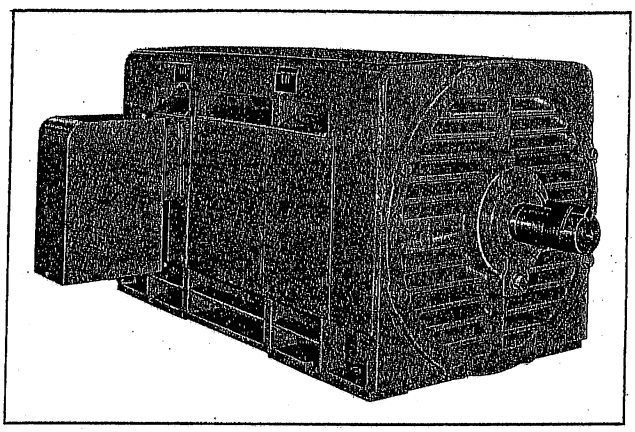
Instructions for Large AC Motors — Life-Line®D Horizontal Induction Motor; Frames 5000, 5800, 6800 Dripproof; Weather Protected Type I Sleeve or Rolling Bearings

I.L. 3130-D1



DESCRIPTION

Westinghouse Life-Line D squirrel cage induction motors are designed and constructed for a wide variety of constant speed applications, in general use where operating conditions are not extreme. These motors are designed with a self-ventilating system, with air entrances provided in the louvered brackets at each end of the motor. The air passes around air shields to the rotor fans, which force part of the air across the stator winding ends. The remainder of the air enters ventilation openings in the rotor core, and passes radially outwards through the rotor ducts, and then exhausts through the stator radial ducts. This air, combined with that passing around the winding end turns, exhausts from the protected side openings in the frame. Weather-protected Type I motors, are equipped with removable guard screens on openings. On some designs (usually 3600 rpm) a top air inlet and discharge housing may be used with a frame bottom that has no access openings. In this case air enters the top through openings in each end, and is discharged through openings on each side.

These instructions may not cover all details or variations in equipment that may be supplied or every possible question in regard to the installation, operation or maintenance. Should situations arise that are not covered by these instructions, further information may be obtained through Westinghouse Sales and Service engineers.

STANDARD WARRANTY

Westinghouse warrants that the equipment delivered by it will be of the kind and quality described in the order or contract, and will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within one year after date of initial operation, not to exceed eighteen months after date of shipment, Westinghouse shall, on prompt notification from the purchaser, and provided that (1) the equipment has been stored, installed, operated and maintained in accordance with the order or contract, generally acceptable industry practices and Westinghouse instructions, and (2) that the equipment has not been subject to alteration, misapplication or misuse, correct such non-conformity by repair or replacement F.O.B. point of shipment, of the non-conforming part or parts. Westinghouse shall not be responsible for providing working access to the defects. Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of liabilities of Westinghouse with respect to the quality of the equipment.

The foregoing warranty is exclusive and in lieu of all other warranties of quality, whether written, oral, or implied, including any warranty of merchantability or fitness for purpose.

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

Unauthorized Repairs

In the event that the customer sends his motor to an unauthorized repair shop, the coverage of this warranty policy is automatically terminated.

RECEIVING

Motors should be carefully inspected upon arrival. Any damage should be reported promptly to the carrier and to the nearest office of the Westinghouse Electric Corporation.

HANDLING

The motor should be lifted by means of the lifting recesses or hooks provided in each side of the frame. If couplings or other attachments unbalance a load, additional slings should be used to prevent tipping.

Effective September, 1969

STORAGE

If, at the time of purchase, it was specified the motor be packed for long-term storage, the package should be left intact during the period of storage.

If the motor is not packaged for long-term storage and is not to be put into service immediately, certain precautions should be taken to protect it. If at all possible, place the motor under cover in a clean, dry location.

During storage, the winding should be protected from excessive moisture absorption by some safe and reliable method of heating. Space heaters, if supplied, may be used for this purpose. The temperature of the winding should be always maintained a few degrees above the temperature of the surrounding air.

