

INDUCTION MOTORS TWO OR THREE PHASE 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 commercial type 2- and 3-phase induction motors which form parts of the following sets:

KS-5007	KS-5137-02
KS-5123	KS-5137-03
KS-5123-01	KS-5396
KS-5123-02	KS-5396-01
KS-5123-03	KS-5396-02
KS-5123-04	KS-5442
KS-5123-05	KS-5668
KS-5137	KS-5668-01
KS-5137-01	

It also covers approved procedures for replacing these parts.

1.02 This section is reissued to list additional machines, to add information pertaining to the use of petroleum spirits in power rooms, to add replacement procedures

for ball bearings, to add recommendations pertaining to the replacement of bearings, and rotors and in general bring the section up to date. Since this reissue covers a general revision, the arrows ordinarily used to indicate changes have been omitted. Detailed reasons for reissue will be found at the end of the section.

1.03 Part 2 of this section 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 replacement parts. This information is called Replacement 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.

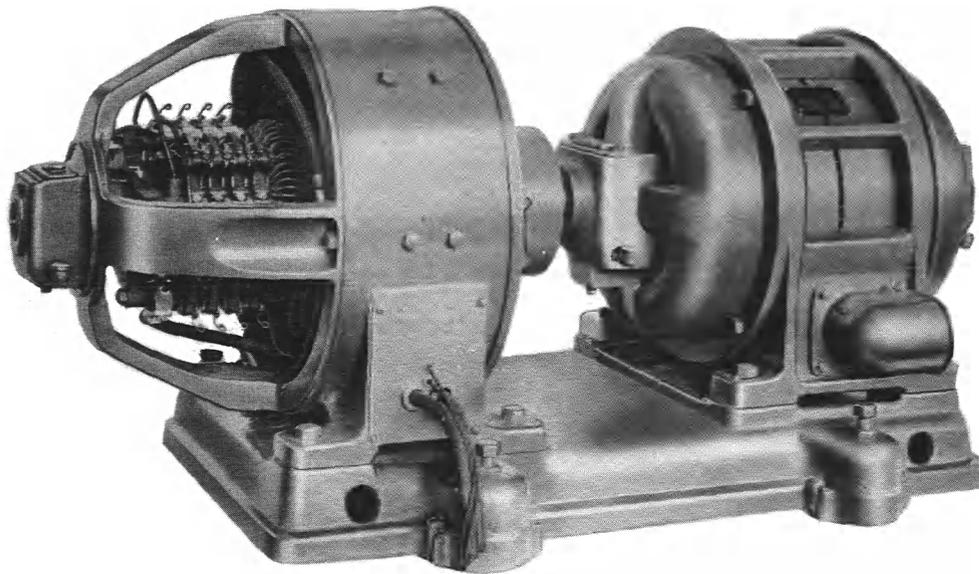


Fig. 1 - Motor-Generator Set - Oil-ring Type - 3-phase
Motor Driving 300 Amp - 65-volt Generator

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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, the end of the motor

for which the replacement part is required and the complete nameplate data of the machine, including the manufacturer's name, for example: (1) Oil ring for the bearing on the coupling end of the motor having the following nameplate data: General Electric Company Model No. 19E709, Type KT-512, Form 81, 3-phase, 60 cycles, 220 volts, 60 amperes, 1170 rpm, full load, 20 hp, KS-5123. Do not refer to the BSP number.

