SECTION 6-B

REAR AXLE, 46, 48, 49000 SERIES

CONTENTS OF SECTION 6-B

6–10 REAR AXLE SPECIFICATIONS

a. Tightening Specifications

Use a reliable torque wrench to tighten the parts listed, to insure proper tightening without straining or distorting parts. These specifications are for clean and lightly lubricated threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Location	Thread Size	Torque Ft.-Lbs.
Bolt	Center Bearing Support to Frame 45, 46, 48000	5/16-18	17-23
Bolt	Center Bearing Support to Frame 49000	5/16-24	15-25
Nut	Clamp, Rear U-Joint to Pinion Flange, 46, 48000	5/16-18	12-15
Bolt	Rear CV Joint to Pinion Flange, 49000	7/16-14	75-95
Nut	Differential Carrier to Housing	3/8 -16	40-50
Nut	Spring, Upper End to Frame 49000	1/2 -13	15-20
Bolt & Nut	Upper Control Arm, Inner to Outer Arm 49000	7/16-14	40-55
Bolt & Nut	Upper & Lower Control Arm Pivot, All, 49000	1/2 -13	60-95
Bolt & Nut	Upper & Lower Control Arm Pivot, All, 46, 48000	1/2 -13	60-95
Bolt & Nut	Upper Control Arm Bracket to Frame, 46, 48000	3/8 -16	25-35
Nut	Rear Shock, Upper & Lower Ends, 49000	1/2 -13	35-45
Bolt & Nut	Rear Shock, Upper End, 46, 48000	5/16-18	15-20
Nut	Rear Shock, Lower End, 46, 48000	1/2 -20	30-60
Bolt	Ring Gear to Case	7/16-20	65-75
Nut	Wheel Bearing Retainer & Brake Assembly to Housing	3/8 -16	40-55
Bolt & Nut	Differential Bearing Support Clamping	1/2 -20	40-50
Nut	Spring, Lower End to Lower Control Arm, 49000	1/2 -13	20-30
Nut	Wheel & Brake Drum to Rear Axle Shaft	1/2 -20	65-85
Bolt & Nut	Track Bar to Axle or Frame Bracket, 49000	5/8 -18	100-140
Nut	Pinion Bearing Lock, 46, 48000	7/8 -14	200-300

b. General Specifications

Item	All Series (Except as otherwise noted)
Rear Axle Type	Semi-Floating Hypoid
Drive and Torque	Through 3 Control Arms - 49000
Drive and Torque	Through 4 Control Arms - 46, 48000
Rear Axle Oil Capacity	3 3/4 Pints
Ring and Piston Gear Set Type	Hypoid
Bolted Ring Gear	12 Bolts—7/16 Alloy
Pinion Position Adjustment	Shims
Pinion Bearing Preload Adjustment	Spacers
Ring Gear Position and Preload Adjustment	Shims

b. General Specifications (Cont'd.)

Item	All Series (Except as otherwise noted)
Rear Universal Joint Angle Adjustment	Vernier—Upper Control Arm - 49000
Rear Universal Joint Angle Adjustment	Shim at Upper Control Arm to Frame - 46, 48000
Differential Cover	Welded to Housing
Propeller Shaft	2 Piece—Open Drive Line
Center Support	Ball Bearing
Universal Joints	2 Single—1 Double Constant Velocity - 46, 48000
Universal Joints	1 Single—2 Double Constant Velocity - 49000

c. Limits for Fitting and Adjusting

Pinion Position	±.0015 from Marking on Pinion
Pinion Bearing Preload	15-35 Inch Lbs. Torque on Pinion with New Seal
Ring Gear Position	.007-.009 Backlash
Ring Gear Preload	.004 Compression (.002 per side)

d. Rear Axle Gear Ratios

Gear ratios are indicated by numbers stamped on the bottom of the axle housing. The production date is also indicated by a stamped number which represents the day of the year starting with "1" for January 1. See Figure 6-44.

e. Speedometer Gears

Speedometer gears must correspond to axle ratios and tire sizes in order to have correct speedometer and odometer readings.

6-11 DESCRIPTION OF REAR AXLE

The rear axle assembly is of the semi-floating type in which the car weight is carried on the axle shafts through ball bearings enclosed in the outer axle housing. The rear axle is designed for use with an open drive line and coil springs.

On the 49000 Series, drive from the axle housing is transmitted to the frame through one upper and two lower control arms. The lower control arms also provide seats for the coil springs; the upper control arm is adjustable in length to give the desired universal joint angle.

On the 46 and 48000 Series, drive from the axle housing is transmitted to the frame through two upper and two lower control arms. The upper arms may be shimmed at the frame attachments to provide pinion angle adjustment. Coil springs are seated in brackets which are welded to the axle tubes.

On all series, large rubber bushings at both ends of the control arms absorb vibration and noise. The final drive is a hypoid type ring gear and pinion with the centerline of the pinion gear below the centerline of the ring gear. See Figure 6-45.

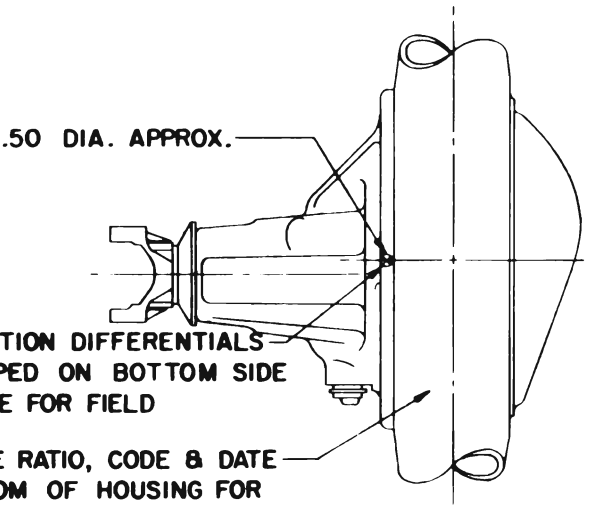
The drive pinion is mounted in two tapered roller bearings which are preloaded by two selected spacers at assembly. See Figure 6-46. The pinion is positioned by a shim located between the head of the drive pinion and the rear pinion bearing. The front bearing is held in place by a large washer and a locking pinion nut. The differential carrier casting has an oil feed passage to the pinion bearings and an oil return hole so that the oil will circulate and cool.

The differential is supported in carrier by two tapered roller side bearings. These are preloaded by inserting shims between the bearings and the pedestals. The differential assembly is positioned for proper gear and pinion backlash by varying these shims. The bearings are centered on the cross axis by lock taper cones secured in the pedestal bores by clamp bolts. The ring gear is bolted to the case. The case houses two side gears in mesh with two pinions mounted on a pinion axle which is anchored in the case by a spring pin. The pinions and side gears are backed by bronze thrust washers.

The axle shaft inner splines engage the differential side gears with a floating fit. The outer ends are supported in the axle housing by thrust type ball bearings which are factory packed for the life of the bearings and sealed on both sides. The axle shaft oil seals are located inboard of the bearings. The bearings are secured against a shoulder on the shaft by a press fit retaining ring. Inward movement of the bearing and shaft assembly is stopped by a shoulder in the housing; outward movement is stopped by a retainer plate. Wheel side thrust is taken at the wheel bearings, so an axle shaft may be removed by removing the nuts holding the bearing retainer and brake backing plate to the axle housing flange. See Figure 6-47.

The rear axle filler plug is located in the right side of the carrier casting. The lubricant level is correct when the level is at the filler opening to 1/4 inch below the filler opening. Since periodic lubricant changes are not recommended, there is no drain plug.

AXLE TYPE	AXLE CODE	AXLE ASM. NUMBER	RATIO	SERIES
STANDARD DIFFERENTIAL	PA	1399885	3.07	49 AUTO. TRANS.
	PB	1399884		46-48 AUTO. TRANS.
	PC	1399883	3.42	46 SYNC. TRANS.
	PD	1399893	S.C.O.	ALL SERIES SPECIAL ORDER AXLE RATIOS.
POSITIVE TRACTION DIFFERENTIAL	PN	1399890	3.07	49 AUTO. TRANS.
	PO	1399889		46-48 AUTO. TRANS.
	PP	1399888	3.42	46 SYNC.
	PR	1399894	S.C.O.	ALL SERIES SPECIAL ORDER AXLE RATIOS.



ALL POSITIVE TRACTION DIFFERENTIALS TO HAVE ⊗ STAMPED ON BOTTOM SIDE OF CARRIER FLANGE FOR FIELD IDENTIFICATION.
ALL AXLES TO HAVE RATIO, CODE & DATE STAMPED ON BOTTOM OF HOUSING FOR FIELD IDENTIFICATION.

SAMPLE MARKING FOR 3.07 RATIO DATE JULY 22 WOULD BE . . .STANDARD AXLES PA 203, POSITIVE FRACTION ⊗PN 203

SAMPLE MARKING S.C.O. (SPECIAL CAR ORDER) RATIO DATE JULY 22 WOULD BE . . , STANDARD AXLE 2.56-203, POSITIVE TRACTION AXLE ⊗ 2.56-203

Fig. 6-44—Rear Axle Ratio Identification U.S. Production Only

The rear brake drum is mounted against the axle shaft flange on bolts pressed through the inboard side of the axle flange. Right and left side wheel bolts both have right hand threads.

