ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT MAINTENANCE INSTRUCTION

TRACTION MOTOR ASSEMBLY AND TEST

INTRODUCTION

This bulletin details instructions on the lubrication and installation of armature bearings and the procedures to be followed for complete assembly of the traction motor. It is quite important that this work be carefully and correctly performed so as to ensure satisfactory traction motor performance.

When assembling sealed lubricated bearings Shell Cyprina RA grade 3 grease should be used. The importance of following the suggested procedure as outlined in these instructions can best be emphasized by giving a short explanation as to how the grease lubricates the bearing during operation.

Fundamentally, lubrication is accomplished in the following way:

1. When applied as recommended, oil bleeds into the required areas by contact with that area. Intimate cage and roller end grease contact softens a small amount of grease, thus gradually releasing the oil lubricant.

2. Solidly packed grease within the contact area forces released oil into the bearing.

3. Proper quantites of grease spread on the roller cage assembly (ID and OD) prevent roller skidding and scuffing.

4. By purposely leaving a space free of grease at the top of the bearing cap and cover, see Fig. 1, churning and liquefaction is limited.

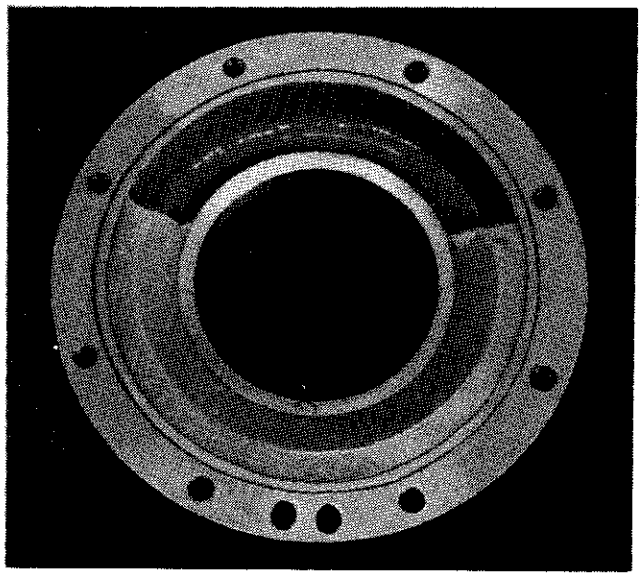

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Fig. 1 — Grease Position

Particular care and attention should be given to the proper application of grease lubricant to the armature bearings. The following precautions should be observed.

1. All assembly parts must be thoroughly cleaned of all foreign material and previous lubricant. All cleaning solvents must be removed and all parts perfectly dry before applying grease. Keep new or remanufactured bearings in their wrapping until application of grease. The lubricant applied to these bearings, when packaged, is compatible with Cyprina RA grease, therefore, if kept clean, they need not be washed.

2. Cyprina RA grade 3 grease must be used exclusively and not mixed with other lubricants.

3. Adequate lubrication depends upon precise weight of grease as determined by an accurate scale. Too much grease is as detrimental to the service life of the bearing as too little.

4. Cleanliness can be ensured by obtaining grease direct from covered containers by use of a hand or motor driven pump, of a type that will not soften or harden (±5 ASTM penetration) the grease during handling. If a pump is not used, extra precaution must be used to prevent contamination of the grease in the pail or drum. Grease should be handled on a clean piece of oil proof paper.

5. A clean steel bladed spatula or putty knife should be used during intermediate handling of the grease, and for greasing the bearing parts. Use of bare hands should be avoided wherever possible to prevent accidental inclusion of dirt or other contaminants.

GREASE APPLICATION TO BEARING PARTS

1. After thorough cleaning and inspection of all bearing parts, the labyrinth grooves in the bearing caps and the pinion end bearing covers should be filled flush with grease, as shown in Fig. 2. This grease need not be measured.

NOTE: If a motor is to be reassembled with nonsealed bearings, Lubrico M-6 or Starfax No. 2 grease should be used in accordance with the procedure and specifications outlined below for sealed bearings.

2. Weigh the piece of paper that will be used in handling the grease. The weight of the paper must be compensated for when weighing the grease.
3. Carefully weigh grease for the specified bearing end to be greased. See Maintenance Data for proper quantities of grease.
4. Grease application to bearing caps and covers.

   a. After weighing, use spatula or putty knife to apply grease to the cap or cover. Roughly form the grease, as shown in Fig. 3, into the approximate desired contour.

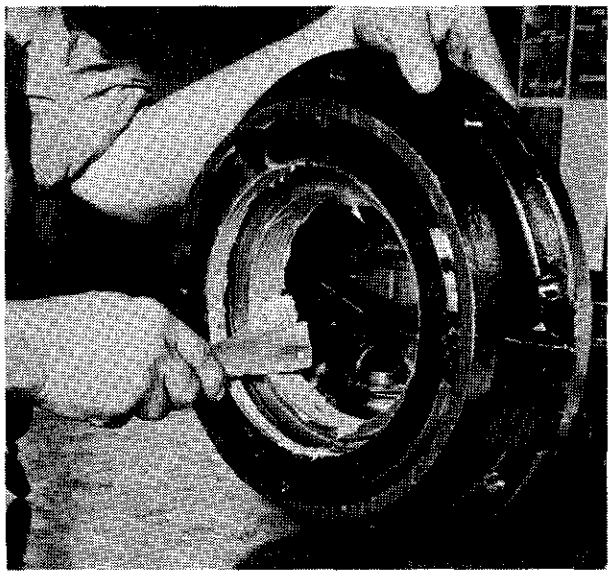

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Fig. 2 — Grease Application To Labyrinth Grooves

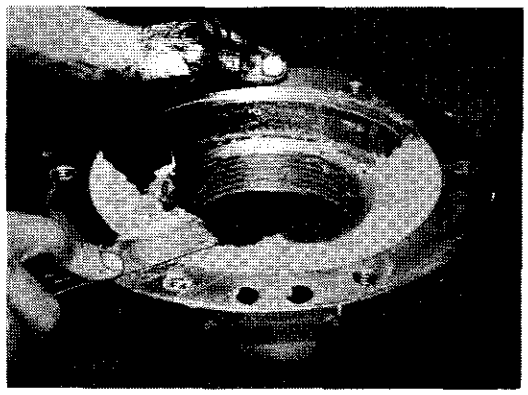

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Fig. 3 — Roughly Formed Grease Contour

b. Grease should be solidly packed only into the lower 180° to 270° (depending on the part and specified quantity) of the cap or cover keeping the ungreased portion at the top, Fig. 1, when motor is in operating position.

c. Use correct grease mask, as determined from the listing below.

C. E. cover w/insert	8252767
C. E. cap	8228024
P. E. cap and cover ("B" Model)	8228025
P. E. cap and cover ("E" Model)	8238744

d. Rotate grease mask to form proper contour, keeping it seated, see Fig. 4.

