



# **IMPERIAL**

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## **ELECTRIC**

***The Driving Force In Motion***

A Kinetek™ Company

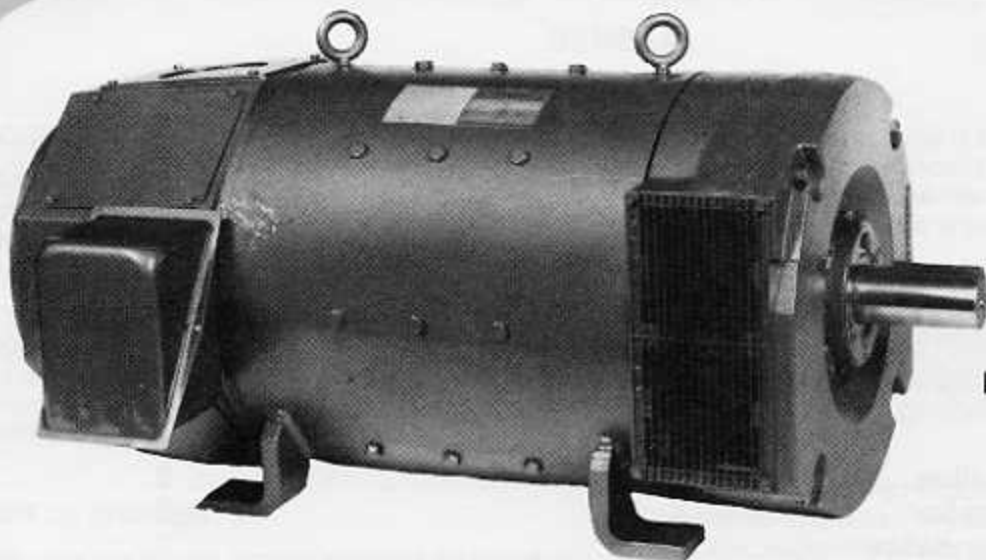
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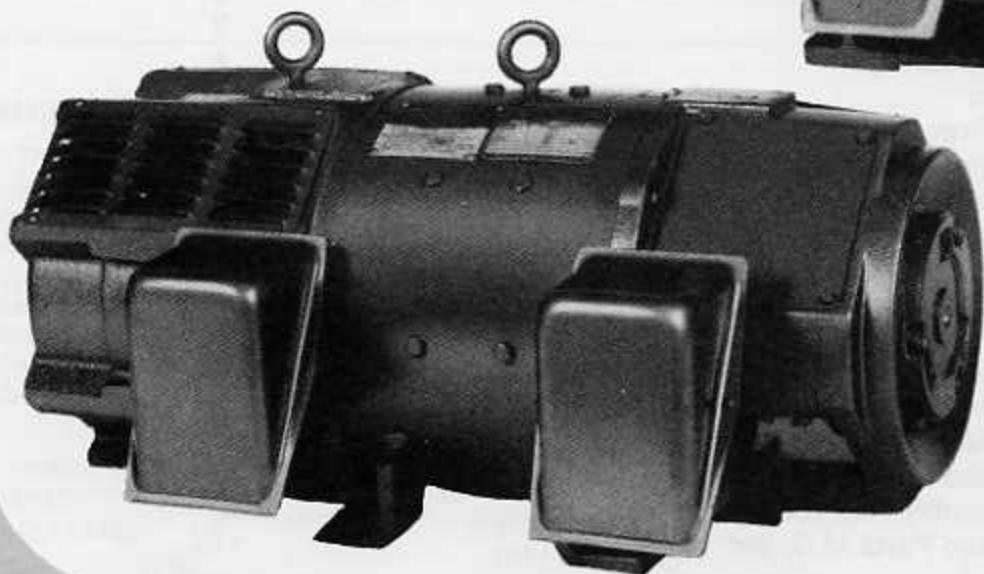


Ball Bearing  
D.C. Motor or  
Generator

**DIRECT and  
ALTERNATING CURRENT  
MOTORS and  
GENERATORS**



Ball Bearing  
A.C. Motor



Motor  
Generator  
Set

SINCE 1889

THE



*Where talented people  
create the finest in motors*

ELECTRIC COMPANY

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## GENERAL

### INTRODUCTION

All Imperial motors and generators are designed for industrial use. With proper operation and maintenance, they will perform continuously for many years within the range and rating established by the design.

It is strongly recommended, therefore, that these instructions be carefully observed and that the motor or generator be connected and operated as intended. Observance of these procedures will result in long life, good performance and financial savings.

### RECEIPT OF SHIPMENT

When your equipment arrives, it should be checked immediately to see that all components have been received and that there is no evidence of damage in shipment.

**In the event of damage, notify the delivering carrier immediately. Report the extent of damage, and file a formal claim.**

If any supporting documents, or repair estimates are required, contact your nearest Imperial Sales Office, or the Factory for assistance.

The delivering carrier is responsible for any damage in transit. The motor should not be returned to our Factory without both the written consent of the carrier and authorization from The Imperial Electric Co.

When communicating with a Sales Office, make reference to the motor serial number, the type and rating of the unit, and any other information such as sales office from which ordered, your purchase order number, etc., that would be useful in identifying the equipment.

### STORAGE

If the equipment is not put into immediate use it should be stored in a clean, dry location. For long periods of storage, especially where moisture or dust is prevalent, the equipment should be covered to protect it from corrosion. Shaft should be rotated every 6 months and additional grease added purging some of that in the cavity (see page 3, steps b, c, d, e, and f).

Brushes should be lifted from commutator during prolonged storage to prevent corrosion and flat spots.

Care should be taken to keep the equipment covered when moving from a cold location to a warm location. Otherwise, condensation may occur. If condensation does occur, and the equipment is moist, allow to dry thoroughly before applying power.