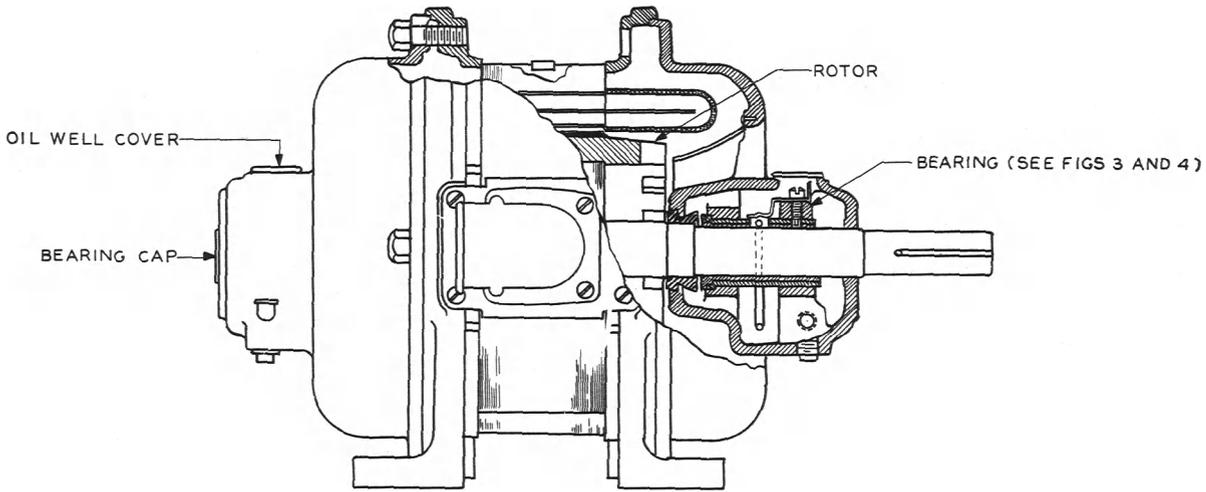


Fig. 2 - Sectional View of Typical Motor With Oil-ring Type Bearings

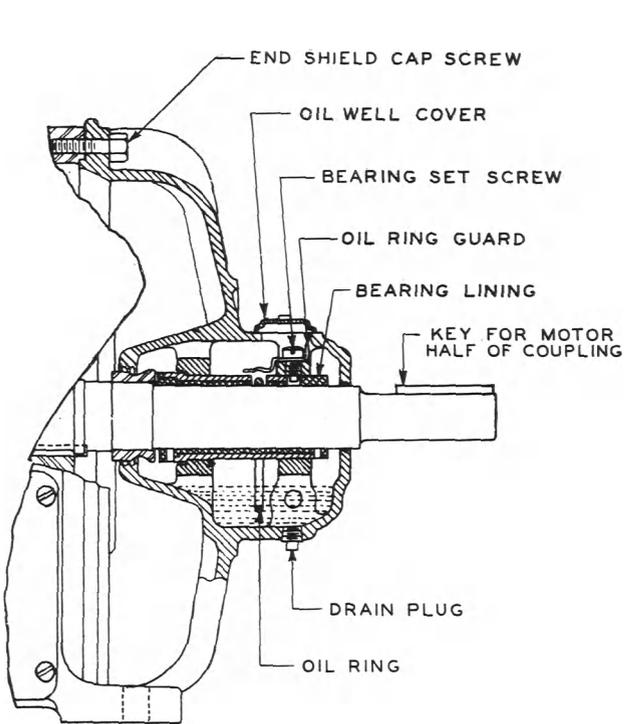
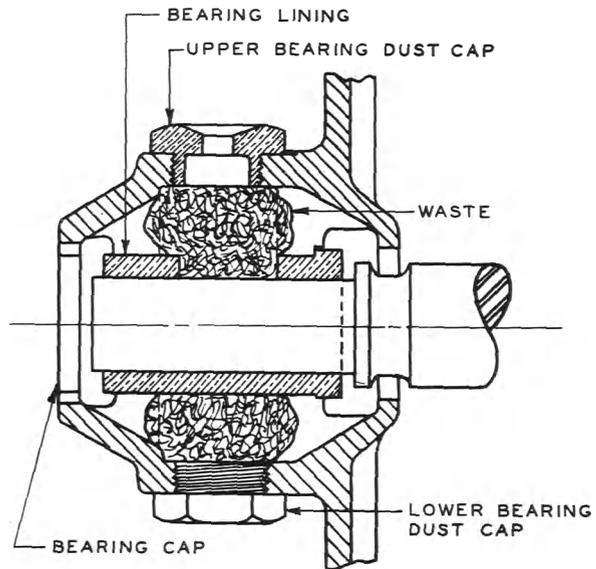


Fig. 3 - Oil-ring Type Bearing



Note: Waste for bearings consists of wool yarn which comes in hanks about 22 inches long. There is enough waste in one hank to pack several bearings.

