

SPICER® AXLE

MAINTENANCE MANUAL

MODEL



FRONT AND REAR
CARRIER TYPE

60

SPICER AXLE DIVISION



DANA CORPORATION

FORT WAYNE, INDIANA

Part 2 of 2 – Dana 60 Rear Axle

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IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all - (Motor Vehicles) or (driving axles whether they be front or rear). The service procedures recommended and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tool should be used when and as recommended.

It is impossible to know, evaluate, and advise the service trade of all conceivable ways in which service might be done or the possible hazardous consequences of each way.

Accordingly, anyone who uses a service procedure or tool which is not recommended, must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service methods he selects.

NOTE

Throughout this manual, reference is made to certain tool numbers whenever special tools are required. These numbers are numbers of Miller Special Tools, 32615 Park Lane, Garden City, Michigan 48135.

REAR AXLE

REAR AXLE

Unit wheel bearing design lubricated with hypoid lubricant.

NOTE

Unit wheel bearings that are dependent on lubrication from the hypoid gear lube in the axle housing, rather than grease, are not equipped with an inner axle shaft oil seal as shown in figure 75.

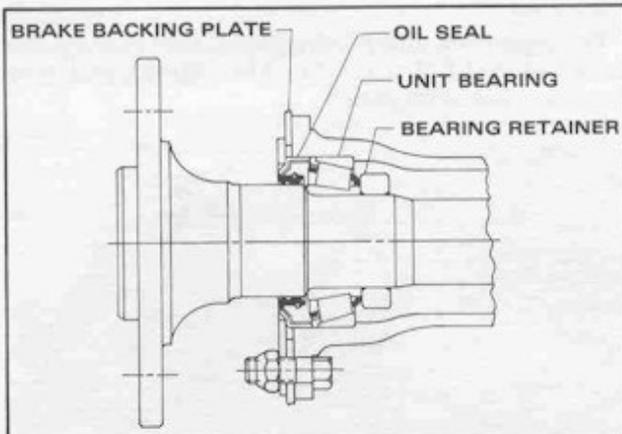


Figure 75

1019-75

Unit wheel bearing L/D without inner grease seal.

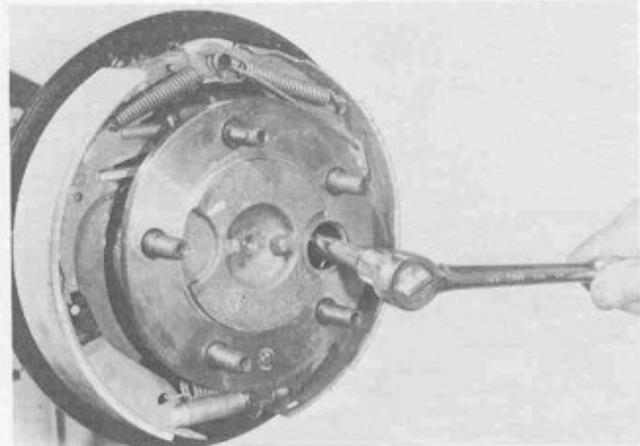


Figure 77

1019-77

Remove backing plate nuts which hold the brake backing plate to the axle housing. Discard nuts, replace with new ones at time of assembly. Nuts of torque prevailing design are not to be reused.

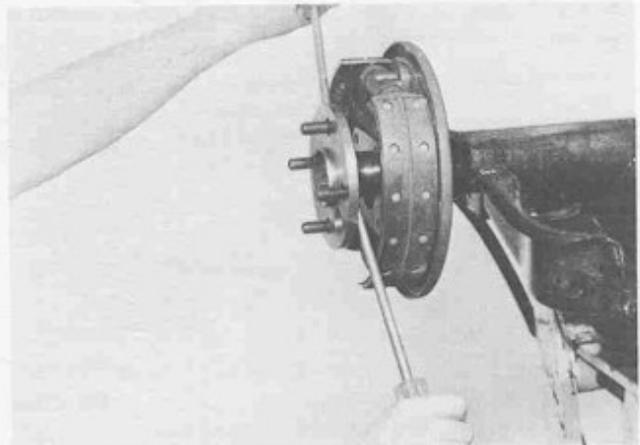


Figure 78

1019-78

Remove the axle shaft by pulling on the axle. It may be necessary to free the axle shaft by prying it loose with two screwdrivers or pry bars as shown.

DISASSEMBLY



Figure 76

1019-76

After wheel is removed, remove brake drum.

NOTE

Backing plate can normally be wired to the frame, without loosening the hydraulic brake line connection at the wheel cylinder, if desired. Use caution to avoid damage to brake line.

REAR AXLE

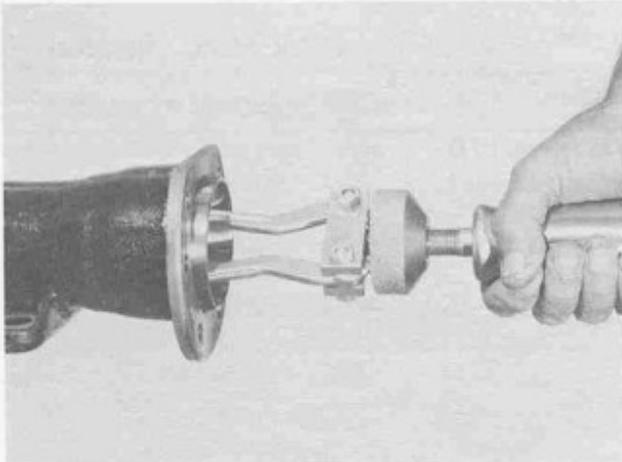


Figure 79

1019-79

The bearing cup will normally stay in place with the housing. To remove bearing cup, use puller as shown.

Tool: #D-131 Slide Hammer.

Cleaning, inspecting, and relubricating wheel unit bearing.

Clean bearing cup with any of the standard metal cleaning solvents. Inspect cup for any possible wear, nicks, etc.

The cone assembly can be cleaned in place on the axle shaft. Use any standard metal cleaning solvent and a stiff bristle brush to remove any dirt or any other contamination that might be present, then use compressed air. Air should be directed at the cone assembly so that it goes through the bearing from one end of the rollers to the other. It is important not to "Spin Dry" the bearing with compressed air. Spinning the dry bearing may score the raceways and rollers due to lack of lubricant.

Use a standard metal cleaning solvent to clean out the bearing bore in the housing. Wipe this area clean making sure it is free from dirt or any other contamination that might be present.

After the bearing has been inspected and approved for continued service, it must be lubricated prior to installation. The bearing must be lubricated by applying a small amount of the specified lube around the rollers of the bearing cone.

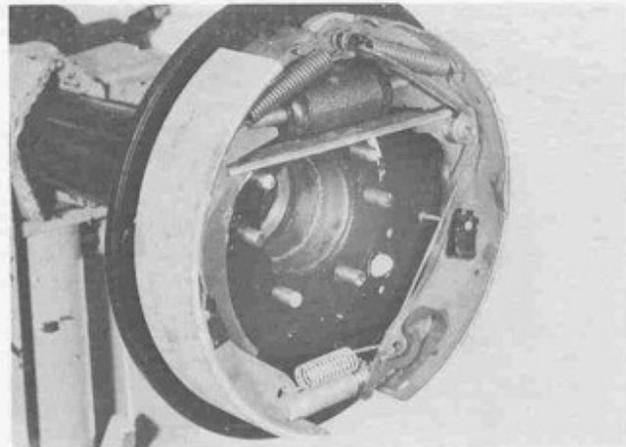


Figure 80

1019-80

Assemble backing plate bolts and backing plate assembly.