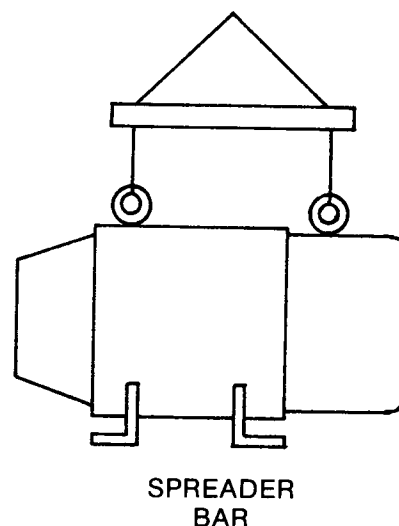
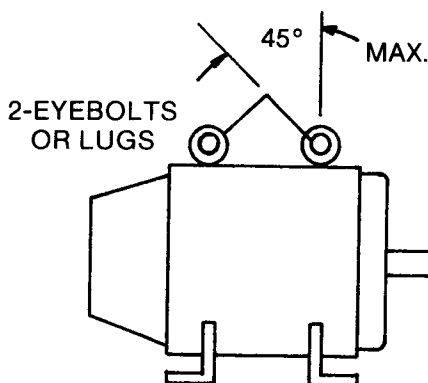
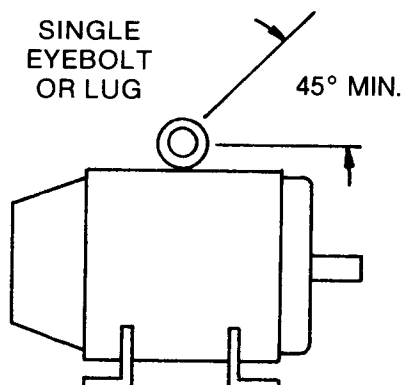
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### HANDLING

The lifting lugs or eyebolts provided on the motor shall be used for lifting and handling motor only and cannot be used to lift assemblies of motor and generator or other equipment mounted on a common base. Base mounted units and assemblies shall be lifted by slinging to base. Use spreader bar to keep angle of lift

with rope greater than  $45^\circ$  from horizontal. Where motor has 2 lugs or eyebolts, sling angle must never be less than  $45^\circ$  from horizontal. If eyebolt is furnished, check that it is threaded securely into the motor before attempting to lift. Make sure lifting chain or cable is not twisted before attaching it to eyebolt.

**LIFT MOTOR ONLY USING ALL EYEBOLTS OR LIFTING LUGS PROVIDED ON UNIT. USE OF A SPREADER BAR IS PREFERRED WHEN TWO BOLTS ARE PROVIDED.**



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## LOCATION

In selecting a location for the unit, first consideration should be given to ventilation. It should be far enough from walls or other objects to permit a free passage of air.

Less maintenance will be required if unnecessary dirt, dust, moisture, liquids and similar hazards are kept away from units.

The motor or generator should never be placed in a room with a hazardous process, or where flammable gases or combustible material may be present unless it is specially designed for this type of service.

## FOUNDATIONS

Foundations must be of ample size and proportion to support the unit. Local soil conditions vary so that the exact depth of the foundation cannot be specified here. Foundations should be reasonably level and high enough to make maintenance easy.

## BASES

All bases, except those specifically designed to be "Self-Supporting," are designed to act only as a spacer between the foundation and the machine and must not be trusted to carry any weight when unevenly supported. Care must be taken when handling to prevent warping or distortion of the base.

## MOUNTING

The motor or generator should be securely mounted on a bed plate, base or platform that is rigid enough to prevent any vibration of the unit and also prevent transfer of vibration to the unit. The base must not impose bending or twisting strains on the housing, therefore base must be properly grouted to maintain alignment.

## ALIGNMENT

The motor shaft should be carefully aligned when directly coupled to the driven equipment. Make certain that the coupling halves are both concentric and parallel.

Misalignment can be the single major cause of premature bearing failure or shaft breakage.

## WIRING

Check all connections with the appropriate wiring diagram. Generator rotation shall be per rotation plate mounted adjacent to name plate.

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## WARNING: AC-DC

- *High voltage and rotating parts can cause serious or fatal injury.*
- *Installation, operation and maintenance of electrical machinery should be performed by qualified personnel.*
- *Motor and equipment must be grounded and protected in accordance with the National Electric and local codes.*
- *See NEMA MG-2 SAFETY STANDARD.*
- *Motor or generator may be at line voltage when not in operation. To avoid electrical shock, before touching internal parts, disconnect power to the power unit, field and accessories.*

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## OVERLOADS

Proper sizing of the thermal unit(s) for motor overload protection should be done based on the National Electrical Code, State Codes, Local Codes and instructions from the control manufacturer. Special attention should always be given to ambient conditions at motor and controller.

## FINAL INSPECTION

Inspect all electrical clearances, particularly where bare conductors of opposite polarity approach each other. Bend all brush pigtails to maintain adequate clearance from grounded portions of the machine and from pigtails or bus bars of opposite polarity.

If possible, turn the armature by hand to see that it rotates freely.

## START UP

When the machine has been carefully inspected according to the instructions just outlined, make the initial start by following the regular sequence of starting operations given under the instructions for the particular type of machine.

Before putting the machine into service, it is desirable to operate without load long enough to determine that there is no unusual localized heating.

Any appreciable vibration should be investigated and corrected.

# MAINTENANCE

## GENERAL

To keep the equipment operating at a high level of efficiency, a good maintenance program must be set up. Systematic inspections of the equipment should be scheduled, and records should be kept of the findings of these inspections. Examination of these records will indicate any sign of potential trouble.

Since each industry has its own special conditions, an overall plan for periodic maintenance is not outlined here. However, the following pages give many tips on the maintenance of electrical equipment.

## CLEANING

Dirt, dust, oil and moisture are the greatest enemies of electrical equipment. When dirt or dust settle on a machine, they may prevent heat dissipation and restrict ventilating passages. This in turn may lead to overheating and insulation breakdown. Some types of dust are electrically conductive and can also cause insulation breakdown. On commutating machines, dirt on the commutator will result in sparking and excessive brush and commutator wear.

Dust and dirt may be removed from electrical equipment with dry compressed air, with dry cloths or by brushing. The compressed air must be dry and at a low pressure (not over 50 P.S.I.) to prevent damage to the insulation. Grit, iron dust, graphite, lamp black and copper dusts should be removed by suction. Hose tips for either pressure or suction should not be metal.

## BALL BEARINGS

The frequency of regreasing should be dependent upon the speed and operating conditions. The greatest cause of bearing failure is overgreasing rather than undergreasing.

**The following steps should be followed when greasing the motor.**

- a. Clean the exterior of the motor.
- b. Remove both the grease plug and relief plug.
- c. If grease has hardened, remove the hardened lubricant which has accumulated in the area around the relief plug with a wooden or plastic stick. In severe conditions, run the motor until the bearing chamber is warmed to a temperature which will allow the grease to flow more easily.

- d. Regrease motor with a low pressure grease gun. (motor shall be stationary) (see note for grease)
- e. Run motor until new grease flows from the drain plug. For optimum operation the bearing chamber should be two-thirds full of grease.
- f. Replace grease and relief plugs (motor shall be stationary)

Imperial motors are properly lubricated when they leave the factory and thus do not require lubrication when installed.

The motor should be relubricated if it has been in storage for six months or longer.

