GM Locomotive Group

# M.I. 6850
# MAINTENANCE INSTRUCTION

*Rev. E

# APPLICATION OF CYPRINA-RA GREASE TO MOTOR ARMATURE BEARINGS

## DESCRIPTION

This Maintenance Instruction presents recommendations for the proper application of Shell Cyprina-RA Grade 3 grease to armature bearings used on locomotive traction motors and similar motors used for other applications. The long service life expected of sealed grease bearings can be realized by carefully following the procedure given in this instruction. Precisely measured quantities of lubricant carefully applied with specially designed tools will produce a properly packed bearing. Cleanliness should prevail throughout all operations.

When assembling sealed lubricant bearings Shell Cyprina-RA Grade 3 grease should be used. The importance of following 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 arc forces the released oil into the bearing.

3. Proper quantities of grease spread on the roller cage assembly (I.D. and O.D.) prevent roller skidding and scuffing.

4. By leaving a space free of grease at the top of the bearing cap and cover, churning and liquefaction are limited.

5. A nylon anti-churn insert is provided in the commutator end bearing cover. The anti-churn insert helps to prevent premature oxidation and purging of bearing grease. A nylon anti-churn insert is also provided in the commutator end bearing cap on some models.

When reassembling bearing caps, covers, housings, and retainer, refer to Service Data for bolt torque values.

## MAINTENANCE

### PREPARATION FOR GREASE APPLICATION

Particular care and attention should be given to the proper application of grease lubricant to the armature bearings. The precautions listed below 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 Shell Cyprina-RA Grade 3 grease, therefore, if kept clean, they need not be washed.

*This bulletin supersedes previous issues of this number.

2. Shell 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.

6. Commutator end bearing covers not equipped with nylon anti-churn insert should be machined to receive the insert as shown in Fig. 1.

**CAUTION**

When performing rework of bearing cover, minimum outer wall thickness is 2.79 mm (.110″).

Commutator end bearing caps may be machined to receive nylon anti-churn insert as shown in Fig. 2.

7. Bearing covers or caps with nylon anti-churn insert should have the insert removed, the cover or cap thoroughly cleaned, and a new insert installed.

## GREASE APPLICATION

When applying grease to the bearing components, it is very important to use all the grease measured for each specific component.

**NOTE**

During motor assembly, bearing covers are bolted to the bearing housing and then removed to check bearing alignment. Do not pack bearing covers with grease until after bearing alignment check.

## BEARING CAPS AND COVERS

1. Ensure bearing caps and covers are thoroughly cleaned and inspected prior to applying grease.

2. If the bearing caps or covers have labyrinth grooves, the grooves should be filled flush with grease as shown in Fig. 3. This grease need not be measured.

**NOTE**

Most current model bearing caps and covers do not have labyrinth grooves.

3. Weigh the piece of paper that will be used in handling the grease. This weight must be compensated for when weighing the grease.

4. Carefully weigh the grease for the specific bearing to be packed. Refer to Service Data for proper grease quantity.

5. Refer to Figs. 4 or 5 to determine proper grease contour.

**NOTE**

When an anti-churn insert is used with a bearing cap or cover, it is recommended that about two-thirds of the weighed grease be applied to the cap or cover grease cavity. Then press anti-churn insert into the grease, position locating tab or buttons of anti-churn insert into corresponding notch or holes in cap or cover. Finish off grease contour per procedure using the remainder of the grease.

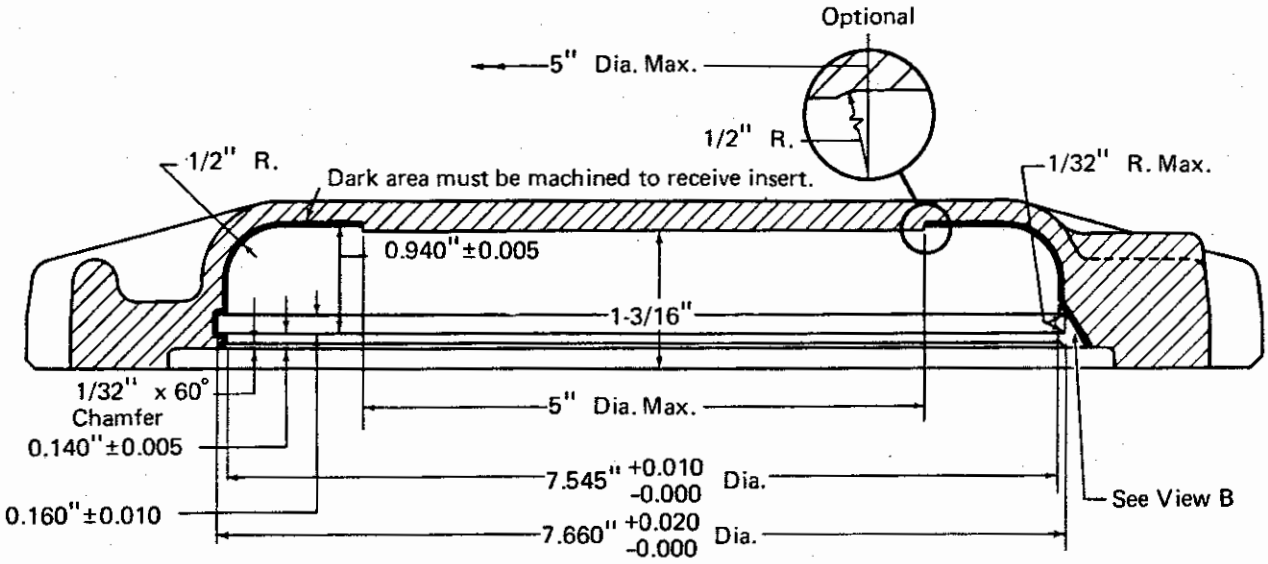
6. Pack grease solidly into lower 200°-270° (depending on the particular part and specified quantity of grease) of the cover or cap. Keep an open portion at the top of the cover or cap as shown in Fig. 7.