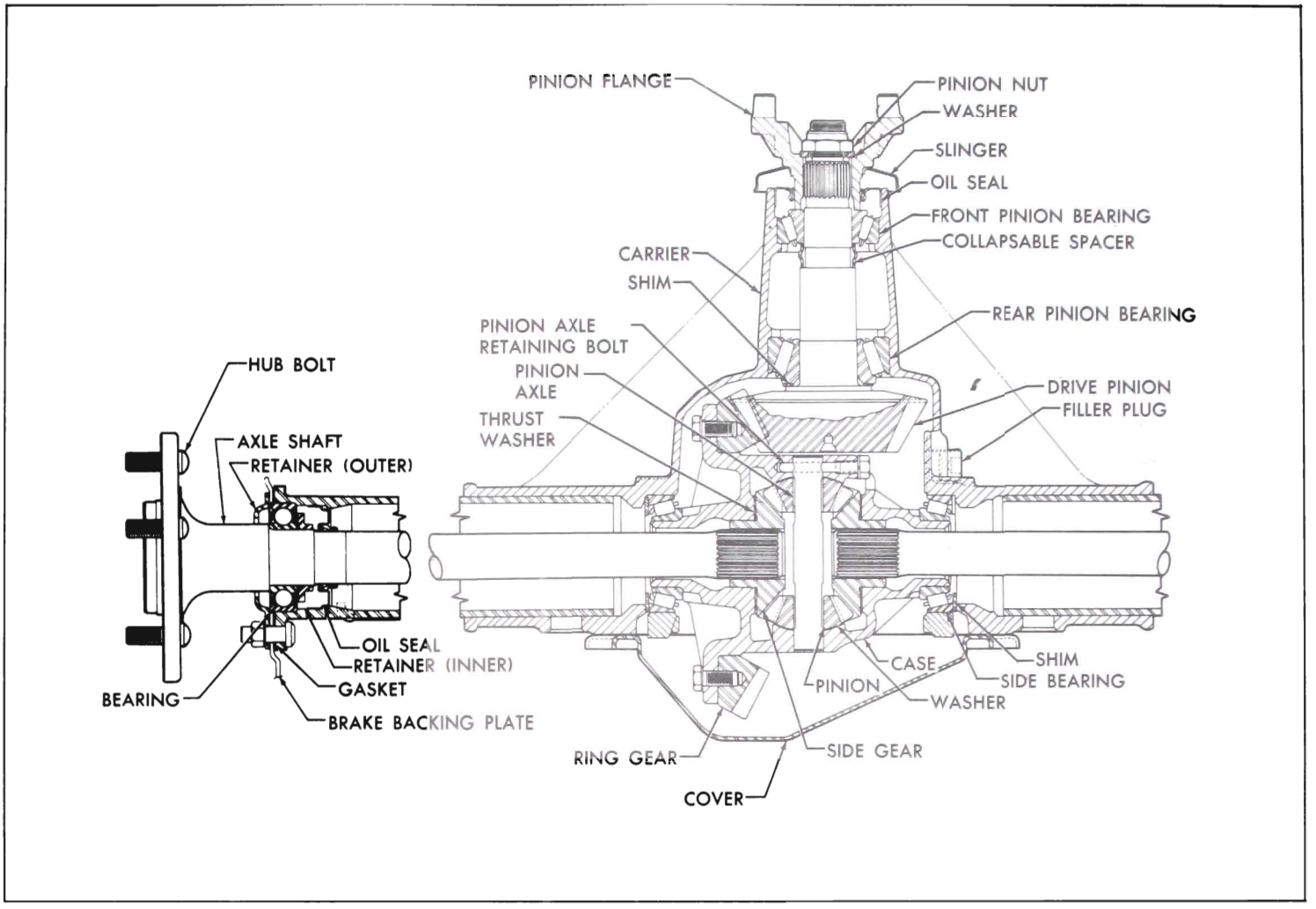


Fig. 6-45—Rear Axle Assembly

A seal in the front of the carrier bears against the pinion flange to prevent differential gear oil from leaking around the O.D. of the flange. An "O" ring seal is compressed between the pinion flange and the drive pinion to prevent gear oil from leaking out through the splines. See Figure 6-45.

6-12 REAR AXLE TROUBLE DIAGNOSIS

a. Elimination of External Noises

When a rear axle is suspected of being noisy it is advisable to make a thorough test to determine whether the noise originates in the tires, road surface, front wheel bearings, engine, transmission, or rear axle assembly. Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle assembly.

(1) Road Noise. Some road surfaces, such as brick or rough surfaced concrete, cause noise which may be mistaken for tire or rear axle noise. Driving on a different type of road, such as smooth asphalt or dirt, will quickly show whether the road surface is the cause of noise. Road noise usually is the same on drive or coast.

(2) Tire Noise. Tire noise may easily be mistaken for rear axle noise even though the noisy tires may be located on the front wheels. Tires which are worn unevenly or which have the surfaces of the non-skid divisions worn in sawtooth fashion are usually noisy, and may produce vibrations which seem to originate elsewhere in the vehicle. This is particularly true with low tire pressure. Some designs of non-skid treads may be more noisy than others, even when tires are new.

(3) Test for Tire Noise. Tire noise changes with different road surfaces, but rear axle noise does not. Temporarily inflating all tires to approximately 50 pounds pressure, for test purposes only, will materially alter noise caused by tires, but will not affect noise caused by the rear axle. Rear axle noise usually ceases when coasting at speeds under 30 miles per hour; however, tire noise continues but with lower tone as car

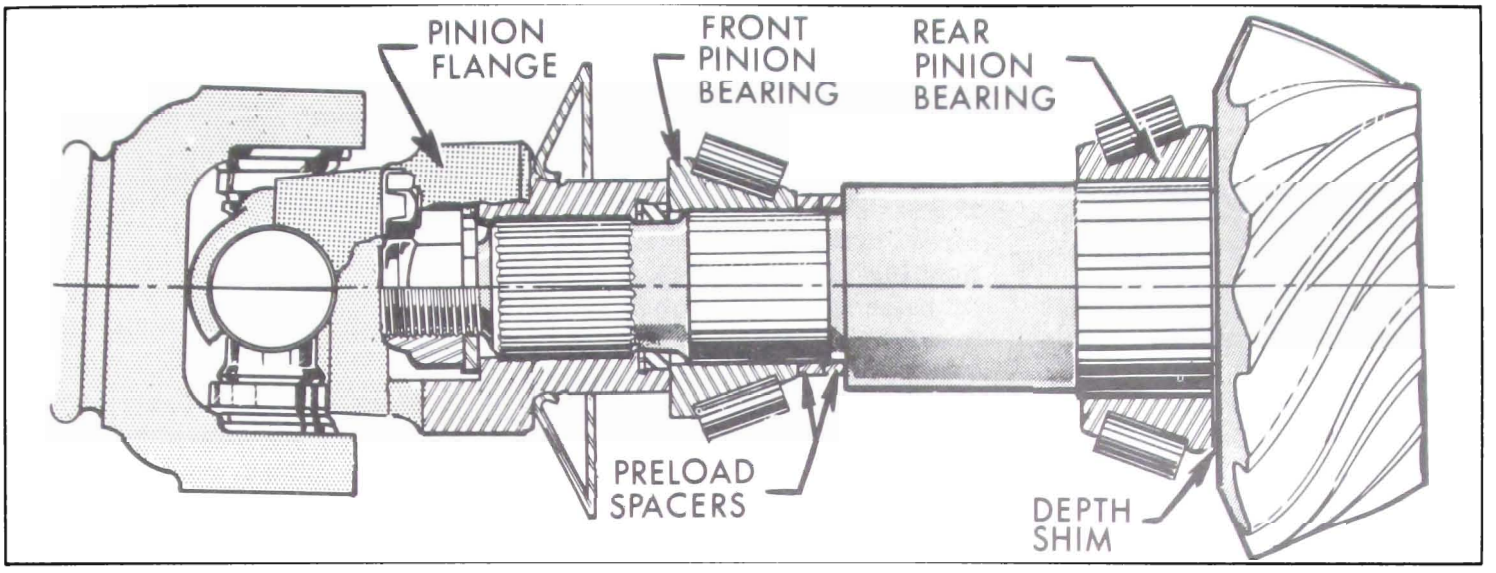


Fig. 6-46—Drive Pinion Parts

speed is reduced. Rear axle noise usually changes when comparing drive and coast, but tire noise remains about the same.

(4) Front Wheel Bearing Noise. Loose or rough front wheel bearings will cause noise which may be confused with rear axle noises; however, front wheel bearing noise does not change when comparing drive and coast. Light application of brake while holding car speed steady will often cause wheel bearing noise to diminish as this takes some weight off the bearing. Front wheel bearings may be easily checked for noise by jacking up the wheels and spinning them, also by shaking wheels to determine if bearings are loose.

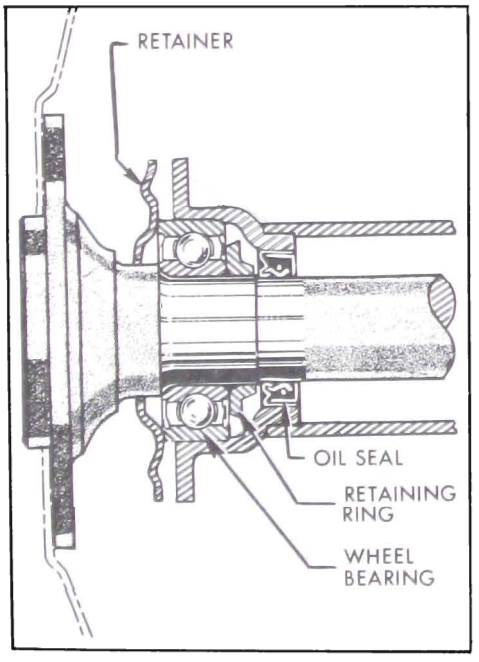


Fig. 6-47—Rear Wheel Bearing and Seal

(5) Engine and Transmission Noises. Sometimes a noise which seems to originate in the rear axle is actually caused by the engine or transmission. To determine which unit is actually causing the noise, observe approximate car speeds and conditions under which the noise is most pronounced; then stop car in a quiet place to avoid interfering noises. With transmission in neutral, run engine slowly up and down through engine speeds corresponding to car speed at which the noise was most pronounced. If a similar noise is produced with car standing, it is caused by the engine or transmission and not the rear axle.

b. Rear Axle Noises

If a careful test of the car shows that the noise is not caused by external items as described in subparagraph a, it is then reasonable to assume that the noise is caused by the rear axle assembly. The rear axle should be tested on a smooth level road to avoid road noise. It is not advisable to test rear axle for noise by running with rear wheels jacked up.