## RELUBRICATION GUIDE IN MONTHS FOR MOTORS OPERATING IN AMBIENT TEMPERATURE OF 0° TO 104° F.

Condition	Motor RPM	
	Thru 1800	3600
1	12 Mo.	6 Mo.
2	6 Mo.	3 Mo.
3	3 Mo.	3 Mo.

For motors supplied with roller bearings, divide above values by 3.

For operation in other than above ambient temperature, contact the manufacturer.

## CONDITION DESCRIPTION

1. (Normal) Eight hours per day, normal loading, clean environment, 104° F. max. ambient.
2. (Severe) Twenty-four hour per day operation, or shock vibration loading, dirt or dust environment, 104° to 150° F. ambient.
3. (Extreme) Heavy shock or vibration, harsh environment.

## Note:

Unless otherwise shown on nameplate, the standard medium temperature grease (0° to 225° F) is Shell Alvania #2. Do not relubricate with so called equivalent greases, they may not be chemically compatible. Do not use silicone greases in D.C. equipment. Relubrication should be done with the shaft stationary.

## MAINTENANCE (Continued)

### SLEEVE BEARINGS

*Sleeve bearing motors are suitable for horizontal foot mounted operation only.*

**Be sure to fill the oil chamber or oil system with properly selected oil before the motor is run for the first time.**

After an oil has been selected, it is advisable to continue the same oil to prevent troubles caused by incompatible lubricant mixtures. Under most circumstances, it is not advisable to add preservatives or rust preventing compounds to the oil system unless such recommendations are made by the manufacturer of the lubricant which is used.

The frequency of checking the level and condition of the oil should be determined by the atmosphere and operating conditions in which the motor is running. Motors in atmospheres containing high humidity, acids, alkalis, and other contaminants should be checked more frequently. If discoloration or other evidence of contamination is observed, the oil should be replaced immediately.

The frequency with which oil should be changed, even when no evidence of contamination is observed, is dependent upon the conditions under which the motor operates and the speed of the motor. The following table suggests the frequency of oil change with regard to motor RPM, assuming average bearing temperatures.

RPM	Interval of Time Between Relubrication	Approx. Hrs. of Operation
900 & Below	6 to 8 Months	2500
1200 thru 1800	6 to 8 Months	2000
3600	4 to 6 Months	1500

### BRUSHES

Brush maintenance includes inspection for proper seating, sparking, chattering, grooving, wear and pressure. Spare brushes should be kept on hand and installed when required. When installing new brushes, place 80 grit garnet commutator paper between brush and commutator with the brush resting on the abrasive side of the paper. Work the garnet paper back and forth until the curvature of the brush fits the commutator.

### DETERMINING BRUSH PRESSURE

Brush pressure is important. Make certain that the brushes rest firmly on the commutator and that all brushes are held firmly by approximately the same pressure. A pressure of 2-4 pounds per square inch of surface for each brush is proper for normal applications.

PSI = LBS./AREA, FOR 0° BRUSH  
 PSI = LBS./(.1064 x AREA), FOR 20° BRUSH  
 AREA = BRUSH WIDTH x THICKNESS (INCHES)  
 LBS. = BRUSH SPRING FORCE.

Attach a spring scale to the pigtail (remove pigtail from stud) and pull very straight on the pigtail so that the brush will not bind. Pull the brush all the way to the top (spring contacts spring clip) and then let it return about 1/16 to 1/8 inch. Observe spring tension. This method will give the spring load to about 10% accuracy.

Do not observe spring tension as the brush is moving out. Readings taken when the brush is moving out will be higher and should be ignored.

### BRUSH USABLE LENGTH

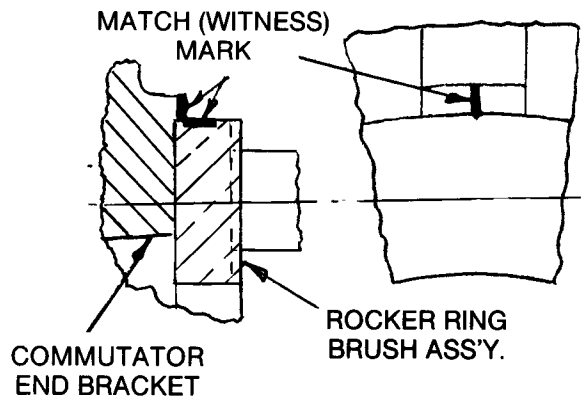
Brush Size			Brush Usable Lgth.	Brush Min. Operating Lgth.*
Width	Thk.	Orig. Lgth.		
3/4	5/16 3/8	1 1/2	9/16	15/16
1	1/4 3/8	1 1/2	5/8	7/8
1 1/4	5/16 3/8	2	7/8	1 1/8
1 1/2	3/8 7/16 1/2	2	7/8	1 1/8
1 1/2	5/8	2 1/4	1	1 1/4
1 1/2	3/4	2 1/4	5/8	1 5/8
1 1/2	7/8	2 1/4	9/16	1 11/16

\*When this length of brush remains it should be replaced otherwise loss of spring force will occur.

### FACTORY BRUSH SETTING

The rocker ring brush assembly on D.C. machines is factory set for optimum machine performance and no field adjustment is necessary.

After the final factory setting of the rocker ring brush assembly, the rocker ring & bracket is match marked as shown in sketch.



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## MAINTENANCE (Continued)

### COMMUTATORS

Normally the commutators of DC generators and motors should be smooth, highly polished and free of dirt, oil, grease or moisture. When an inspection is made, these features should be checked.

If excessive sparking has occurred, the surface of the commutator will appear dull and black. In this case it should be cleaned with a fine commutator stone or garnet commutator paper (do not use emery cloth). See trouble shooting chart for possible brush and/or commutator problems.

In event commutator requires finishing in a lathe, follow procedures which will ensure its concentricity to the bearing journals within .001 T.I.R. (total indicator reading) and a surface finish of 16 microinch or better. After undercutting mica, reinstate finish with garnet commutator paper. Imperial DC machines are designed to operate with the mica between commutator bars undercut below the surface of the bars. Failure to restore the undercut will result in sparking, excessive brush wear, and ultimate damage to the commutator.

Where dirt, oil, grease, or moisture is found on the commutator, it should be completely cleaned with a hard, lint-free cloth. Segments between the commutator should be cleaned out with a hardwood wedge or undercutting tool. The source of dirt, oil, grease, or moisture should be determined and measures taken to prevent its deposit on the commutator.

### WINDINGS

Accumulations of any foreign materials should be kept off the windings. Failure to keep the windings clean may result in short circuits, grounding of insulated surfaces, and increased temperature rise.

The frequency of cleaning windings will have to be determined by operating conditions. However, it is a good policy to clean the windings at least once a year. Greasy or oily deposits may be wiped off with a lint free cloth dipped in a suitable solvent.