7. Use a spatula or putty knife to roughly form the grease into approximate desired contour and apply correct mask. Refer to Service Data for correct grease contour mask. The grease arc must be packed without air voids.

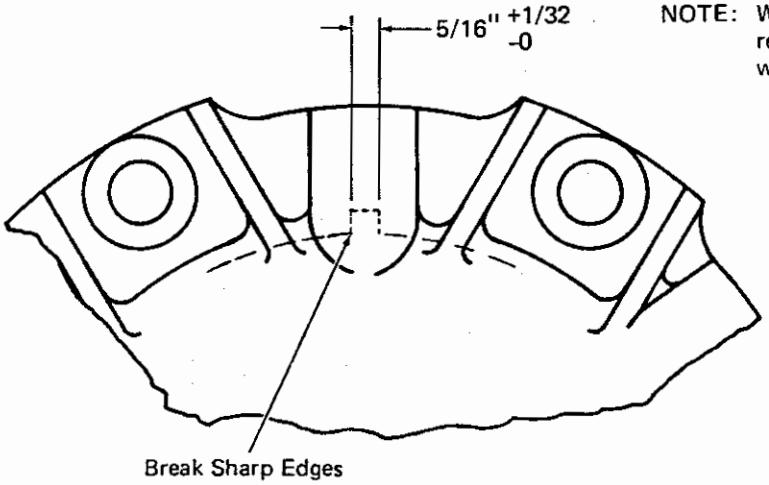
8. Rotate grease contour mask to form the proper contour, keeping mask seated as shown in Fig. 8. Several turns may be required. Use spatula or putty knife to fill low spots with grease from the grease mask blade.

9. When grease contour is finished, the small amount of grease retained on the grease mask blade should be removed and applied to the ends of the grease arc. Fig. 9 illustrates properly packed pinion end and commutator end bearing caps and covers.

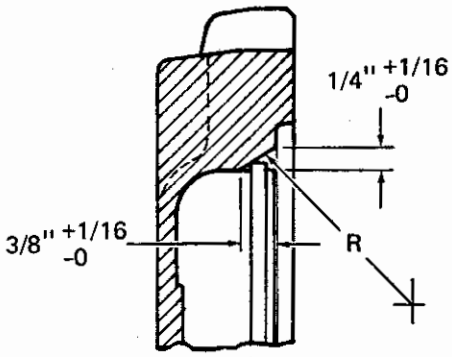
## View A - Machining Anti-Churn Insert Clearance




## View B - Machining Anti-Churn Insert Notch



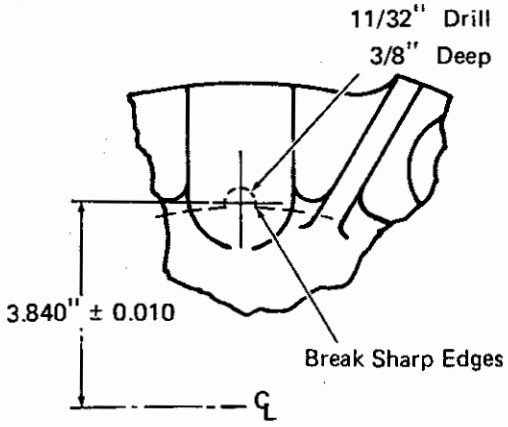

NOTE: When performing rework, minimum outer wall thickness is 0.110"




NOTE: Notch must be cut at the top center of the cover to properly position the insert to prevent insert from turning.

