

**Instruction Manual**



**Models**

**SPMV-8100, 8120, 8140, AT-440-SPMV, 8160, 8180  
8200, 8220, 8240, 8260**

**SPM-8100, 8120, 8140 & AT-440-SPM**

**SPC-8100, 8120, 8140, 8160, 8180, 8200, 8220, 8240, 8260**

**Caution:**

Rotating shafts and above ground electrical potentials of Dynamatic equipment can be hazardous. Therefore, it is strongly recommended that all electrical work, installation, alignment and maintenance be performed only by qualified personnel. • preferably factory trained.

Because high level, above ground potentials exist, electrical work, conforming to National Electrical Codes and local regulations, should only be handled by qualified electricians. Only factory recommended test procedures, included in the instruction manual, should be followed. Electric power should always be disconnected before working inside of the control enclosure.

Although shaft couplings are generally not furnished by the manufacturer, rotating shafts and couplings must be protected with securely mounted metal guards that are of sufficient thickness to provide protection against flying particles such as keys, bolts and coupling parts. Even when the output shaft is motionless, it should be considered "alive" as long as its motor, or prime mover, is running; keep hands away from the output shaft until the motor has completely stopped and power is disconnected from the controller.

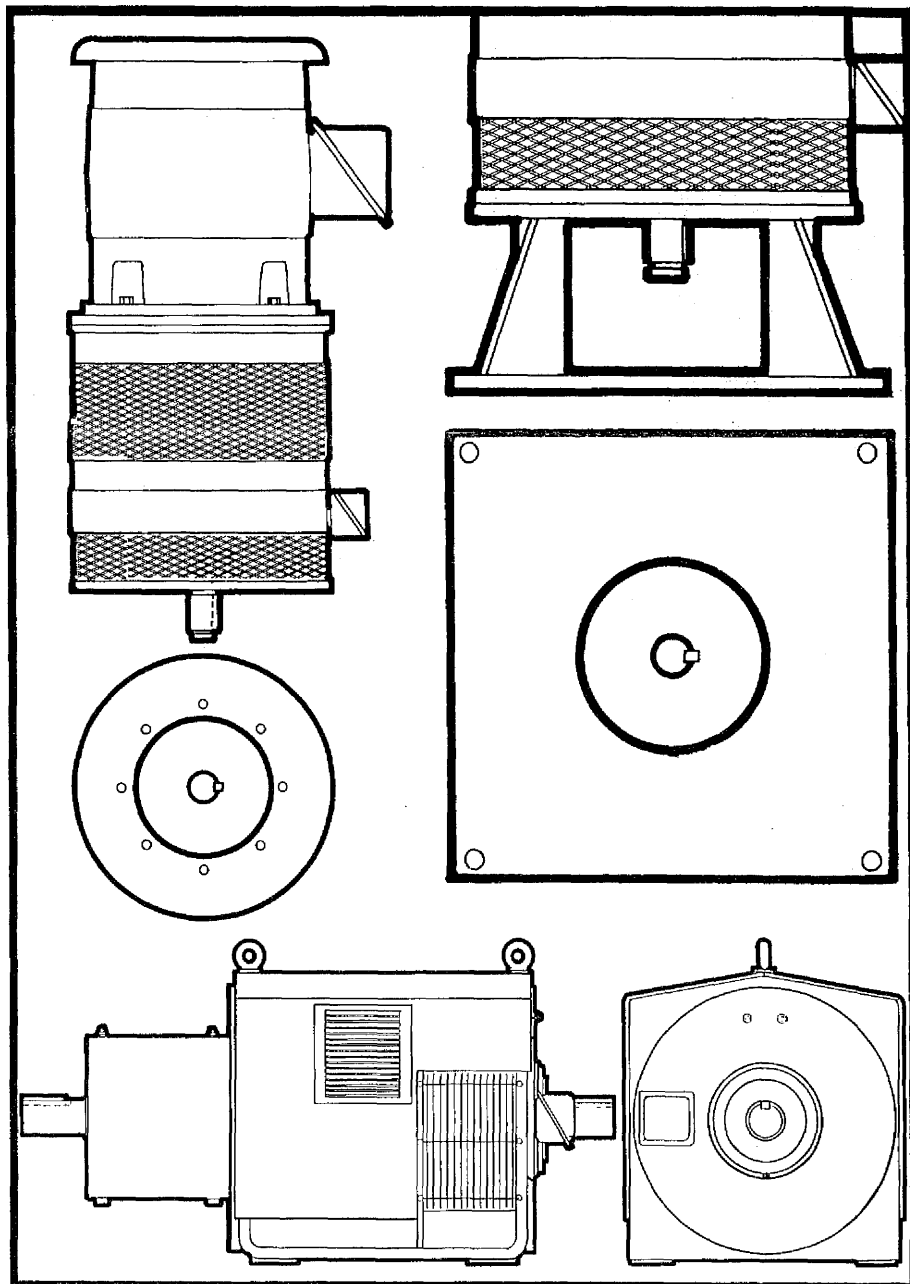
Provide immediate corrective measures if abnormal noises are detected. If noise is due to excessive vibration, check for misalignment, build-up of foreign material on internal rotating components or bearing failure. Keep clear of the air discharge vents of air cooled machines. The air temperature may be hot and particles may be propelled through the air stream by internal rotating components.

**Note:**

Since improvements are continually being made to available equipment, the enclosed data is subject to change without notice. Any drawings are for reference only, unless certified. For additional information contact your nearest District Office or Representative listed on line, Or write: Drive Source International, 7900 Durand Avenue, Sturtevant Wisconsin 53177

Web: [www.dynamatic.com](http://www.dynamatic.com)

Email: [sales@dynamatic.com](mailto:sales@dynamatic.com)



## Preface

Standardization of Dynamatic eddy-current units has made it possible for this single instruction manual to sufficiently cover all standard, air cooled, eddy-current, Salient Pole drives and couplings. However, where specific differences do exist, separate instructions and data are provided in this manual. Whether this manual is to be used for standard or special units, the exact assembly drawing and contract specifications should be considered when following these instructions. If this manual is used for non-standard units, separate supplement sheets will be provided to cover any special aspects requiring instructions.

Each model number that is covered in this manual is listed on the front cover. A brief explanation of what these model numbers mean should be helpful: Each model consists of a three- or four-letter prefix and a four-digit number. The prefix is either SPM, SPMV or SPC. The "SP" represents salient pole. The "M" represents a unit with a motor and is therefore a drive. The "C" represents a unit with NO motor and is therefore a coupling.

A fourth letter, "V", represents a vertical unit.

The first of four digits is an 8 for air cooled eddy-current salient pole units; the next three represent the size, from a 100 through the larger 260. The full model range available is 8100 through 8260; due to different configurations in design, models not covered in this manual have their own appropriate instruction manual.

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## MECHANICAL

### Inspection

#### Receiving

The factory **has** taken special precautions to ship your eddy-current unit in an approved shipping crate so it will arrive at its destination in the best possible condition. In case of rough handling or shipping damage, immediately file claim with the carrier and promptly notify your nearest Industrial Drives Division Sales Office.

#### Shaft Rotation

Hand rotate the shaft(s) to determine that rotation is free and that no binding exists.

**Caution: DO NOT pound on a shaft or bearings will become damaged.**

#### Exterior

Carefully examine housing, end bells, conduit box, lead wires and terminals. Tighten any exterior screws and nuts if they have become loosened in transit.