Follow the cleaner instructions carefully regarding procedures, methods, cautions and warnings.

Take care not to leave solvent deposits on the windings. Light accumulations of non-conductive dust may be removed by compressed air (not over 50 P.S.I.). Do not blow directly into the windings.

When dirt and dust accumulations are heavy or of a highly conductive nature, it is best to use a vacuum cleaner to clean the machine. Use a non-metallic suction head inlet nozzle (plastic crevice tool).

### TROUBLE SHOOTING - D.C.

#### MOTOR WON'T START

1. *Low armature voltage* — Check motor nameplate to insure that motor is connected to proper voltage. Also, check voltage at motor terminals to insure that wire size is adequate.
2. *Weak field* — Check for resistance in shunt field circuit. Check for open in shunt field circuit.
3. *Open circuit in armature or field* — Check for open circuit.
4. *Short circuit in armature or field* — Check for short circuit.

#### MOTOR RUNS TOO FAST

1. *Armature voltage too high* — Reduce.
2. *Weak field* — Check for resistance in shunt field circuit.
3. *Brushes not on factory setting* — Correct.

#### MOTOR RUNS TOO SLOWLY

1. *Armature voltage low* — Check for resistance in armature circuit.
2. *Overload* — Reduce load or use larger motor.
3. *Brushes not on factory setting* — Correct.

#### BRUSH CHATTER

1. *High mica* — Undercut
2. *Incorrect brush size* — replace with brushes of proper size.
3. *Incorrect brush grade* — Review application — Consult factory.
4. *Commutator rough or eccentric* — Resurface commutator.

#### BRUSHES SPARKING

1. *Brushes worn* — Replace.
2. *Brushes not seated properly* — Reseat.
3. *Brushes stuck in brushholder* — Free brushes. Be sure that brushes are of proper size.
4. *Commutator dirty* — Clean.
5. *Commutator rough or eccentric* — Resurface commutator.
6. *Brushes off factory setting* — Correct.
7. *Wrong direction of rotation* — Change rotation (generator only).
8. *Short circuit in commutator* — Check for shorted commutator. Also, check for metallic particles between commutator segments.
9. *Overload* — Review application.



**RENEWAL PARTS - D.C.**

The renewal parts recommended (table) are those most subject to wear in normal operation, or most subject to damage or breakdown due to abnormal operating conditions. Whether or not a supply of spare parts should be maintained depends entirely upon the evaluation of loss that can be sustained during the time required to procure such parts after an unexpected failure.

The quantities recommended (table) are given only as a guide, but are believed to offer reasonable security against normal operating hazards. Where continuous operation is of paramount importance, consideration should be given to increasing the quantities shown, depending on the severity of service conditions and the time required to obtain replacements.

**RECOMMENDED RENEWAL PARTS FOR D.C. MOTORS AND GENERATORS  
(Adapted from NEMA Guide 1)**

Item	Part Name	1 to 4 Units	5 to 9 Units	10 to 25 Units
1	Complete Motor	0	0	1
2	Main Field Coil	1 coil	1 set	1 set
3	Interpole Coil	1 coil	1 set	1 set
4	Armature Complete	0	1	1
5	Commutator	0	1	1
6	Brush Holder Yoke	1	1	1
7	Rocker Arm	1	1	2
8	Brush Holder Ass'y	2	1 set	1 set
9	Brush Holder Stud	1 set	1 set	1 set
10	Brushes	1 set	2 sets	2 sets
11	Brush Holder Spring Clip Ass'y	2	4	8
12	Front Bearing	1	2	2
13	Back Bearing	1	2	2
14	Oil Ring (Where required)	1 set	1 set	1 set

**RENEWAL PARTS - AC**

The renewal parts recommended (table) are those most subject to wear in normal operation, or most subject to damage or breakdown due to abnormal operating conditions. Whether or not a supply of spare parts should be maintained depends entirely upon the evaluation of loss that can be sustained during the time required to procure such parts after an unexpected failure.

The quantities recommended (table) are given only as a guide, but are believed to offer reasonable security against normal operating hazards. Where continuous operation is of paramount importance, consideration should be given to increasing the quantities shown, depending on the severity of service conditions and the time required to obtain replacements.

**RECOMMENDED RENEWAL PARTS FOR SQUIRREL-CAGE MOTORS  
(Adapted From NEMA Guide No. 2)**

Description of Part	Recommended Minimum Stock Number of Units in Operation			
	1 to 4	5 to 9	10 to 20*	10 to 20
Motor complete	0	0	0	1
Frame with wound stator core ass'y.	0	1	2	1
Bearings	1 Set	2 Sets	2 Sets	1 Set
Oil rings (where used)	1 Set	1 Set	2 Sets	1 Set
Retainer rings (where used)	1 Set	1 Set	2 Sets	1 Set

\*This column to be used when complete motor is not stocked.

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## TROUBLE SHOOTING - AC

### MOTOR WON'T START

1. *Overload relay tripped - Reset.*
2. *Fuses blown - Replace fuses.  
Restart only after checking #3 thru #12.*
3. *Motor not connected properly - Check all connections to motor and control.*
4. *Improper line voltage - Check motor nameplate to insure that motor is connected to proper voltage. Also check the voltage at the motor terminals to insure that wire size is adequate.*
5. *Jammed - Disconnect motor from load. If motor starts, check driven machine.*
6. *Control not operating - Check control circuit and components.*
7. *Overloaded - Reduce load or use larger motor.*
8. *Bearings stiff - Replace bearings.*
9. *Grease stiff - Replace grease. Be sure to use the right grease for the application. Consult the factory if in doubt.*
10. *Open circuit in stator or rotor - Check for open circuit.*
11. *Short circuit in stator - Check for short circuit.*
12. *Winding grounded - Check for ground.*

### MOTOR RUNS BACKWARDS

1. *Reversed phase sequence - Interchange two line connections at the motor.*

### MOTOR NOISY

1. *Single phased - Stop motor and try to start. It will not start on single phase.*
2. *Loose coupling - Check alignment and tighten coupling.*
3. *Motor loose - Tighten mounting bolts - Check alignment.*
4. *Shaft bumping (sleeve bearing motor) - Check alignment.*
5. *Noisy bearing - Check lubrication and replace bearing.*
6. *Air gap not uniform - Sleeve bearings worn - Replace sleeve bearings.*
7. *Vibration - Check alignment. Driven machine may be unbalanced. Remove motor from driven machine. If motor is still noisy, rebalance rotor.*
8. *Electrical unbalance - Check voltage and current per phase.*

