INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

WOUND-ROTOR *Life-Line* MOTORS

DRIP-PROOF, SPLASH-PROOF TYPE CWP

Frames 580 Through 683 **Sleeve and Ball Bearings**

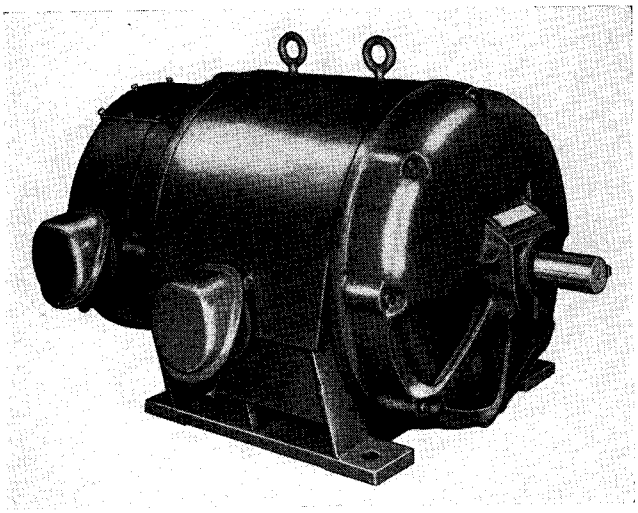


FIG. 1. Open Drip-Proof Sleeve Bearings Type CWP Life-Line Wound-Rotor Motor (Frames 580-683)

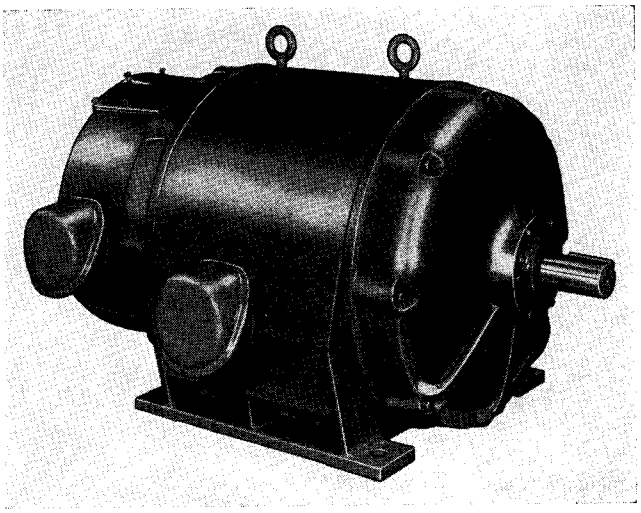


FIG. 2. Open Drip-Proof Ball Bearing Type CWP Life-Line Wound-Rotor Motor (Frames 580-683)

LIFE-LINE Type CWP Motors in NEMA frame sizes of the 580 and 680 series are wound-rotor induction motors designed for a wide variety of constant speed, variable speed, or high inertia acceleration applications. Wound rotor motors are often used where high starting torque with low starting current is a requirement. For detailed application data request "Application Data 3200, Pages 61 to 64" from nearest Westinghouse Sales Office.

The stator core is encased in a specially designed ventilated splash proof steel frame. Cast drip-proof end brackets protect the windings from falling chips and dripping liquids. Sheet metal covers may be removed to expose large openings in the front bracket for access to the brushes and slip rings (Fig. 4). A cast splash-proof rear bracket and a splash guard for the front bracket can be supplied when ordered to give full protection against dripping and splashing liquids.

Warranty. The Corporation in connection with apparatus sold agrees to correct any defect or defects in workmanship or material which may develop under proper or normal use during the period of one year from the date of shipment, by repair or by replacement F.O.B. factory of the defective part or parts, and such correction shall constitute a fulfillment of all the Corporations' liabilities in respect to said apparatus, unless otherwise stated in the quotation.

Any defects that may develop should be referred to the nearest Westinghouse Sales Office for complete servicing information.

RECEIVING

Unpack the motor and make certain that it was not damaged during shipment. Check to see that the nameplate data agrees with the voltage and frequency of the power supply provided for the motor. Check the secondary voltage on nameplate with control provided and service expected. Motors with secondary voltage above 350 volts should not be used for reversing service.

The shaft extension may be coated with a slushing compound to prevent rusting during shipment and storage. This slushing compound may be removed

by wiping with turpentine or a petroleum solvent, such as benzine, gasoline, Stoddard solvent, etc. See precautions under "Maintenance" for use of these solvents.

