

SYNCHRONOUS MOTORS REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers synchronous motors with direct-connected exciters in accordance with specification KS-5123-01.

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 the 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 together with the KS number e.g.,

Motor: (1) oil ring for the bearing on the coupling end of the motor having the following nameplate data:- Serial number 4315344, Model IS-350405-8, Type TS 42 1200, Form PK, 40 HP, 3 phase, 60 cycle, .8 PF, 117 amps., 208 volts, 1200 rpm., Spec. KS-5123.

Exciter: (6) brushes for the exciter having the following nameplate data:- Frame 2, Model IS-350042-54, serial number 257993, Type EF, Form EB, amps. 12, speed 1200 rpm, Volts 125, KW 1.5, continuous 50° C.

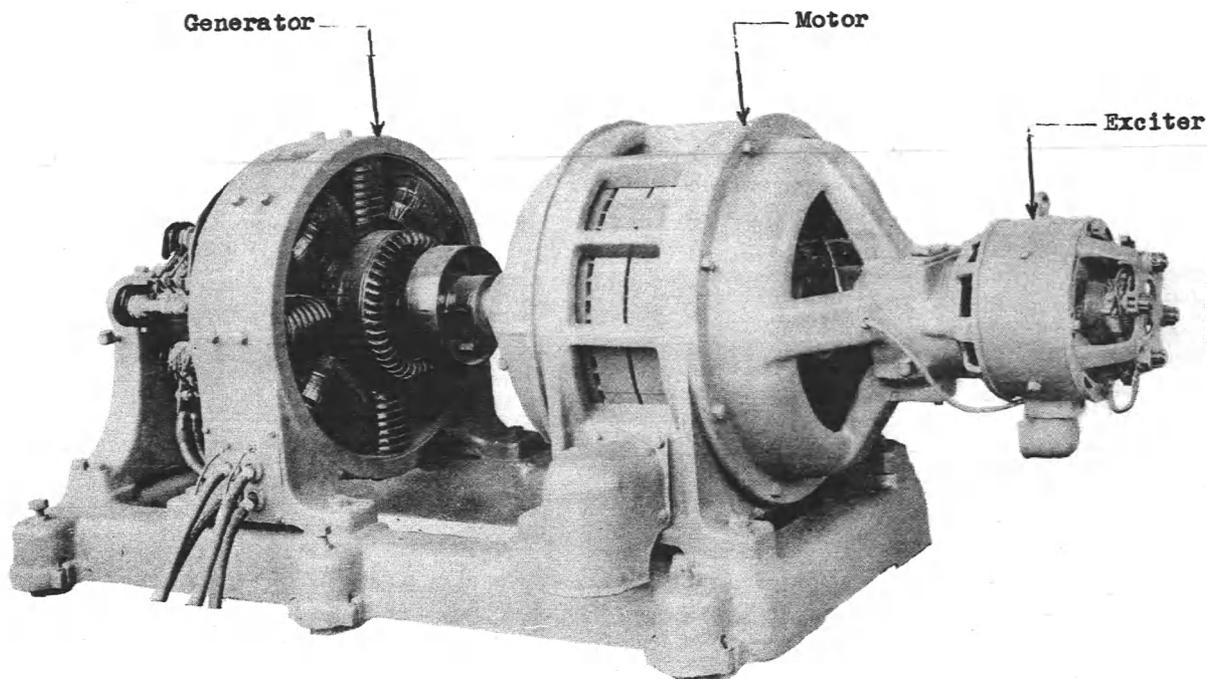


Fig. 1 - Motor-Generator Set - 50 HP Synchronous
Motor - 65 Volt 500 Amp. Gen.