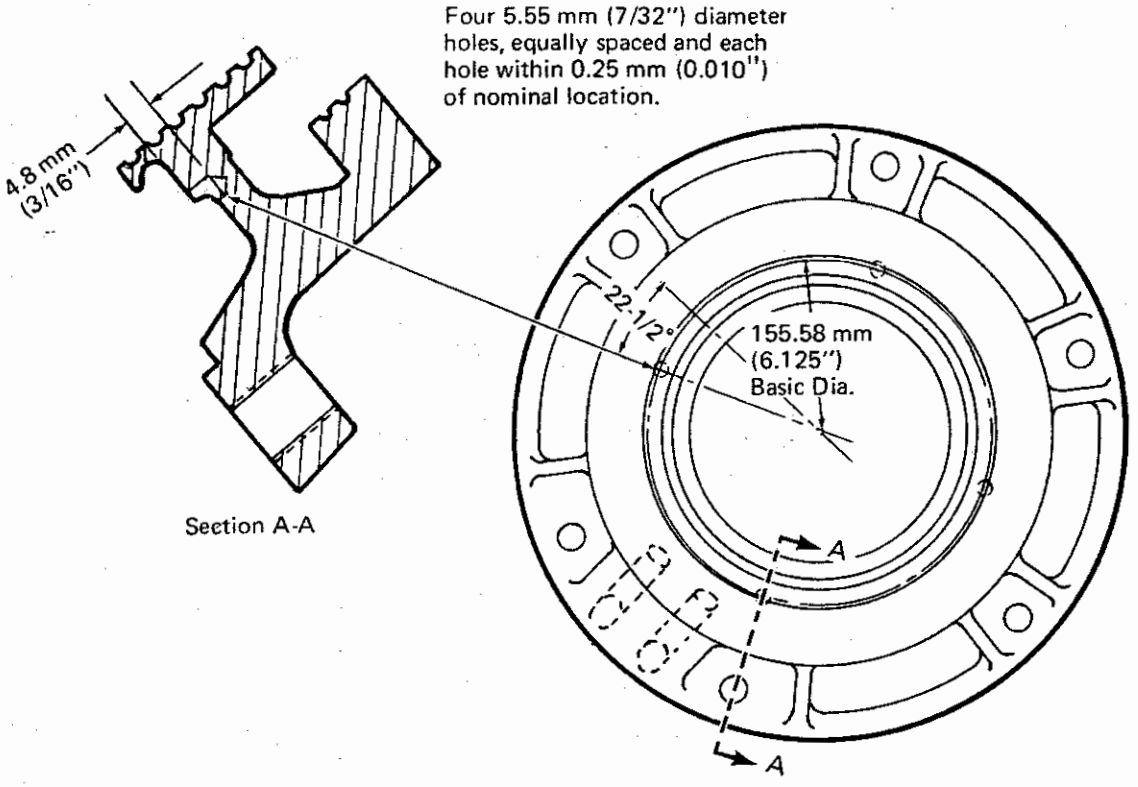
| METRIC CONVERSION CHART | | | |
|---|---|---|---|
| (inch) | mm | (inch) | mm |
| 0.005 | 0.13 | 11/32 | 9 |
| 0.010 | 0.25 | 3/8 | 9.5 |
| 0.020 | 0.51 | 1/2 | 13 |
| 1/32 | 0.8 | 0.940 | 23.88 |
| 1/16 | 1.6 | 1-3/16 | 30.2 |
| 0.110 | 2.79 | 3.840 | 97.54 |
| 0.140 | 3.56 | 5 | 127 |
| 0.160 | 4.06 | 7.545 | 191.64 |
| 1/4 | 6.4 | 7.660 | 194.56 |
| 5/16 | 8 | | |