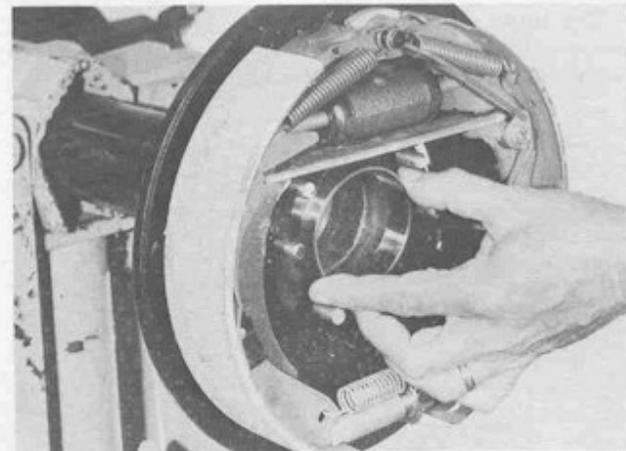


Figure 81

1019-81

Assemble bearing cup into bearing bore of the tube. Make sure the cup backface is against the bearing seat of the tube.

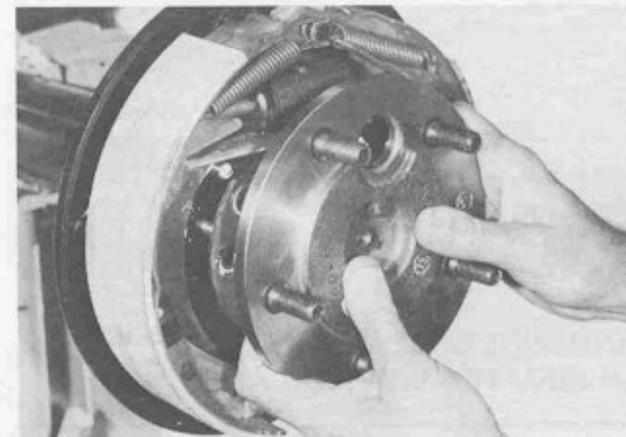


Figure 82

1019-82

Assemble axle shaft into housing. Care should be taken not to damage the bearing rollers.

Line up the holes of the retainer plate with the bolts, push axle shaft into the housing as far as possible.

REAR AXLE

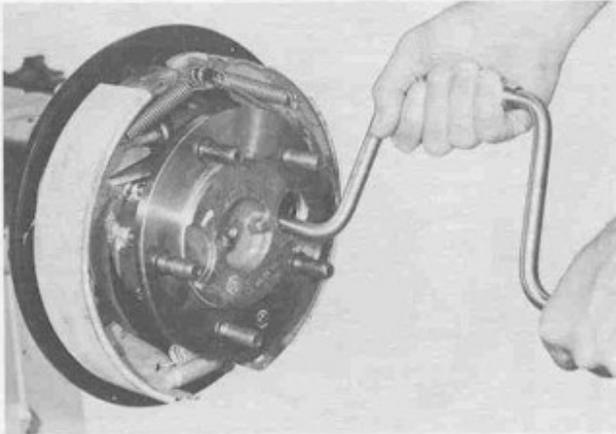


Figure 83

1019-83

Start nuts on backing plate bolts by hand. Use a speed wrench as shown and tighten to approximately 15 Lb. Ft. (20 N·m).

The units should be tightened in a manner that assures that the seal and cup rib ring are drawn evenly against the cup in the housing.

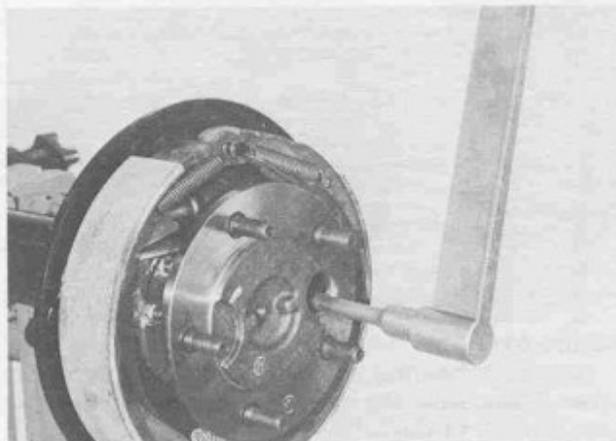


Figure 84

1019-84

Using a torque wrench as shown, torque nuts to 25-35 Lb. Ft. (34-47 N·m). Assemble brake drums, retainer nuts, wheels, etc.

Tool: #524-A Torque Wrench.

UNIT WHEEL BEARING DESIGN LUBRICATED WITH GREASE

NOTE

Unit wheel bearing that are dependent on grease for lubrication, rather than hypoid gear lube from the axle housing, are equipped with an inner axle shaft oil seal as shown in figure 85.

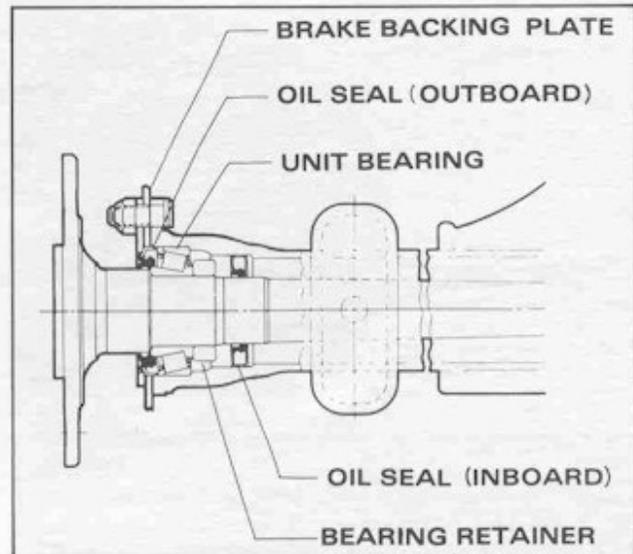


Figure 85 L/D

1019-85

Unit wheel bearing L/D with grease seal.

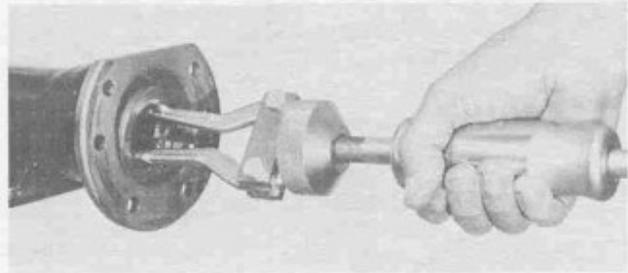


Figure 86

1019-86

Remove inner axle shaft seal using puller as shown.