During manufacturing and preparation for shipment, certain precautions are taken to guard against corrosion of the shaft and bearings. The shaft extension is treated with a heavy coating of rust inhibitor. Machines with oil lubricated bearings are operated with a rust-inhibiting oil in the lubrication system. However, it is recommended that the oil reservoir be filled immediately with a good grade of rust-inhibiting oil, and shaft should be rotated at one-month intervals. Rolling bearings have an inherent rust inhibitor in the grease, but the shaft should be rotated at three-month intervals.

INSTALLATION

Unpacking

Remove the shipping braces which may be installed at end and on shaft extension (used to limit movement of the rotor during shipment). Remove the slushing compound on the shaft with a petroleum solvent, observing safety precautions.

Location

Install the machine in a well ventilated area not subject to ambient temperatures above 40°C (104°F) or altitude over 3300 feet. If protecting shields or guards are used, they must not obstruct the free flow of air around the motor.

Avoid locations subject to excessive steam vapors, oil vapors, chemical fumes, moisture, dirt, dust, or lint.

WARNING

Do not install the motor where hazardous, inflammable or combustible vapors or dust are present, due to the possibility of explosions or fire and damage to property or injury to personnel. Install motors on a non-combustible surface.

Note the air inlet and outlet patterns described above and take precautions to prevent air recirculation from motor to motor or from a given motor, the hot exhaust air recirculating into the intake openings.

Mounting

Oil lubricated sleeve bearing machines must be mounted so the shaft is in a horizontal position to prevent leakage of oil.

For wall or ceiling horizontal mounting of rolling bearing motors where weather protection is not required, the brackets must be turned to 90 or 180° to keep surplus grease sump below the shaft. For such mounting on sleeve bearing motors, the brackets must be rotated 90 or 180° to keep oil reservoir below the shaft. Unless ordered specifically for vertical mounting, motor should not be mounted with the shaft vertical without reference to the factory.

The foundation of the motor must be sufficiently rigid to minimize vibration and to maintain alignment between the motor and the driven unit. Motors are dynamically balanced at the factory to NEMA standard vibration limits. However, vibration of motor and driven unit in service are determined not only by balance, but may be greatly affected by the base on which they are mounted. To minimize vibration, a base with proper rigidity must be provided for motor and driven unit. A frequent cause of vibration when motor and driven unit are first coupled up, has been inadequate rigidity of the motor mounting base. When foundation caps and sole plates are used, they are designed to act as spacers between the true foundation and the motor and must be evenly supported on the foundation. Mounting plates should extend at least over the entire distance of the pad underneath the mounting foot and shims under entire foot. This is the area from the end bulkhead at the bracket to the core bulkhead at the end of the foot hole mounting recess. Feet must be on a level surface so oil level indication will be correct.

Always align the motor accurately with the load.

Method of Drive

The power may be transmitted from the motor to the load by direct coupling, belts, gears, or chains. Special consideration should be observed with each type of drive. Motors having the suffix -H, -S, -L, following the frame

number, are suitable for direct coupled service only. Motors having the suffix -U, -B, are suitable for belt, gear or chain drive.

Direct Coupling

Direct connected motors may be coupled to the load through flexible couplings. Coupling half should not be installed by hammering, unless the opposite end of shaft can be backed up to prevent damage to bearings. Accurate mechanical lineup is essential for successful operation.

Mechanical vibration and roughness during the operation of the motor may be indications of poor alignment. In general, line up by straight edges across, and a feeler gauge between coupling halves, is not sufficient. It is recommended that the lineup be checked with dial indicators and checking bars connected to the motor and load machine shafts. For the larger diameter machines, threaded bolt holes for vertical jacking are provided in the base of the motor for convenience in alignment. Jacking bolts should not be used as permanent supports.