Noises in the rear axle assembly may be caused by faulty propeller shaft or rear wheel bearings, faulty differential or pinion shaft bearings, misalignment between two U-joints, worn differential side gears and pinions, or by a mismatched, improperly adjusted or scored ring and pinion gear set.

(1) Rear Wheel Bearing Noise. A rough rear wheel bearing produces a vibration or growl which continues with car coasting with transmission in neutral. A brinelled rear wheel bearing causes a knock or click approximately every two revolutions of rear wheel since the bearing rollers do not travel at the same speed as the rear axle and wheel. Jack up rear wheels and spin by hand while listening at hubs for evidence of rough or brinelled wheel bearing.

(2) Differential Side Gear and Pinion Noise. Differential side gears and pinions seldom cause noise since their movement is

relatively slight on straight ahead driving. Noise produced by these gears will be most pronounced on turns.

(3) Pinion Bearing Noise. Rough or brinelled pinion bearings produce a continuous low pitch whirring or scraping noise starting at relatively low speed.

(4) Ring and Pinion Gear Noise. Noise produced by the ring and pinion gear set generally shows up as drive noise, coast noise, or float noise.

(a) Drive noise is most evident on constant acceleration through the speed range.

(b) Coast noise is most evident when car is allowed to coast through the speed range with throttle closed.

(c) Float noise is most evident while just barely holding the car speed constant on a level road at any given speed.

(d) Drive, coast, and float noises will be very rough and irregular if the differential or pinion shaft bearings are rough, worn, or loose, and will vary in tone with speed.

c. Check for Propeller Shaft Vibration

Objectionable vibrations at high speed (65 MPH or higher) may be caused by a propeller shaft that is out of balance. Out of balance may be caused by a bent shaft.

To determine whether the propeller shaft is causing vibration, drive car through the speed range and note car speed at which vibration is most pronounced. Shift transmission into low range and drive car at same engine speed as when vibration was most pronounced in direct drive, and note the effect on vibration.

To determine the required engine speed, divide car speed by the transmission gear ratio, using 2.48 for automatic. Example: if vibration is most pronounced at 65 MPH in direct drive, the same engine speed would be produced in low range at $\frac{62}{2.48}$ = 26 MPH. If the vibration is still present at the same engine speed whether in direct drive or in the lower gear, then the propeller shaft is not out of balance. If the vibration decreases or is eliminated in the lower gear, then the propeller shaft is out of balance and should be removed for correction.

d. Oil Leaks

It is difficult to determine the source of some oil leaks. When there is evidence of an oil leak at these locations, the probable cause is as follows:

(1) A leak coming from the bottom edge of the brake backing plate is caused by either a leaking wheel bearing seal or a leaking brake cylinder. The feel and smell of the leaking oil will help determine the type leak to expect.

(2) Oil coming from between the rear pinion flange slinger and the carrier is caused by a leaking pinion seal. Oil coming out around the pinion nut is caused by a defective "O" ring seal between the drive pinion and the pinion flange.

Even after the point of leakage has been determined, it is hard to tell whether the oil is leaking past the lip of the seal or past the O.D. of the seal. Therefore it is a good idea to make sure the leak is stopped by using a non-hardening sealing compound around the O.D. of the new seal.

6-13 REMOVAL AND INSTALLATION OF REAR AXLE ASSEMBLY

It is not necessary to remove the rear axle assembly for any normal repairs. The axle shafts and the carrier assembly can easily be removed from the car, leaving the rear axle assembly in place. However, if the housing is damaged, the rear axle assembly can be removed and installed using the following procedure.

a. Removal of Rear Axle Assembly

1. Raise rear of car and support securely using car stands under both frame side rails.

2. Mark rear universal joint and pinion flange for proper reassembly. Disconnect rear universal joint by removing two U-bolts. (On 49000, mark flanged ball stud yoke and rear pinion flange for proper alignment at reassembly. Then disconnect rear CV joint from rear axle by removing four pinion flange bolts.) Push rear propeller shaft forward as far as possible, then wire it to the upper control arm frame bracket to support it out of the way.

3. Disconnect brake hose at support bracket. Cover hose and brake pipe openings to prevent entrance of dirt.

4. Disconnect parking brake cables. Unclip each cable at two places, disengage from guides, pull each cable free and lay-out forward from rear wheels.

5. Place a jack under center of rear axle housing and raise until shock absorbers are compressed slightly. Disconnect shock absorbers at lower ends.

6. Disconnect track bar at axle end on 49000.

7. Disconnect upper control arm (or arms, 46, 48000) at axle end.

8. Lower jack slightly and disconnect lower control arms at axle end.

9. Lower jack from under axle housing and remove.

10. Roll rear axle assembly out from under car.

b. Installation of Rear Axle Assembly

1. With car resting securely on stands under frame, roll rear axle assembly into place.

2. Place a jack under center of axle housing and raise until aligned with lower control arms. Install lower control arm bolts and nuts. Torque nuts to 95 ft. lbs.

3. Raise jack slightly and connect upper control arm (or arms 46, 48000) to axle housing. Torque nuts to 95 ft. lbs.

4. Connect track bar to axle housing. Torque nut to 120 ft. lbs.

5. Connect shock absorber lower ends. Torque nuts to 40 ft. lbs.

6. Install parking brake cables through clips and guides.

7. Connect and adjust parking brake according to procedure in paragraph 9-8.

8. Connect brake hose at support bracket and lock in place with yoke.

9. Bleed both rear wheel cylinders as described in paragraph 9-6.

10. Connect rear universal joint to pinion flange according to alignment marks. Compress bearings using a C-clamp so that bearing snap rings will engage pinion flange without gouging. See Figure 6-113. (On 49000, connect flanged ball stud yoke and rear pinion flange according to alignment marks.)

11. Torque U-bolt nuts to 13 ft. lbs. using an extension such as J-9113 (this corresponds to 15 ft. lbs. without an extension). See Figure 6-114. (On 49000, torque 4 pinion flange bolts to 75-95 ft. lbs.).

12. With car approximately level, fill rear axle housing to filler plug hole using specified gear lubricant. If axle housing or any rear suspension parts were replaced due to damage, rear universal joint angle must be checked and adjusted as required. See paragraph 6-28.

6-14 REMOVAL AND INSTALLATION OF AXLE SHAFT, WHEEL BEARING, OR OIL SEAL

a. Remove Axle Shaft Assembly

1. Place car stands solidly under rear axle housing so that wheels are clear of floor.

2. Remove rear wheel and brake drum. Both left and right side wheel bolts have right hand threads.

3. Remove nuts holding wheel bearing retainer plate to brake backing plate, leaving bolts in place to support backing plate.

4. Pull out axle shaft assembly using Puller J-6176 with a slide hammer. See Figure 6-48. CAUTION: While pulling axle shaft out through seal, support shaft carefully in center of seal to avoid cutting seal lip.

5. Replace two opposite retainer nuts finger tight to hold brake plate in position.

b. Remove and Install Rear Wheel Bearing

The rear wheel bearing and the bearing retaining ring both have a heavy press fit on the axle shaft. Because of this fit, they should be removed or installed separately.

1. Notch wheel bearing retaining ring in 3 or 4 places with a chisel. See Figure 6-49. Retaining ring will expand so that it can be slipped off. CAUTION: Axle shaft may be nicked if ring is cut completely through.

2. Press wheel bearing off, using Remove J-6525 either in a press or in a set-up using Ram and Yoke Assembly J-6180 and Adapter J-6258 as shown in Figure 6-50.

3. Install bearing retainer plate. Press new wheel bearing and retaining ring against shoulder on axle shaft using Installer J-9739 either in a press or in a set-up using Ram and Yoke Assembly J-6180 and Holder J-6407 shown in Figure 6-51. CAUTION: Bearing retainer plate must be on axle shaft before bearing is installed; retainer gasket can be installed after bearing.