Tool: #D-131 Slide Hammer.

Discard seal and replace with new one at time of assembly.

NOTE

Avoid contacting seals with cleaning solvent in cleaning operation.

CLEANING, INSPECTING, AND RELUBRICATING UNIT BEARINGS

Clean bearing cup with any of the standard metal cleaning solvents. Inspect cup for any possible wear, nicks, etc.

The cone assembly can be cleaned in place on the shaft. Use a standard metal cleaning solvent and a stiff bristle brush to loosen the old grease. To ensure removal of the old grease and any contamination that might be present, use compressed air. Air should be directed at the cone assembly so that it goes through the bearing from one end of the rollers to the other. It is important not to "Spin

REAR AXLE

Dry the bearing with compressed air. Spinning the dry bearing may score the raceways and rollers due to the lack of lubricant.

Use a standard metal cleaning solvent to clean out the bearing and oil seal bore in the housing. Wipe this area clean, making sure it is free from any old grease or other contamination that might be present.

After the bearing has been inspected and approved for continued service, it must be lubricated prior to installation.

The grease should be a good quality number 2 E.P. (Extreme Pressure) lithium soap, wheel bearing grease.

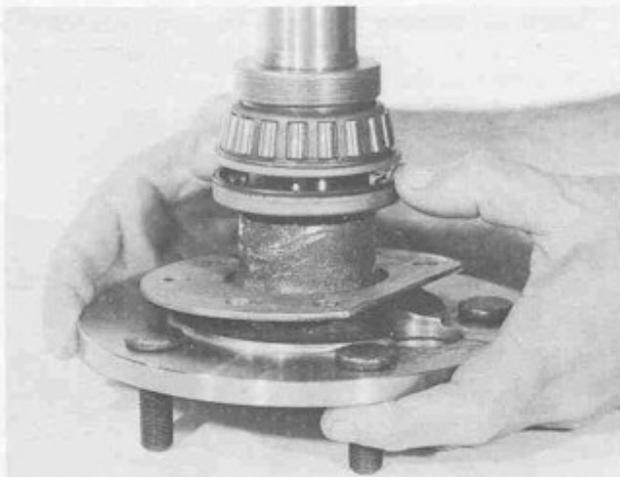


Figure 87

1019-87

Push seal and retainer away from the bearing to allow a cavity between the seal and bearing.

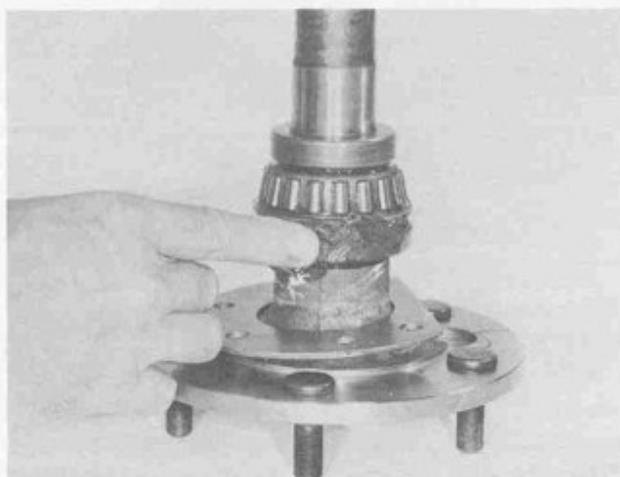


Figure 88

1019-88

Fill the area or cavity between the seal and bearing with the recommended grease.

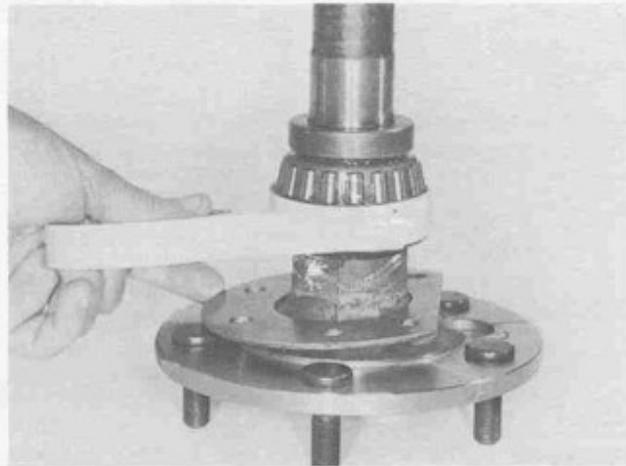


Figure 89

1019-89

After the cavity is full of grease, wrap tape completely around the rib ring and seal as shown to enclose the cavity.

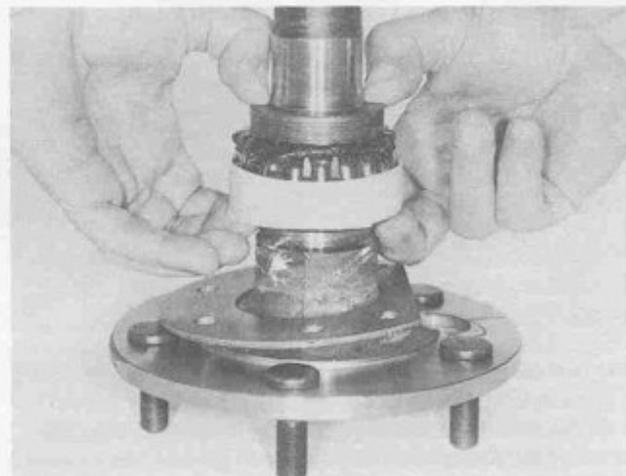


Figure 90

1019-90

With tape still wrapped around the ring, push seal up until it contacts the rib ring. This will force the grease up through the rollers.

NOTE

If grease is not apparent on small end of rollers, repeat these steps until grease appears.

REAR AXLE

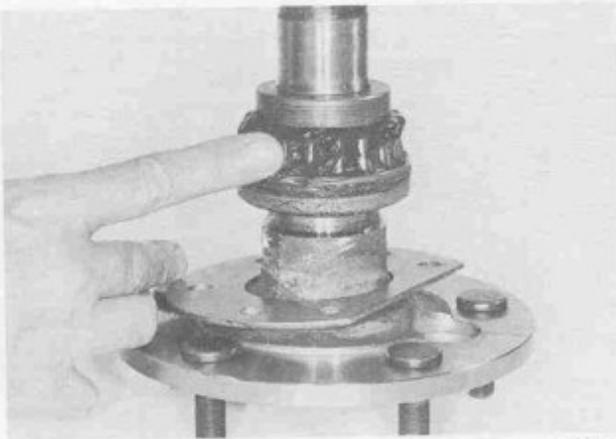


Figure 91 1019-91
Remove tape and wipe excess grease on roller bodies.