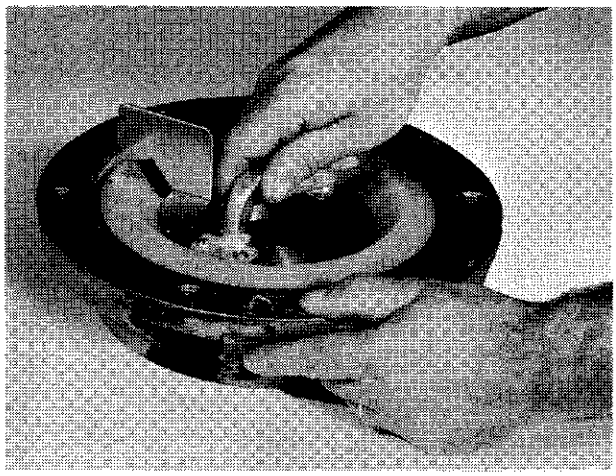

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Fig. 4 — Application Of Grease Mask

Several turns may be required to get the proper contour. Use spatula to fill in low spots with grease from mask blade.

e. The small amount of grease retained on the mask blade should be removed and applied to the ends of the grease arc.

5. Grease should be built up as shown in Fig. 5, to effect the following:

   a. Height of grease to contact bearing cage.

   b. Depth of grease sufficient to contact ends of bearing rollers.

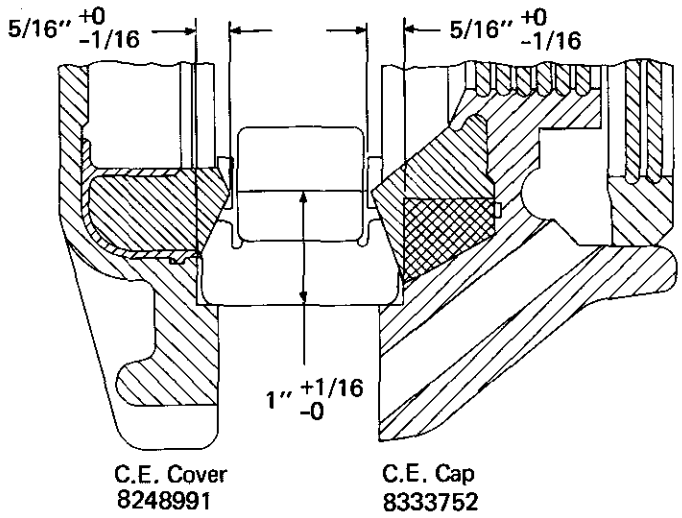
6. Before assembling outer race and roller assembly to the armature, fill space between rollers and around inside diameter with full amount of grease specified. Work grease into outer race and rollers uniformally.

7. Set the armature in a horizontal position on a cradle, supporting the armature on the core section only. Clean shaft diameters and make certain the pinion end shaft threads are not damaged. Remove any grit or dust from the retaining plate bolt holes in the commutator end of the shaft.

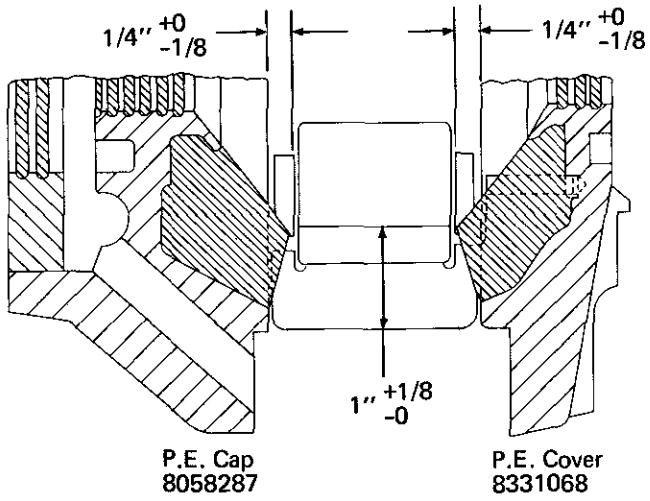
8. Clean the parts to be heated and shrunk on the shaft. These parts should be suspended in SAE No. 50 oil, with a safe flash point, at a temperature of 239° to 257° F. The oil container should have a false, perforated bottom which will prevent direct transmission of heat from the heating unit to the bearing parts.

In no case should direct heating be applied to the bearing parts. Use of a torch, induction heater, brazing tongs, or similar uncontrolled heat will warp or metallurgically upset the parts.

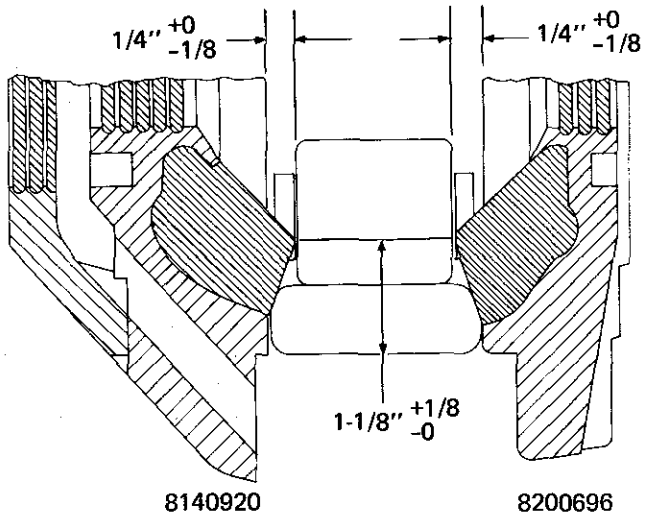
Regularly clean the oil and the container so that the bearing parts will always be kept clean.



COMMUTATOR END



PINION END



P.E. "E" MODELS ONLY

Fig. 5 — Grease Contours

BEARING ASSEMBLY TO ARMATURE

With the grease properly applied to the caps, Fig. 6, assemble them in their proper position on the armature shaft. Refer to Figs. 7, 8 and 9 for proper location of bearing assembly components. Observe carefully the various assemblies before proceeding to assemble the parts to the armature.

1. Shrink the inner oil throwers onto the commutator end and pinion end of the shaft. Be careful to hold the piece being shrunk to the shaft against either the face of the commutator end spacer or the pinion end inner oil ring while at the same time turning the part on the shaft. This is necessary until the piece cools sufficiently to seize to the shaft. If the piece is not held firmly against the face, or if it is not turned while cooling, the piece may seize in either a displaced or cocked position.