### OVERHEATING

1. *Overload - Review application.*
2. *Poor ventilation - Check motor air passages. Make sure that ventilating air is not obstructed.*
3. *Bearings stiff - Replace bearings.*
4. *Belt too tight - Reduce belt tension.*
5. *Electrical unbalance - Check voltage and current per phase.*
6. *Stator grounded - Check for grounded coil.*
7. *Stator shorted - Check for shorted coil.*
8. *Air gap not uniform - Sleeve bearings worn - Replace sleeve bearings.*

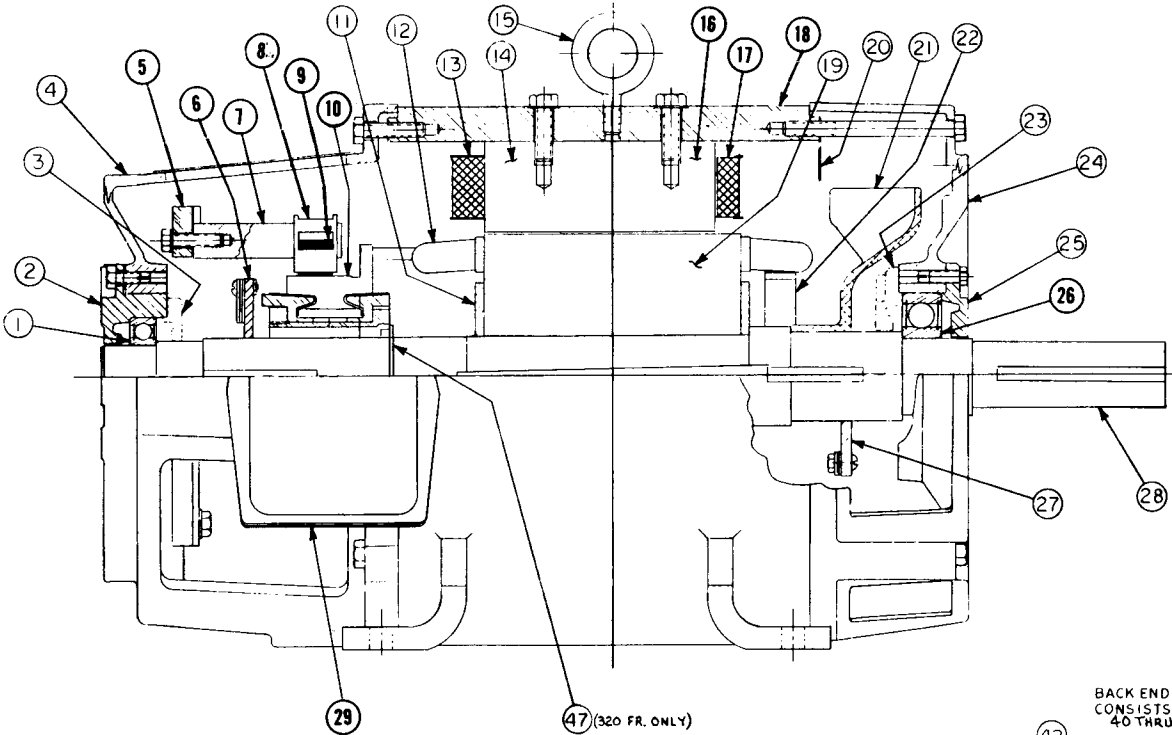
### BEARINGS HOT (Ball Bearings)

1. *Belt too tight - Reduce belt tension.*
2. *Misaligned - Check alignment.*
3. *Bent shaft - Straighten shaft.*
4. *Too much grease - Remove excess grease.*
5. *Insufficient grease - Add proper amount of grease. (see page 3)*
6. *Wrong grade of grease - Use recommended greases. (see page 3)*
7. *Grease contaminated - Relubricate. Be sure that grease supply is clean.*
8. *Bearings damaged - Replace bearings.*

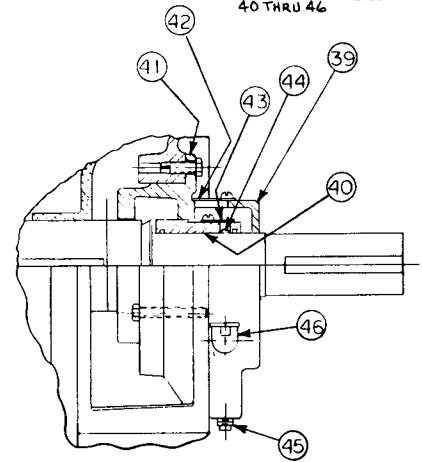
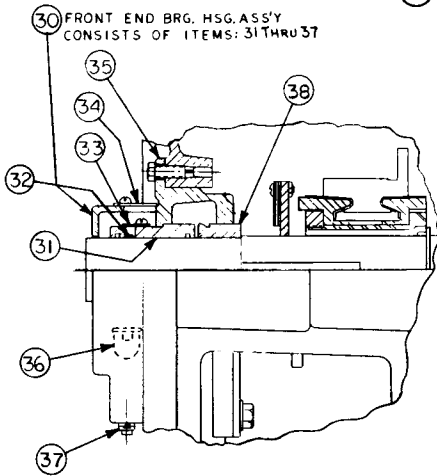
### BEARINGS HOT (Sleeve Bearings)

1. *Insufficient oil - Add proper amount of oil.*
2. *Motor tilted causing end thrust - Level motor.*
3. *End thrust caused by driven equipment - Use limited end play coupling if direct connected. Check axial alignment.*
4. *Wrong grade oil - Use recommended lubricant.*
5. *Oil contaminated by foreign material - Drain oil. Relubricate using a recommended oil.*
6. *Oil rings not rotating - Oil may be too heavy - Drain and replace with recommended oil. Rings may be bent, damaged or worn out - Replace rings.*
7. *Defective bearings or rough shaft - Replace bearings or resurface shaft.*
8. *Bearings stiff - Free bearing or replace.*