Fig. 4 - Waste Packed Bearing

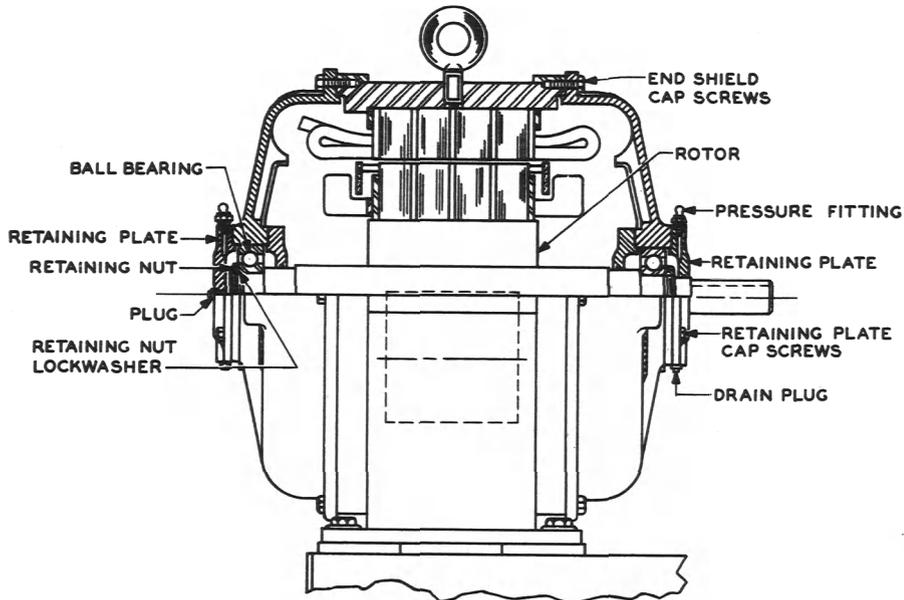


Fig. 5 - Sectional View of Typical Motor With Ball Bearings

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials
(Equivalents may be substituted)

<u>Code or Spec. No.</u>	<u>Description</u>
<u>Tools</u>	
246	1/2-inch, Hex. Open Single-end Wrench
247	1-1/4-inch, Hex. Open Single-end Wrench
346	Spanner Wrench
347	Spanner Wrench
R-1255	31/32 inch, 1-1/16 inches, Open Double-end Wrench
R-1289	1-5/8 inches, Open Single-end Flat Wrench
R-1496	1-ton Chain Hoist
R-2512	8-inch Adjustable Wrench
R-2593	7/8 inch, 1-1/16 inches Open Double-end Flat Wrench
-	13/32-inch, 19/32-inch, Open Double-end Flat Wrench, J. H. Williams Co., No. 24
-	11/16-inch, 25/32-inch, Open Double-end Flat Wrench, J. H. Williams Co., No. 29
-	1-7/16-inches, 1-13/16-inches, Open Double-end Flat Wrench, J. H. Williams Co., No. 42

<u>Code or Spec. No.</u>	<u>Description</u>
-	1 lb Ball Peen Hammer
-	5-inch, Regular Screwdriver (2 required)
-	Bearing Puller, Owatonna Tool Co., Grip-O-Matic No. 1001
<u>Materials</u>	
KS-6824	Sealing Compound
KS-14666	Cleaning Cloth
-	Oil, 220-260 S100
-	Oil, 130-190 S100
-	Petroleum Spirits
-	1-quart Measure (funnel attached)
-	Pail
-	Wool Yarn Waste
-	Grease, 260-300P
-	Wooden Block
-	Wooden Wedges
3.02	Remove the apparatus from service before making any replacements.
3.03	After making any replacement of parts, the motor shall be checked and, where necessary, readjusted to meet the requirements of Section 159-406-701.

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

3.05 When using petroleum spirits for cleaning purposes in the 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.

3.06 Oil Gauges

(1) Remove the plug at the bottom of the bearing housing and drain the oil into a pail or other receptacle. Remove the gauge, and clean the threads in the bearing housing with petroleum spirits (see 3.05). Coat the threads on the new gauge and the threads in the housing with KS-6824 sealing compound and replace the gauge. Coat the drain plug with sealing compound in a similar manner, replace the plug and fill the bearing chamber with 220-260 S100 oil to the proper level as described in Section 159-406-701.