Sleeve bearings are supplied with a babbitted face to restrain axial rotor movement during startup or while running disconnected from the load. These babbitted faces are not intended to withstand continuous thrust loads and care should be exercised in the lineup to prevent this from occurring during operation. Lineup should provide operation in approximately the mechanical center between the extremes of end play; this is very close to the magnetic center location.

Standard motors are supplied with the end play as shown on the outline drawing. It is recommended that a limited end float coupling be used on sleeve bearing motors to limit the total axial movement to less than that shown in the motor outline drawings. As noted in NEMA Standards MG1-14.38, sufficient thrust to damage bearings may be transmitted to the motor through a flexible coupling.

In considering the proper axial position of the motor relative to the driven equipment, consideration must be given to:

1. Total end play of the motor
2. Allowable end play of the coupling
3. Thermal expansion of the shaft
4. Axial float of the driven equipment

Dowel pins should be inserted through the base of the motor into the foundation to maintain accurate positioning of the motor. Pilot dowel holes for this purpose are located in diagonally opposite corners of the motor base. These holes should be drilled and reamed together with the corresponding holes in the foundation and the dowel pins inserted.

Belt Drive

Mount the motor on slide rails or bedplate which allows for adjusting the belt tension. To avoid over-stressing the motor bearings and belts or chains, use pulley sheaves or sprockets no smaller than those recommended by the belt or chain manufacturer and the Westinghouse Electric Corporation. 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. The slide rails should be located so that the motor is near the end of the slide closest to the driven machine. This permits maximum adjustment for belt stretch. Excessive belt tensions cause unnecessary loads on the bearings; belt tension should just prevent slippage when the motor is running at full load. On high inertia loads, where belts squeal or slip during acceleration, tightening to prevent this action, may result in overloading the bearing. The belt speed should not exceed 5000 ft. per minute unless otherwise recommended by the manufacturer of the belt.

CAUTION

Note - Not all motors are suitable for belt drive. Refer to the nearest Westinghouse Sales Office if there is any question as to the particular suitability.

Gear Drive

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

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, and align the sprockets accurately. Adjust the chain just enough to permit a slight sag on the slack side. Consult chain manufacturer for maximum ratio, speed and lubrication of the chain.

Position of Conduit Box

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

and reassemble. Note this changes the position of the box in the axial direction also.

If mounting conditions permit, the conduit box may be turned so that the entrance may be made from the top, bottom, or from either side.

ELECTRICAL CONNECTIONS

Motor and control wiring, overload protection and grounding should be done in accordance with the National Electrical Code and local requirements.

The motor frame should be grounded by attaching a ground strap from a known ground point to one of the conduit box bolts.

Be sure the motor is connected as shown on the nameplate, and that the power supply (voltage, frequency, and number of phases) corresponds with the nameplate data. The motors will continue to operate (but with characteristics somewhat different from the nameplate values) if the voltage and frequency vary within the following ranges:

Voltage – within ± 10% of the value stamped on the nameplate
Frequency – within ± 5% of the value stamped on the nameplate
Voltage and Frequency together – within ± 10% providing the frequency is within ± 5% of the value stamped on the nameplate.

To change the direction of rotation on 3 phase motors, interchange any two line leads. Note: If the direction of rotation is indicated on the motor, and it is desired to operate in the opposite direction, it will be necessary to change the blowers, as unidirectional blowers have been used. Refer to the nearest Westinghouse Sales Office for assistance.

INSULATION RESISTANCE

Before energizing motors it is recommended that the insulation resistance be measured, particularly if the motor has been exposed to excessive moisture in shipment or in storage. The insulation resistance of the stator winding can be measured with a "megger" type instrument. This value should be not less than rated KV + 1 in megohms. For example a 2300 volt motor should have a minimum insulation resistance of 2.3 + 1 or 3.3 megohms.

If the insulation resistance is lower than this value, it is advisable to eliminate the moisture in one of the following ways:

1. If space heater were supplied, energize these until motor dries out and until insulation resistance becomes constant.

2. Enclose the motor with canvas or similar covering, leaving a hole at the top for moisture to escape. Insert heating units or lamps and leave them on until the insulation resistance becomes practically constant.