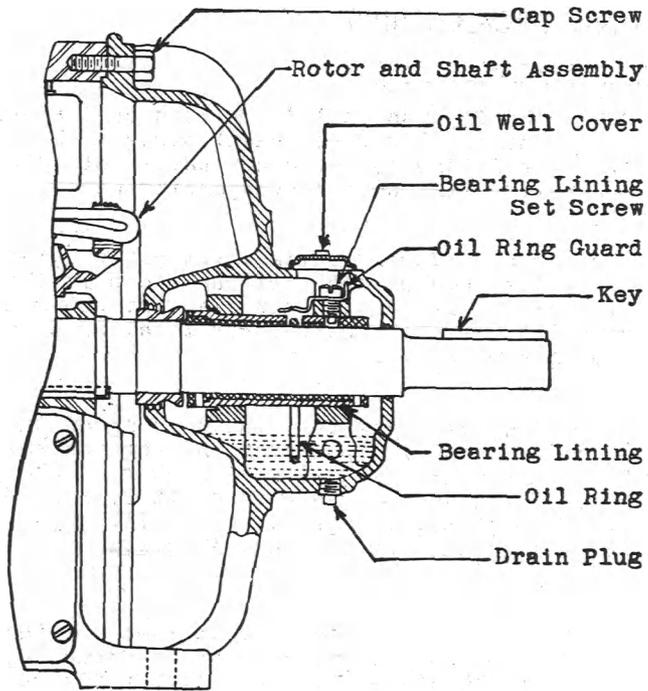


Fig. 2 - Bearing Assembly - Solid End Shield

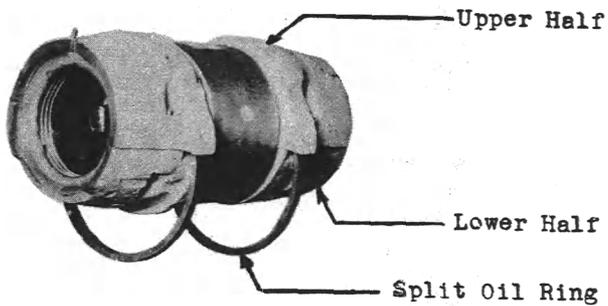


Fig. 3 - Bearing Lining Assembly - Split End Shield

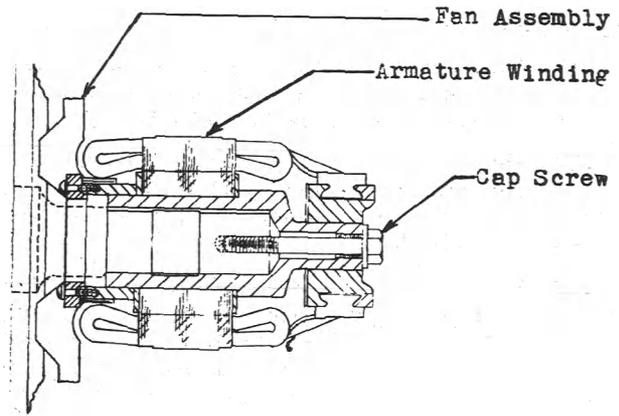


Fig. 4 - Exciter Armature Assembly

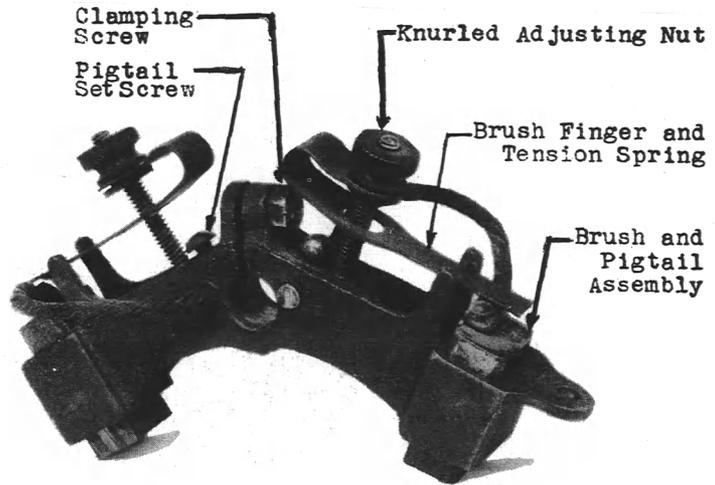


Fig. 5 - Brush Holder Assembly - Motor

3. REPLACEMENT PARTS**3.001 List of Tools and Materials****Tools**

Hammer, claw, 1 lb., A.T.& T. Std. Spec. 6258-N
 Hoist, chain, 1 ton, or equivalent
 Screw-driver, 5" (Regular) A.T.& T. Std. Dwg. 46-X-34
 Wrenches, double end or single end, flat, with the following openings: 1/2", 19/32", 11/16", 7/8", 1-1/16", 1-1/4", 1-7/16", 1-5/8"
 Wrench, Crescent, adjustable, double-end, flat, 8", maximum opening 15/16"