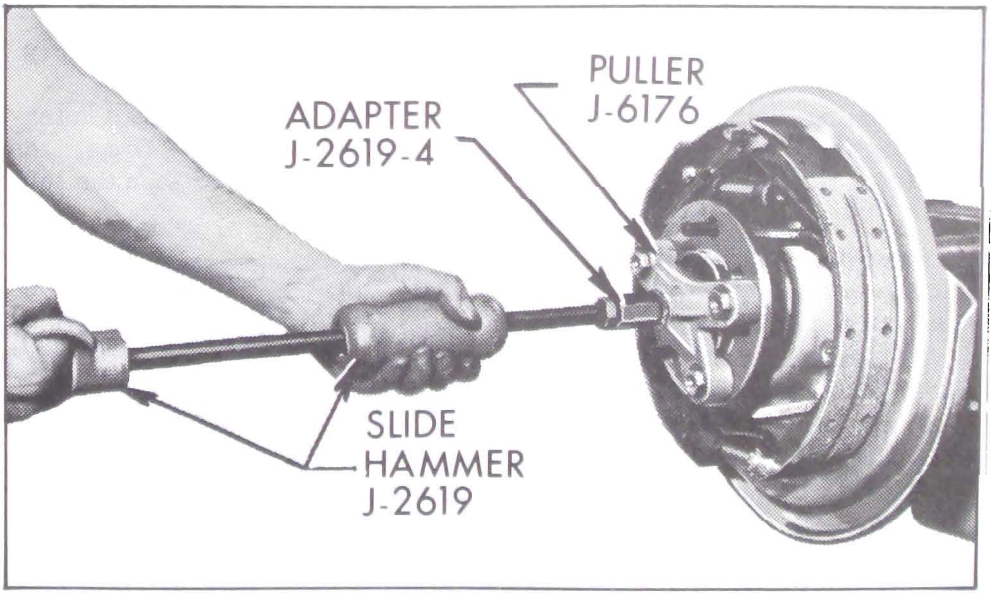


Fig. 6-48—Removing Rear Axle Shaft

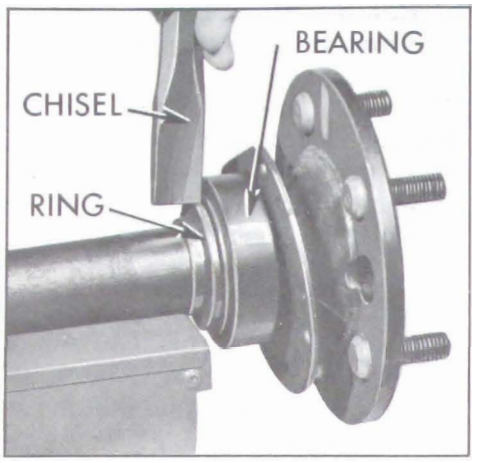


Fig. 6-49—Removing Rear Wheel Bearing Retaining Ring

c. Remove and Install Axle Shaft Oil Seal

The oil seal is located inboard of the wheel bearing with its O.D. tight in the rear axle housing and its sealing lip contacting a ground surface of the axle shaft. See Figure 6-45. Before removing, install 2 nuts finger tight to retain backing plate to axle housing. This protects the brake lines.

1. To remove oil seal, insert Puller J-6199 just through seal and expand. Pull seal with a slide hammer. See Figure 6-52.

2. Before installing apply sealer to O.D. of new seal.

3. Position seal over Installer J-9740 and drive seal straight into housing until installer bottoms against wheel bearing shoulder. See Figure 6-53.

d. Remove and Install Rear Wheel Bolt

1. To remove and install a rear wheel bolt, axle shaft assembly must be out of car. Remove rear wheel bolt by pressing from axle flange.

2. Install new rear wheel bolt by pressing through axle flange. Check new bolt for looseness; if bolt can be moved at all with fingers, axle shaft must be replaced.

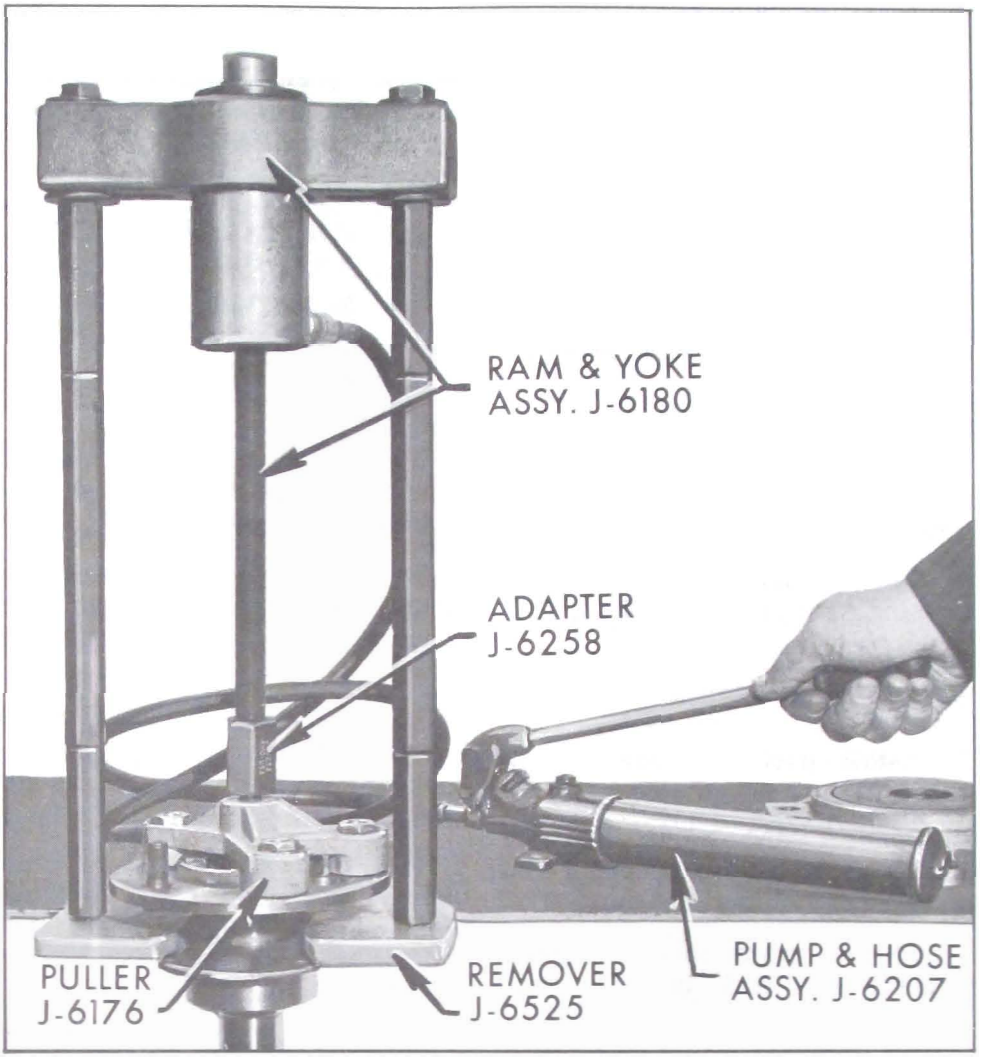


Fig. 6-50—Removing Rear Wheel Bearing

e. Install Axle Shaft Assembly

Rear axle shafts are not interchangeable between sides; the right shaft is longer than the left.

1. Apply a coat of wheel bearing grease in wheel bearing recess of housing. Install new outer retainer plate gasket over retainer bolts.

2. Apply gear lubricant to the bearing surface and splines at the inner end of the axle shaft. Apply a coat of wheel bearing grease on the seal surface of the shaft to approximately 6 inches inboard of the shaft. Install axle shaft through seal carefully to avoid cutting seal lip. Drive shaft into position. NOTE: If the axle to be installed is a positive traction axle, ONLY POSITIVE TRACTION LUBRICANT SHOULD BE USED.