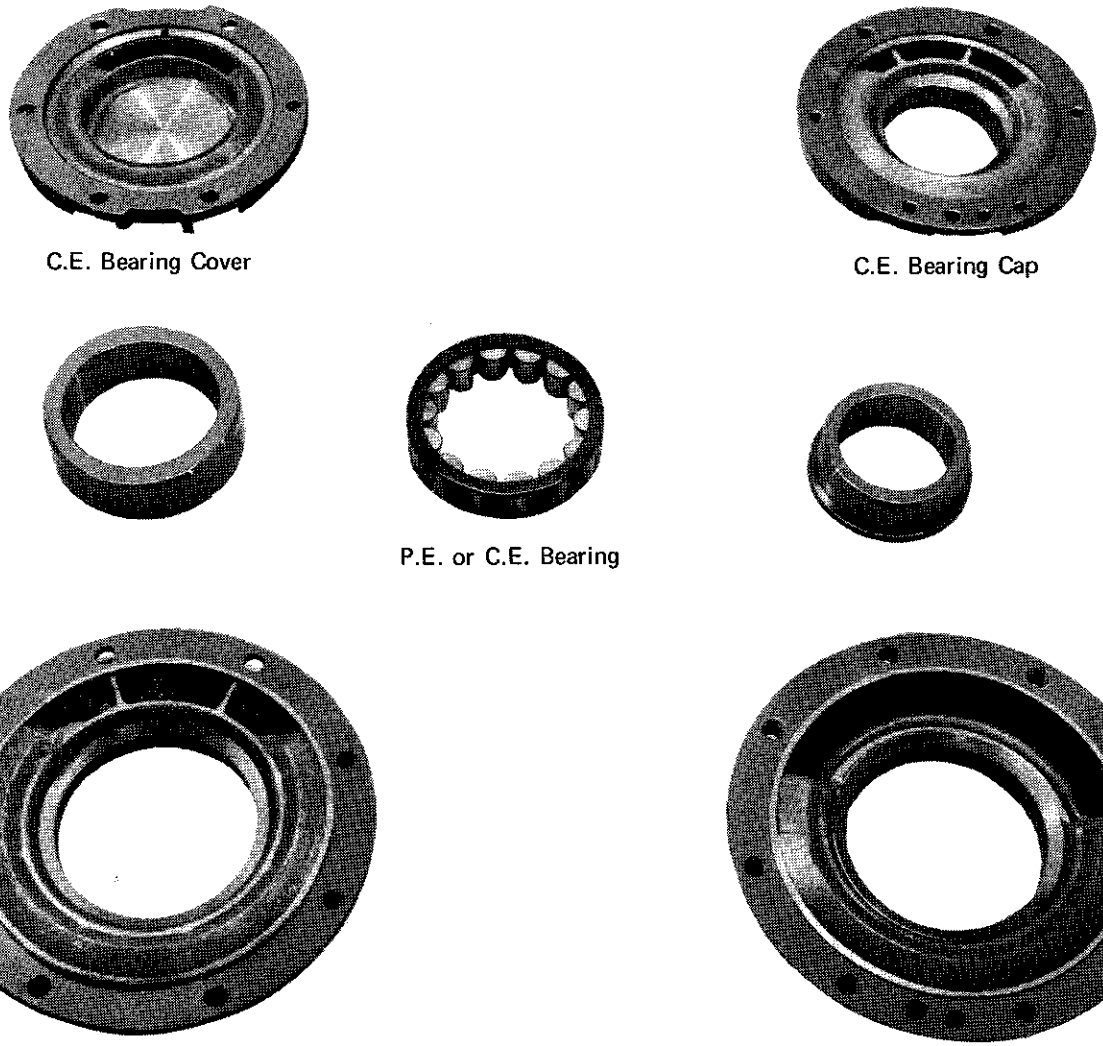
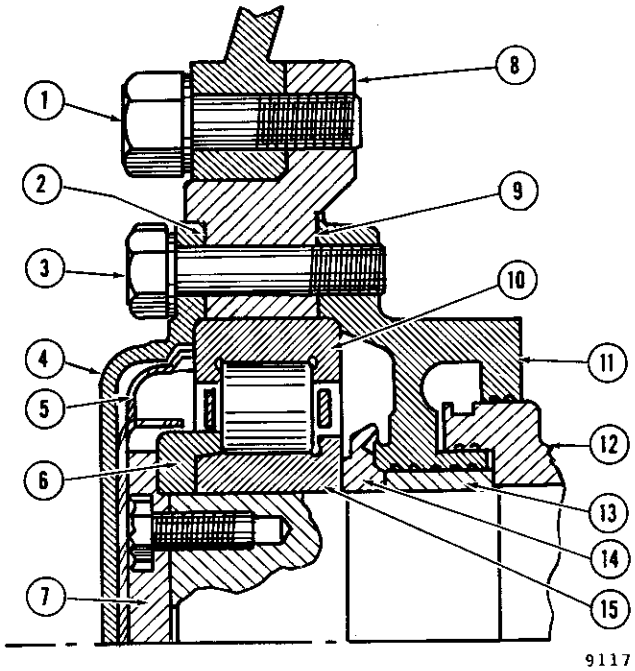


Fig. 6 — Proper Application Of Grease

NOTE: Be sure to wipe oil off all parts to be applied with a clean bound edge cloth before applying parts to the shaft. Use a brass tube large enough to fit over the shaft, to hold parts in their proper location.

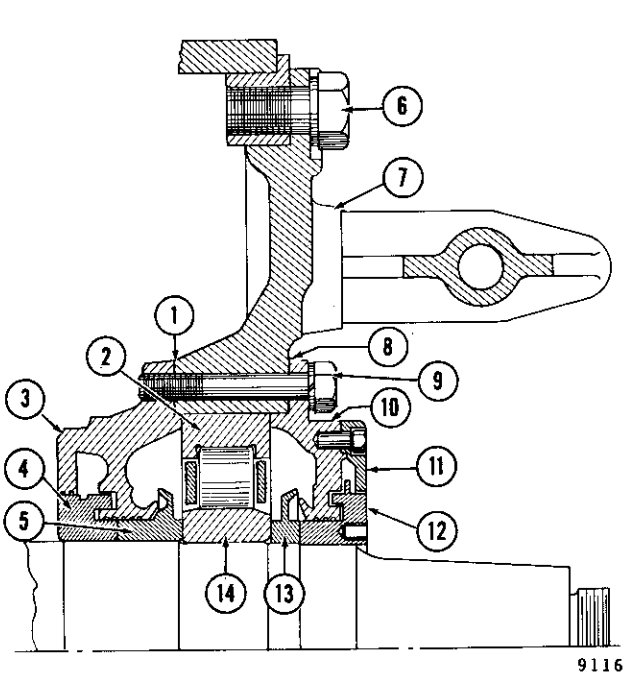
2. Next shrink the commutator end and pinion end inner races onto shaft with the serial number facing out. Push each race against the oil thrower previously applied and turn race; at the same time exert pressure to hold the mating surfaces together. Continue turning race under pressure until the piece seizes to the shaft. No chance should be taken in assembly which might allow either race to distort, misalign, or get out of the proper position from the end of the shaft. Remove all traces of oil from the races.

NOTE: D77 motors manufactured since Jan. 1, 1971 are equipped with an offset crown inner race P.E. bearing. When replacing bearings on other models, the offset crown type bearing can be used.