3. With the rotor locked, using approximately 10% of rated voltage, pass a current through the stator windings. This current may be gradually increased until the temperature of the stator winding reaches 90°C. Do not exceed this temperature. Maintain a temperature of 90°C. until the insulation resistance becomes practically constant.

OPERATION

Steps Prior to Initial Start

For sleeve bearing motors, fill the oil reservoirs through one of the plugs on the top half of the bearing housing with a rust and oxidation inhibited turbine oil (viscosity 200 SSU at 100°F) to the center or mark of the oil level gauge when the motor is at standstill. See page 6 for constant level oilers.

If possible, turn the rotor by hand to make sure that it rotates freely.

Examine the rotor for loose objects or debris which may have accumulated to interfere with operation. Check factory made connections for tightness to make sure none has become loosened during shipment or storage. Remove shipping braces from each end of rotor.

Initial Start

It is recommended that the motor be initially started uncoupled from the load. Check the direction of rotation.

After starting the motor, use the oil ring sight windows to see that sleeve bearing oil rings are turning and carrying oil properly.

Check the temperature of the bearings. When measured by a bearing temperature detector on sleeve bearings, it should not exceed 90°C total temperature. When measured by a thermometer at a point on the bearing housing nearest the bearing, it should not exceed 60°C, total temperature.

At initial start, the rate of rise of the bearing temperature is more indicative of trouble than the total temperature. When starting a motor for the first time, the bearing

temperature should be observed for a minimum of two hours. If at any time the rate of temperature rise appears too great or if there is excessive vibration or unusual noises, shut down the motor immediately and inspect the machine for possible causes.

With the motor connected to the load, check for satisfactory operation.

Jogging and Repeated Starts

CAUTION

Repeated starts and/or jogs of induction motors greatly reduce the life of the winding insulation or the rotor. The heat produced by each acceleration or jog is much more than that produced and dissipated by the motor under full load. These motors are designed to withstand being shutdown and restarted once, providing the motor is allowed to coast to rest before being restarted. It is recommended that no restart be made until all conditions affecting operation have been thoroughly checked and the motor examined for evidence of excessive heating.

Long accelerating times, resulting from low voltage, high connected inertia, or other reasons, may seriously damage the rotor or shorten its life. If load inertia in excess of that recommended by NEMA, MG1-20.42 is expected, the nearest Westinghouse Office should be consulted to determine if motor is suitable.

Heating

Consult the nameplate for the correct temperature rating of the motor. The maximum continuous operating temperature of the motor is a rise stamped on the nameplate plus the temperature of the surrounding air. If the motor does not have temperature indicating devices, and abnormal heating conditions are suspected, shut the motor down until the cause of overheating can be determined and corrected. Temperature rise can be determined by the change in stator winding resistance.

MAINTENANCE

A carefully planned program of inspection and maintenance will result in maximum equipment availability and minimum maintenance cost. If it is necessary to repair, recondition, or rebuild these motors, it is recommended that the nearest Westinghouse Apparatus Repair shop be consulted.

In addition to the daily observation of the overall condition and operation of the motor, it is recommended that a general inspection routine be established to check periodically the following items:

1. Cleanliness
2. Insulation and winding
3. Lubrication and bearings
4. Vibration

Cleanliness

The interior and exterior of the machine should be kept free from dirt, oil, and grease. Oily vapor, paper, chemical, product, or textile dust may build up and block off ventilation, leading to overheating of windings. Conducting dusts shorten creepage distance and may penetrate windings, causing short circuits and grounds. Sharp dusts tend to abrade the insulation, and shorten its useful life as they are driven by motor fans. Magnetic dust is a particular hazard to insulation because of the magnetic properties and agitation by magnetic fields. Light and relatively harmless dust can be blown out with low pressure dry air. Grit, metallic, magnetic and carbon dust should be removed by suction with non-metallic suction tips.