INSTALLATION

Mounting. Locate the motor in a place that is clean, dry and well ventilated. For exceedingly dirty applications forced ventilated or fan cooled enclosures are available for most ratings. The external air temperature should not exceed 40°C or 104°F. If protecting shields or guards are used, they must not obstruct the free flow of air around the motor.

Fasten to a rigid foundation using bolts or screws of the largest size permitted by the drilling in the mounting feet. The motor must rest evenly on all mounting pads. When slide rails are used for belted or chain drive service motor should be securely bolted to the traveling member of the slide rails.

For wall or ceiling mounting of "Ball Bearing Motors" the brackets must be turned 90° or 180° to keep surplus grease sump below shaft. For wall or ceiling horizontal mounting of "Sleeve Bearing Motors" the brackets must be turned 90° or 180° to keep oil reservoir below shaft.

CONDUIT BOX LOCATION

If the primary conduit box is desired on the opposite side of the motor, remove the brackets and rotor, reverse the frame and reassemble.

If the secondary conduit box is desired on the opposite side of the motor, remove box and adapter and secondary leads and protective cover from opposite lead hole. Reassemble with box and secondary leads on desired side.

The conduit boxes may be rotated 90° or 180° for use with horizontal conduit or conduit from above.

When the motor is mounted on a bedplate, or slide rails for belt adjustment, flexible metallic conduit should be used to protect the leads to the motor. In making this connection squeeze connectors should be used for attaching the flexible conduits to the conduit boxes. Squeeze connectors may be straight, 45° or 90°.

METHOD OF DRIVE

Motors having the suffix "-S" following the frame number are suitable for direct coupled service only. Motors having the suffix "-C" or "-D" are suitable for the following drives if they are included in the following tables which are based on NEMA recommendations.

Note: *Coupling halves, pulleys, pinions or sprockets should have a close sliding fit on the shaft extension and must be securely keyed and locked to avoid hammering out in operation. If it is necessary to drive the part into position, it is important that the end of the shaft opposite the extension be backed up so that the force of the blow is not taken in the bearing. Use a puller for removing tight couplings, pulleys, pinions or sprockets.*

1. Direct Coupled Drive. The motor shaft and driven shaft must be carefully aligned. Dowel the motor and driven unit to the base.

2. Belt Drive. Mount the motor on slide rails or a bedplate which allows for adjusting the belt tension. Mount the motor pulley close to the bearing housing, allowing sufficient clearance for rotor end play. Align the pulleys so that the belt runs true, and tighten the belt just enough to prevent slippage. Use a belt wide enough to carry the load without excessive tension. Starting with a new belt the slide rails should be fastened to the base so that the motor is moved towards the driven machine as far as the slots in the rails permit so that the full travel of the slide rails will be available for tightening the belt.

Table No. 1
FLAT BELT DRIVE

FULL LOAD RPM OF MOTOR		MAX. HP. RATING
Above	Including	
900	1200	75
750	900	125
720	750	150
560	720	200

Table No. 2
V-BELT DRIVE

FULL LOAD RPM OF MOTOR		MAX. HP. RATING
Above	Including	
900	1200	125
750	900	200
720	750	250
560	720	300

3. Gear Drive. Mount the motor and driven unit so as to maintain accurate alignment. The gears must mesh accurately to prevent vibration. Mount the motor pinion close to the bearing housing to minimize the overhang allowing sufficient clearance for rotor end play. Dowel the motor to the base.

Table No. 3
GEAR DRIVE

FULL LOAD RPM OF MOTOR		MAX. HP. RATING
Above	Including	
750	900	50
560	750	75

4. Chain Drive. Mount the motor on slide rails or a bedplate which allows for adjusting the chain tension. Mount the motor sprocket close to the bearing housing, allowing sufficient clearance for rotor end play. Align sprockets accurately so chain will run true.

Table No. 4
CHAIN DRIVE

FULL LOAD RPM OF MOTOR		MAX. HP. RATING
Above	Including	
900	1200	125
750	900	200
720	750	250

ELECTRICAL CONNECTIONS

Be sure that the nameplate data matches the power supply available in voltage, frequency and number of phases. Check the secondary voltage on nameplate with control and with service expected. Motors with secondary voltage above 350 volts should not be connected to a reversing controller.