**WARNING: Correct handling and shipment of vertical units is essential because they may be equipped with angular contact ball bearings. Keep the unit in an upright position or restrain the output shaft in a suitable manner, such as attaching it to the base or crate. Therefore, a vertical unit must not be positioned in a horizontal or inverted manner without such shaft restraint.** Otherwise, the **effect of mishandling will be the dislocation of the shaft and injury to one or more internal parts.**

### Handling

Although this unit is constructed of high quality, rugged material, care must be exercised in handling it properly. Dropping, jarring or pounding on a shaft can damage bearings and other components. Be careful in avoiding damage to the discharge grille on the drive or coupling. Use furnished lifting eyes for lifting.

**Caution: Lifting eyes are intended for lifting the drive or coupling only. DO NOT USE them to lift the unit with driven equipment attached.**

### Electrical Connections

Follow National Electrical Code and local regulations to make required electrical connections for operating the drive.

### Storage

Whenever this unit is to be set aside in storage, a clean, dry area must be provided and it should be kept in its original crate. If kept in an air tight material such as polyethylene, silica-gel or some other moisture absorbent should be used to prevent rust. Additional grease is not required until ready for operation. Shafts should be rotated occasionally to redistribute bearing grease and to prevent bearings from becoming brinelled.

### Ordering Replacement Parts

All parts should be ordered from the factory in Sturtevant, Wisconsin.

In ordering parts, determine the part number from the bill of material, drawings or diagrams whenever possible. These contain parts lists of all parts ordinarily considered to be subject to replacement, but in case you are unable to find the part number, furnish the factory with the PRO number and serial number of applicable parts, such as the AC motor, eddy-current clutch or controller.

This will enable the factory to locate records in case you are unable to describe completely the part wanted.

Additional information on parts is always available at your request.

## Returning Material

Before returning material, contact the nearest factory District office, Representative or the Service Department in Sturtevant, Wisconsin.

## Installation

### Location

Select a permanent location affording an unobstructed flow of clean cooling air to permit the unit to perform according to its ratings. Locate the unit at least 12 inches away from walls and similar obstructions to ensure sufficient air for cooling. The ambient temperature of input air must not exceed 40° Centigrade (104° Fahrenheit). Higher ambient temperatures reduce the thermal rating by 20 percent for every 20° F. ambient increase.

All air cooled units are suitable for operation at an altitude of 3300 feet or less. For operation above 3300 feet it is necessary to derate the horsepower dissipation 5% for each 1100 foot interval to an altitude of 10,000 feet.

### Mounting Horizontal Units

The unit should be mounted directly to a bed, base or platform to ensure that it is rigid. Even if it is purchased mounted on a base, the base must still be aligned and secured.

**CAUTION: Failure to properly mount and level this unit may result in distortion to the housing, mechanical failure, misalignment and rapid bearing wear.**

**Mount the unit** as follows:

1. Push slotted shims under the lowest foot and moderately tighten the bolt.
2. Align the unit (see Alignment instructions). Insert feeler gauges under the remaining feet during the alignment procedure to level the unit.
3. Replace feeler gauges with equal thickness of slotted shims. (Use a few thick shims rather than a large number of thin shims.)
4. Alternately tighten bolts.
5. Recheck alignment and change shims as required.
6. Dowel all directly connected units to prevent creeping and future misalignment.

### Mounting Vertical Units

Choose a suitable mounting site. Use the Outline and Mounting Dimension drawing to locate, mark and drill the necessary mounting holes. When mounting a P-Flange, its mounting surface should be machined to within  $\pm .002$  inch. Remove the fasteners and the grille for access to the mounting holes in the P-Flange and secure with cap screws and lock washers. If the drive is equipped with a ring base and is not perfectly vertical, proper shimming should be done before bolting in place.

## Alignment

### General

Proper installation and alignment of this unit, as specified herein, is a condition of the Manufacturer's warranty.

*Angular misalignment and Offset misalignment* between directly connected shafts will cause increased bearing loads and vibration, even when the connection is made by means of a flexible coupling. Shaft alignment becomes especially critical if operated at high speeds. For this reason, the alignment of directly connected shafts must be checked with a dial indicator after coupling hubs have been installed.

### Flexible Couplings

A flexible coupling should be used to connect in-line shafts in order to avoid undue bearing stresses. It should never be forced onto a shaft by pounding, or serious damage to the bearings is risked. Moderate heat can be applied to the hubs to locate them in place on the shafts. If the hubs must be pressed on, use the threaded hole in the end of the shaft in order to avoid bearing damage. Be careful to start it true, not cocked, otherwise it is possible to burr the shaft. A light film of oil or other lubricant on the shaft will prove an aid to mounting. Be sure that the shafts are well cleaned before the coupling hubs are installed. When pressed over a considerable length of shaft, it may be necessary to expand the coupling hubs by heating.

**CAUTION: DO NOT drive or force the coupling hubs onto the shafts.**

If a key is used in a coupling, be sure that the key fits snugly in the shaft and coupling, but does not fill the space on top of the key. Some clearance must be left at this point.

### Note:

Although flexible couplings are designed to accommodate parallel and angular misalignment, care should be taken to align the driving and driven machinery as accurately as possible when the coupling is installed. Even when the original alignment has been very accurate, misalignment may occur later because of settling foundations, wear of bearings, etc., and it is well to make periodic checks to see that such misalignment does not become excessive.

**Parallel Offset Alignment**

*Offset misalignment* is illustrated in Figure 1. Also shown is the location of the dial indicator. *Offset alignment* can be accomplished as follows:

1. Clamp the dial indicator on the hub and position the finger on the ground or machined diameter of the other hub (Figure 1, Item 1).
2. Scribe a mark on the surface of the hub where the finger is located.
3. Rotate both shafts simultaneously while keeping the finger on the scribe mark. Note the readings at each 1/4 revolution.

**NOTE: Refer to Table 1 for permissible parallel offset misalignment.**

**Permissible Operating Misalignment\***

**Table 1**

Model	Basic Coupling Size	Parallel Offset (1) X,in.	Angular (2) Y, in/In. Radius	Max. Angular (2) with a Measured Parallel Offset (1) in/in. Radius **
8100	2	.0100	.0058	$Y(2) = .0058 - .6 \times (1)$
8120	2	.0100	.0058	$Y(2) = .0058 - .6 \times (1)$
8140	2.50	.0100	.0052	$Y(2) = .0052 - .5 \times (1)$
8180	3.50	.0120	.0040	$Y(2) = .0040 - .3 \times (1)$

\*Operating misalignment is dependent on the following factors: Initial misalignment, temperature growth and foundation settlement. Initial alignments should allow for the effects of temperature growth and foundation settlement. All above values are (TIR) Total Indicator Run out. To avoid errors in readings due to shaft magnetism, non-magnetic indicators should be used.

\*\* Maximum value for either must not exceed those given in columns 3 and 4.