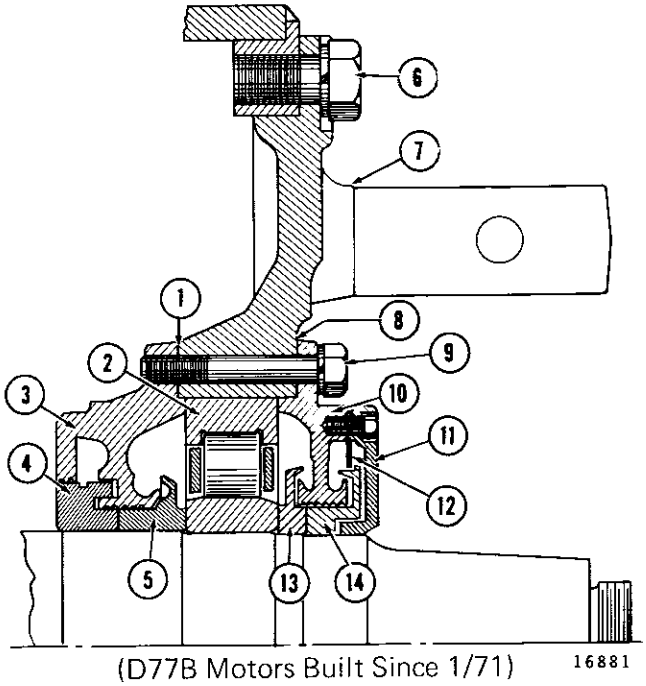


1. Housing Capscrew
2. Gasket
3. Cover Capscrew
4. Cover
5. Insert
6. Thrust Collar
7. Retainer
8. Housing
9. Gasket
10. Outer Race
11. Cap
12. Collar
13. Spacer
14. Inner Thrower
15. Inner Race

Fig. 7 – C.E. Bearing Assembly



1. Gasket
2. Outer Race
3. Bearing Cap
4. Inner Oil Ring
5. Inner Thrower
6. Housing Bolt
7. P.E. Housing
8. Gasket
9. Bearing Capscrew
10. Bearing Cover
11. Seal
12. Outer Oil Ring
13. Outer Thrower
14. Inner Race



(D77B Motors Built Since 1/71)

1. Gasket
2. Outer Race
3. Bearing Cap
4. Inner Oil Ring
5. Inner Thrower
6. Housing Bolt
7. P.E. Housing
8. Gasket
9. Bearing Capscrew
10. Bearing Cover
11. Outer Seal
12. Partition Plate
13. Outer Oil Thrower
14. Outer Grease Slinger

Fig. 8 – P.E. Bearing Assembly Model "B"

However, the bearing must be replaced as an assembly. Do not use component parts of the offset crown bearing with parts of the old bearing.

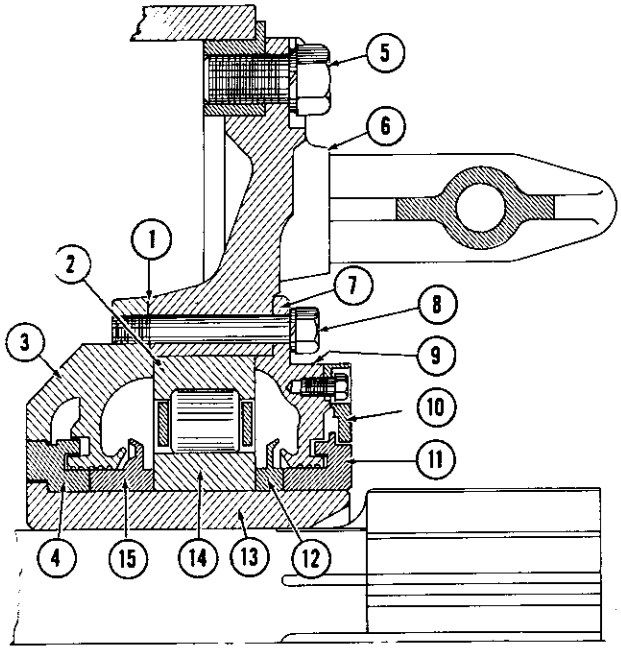
3. Install proper gaskets to bearing caps. P.E. bearing cap gasket must have the enlarged drain hole to match enlarged drain hole in cap.

4. Using a suitable bearing press, completely support the face surface of the outer roller bearing race and press the bearing into the housing, keeping it level to prevent cocking in the bore. If bearings are installed which have been in service previously, they should be installed so that the top of the outer race before removal from the housing is now 90° to either side of the housing top.

NOTE: The commutator end outer race face should project .200" from each side of the housing when properly seated. The pinion end outer race face should be .333" from the outer face of the housing.

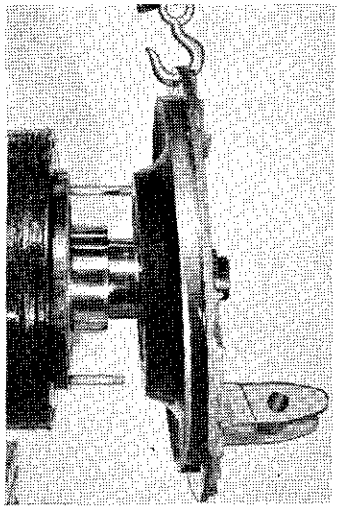
5. With the bearing pressed into the housings, apply grease to bearings before assembling to armature, if not applied previously.

6. Add a light coating of grease to the inner races and install two locating studs 8155976 to the pinion end bearing cap and two studs 8155977 to the commutator end bearing cap. These studs will keep the bearing cap in position when the housings are assembled to the armature, see Fig. 10.



1. Gasket
2. Outer Race
3. Bearing Cap
4. Inner Oil Ring
5. Housing Bolt
6. P.E. Housing
7. Gasket
8. Bearing Capscrew
9. Bearing Cover
10. Seal
11. Outer Oil Ring
12. Outer Thrower
13. Sleeve
14. Inner Race
15. Inner Thrower

Fig. 9 – P.E. Bearing Assembly Model "E"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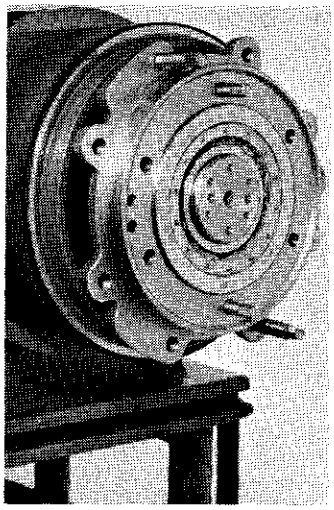
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Fig. 10 – C.E. And P.E. Line Up Studs

7. Assemble the bearing housing assemblies to the armature, being careful not to cock or force rollers over the inner race.

8. Assemble the proper bearing covers to the bearing assemblies. Remove locating studs. D77B motors built after Jan. 1, 1971 are equipped with a new P.E. seal arrangement. When installing P.E. bearing assembly, see Fig. 8, for proper application.