Connect primary (stator) leads to the power supply through a suitable switch and overload protection. Connect secondary (rotor) leads to controller.

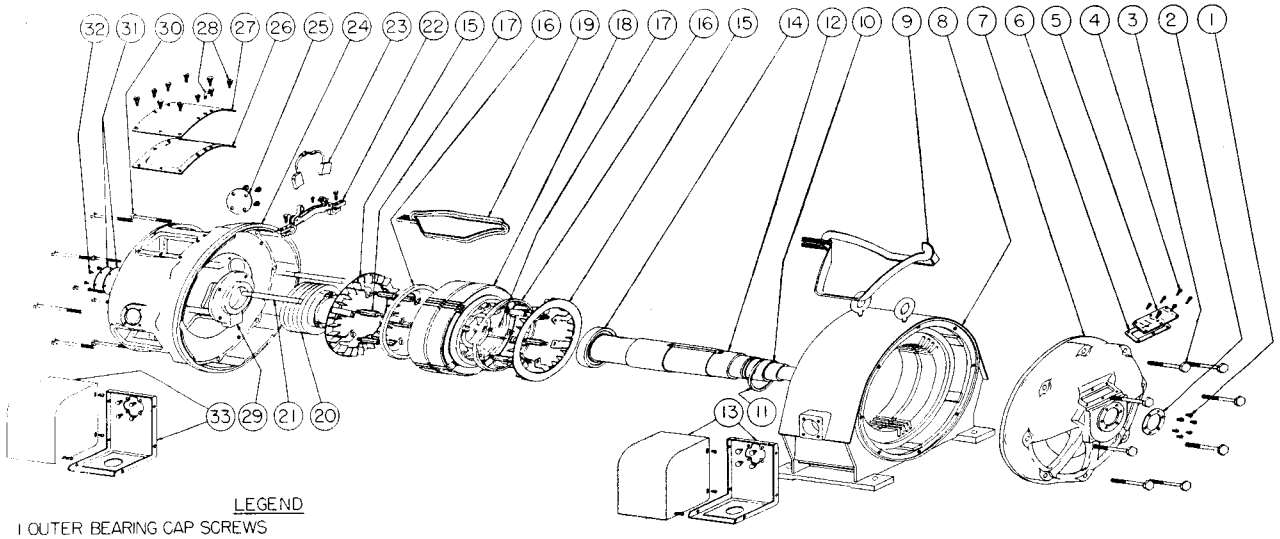
CAUTION: ***Never start a wound rotor motor without secondary resistance in the circuit or brushes and collector rings will be burned and pitted.***

Install all wiring and fusing in accordance with the National Electric Code and local requirements.

To change direction of rotation of three phase motors, interchange any two primary line leads.

To change direction on two phase 4-wire motors, interchange the primary line leads of either phase.

To change the direction of two phase 3-wire



LEGEND

1 OUTER BEARING CAP SCREWS
2 OUTER BEARING CAP
3 REAR BRACKET BOLTS
4 OIL SIGHT SLOT COVER SCREWS
5 OIL SIGHT SLOT COVER
6 OIL SIGHT SLOT COVER GASKET
7 SLEEVE BEARING BRACKET (REAR END)
8 FRAME & STATOR CORE ASSEMBLY
9 STATOR COILS
10 SLEEVE BEARING
11 OIL RING
12 SHAFT
13 CONDUIT BOX & COVER (PRIMARY)
14 BALL BEARING
15 BLOWER (FR & REAR)
16 ROTOR COIL SUPPORT (FR & REAR)
17 BLOWER STUDS (FR & REAR)
18 ROTOR
19 ROTOR COILS
20 COLLECTOR
21 BRUSH HOLDER RODS
22 BRUSH HOLDER
23 BRUSHES
24 BALL BEARING BRACKET (FR END)
25 SECONDARY LEAD HOLE COVER
26 FR BRACKET COVER GASKET
27 FRONT BRACKET COVER
28 COVER HINGE & THUMB SCREWS
29 INNER BALL BEARING CAP
30 FRONT BRACKET BOLTS
31 OUTER BEARING CAP & GASKET
32 OUTER BEARING CAP SCREWS
33 SECONDARY CONDUIT BOX & COVER

NOTE -
ARRANGEMENT OF PARTS SHOWS TYPICAL BALL BEARING PARTS ON FRONT END AND TYPICAL SLEEVE BEARING PARTS ON REAR END. FOR BEARING PARTS ALWAYS DESIGNATE END TO BE USED ON, TYPE OF BEARING, AND FRAME WITH LETTER SUFFIX. DRIVE END IS CONSIDERED REAR END.