3. Install retainer nuts and torque to 50 ft. lbs.

4. Install drum and wheel. Torque lug nuts to 70 ft. lbs.

6-15 REMOVAL AND INSTALLATION OF CARRIER ASSEMBLY

a. Remove Carrier Assembly

1. Raise rear of car and support securely under rear axle housing.

2. Mark rear universal joint and pinion flange for proper alignment

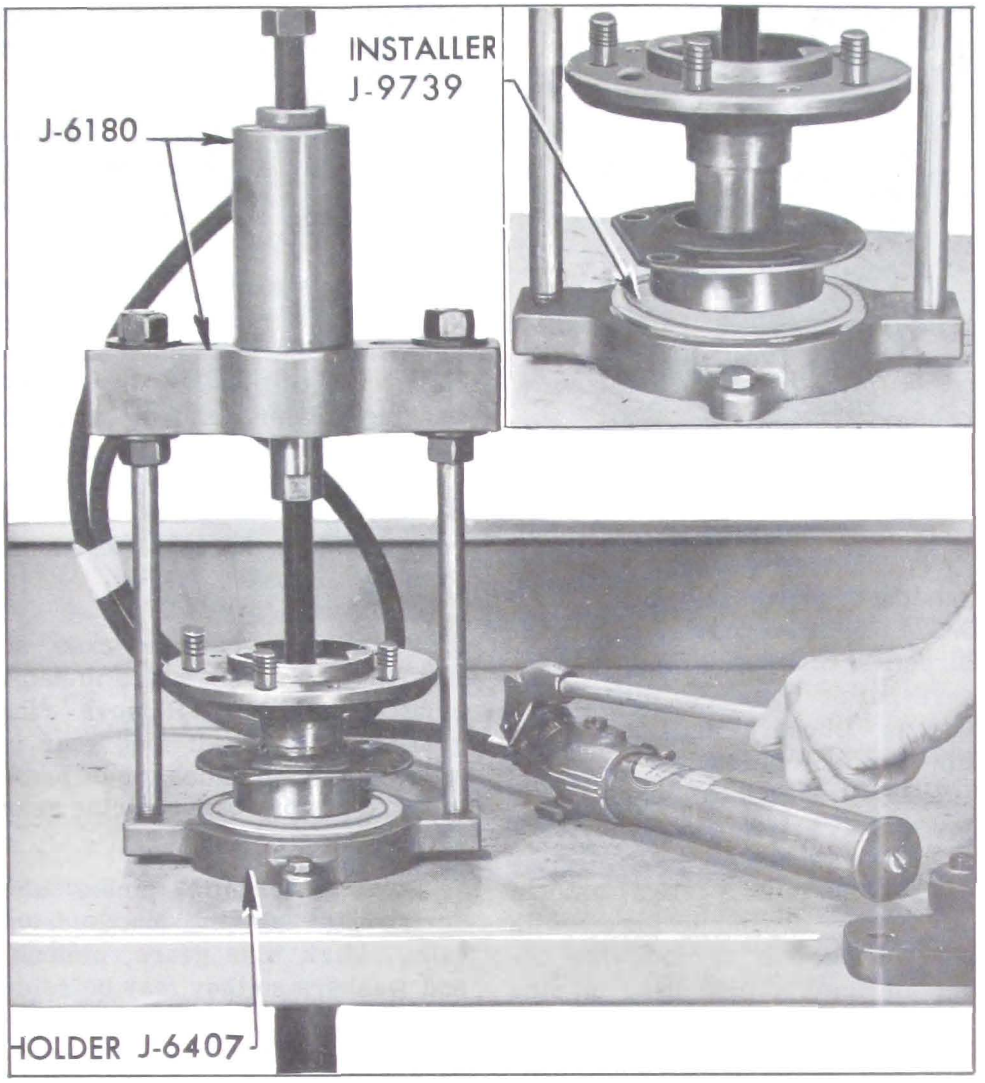


Fig. 6-51—Installing Rear Wheel Bearing or Retaining Ring

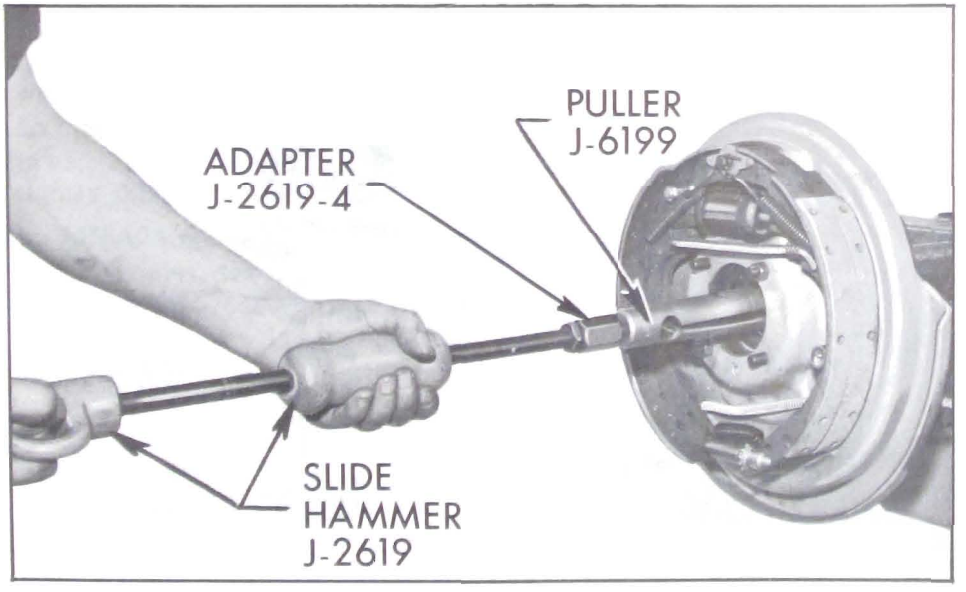


Fig. 6-52—Removing Axle Shaft Oil Seal

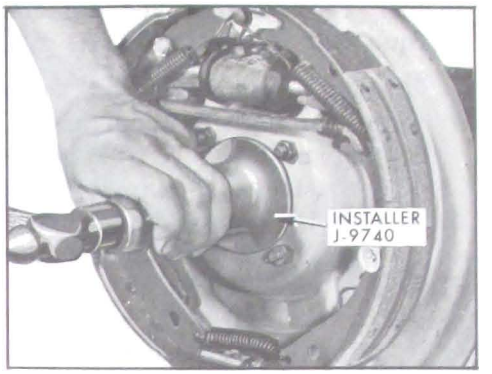


Fig. 6-53—Installing Axle Shaft Oil Seal

at reassembly. Then disconnect rear universal joint by removing two U-bolts. (On 49000, mark flanged ball stud yoke and rear pinion flange for proper alignment at reassembly. Then disconnect rear CV joint by removing 4 pinion flange bolts.) Push rear propeller shaft forward as far as possible, then wire it to the upper control arm frame bracket to support it out of the way.

3. Remove rear wheels and brake drums. Remove axle shaft assemblies as described in paragraph 6-14.

4. Remove carrier to axle housing nuts except two opposite nuts; back these two nuts out until they engage only a few threads.

5. Locate a drain pan under carrier flange, then move carrier forward to drain gear lubricant.

6. Remove carrier assembly using a transmission jack, if available.

b. Install Carrier Assembly

1. Clean gasket surface of rear axle housing. Apply gasket cement and install new gasket. Make sure mounting surface of carrier is clean and free of any burrs or nicks.

2. Raise carrier assembly with a transmission jack, if available. Install carrier on axle housing. Torque nuts to 50 ft. lbs.

3. Install axle shaft assemblies as described in paragraph 6-14.

Install rear drums and wheels. Torque lug nuts to 70 ft. lbs.

4. Connect rear universal joint to pinion flange according to alignment marks. Compress bearings using a C-clamp so that bearing snap rings will engage pinion flange without gouging. See Figure 6-113. (On Riviera, connect flanged ball stud yoke and rear pinion flange according to alignment marks.)

5. Torque U-bolt nuts to 13 ft. lbs. using an extension such as J-9113. See Figure 6-114. (On Riviera torque 4 pinion flange bolts to 75-95 ft. lbs.).

6. With car approximately level, fill rear axle housing to filler plug hole using specified lubricant.

6-16 DISASSEMBLY OF CARRIER ASSEMBLY

a. Removal and Disassembly of Ring Gear and Case Assembly

1. Place carrier assembly in suitable mounting fixture such as Fixture J-6177.

2. It is advisable to check the existing gear lash with a dial indicator as described in paragraph 6-17, e. This will indicate gear or bearing wear or an error in backlash or preload setting which will help in determining cause of axle noise. It will also enable used gears to be reinstalled at original lash setting to avoid changing gear tooth contact.

3. Remove differential bearing pedestal clamp bolts and open pedestals by tapping a wedge in each pedestal slot.

CAUTION: Do not use excessive force on wedges as pedestal bores may be permanently distorted.

4. Pull differential bearing supports with Puller J-9744-1 using the following procedure:

(a) Using a screwdriver, turn expanding screw in puller body J-9744-5 in a counterclockwise direction to retract pins; then insert puller body into differential bearing support until reference line on tool is flush with end of support and punch mark is in general direction of hole in support. See Figure 6-54.

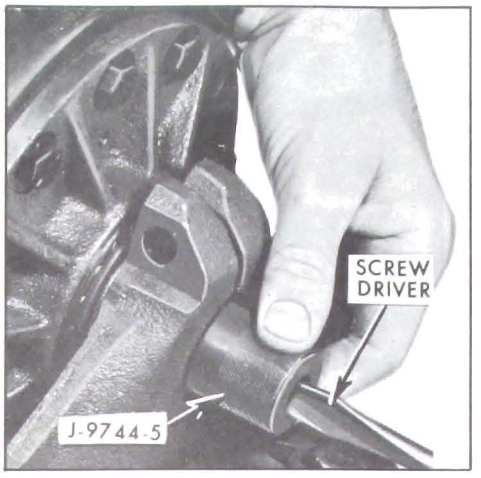


Fig. 6-54—Installing Support Puller

(b) Expand pins a slight amount by turning expanding screw with screwdriver in a clockwise direction until a light drag on pins is felt, then move tool as required to engage pins with holes in support. Fully expand pins.

(c) Place bridge J-9744-2 over puller complete with draw bolt, thrust bearing, and washer as shown in Figure 6-55. With a suitable wrench tighten bolt to withdraw bearing support.

5. Install Spreader J-6185 shown in Figure 6-79. Tighten spreader bolt just enough to free case assembly.

CAUTION: Do not spread pedestals any farther than necessary or they may be permanently sprung.

Lift case straight out until side bearings are half-way clear of pedestals. Then take hold at bearings with both hands to prevent bearings from dropping and lift case assembly out. Keep right and left bearings, shims, and supports in sets so that they may be reinstalled in the same positions. Remove spreader tool.

6. Mark ring gear and case, so they may be reassembled in same relative position. Remove ring gear from case. If ring gear is tight, tap it off using a soft hammer; do not pry between ring gear and case.

7. Drive differential pinion axle spring pin and pinion axle from case. Mark side gears, pinions, and washers so they may be reinstalled in same sides. Remove side gears, pinions, and washers.