9. Use four bolts on the pinion end and three on the commutator end to hold covers in position. The covers will have to be removed after the armature assembly is placed in the stator in order to inspect the bearings for alignment.

NOTE: The bearing covers are not to be packed with grease until after the bearings have been checked for alignment.

10. Assemble a pinion end lifting eye 8067122 to the shaft. Install two locating studs 8155975 to the commutator end housing and apply turning plate 8067147 to the commutator end bearing assembly as shown in Fig. 11.

At this point the armature is ready for assembly into the stator.

ARMATURE INSTALLATION AND ALIGNMENT

Stator that has been cleaned, inspected and repaired, and that has the brush holders installed is now ready to be placed on stand 8064917.

1. With commutator end down, position stator all the way against the brush holder blocks to give clearance for the commutator. Make certain the bolt holes in the stator clear the blocks on the stand to allow the locating pins at the commutator end of the armature to clear as the armature is lowered into the stator.

2. With the stator in position, lift the armature into a vertical position, and remove the turning plate. Be sure to cover the commutator with a strip of protecting paper 1/16" x 7" x 54" to prevent possible damage to the commutator as it passes the brush holder.

3. Center the armature over the pinion end stator bore and lower the armature slowly into the stator, guiding the armature from the top of stator past the coils and from between brush holders at the commutator end opening of frame to position the line up studs, see Fig. 12.

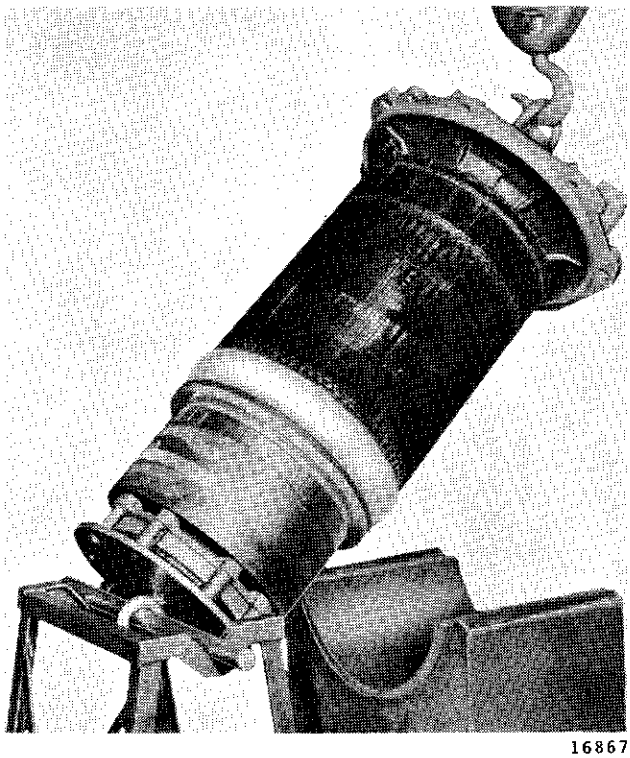

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Fig. 11 — Raising The Armature For Installation Into Stator

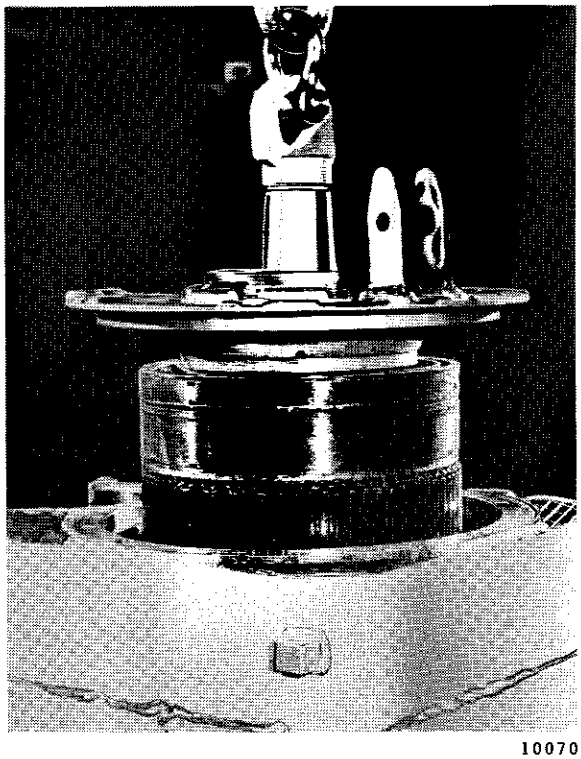

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Fig. 12 — Installing Armature Into Stator

CAUTION: Be careful to keep hands out of the way of the armature housing and brush holders.

4. Lower armature until housing line up studs are about to contact stator, Fig. 13. Line up the commutator housing studs and pinion end housing cap screw holes with the stator holes.

5. Remove the P.E. guide pins and install P.E. housing bolts and lockwashers. (Do not use a lockwasher with the bottom housing bolt as clearance is needed at this point for the gear case return duct.) Equally space three 3/4" spacer blocks between the P.E. housing and the bore face. Tighten the P.E. housing bolts evenly until the housing contacts the spacer blocks, then remove the three spacer blocks.

NOTE: The armature must be rotated while the housing bolts are being tightened to make sure the bearings do not bind. If binding occurs, damaged bearings will result.

6. Remove the motor from the assembly stand, using the pinion end lifting eyes, and place in a vertical position on the floor. Using the upper lifting eyes of the motor frame, lower the motor into a horizontal position. Lift the motor and set it on a stand so that the pinion end of the motor is 3" to 4" higher than the commutator end. This is done to keep armature play in one direction.

7. Remove C.E. bearing guides and install C.E. housing bolts. Carefully tighten P.E. and C.E. housing bolts evenly, Fig. 14, being careful to see that the housings are drawn in evenly (not cocked), keeping the C.E. housing slightly ahead of the P.E. housing so that the commutator outer race will at no time be forced out of its position in the housing.