Misalignments - Horizontal Units

Figure 1

**Angular Alignment**

*Angular misalignment* is illustrated in Figure 1. Also shown is the location of a dial indicator. Angular alignment can be accomplished as follows:

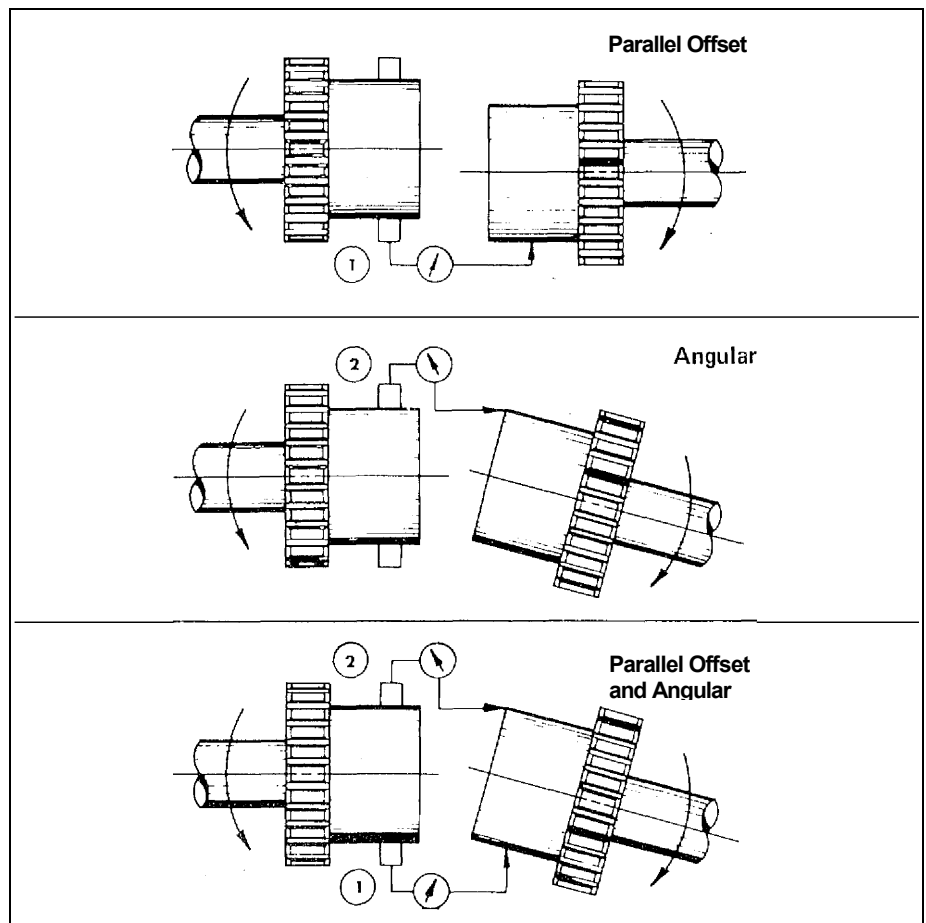
1. Clamp the dial indicator on the hub and position the finger on the other hub face (Figure 1, Item 2).
2. Scribe a mark on the face of the hub where the finger is located.
3. Rotate both shafts simultaneously while keeping the finger on the scribe mark. Note the readings at each 1/4 revolution.

**NOTE: Refer to Table 1 for permissible angular misalignment.**

**For One Rotating Shaft**

If it is impossible to rotate both shafts, the dial indicator should still be used by following this procedure for both angular and offset alignment:

1. Clamp the dial indicator to the rotating shaft.
2. Position the finger against the face of the other hub (Figure 1).
3. Rotate the shaft and note the dial indicator reading for a measurement of the *angular misalignment* per Table 1.
4. Position the finger against the diameter of the other hub.
5. Rotate the shaft and note the dial indicator reading for a measurement of *offset misalignment* per Table 1.



**Rough Check**

The unit can be roughly aligned without the use of a dial indicator, but alignment as such is not recommended for permanent installations. The degree of *angular misalignment* can be roughly determined by inserting feeler gauges between faces of the coupling hubs. The amount of *offset misalignment* can be roughly determined by positioning a straight edge across the machined diameter of the hubs.

## Cleaning

A certain amount of foreign matter, such as dirt, dust and grease, enters with cooling air and accumulates inside, with the amount depending on the purity of surrounding air and cleanliness of exposed surfaces.

Therefore, periodic cleaning will be required. To do so, remove excitation, remove air intake grille and use compressed air to dislodge and remove foreign matter. Repeat this procedure as often as necessary to keep the unit clean.

Grease and other adherent substances can be removed with a good commercial cleaning solvent, such as OSHA Code No. 66 Specification.

**CAUTION: DO NOT USE carbon tetrachloride, as it will injure the slip rings and produce toxic fumes injurious to health.**

If, after operating a long time, compressed air and cleaning solution do not sufficiently remove all foreign matter, disassemble per disassembly instructions and use compressed air and cleaning solution.

If this unit is equipped with filters, remove each filter from the clutch housing and the motor by loosening the filter catches. Flush the filters with cleaning solvent.

## Slip Rings & Brushes

The slip rings and brushes are enclosed to prevent contaminants in the atmosphere from damaging slip rings and brushes and also to prevent brush dust from getting into bearings and air gaps. The cover above the slip ring and brushes should be removed periodically (90 day interval is recommended for normal service) to check both slip rings and brushes. To reduce the potential for pitting the brush springs should be set to the highest possible tension on the brush holder spring. This is necessary to assure good electrical contact with the brushes and prevent electrical leakage from the slip rings to ground. Additionally it is advisable to reverse the coil polarity at the controller (exchange C1 & C2) every 90 days to prevent material transfer from the slip rings to the brush or the brush to the slip ring. If slip rings become pitted or badly worn, the unit should be disassembled and new slip rings installed. The brushes should also be checked periodically to assure that they are of sufficient length; they should be replaced before becoming so short that they bind in the brush holder. To get to the brush holder cover simply remove the lower screen (vertical units) or louvers (horizontal units).

To clean slip rings, use a small square of canvas or a similar, hard-woven, non-linting material to remove dirt and foreign matter from them. Do not use any lubricant on the slip rings.

New brushes must be dressed to the curvature of the slip ring after installation so that at least 80% of each brush tip contacts the slip ring surface. Insert a strip of sandpaper between the slip ring and the brush tip, and rotate the field assembly and slip rings back and forth while holding the sandpaper tightly against the ring. Place the brush arm against the brush to hold the brush tip firmly against the sandpaper. Use progressively finer sandpaper as the brush tip assumes the shape of the slip ring curve. Finish dressing the brush with a very fine grade. Avoid chipping and rounding the brush corners. Carbon dust and abrasive particles should be blown from the unit with compressed air.

Brush Specifications		Table 2
Dynamatic Part No.	Type	Size
A-244-7	Helwig carbon Electrographic Grade H25	Length 1.75 Width .75
A-244-5	US Graphite Carbon grade E4 for Stainless Steel	Thick .50
A-244-4	US Graphite grade Number 901	Pigtail from Brush to center of slotted terminal 3-3/4" Terminal screw 10-32
A-244-2	National Carbon grade AY	
A-244-1	Stakpole Carbon grade R-67	
A-244-0	Helwig Carbon Grade 6H2	

## Governor Generator

The generator is a permanent-magnet, alternating-current device that produces a linear voltage in direct proportion to the speed at which it is driven. In the governing circuit of the control system, the voltage produced by the generator represents the actual speed of the unit. This voltage is amplified and compared with a constant voltage in the reference circuit, representing the desired speed of the unit, to effect speed control.

At maximum speed the output of the generator is maximum volts. Frequency also varies with speed. This generator is designed to operate with equal output and efficiency in either direction of rotation.

The use of an AC governor generator eliminates rotating windings and consequently no maintenance of brushes, slip rings or commutator is required.

The Alnico magnet employed in this unit retains its field strength over a long period of time, assuring a constant generator output at a given speed. This magnet should not be subjected to sharp impacts, abuse or temperatures higher than the maximum operating temperature of the unit, as this will result in a weakening of field strength. Should removal of the magnet be necessary for remagnetization or repairs, the entire generator assembly should be returned to the factory.