FIG. 3. Arrangement of Parts—Drip-Proof Type CWP Motor (Frames 580-683)

Table No. 5—DIMENSIONS

Approximate Dimensions in Inches. Do Not Use For Construction Purposes.

FRAME NO.	HEIGHT (Without Eyebolts)	WIDTH (Without Conduit Boxes)	LENGTH (Without Shaft Extension)	CENTERLINE OF SHAFT TO BASE	WEIGHT IN LBS. APPROX.
580	28⅞″	32¼″	48⅜″	14½″	2600
581	28⅞″	32¼″	52⅜″	14½″	2900
582	28⅞″	32¼″	56⅜″	14½″	3200
583	28⅞″	32¼″	60⅜″	14½″	3500
680	34 1/16″	38⅛″	56¼″	17″	3550
681	34 1/16″	38⅛″	60¼″	17″	4000
682	34 1/16″	38⅛″	64¼″	17″	4400
683	34 1/16″	38⅛″	70¼″	17″	4950

motors, interchange the two outside primary line leads.

Note: Two phase CWP motors are supplied with three phase secondary (rotor) windings.

OPERATION

Run the motor without load to check the connections and direction of rotation. Check sequence of secondary controller contactors.

The motor will operate satisfactorily with a 10% variation in voltage, a 5% variation in frequency, or a combined variation of 10%, but not necessarily in accordance with the standards of performance established for operation at normal rating. To stop motor refer to instructions furnished with starter and secondary controller. Starter should be interlocked with secondary controller to prevent starting motor without resistors in secondary circuit.

Before starting sleeve bearing motors see instructions on page (7) under Maintenance of Sleeve Bearings.

MOTOR MAINTENANCE

Although Life-Line wound rotor motors require a minimum of attention in service they should be inspected at regular intervals to guard against damage resulting from excessive (1) dirt, (2) moisture, (3) friction, (4) vibration, (5) brush wear, (6) slip ring wear; which are contributing causes of 90% of all motor failures.

1. Guard Against Dirt. Keep the insulation and mechanical parts of the motor clean. Wipe top of the access cover before removing to check brushes and slip rings. Normal brush and slip ring wear will produce a conducting dust that should be removed at regular intervals to prevent accumulation in the windings. Dust that is free of oil or grease may be removed by wiping with a clean dry cloth or preferably by suction. Blowing with compressed air is not recommended as this may drive the dust into the windings.

When grease or oil is present wipe with a cloth moistened (but not dripping) with a petroleum solvent of a "safety type" such as Stoddard solvent or similar material available under various trade names. When an accumulation of dirt is difficult to remove, carbon tetrachloride is more effective than petroleum solvents. (Wear neoprene gloves to prevent skin irritation when using either petroleum solvents or carbon tetrachloride.)

Petroleum solvents are flammable and comparatively non-toxic.

Carbon tetrachloride is non-flammable, but is highly toxic. Suitable ventilation should be provided to avoid breathing the vapor. When ventilation is not sufficient to prevent a distinct odor of carbon tetrachloride, a chemical cartridge respirator or gas mask must be used.

2. Guard Against Moisture. Drip-proof motors should always be guarded against the accidental intrusion of water from splatter or splashing. Stand by motors should be run at least once a week to guard against moisture condensation. Where motors are subject to extreme moist conditions or to alternate heat and cold when not in operation, a means of keeping the internal temperature above that of the surrounding air should be used (space heaters or circulating current in winding). Before starting motors which have been subjected to moisture, the insulation resistance should be checked by using a 500 volt megger. If resistance is below 2 megohms, dry the winding in an oven or with circulated warm air or by applying a current through the winding by using low voltage applied to the wind-

ing terminals. This current must be controlled and should never exceed nameplate rated values. Continue drying until resistance rises to above 2 megohms.