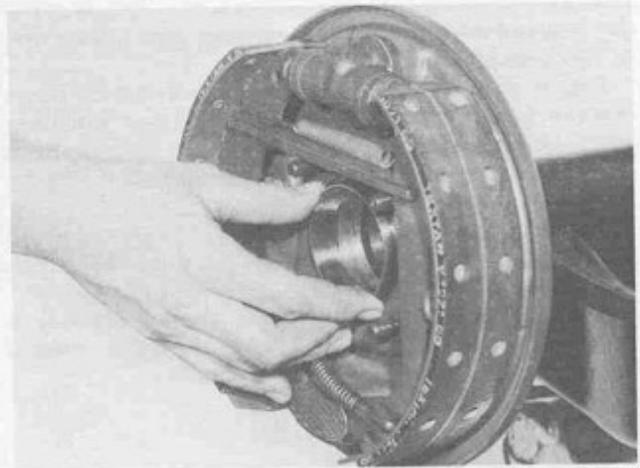


Figure 94 1019-94
Assemble bearing cup into bearing bore of the tube. Make sure the cup backface is against the bearing seat of the tube.

ASSEMBLY

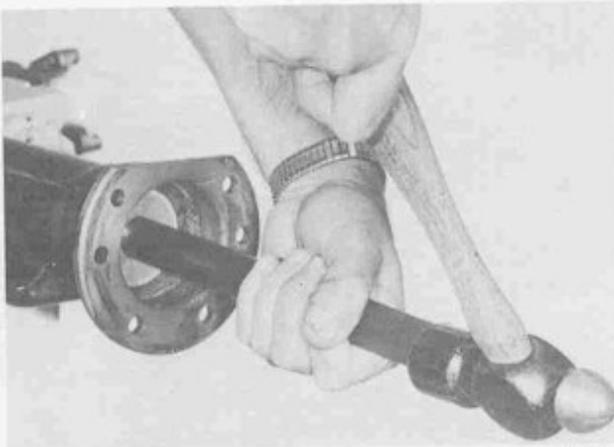


Figure 92 1019-92
Assemble new grease seal into housing.
Tools: #C-4026A Seal Installer, #C-4171 Handle.
After seal has been assembled, grease lip of seal.

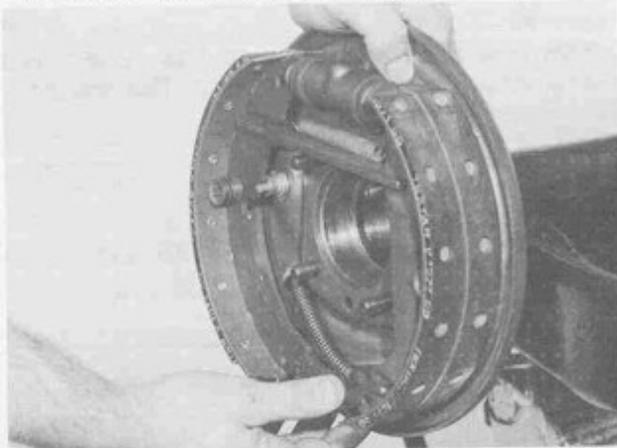


Figure 93 1019-93
Assemble backing plate bolts and backing plate assembly.

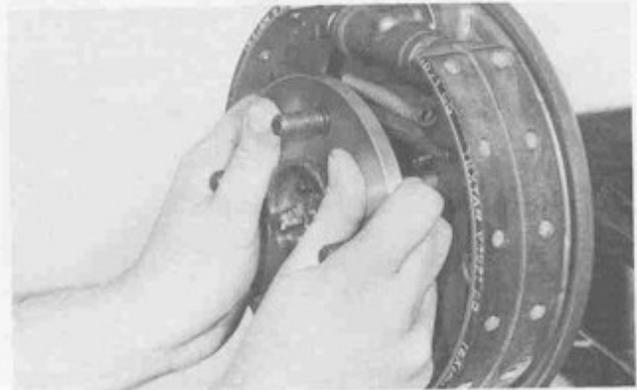


Figure 95 1019-95
Assemble axle shaft into housing. Care should be taken not to damage the seal lip and bearing rollers.
Line up the holes of the retainer plate with the bolts; push axle shaft into the housing as far as possible.

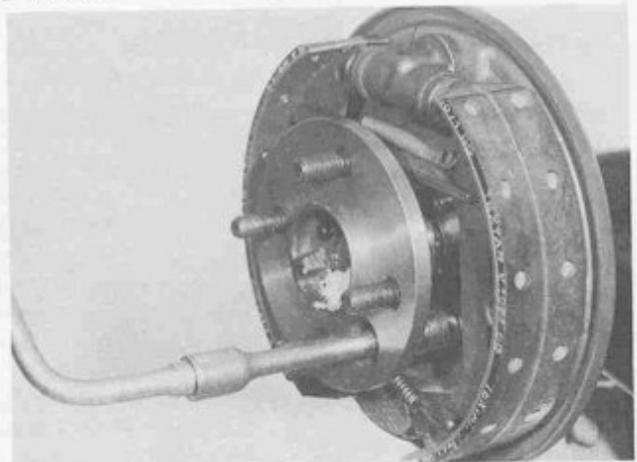


Figure 96 1019-96
Start nuts on backing plate by hand. Use a speed wrench as shown and tighten to snug fit.

REAR AXLE

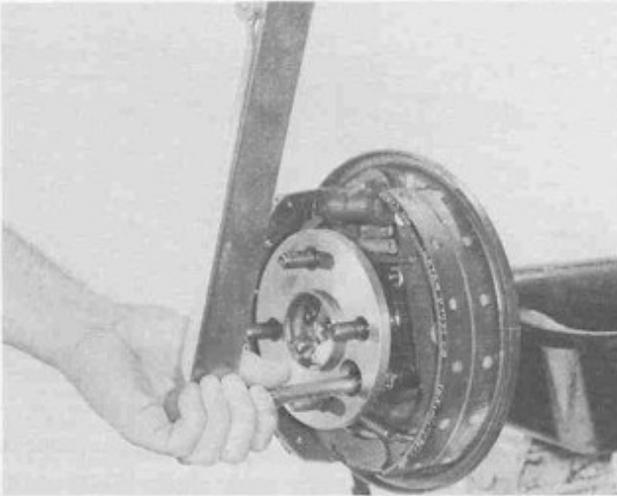


Figure 97

1019-97

Use a torque wrench and torque nuts to 25-35 Lb. Ft. (34-47 N·m).

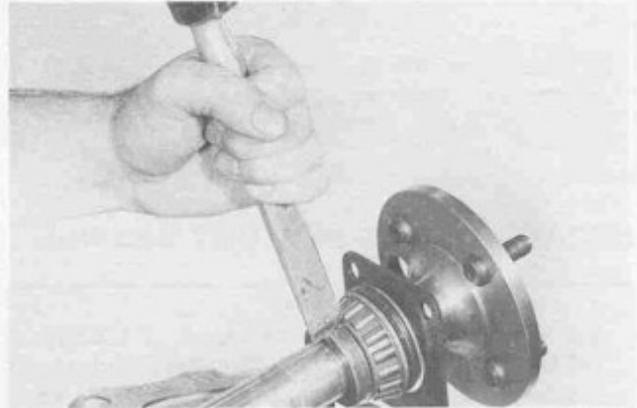


Figure 99

1019-99

After drilling the ring, use a chisel positioned across the hole and strike sharply to break the ring. Discard and replace with a new one at time of assembly.

REMOVAL OF UNIT BEARING FROM AXLE SHAFT

NOTE

To disassemble axle shaft from housing, follow the procedures illustrated in figures 75 thru 79.



