jacks. The armatures of smaller generators may be lifted by hand with or without a rope sling instead of using a chain hoist, block and tackle or equivalent. Great care should be taken not to rest any of the weight of the armature on the commutator bars. Thin fibre sheets should be used between the sling and the commutator to protect the end of the commutator. Do not allow the rope to touch the armature windings.

(3) M-7 Generators and Smaller These generators may have their bearings removed after going through the procedure (1) and (2) by taking off the bearing housing end plates which are held to the bearing housings by four screws, and sliding the bearing out of the bearing housing taking care to lift the oil rings free from their slots in the bearing. The bearing housings are not split and the bearings are in a single piece which in a good many cases fit tightly. It will be necessary to remove the housing to take out the bearing, taking care, however, to mark the housing so that the housing may be replaced in exactly the same position in order not to alter the amount of armature end play. The housing may be removed by unscrewing the cap screw which is under the bearing housing

and inside the bearing pedestal, and which secures the bearing housing in place on the pedestal. If the bearing is at the commutator end the two yoke clamping screws should be removed and the yoke taken off before attempting to remove the bearing housing.

(4) M-8 and M-10 Generators (Except some obsolete Types) On generators of these types the bearing housings consist of two pieces, the upper half being clamped to the lower half by two bolts. The bearing, however, is a single piece. To remove the bearing after going through the procedure given in (1) and (2) the lower half of the bearing housing together with the bearing should first be loosened by unscrewing the two cap screws under the bearing housing and inside the bearing pedestal which secure the housing to the pedestal. After doing this the bearing and the lower half of the bearing housing may be removed from the shaft and the bearing taken from the housing.

(5) M-15 Generators The upper half of the bearing housing may first be removed by unscrewing the holding down bolts and then the bearing which is in two halves on this size generator may be removed. It is not necessary to move the pedestal to remove the bearing. The lower bearing half may be removed after the upper half by first removing the weight of the armature from the bearing and revolving the lower bearing half around the shaft until it is on the upper side.

(6) Bearings should be replaced so that the hole for the clamping screw or clamping pin and the slots for the oil rings are on the upper side. Care should be taken when replacing bearings not to injure the oil rings. Replace the clamping screws or pin, depending on which is furnished, and make sure that all bolts and nuts are set up tight. When replacing end plates on bearing housing halves, use KS-6824 Sealing Compound to make the joints oil-tight. Coat the drain plug and its associated threads in the casting with KS-6824 compound, replace the plug and refill the bearing chamber with oil. Reassemble the machine in the reverse order. If it is necessary to move the bearing housing on the pedestal, care should be taken to replace it in its original position so that the end play of the armature is the same as before. New bearings should bring the armature into a central location in the frame so that the air-gap is approximately uniform at all poles.

Windings

3.05 Armature (See Figs. 1 & 2)

(1) To replace an armature proceed as follows: Mark the position of the

coupling on the shaft and remove the coupling half or pulley, shifting the position of the generator on the sub-base, if necessary. Insert thin fibre sheets between the pole faces and armature and also between the rope slings (if used) and the ends of the commutator and the armature windings to prevent injury. Then remove the bearings as outlined in procedure 3.04.

(2) Support the weight of the armature by rope slings at either end of the shaft. Slide the armature toward the commutator end of the generator until one of the rope slings comes up against the magnet frame. Rest the armature carefully on pieces of fibre inserted between the pole pieces and the armature and bring the sling used at the coupling end to the other side of the magnet frame and loop it back through the magnet frame and under the shaft again. Take up the weight carefully and work the armature clear of the magnet frame. A spreader should be inserted between the two slings whenever possible to keep the slings from bearing against the commutator or end turns of the armature winding.

(3) M-15 Generator armatures may be removed by removing the upper half of the field magnet frame as well as the upper bearing caps and bearings and hoisting the armature out by means of a chain, hoist or block and tackle hooked into two rope slings looped under each end of the shaft, with a spreader holding the two slings apart, so that they will not bear against the commutator or end turns of the armature winding.

(4) Whenever an armature is removed from a machine the greatest care should be taken to rest it on wooden blocks placed under the shaft and never allow the weight to rest on the surface windings of the armature except temporarily just after removing from the machine when it may be rested on burlap bagging or equivalent material. Great care should be taken to avoid scratching the journals of the shaft as this will cause cutting in the bearings and heating. If roughened the journals should be smoothed with No. 00 sandpaper and dynamo oil, using a circular motion around the shaft.

(5) When shipping an armature the shaft should be covered with vaseline, the armature wrapped with waterproof paper and carefully boxed, the weight resting on the shaft bearing on "V" shaped blocks with holding down blocks bearing on the top and both sides of the shaft so as to make movement of the armature within the box impossible. The shafts should be completely enclosed in the box and blocked to prevent the armature from shifting in an endwise direction. All blocks should have a clearance of from 1 1/2 inch to 2 1/2 inches from the commutator or

armature winding. A space of at least 1 1/2 inches should be left between the armature and the sides of the box. Replace the new or reconditioned armature in a similar manner going thru the steps given above in the reverse order.

3.06 Oil Gauge
Oil Drain Plug

(1) To replace an oil gauge the drain plug in the bottom of the oil chamber should be taken out and the oil drained into a pail or other receptacle. Remove

the oil gauge. Clean the gauge and plug threads and their associated threads in the machine frame with a dry cloth. Old compound will be loosened and removed most easily if this is done as soon as possible after removing the gauge or plug. After cleaning coat the threads with KS-6824 compound, and insert the plug and gauge. Refill the bearing chamber with oil.

(2) To replace a drain plug, remove it and replace with a new one in a manner similar to that as outlined in (1).