# PARTS LIST - DC MOTORS & GENERATORS



BACK END BRG. HSG. ASS'Y  
CONSISTS OF ITEMS.  
40 THRU 46

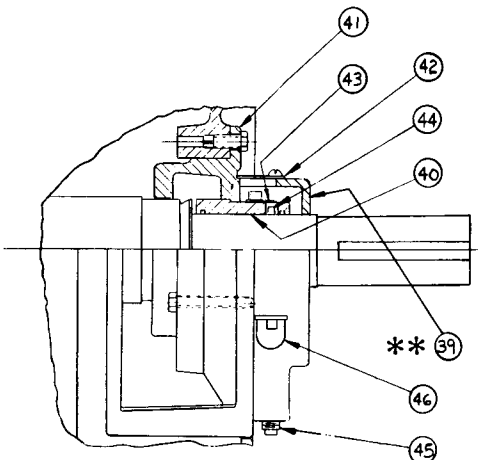
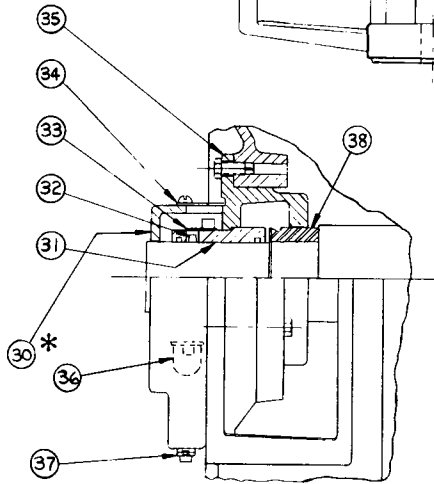
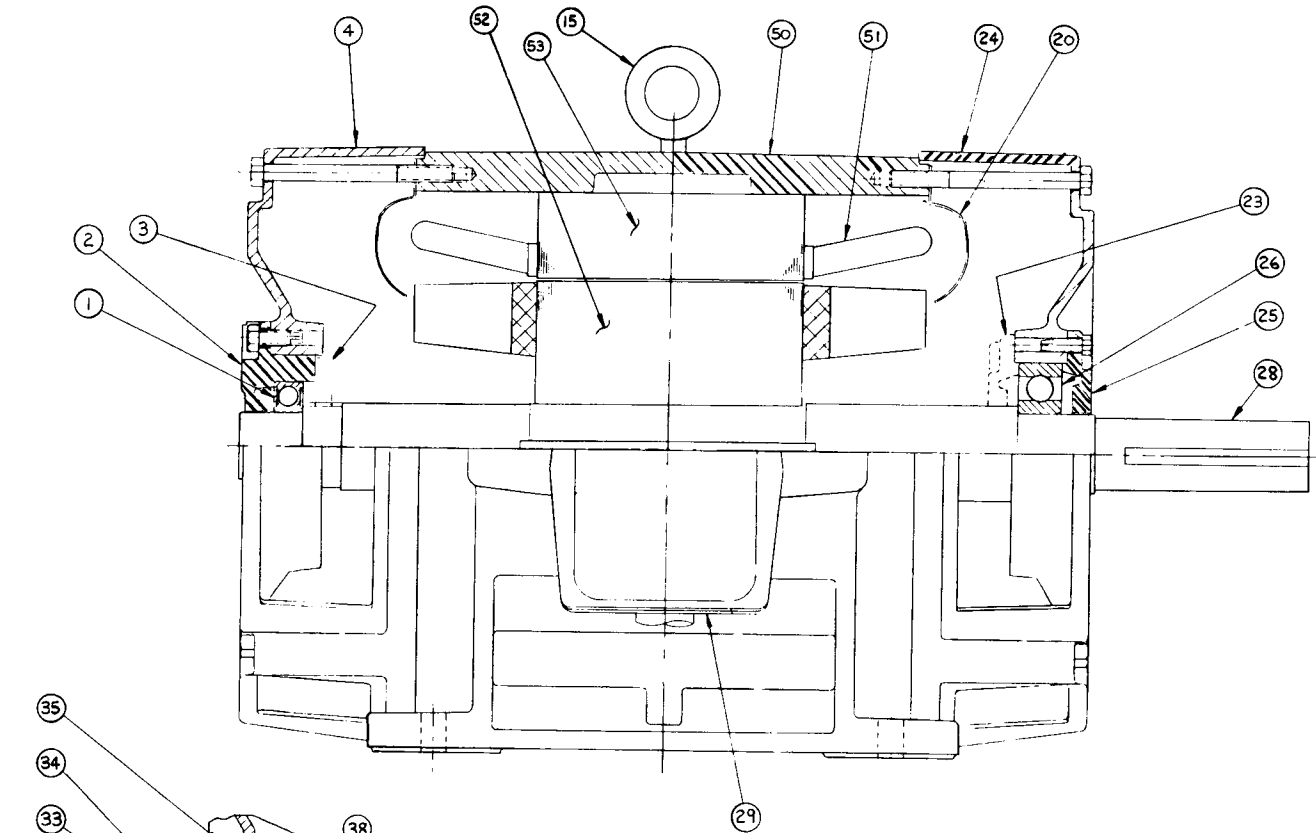


ITEM	DESCRIPTION
1	FRONT END BALL BEARING
2	FRONT END BALL BEARING HOUSING
3	FRONT END INSIDE BEARING CAP
4	FRONT END BRACKET
5	ROCKER ARM
6	FRONT END BALANCE RING
7	BRUSH STUD
8	BRUSH HOLDER
9	CARBON BRUSH
10	COMMUTATOR
11	ARMATURE END PLATE
12	ARMATURE COILS
13	MAIN POLE FIELD COIL
14	MAIN POLE BODY

ITEM	DESCRIPTION
15	EYEBOLT
16	INTER POLE BODY
17	INTER POLE FIELD COIL
18	D.C. FRAME
19	ARMATURE CORE
20	BAFFLE
21	FAN (INTERNAL)
22	BACK END COIL SUPPORT
23	BACK END INSIDE BEARING CAP
24	BACK END BRACKET
25	BACK END OUTSIDE BEARING CAP
26	BACK END BALL BEARING
27	BACK END BALANCE RING
28	SHAFT (WITH KEY)
29	CONDUIT BOX
30	FRONT END SLV. BEARING HOUSING ASS'Y
31	FRONT END SLV. BEARING
32	OIL RING
33	OIL RING GUARD
34	OIL RING SLOT COVER
35	FRONT END SLV. BEARING HOUSING

ITEM	DESCRIPTION
36	OIL GAUGE
37	PIPE PLUG
38	OIL COLLAR
39	BACK END SLV. BEARING HOUSING ASS'Y
40	BACK END SLV. BEARING
41	BACK END SLV. BEARING HOUSING
42	OIL RING SLOT COVER
43	OIL RING GUARD
44	OIL RING
45	PIPE PLUG
46	OIL GAUGE
47	COMMUTATOR RETAINING RING
48	
49	
50	

# PARTS LIST - AC MOTORS



ITEM	DESCRIPTION
1	FRONT END BALL BEARING
2	FRONT END BALL BEARING HOUSING
3	FRONT END INSIDE BEARING CAP
4	FRONT END BRACKET
15	EYEBOLT
16	
17	
18	
19	
20	BAFFLE
21	
22	
23	BACK END INSIDE BEARING CAP
24	BACK END BRACKET
25	BACK END OUTSIDE BEARING CAP
26	BACK END BALL BEARING
27	
28	SHAFT (WITH KEY)
29	CONDUIT BOX
30	FRONT END SLV. BEARING HOUSING ASS'Y*