Figure 98

1019-98

Place axle shaft in a vise. Drill a 1/4" (6.35 mm) hole in the outside of the retainer ring to a depth approximately three fourths the thickness of the ring. Do not drill all the way through the ring; the drill could damage the axle shaft.

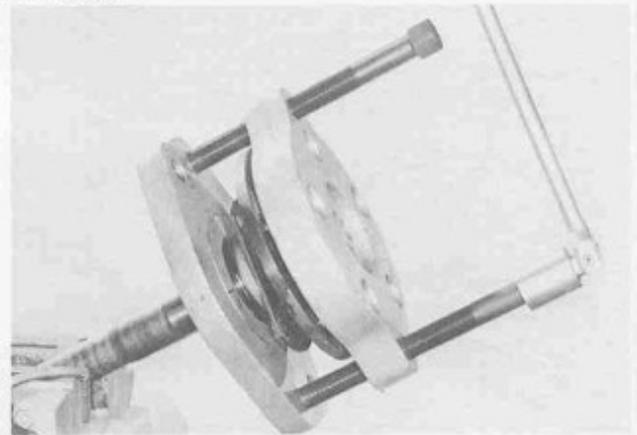


Figure 100

1019-100

Push retainer plate and seal towards flange of axle shaft. Install the flange plate to the flange of the axle shaft. Install bolts into flange plate. Slide forcing plate over the axle shaft. Install the adapters so they seat under the cup rib ring.

Gradually tighten the bolts until they are located in the dimples on the backside of the forcing plate.

Tools: #SP-5443-A Flange Plate, #SP-5017 Adapter Ring, #SP-5542-D Adapters, #SP-5026 Bolts.

Tighten bolts of tool alternately until bearing cone is removed from axle shaft. Be careful not to mark the machined surfaces of the axle shaft.

CAUTION

Do not heat or cut the bearing cone assembly with a torch to remove. Damage to the axle shaft will result.

Remove seal and retainer plate. Discard seal. Replace with new one at time of assembly.

Inspect retainer plate for possible distortion.

If any portion of the retainer plate is damaged, it should be replaced. Inspect machined surfaces of the axle shaft, such as the seal and bearing diameters. Clean axle shaft, remove all nicks or burrs.

REAR AXLE

INSTALLATION OF NEW UNIT BEARING

NOTE

The retainer ring area of the shaft is 1.7727" (45.01 mm) minimum in diameter, and the retainer ring inside diameter is 1.7675" (44.88 mm) maximum, and therefore, should require some 6000 lb. (26688N) minimum press to seat the ring against the unit bearing.

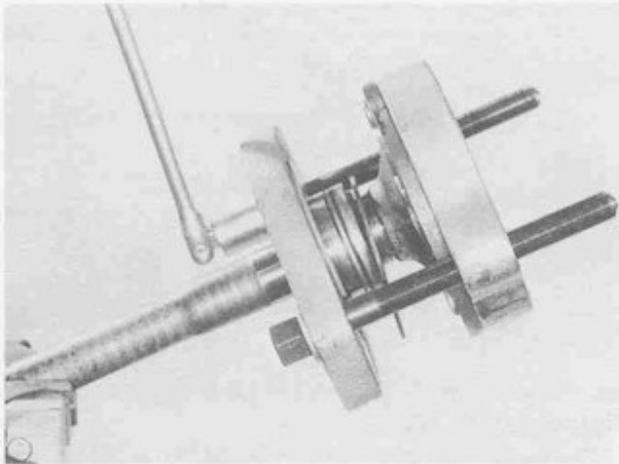


Figure 101

1019-101

Flange plate should still be assembled to the flange of the axle shaft. Remove bolts from flange plate. Assemble new retainer plate and oil seal.

The rubber portion of the oil seal, which extends beyond the casing has numbers bonded in the rubber. These numbers are to face toward the flange of the axle shaft.

Assemble new unit wheel bearing on axle shaft. Slide installing ring on axle shaft. Be sure to locate unit wheel bearing on the inside of the installing ring. Slide forcing plate on axle shaft and locate on installing ring. Install bolts and washer through the holes in the forcing plate and into flange plate.

Tools: #SP-5543-A Flange Plate, #SP-5017 Adapter Ring, #SP-5440 Adapter Plate Installer, #SP-5026 Bolts, #SP-3020 Washers.

Tighten bolts alternately and evenly, making sure bearing is not cocked on axle shaft. Continue until wheel bearing is seated. To make sure bearing is seated use a .0015" (.0381 mm) feeler gage between bearing seat and bearing. If gage enters, force bearing further on the axle shaft, until gage does not enter.

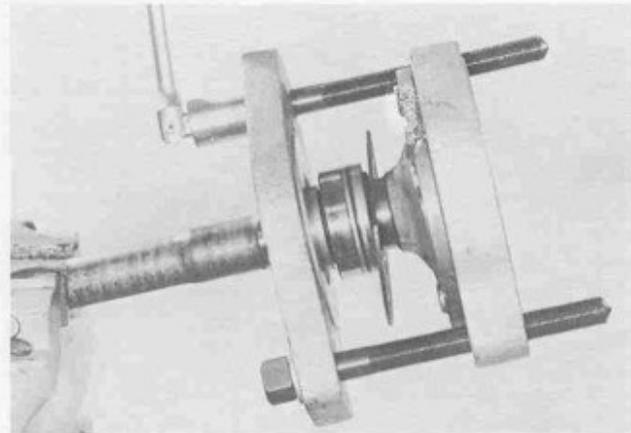


Figure 102

1019-102

Install retainer ring on axle shaft. Follow the same procedures in figure 101 to assemble the retainer ring.

Use a .0015" (.0381 mm) feeler gage between the bearing and retainer ring to be sure that the retainer ring is seated. At least one point should exist, where the gage will not enter between the retainer ring and bearing. If gage enters completely around the diameter, retainer ring must be forced onto the axle shaft.

To assemble axle shaft assembly into housing, follow steps as illustrated in figure 82 through 84.

LUBRICATING NEW UNIT BEARING WITH GREASE

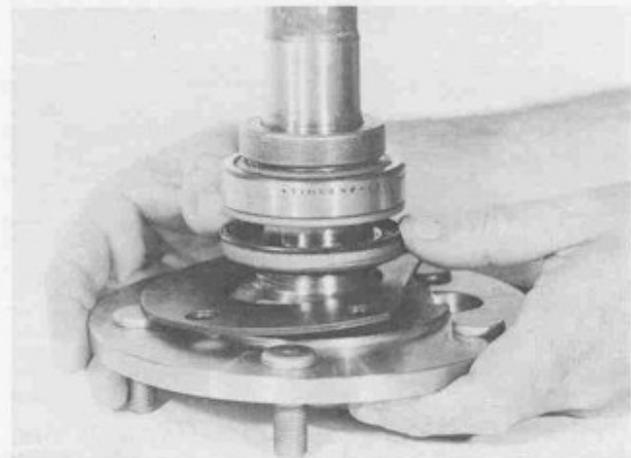


Figure 103

1019-103

Push seal and retainer away from bearing to allow a cavity between the seal and bearing.