## Lubrication on AT-440-SPMV Model Only

The only parts in the clutch requiring lubrication are two bearings. Standard units are grease lubricated and are provided with large grease chambers next to the bearings to permit a long period of operation before greasing is required. Grease fitting locations are shown in Figures 6-1 and 6-2.

The center support bearing in Models AT-140 through 280 is greased through a grease fitting located on the drum hub, as shown in Figure 6-1; a plug button must be removed from the housing to reach the grease fitting. In Models AT-320 through 440, this bearing is greased through a rifle-drilled hole through the output shaft, as shown in Figure 6-2, and is relieved through a lip seal located beside the bearing.

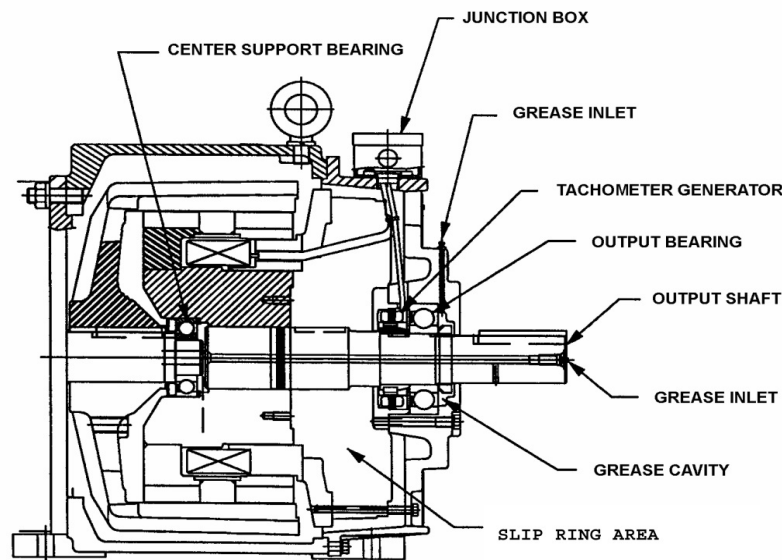
The outboard bearing is greased through a grease fitting located over the bearing in the output end bracket. The motor bearings are greased through grease fittings located in the end brackets over the bearings. Plugged relief vents are located below the bearings. Smaller motors have permanently sealed non-regreaseable bearings.

Since the two most prevalent causes of bearing failure are contamination and over greasing, do not over grease. For most operating conditions the bearings should not be greased more than twice a year. However, if the drive is to be run continuously or operated in a high ambient temperature [86°F to 104°F (30°C to 40°C)] or at a high slip RPM, re-greasing should be done more frequently.

The grease specification is per Dynamatic Engineering Standard MML 4-1.3. This is a premium grade of lithium base N.L.G.I. #2 EP grease. Recommended greases are listed in Table 6-2. Mobilux E.P. #2 is used at the factory. Recommended amounts of grease for the bearings are listed in Table 6-3. Any equivalent and compatible grease may be used. Special greases may be specified at the time of order entry. Consult your order papers if a special grease has been specified.

When lubrication is required, use the following procedure to grease the bearings:

1. Stop the motor and clutch and allow both to coast to a complete stop.
2. Wipe the surfaces on and around the grease fittings and relief holes clean. This is important and necessary to prevent contaminating the bearings.
3. Remove the plugs from the relief holes (when plugged). The relief hole for the center support bearing is inside the housing and is not accessible.
4. Lubricate the center support bearing. If the amount of grease applied for each stroke of the grease gun is not known, pump one stroke onto a piece of paper and weigh it. Then calculate the number of strokes required.. **For AT-320 through 440 Drives:** Clean the grease fitting in the end of the output shaft or in the cross drilled hole on the side of the shaft and pump the recommended quantity of grease into it. Excess grease will be dispelled into the drive housing.
5. Pump specified amount of grease into output end bracket bearing through grease fitting above bearing. If the unit is a separate clutch (without a motor attached), pump two ounces of grease into each input shaft bearing.
6. Pump two ounces of grease into each motor bearing through grease fittings above the bearings. Smaller motors have permanently sealed non-regreaseable bearings
7. Allow the drive to run for 20 minutes with the relief plugs removed to expel excess grease.
8. Wipe off all excess grease. Replace the plug button if removed in step 4.



Typical Assembly Drawing of AT-320 through AT-440 Drives

Figure 6-2

**Lubrication – All Units Other than AT-440-SPM & AT-440-SPMV**

**General**

This unit was sufficiently lubricated at the factory to require no further lubrication for an operating period of 2,000 hours, if operated under reasonably normal conditions in an area free of acid fumes, excessive humidity, dust, dirt or any foreign matter harmful to bearings and lubricant. Operating conditions and atmospheric conditions existing in the area of installation must be considered when determining how often lubrication is necessary. If operating under favorable conditions that do not warrant frequent lubrication, the grease inlets should be equipped with plugs that are replaced with grease fittings only during lubrication. Refer to Figure 2 or 3.

If the motor is equipped with grease fittings, lubricate it whenever lubricating your unit. However, if sealed bearings are used in your motor, bearing replacement is suggested every 3 to 5 years, depending on how much use they get and if the bearings become noisy.

Allow only experienced maintenance personnel to lubricate this unit. Before attempting to lubricate this unit refer to your specific assembly drawing to determine the specific type and location of bearings that are used. The bearings will accept grease while operating.

The following steps constitute the procedure for lubricating the bearings:

1. Clean the exterior of the unit around the grease and drain plugs.
2. Remove the drain plugs and if grease holes are plugged, remove the plugs and install grease fittings in their place.
3. Slowly introduce recommended grease, per Table 3, into the output and motor bearings until clean grease appears at the drain holes.
4. Slowly introduce approximately one to two ounces of grease into the pilot bearing (4).

DO NOT over-lubricate. Churning of the grease may result in harmful over-heating of bearings.

5. Before replacing the drain plugs operate the unit for approximately 15 minutes to expel any excess grease from the bearing chambers. Then wipe off all grease from around drain holes and grease fittings. Replace drain plugs.
6. If the unit is being operated under reasonably normal conditions, and does not require frequent lubrication, replace grease fittings with plugs as a precaution against personnel over lubricating bearings.

Recommended Greases Company	Grease	Table 3
Texaco .....	Premium RB No. 2*	
Shell .....	Alvania No. 2	
Gulf .. .. .	Gulfcrown No. 2	
Texaco .....	Multifak No. 2	
Standard .....	Amolith No. 2	
Sinclair.....	Litholine Industrial No 2	
Cities Service .....	H-2	

**\*Note**

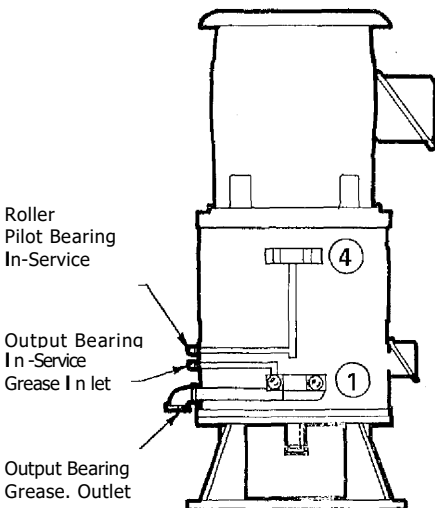
AU units are factory lubricated with this grease before shipment.

**Recommended Greases**

The greases listed in Table 3 are recommended for use in all bearings of your unit. All old grease must be flushed from the bearing chambers before, lubricating if another type of grease has been used.