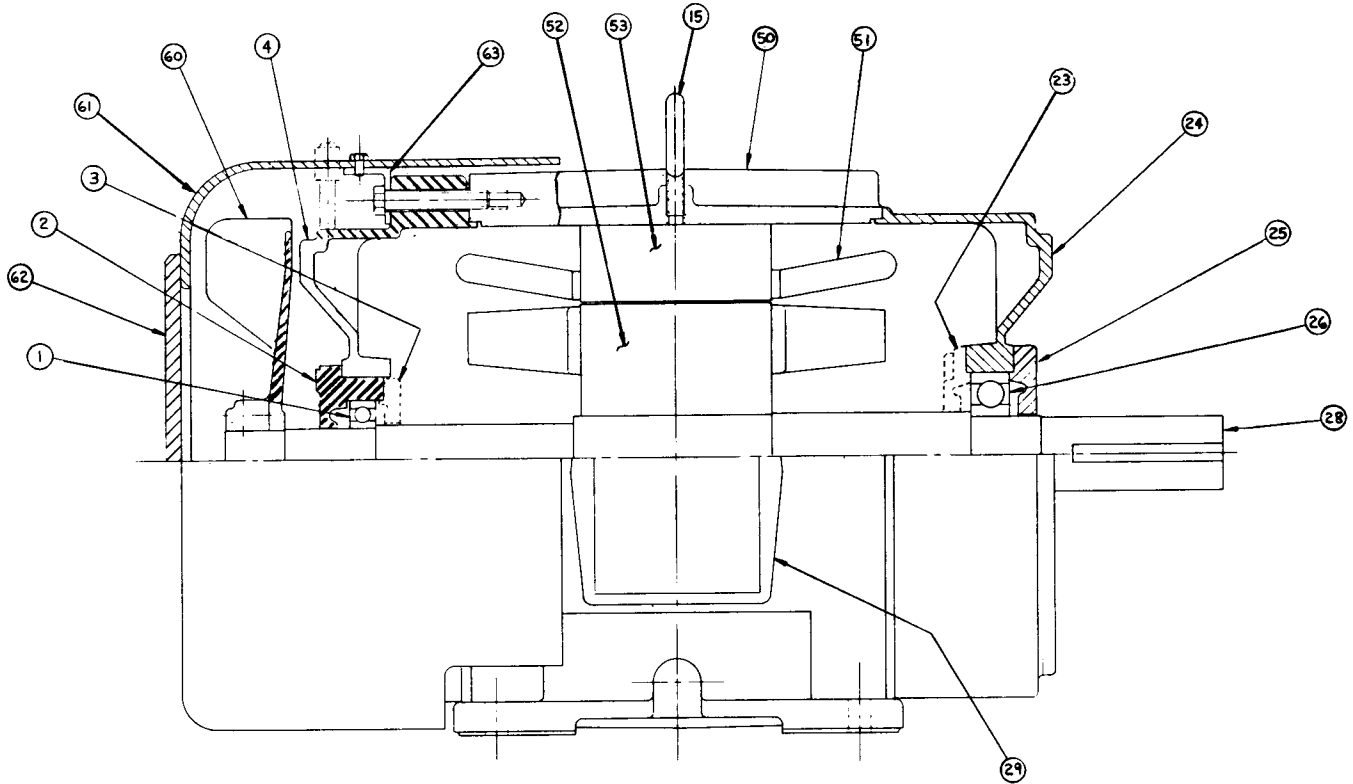
ITEM	DESCRIPTION
31	FRONT END SLV. BEARING
32	OIL RING
33	OIL RING GUARD
34	OIL RING SLOT COVER
35	FRONT END SLV. BEARING HOUSING
36	OIL GAUGE
37	PIPE PLUG
38	OIL COLLAR
39	BACK END SLV. BEARING HOUSING ASS'Y**
40	BACK END SLV. BEARING
41	BACK END SLV. BEARING HOUSING
42	OIL RING SLOT COVER
43	OIL RING GUARD
44	OIL RING
45	PIPE PLUG
46	OIL GAUGE
47	

50	STATOR FRAME
51	STATOR COILS
52	ROTOR CORE
53	STATOR CORE

\* Consists of subassembly of items 31 through 37

\*\* Consists of subassembly of items 40 through 46

## PARTS LIST - AC ENCLOSED



ITEM	DESCRIPTION
1	FRONT END BALL BEARING
2	FRONT END BALL BEARING HOUSING
3	FRONT END INSIDE BEARING CAP
4	FRONT END BRACKET
5	
14	
15	EYEBOLT
16	

ITEM	DESCRIPTION
23	BACK END INSIDE BEARING CAP
24	BACK END BRACKET
25	BACK END OUTSIDE BEARING CAP
26	BACK END BALL BEARING
27	
28	SHAFT (WITH KEY)
29	CONDUIT BOX

ITEM	DESCRIPTION
50	STATOR FRAME
51	STATOR COILS
52	ROTOR CORE
53	STATOR CORE
60	FAN (EXTERNAL)
61	FAN GUARD
62	FAN GUARD GRILL
63	FAN GUARD SUPPORT

## DISASSEMBLY INSTRUCTIONS

for Motor-Generator Sets shown on Page 11



### I. Frame 284-6/280 (1-piece A.C. frame)

#### A. To replace bearings:

1. D.C. End - remove commutator bracket covers, release brushes (9) from brush holders (8) and remove commutator bracket (4).
2. A.C. End - remove stator housing louvered-covers, then remove stator housing (54) by removing bolts.

#### B. To remove rotating unit:

1. Remove commutator bracket covers, then release brushes (9) from brush holders (8).
2. Remove stator housing (4), as in A.2 above. (Note: baffle (20) must be re-positioned between frame (18) and stator housing (54) when re-assembling unit.

### II. Frames (366-7-8/360, 324-6/320) (2-piece A.C. frame and ball bearing housing)

#### A. To replace bearings:

1. D.C. End - (same as I.A.1).
2. A.C. End - remove bearing housing (56).

#### B. To remove rotating unit:

1. (Same as I.B.1 & 2).