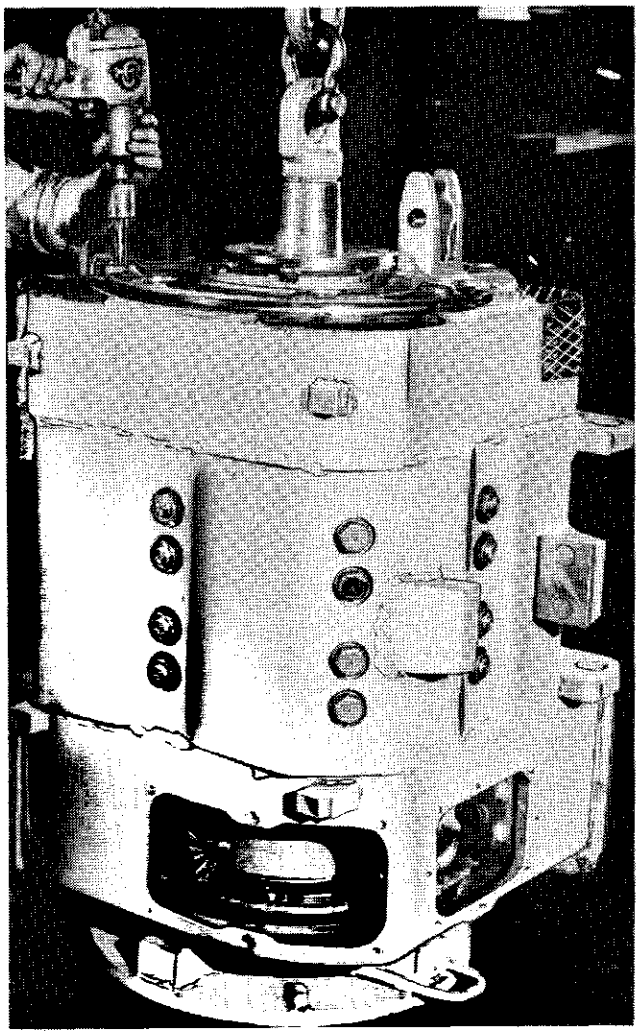

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Fig. 13 — Securing P.E. Housing To Stator Frame

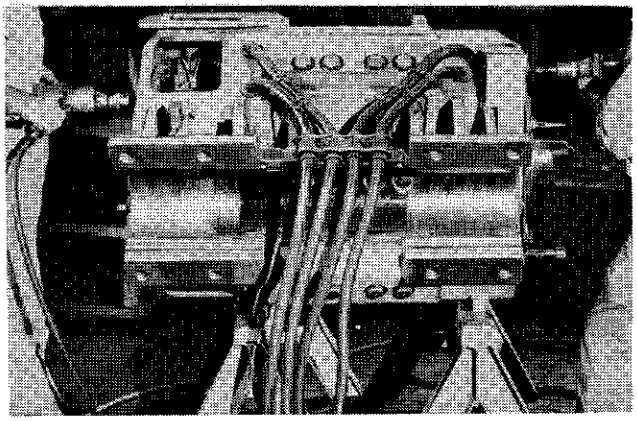

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Fig. 14 — Securing Housings To Stator

8. Tighten C.E. thrust collar and bearing retainer with cap screws in order to pull C.E. bearing into proper position. Assemble the C.E. bearing cover with gasket and cap screws and tighten until the lockwashers are set. After tightening cap screws use a 0 – 300 ft-lb. torque wrench and tighten pinion end housing cap screws to 250 – 270 ft-lbs. dry. Tighten commutator end housing bolts to 155 – 165 ft-lbs. (threads lubricated).

CAUTION: It is very important that the inner oil thrower and inner bearing race faces are tight against each other before the following inner race runout check is made.

9. Remove the commutator end cover bearing retainer, and thrust collar. Clamp an indicator to the frame and check the runout of inner race face, Fig. 15. Maximum runout should not exceed .001" of total indicator reading. If runout is more than .001", the inner race must be aligned. Usually, this will require removing the bearing assembly from the armature, checking the runout of spacer face and reinstalling the bearing assembly in the manner previously outlined.

10. Check the internal clearance between the inner race and rollers by passing a feeler gauge blade under the unloaded rollers at one point. The minimum radial clearance after assembly should be .0025".

11. Reassemble C.E. bearing thrust collar and bearing retainer using six 8168619 bolts. It is important that these special bolts are used and they should be torqued from 50 – 55 ft-lbs dry. Torque bolts in a crisscross pattern.
12. Remove one of the retaining plate bolts and mount indicator to check runout of outer race, Fig. 16. Maximum runout not to exceed .0025" total indicator reading. If the outer race is out of square beyond the .0025" reading, check the runout of the commutator end housing face and align it before attempting to check outer race again.

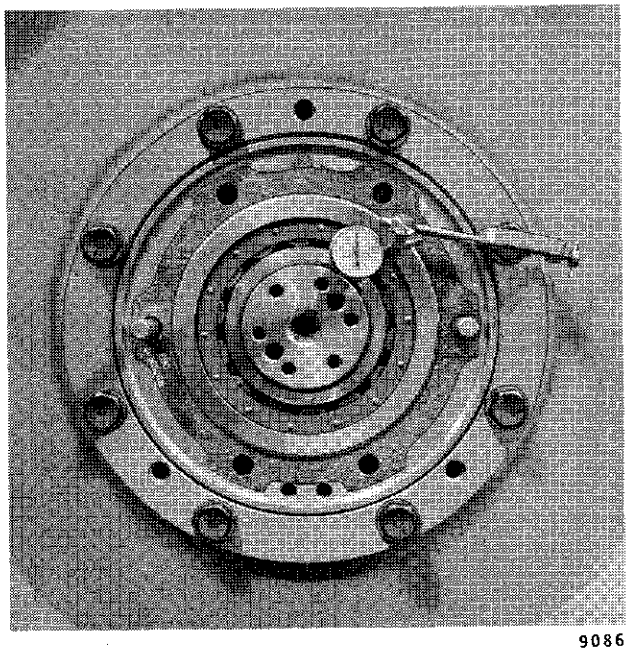

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Fig. 15 – Checking Alignment Of C.E. Inner Race

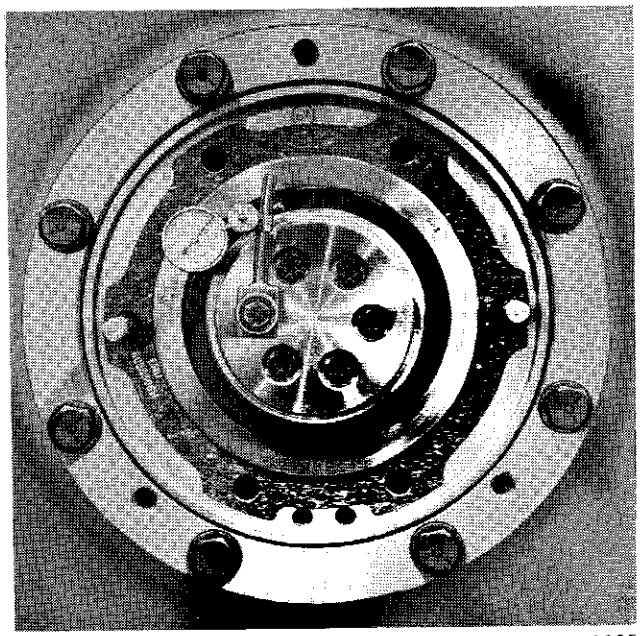

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Fig. 16 – Checking Alignment Of C.E. Outer Race

CAUTION: Do not force the outer race against the inner bearing cap in an attempt to align the outer race.

13. With the indicator positioned on the outer race, check the end play.

Before checking armature end play, take up all end play in one direction towards the commutator end by pressing on the pinion end lifting fixture (applied to the shaft) with a 18" or 24" steel bar. Set indicator to "O" and then pull shaft towards the pinion end until the shaft comes to a definite stop. For new and remanufactured Hyatt bearings, the end play should be .0055" to .0118". If greater than .0118", check the commutator end bearing retainer and bearing thrust collar for tightness, and thrust collar for wear.