3. Guard Against Friction. Excessive friction and overheating of bearings is usually traced to one of the following causes:

a. Excessive belt tension.

b. Poor alignment causing excessive vibration or binding.

c. Bent shaft.

d. Excessive end or side thrust due to gearing, flexible couplings, etc.

e. Lack of oil in sleeve bearings.

f. Lack of or too much grease in ball bearings.

4. Guard Against Vibration. To avoid failures due to vibration, a few simple checks should be made regularly.

Check for misalignment such as may be caused by foundation settling or heavy floor loading. These may be causing vibration through misalignment.

Check to see if vibration from the driven machine or another nearby machine is being transmitted to the motor.

Check for excessive belt or chain tension or the push-apart effect inherent in spur gears.

Check the motor mounting bolts and bracket bolts to be sure they are tight.

5. Guard Against Excessive Brush Wear. Excessive brush wear may result from brushes too tight in holders. A free sliding fit should be maintained between brushes and brush holders by cleaning both when necessary.

Brushes should make good contact with the slip rings along the whole face of the brush. If necessary grind by attaching a strip of sandpaper to the slip rings with gummed tape on one end and turn the motor over slowly by hand. Use care to remove dust from motor. Maintain the brush spring tension at the correct value. A correct pressure per square inch is between 2 and 3 pounds for carbon or graphite brushes and between 3 and 5 pounds for metallic brushes, the lower pressure being favored in each case if a good brush to slip ring contact is obtained. Each brush should bear equal pressure.

NEVER LUBRICATE BRUSHES OR SLIP RINGS. Use the correct grade and size of brush which may be obtained by contacting the nearest Westinghouse Sales Office.

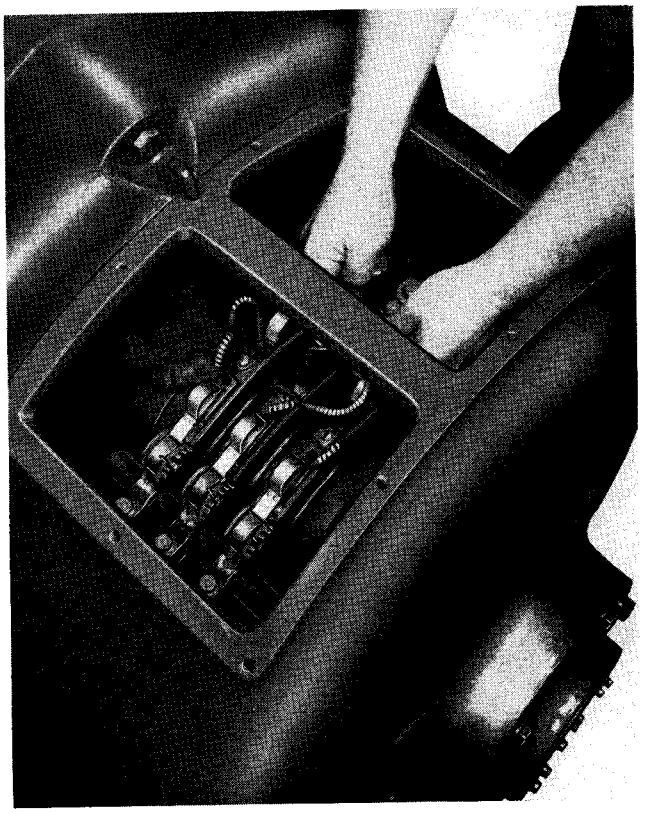


FIG. 4. View of Brushes and Slip Rings

6. Guard Against Groved, Rough, or Eccentric Slip Rings. Slip rings should be maintained smooth and true but not necessarily at a bright metallic color (brown oxide color indicates good brush and slip ring life). Grind or turn slip rings if necessary to restore a smooth and true surface.

If slip rings become pitted or burned check for improper functioning of secondary control or for open in motor rotor circuit.

STATOR AND ROTOR WINDINGS

Do not allow dirt to accumulate on rotor or stator windings. Revarnishing of the windings when motors are overhauled will lengthen their life.