(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, clean the drain plug and associated threads in the bearing housing, coat the threads with KS-6824 sealing compound and replace the plug. Fill the oil chamber to the proper level with oil as described in Section 159-406-701.

3.07 Bearings and Bearing Linings

(1) To replace any worn bearings, it will be necessary to dismantle the set, in which case the matter should be referred to the supervisor. It is recommended that the replacement of bearings and bearing linings, particularly in the larger sizes of motors, and particularly when located at the coupling end of the motor, be done by the supplier's local service shop or a similar organization. If the bearing to be replaced is located in the coupling end and the coupling half has a force fit on the shaft, it will require facilities for pulling the coupling half from the shaft, fit-

ting the new bearing lining, and pressing the coupling half on again when the bearing or lining has been replaced. However, procedures for replacing various types of bearings and linings follow. Procedures concerning removal and replacement of couplings are not given.

3.08 Bearing Lining (Oil-ring Type) in Split End Shield at Coupling End

(1) On 3-bearing sets, the shaft of the driven member should be securely supported at the coupling end. Remove the coupling bolts, loosen the bolts holding the motor to its subbase, remove the motor dowels as described below, and shift the motor sufficiently to free the coupling halves. When the dowels are equipped with nuts, they may be backed out by tightening the nut, placing spacers under the nut as required, until the dowel is free. In the case of dowels which are not equipped with nuts, the motor may be pried up from the subbase after loosening the holding bolts, and the dowels driven out. In driving out a dowel, care must be exercised to prevent breaking the motor foot in which the dowel is located.

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

(3) Remove the upper half of the end shield, the upper half of the bearing lining, and the split oil ring. Lift the motor shaft sufficiently to take its weight from the lower half of the bearing lining and slide the lower half of the bearing lining around the shaft and remove.

(4) Insert the replacing bearing lining and reassemble in the reverse order. 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 lining seated against the projection in the bearing housing.

(5) Make certain that the dowels in the subbase are replaced and all bolts and nuts are securely tightened when reassembling the motor to the subbase. The drain plug and associated threads should be cleaned, coated with KS-6824 sealing compound, and the plug replaced. Fill the oil chamber to the proper level with 220-260 S100 oil as described in Section 159-406-701.

3.09 Bearing Lining (Oil-ring Type) in Solid End Shield

(1) If the bearing to be replaced is located at the coupling end, the motor may have to be taken to a shop as referred to in 3.07. To remove a motor, the shaft of the driven member on 3-bearing sets should be securely supported at the coupling end and the motor removed as described in 3.08(1).

(2) Small wooden wedges or fiber 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.

(3) Unscrew the drain plug in the bottom of the oil chamber and drain the oil into a pail or other receptacle. Remove the cap screws holding the end shield to the motor frame and slide the end shield from the shaft. A chain hoist or block and tackle may be used to support the end shield if necessary.

(4) The oil-well cover, the setscrew 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 so as not to interfere with the removal of the bearing lining. Remove the bearing lining by exerting a pressure against it or by tapping it. 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.

(5) See that the oil ring is positioned in the end shield so as not to interfere with the insertion of the new bearing lining and to avoid damage to the oil ring. Insert the replacing bearing lining and reassemble in the reverse order. 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 lining seated against the projection in the bearing housing.

(6) Make certain that the oil ring is replaced in its groove without being bent or damaged. When reassembling the motor to the subbase, make certain that all dowels in the subbase are replaced and all bolts and nuts are securely tightened. The drain plug and associated threads in the casting should be cleaned and coated with KS-6824 sealing compound before replacing. After replacing the drain plug, fill the oil chamber to the proper level with 220-260 S100 oil as described in Section 159-406-701.

3.10 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 in 3.09.

3.11 Bearing Lining (Waste Packed Type)

(1) If the bearing to be replaced is located on the coupling end, the motor may have to be taken to a shop as referred to in 3.07.

To replace a bearing lining, remove either the bearing cap in the end shield or the coupling half, as required. Unscrew the bearing dust caps and take out the waste. Remove the nuts on the through bolts and dismantle the end shield. Remove the bearing lining by exerting a pressure on the lining or by driving. Pressure should be exerted from the outside of the end shield towards the inside and a wooden block should be used to protect the lining from the direct blow of the hammer. Insert the replacing bearing lining and reassemble in the reverse order. Make certain that the bearing lining is in its correct position with the slot at the top and the shoulder of the lining seated against the projection in the bearing housing.