REAR AXLE

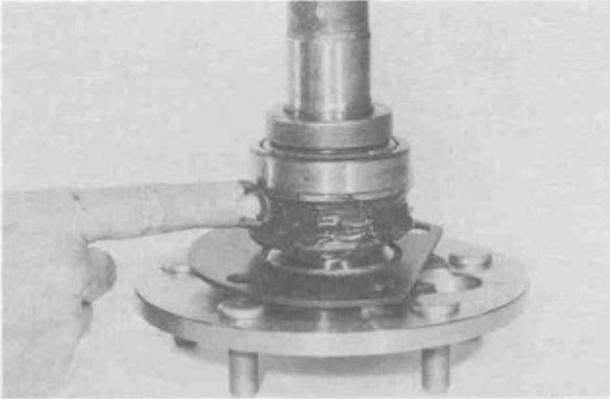


Figure 104

1019-104

Fill cavity with a good quality #2 E.P. (Extreme Pressure) lithium soap, wheel bearing grease.

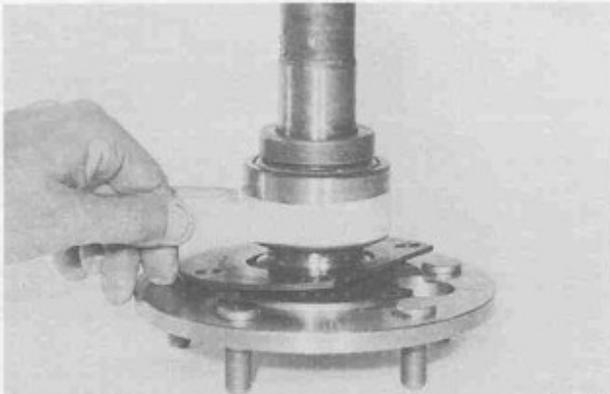


Figure 105

1019-105

After cavity is full of grease, wrap tape completely around rib ring, and seal to enclose the cavity.

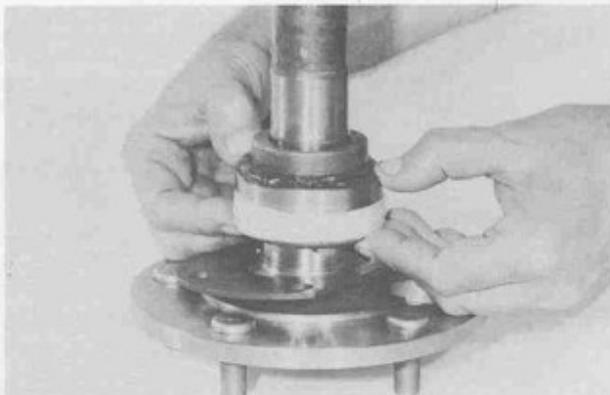


Figure 106

1019-106

Push seal towards the bearing until it contacts the rib ring. This will force the grease between the rollers and cup.

NOTE

If grease is not apparent on the small ends of the rollers, repeat the same steps until grease is evident between the small end of the roller and cup. Remove tape.

REAR AXLE SEMI-FLOAT SHAFT RIDING BEARING DESIGN LUBRICATED WITH HYPOID LUBRICANT

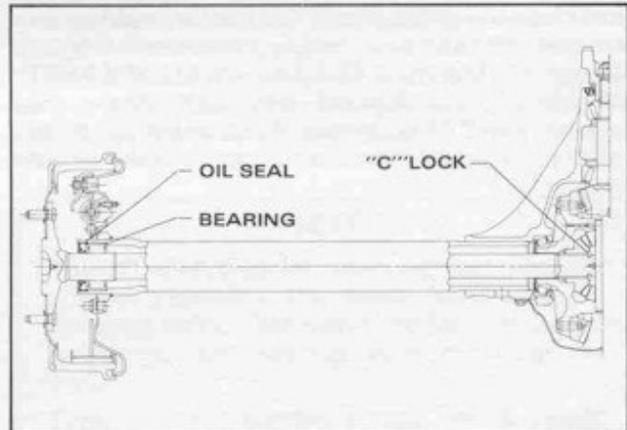


Figure 107

1019-107

(Picture of Shaft Riding Bearing Design)

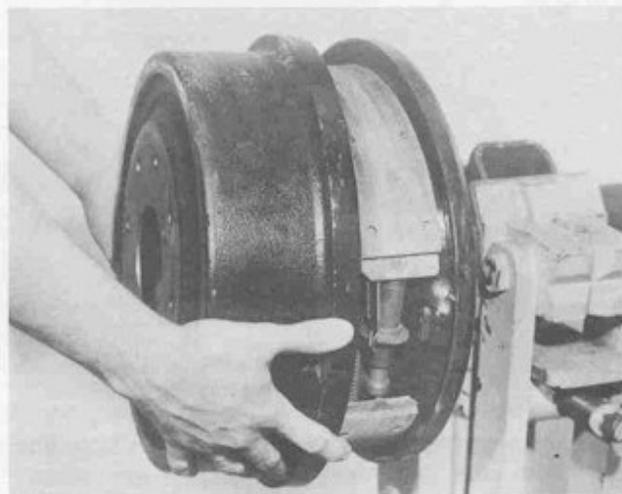


Figure 108

1019-108

After wheel is removed, remove brake drum. Remove drain plug and drain lubricant. If there is no drain plug in the carrier, the lube will drain out as the cover plate is removed.

REAR AXLE

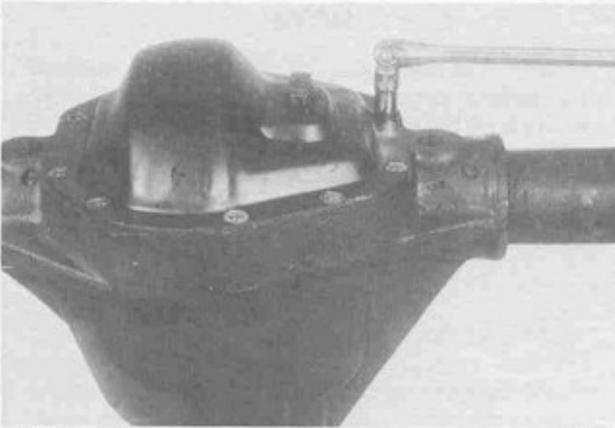


Figure 109

1019-109

Remove cover plate screws, cover plate, and cover plate gasket. Discard old gasket. Tip carrier to allow lube to drain completely. Also during this time clean the cover face of the carrier, making sure it is free from any nicks and any particles left by the old gasket. **DO NOT USE CLEANING SOLVENTS OF ANY TYPE.** Use of cleaning solvents may prevent the "RTV" sealer from adhering to the cover plate and carrier, resulting in leaks of axle lubricant.