Optional Notch




21906

Fig. 1 - Commutator End Bearing Cover Modification

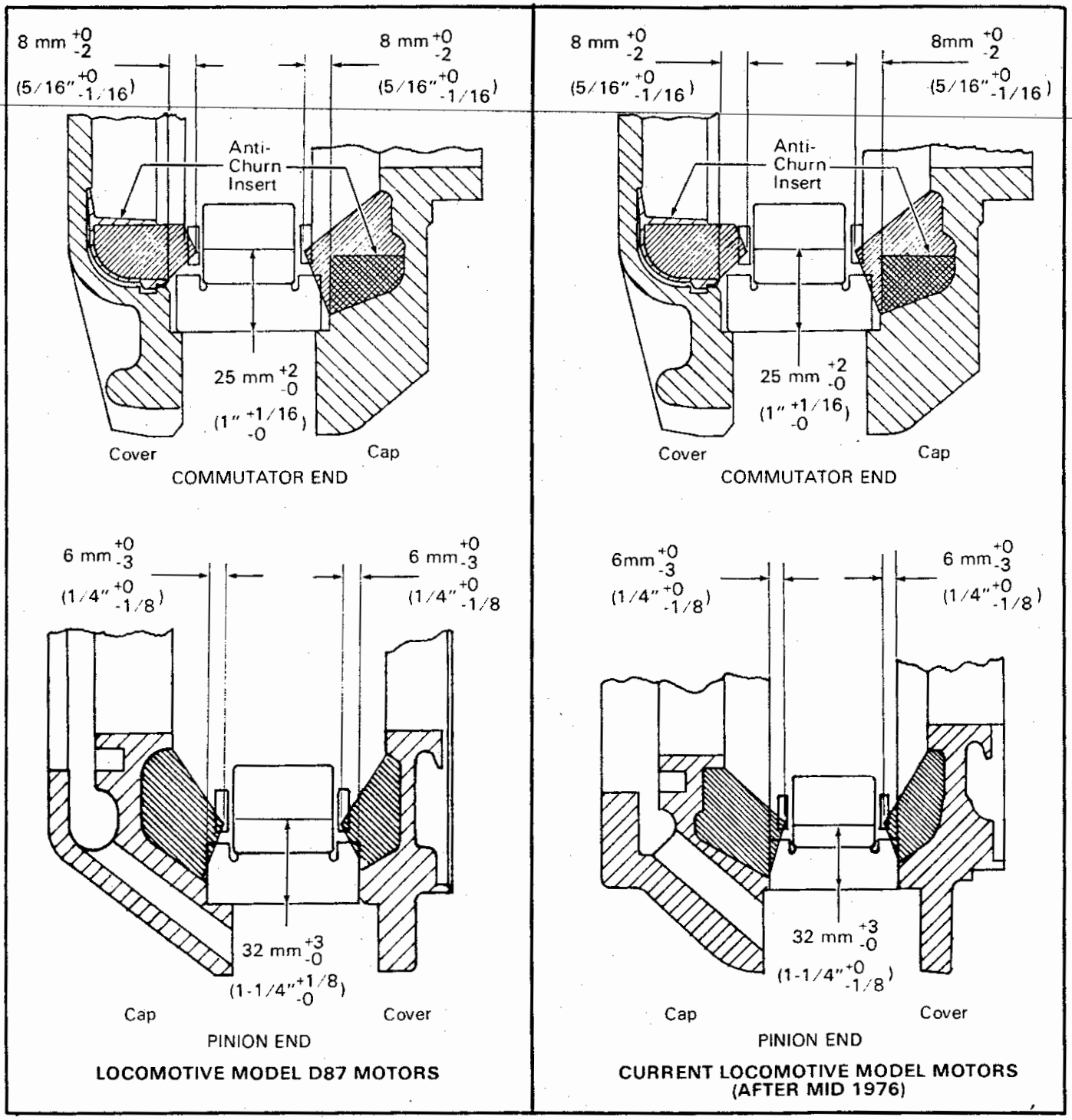



27799

Fig. 2 - Commutator End Bearing Cap Modification

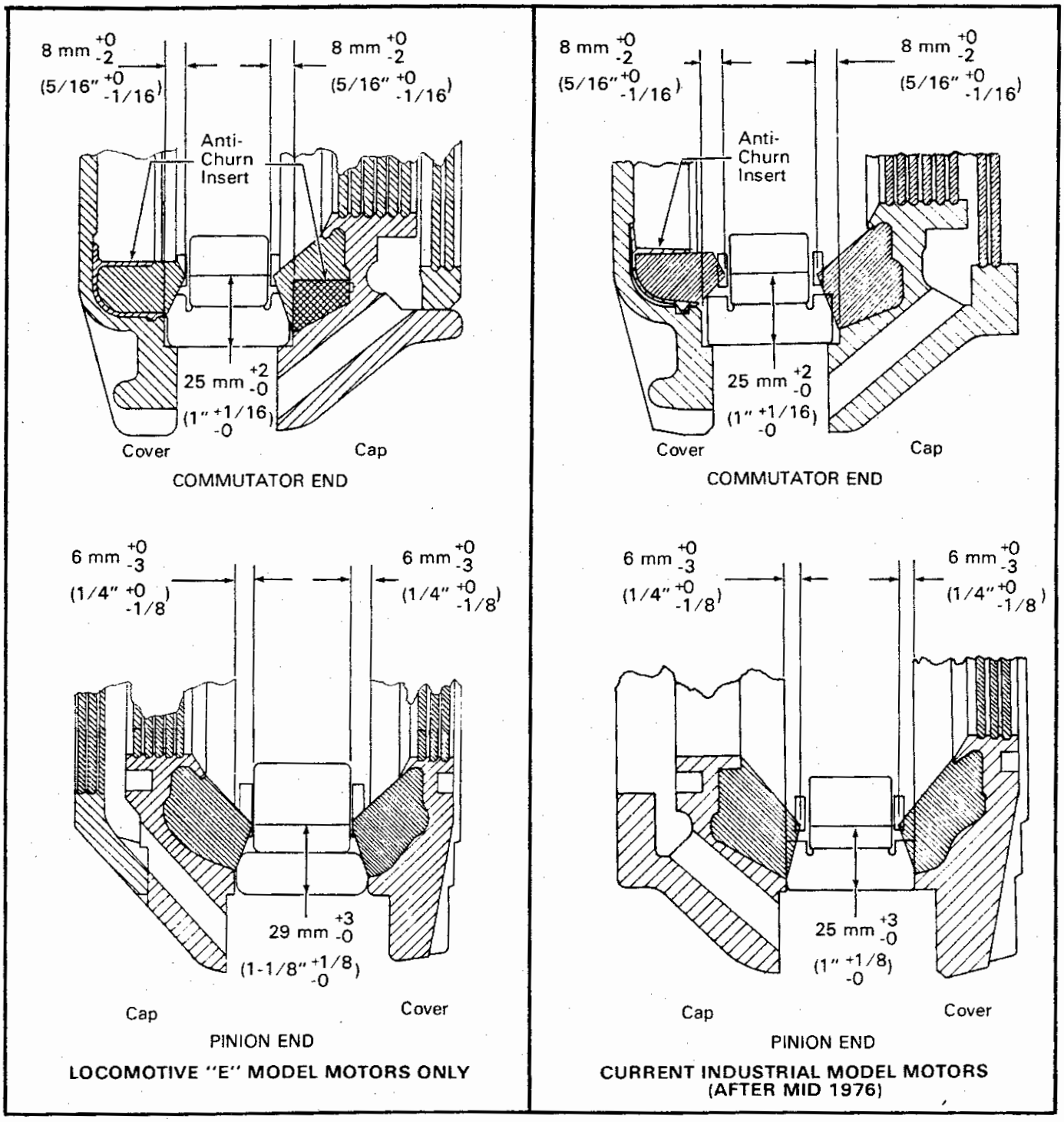
7762

Fig. 3 - Grease Application To Labyrinth Grooves




27800

Fig. 4 - Grease Contours, Current Model Motors
(Sheet 1 of 2)




27800

Fig. 4 - Grease Contours, Current Model Motors
(Sheet 2 of 2)

