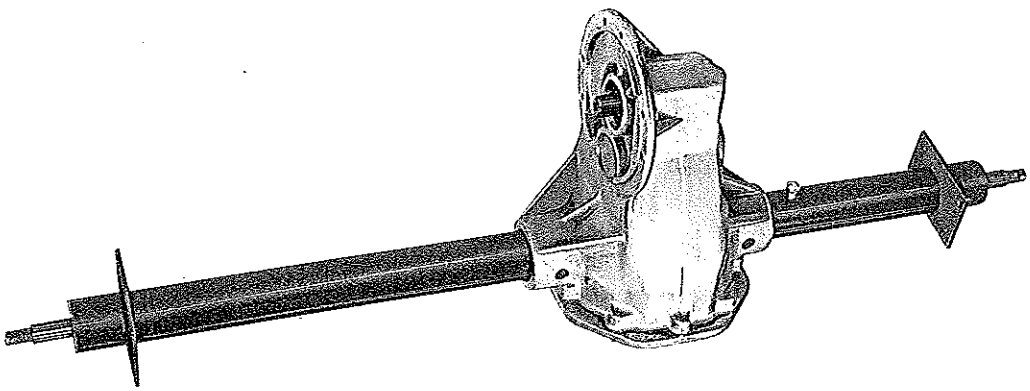
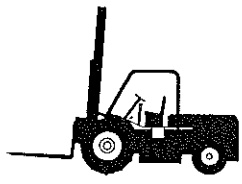
Maintenance Manual
Model 12 (Electric)





SCHAFER DRIVELINE

Schafer Driveline LLC
123 Phoenix Place
Fredericktown, OH 43019-9162
United States

SCHAFER DRIVELINE

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General Precautions for Disassembly

THE REAR AXLE IS A PRECISION ASSEMBLY, AND AS SUCH ANY REPAIR OR REPLACEMENT OF PARTS MUST BE DONE WITH GREAT CARE IN A CLEAN ENVIRONMENT. BEFORE ATTEMPTING TO PERFORM ANY SERVICE ON THE AXLE, READ AND UNDERSTAND ALL FOR THE FOLLOWING TEXT AND PHOTOGRAPHS.

HANDLE ALL GEARS WITH EXTREME CARE.

CLEANLINESS
The axle assembly should be degreased prior to disassembly.
Dirt is abrasive and will cause premature wear of bearings and other parts. We suggest that mechanics have a small wash tank to clean parts just prior to reassembly.

BEARINGS/SEALS
It is recommended that whenever a bearing, seal or "O" ring is removed, it be replaced with a new one regardless of mileage. Always wipe the seals and "O" rings with a light oil before installing.
Bearings and seals should be removed with pullers designed for this purpose.

SNAP RINGS
SNAP RINGS MUST BE REMOVED/INSTALLED WITH CARE TO PREVENT DAMAGE TO BEARINGS, SEALS AND BEARING BORES.

TORQUE CHART

Differential Bearing Cap	35-45 Ft. Lbs.
Ring Gear Bolts	35-45 Ft. Lbs.
Cover Plate Screws	16-24 Ft. Lbs.
Fill Plug	25-40 Ft. Lbs.
Brake Bolts-160MM Brakes	15-19 Ft. Lbs.
-7" X 1-3/4" Brakes	16-20 Ft. Lbs.
Spindle Nut	95-115 Ft. Lbs.

Cleaning and Inspection

CLEANING
Parts should be cleaned with emulsion cleaners or petroleum based cleaners.
Clean, inspect, and lubricate all bearings just prior to reassembly.
Clean all sealing surfaces of gasket material.

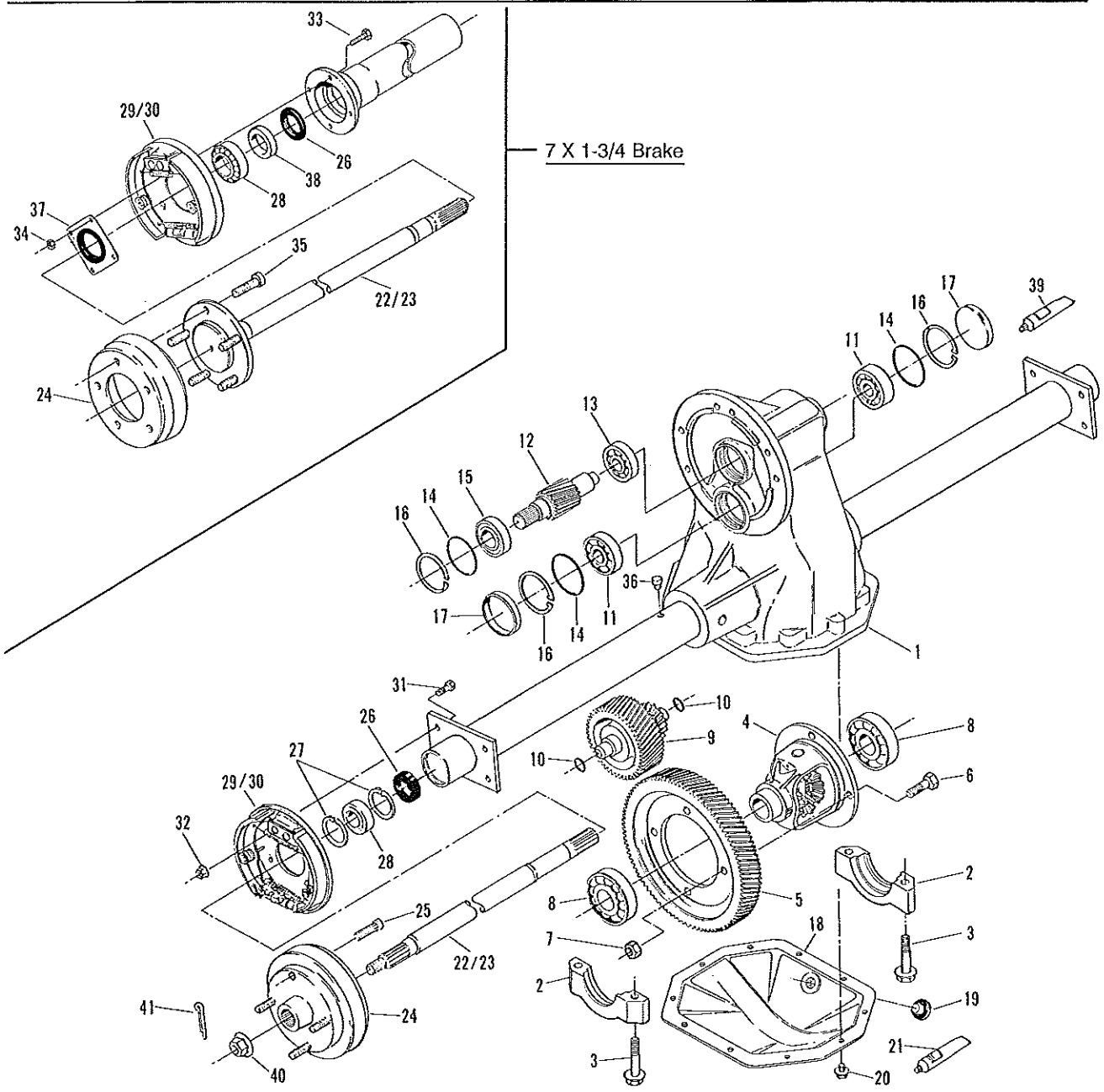
DRYING
Use soft, clean, lintless towels or rags to dry components after cleaning. Bearings should NOT be dried by spinning with compressed air. This can damage mating surfaces due to lack of lubrication.

After drying, parts should be coated with a light coat of lubricant or rust preventative to prevent damage from corrosion. If parts are to be stored for a prolonged period they should be wrapped.

INSPECTION
Prior to reassembly, inspect part for signs of wear or damage.
Bearing and seal surfaces should be inspected for pitting, wear, or overheating.
Inspect gears for pitting, wear or scoring.
Inspect axle shafts for worn splines, bends, or cracks.
Replacement of these parts can prevent premature failure.

Safety Glasses should be worn at all times when assembling or disassembling

Exploded View/Parts List



Item	Description	Qty.
1	Carrier Sub-Assembly	1
2	Bearing Cap	2
3	Bolt - Bearing Cap	4
4	Diff. Case Assembly	1
5	Gear - Output	1
6	Cap Screw	4
7	Nut	4
8	Bearing - Ball	2
9	Intermediate Shaft & Gear Assy.	1
10	"O" Ring	2
11	Bearing - Ball	2
12	Input Shaft	1
13	Bearing - Ball	1
14	"O" Ring	3

Item	Description	Qty.
15	Bearing - Ball	1
16	Snap Ring	3
17	Plug - Cup	2
18	Cover - Carrier	1
19	Plug - Fill	1
20	Screw - Cover Plate	10
21	Sealant - Cover Plate	1
22	Shaft - Axle, L.H.	1
23	Shaft - Axle, R.H.	1
24	Hub Assembly	2
25	Bolt - Wheel (160mm Brake)	*
26	Oil Seal	2
27	Snap Ring	4
28	Bearing	2

Item	Description	Qty.
29	Brake Assembly, L.H.	1
30	Brake Assembly, R.H.	1
31	Bolt - Brake (160mm Brake)	8
32	Nut (160mm Brake)	8
33	Bolt - Brake (7 X 1-3/4 Brake)	8
34	Nut (7 X 1-3/4 Brake)	8
35	Bolt - Wheel (7 X 1-3/4 Brake)	*
36	Vent	1
37	Seal	2
38	Retaining Ring	2
39	Sealant - Anaerobic	1
40	Nut - Axle Shaft	2
41	Cotter Pin	2

* See specific Bill of Material for each axle.