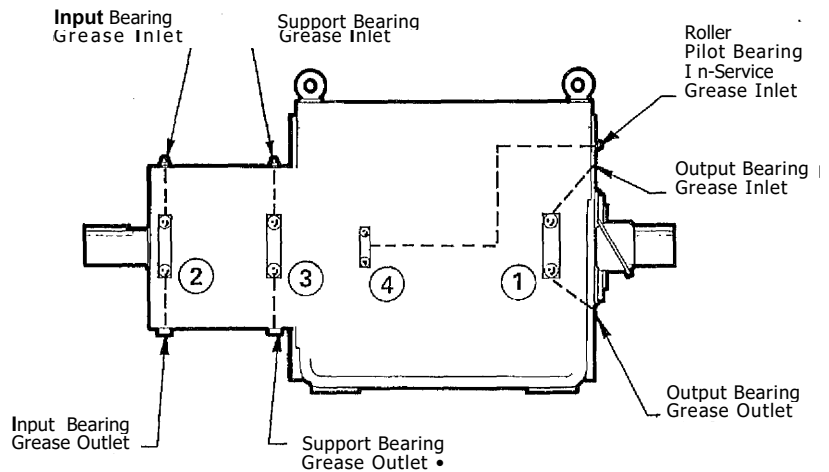
**SPMV**

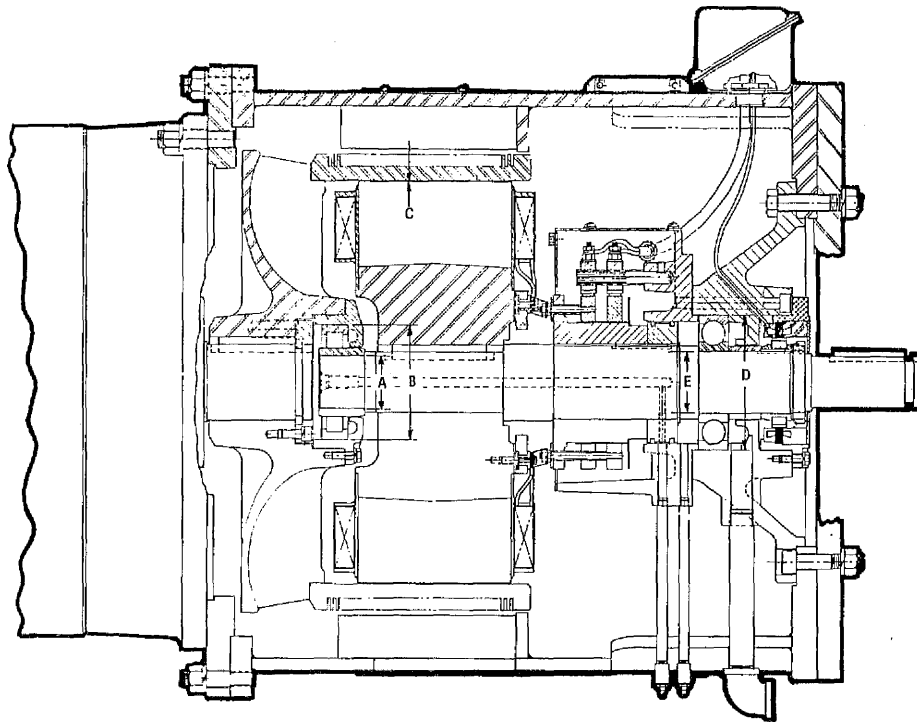
**Figure 2**



**SPC**

**Figure 3**





Dimensions - Inches

Table 4

Models SPM- /SPMV-SPC	8100	8120	8140	8160	8180	8200	8200
PI LOT BEARING - Shaft O. D.	A	1.7727	2.1666	3.5447	3.9384	3.9384	3.7413
		1.7721	2.1659	3.5438	3.9375	3.9375	3.7407
Pilot Bearing Housing I. D.	B	3.9352	4.7226	6.2970	7.0844	7.0844	7.8718
		3.9364	4.7238	6.2982	7.0856	7.0856	7.8728
AIR GAP	c	.028	.044	.048	.048	.050	.046
		.032	.048	.052	.052	.055	.050
OUTPUT BEARING Bearing Support I. D.	D	4.3307	5.5116	7.4801	8.4644	9.4485	10.2359
		4.3314	5.5123	7.4808	8.4651	9.4497	10.2371
Shaft O. D.	E	1.9687	2.5593	3.5438	3.9375	4.3314	4.7249
		1.9683	2.5588	3.5429	3.9366	4.3308	4.7240

**Disassembly/Reassembly**

**General**

Read these instructions carefully and check the appropriate typical Cross Section Drawing with your own assembly drawing to determine the extent of disassembly that is necessary. Should it be necessary to remove bearings, they should be removed by force applied to the outer race when removing from a shaft.

Match mark **all** parts before removing to aid in reassembly.

When reassembling the unit, the USE of new bearings is recommended. After all parts are cleaned and all machine fits have been checked, repaired or replaced, proceed with reassembly.

**Installation of Bearings**

Bearings should never be forced onto a shaft or into housing by blows applied to either race. To do so is to risk serious damage to the bearings. Use either an arbor press or a jack and a piece of soft metal tubing squared on both ends, if necessary. Be careful to start the bearing true, not cocked; otherwise it is possible to burr the shaft. **A light** film of oil or other lubricant on the shaft will prove an aid to mounting. Be sure that the shaft and bearing bores are well cleaned before the bearing is installed. Also, the mechanic doing the work should be



careful that particles of metal or other foreign matter do not enter the bearing during installation. **Do not un-wrap bearings until ready for installation.**

When a bearing is to be pressed over a considerable length of shaft, or over a tight fitting seat, it may be necessary to expand the bearing by heating in oil. When a bearing is heated in oil, the temperature of the oil should not exceed 200°F and the bearing should not be kept in the bath longer than necessary to bring the entire bearing to the required temperature.

### **Coil Replacement**

If one or more coils need replacement, the following procedure will minimize the need for balance correction.

Remove the coil and immediately re-install the four bolts and all other loose pieces to their former position on the rotor until a new coil assembly is available for replacement. Weigh the coil upon removal and then compare it with the weight of the new coil. If weights compare closely, use all pieces when attaching the new coil. A weight difference may require additional (or fewer) loose pieces than those provided. Coils may be ordered from the factory with exactly the same weight as the coil being replaced. When changing more than one coil, selective replacement on a weight-for-weight basis will result in the least amount of compensating weight correction.