Cleaning Insulation

The insulated windings should be kept reasonably clean of dirt, oil, metal particles, and other contaminants. A film of oily dirt tends to accumulate particles that may interfere with the satisfactory ventilation of the machine. Cleaning can be accomplished in several satisfactory methods, some of which are suggested below:

1. Vacuum Cleaning

For removal of loose dust, dirt, and particles, the use of suction is preferable to blowing out with compressed air since there is less possibility of damage to insulation and less chance of getting conducting or harmful particles into areas that may later result in damage during operation.

2. Compressed Air Cleaning

Compressed air is effective and convenient for removing loose dust and particles from inaccessible areas such as air ducts, and between coils at the end turns. Caution should be taken, however, to make sure that the air supply is dry, and free of oil. Excessive air pressure, (in excess of 30 PSI) should not be used.

3. Solvent Cleaning

Oil or grease are not harmful to the insulation, however, they do tend to accumulate dust which may impair the ventilation. Oil or grease may be removed with a cloth moistened, but not dripping, with a petroleum solvent of the safety type, such as Stoddard solvent or similar materials available under various trade names. In using such solvents, precaution should be taken because of their flammability and possible injurious health reaction. If there is evidence of winding movement or varnish deterioration, revarnishing the winding should be considered.

Moisture

Dripproof motors should always be guarded against the accidental intrusion of water from splatter or splashing. Standby motors should be run at least once a week to guard against moisture condensation. Motors with long, idle periods should normally be installed with space heaters in operation during the idle periods.

Bearing Maintenance

Sleeve bearing oil recommendations: For normal ambient temperatures, use a good grade of oxidation and corrosion inhibited mineral base turbine oil. For operation at temperatures between 30°F and 110°F, oils with viscosities as follows should be used:

Nominal viscosity 200 SSU at 100°F.

Cleaning

On sleeve bearing machines, the reservoir should be drained approximately every six months by removing the drain plug located at the bottom of the oil sump in the bottom of the casting. More frequent changes may be necessary if discoloration or other contamination of the oil is observed, or for 3600 RPM machines. Refill with fresh, clean oil. At intervals, depending on the ambient condition, and dirt in the atmosphere, the bearings may be flushed out with kerosene to remove any dirt or grit which may have accumulated. The kerosene may be introduced through the oil filler opening at the top and drained out at the bottom. Leakage around the oil drain plug may be prevented by using an oil sealing compound such as Permatex.

Sleeve Bearing Lubrication

On motors equipped with constant level oilers, fill the bottle with oil, insert quickly into place. Repeat until bottle remains partially filled. It is necessary that oil be visible in the bottle for proper bearing lubrication. Do not operate motor unless bottle is partially filled with oil.

Maintenance of Grease Lubricated Rolling Bearings

When motor is installed, make certain that the motor turns easily, particularly when the motor is not installed until some months after being shipped. External inspection after the motor is put into operation will determine whether the bearings are operated quietly and without undue heating.

The grease used as a lubricant in grease lubricated rolling bearings does not lose its lubricating ability suddenly, but over a period of time. This time, in which regreasing would be necessary, depends upon the type of grease, the size of the bearings, the speed at which the bearing operates, and the severity of operating conditions. As a result, it is not possible to accurately predetermine when new grease must be added. Some of the conditions for which more frequent greasing is required would be severe dirt; exposure to weather, high humidity, splashing water; or high ambient temperature.

Regreasing

Too much grease will cause churning, overheating, and grease leakage. Only a small amount of lubricant is necessary for lubrication, however, this amount must always be present. Lubricant also performs other functions such as prevention of water and contaminants from entering the bearing and corrosion protection.

When regreasing, care must be taken against introduction of dirt. Clean the fittings as this has been found to be a primary cause of dirt introduction and failure of bearings.

If high pressure guns are used, great care must be taken to avoid over-lubrication.