CAUTION: *Do not apply varnish without first removing dirt from the windings. Suitable varnish may be obtained from the nearest Westinghouse Sales Office.*

GREASE LUBRICATED BALL BEARINGS

Inspection. When the motor is installed make certain that the rotor turns easily, particularly if the motor is not installed until some months after being shipped. External inspection should be made after motor is placed in operation to determine whether

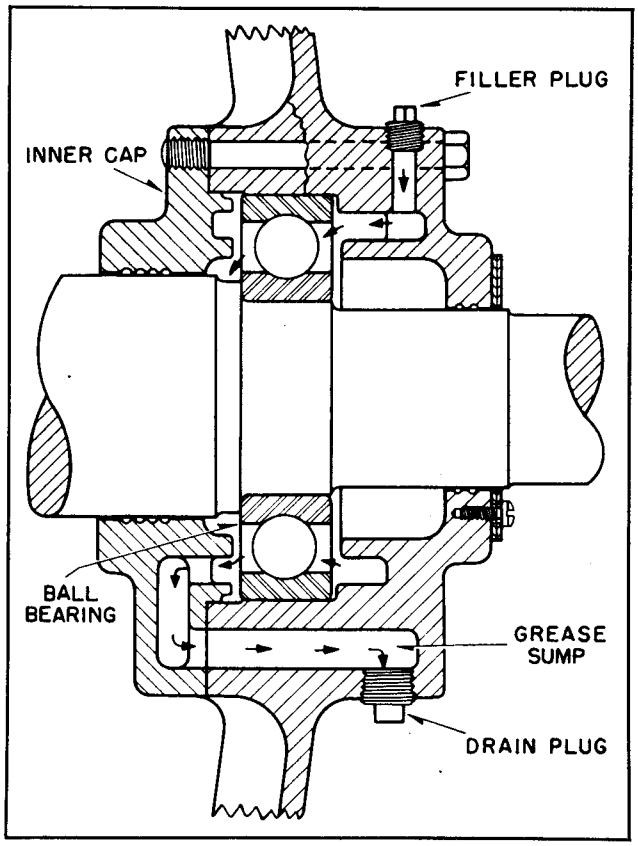


FIG. 5. Typical Ball Bearing

the bearings are operating quietly and without undue heating. Further inspection will not be necessary except at infrequent intervals, probably only at greasing periods.

Regreasing. Too much grease will cause churning action within the grease resulting in overheating and grease leakage. If grease leakage occurs the bearing has either been over-greased or the grease used was not suitable for the bearing or the service conditions.

If high-pressure grease guns are used for greasing, great care must be used to avoid over greasing. The plug in the over-flow sump must be removed during greasing and should be left out for a short time after to allow the bearing to clear itself of excess grease.

When shipped from the factory grease lubricated ball bearing motors have sufficient quantity of the proper grade to last for a limited period. However, a charge of Westinghouse grease should be added soon after the motor is placed in operation and at suitable intervals as determined by experience. As a guide it is suggested that 4 ounces of grease per bearing be added every 2000 hours of operation. If experience indicates that this quantity results in a surplus of grease in the bearings, the quantity should be reduced. Remove the drain plug of the over-flow sump at all times when greasing to allow the excess grease to be cleared from the bearing.

There is a certain capacity built into the grease sump so no grease may run out of the drain hole during the first few greasings.

WESTINGHOUSE GREASE—Ordering Data

8 oz. tube	Style No. 1360 876
1 lb. can	Style No. 1248 911
5 lb. can	Style No. 1248 912
10 lb. can	Style No. 1248 913
25 lb. can	Style No. 1360 877

For grease packed in larger containers please refer to the nearest Westinghouse Sales Office.

Lubricating System. Fig. (5) is a cross-section view of a typical grease lubricated ball bearing assembly. New grease is added at the top of the bearing fartherest from the body of the motor. A sufficient charge of new grease will force the old grease through the rolling members and out a partially restricted escape port during operation.

Excess grease is removed from the sump through drain plug openings. See Fig. 5. Periodic greasing and cleaning of the surplus grease sump will prevent damage to the bearings from deteriorated grease and will reduce the need for frequent bearing overhaul.

It is desirable for the most satisfactory service, to open the bearing housing once a year, or after every 5000 hours of operation, to check the condition of the housings and grease. If difficult to inspect the drive end bearing, the condition of the opposite end will usually be representative of the condition of both bearings. If grease deterioration has occurred or if grease is dirty, the bearing and housing parts should be thoroughly cleaned and new grease added. Clean with carbon tetrachloride (avoid allowing this liquid to remain on adjacent motor windings). In some cases it may be necessary to remove the bearing from the shaft in order to properly clean the bearing.

For disassembly of the bearing housing see notes under Removal of Brackets and Removal of Bearings.