CAUTION: Do not force the shaft in taking this measurement as one can shift the commutator end outer race or spring the thrust flanges with sufficient force to obtain an erratic reading from .002" to .015".

14. Apply grease to the commutator end cover using mask 8252767 and make certain commutator end bearing cover has the nylon insert installed.

15. Inspect cover gasket to be sure it is not damaged or broken and install cover to the bearing. Apply a small quantity of white lead or thread lubricant to bolt threads. Apply lockwashers and tighten until lockwashers begin flattening. The thread lubricant ensures even tightness of all bolts.

16. Tighten bolts evenly in the sequence 1-3-5-2-4-6, Fig. 17, until they are pulled up to 110 – 125 ft-lbs. lubricated, or 125 – 140 ft-lbs. dry.

17. Remove the pinion end bearing cover. Clamp an indicator to the frame and check the runout of inner race face. Maximum runout should not exceed .001" of total indicator reading. If runout is more than .001", the inner race must be aligned. Usually this will require removing the bearing assembly from the armature and reinstalling the bearing assembly in the manner previously outlined.

18. Indicate runout of P.E. bearing outer race face by clamping an indicator from shaft to outer race, Fig. 18. Maximum runout is not to exceed .0025" of total indicator reading.

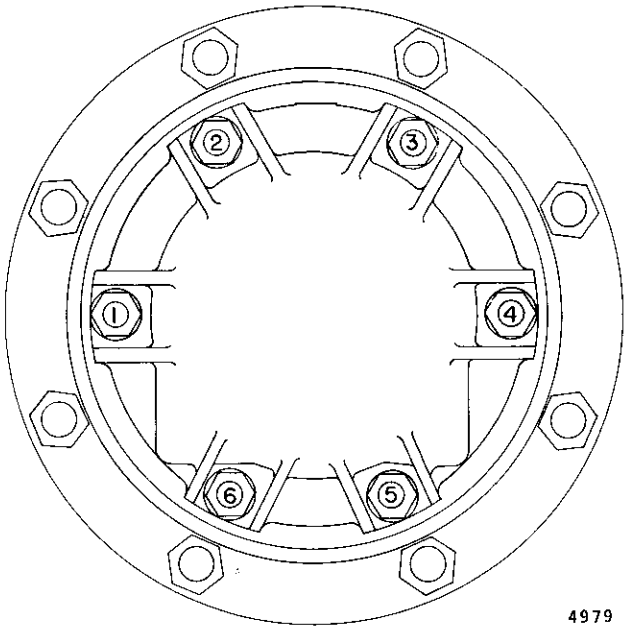

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Fig. 17 – C.E. Bolt Tightening Sequence

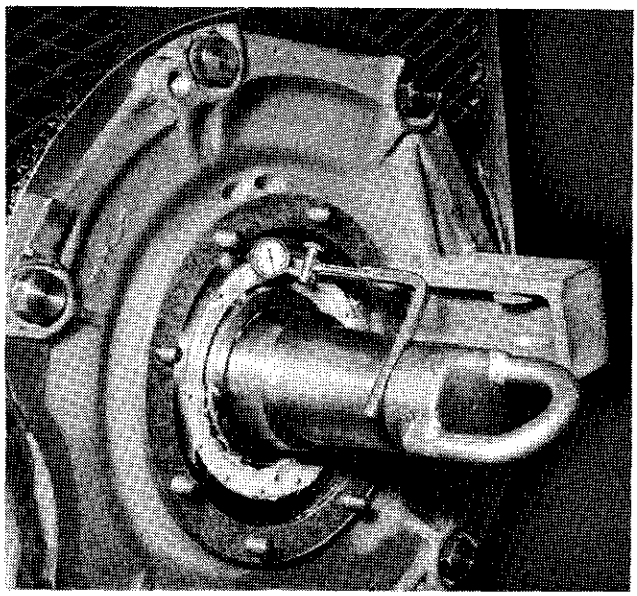
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Fig. 18 – Checking Alignment Of P.E. Outer Race

19. Check internal radial clearance between race and rollers by passing a feeler gauge blade under each unloaded roller at one point. This internal radial clearance after assembly should be an absolute minimum of .002" when motor is in a normal position.

20. Also check the internal radial clearance with the axle bore up (motor suspension lugs down). With the motor in this position, the absolute minimum clearance shall be .002" for both P.E. and C.E. bearings, except "E" size P.E. bearings which shall be .003". If clearances are lower, check for tight cage and misalignment. Clearances also apply to all Hyatt remanufactured bearings.

NOTE: Only those motors which have the pinion end bore more than .012" out-of-round or a radial clearance of .0035" or less will have to be checked in the two positions.

21. Shrink the P.E. outer oil thrower to the shaft and hold it against the bearing inner race rotating the oil thrower until it seizes to the shaft.

22. Apply grease to the pinion end bearing cover using mask 8228025.

23. Inspect cover gasket to ensure it is not damaged or broken and install cover. Apply a small quantity of white lead or thread lubricant on bolt threads. Apply lockwashers and tighten until lockwashers begin flattening. The thread lubricant ensures even tightness of all bolts.

24. Tighten bolts evenly in the sequence 1-3-5-7-2-4-6-8 until they are all pulled up to 110 — 125 ft-lbs. lubricated, or 125 — 140 ft-lbs. dry, see Fig. 19.

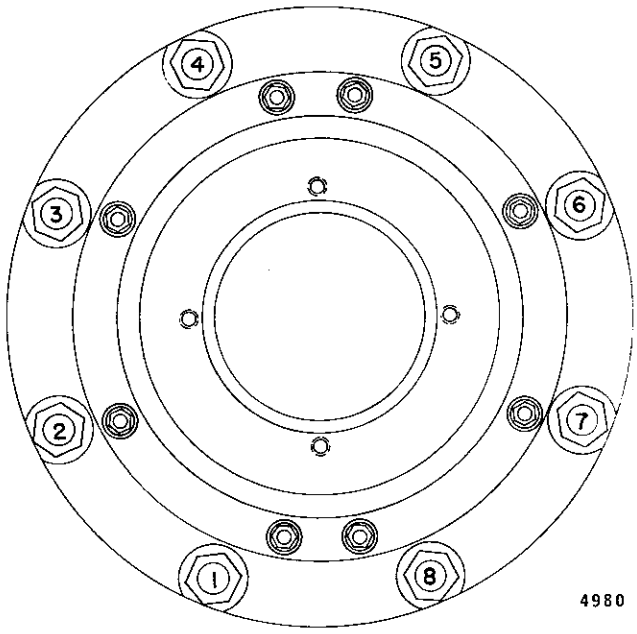

Fig. 19 — P.E. Bolt Tightening Sequence

25. Shrink P.E. outer oil ring (outer grease slinger and partition plate on models with new seal arrangement built after Jan. 1, 1971) to shaft, hold it against the outer oil thrower and turn oil ring until it seizes to the shaft. Assemble grease seal (outer seal on models with new seal arrangement) and secure with lockwashers and cap screws. Be sure slotted half of grease seal is assembled to bottom side of shaft.