1. Axle Shaft, Bearing, and Oil Seal Disassembly

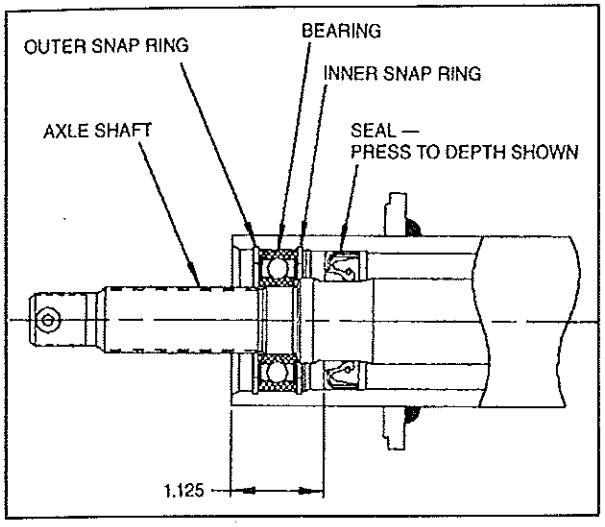
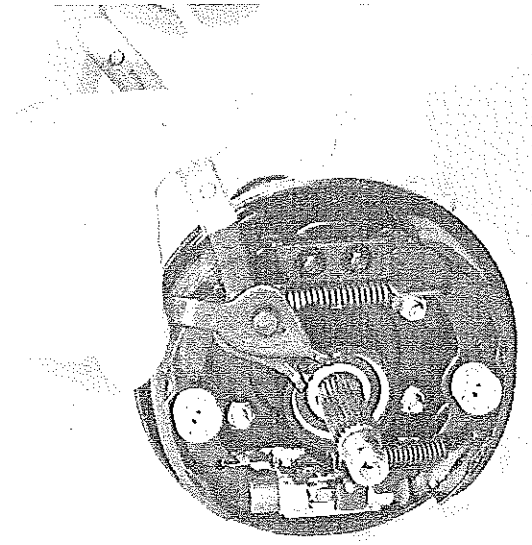
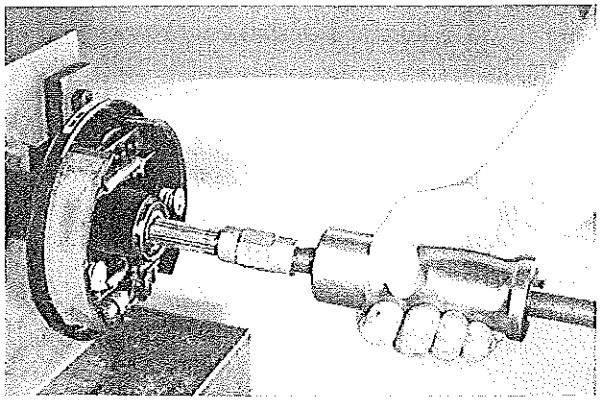


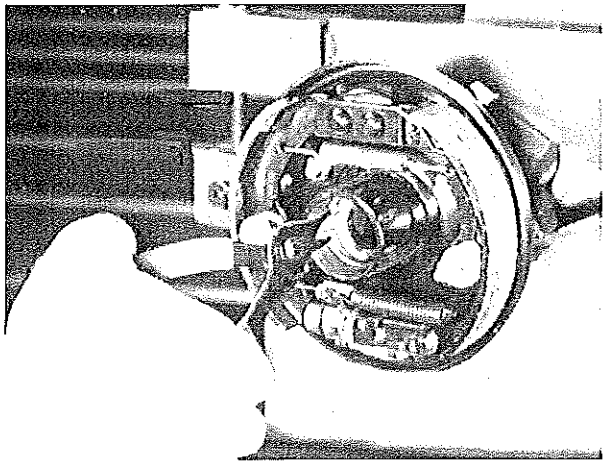
Diagram 1



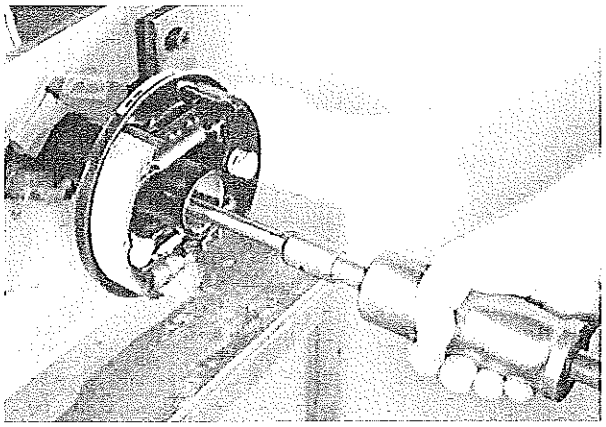
1-1. Remove outer snap ring.



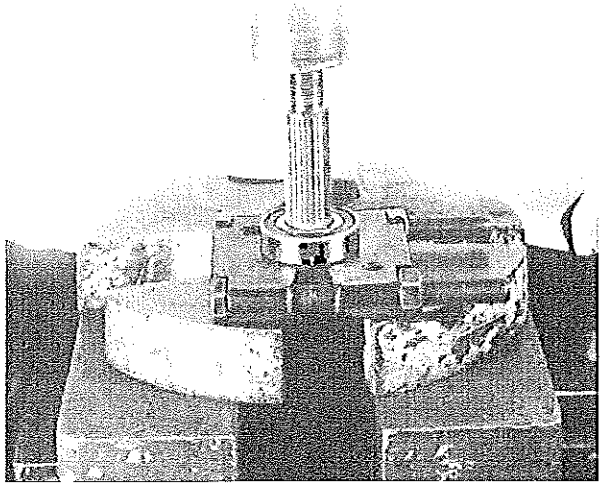
1-2. Using a slide hammer attached to the threaded end of the axle shaft, remove axle shaft and bearing assembly.



1-3. Remove inner snap ring. Use caution as not to damage bearing surfaces.



1-4. Using an oil seal puller, attached to a slide hammer, remove oil seal. Use caution as not to damage the seal seating surface.



1-5. Remove the bearing from the axle shaft by supporting the inner race of the bearing on an arbor press, and apply pressure to the threaded end of the axle shaft.

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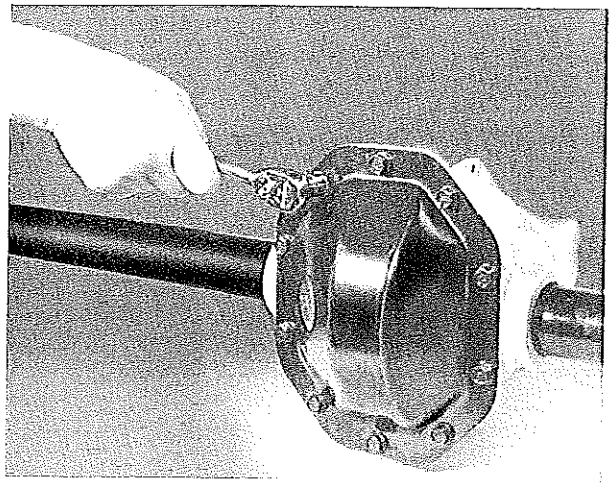
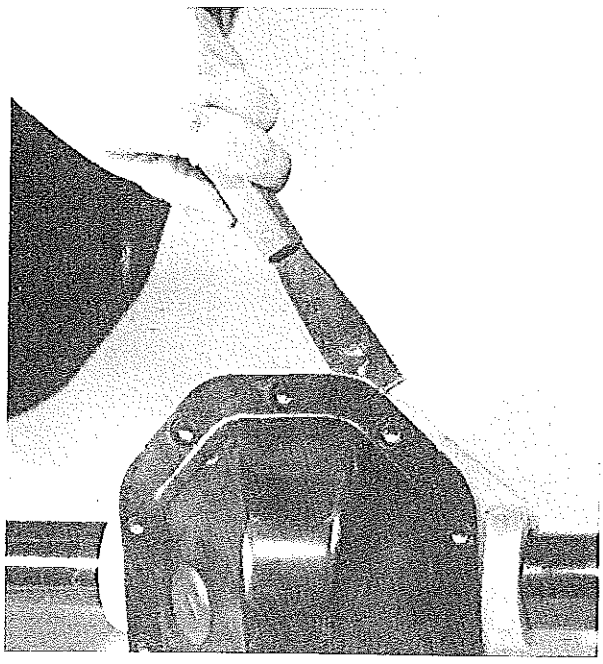
2. Differential Case and Final Drive Gear Removal

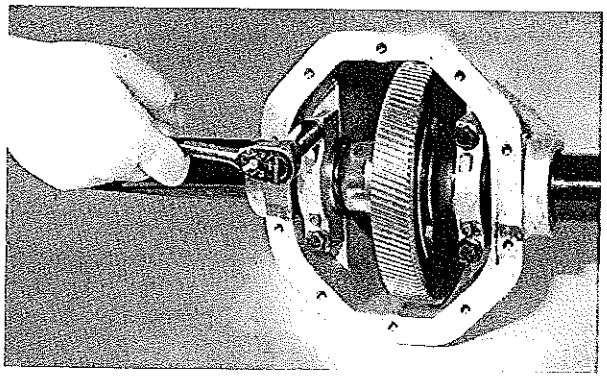


2-1. After removing left and right axle shafts (See Axle Shaft, Bearing, and Oil Seal Disassembly, page 3.)

A. Remove ten (10) cover plate screws.

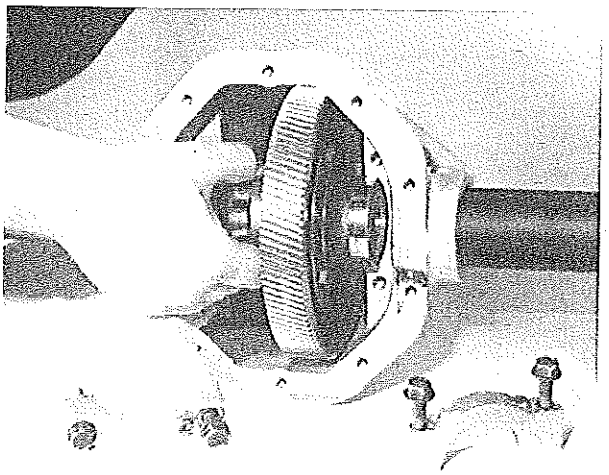


B. Position the axle housing and cover plate over a drain pan. Using a putty knife, separate the cover plate from the housing. Use caution as not to damage the housing sealing surface or deform the cover plate.