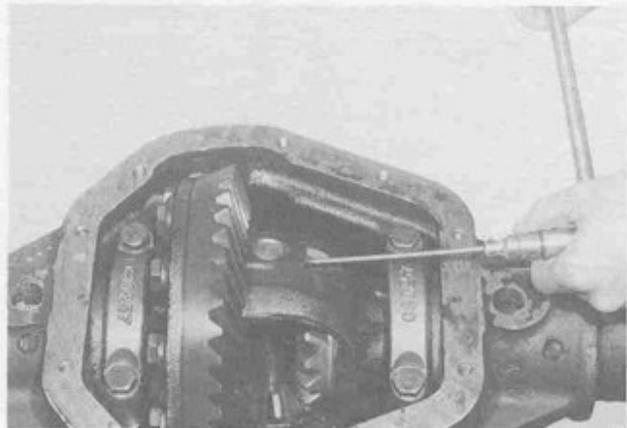


Figure 111

1019-111

Remove the differential pinion shaft lock screw as shown in Figure 111.

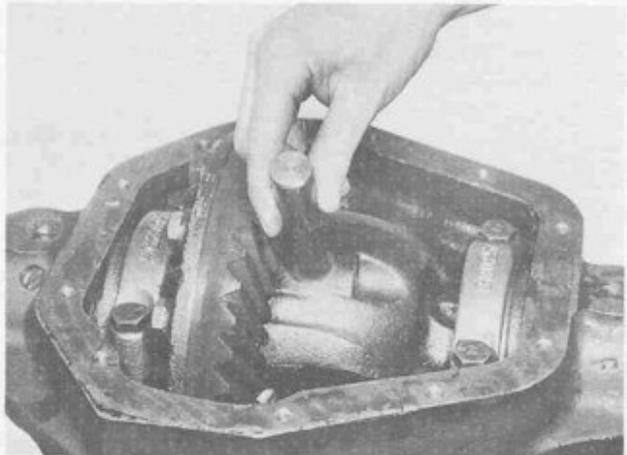


Figure 112

1019-112

Remove the differential pinion mate shaft.

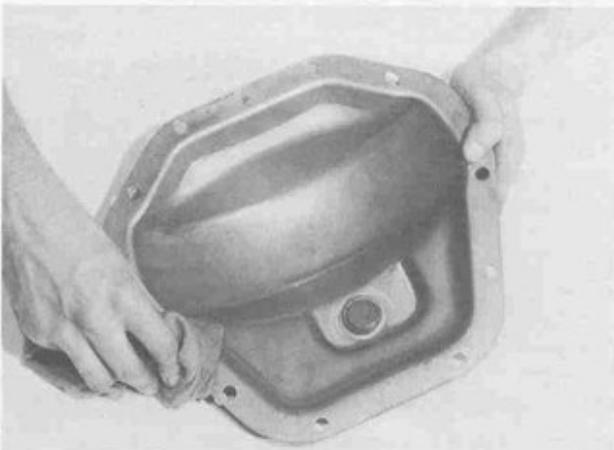


Figure 110

1019-110

Clean cover plate, making sure it is free from any nicks and any particles left by the old gasket material. Use a clean rag or a blunt tool for removing remaining gasket material. **DO NOT USE CLEANING SOLVENTS OF ANY TYPE.** Use of cleaning solvents may prevent the "RTV" sealer from adhering to the cover plate and carrier, resulting in leaks of axle lubricant.

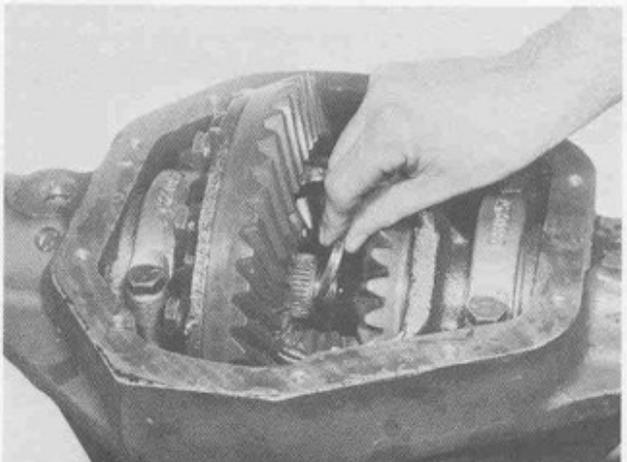


Figure 113

1019-113

Push flange end of axle shafts toward center of vehicle and remove the "C" locks from button end of both shafts.

REAR AXLE

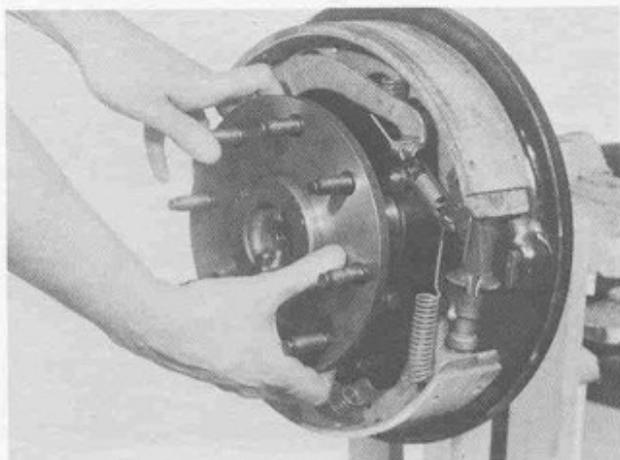


Figure 114

1019-114

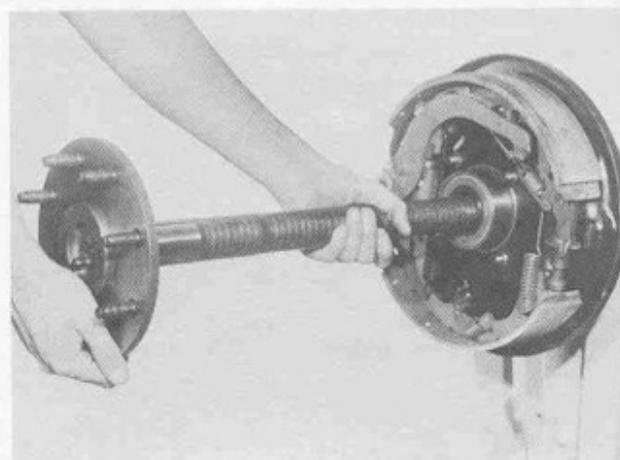


Figure 115

1019-115

Remove the axle shafts from the housing, being careful not to damage the oil seals, as shown in Figures 114 and 115.

CAUTION

When removing the axle shafts, be careful not to rotate the differential side gears. This will cause the pinion mate gears and thrust washers to turn to the opening of the case and drop out.

OIL SEAL AND WHEEL BEARING REPLACEMENT

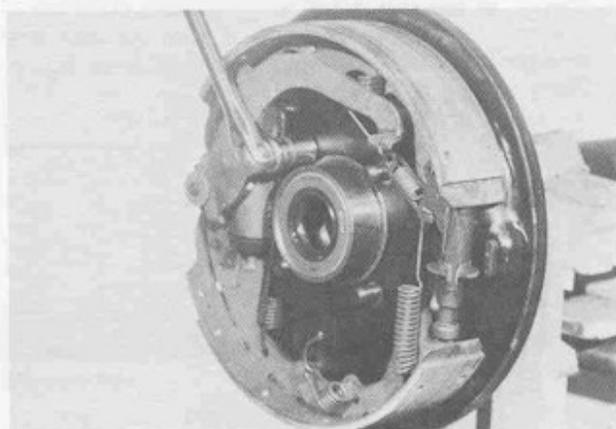


Figure 116

1019-116

Remove the backing plate nuts and bolts which hold the brake backing plate to the axle housing, (3) places. Discard nuts, replace with new ones at time of assembly. Nuts of torque prevailing design are not to be reused. Do not remove brake backing plate.