### III. Frame 407-9/360

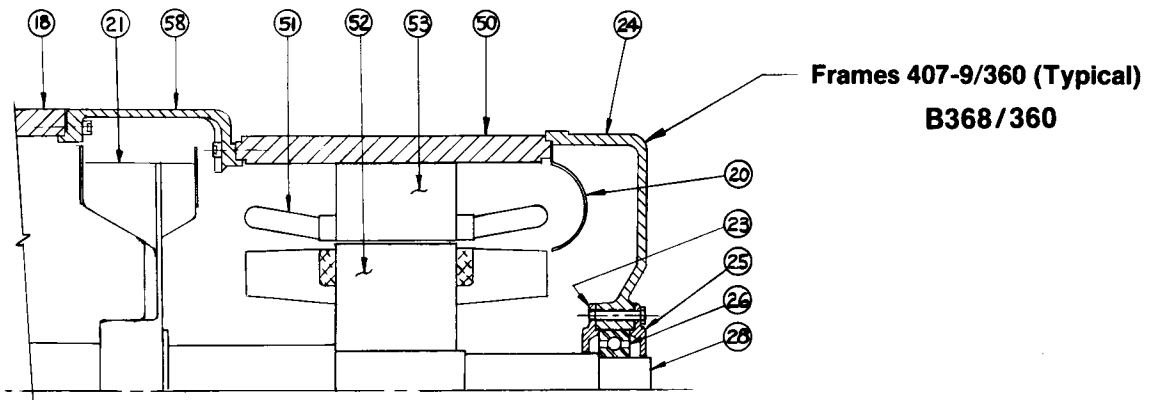
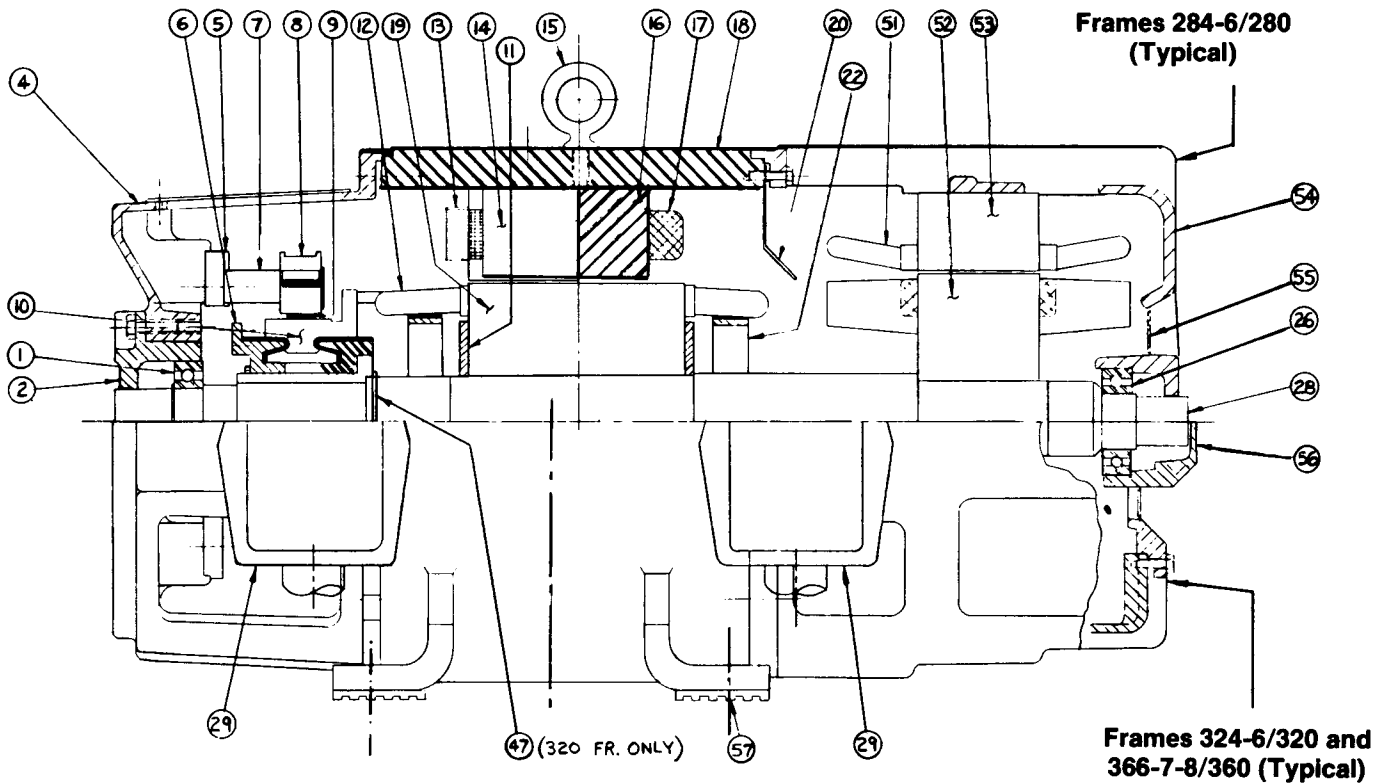
#### A. To replace bearings:

1. D.C. End - (same as I.A.1).
2. A.C. End - remove outside bearing cap (25), then remove bracket (24).

#### B. To remove rotating unit:

1. Remove outside bearing cap (25); then remove bracket (24), frame (50) and ring (58) by removing socket head screws.

# PARTS LIST - MOTOR - GENERATOR SETS



**FOR DISASSEMBLY INSTRUCTIONS, SEE PAGE 12**

ITEM	DESCRIPTION
1	FRONT END BALL BEARING
2	FRONT END BALL BEARING HOUSING
3	
4	FRONT END BRACKET
5	ROCKER ARM
6	FRONT END BALANCE RING
7	BRUSH STUD
8	BRUSH HOLDER
9	CARBON BRUSH
10	COMMUTATOR
11	ARMATURE END PLATE
12	ARMATURE COILS
13	MAIN POLE FIELD COIL
14	MAIN POLE BODY
15	EYEBOLT

ITEM	DESCRIPTION
16	INTER POLE BODY
17	INTER POLE FIELD COIL
18	D.C. FRAME
19	ARMATURE CORE
20	BAFFLE
21	FAN (INTERNAL)
22	BACK END COIL SUPPORT
23	BACK END INSIDE BEARING CAP
24	BACK END BRACKET
25	BACK END OUTSIDE BEARING CAP
26	BACK END BALL BEARING
27	
28	SHAFT (WITH KEY)
29	CONDUIT BOX

ITEM	DESCRIPTION
47	COMMUTATOR RETAINING RING
48	
49	
50	STATOR FRAME
51	STATOR COILS
52	ROTOR CORE
53	STATOR CORE
54	STATOR HOUSING
55	STATOR HOUSING COVER
56	BACK END BALL BEARING HOUSING
57	VIBRATION DAMPENERS PADS
58	CONNECTING BRACKET