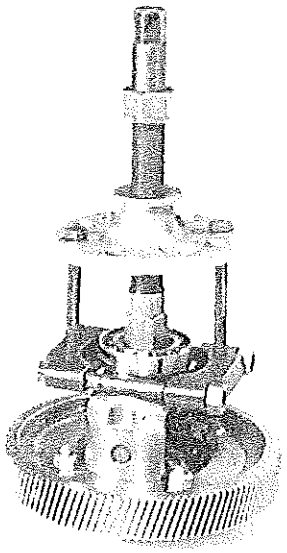


2-2. Remove four (4) bearing cap screws and remove bearing caps.

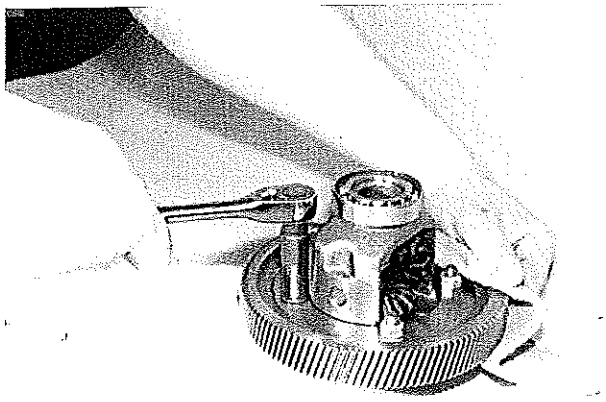
NOTE: Bearing caps are marked for identification. Letters or numbers are stamped in horizontal and vertical position. During reassembly, place them back in their original positions.



2-3. Remove differential case assembly from housing.



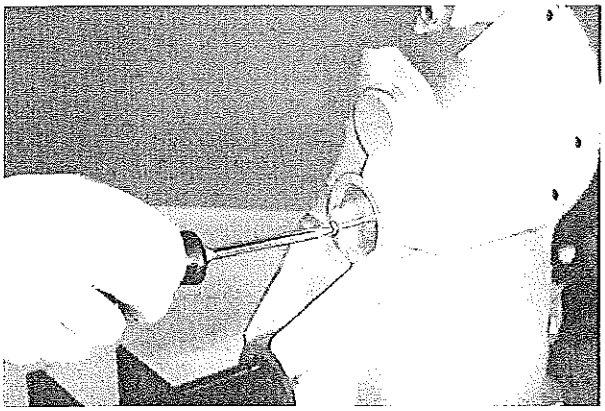
2-4. Using a bearing puller, remove differential bearings from each side of differential case.



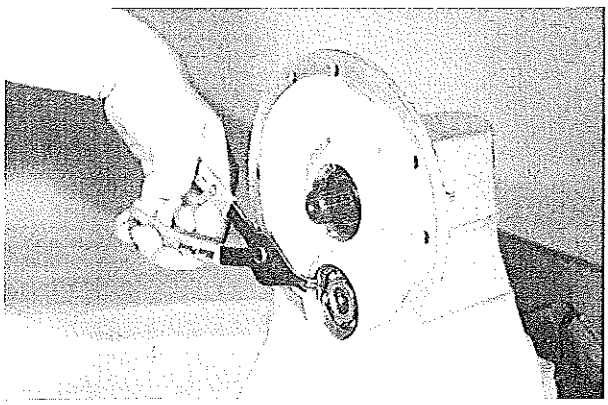
2-5. Remove four (4) bolts and nuts from the final drive gear. Remove gear from differential case, using caution not to damage gear teeth.

■ ■ ■

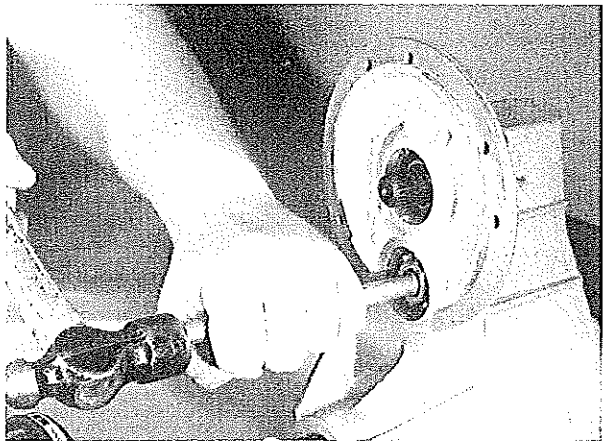
3. Intermediate Shaft and Gear Assembly Removal



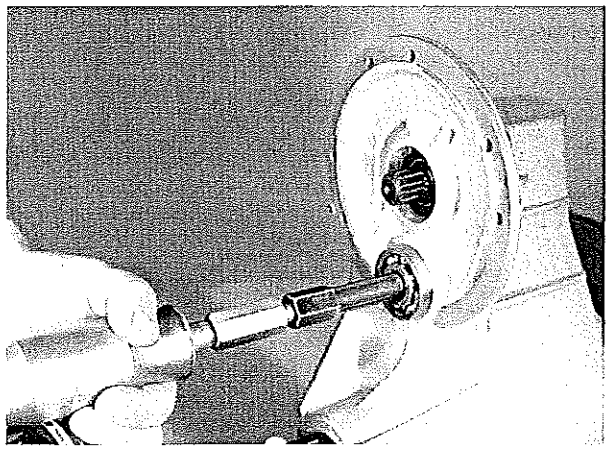
3-1. Punch or drill approximately a 1/8" diameter hole near the center of each intermediate bore plug. Insert a suitably sized sheet metal screw until the metal bore plug is forced out of the bearing bore.



3-2. Remove snap rings from each intermediate bore.



3-3. Using a brass drift pin, drive the intermediate shaft from the flange side of housing. Shaft should travel far enough to allow engagement of I.D. bearing puller.



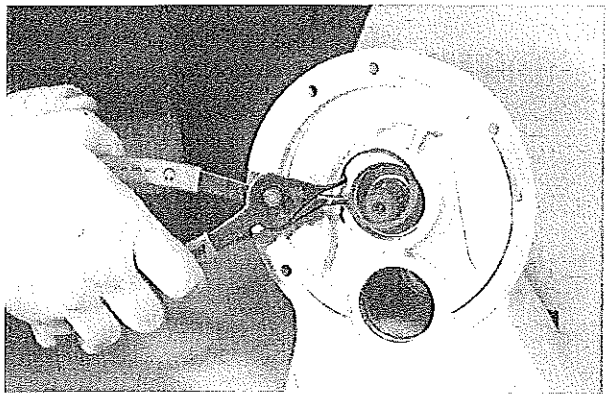
3-4. Using an I.D. bearing puller attached to a slide hammer, remove intermediate bearing from flange side of housing.

3-5. Repeat step 3-3 for intermediate bearing on opposite side.

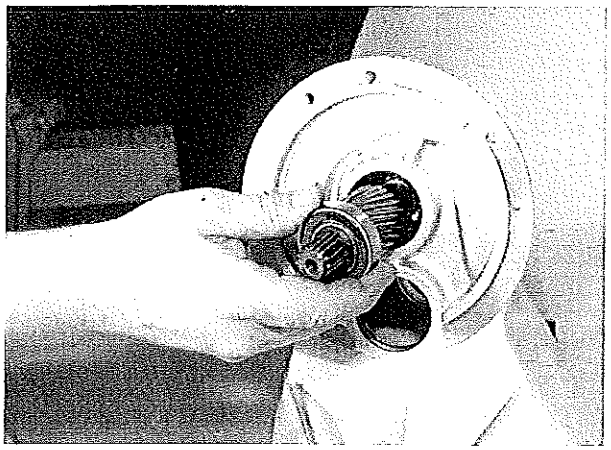
CAUTION: Shaft and gear assembly must be supported by hand as not to damage gear teeth. NOTE: Small end of intermediate shaft and gear assembly must be tilted toward opening in bottom of housing for removal. Use caution as not to damage gear teeth.

■ ■ ■

4. Input Shaft Removal



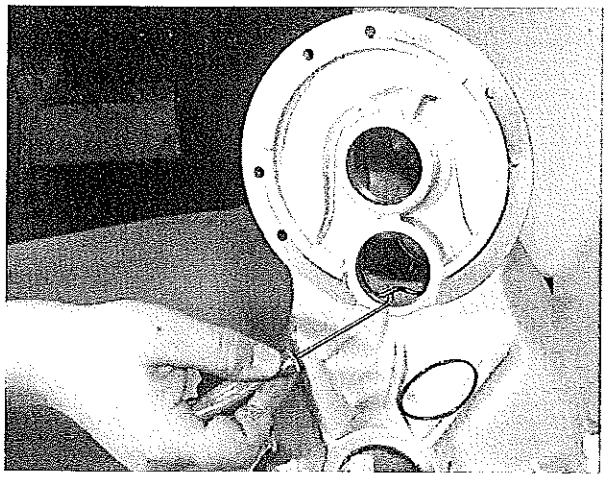
4-1. Remove snap ring from input shaft bore.



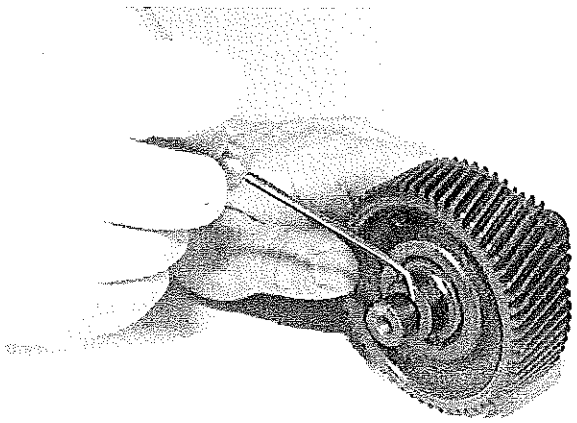
4-2. Pull input shaft assembly from housing. The input shaft assembly should slide out of the housing easily. If resistance is encountered, a slide hammer may be required. Use caution as not to damage gear.

■ ■ ■

5. Removal of "O" Rings from Housing and Intermediate Shaft



5-1. Remove "O" rings from outer input bearing bore, and both intermediate bearing bores.