## **Horizontal Couplings (Ref: Figure 5)**

### **Disassembly**

1. Remove the coupling from operation and remove machine screws (1) and conduit box cover (2). Disconnect generator and field coil leads entering the box from inside of the housing.
2. Pull off shaft coupling hubs, or sheaves, with an approved puller and remove shaft key (3).
3. Remove pipe plugs (4 & 5).
4. Remove machine screws (6) and brush holder cover (7). Then remove brushes (8).
5. Remove cap screws and lock washers (6) and end bell (7); included are the rotor and shaft assembly, governor generator and inner race of cylindrical roller pilot bearing (30).
6. Remove cap screws and lock washers (8) and generator field (9), being careful to slide lead wires through cavity from the connection box without tearing insulation.
7. Unthread two fittings (10) to separate grease fittings from the end bell. Then remove end bell (7) from the output shaft.
8. Remove locknut and lock washer (11) from the shaft.
9. Remove generator rotor (12) and key (13). Wrap in paper and set rotor aside, being careful not to drop, bump or cause damage.
10. Remove bearing (14), using an approved puller or press.
11. Remove machine screws (15) and brush holder cover (16). Then remove brushes (17). Slide brush holder housing (18) off of the in-service lubrication seal rings.
12. Remove snap ring (19) and slide in-service lubrication seal ring housing (20) off of the shaft. Remove in-service lubrication seal rings (21),
13. Remove nuts (22) from terminal posts in slip ring assembly (26). Remove screws and lock washers (23) and terminal strips (24) from terminal plate (25).
14. Remove slip ring assembly (26) by sliding it off of rotor and shaft assembly (27).
15. Remove cap screws and lock washers (28) and pilot bearing housing (29). Using an inverted bearing puller, remove outer race of cylindrical roller pilot bearing (30) from inside of the pilot bearing housing.
16. Using an approved bearing puller, remove inner race of cylindrical roller pilot bearing (30) from the end of rotor and shaft assembly (27).
17. Install puller studs into tapped holes in drum and support assembly (31) and install puller bar across its hub. Use a hydraulic jack to remove drum assembly. Also remove key (32).
18. Remove cap screws and lock washers (33) and separate input end bracket (34) from housing assembly (35).
19. Unthread two grease fitting extensions (36) from the input end bracket.
20. Remove input shaft key (37).
21. Remove snap ring (38). Then slide input end bracket (34) off of the bearings.
22. Using an approved bearing puller, remove bearings (39 & 40) and grease shield (41) from input shaft (42).
23. To remove any coils from rotor and shaft assembly (27), disconnect the two leads coming from the coil; remove four cap screws holding it in place.

### **Note:**

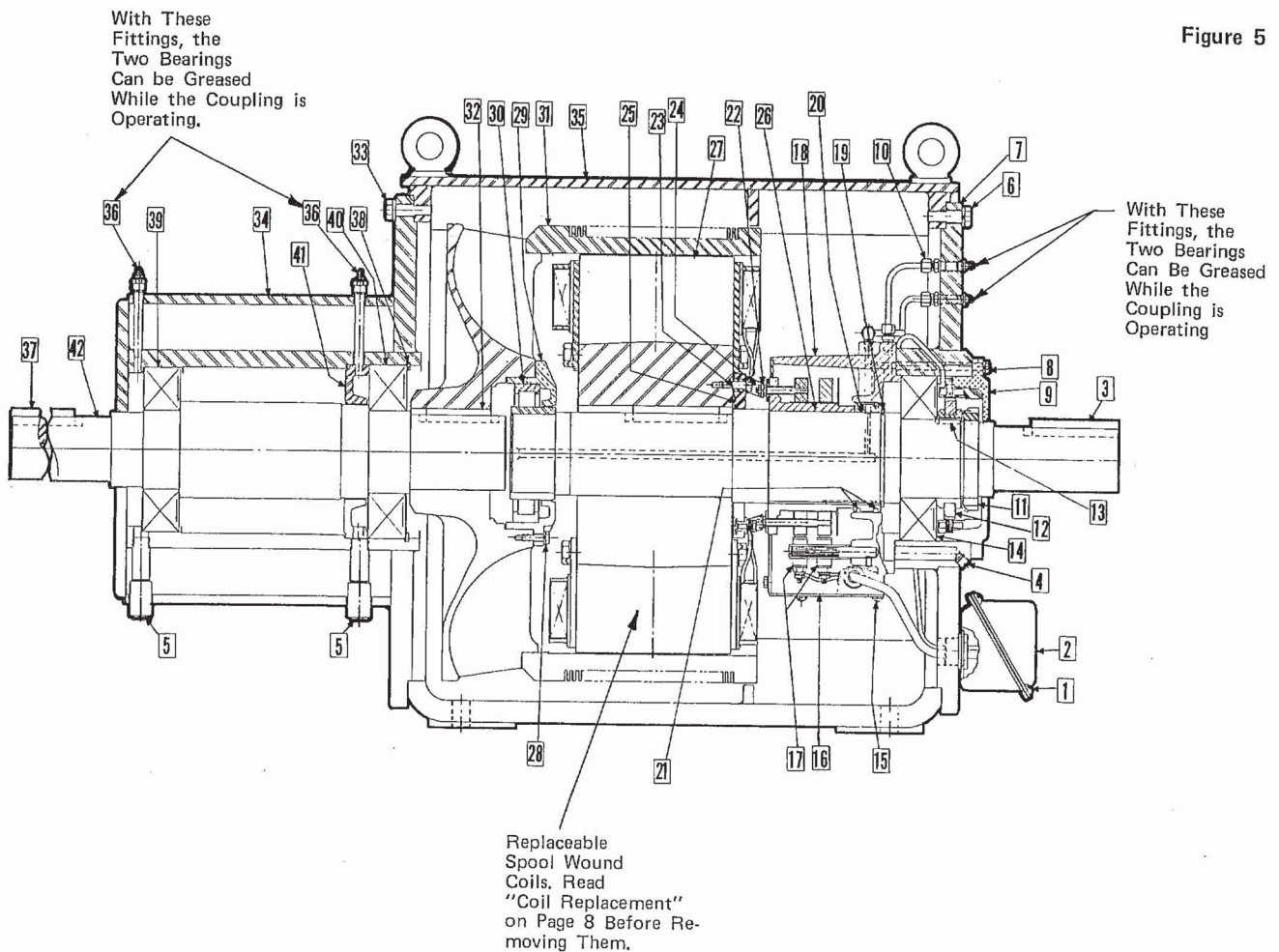
Clean grease and dirt off of all pieces before reassembly.

### **Reassembly**

1. If any coils were removed, install them with four cap screws to rotor and shaft assembly (27). Reconnect the two leads to proper terminal screws.
2. Install grease shield (41) onto input shaft (42). Pack its cavity with recommended grease.
3. Using an approved pusher device, install new bearings (40 & 39) onto the shaft. Each bearing seal must be towards the output end of the shaft as illustrated. Pack the outside end of bearing (39) with recommended grease.
4. Install input end bracket (34) over the bearings and shaft. Install snap ring (38). Be sure to align the two grease fitting holes (end bracket & grease shield).

5. Position and tighten two grease fitting extensions (36) into the input end bracket. Since one of them must thread into grease shield (41), rotate the shaft to locate the hole.
6. Secure completed input end bracket (34) to housing assembly (35) with cap screws and lock washers (33).
7. Use a dial indicator to check alignment of shaft with housing (See Table 1).
8. Install key (32) into the input shaft and use a hydraulic jack to press drum and support assembly (31) onto the shaft. Position the drum support flush against the shoulder of shaft (42).
9. Use a dial indicator to check alignment of shaft with drum support assembly (See Table 1).
10. Pack the cavity of pilot bearing housing (29) with recommended grease. Chill outer race of cylindrical roller pilot bearing (30) and press it into the inner bore of the pilot bearing housing.
11. Secure pilot bearing housing (29) to the hub of drum and support assembly (31) with cap screws and lock-washers (28).
12. Slide slip ring assembly (26) onto rotor and shaft assembly (27), flush against the shoulder of the shaft. Connect two terminal strips (24) to terminal posts and install nuts (22). Connect the other end of terminal strips (24) to the proper terminal lug of terminal plate (25), using screws and lock washers (23).