When shipped from the factory, grease lubricated ball bearings, have sufficient grease of a rust inhibited lithium soap type to last for a limited period. However, a charge of grease should be added soon after the motor is put into operation, and thereafter at suitable intervals as determined by experience.

NOTE

Some motors for special applications, such as high ambient temperature conditions, will require a special grade of grease. These motors will be identified by having a special nameplate giving greasing instructions. In such cases, do not use the standard grease.

When re-greasing the motor, it is preferable to stop the motor. To re-grease, proceed as follows:

1. Wipe the lubrication fitting clean.

2. Remove the relief plug and free the hole of hardened grease.

3. Add grease slowly with a hand operated pressure gun.

4. Operate motor for at least 10 minutes with the drain plug removed to allow excess grease to drain out.

5. On motors with long grease pipes, pipes should be thoroughly cleaned before re-greasing, if grease has hardened.

6. Replace drain plug.

7. If it is necessary to re-grease with the machine in operation, grease added should be limited and careful attention paid to avoid over greasing. Allow to run with drain plug open for approximately 10 minutes before restoring drain plug to its sealed condition.

As a guide as to the amount of grease to be added and the frequency of greasing, see following charts.

Greasing Schedule

Method of Drive	Hours Operation	Greasing Intervals 8 Hr. Day	16 Hr. Day	24 Hr. Day
Belt, Chain or Gear (1800 RPM or less)	1000	4 Mo.	2 Mo.	1-1/3 Mo.
Coupled (1800 RPM or less)	2000	8 Mo.	4 Mo.	2-1/3 Mo.
Coupled (3600 RPM)	1000	4 Mo.	2 Mo.	1-1/3 Mo.

Note: For severe dirt, weather exposed, high humidity or high ambient, cut time intervals to 1/2 of the above schedule.

Guide to Amount of Grease

Shaft Diameter at Bracket	Amount of Grease to Add
Up to 2-3/8	1-1/4 cu. in.
Above 2-3/8 to 3	2
Above 3 to 4	3
Above 4 to 5	4

Note: 1 oz. = 1-1/4 cu. in.

Standard Westinghouse Grease #55272-BA Ordering Data

8 oz. tube	S#1781386
1 lb. can	S#1781387
5 lb. can	S#1781388
35 lb. can	S#1781389

Under operating conditions of severe dirt or temperature, it may be desirable for most satisfactory service, to open the bearing housing once a year, or after every 5,000 hours operation, to check the condition of the housing and grease. If difficult to inspect the pulley or pinion end bearing, the condition of the bearing at the opposite end will usually be representative of both. If grease deterioration has occurred or if dirty, the bearing housing parts should be thoroughly cleaned out and new grease added. Clean with a suitable solvent, such as Trichlorethylene, taking necessary precautions.

Bearing Currents

Certain motors have a tendency to produce harmful circulating currents through the bearings. In such cases, the bearing at the end of the motor opposite the shaft extension is insulated. This insulation must not be short circuited when temperature detecting devices are inserted into the bearing.

Vibration

Any excessive noise or vibration should be traced to its source and eliminated. Increase in vibration may be indicative of change in balance (uncouple from driven unit to isolate motor), possible incipient bearing or rotor failure, electrical unbalance, or change in alignment.

RENEWAL PARTS

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

INSPECTION

Inspection covers are furnished on the sides of some motors; three of these may be removed to check cleanliness of windings and necessity for further disassembly for cleaning. With split brackets, removal of the upper bracket half, and upper airshield half will permit inspection of inner side of end turns and end of rotor.

DISASSEMBLY OF ROLLING BEARING MOTORS

1. Cleanliness

Since ball and roller bearings are sensitive to small amounts of dirt, they must be protected at all times. When necessary to disassemble the bearing housing, first thoroughly remove all dirt from the adjacent part, so no dirt will fall upon the bearing or into the bearing housing.