5-2. Remove "O" rings at each end of intermediate shaft on bearing shoulders.

5-3. Refer to page 1 for cleaning and inspection of components.

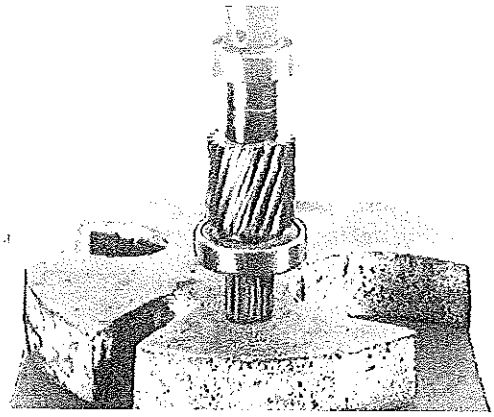
■ ■ ■

6. Reassembly

6-1. Install new "O" rings into outer pinion bearing bore,intermediate bearing bores and intermediate shaft and gear assembly. Prior to installing, wipe "O" rings with light oil or "O" ring lubricant.

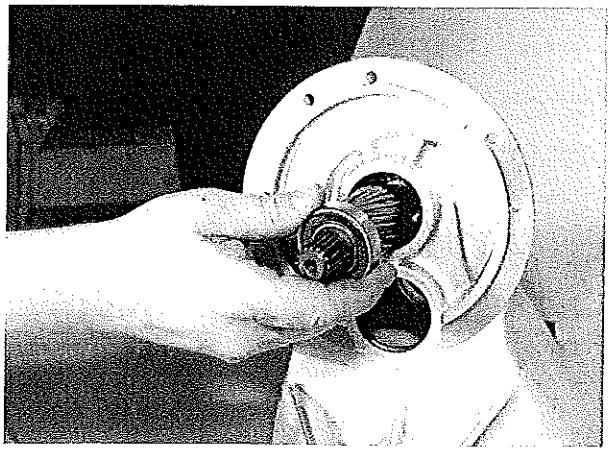
■ ■ ■

7. Input Shaft Reassembly

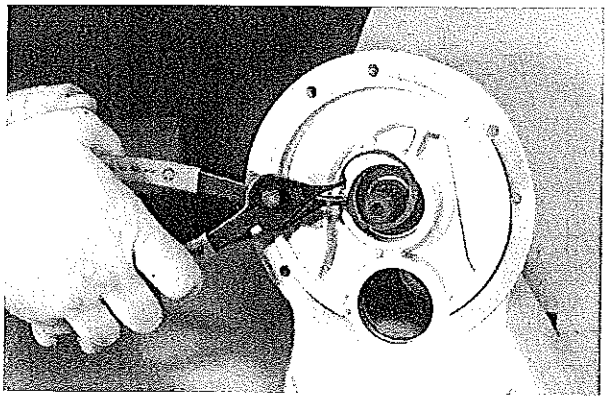


7-1. Press inner and outer bearings on input shaft until seated against bearing shoulders.

7-2. Install new "O" ring into input bearing bore. Lightly oil "O" ring at installation.



7-3. Reinstall input shaft. Bearings and shaft should slide easily into housing. If resistance is encountered, a plastic or leather mallet could be used to tap the shaft into its correct position, using caution not to damage gear teeth.



7-4. Install outer snap ring at input shaft bore.

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8. Intermediate Shaft and Gear Assembly Installation

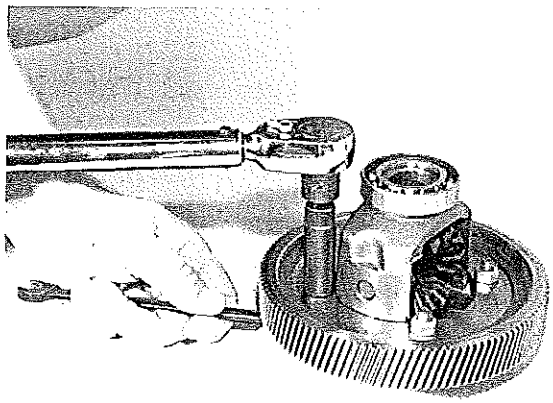
8-1. After "O" ring installation on shaft and in housing, install intermediate shaft and gear assembly through bottom opening in housing.

NOTE: Small end of intermediate shaft and gear assembly must be tilted toward bottom opening until bearing trunnion visually engages intermediate bores.

Align both bearing trunnions with intermediate bore. Continue supporting intermediate shaft and gear assembly with one hand and insert the flanged side bearing into opening. To seat the bearing past "O" ring, a leather or plastic mallet may be required.
After flanged side bearing is seated past snap ring groove, install snap ring. Repeat procedure for opposite side bearing and install snap ring. Use caution as not to damage gear.

■ ■ ■

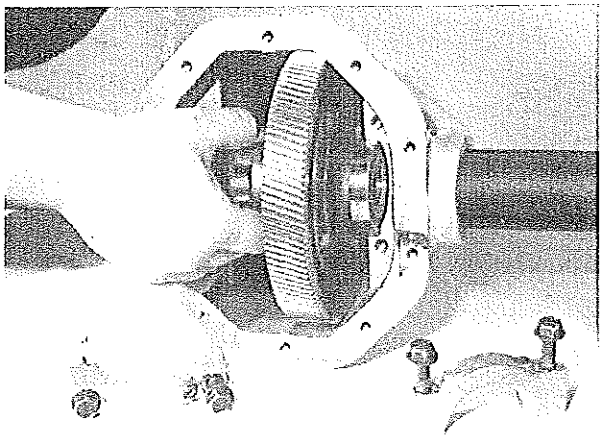
9. Differential Case and Final Drive Gear Reassembly



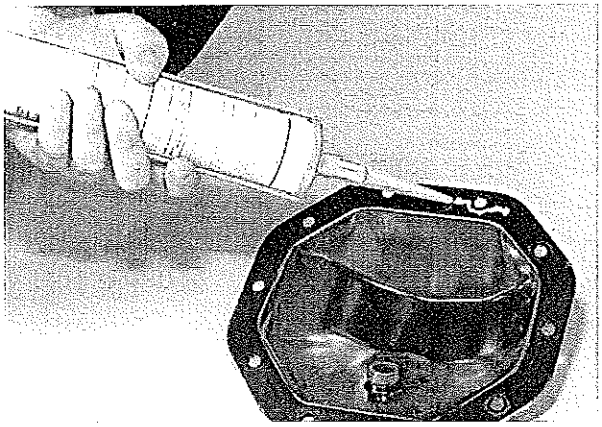
9-1. Position differential case assembly with flanged side trunnion down on work surface. Align final gear mounting holes with differential case and install four (4) bolts and nuts. Bolts should be installed from the differential flange side. Refer to torque chart on page 1 for torque specifications.

9-2. Differential bearings can be installed on differential before or after installing ring gear. Use caution as not to damage differential bearings or ring gear when installing the opposite component.

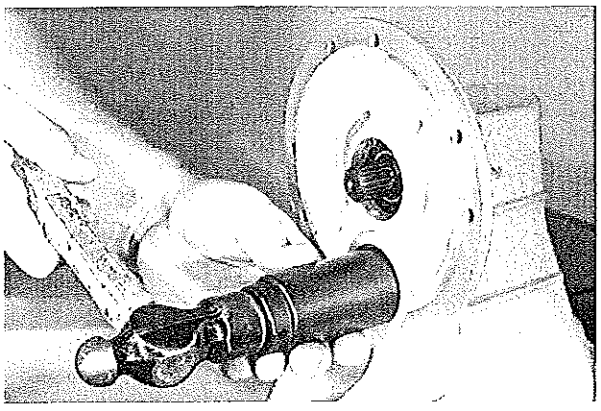
■ ■ ■



9-3. Position housing with opening up and insert differential case, final drive gear and bearing assembly into housing. Install differential bearing caps.
NOTE: Bearing caps are marked for identification. Letters or numbers are stamped in horizontal or vertical position. During reassembly, they must return to their original positions.
9-4. Install four (4) screws into bearing caps and torque. Refer to torque chart on page1 for torque specifications.



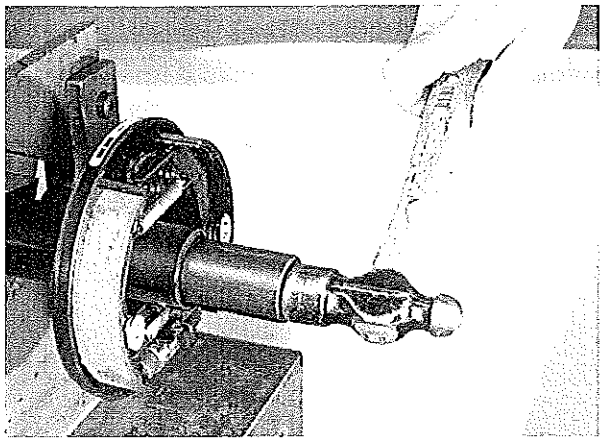
9-5. Place a small bead of RTV (non-acidic) silicone sealant to flange of cover plate. Sealant should be applied inside of cover plate mounting holes. Install the cover plate and ten (10) cover plate screws and torque. Refer to the torque chart on page 1 for torque specifications.



9-6. Install new intermediate bore plug to both sides of housing. Use Loctite Safety Solvent #75559 to clean bores,then apply Loctite RC 609 to housing bores. Bore plugs can be installed by using a properly sized driver and a hammer.

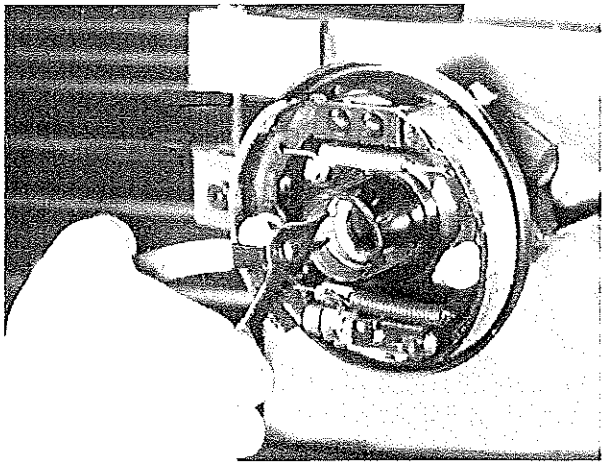
NOTE: Bore plugs should be firmly against snap rings, when fully seated.