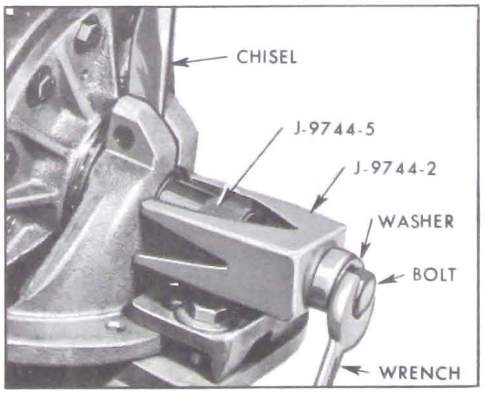


Fig. 6-55—Removing Differential Support Bearing

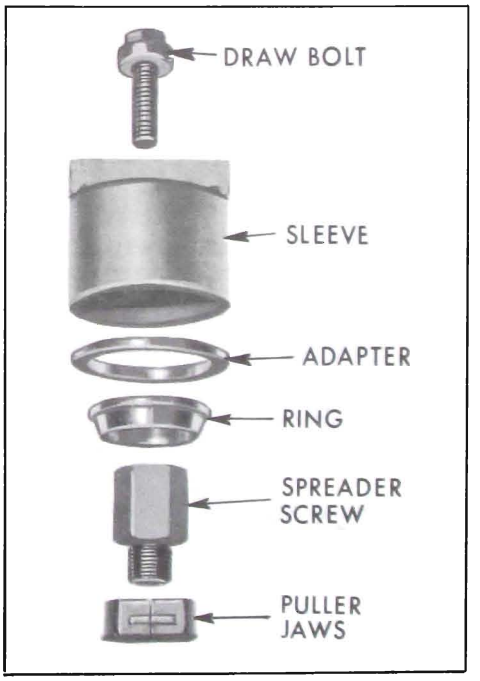


Fig. 6-56—Proper Position of J-6552 Parts

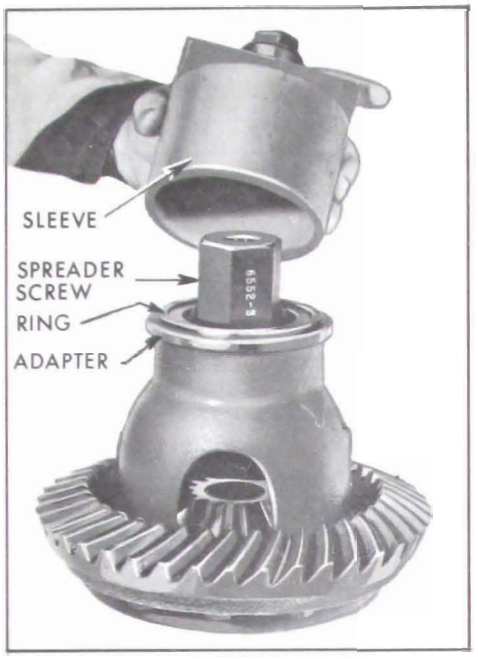


Fig. 6-57—Installing Sleeve to Remove Bearing Outer Race

8. If a differential bearing is to be replaced, pull bearing outer race from case with Remover J-6552 using the following procedure: (See Figures 6-56 and 6-57).

(a) Insert puller jaws with lips down under edge of outer race.

(b) Carefully thread spreader screw into jaws, making sure that threads are not crossed. Leave spreader screw one full turn away from jaws.

(c) Place retainer ring and adapter over jaws, tapping them down while pulling up spreader screw so that ring fits snugly around jaws; then turn spreader screw tightly against jaws.

(d) Place sleeve over assembled tool. Insert draw bolt through washer, thrust bearing and sleeve. Then thread it into spreader screw and pull bearing outer race.

b. Removal of Pinion and Bearings

1. Check pinion preload as described in paragraph 6-17. If there is no preload reading, check

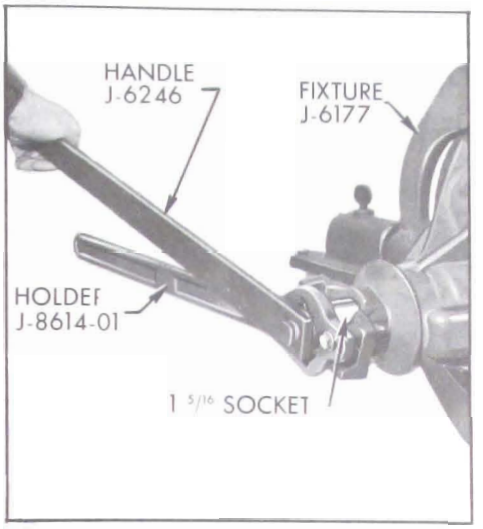


Fig. 6-58—Removing Pinion Nut

for looseness of pinion assembly by shaking. Any noticeable looseness indicates worn or defective bearings, requiring replacement. If run long with very loose bearings, ring and pinion gears will be damaged and also need replacing.

2. Install Holder J-8614-01 on pinion flange using two 5/16-18 x 2 bolts with flat washers. (On 49000, install Holder J-8614-01 on pinion flange using Adapters J-21619.) Remove pinion nut using a 5/16 (3/4 drive) socket on Handle J-6246. Remove washer. See Figures 6-58 and 59.

NOTE: Because of differences in castings, it may be necessary to file out slightly the slotted bolt holes in Holder in order to accommodate J-21619 Adapters.

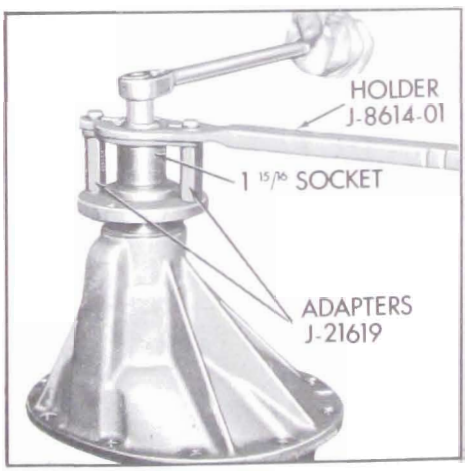


Fig. 6-59—Removing Pinion Nut - 49000

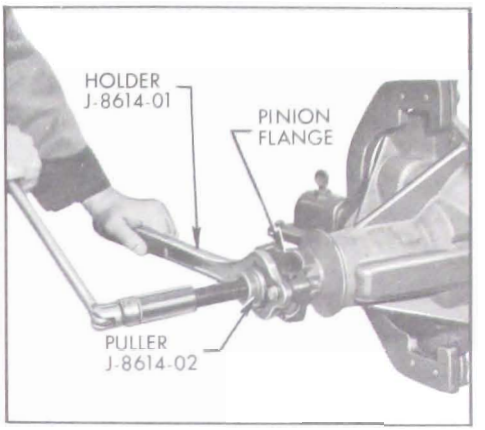


Fig. 6-60—Removing Pinion Flange

3. Pull flange from pinion using Puller J-8614-02 in Holder J-8614-01. (On 49000 use Puller J-861402 in Holder J-8614-01 with Adapters J-21619.) To install puller, back out puller screw, insert puller through holder, and rotate 1/8 turn. See Figures 6-60 and 61.

4. As pinion flange is removed, hold hand under pinion to catch it, as it may fall through. Remove "O" ring seal from pinion. If necessary, tap pinion out with a soft hammer, being careful to guide pinion with hand to avoid damage to bearing outer races.

5. If rear pinion bearing is to be replaced or pinion depth setting is

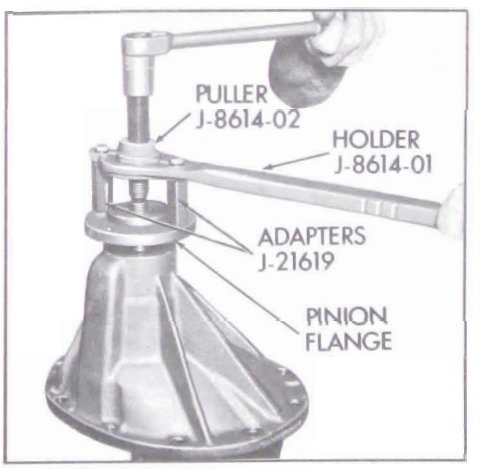


Fig. 6-61—Removing Pinion Flange - 49000

Fig. 6-62—Installing Pinion Bearing Remover

to be changed, remove rear bearing from pinion shaft using Remover J-9746 and Holder J-6407 in a press, or in a set-up using Ram and Yoke Assembly J-6180 as shown in Figures 62 and 63.

6. Pry pinion oil seal from carrier, being careful not to damage front pinion bearing. If front pinion bearing is to be replaced, drive outer race from carrier using a drift in slots provided for this purpose.

7. If rear pinion bearing is to be replaced, drive outer race from carrier using a drift in slots provided for this purpose.

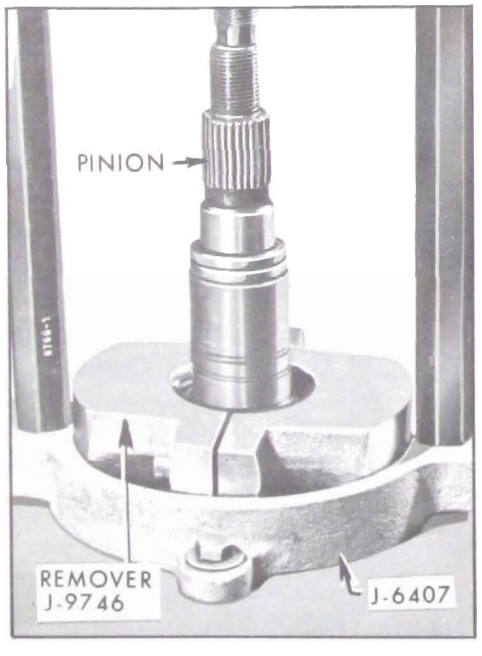


Fig. 6-63—Removing Rear Pinion Bearing

6-17 ASSEMBLY OF CARRIER ASSEMBLY

Before installation of any parts, examine the wearing surfaces of all parts for scoring or unusual wear. Make certain that the interior of the carrier housing is absolutely clean and dry. Also make certain that the parts to be assembled are absolutely clean and that there are no burred edges. Lubricate all parts with the specified rear axle lubricant just before assembly.

NOTE: If the Buick is equipped with a Positive Traction Differential, only Positive Traction Lube should be used.