NOTE

The oil seal may be removed and installed without removing the brake backing plate, nuts and bolts. Care should be taken so as not to damage the bearing upon removing the seal.

Tools: #C-4171 Handle, #D-233 Seal Installer, Seal Remover (screwdriver or other similar tool).

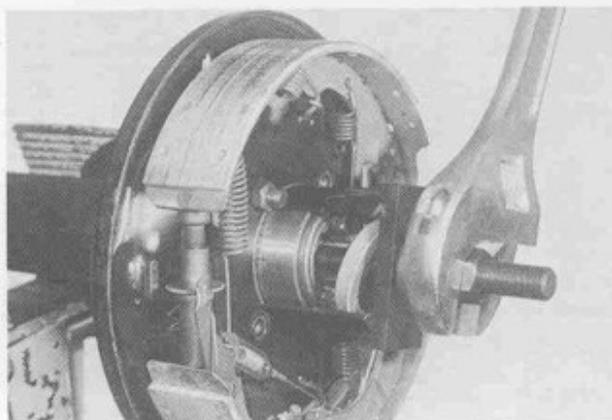


Figure 117

1019-117

Remove the wheel bearing and oil seal as shown. Discard old seal and bearing.

Tool: #D-232-1 Bearing Remover.

Use a standard metal cleaning solvent to clean out the bearing bore in the housing. Wipe this area clean, making sure it is free from dirt or any other contamination that might be present.

NOTE

The bearing bore must be free from nicks and burrs. Wipe the bore with emery cloth to assure a smooth surface. Clean bore out with a standard metal cleaning solvent. If bore has burrs or spalled areas and a new bearing is installed, it may lead to early fatiguing.

AXLE SHAFT AND WHEEL BEARING / OIL SEAL ASSEMBLY

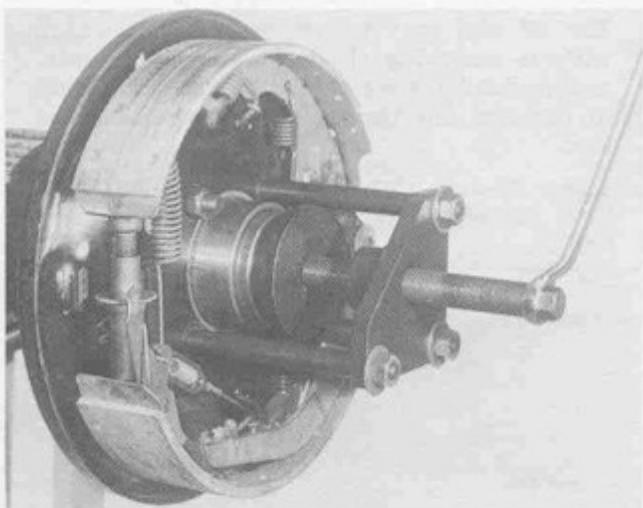


Figure 118

1019-118

Assemble bearing assembly into bearing bore of the tube as shown. Differential lube should be placed on the bearing for easier assembly and for the possible prevention of scoring the tube bore. The tool will stop against the tube end when bearing is seated to the proper depth

Tools: #D-247 Installer Press, #D-248 Bearing Installer.

CAUTION

DO NOT DRIVE THE BEARING INTO TUBE BORE WITH A BEARING DRIVER, AS DAMAGE TO THE BEARING MAY OCCUR.

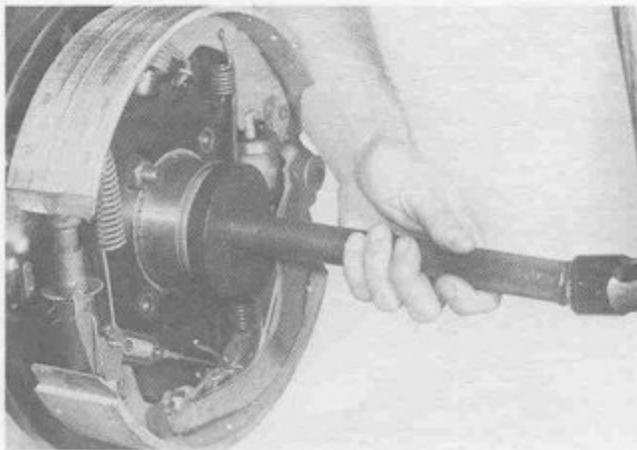


Figure 119

1019-119

Assemble new oil seal into housing as shown. Tool will stop against tube end when oil seal is seated to the proper depth.

Tools: #C-4171 Handle, #D-233 Seal Installer.

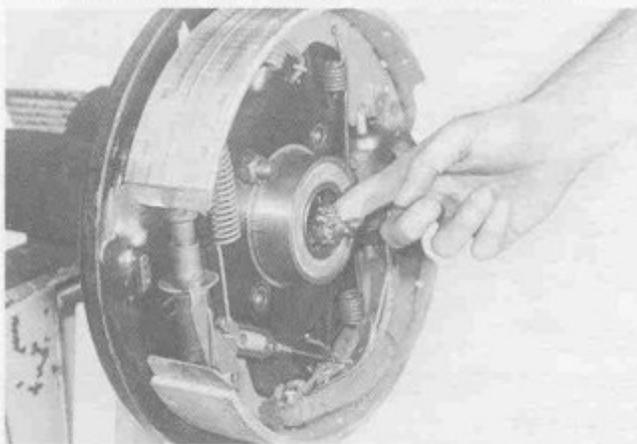


Figure 120

1019-120

Lubricate cavity between seal lips and lubricate new bearing with a good quality number 2 E.P. (Extreme Pressure), lithium soap, wheel bearing grease.

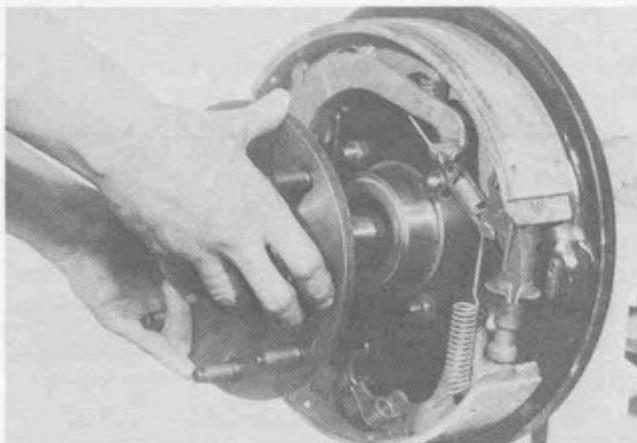


Figure 121

1019-121

Assemble axle shaft into housing. Care should be taken not to damage the seal lip and bearing rollers, and that the shaft spline engages with splines of differential side gears. Do not rotate side gears.