10. Axle Shaft Bearing and Seal Reassembly

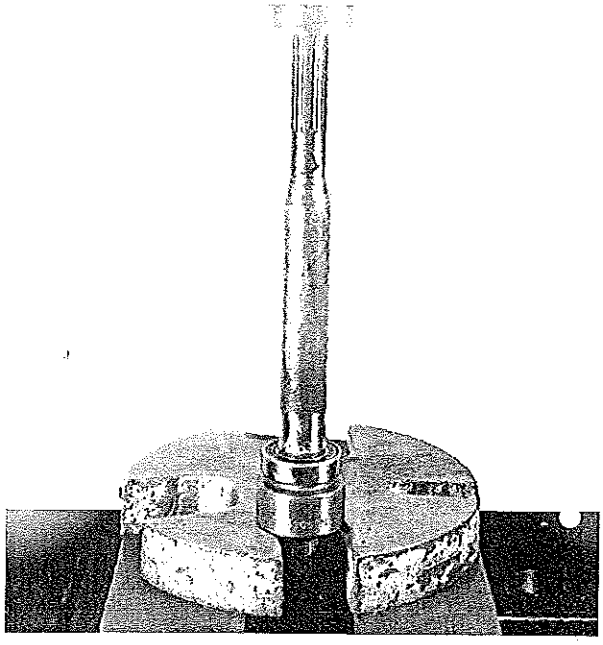


10-1. With properly sized seal driver, install shaft seals.

NOTE: Seal to be installed to dimension shown in Axle Shaft, Bearing, and Oil Seal Disassembly Diagram1, page 3. Seal lip should be coated uniformly with light oil or grease before inserting axle shaft.



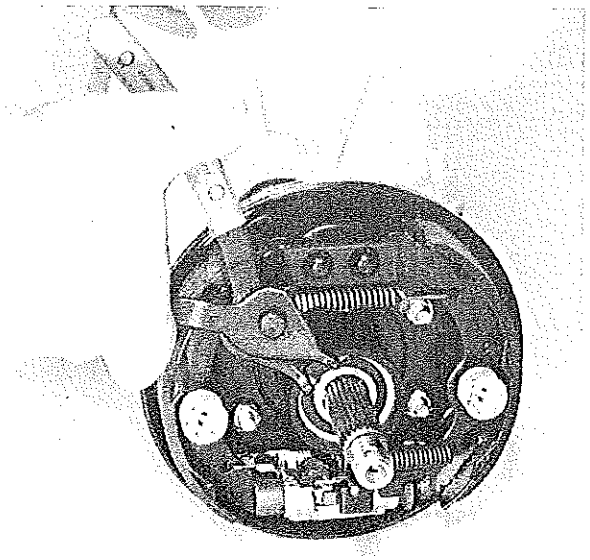
10-2. Install inner snap ring to both right and left hand tubes.



10-3. Press bearings onto axle shafts. Bearing should seat to shoulder. Use appropriate drive to install bearing.

10-4. Insert axle shaft assemblies into tubes. With a properly sized bearing driver, tap assembly until it is seated firmly against inner snap ring. Refer to Diagram 1, page 3.

NOTE: Rotation of shaft may be required to engage differential splines during installation.



10-5. Install outer snap ring in each tube.

10-6. Remove fill plug in cover plate. Fill axle assembly with correct type and amount of lubricant as recommended by O.E.M. Install rubber fill plug into cover plate. If threaded fill plug, see torque chart on page 1 for torque specifications.

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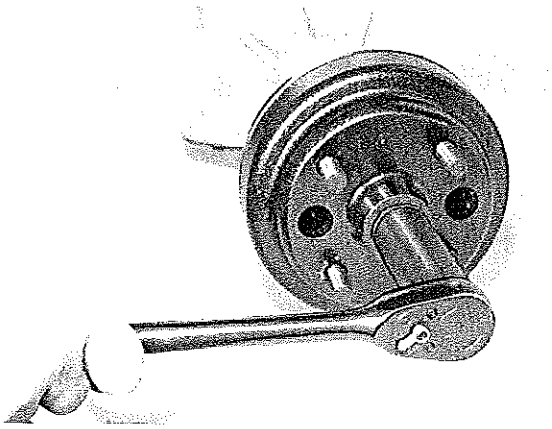
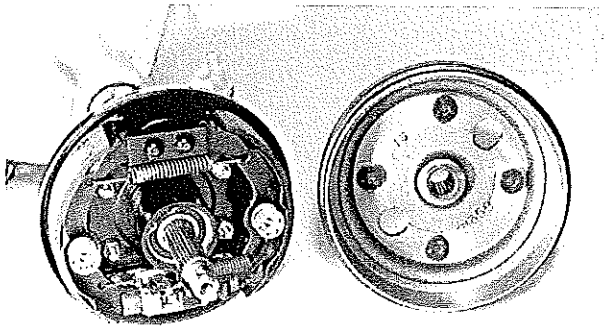
11. Two-piece Axle Shaft Teardown



11-1. Remove spindle nut from end of axle shaft.



11-2. After the spindle nut has been removed, slide the hub off the axle spline. Remove the brake assembly by removing (4) bolts and nuts that attach it to the tube.

11-3. Refer to Section 1, page 3, for axle removal.

11-4. If the brakes are removed, reinstall the brakes using (4) new bolts and nuts. Refer to torque chart on page 1 for torque specifications.

11-5. Apply an anti-seize compound to the splines before installing the hub. This will reduce fretting wear on the splines.

11-6. Reinstall the hub on the spline and install spindle nut on the threaded end of shaft. Refer to torque chart on page 1 for torque specifications.

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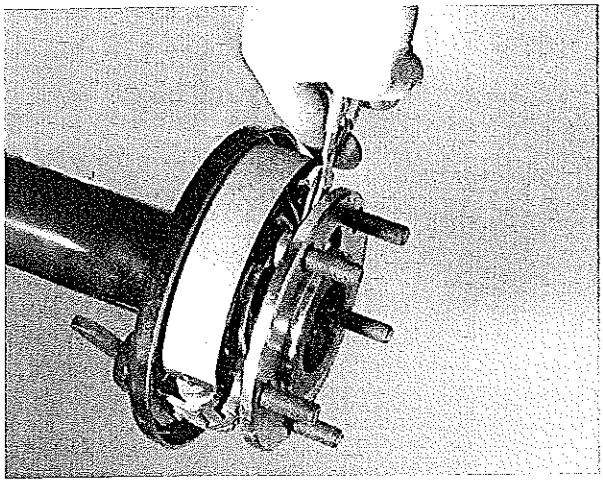
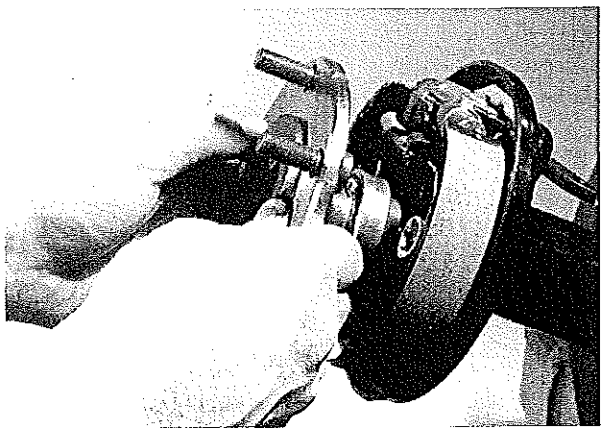
12. One Piece Axle Shaft and Brake Disassembly -

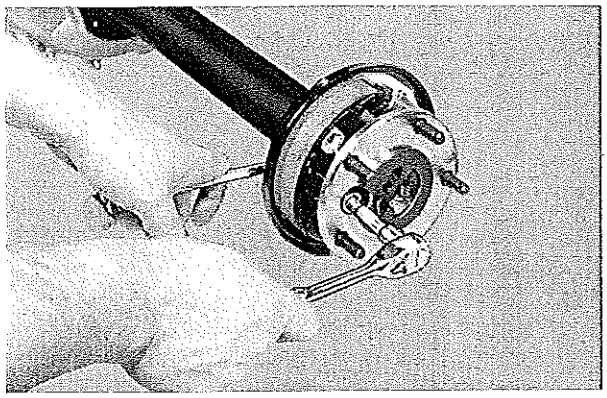
160mm Drum Brakes



12-1. Remove snap ring from end of tube.

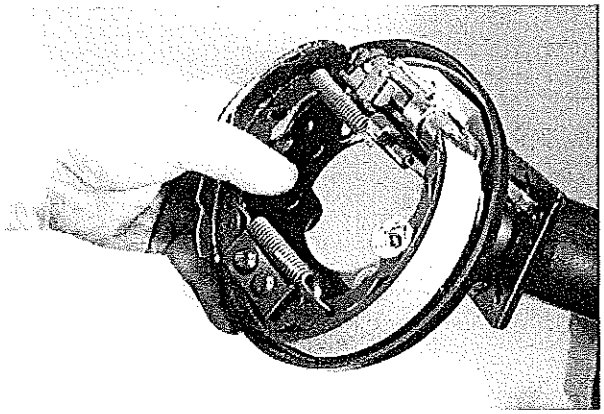


12-2. Remove axle shaft from the tube



12-3. Remove (4) bolts holding brake assembly on tube.

NOTE: Brake bolts can be removed and installed with axle shaft in tube, but one-piece axle shaft must be removed from tube to remove brake assembly.



12-4. Remove brake assembly from the tube.