(2) Insert the old waste or provide new waste. This may be done by inserting a wire through the lower bearing dust cap opening, directing it around the bearing lining and out through the upper bearing dust cap opening. Loop the bearing waste over this and draw the waste around the bearing lining and out through the bottom opening. Repeat by inserting the wire through the upper bearing dust cap opening and out through the bottom opening in such a manner that the bearing waste when again pulled through will form a complete loop around the bearing lining. Repeat this procedure until sufficient waste is wound around the bearing lining, making certain, however, that it is wound loosely. Clean the bearing dust cap threads, apply KS-6824 sealing compound to the lower dust cap threads, and replace the lower dust cap. Saturate the waste with 130-190 S100 oil as described in Section 159-406-701. Replace the upper dust cap.

3.12 Ball Bearings

(1) If the bearing to be replaced is located at the coupling end, the motor may have to be taken to a shop as referred to in 3.07. To remove the motor, the coupling guard, the coupling bolts, the bolts holding the motor to the subbase, and the dowels (if provided) should be removed.

(2) Where possible, support the rotor with wooden wedges inserted between the rotor and the stator faces so as to prevent injury to the windings when the end shield is removed. Supplementary support of the rotor, after the end shield has been removed, is desirable as there is a possibility of the supporting wedges becoming dislodged while the bearing is being removed.

(3) If the machine is equipped with bearing retaining plates, remove the screws which hold them in place. Remove the screws holding the end shield to the motor frame; and the end shield with the retaining plate can be pulled off the shaft leaving the ball bearing in position.

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(4) If the bearing is held on the shaft with a bearing retaining nut and lockwasher, wipe away surplus grease with a dry cleaning cloth and, using a screwdriver, carefully straighten the bent lip of the washer. Remove the bearing retaining nut with a suitable hexagonal flat end or spanner wrench depending upon the type of nut found to be in use. Remove the lockwasher and with a bearing puller, remove the old ball bearing. If the bearing is not held on the shaft with a bearing retaining nut, the bearing may be pulled after removal of the end shield.

(5) Slip the new ball bearing on the shaft. Using a short piece of clean pipe having a smooth end which will push against the inner but not the outer race, tap the bearing gently into place against the shoulder of the shaft. In performing this operation, care should be taken not to injure the surface of the race while forcing it on the shaft. Lubricate the bearing with grease, 260-300P, as described in Section 159-406-701, and reassemble the remaining parts in the reverse order of their removal. Fasten all bolts, screws, and dowels securely.

3.13 Rotor

(1) To replace a rotor, it will be necessary to dismantle the set, in which case the matter should be referred to the supervisor. It is recommended that the replacement of a rotor be done by the supplier's local service shop or a similar organization inasmuch as the removal and replacement of the coupling half would be involved as outlined in 3.07. However, a procedure for replacing a rotor is given below. Procedures concerning removal and replacement of couplings are not given.

(2) 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 for the replacement of those parts. In addition, on sets having a split end shield, the lower half of the end shield should also be removed.

(3) 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 fiber 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 either the rotor or stator windings. Insert the new rotor and reassemble the set, following the reverse procedure to that in which it was taken down.

REASONS FOR REISSUE

1. To add the following machines (1.01)

KS-5123-03	KS-5396-01
KS-5123-04	KS-5396-02
KS-5123-05	KS-5442
KS-5137-03	KS-5668
KS-5396	KS-5668-01
2. To revise ordering information (2.02).
3. To revise the list of tools and materials (3.01).
4. To add 1.04, 3.02, 3.03, 3.04, and 3.05.
5. To add a recommendation that bearings and rotors be replaced by supplier's local service shop or similar organization (3.07), (3.09), (3.10), (3.12), (3.13).
6. To revise text in 1.03, 3.08, and 3.09.
7. To add a procedure for replacing ball bearings (3.12).
8. To add a figure of a motor with ball bearings (Fig. 5) and revise Fig. 1 and 2.