CAUTION: If the ring gear and pinion are changed, only factory hypoid lubricant should be used for filling because of its special anti-scoring properties. For this reason the proper lubricant is included in the carton with the replacement gears as received from the Buick warehouses. See paragraph 1-9.

a. Pinion Setting Marks and Setting Gauges

All Buick ring and pinion gear sets are selectively matched for best operating position and proper tooth contact. After matching, a serial number is etched on both the pinion and the ring gear to aid in keeping matched parts together. Parts having different serial numbers must never be used together.

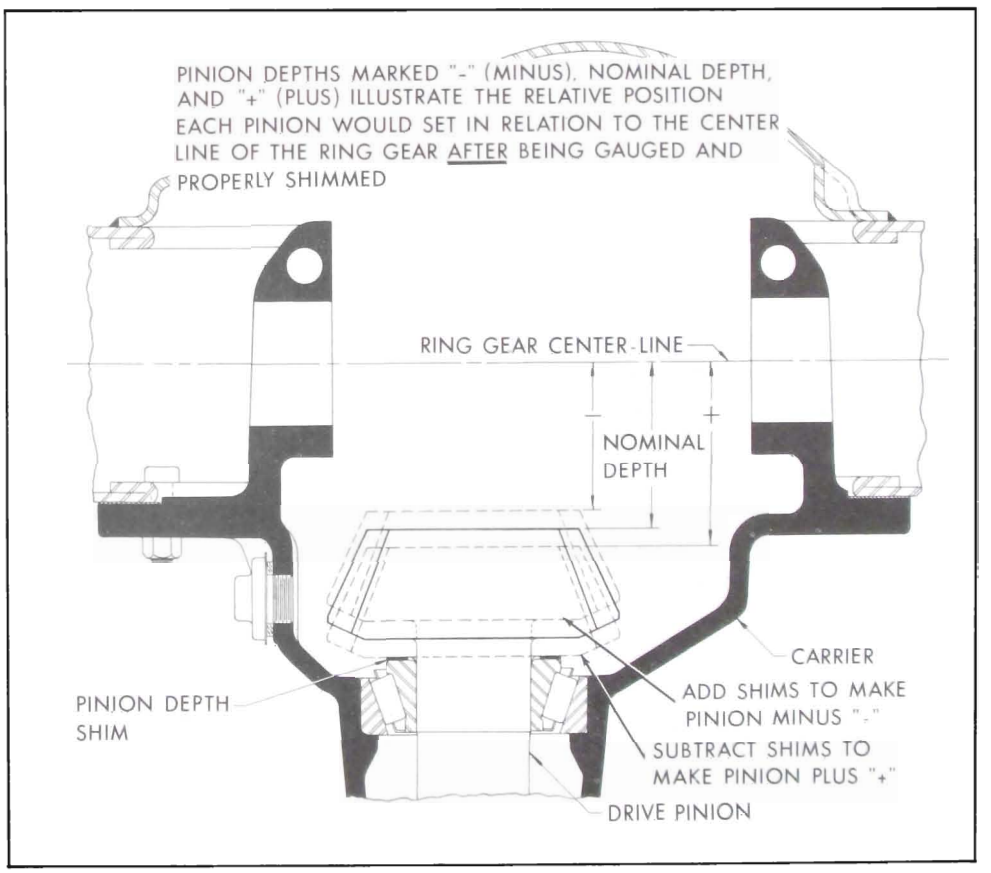


Fig. 6-64—Nominal Pinion Setting Depth

Ring and pinion gear sets are matched in a special test machine which permits adjustment of pinion depth in ring gear until a point is reached where best operation and proper tooth contact under load is obtained. At this point, the setting of the pinion with reference to the centerline of the ring gear is indicated by the machine. This setting may vary slightly from the design or "nominal" setting due to allowable variation in machining the parts. However, most production pinions and all pinions used for service replacement are zero or nominal pinions.

If during repair, a pinion is found having a plus or minus reading recorded in thousandths on the rear face of the pinion, this indicates that the pinion during testing was found to have best tooth contact at a position varying from design or nominal depth.

In order to compensate for all of the allowable machining variables, a procedure of gauging the carrier and shimming the pinion has been developed. After gauging a carrier, the assembler is able to install a shim between the front face of the pinion and its bearing so that pinion depth can be adjusted to an exact required specification for best tooth contact in each axle assembly.

Pinion Setting Gauge J-5647 with Adapter J-5647-35, Adapter J-5647-34, Pilot J-5647-37, Gauge Plate J-5647-36, and Stud and Nut Assembly J-8619-13 is used to set pinion depth. See Figure 6-65. It is not necessary to reassemble and install the pinion depth shim since the pinion depth setting gauge arrangement provides in effect, a nominal or zero pinion as a gauging reference.

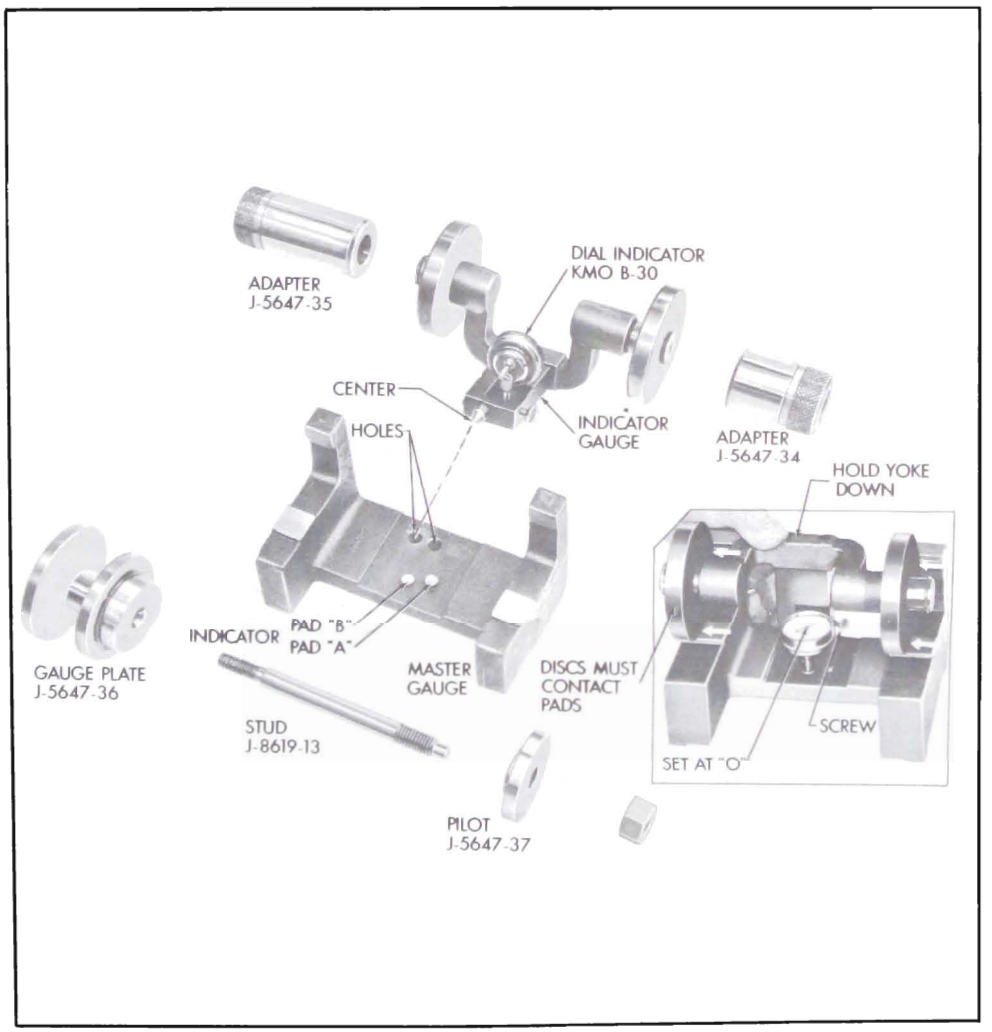


Fig. 6-65—Pinion Setting Gauge J-5647 and Adapters

b. Checking Pinion Depth

NOTE: Before setting pinion depth, the pinion bearing races must be in position and the pinion oil seal must be removed. Install races following instructions in subparagraph c., Steps 1 and 2.

1. Be certain that all parts in pinion setting gauge are clean.

2. Install the disks on the indicator gauge. Install the small contact button on the stem of the dial indicator and mount the dial indicator on the indicator gauge.

3. Place the indicator gauge on the master gauge so that the spring-loaded center is engaged in the centering hole corresponding to the indicator pad "b". See Figure 6-65.

4. Center the indicator contact button on the specified contact pad and lock the indicator by tightening the thumb screw.

5. Hold gauge yoke down firmly with both disks contacting the horizontal and vertical pads on the master gauge; set dial indicator at zero.

6. Lubricate front and rear pinion bearings which will be used in final reassembly, and position them in their respective races in the carrier. With bearings held in place in races, install a 50 thousandths shim and Gauge Plate J-5647-36 on rear pinion bearing inner race. Install Pilot J-5647-37 on front pinion bearing with small diameter raised portion inside bearing race. Insert Stud J-8619-13 through pilot, and thread it into the gauge plate. See Figure 6-66.