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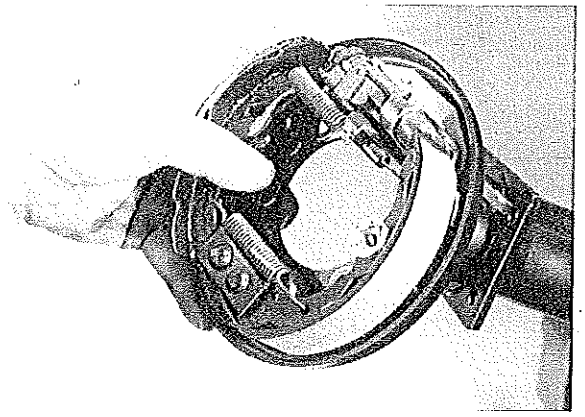
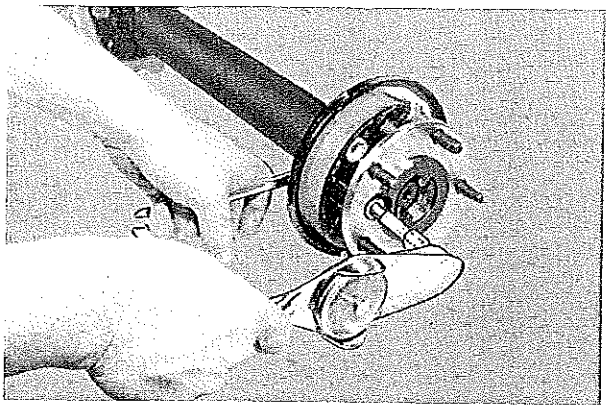
13. One Piece Axle Shaft and Brake Assembly- 160mm

Drum Brake

NOTE: The seal lip should be coated with light oil before installing axle shaft.

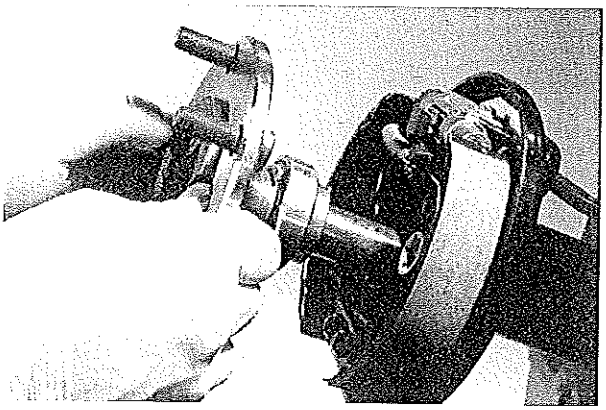


13-1. Replace brake assembly on tube and install (4) new bolts and nuts.

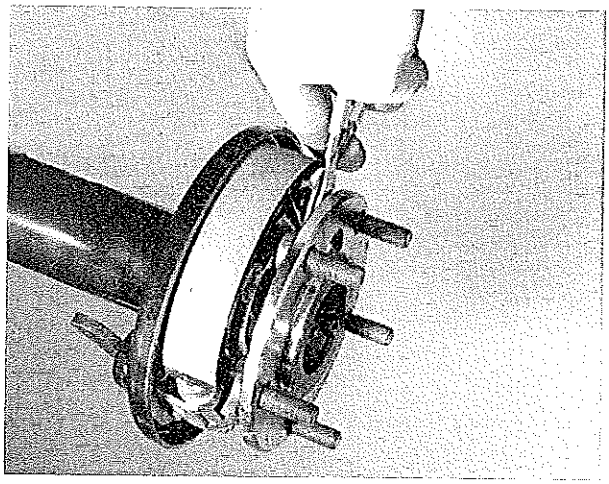


13-2 Torque bolts according to torque chart on page 1.

NOTE: Brake bolts can be removed and installed with axle shaft in tube, but one-piece axle shaft must be removed from tube to remove brake assembly.



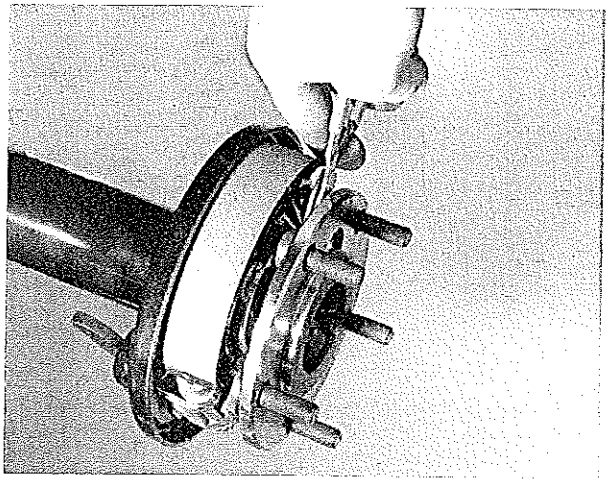
13-3. Install the axle shaft into the tube, being careful not to damage the seal when installing the shaft into the carrier.



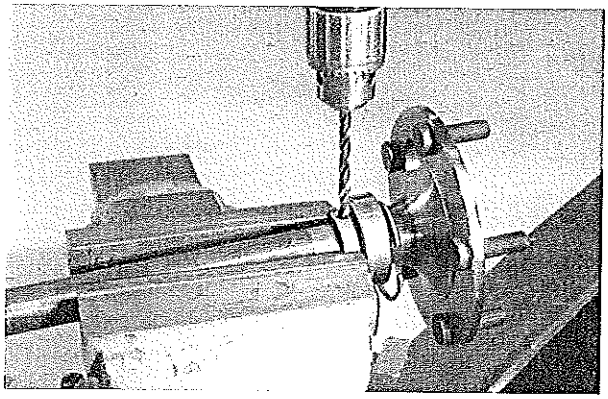
13-4. Install the snap ring into the groove in the tube to secure the axle shaft.

■ ■ ■

14. Tear Down One-Piece Axle Shaft

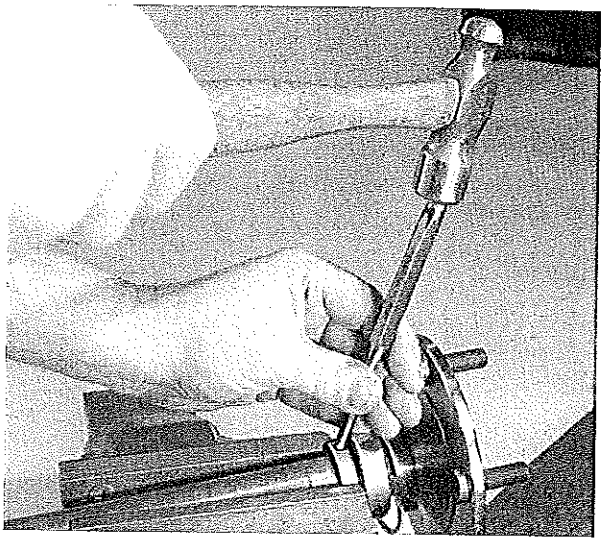


14-1. Remove the snap ring from the groove in the axle shaft.

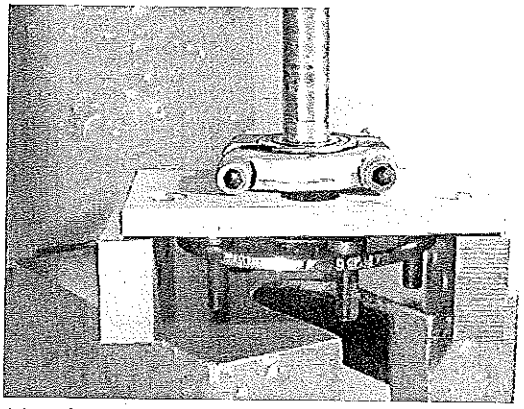


14-2. Place the shaft in a vise and center punch the outside of the retaining ring on the axle shaft. Drill the retaining ring with a 1/4" drill bit, approximately 3/4 of the depth of the retaining ring.

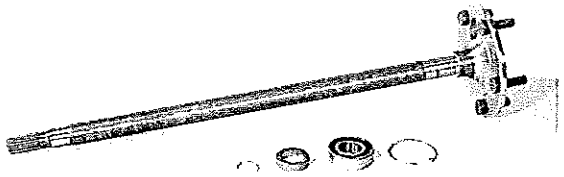
CAUTION: Drilling completely through the retaining ring will damage the shaft.



14-3. Position a chisel across the hole and strike sharply to break the retaining ring. Installing a new ring will be addressed during reassembly.



14-4. Support the axle shaft in a suitable press. Press on the end of the shaft until the wheel bearing is removed.



14-5. Components of the one-piece shaft.

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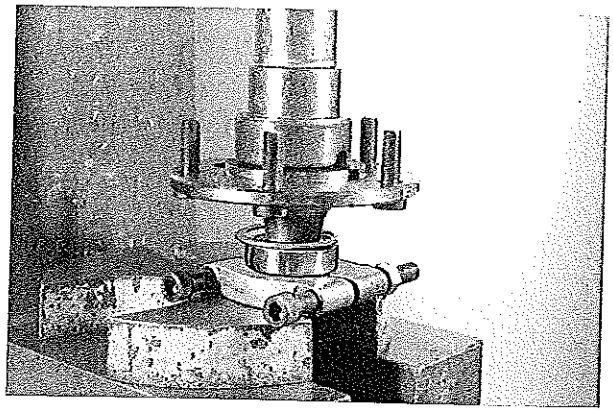
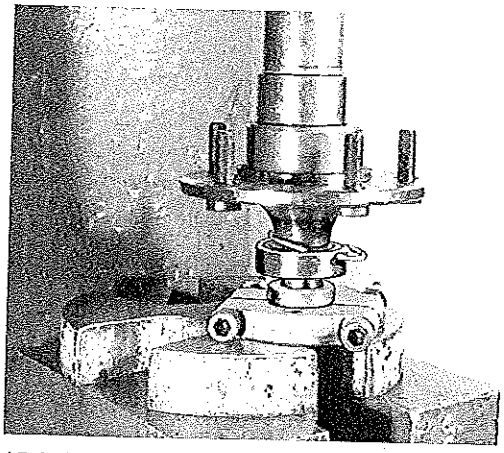
15. Rebuild One-Piece Axle Shaft



15-1. Support the axle shaft in a suitable. Press shaft until bearing is firmly seated against the shoulder. When installing a bearing, press only on the inner ring. Make sure the snap ring is on the shaft before pressing the bearing.