**Typical Horizontal Salient Pole Coupling Cutaway.**



**Figure 5**

**Parts Description**

- |                            |  |                                      |
|----------------------------|--|--------------------------------------|
| 1. Machine screw           | 15. Machine screw                            | 29. Pilot bearing housing            |
| 2. Conduit box cover       | 16. Brush holder cover                       | 30. Cylindrical roller pilot bearing |
| 3. Key                     | 17. Brushes                                  | 31. Drum & support assembly          |
| 4. Pipe plug               | 18. Brush holder housing                     | 32. Key                              |
| 5. Pipe plug               | 19. Snap ring                                | 33. Cap screw & lock washer          |
| 6. Cap screw & lock washer | 20. In-Service lubrication seal ring housing | 34. Input end bracket                |
| 7. End bell                | 21. In-Service lubrication seal ring         | 35. Housing assembly                 |
| 8. Cap screw & lock washer | 22. Nut                                      | 36. Grease fitting extension         |
| 9. Generator field         | 23. Screw & lock washer                      | 37. Key                              |
| 10. Fitting                | 24. Terminal strip                           | 38. Snap ring                        |
| 11. Locknut & lock washer  | 25. Terminal plate                           | 39. Bearing                          |
| 12. Generator rotor        | 26. Slip ring assembly                       | 40. Bearing                          |
| 13. Key                    | 27. Rotor & shaft assembly                   | 41. Grease shield                    |
| 14. Bearing                | 28. Cap screw & lock washer                  | 42. Input Shaft                      |

13. Slide in-service lubrication seal ring housing (20) onto the shaft, flush against the slip ring assembly. Install two in-service lubrication seal rings (21) with sides marked "up" facing toward each other. Install snap ring (19).
14. Install brush holder housing (18) onto the shaft. Install brushes (17) and install brush holder cover (16) with machine screws (15).
15. Pack cavity between brush holder housing (18), in-service lubrication seal ring housing (20) and rotor and shaft assembly (27) with recommended grease. Warm bearing (14) and press it onto the shaft, with the seal to the outside, flush against the shoulder of the shaft.
16. Install key (13). Carefully slide generator rotor (12) in place onto the shaft.
17. Install lock washer and locknut (11).
18. Insert a long stud into one hole of brush holder housing (18), (installed in Step 14 above).
19. Install end bell (7) over bearing (14) and stud in brush holder housing.
20. Install generator field (9) over shaft so lead wires pass through cavity to connection box and so hole in generator field is aligned with stud installed in Step 18 above. Install cap screws and lock washers (8) and remove the stud.
21. Position and tighten fittings (10) into the back side of end bell (7).
22. Warm inner race of cylindrical roller pilot bearing (30). Press it onto the input end of the rotor and shaft assembly.
23. Install rotor and shaft and end bell assemblies into bearing (30) inside of drum and support assembly (31). Secure with cap screws and lock washers (6).
24. Install keys (3 & 37) onto the two shafts.
25. Make necessary electrical connections in connection box; install gasket and cover (2) with machine screws (1).
26. Align unit in accordance with installation and alignment instructions.
27. Run the unit for fifteen minutes to purge excess grease. Then install pipe plugs (4 & 5).

## Vertical Drives (Ref: Figure 6)

### Disassembly

1. Remove the drive from operation and remove machine screws (1) and conduit box cover (2). Disconnect generator and field coil leads entering the box from inside of the housing.
2. Pull off shaft coupling hub with an approved puller and remove shaft key (3).
3. Remove two machine screws, lock washers and square nuts (4) and grille (5).
4. Remove machine screws (6) and brush holder cover (7). Then remove brushes (8).
5. Remove nuts and lock washers (9), and eyebolts (10) if used. Lift motor (11) vertically to separate the motor from the housing; included on the motor shaft is drum and drum support assembly (41) with outer race of cylindrical roller pilot bearing (34).
6. Unthread two grease fitting extensions (12) from brush holder housing (25) and grease drain extension (13) from output bearing support housing (22).
7. Remove nuts, lock washers and cap screws (14). Insert an eye bolt into the input end of rotor and shaft assembly (35) and lift vertically out of housing assembly (15).
8. Remove cap screws and lock washers (16) and generator field (17), being careful to slide lead wires through cavity in output bearing support housing (22) without tearing insulation.
9. Remove locknut and lock washer (18) from the shaft.
10. Remove generator rotor (19) and key (20). Wrap in paper and set rotor aside, being careful not to drop, bump or cause damage.
11. Remove output bearing support housing (22) by first removing cap screws (21). Also, slide spacer (23) off of the shaft.
12. Remove bearing(s) (24), Using an approved puller or press. Slide brush holder housing (25) off of the in-service lubrication seal rings.
13. Remove snap ring (26) and slide in-service lubrication seal ring housing (27) off of the shaft. Remove in-service lubrication seal rings (28)
14. Remove nuts (29) from terminal posts in slip ring assembly (33). Remove screws and lock washers (30) and terminal strips (31) from terminal plate (32).
15. Remove slip ring assembly (33) by sliding it off of rotor and shaft assembly (35).
16. Using an approved bearing puller, remove inner race of cylindrical roller pilot bearing (34) from the end of rotor and shaft assembly (35).
17. Remove cap screws and lock washers (36) and pilot bearing housing (37). Using an inverted bearing puller, remove outer race of cylindrical roller pilot bearing (34) from inside of the pilot bearing housing.
18. Remove cap screws and lock washers (38), split ring retainer (39,) and split ring (40).
19. Install puller studs into tapped holes in drum and support assembly (41) and install puller bar across its hub. Use a hydraulic jack to remove drum assembly. Also, remove key (42).
20. To remove any coils from rotor and shaft assembly (35), disconnect the two leads coming from the coil; remove four cap screws holding it in place.

### Note:

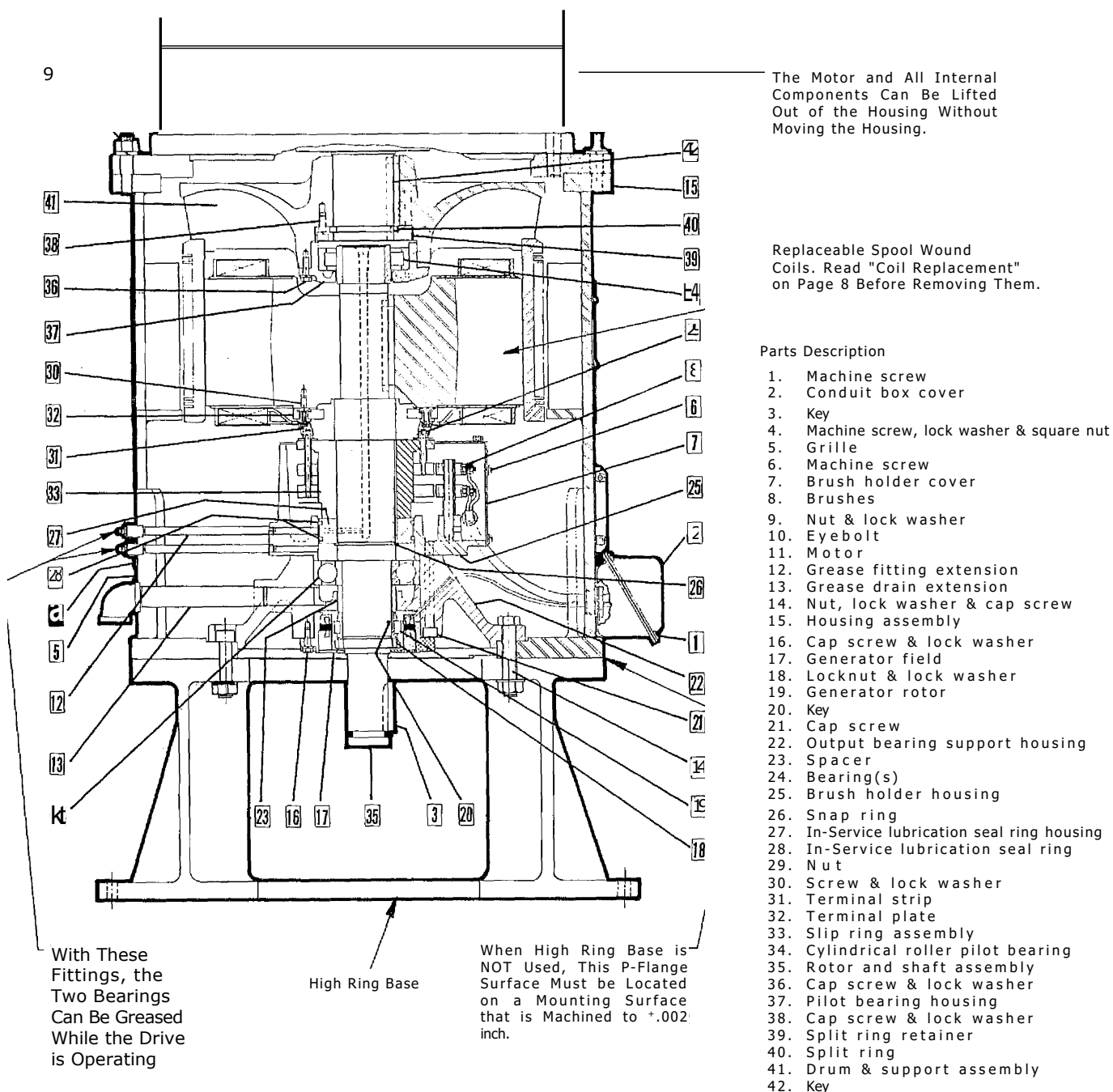
Clean grease and dirt off of all pieces before reassembly.