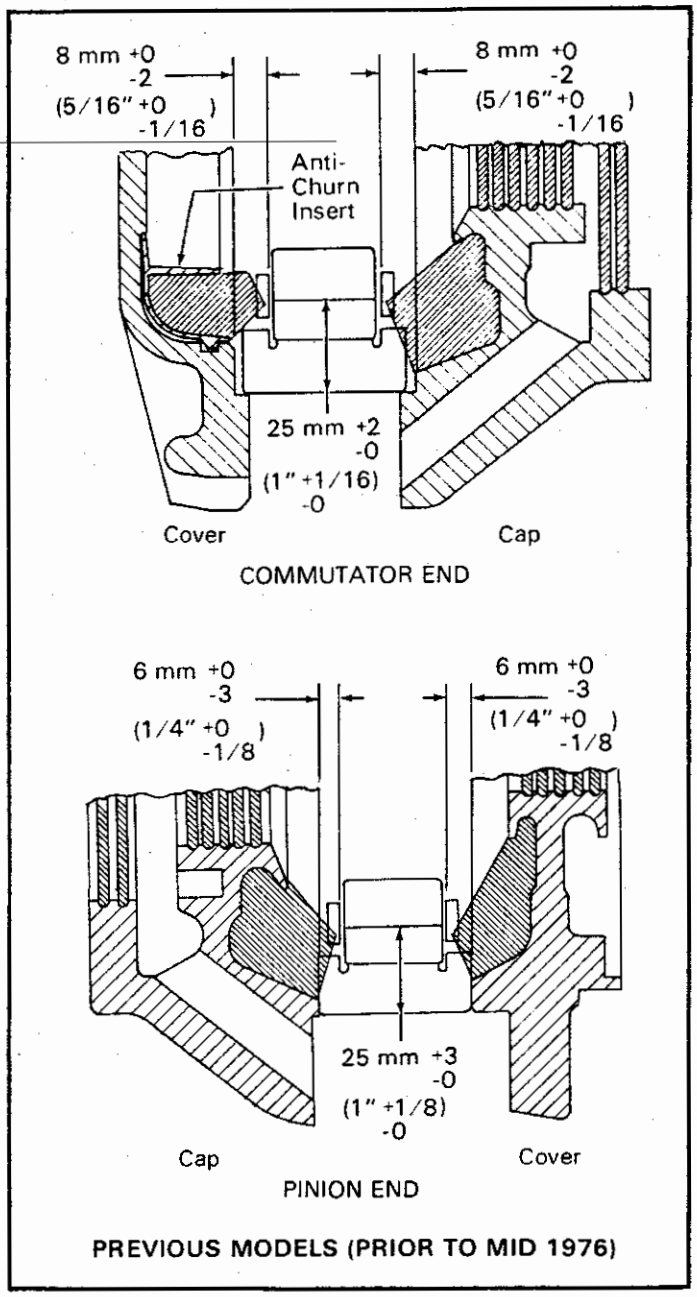



Fig. 5 - Grease Contours
Previous Model Motors

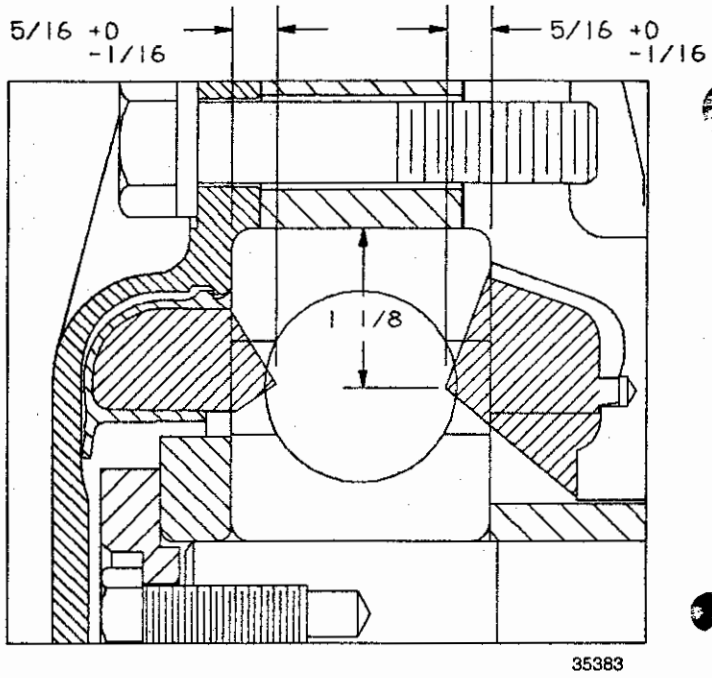



Fig 6 - Grease Contour for C.E. Ball Type Bearing

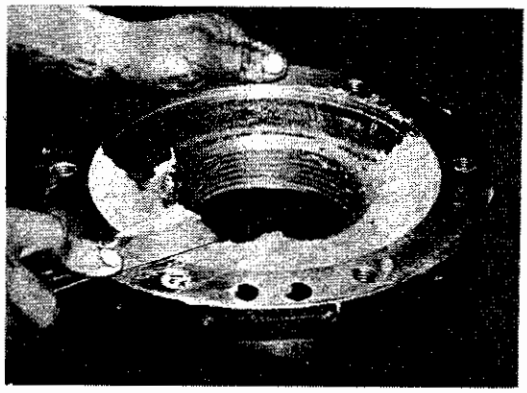



Fig. 7 - Packing Grease Into Bearing Cap


Fig. 8 - Application of Grease Mask

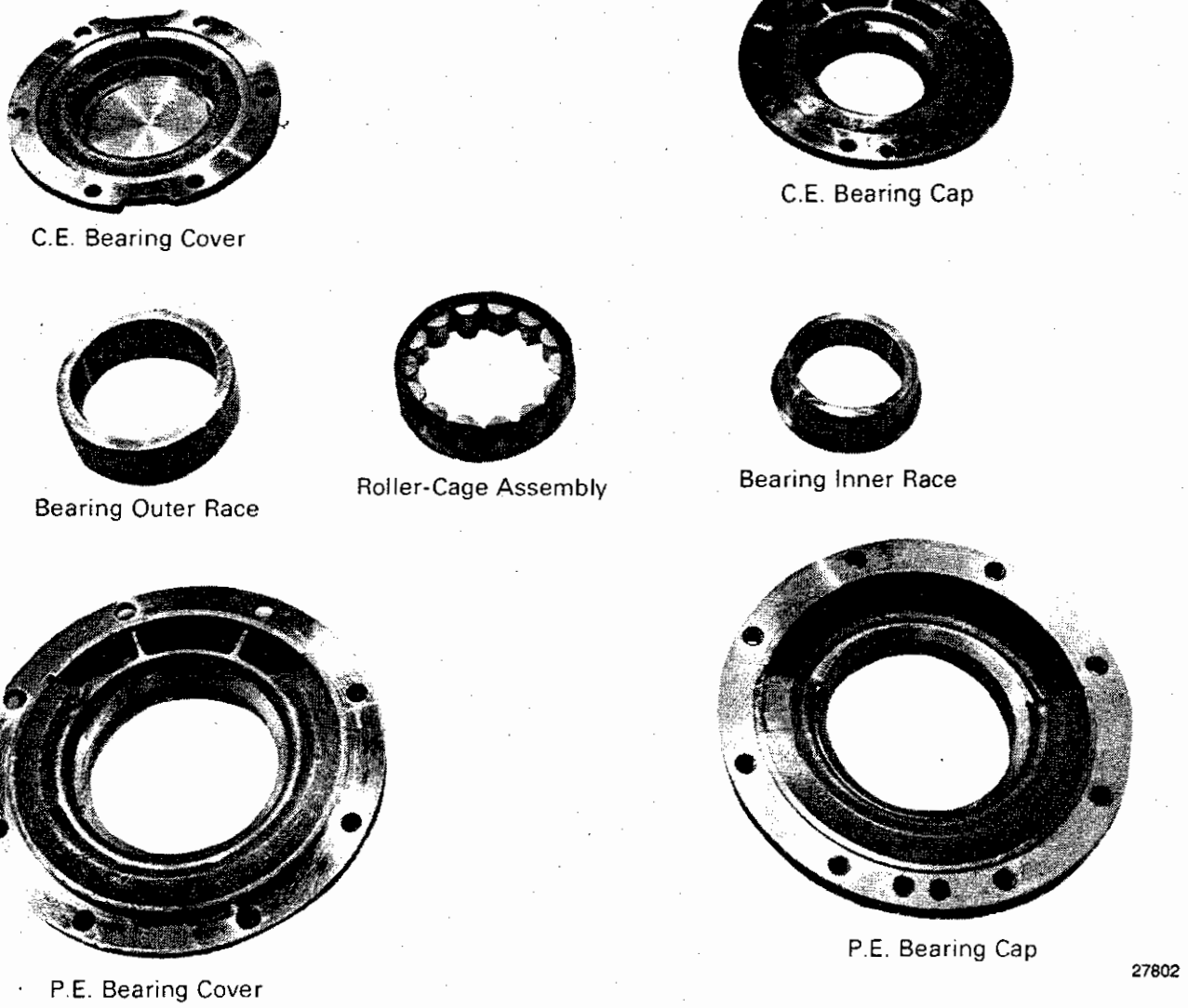



Fig. 9 - Proper Application of Grease

## ROLLER-CAGE ASSEMBLY

### DEMOUNTABLE CAGE-TYPE BEARING

**CAUTION**

When removing or replacing the roller-cage assembly in Steps 1 and 2, ensure roller-cage assembly is handled squarely to prevent gouging or deforming cage bars on the outer race.

1. Remove roller-cage assembly, Fig. 9, from bearing outer race. Refer to Service Data for proper grease quantity specified for the bearing. Using a spatula or putty knife, work grease into outside diameter of the roller-cage assembly as shown in Fig. 10. Coat the rollers and spread grease into the bearing cage pockets.
2. Replace roller-cage assembly in bearing outer race and work grease around the inside diameter of the rollers and into bearing cage pockets.

**NOTE**

Ensure full amount of grease specified in Service Data is used for the bearing assembly.

### NON-DEMOUNTABLE CAGE-TYPE BEARING

Refer to Service Data for proper grease quantity specified for the bearing. Using a spatula or putty knife, apply grease to inside diameter of roller-cage assembly as shown in Fig. 11. Work grease into bearing by rotating the bearing cage until all specified grease has been thoroughly distributed.