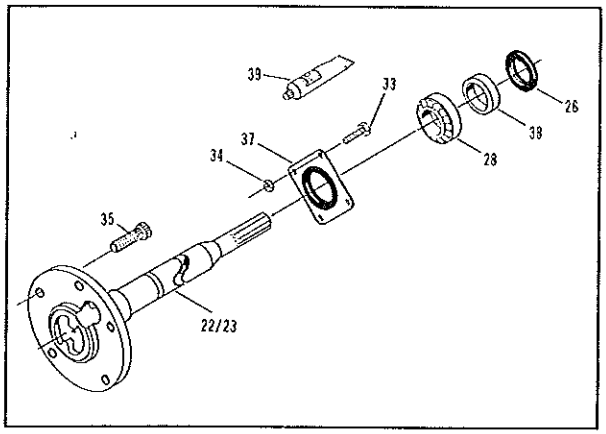


15-2. Press the retaining ring firmly against the bearing.

15-3. Install retaining ring in the groove in shaft.

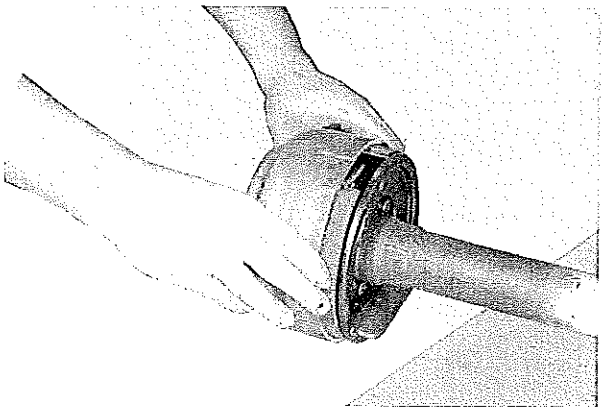
■ ■ ■

16. Tear Down One-Piece Axle shaft Assembly with 7 X 1-3/4 Brakes

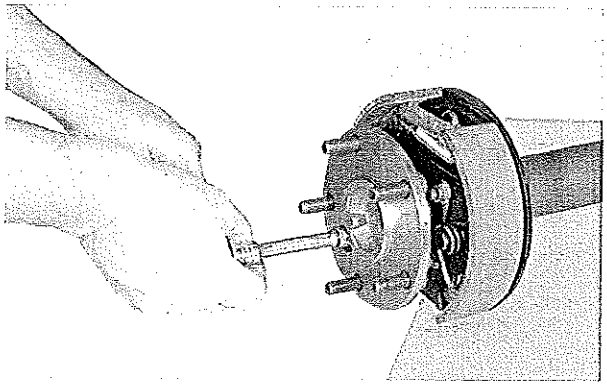


One-piece axle shaft.

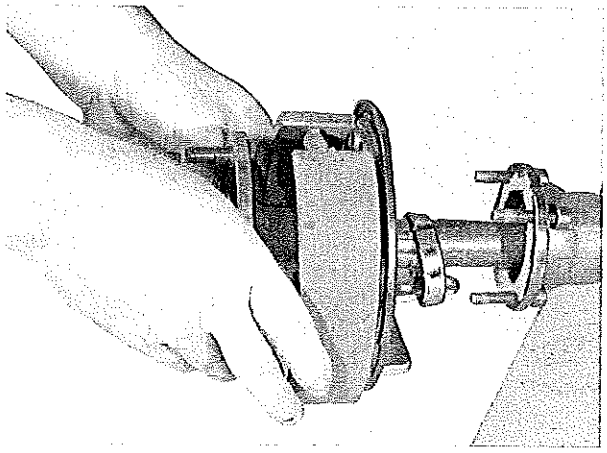
22/23	Shaft
26	Seal
28	Bearing
33	Bolt
34	Nut
35	Bolt
37	Seal
38	Retaining Ring
39	Sealant



16-1. After the wheel has been removed, remove the brake.

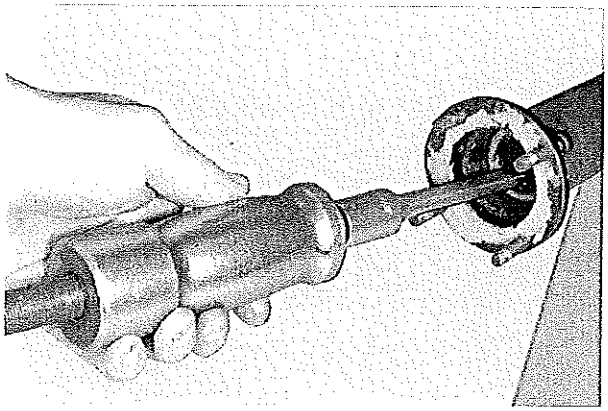


16-2. Using a 1/2" socket, line up the hole in the axle shaft flange to remove the backing plate nuts which hold the axle shaft assembly to the axle.



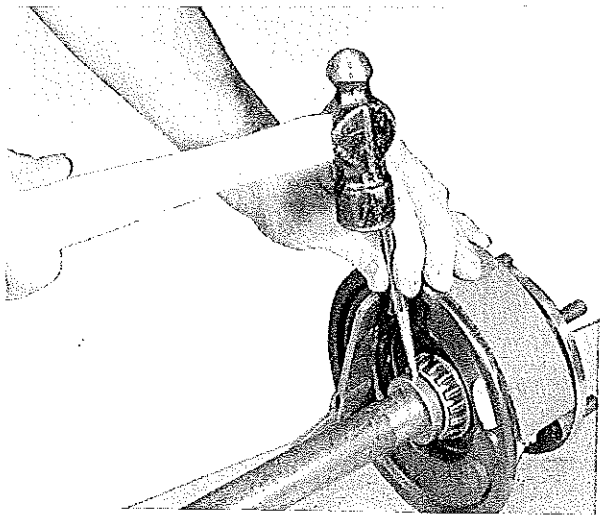
16-3. To remove the axle shaft assembly, grasp the assembly with both hands (the assembly includes the shaft, oil seal, brake assembly and retainer) and pull it free.

NOTE: The unit bearing assembly cup and retainer ring are cemented together with epoxy adhesive and in most cases the bearing assembly will remain intact. If not, the bearing cup must be removed from the housing with an internal puller.

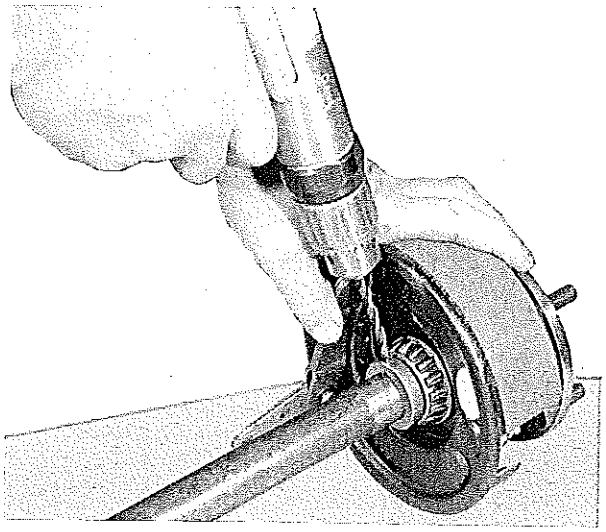


16-4. Use an internal puller to remove the inner axle shaft seal. Discard the seal.

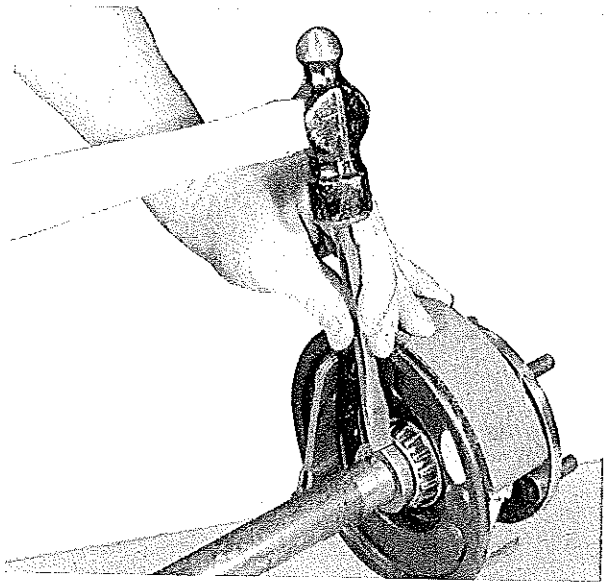
NOTE: Avoid contacting seals with cleaning solvent during cleaning operation.



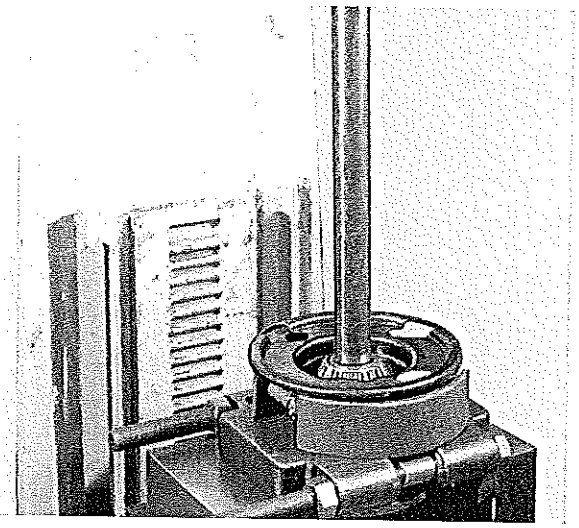
16-5. Place the axle shaft in a vise. Center punch the outside of the retaining ring.



16-6. Drill a 1/4" hole in the outside of the retaining ring approximately 3/4 through the ring. Do not drill through the ring, axle shaft damage will result.



16-7. Use a chisel to split and remove the retaining ring. A new ring will be install at reassembly.



16-8. Support the axle shaft assembly in a suitable press. Press on the upper end of the axle until the wheel bearing and brake assembly are removed.