DISASSEMBLY OF BALL BEARING MOTORS

Cleanliness. Since ball and roller bearings are sensitive to small amounts of dirt, they must be protected from the entrance of dirt at all times. When necessary to disassemble the bearing housing, first thoroughly remove all dirt from the adjacent parts,

so no dirt can fall into the bearing or the bearing housing parts.

Removal of End Brackets. To remove the end brackets, first remove the bolts that hold the inner bearing caps to the bearing housing on both ends. Remove the bolts holding brackets to frame and bump the bracket at the indentations provided for this purpose at the ends of the frame. With one bracket and the bolts from the opposite bearing cap removed the rotor may be removed from the frame. This method may be used to clean drive end bearing without removing coupling, pulley, pinion or sprocket.

Removal of Bearings. The bearings can be removed from the shaft by using a wheel puller or similar device. The inner cap should be slid along the shaft away from the bearing so that the puller can be used against the inner race of the bearing. If the bearing is pulled by pressure against the outer race it will be ruined.

Replacement of Bearings. To replace a bearing on the shaft, be sure that the bearing seat is free of dirt, scale, nicks or burrs. Heat the bearing in an oven or clean oil bath for ½ hour at a temperature of approximately 190°F but not to exceed 212°F at any time. Slip the hot bearing on the shaft and hold in place until bearing has cooled appreciably. Do not tighten locknuts or assemble in bracket until bearing has cooled to room temperature. Be sure to grease bearing before running machine.

Mounting or Removing Couplings, Pulleys, etc. In mounting or removing pulleys, couplings, etc., the bearings must not be subjected to axial pressure, and in no case to hammer blows. Any pressure will distort a sleeve bearing or brinell a ball bearing, and therefore this pressure must be taken by supporting the opposite end of the shaft against a stop.

SLEEVE BEARINGS

Lubrication. Before starting the motor, fill both oil reservoirs through the combination overflow gauge and filling device with best quality clean dynamo oil. (See Fig. 6). The oil used should have a viscosity of from 180 to 220 SSU equivalent to SAE #10. No oil should be poured in the top of the brackets through the oil ring slot cover of the bracket.

No oil need be added till the oil drops below the full level, which is 1/8 inch below the top of the overflow gauge. Do not flood the bearings. After oiling, close the cover of the overflow gauge.

If any oil is accidentally spilled on the bracket, it should be wiped off with a rag or waste. This prevents dirt from collecting on the surface of the motor. It also eliminates any possibility of oil getting into the windings which in time may mean an expensive repair job.

The construction of the Sealed Sleeve Bearing is such as to require no "flushing out". As any

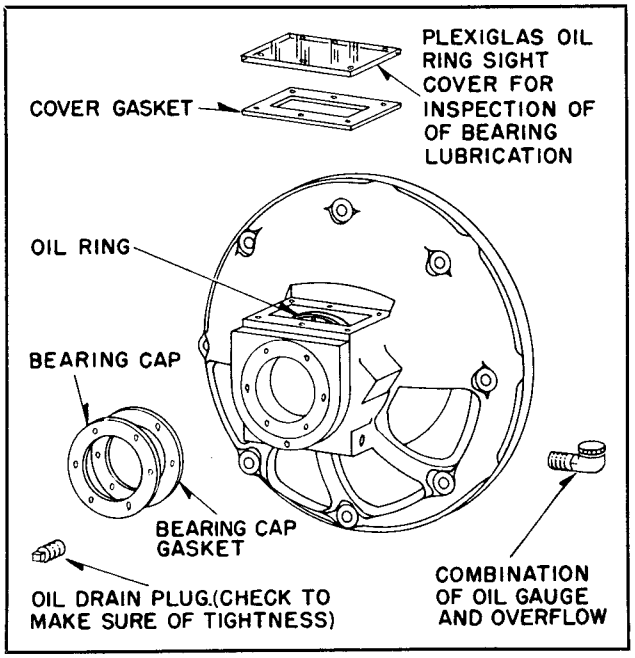


FIG. 6. Detail of Sleeve Bearing Bracket

accumulated dirt will settle into the sump well below the oil picked up by the oil ring. It is wise, however, to remove this accumulation. At intervals of about