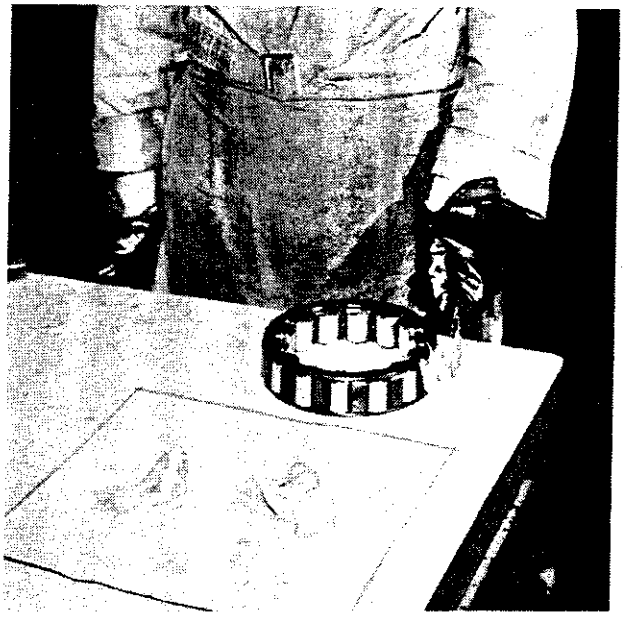


Fig. 10 - Coating O.D. of Roller and Cage Assembly 7749

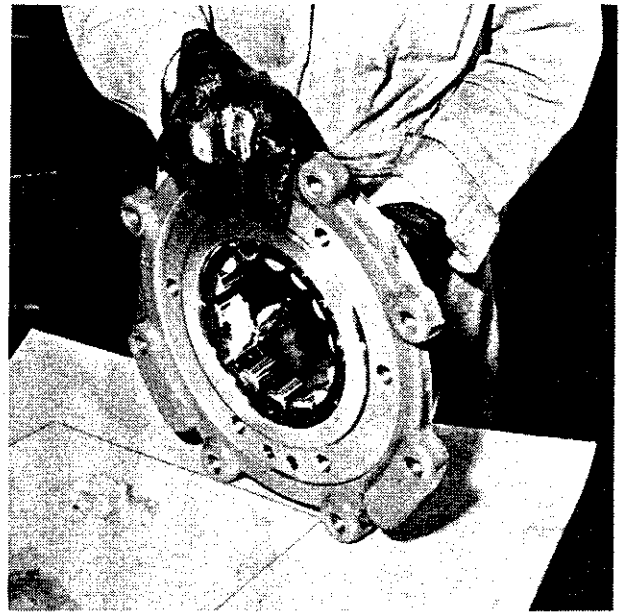


Fig. 11 - Coating I.D. of Roller and Cage Assembly 7750

## NON-DEMOUNTABLE C.E. BALL-TYPE BEARING ASSEMBLY

The "Ball" - type bearing (Fig. 12) is **only** used on the C.E. of the armature. It is to be greased after the bearing assembly is pressed into the bearing housing, and before the bearing/housing assembly is heated for application to the armature shaft. The Ball bearing must be used with a special flashring type bearing housing to eliminate arc pitting and damage to the ball bearing in the event of a flashover to the traction motor. (Reference Fig. 12.)

**NOTE**

The C.E. bearing cap and cover are greased and masked the same as the conventional roller type bearing using same quantities of grease as noted under Service Data on all D77 and D78 type motors.

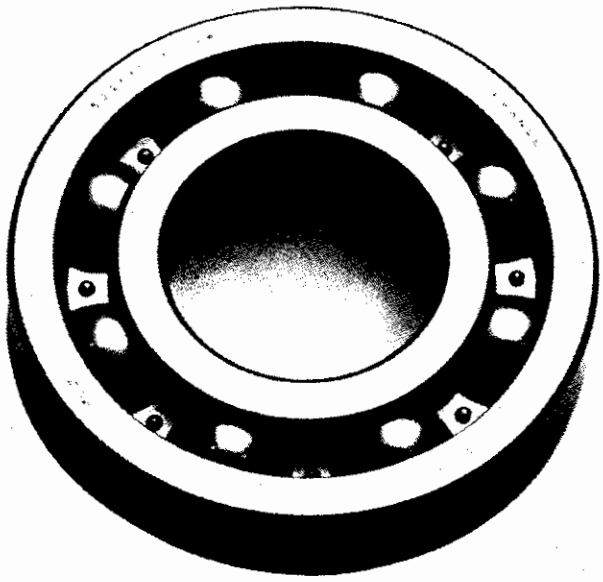
Refer to Service Data for proper quantity specified for the Ball type bearing.

1. Using a suitable bearing press, completely support the face surface of the outer ball bearing race and press bearing into the bearing housing. Keep bearing level and not cocked in bore.

   The face of the outer race should project 4.44 - 5.21 mm (.175 - .205″) from each side of the housing when properly seated.

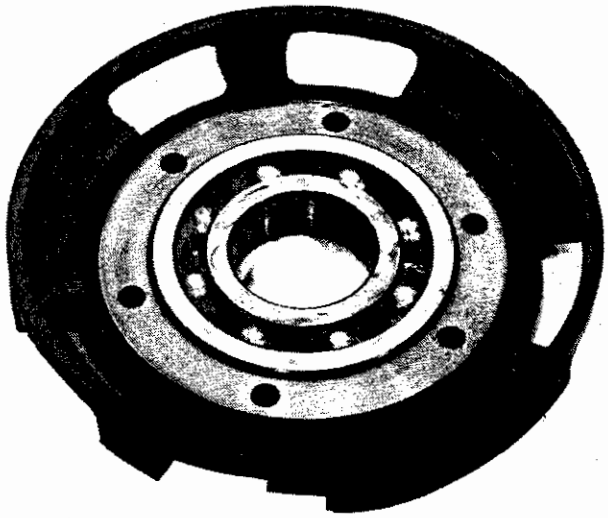
2. Apply 4.0 oz. of grease to ball cage. Spread 2.0 oz. grease evenly throughout one side of ball cage, turn bearing and housing over and spread another 2.0 oz. of grease throughout ball cage. When greasing both sides, rotate the inner race to ensure grease is distributed uniformly. While rotating, grease might excessively collect in certain areas around cage, if so, redistribute grease to other areas where grease is less abundant. (Reference Fig. 12.)

3. Refer to Fig. 6 to determine proper grease contour for the ball type C.E. bearing.



35384

Fig. 12 - C.E. Ball Type Bearing



35385

Fig. 13 - Greased Ball Bearing inside Special Flashring Type Housing

# SERVICE DATA

## EQUIPMENT LIST

Cyprina-RA Grade 3 Lubricant
- 35 lb (15.9 kg) . . . . . 8249819
- 120 lb (54.4 kg) . . . . . 8249820

Bearing Grease Contour Masks

Grease Masks for Model D87 Motor
- Commutator End Bearing Cover . . . . . 8252767
- Commutator End Bearing Cap . . . . . 8228024
- Pinion End Bearing Cover . . . . . 9531317
- Pinion End Bearing Cap . . . . . 9529867

Grease Masks for Other Model Motors
- Commutator End Bearing Cover, Without Insert . . . . . 8228023
- Communtator End Bearing Cover, With Insert . . . . . 8252767
- Communtator End Bearing Cap . . . . . 8228024
- Pinion End Bearing Cap and Cover - "E" Models Only . . . . . 8238744
- Pinion End Bearing Cap and Cover - Other Than "E" Models (Built Prior to January 1, 1971) . . . . . 8228025
- Pinion End Bearing Cap and Cover - Other Than "E" Models (Built After January 1, 1971) . . . . . *File No. 777

* File numbers represent facility drawings that are available (at no charge) from EMD Service Department. These drawings include construction details of tooling that can be manufactured.