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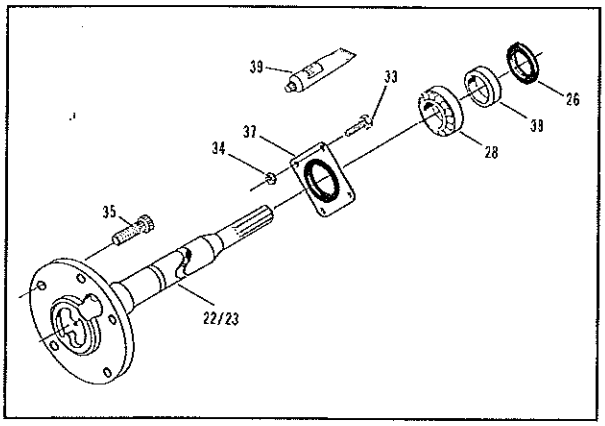
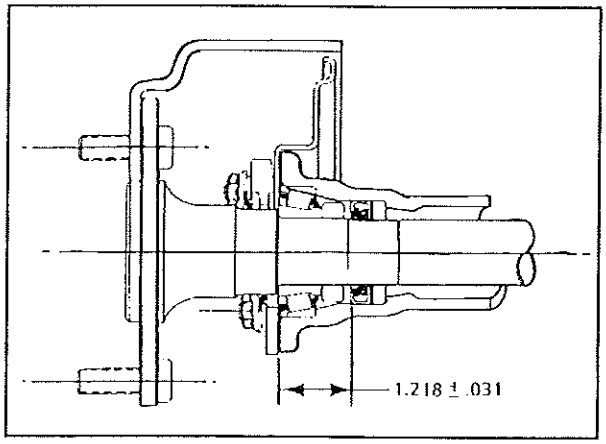
17. Rebuild One-Piece Axle Shaft Assembly with 7 X 1-3/4 Brakes

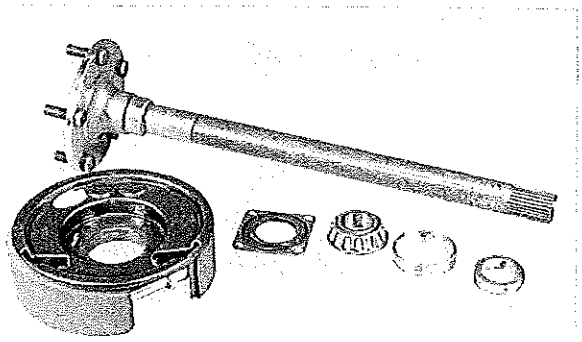


One-piece axle shaft.

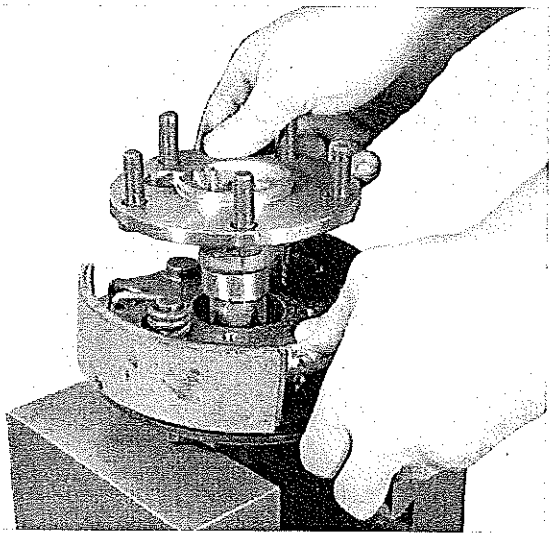
22/23	Shaft
26	Seal
28	Bearing
33	Bolt
34	Nut
35	Bolt
37	Seal
38	Retaining Ring
39	Sealant



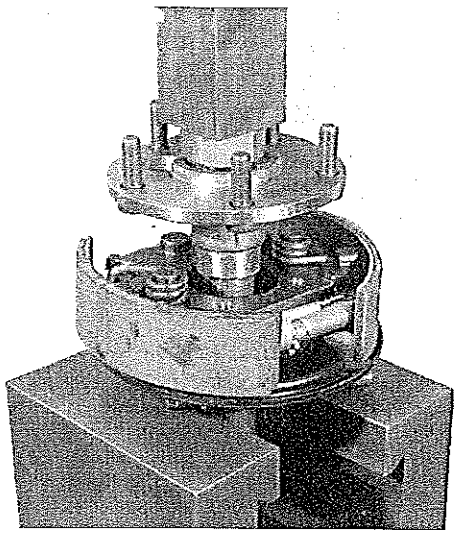
IMPORTANT: NOTICE THE ORDER OF COMPONENTS FOR AXLE SHAFT ASSEMBLY, ESPECIALLY NOTE THE CORRECT ORIENTATION FOR THE BEARING ASSEMBLY.



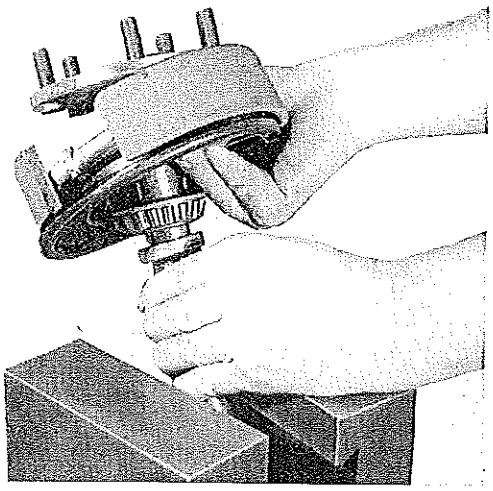
17-1. Inspect the axle shaft for damage. In the following order place these parts on the axle shaft: new oil seal, brake assembly, and a new grease packed bearing assembly (with unit bearing rib ring toward flanges end of shaft).



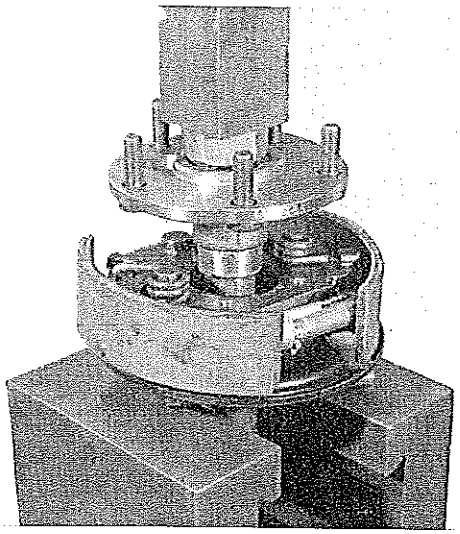
17-2. Support the bearing assembly in a suitable press.



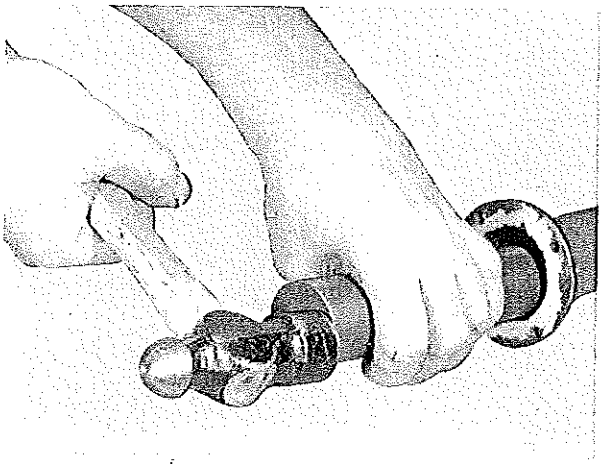
17-3. Press on the axle flange center until the bearing is firmly seated against the axle shaft shoulder.



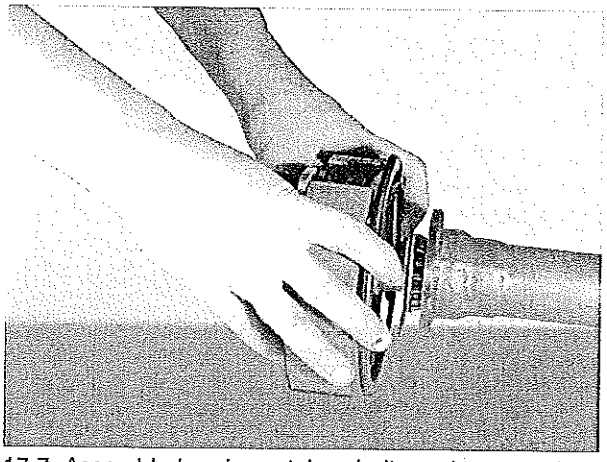
17-4. Slide a new retaining ring on the axle shaft and reposition the assembly in the press.



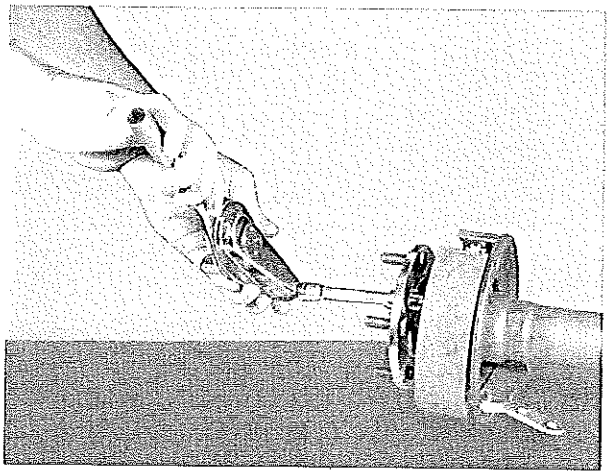
17-5. Press the retaining ring firmly against the bearing.



17-6. Assemble a new grease seal into the axle housing to a depth of 1.218 +/- .031. After seal has been seated, grease the lip of the seal.



17-7. Assemble bearing retainer bolts and new gasket material on the axle housing. Then install axle shaft assembly into axle housing. Care should be taken not to damage oil seal. Push axle shaft as far as possible into axle housing.



17-8. Start nuts on bolts by hand. Tighten nuts in a manner that assures the seal and bearing assembly are drawn evenly into the axle housing. When assembling, head of screw should be held away from the tube with a putty knife or flat blade screwdriver to avoid head turning into radius. Refer to torque chart on page 1 for torque specifications.