26. Remove fish paper cover from commutator and adjust brush holders so that the bottom faces of the brush slots are 1/8" to 3/16" above the commutator surface. Tighten brush holder clamp bolts after obtaining clearance.

Apply new brushes to brush holders, or if old brushes are to be used they should be installed in the same position in brush holder from which they were removed. When new brushes are installed, which do not have a contour they should be "sanded-in" by wrapping 1-1/2 turns of medium grade sandpaper (with the abrasive side out) around the commutator before brushes are applied. Install brushes and turn armature until all brushes are seated.

Remove sandpaper and blow out carbon dust with clean, dry compressed air at reduced pressure. Use a clean dry bound edge cloth and remove carbon dust from string band and commutator riser while armature is being turned by hand. Wipe carbon dust from brush holder insulators.

Make a visual inspection of the commutator surface and creepage surface for damage or dirt. Rework as needed. Apply and secure axle caps to motor frame (if caps have not been previously applied) and check to see that the suspension cap serial number corresponds to motor frame number. If a new cap was line bored to the motor frame,be sure the frame number is stamped on the cap. Remove pinion end lifting fixture from armature shaft.

BEARING RUN

Before preparing motor for storage or shipment, make an armature bearing run at 1500 RPM for 2 hours or until the bearing temperature levels off. It requires approximately 125 volts DC and 50 amperes per motor to run a bearing test. The average temperature rise is 15°C. above room temperature. The high limit rise above room temperature is 25°C. at C.E. and 35°C. at P.E. During the bearing run, take temperature readings every 15 minutes. Also check for noise and roughness, which indicate faulty assembly, dirty bearings or armature unbalance. Faulty assembly generally is the cause of misalignment of the bearings. This condition is dangerous in that a misaligned bearing has a greatly lessened life.

After completion of a bearing run, make a visual inspection of the commutator and wipe off any carbon dust from the creepage surface.

OIL LUBRICATED BEARINGS

The method of assembling and aligning is the same for oil lubricated bearing as for sealed grease lubrication with the following exceptions:

1. The bearing caps and covers require lubrication only at the labyrinth grooves.

2. The pinion and commutator end bearing covers must have a drilled and tapped hole at the top of the cover to receive lubricating tubes.

3. The commutator end cover will not require the nylon insert.

4. The pinion and commutator end bearings will require 2 to 3 ounces of grease for bearing run-in test. Wipe the grease on the rollers of the outer race and roller assembly before assembling to the armature shaft.

5. After the motor has passed the bearing run test, 6 ounces of SAE No. 30 approved oil should be added to the pinion end bearing and 4 ounces of oil to the commutator end. Refer to Maintenance Instruction 1756 for recommended oil.

NOTE: The flexible lubricating tube assembly has a button head fitting that is permanently attached to the tube. Application of oil to armature bearings can only be made by specially designed lubricating oil dispenser 8191382. As this device is equipped with a meter registering in ounces, it is possible to accurately measure the amount of lubricant being dispensed. The meter will not register when air is pumped.

Prepare motor for storage or shipment by assembling commutator end covers and covering air vents (temporarily only).

For application of pinion to armature shaft see Maintenance Instruction 3900.

MAINTENANCE DATA

SPECIFICATIONS

Armature Bearings
- Lubricant
  - Sealed Application – Cyprina RA Grade 3
    - 35 lb. Pail 8249819
    - 120 lb. Drum 8249820
  - Nonsealed Application
    - Lubrico M6 8004748
    - Starfax No. 2 8084000
  - Grease quantities by weight to ±1/4 ounce.

	"E" Models		"B" Models	
	C.E.	P.E.	C.E.	P.E.
Cover	14	6	12	6
Cap	17	7	14	7
Roller Cage O.D.	2	1	2	1
Roller Cage I.D.	2	1	2	1
Total	35	15	30	15

Clearance	C.E.	P.E.
Assembled	Min. .002"	.002"
Max. Runout Inner Race	.001"	.001"
Max. Runout Outer Race	.0025"	.0025"
End play	.0055" to .0018"	

Torque Values

P.E. Housing Cap Screws	250 – 270 ft-lbs.
C.E. Bearing Housing	155 – 165 ft-lbs.
P.E. Bearing Cover Cap Screws	125 – 140 ft-lbs.
C.E. Bearing Cover Cap Screws	125 – 140 ft-lbs.
C.E. Bearing Retaining Plate Bolts	50 – 55 ft-lbs.
Brush Holder Clamping Bolts	150 – 160 ft-lbs.
Brush Holder Terminal Lugs To Brush Holders	10 – 15 ft-lbs.

Brush Holder
- Number Of Brush Holders 4
- Clearance Bottom Of Brush Holder To Commutator . . . . . Min. 1/8" – Max. 3/16"
- Brush Spring Pressure
  - Coil Spring Type . . . . . Min. 9 lbs. – Max. 11 lbs.
  - Constant Pressure Spring Type . . . . . 3 lbs. 5 oz. Min.

Brushes
- Number Of Brushes Per Holder 3

Brush Type	Brush Grade	Part No.
D37, 47 and 57 Two wafer flat-top (2-1/8" x 2" x 5/8")	DE-5	8215949
	AC-35	8256183
	DE-7	8322301
	AC-100	8350348
D37, 47 and 57 Two wafer common rubber top (2-1/8" x 2" x 5/8")	DE-7	8404451
	AC-100	8394191

	Brush Grade	Part No.
D37, 47 and 57		
Three wafer floating center wafer	DE-7	8403347
(2-1/8" x 2" x 5/8")	AC-100	8393692
D37, 47 and 57 with 8331061 brush holder		
Two wafer common rubber top	DE-7	8404453
(2-3/8" x 2" x 5/8")	AC-100	8394852
D67, 75 and 77		
Three wafer floating center wafer	DE-7	8403506
(2-3/8" x 2" x 5/8")	AC-100	8391337

Pinion Application . . . . . M.I. 3900

EQUIPMENT LIST

Rethreading die, armature shaft	8050721
Die holder	8050722
Stand, Motor frame	8064917
P.E. lifting fixture ("E" Model)	8065527
P.E. lifting fixture	8067122
Turning plate, armature	8067147
Brush tension scale	8068027
Locating studs – C.E. bearing cap	8155975
Locating studs – P.E. bearing cap	8155976
Locating studs – C.E. bearing housing	8155977
C.E. cap grease mask	8228024
P.E. cover and cap grease mask ("B" Model)	8228025
C.E. cover grease mask	8252767
P.E. cap and cover grease mask ("E" Model)	8238744

Litho in U.S.A.