Material

Cheesecloth, A.T.& T. Std. Spec. 6350
 Lubricating Oil (One of the following)
 Western Electric KS-2245
 Texas Regal Oil B
 Standard Renown Engine Oil
 Gulf Security Grade A
 Sinclair Speed Engine and Dynamo Oil
 Squire's Brand Royal Dynamo Oil
 Vacuum Oil Company's "DTE" Light
 Measure, 1 qt. (funnel attached) or equivalent
 Pail, or equivalent receptacle for oil
 Sealing Compound, KS-6824

3.002 Remove the apparatus from service before making any replacements.

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

3.01 Oil Gauges

(1) Remove the plug at the bottom of the bearing housing and drain the oil into a pail or other receptacle for oil. Remove the gauge, and clean the threads in the bearing housing scraping off old sealing compound if necessary. Coat the threads on the new gauge and the threads in the casting with KS-6824 sealing compound and replace the gauge. Coat the drain plug and associated threads with sealing compound in a similar manner, replace and fill the bearing chamber with oil to the proper level.

(2) To replace a glass gauge, drain the oil as in (1). Unscrew the cap or holding ring at the top of the glass and lift out the old glass. The cork washer under the glass should then be removed and replaced with a new one, making certain that it rests on a clean, smooth surface. Care should be exercised in replacing a glass gauge as leaks may be caused by nicks around the lower edge of the glass. Screw the cap or ring down firmly enough to force the glass

into good contact with the cork washer but not enough to break the glass.

(3) After replacing the gauge, scrape the drain plug and associated threads in the bearing housing to remove old sealing compound. Coat the threads with KS-6824 sealing compound and replace the plug. Fill the oil chamber to the proper level with oil.

3.02 Bearing Lining (Oil Ring Type) in Split End Shield

(1) When the bearing to be replaced is located in a split end shield, the shaft of the driven member of three-bearing sets should be securely supported at the coupling end, the coupling bolts removed, the bolts holding the motor to its sub-base loosened, the motor dowels removed and the motor shifted sufficiently to free the coupling halves. In instances where it is impossible to remove the dowels, the motor should be pried up from the sub-base after loosening the holding bolts and the dowels driven out after removing the motor. Unscrew the drain plug in the bottom of the oil chamber and drain the oil into a pail or other receptacle.

(2) If the bearing to be replaced is located in the exciter end, it will be necessary to remove the exciter armature and frame as outlined below under the procedure to be followed for removing a bearing lining in a solid end shield. Drain the oil from the bearing chamber. Remove the upper half of the end shield, the upper half of the bearing and the split oil rings. Lift the motor shaft sufficiently to take its weight from the lower half of the bearing, and slide the lower half of the bearing around the shaft and remove.

(3) Insert the replacing bearing and re-assemble in the reverse order from that in which the bearing was dismantled. Make certain that the bearing lining is in its correct position, with the slot for the oil ring on top and with the shoulder of the liner seated against the projection in the bearing housing.

(4) Make certain that the dowels in the sub-base are replaced and all bolts and nuts are securely tightened when re-assembling the motor. The drain plug and associated threads should be scraped to remove old sealing compound, coated with KS-6824 sealing compound and the plug replaced. Fill the oil chamber to the proper level with oil.

3.03 Bearing Lining (Oil Ring Type) in Solid End Shield

(1) When the bearing to be replaced is located in a solid end shield, small

wooden wedges or fibre sheet should be inserted between the rotor and stator faces of the motor to support the rotor in position when the bearing end shield is removed.

(2) Unscrew the drain plug in the bottom of the oil chamber and drain the oil into a pail or other receptacle.

(3) If the bearing to be replaced is located on the coupling end, the motor should be taken to a shop where there are facilities for pulling the coupling half from the shaft and pressing it on after the bearing has been replaced. To remove a motor, the shaft of the driven member on three-bearing sets should be securely supported at the coupling end, the coupling bolts removed, and the bolts and dowels holding the motor to its sub-base taken out and the motor removed from the sub-base, making use of a chain hoist or block and tackle, if necessary. In instances where it is impossible to remove the dowels, the motor should be pried up from the sub-base after loosening the holding bolts, and the dowels driven out after removing the motor.