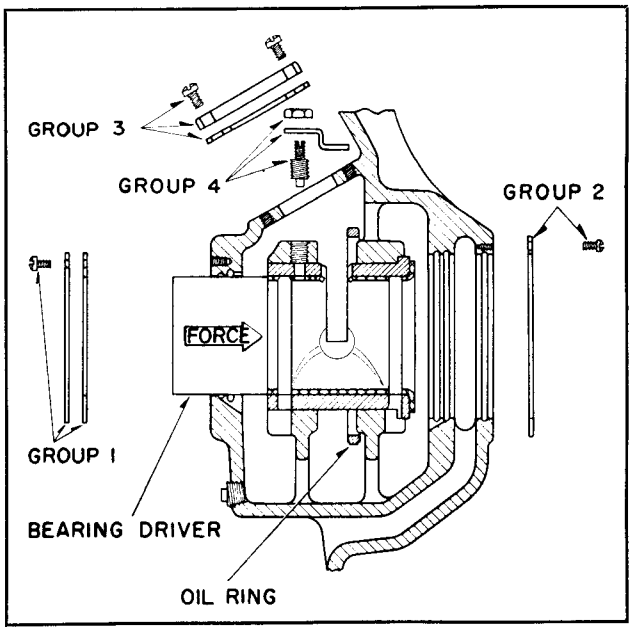


FIG. 7. Detail of Solid Sleeve Bearing

two years in average service, or during general overhaul periods, remove the bracket and thoroughly wash out the bearing housings, using hot kerosene oil and compressed air if available.

Removing Solid Sleeve Bearings. If it becomes necessary to remove sleeve bearings, proceed as follows:

1. Drain oil by removing drain plugs from bearing housing. See Fig. 6.

2. Remove oil ring inspection cover. (Group 3 of Fig. 7).

3. Remove bolts holding the bracket to the frame and force the bracket loose by striking it with a soft mallet or other soft material in a direction parallel to the shaft. Pull bracket off the shaft.

4. Remove bearing locking screw and oil ring keeper. (Item 4 of Fig. 3).

5. Remove outer and inner bearing caps. (Group 1 and 2 of Fig. 7).

6. Turn bracket 180° so that oil ring will drop through oil ring slot in the bearing. Position or hold with a piece of wire the oil ring away from bearing so that bearing can be removed without damage to oil ring.

7. Tap the bearing out toward the inside by placing a bearing driver or rod against bearing shoulder. (See Fig. 7).

8. To replace, reverse the above procedure, except take care to keep the oil ring clear of the bearing as before and preferably assemble the bracket on the shaft upside down so that the oil ring will not be caught and damaged between the end of the shaft and the side of the oil ring slot in the housing. Before bolting the bracket in place, it must be revolved on the shaft to the correct position. After bolting in place check to see that the oil ring revolves with the shaft.

Removing Split Sleeve Bearings. If it becomes necessary to remove split sleeve bearing proceed as follows:

1. Remove four 1/4" air shield bolts on upper half of bracket only. Do not disturb position of solid air shield bolts in lower half of bracket unless bottom half of bracket is also to be removed.

2. Remove three bolts holding upper half of bracket to frame.

3. Remove four bolts holding bracket halves together at split.

4. Remove two dowel bolts mounted through bracket halves by tightening up nuts.

5. Break sealing compound between bracket halves by bumping along split and frame fit with a copper or brass mallet.

6. Slide upper half of bracket axially from frame to clear bracket fit.

7. Lift off upper half of bracket. Use bracket bolts in bracket holes for lifting lugs.

8. Lift off upper half of sleeve bearing from lower half. Bearing halves are held together by four dowel pins and slight pressure straight up will remove upper half. It may be necessary to use chisel at split to break sealing compound.

9. To remove lower half of bearing rotate bearing 180° around shaft and lift out. To rotate bearing apply a series of light bumps on outer edge of bearing shoulder with soft material rod and light hammer.

10. To replace reverse above procedure except be sure all old sealing compound is removed from both halves of parts. To remove sealing compound first scrape then use a coal tar solvent such as Xylol or Toluol. Do not apply new sealing compound to bearings or bracket halves until ready to join both halves as compound sets up quickly. When joining brackets be sure to connect first with dowel bolts.

11. To reseal splits use Westinghouse Red Enamel # B-6-614.

RENEWAL PARTS

Renewal Parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to name the part or parts required (see Fig. 3) and give the complete nameplate reading on the motor for positive identification.

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