# GREASE QUANTITY BY WEIGHT ± 7 g (1/4 oz.)

## DEMOUNTABLE CAGE-TYPE BEARING

**NOTE**

Changes were introduced in mid-1976 to model D77 motor pinion end bearing. The new arrangement removes unnecessary oil slingers designed for oil lubricated motors and incorporates other redesigned parts developed specifically for the grease lubricated motors.

### MODELS WITH CURRENT PINION END BEARING SEAL ARRANGEMENT

| | PINION END | | COMMUTATOR END | |
|---|---|---|---|---|
| | Ounces | Kilograms | Ounces | Kilograms |
| Cover | 8 | 0.227 | 6 | 0.170 |
| Cap | 14 | 0.397 | 7 | 0.198 |
| Roller Cage O.D. | 2 | 0.057 | 1 | 0.028 |
| Roller Cage I.D. | 2 | 0.057 | 1 | 0.028 |
| Total | 26 | 0.738 | 15 | 0.425 |

### MODELS WITH PREVIOUS PINION END BEARING SEAL ARRANGEMENT

| | PINION END | | COMMUTATOR END | |
|---|---|---|---|---|
| | Ounces | Kilograms | Ounces | Kilograms |
| Cover | 12 | 0.340 | 6 | 0.170 |
| Cap | 14 | 0.397 | 7 | 0.198 |
| Roller Cage O.D. | 2 | 0.057 | 1 | 0.028 |
| Roller Cage I.D. | 2 | 0.057 | 1 | 0.028 |
| Total | 30 | 0.851 | 15 | 0.425 |

## MODELS D27E, D37E, D47E, D57E, D67E, D77E

| | PINION END | | COMMUTATOR END | |
|---|---|---|---|---|
| | Ounces | Kilograms | Ounces | Kilograms |
| Cover | 14 | 0.397 | 6 | 0.170 |
| Cap | 17 | 0.482 | 7 | 0.198 |
| Roller Cage O.D. | 2 | 0.057 | 1 | 0.028 |
| Roller Cage I.D. | 2 | 0.057 | 1 | 0.028 |
| Total | 35 | 0.993 | 15 | 0.425 |

## MODELS D87

| | PINION END | | COMMUTATOR END | |
|---|---|---|---|---|
| | Ounces | Kilograms | Ounces | Kilograms |
| Cover | 15 | 0.425 | 6 | 0.170 |
| Cap | 20 | 0.567 | 7 | 0.198 |
| Roller Cage O.D. | 3 | 0.085 | 1 | 0.028 |
| Roller Cage I.D. | 3 | 0.085 | 1 | 0.028 |
| Total | 41 | 1.162 | 15 | 0.425 |

## MODELS D77/D87 (Ball Type Bearing)

| | COMMUTATOR END | | |
|---|---|---|---|
| | Ounces | Kilograms | |
| Ball Bearing | 4 | 0.114 | |

## NON-DEMOUNTABLE CAGE-TYPE BEARINGS

| | PINION END | | COMMUTATOR END | |
|---|---|---|---|---|
| | Ounces | Kilograms | Ounces | Kilograms |
| **D7*** | | | | |
| Cover | 9.5 | .269 | 6.0 | .170 |
| Cap | 11.5 | .326 | 2.5 | .071 |
| Bearing | 4.0 | .113 | 2.0 | .056 |
| Total | 25.0 | .708 | 10.5 | .297 |
| **D7E*** | | | | |
| Cover | 12.5 | .354 | 6.0 | .170 |
| Cap | 10.5 | .298 | 2.5 | .071 |
| Bearing | 4.0 | .113 | 2.0 | .056 |
| Total | 27.0 | .765 | 10.5 | .297 |
| **D17 and D27** | | | | |
| Cover | 12.0 | .340 | 6.0 | .170 |
| Cap | 14.0 | .397 | 7.0 | .198 |
| Bearing | 4.0 | .113 | 2.0 | .057 |
| Total | 30.0 | .850 | 15.0 | .425 |
| **D27E** | | | | |
| Cover | 14.0 | .397 | 6.0 | .170 |
| Cap | 17.0 | .482 | 7.0 | .198 |
| Bearing | 4.0 | .113 | 2.0 | .057 |
| Total | 35.0 | .992 | 15.0 | .425 |

*D7 and D7E parts are to be used only on D7 and D7E conversions from oil to grease lubrication.

## BEARING ASSEMBLY TORQUE VALUES

| | Bolt Size | Torque N·m (ft. lbs.) |
|---|---|---|
| **Pinion End** | | |
| Bearing Cover and Cap to Bearing Housing | 5/8″-11 | 169-190 (125-140) |
| Bearing Housing to Frame | 1″-8 | 800 (590) |
| **Commutator End** | | |
| Bearing Cover and Cap to Bearing Housing | 5/8″-11 | 169-190 (125-140) |
| Bearing Housing to Frame | 3/4″-10 | 366 (270) |
| Bearing Retainer to Shaft | 7/16″-20 | 68-75 (50-55) |

Electro-Motive Division of General Motors Corporation
LaGrange, Illinois 60525 USA
Telex: 270041 McCook, Illinois USA
Cable: ELMO DIV LaGrange, Illinois USA
Telephone: 708-387-6000