(4) When the bearing to be replaced is located at the exciter end of the motor, it will be necessary to remove the collector ring brushes and to take the exciter from the motor end shield before removing the bearing. To dismantle the exciter loosen the connections in the exciter as necessary, take the brushes from the brush holders and remove the combination brush yoke and end shield from the exciter frame. Unscrew the cap screw in the center of the shaft holding the exciter armature in place and screw a suitable bolt (threaded to the head of the bolt) into the tapped sleeve of the armature, thereby removing it from the shaft. This is a special bolt and may be ordered by giving the nameplate data of the particular exciter whose armature is to be removed. The exciter frame and motor end shield may then be removed. A chain hoist or block and tackle may be used to support the end shield if necessary.

(5) The oil well cover, the set screws holding the bearing in position in the bearing housing and the oil ring guard should be taken off and the oil ring lifted out of its groove. Remove the bearing by exerting a pressure against the bearing lining or by tapping the bearing. A wooden block should be used to protect the lining from the direct blow of the hammer. Care should be taken to do no damage to the oil ring while removing the bearing.

(6) Insert the replacing bearing and assemble the unit in the reverse order

from that in which the bearing was removed. Make certain that the bearing lining is in its correct position, with the slot for the oil ring on top and with the shoulder of the liner seated against the projection in the bearing housing.

(7) Make certain that the oil ring is replaced without being bent or damaged. When reassembling, make certain that all bolts, screws and dowels in the sub-base are securely tightened in order to prevent excessive noise and vibration. The drain plug and associated threads in the casting should be scraped to remove old sealing compound, and coated with KS-6824 sealing compound before replacing. After replacing the drain plug, fill the oil chamber to the proper level with oil.

3.04 Oil Rings

(1) To replace an oil ring on machines with split end shields it will only be necessary to remove the upper half of the end shield and open up the split ring.

(2) To replace an oil ring on machines with a solid end shield it will be necessary to completely remove the end shield and bearing lining as described above.

3.05 Rotor

(1) When it is desired to remove a rotor proceed with the removal of the end shield or bearing halves in a manner similar to that outlined above. In addition on sets having a split end shield, the lower half of the end shield should also be removed. In the case of some small motors, it may be possible to remove the rotor and the end shield on the coupling end as a unit without removing the coupling half. In these cases, the rotor and end shield should be supported in such a manner that the end shield will not place any extra strain on the shaft or bearing.

(2) Support the rotor by a rope sling looped over the ends of the shaft making use of the chain hoist or block and tackle if necessary. Remove the wedges or fibre sheet, if used, and work the rotor out of the frame, passing it through the stator until one end of the sling comes against the stator frame. Support the rotor on a wooden block and bring the end of the sling which is against the stator frame around to the same side of the frame as the other end of the sling and pass it around the rotor as close to the stator as possible. Take up the weight of the rotor and work it clear of the stator, taking care not to injure the rotor or stator windings. Insert the new rotor and replace, following the reverse procedure to that in which it was taken down.

3.06 Brush Springs

(1) To replace either an exciter or collector-ring brush spring, remove the knurled nut which adjusts the tension of the combination brush finger and tension spring. The spring can now be removed from the projecting stud and the new one inserted. Replace the knurled nut and adjust the tension. In making this replacement care should be taken to see that the brush finger moves without binding between the two guide posts provided for that purpose on the brush holder.

3.07 Brushes

(1) To replace either an exciter or collector ring brush, loosen the set screw which fastens the brush pigtail to the brush holder. Next lift the finger of the combination brush finger and tension spring so that it will clear the top of the brush holder finger guide posts and turn it on its supporting stud as an axis, sufficiently to permit the

removal of the brush. Insert the new brush with its pigtail and revolve the brush finger and tension spring back into position and connect the pigtail to the brush holder. After any replacement, brushes should be "sanded in" until the proper brush fit is obtained.

3.08 Brush Holders

(1) If necessary to replace an exciter or collector ring brush holder, remove the brush or brushes associated with that holder as outlined above and any connections necessary. Loosen the brush holder clamping screw which clamps the brush holder to the brush holder stud and work it off the stud. It may be necessary to remove an adjacent brush holder before the desired brush holder can be removed. If the brush holder binds on its stud place a screw-driver between the edges of the clamp as near to the clamping screw as possible and spread the clamp slightly. Replace with a new brush holder and reassemble in the reverse order.