2. Removal of End Brackets

End brackets can be removed by unscrewing all the bolts that hold the bracket to the frame and the bolts that hold the inner cap to the bearing housing. Upon removing the brackets and airshield, the rotor can be removed.

3. Removal of Bearings

Bearings can be removed using a wheel puller or similar device. The inner cap should be slid along the shaft away from the bearings 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 may be damaged and should not be reused.

4. Replacing of Bearings

To replace a bearing on the shaft, be sure that the bearing seat is free from dirt, nicks, or burrs. Examine the machine fits of the end bracket, and bearing cap for burrs. It is important that these surfaces be smooth and clean. If any polishing is done, care should be taken to avoid a deposit of metal dust in and around the bearing assembly. The internal surfaces of the bearing housing should be coated with a thin film of the recommended grease. The shaft and the shaft fit of the bearing and the bearing cap should also receive a coating of grease. Heat the bearing in an oven or clean oil bath for one half 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 it in place until bearing has cooled appreciably. Do not assemble in bracket until bearing has cooled. Fill bearing with grease; pack outboard grease cavity in bracket approximately one-half full. Do not fill inner bearing cap with grease. Orient the inner bearing cap so that grease relief passage is lined up with similar passage in the bracket.

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.

2. Remove bolts holding the bracket to the frame and force the bracket loose utilizing pry space at the bracket lugs. Pull bracket off of shaft.

3. Remove the access cover plate (on inboard side of the bracket) for the oil ring. Remove the bearing locking screw and oil ring keeper.

4. Remove inner and outer bearing seals. Remove any bearing temperature detectors.

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

6. Drive or press the bearing out toward the inside by placing a bearing driver or rod against the bearing shoulder.

7. 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 the oil ring will not be caught and damaged between the end of the shaft and 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. Replace inner and outer seals, if damaged. After bolting in place, check to see that the oil ring revolves with the shaft.

REMOVING SPLIT SLEEVE BEARINGS

1. Drain the oil by removing the drain plugs from the bottom of the bearing housing if the bottom half of the bracket is to be removed.

2. Remove the oil ring sight window.

3. Remove the bolts holding the upper half of the bracket or front panel (on some designs that have a top air intake and exhaust chamber). Remove the panel or top half of the bracket.

4. Remove the bolts holding the upper bearing housing to the bottom half of the bracket. Remove any bearing temperature detectors.

5. Tighten the dowel bolt nuts to disengage the dowels from the bottom half of the bracket. A withdrawal of approximately one-half inch is sufficient.

6. Break the joint (sealed with a Permatex sealing compound) by inserting screwdrivers or small pinch bars into the slots cast in the bottom half of the bracket at the split line. Remove the upper half of the bearing housing.

7. Lift off the upper half of the bearing. The dowel pins in the bearing are designed as an aid in bearing alignment for assembly purposes and are not a force fit.

8. To remove the lower half of the bearing, the weight of the rotor should be removed by the use of a jack against the shaft (or against a bolt screwed into the shaft on the end opposite the shaft extension) or by the use of a sling and hoist. Raise the shaft only several mils to free the bearing which can then be rotated 180^{o} and then lifted out.

9. Remove the bottom half of the bracket if convenient to facilitate cleaning the sealing compound from the split surface of the bearing housing or cleaning the oil reservoir.