## Reassembly

1. If any coils were removed, install them with four cap screws to rotor and shaft assembly (35). Reconnect the two leads to proper terminal screws.
2. Install key (42) into the motor shaft and use a hydraulic jack to press drum and support assembly (41) onto the shaft. Locate the drum and support by dimensions in Table 4. White lead on the shaft will aid the assembly.
3. Use a dial indicator to check alignment of shaft with drum and support assembly (See Table 1).
4. Install split ring (40), split ring retainer (39) and secure them inside the bore of the drum and support assembly with cap screws and lock washers (38).
5. Pack the cavity of pilot bearing housing (37) with recommended grease. Chill outer race of cylindrical roller pilot bearing (34) and press it into the inner bore of the pilot bearing housing.
6. Secure pilot bearing housing (37) to the hub of drum and support assembly (41) with cap screws and lock washers (36). Apply additional grease to this side of bearing.
7. Slide slip ring assembly (33) onto rotor and shaft assembly (35), flush against the shoulder of the shaft. Connect two terminal strips (31) to terminal posts and install nuts (29). Connect the other end of terminal strips (31) to the proper terminal lug of terminal plate (32), using screws and lock washers (30).

Typical Vertical Salient Pole Pump Drive Cutaway

Figure 6



8. Slide in-service lubrication seal ring housing (27) onto the shaft, flush against the slip ring assembly. Install two in-service lubrication seal rings (28) with sides marked "up" facing toward each other. Install snap ring (26).
9. Install brush holder housing (25) onto the shaft. Install brushes (8) and install brush holder cover (7) with machine screws (6)
10. Pack cavity between brush holder housing (25), in-service lubrication seal ring housing (27) and rotor and shaft assembly (35) with recommended grease. Warm bearing(s) (24) and press onto the shaft, flush against the shoulder of the shaft.
11. Slide spacer (23) onto the shaft, flush against bearing(s) (24). Then install output bearing support housing (22) and secure with cap screws (21).
12. Install key (20). Carefully slide generator rotor (19) in place onto the shaft.
13. Install lock washer and locknut (18).
14. Install generator field (17) over shaft so lead wires pass through cavity to connection box. Install cap screws and lock washers (16).
15. Insert an eyebolt into the input end of rotor and shaft assembly (35) and carefully insert it into housing assembly (15). The housing must be in a vertical position with its input flange in the up position. Secure it with cap screws, nuts and lock washers (14).
16. Install grease drain extension (13), threading it into output bearing support housing (22) so its opening is downward. Then install two grease fitting extensions (12), Threading them into brush holder housing (25).
17. Warm inner race of cylindrical roller pilot bearing (34). Press it onto the input end of the rotor and shaft assembly.
18. Carefully lower motor (11) onto the input end of housing (15). Secure with nuts and lock washers (9), and eyebolts (10) if used.
19. Position grille (5) around the housing and secure with machine screws, lock washers and square nuts (4).
20. Install key (3) onto the shaft.
21. Make necessary electrical connections in connection box; install gasket and cover (2) with machine screws (1).
22. Align unit in accordance with installation and alignment instructions.

## PRODUCT DESCRIPTION

The Dynamatic air cooled, eddy-current salient pole units are available as a horizontal drive (SPM), horizontal coupling (SPC) and vertical drive (SPMV). The salient pole drive consists of the coupling integrally mounted to an AC motor. A vertical drive is designed especially to accommodate vertical operation.

The salient pole unit is an adjustable speed slip device used to transmit power from a prime mover to a load that diminishes its torque requirements as the load speed decreases, thus lending itself to fan and pump applications.

Within the coupling housing, there is an easily removable drum, which is keyed to the input shaft, and rotates at the speed of the prime mover, an adjustable speed rotor assembly, which contains a series of rotating field coils, slip rings and output shaft. The rotor is mounted within and concentric to the smooth inner surface of the drum. Since the drum and rotor are independent of each other, the only mechanical linkage between them is the pilot bearing. The brushes, located inside of the brush holder assembly, carry the field coil excitation from the controller to the field coil slip rings that are mounted on the output rotating member.

### Operation

When the field coils are energized, the interaction of their magnetic field with the eddy-currents generated on the drum attracts the rotor to rotate with the drum, thereby transmitting torque from the prime mover to the load. Control of the output speed is achieved with a system that automatically adjusts itself, by varying field coil excitation, to deliver rated torque at the required speed. The coupling is neither a speed nor torque multiplier.

The maximum output speed is necessarily less than that of the prime mover.

### Feedback Control

A governor generator, located inside of the housing, and driven by the output member, produces an AC voltage in direct proportion to the speed at which it is driven. This voltage, which represents the actual output speed of the coupling, is rectified and compared with a reference voltage in the governing circuit of the control to ensure accurate, sensitive speed control. At maximum speed of the coupling, the governor generator produces approximately 48 to 60 volts AC.

### Vertical Drives

The vertical drives and couplings are similar to the standard horizontal salient pole drives and couplings, except that they are equipped with a P-Flange output end bell, special bearings, special seals and a shaft extension sufficiently long for vertical operation. An optional drive pedestal is available that aligns with the P-Flange end bell.

**Dynamatic**<sup>®</sup>  
DRIVE SOURCE INTERNATIONAL, INC.

Manufacturer of Dynamatic and Ajusto Spede Products

**DRIVE SOURCE INTERNATIONAL, INC.**  
7900 Durand Avenue, Bldg 3  
Sturtevant, WI U.S.A. 53177  
Tel: 262-554-7977 Fax: 262-554-7041  
Toll Free: 800-548-2169  
E-mail: sales@dynamatic.com