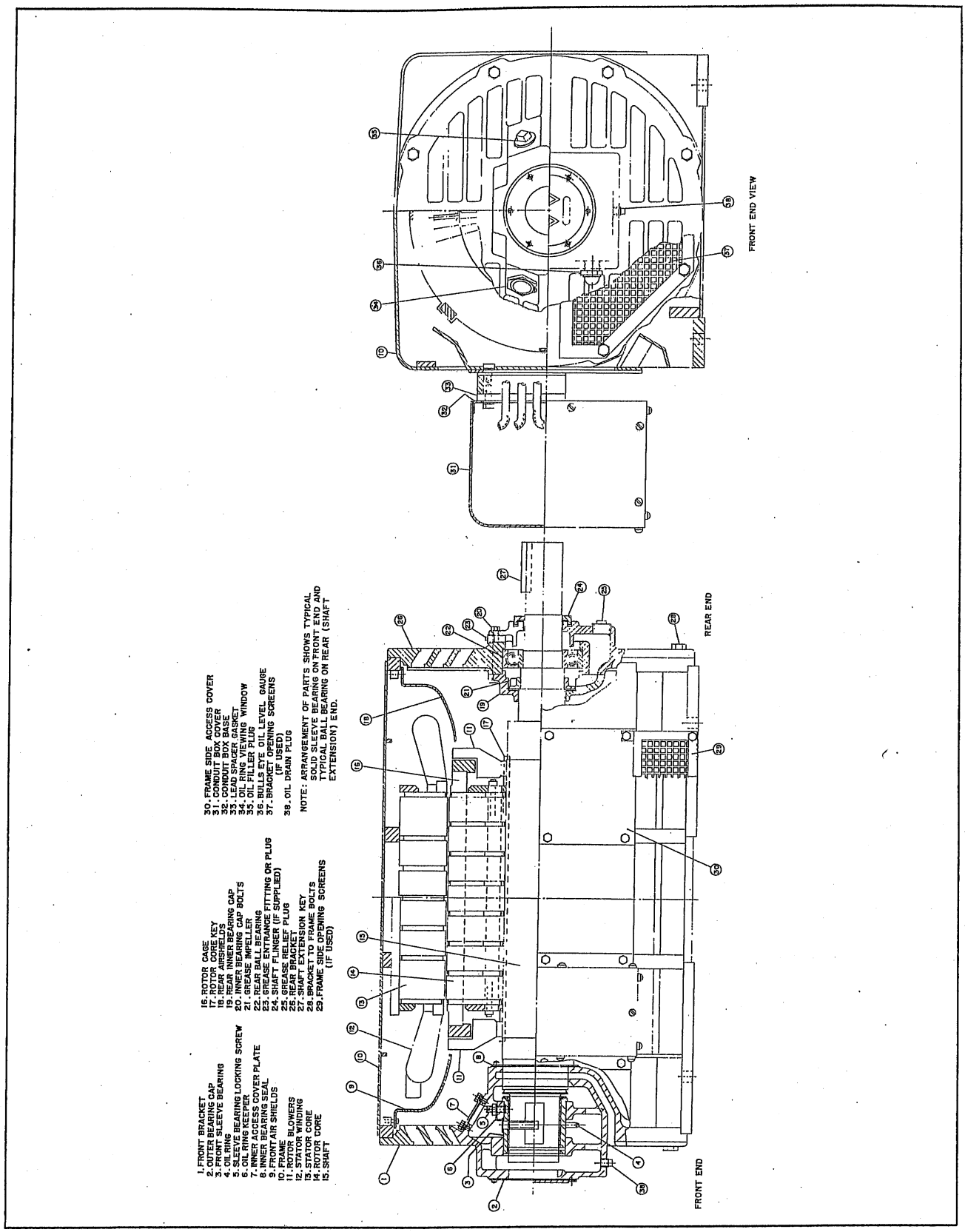
10. To reassemble the bearings, the above procedure is to be reversed with the following precautions:

A. Remove all old sealing compound from the machined joints of the bearing housing parts. To remove the sealing compound, first scrape and then use a coal tar solvent such as Xylol or Toluol. Observe safety precautions.

B. Check all parts for nicks or burrs on the bearing journal and thrust shoulders, oil rings and machined fits. Remove defects by stoning or filing as required to ensure the proper functioning of the part.

C. Before installing the upper half of the bearing housing, apply a thin film of sealing compound Permatex #2 to the mating surface on the bracket.

D. Tap the dowel bolts into position before installing the bolts that secure the upper half of the bearing housing to the lower half to ensure proper alignment of the bearing halves and seals.



Typical Arrangement of Parts