NOTE: Fifty thousandths shim is required under Gauge Plate

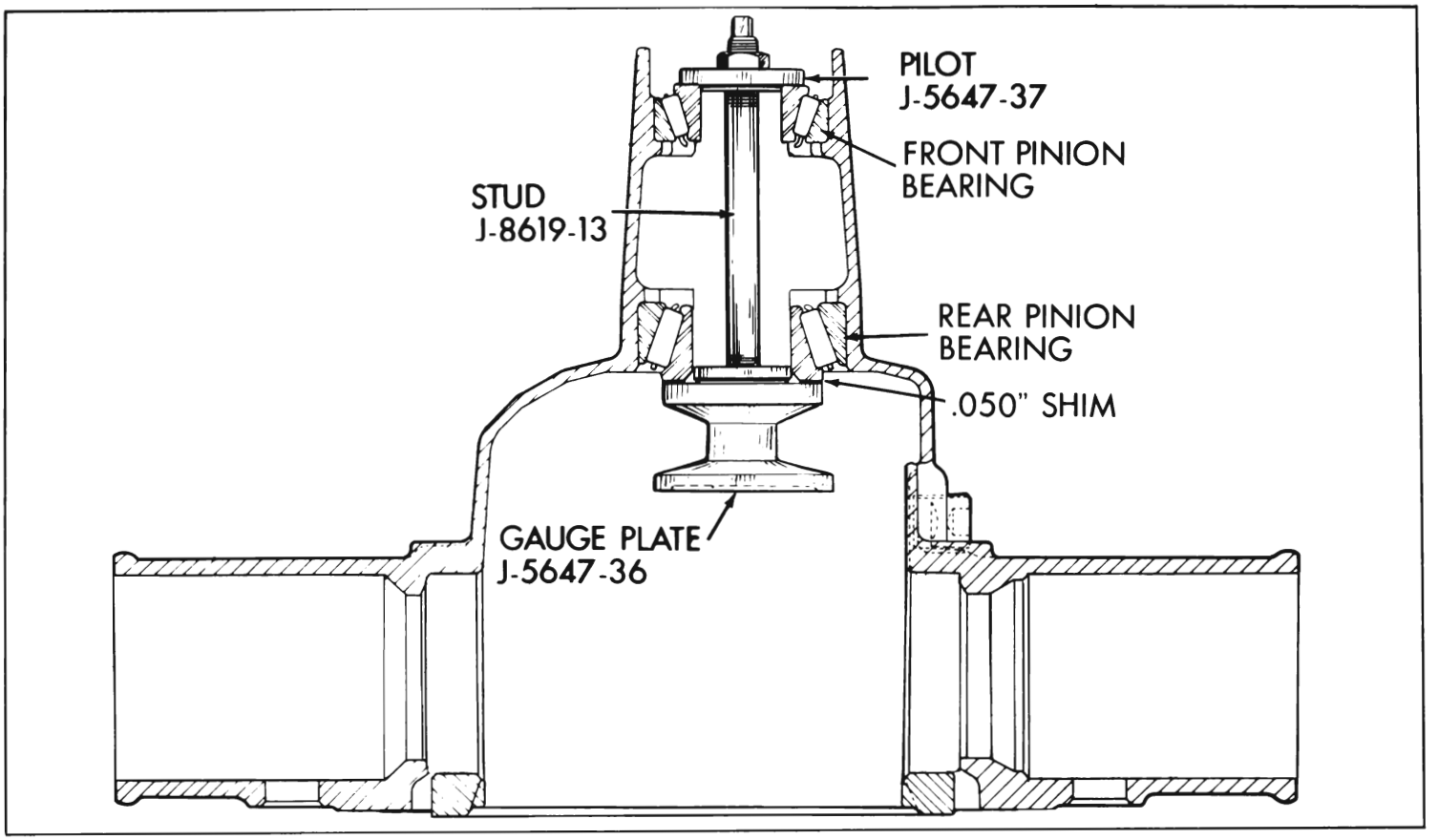


Fig. 6-66—Installing Gauge Plate in Carrier

J-5647-36 during gauging operation in order to compensate for variations in different carrier assemblies. By using fifty thousandths shim, the dial indicator will contact Gauge Plate J-5647-36 in any carrier assembly during gauging operation.

7. Install nut on Stud J-8619-13. Hold stud stationary with wrench positioned on flats on end of stud; tighten nut until a reading of 20 inch pounds is obtained when rotating the gauge plate assembly with an inch pound torque wrench.

8. Be certain that differential support bores are free of burrs. Drive a wedge into each pedestal split and spread them just enough so that Adapters J-5647-35 and 34 can be inserted. Then place indicator gauge in carrier as follows: (See Figure 6-67.)

a. Remove disks from indicator gauge and hold it in position in the carrier with pins centered in the pedestal bores.

b. Slide long adapter through pedestal bore farthest from pinion and over gauge pin. Then slide short adapter in place on other side.

c. Position the spring-loaded pin of the indicator gauge in the centering hole of Gauge Plate J-5647-36, and position the contact button of dial indicator to bear against. machined surface of Gauge Plate. See Figure 6-67.

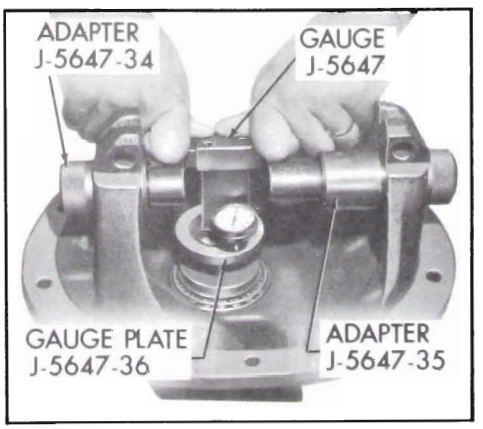


Fig. 6-67—Checking Pinion Setting

9. Press gauge yoke down firmly. Record number of thousandths dial indicator moves in a "+" (plus) or "-" (minus) direction from zero. (Reading will usually be "+" (plus). Remove dial indicator from carrier and check zero setting on master gauge to make certain this setting was not disturbed by handling. If zero setting is still correct, remove gauging set-up (including 50 thousandths shim), then add a plus reading or subtract a minus reading from 50 thousandths. This answer indicates the thickness of the shims to be selected as further qualified in Step 11.

NOTE: The usual dial indicator reading will average from 1 to 10 thousandths in a plus direction with a corresponding shim thickness after computation of between 51 and 60 thousandths.

10. Examine ring gear and pinion for nicks, burrs, or scoring. Any of these conditions will require replacement of the set.

11. The correct pinion shim to be used during pinion reassembly should be selected as follows:

a. If a production (marked) pinion is being reused and pinion is marked "+" plus, subtract the amount specified on the pinion from the shim thickness as determined in Step 9.

b. If a production (marked) pinion is being reused and the pinion is marked "-" (minus), add the amount specified on the pinion to the shim thickness as determined in Step 9.

c. If a service pinion is being used (no marking) shim pinion using shim thickness directly as determined in Step 9.

NOTE: Frequently, production pinions are nominal or zero pinions (no marking). When re-using a nominal production pinion, shim as with service pinion using shim thickness directly as determined in Step 9.

c. Installation of Pinion Bearings and Pinion

1. Drive front pinion bearing outer race against shoulder on carrier using Replacer J-8611 with driver handle. See Figure 6-68.

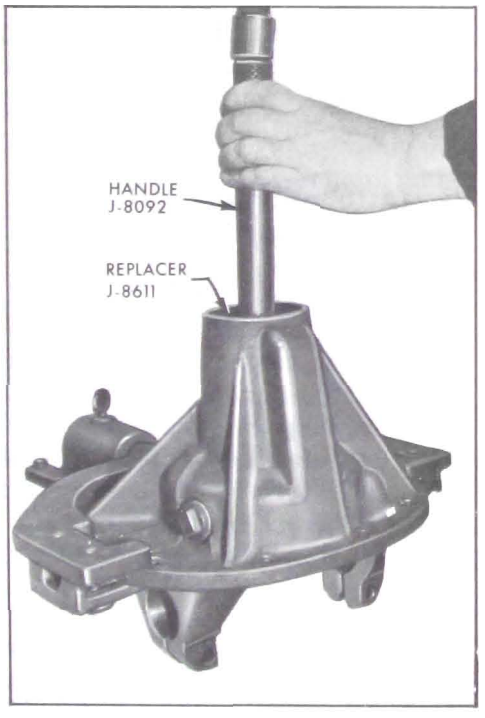


Fig. 6-68—Installing Front Pinion Bearing Outer Race

2. Drive rear pinion bearing outer race against shoulder in carrier using Replacer J-9745 with driver handle. See Figure 6-69.

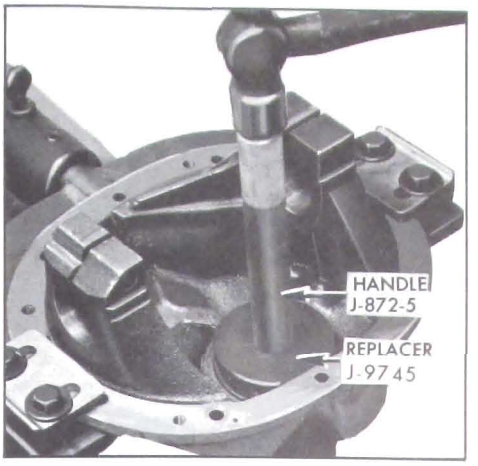


Fig. 6-69—Installing Pinion Bearing Outer Race

3. Plate correct shim (as determined in subpar. b) against head of pinion and install rear pinion bearing using Replacer J-6377 and Holder J-6407 with Ring J-6407-2 in a press or as shown in Figure 6-70.

4. For a starting pinion bearing preload adjustment, use original pinion preload spacers. Place these spacers on pinion and hold pinion assembly in position in carrier. Oil front pinion bearing and place in position on pinion. Hold pinion in place and drive front pinion bearing over pinion until fully seated using Installer J-21005. See Figure 6-71.

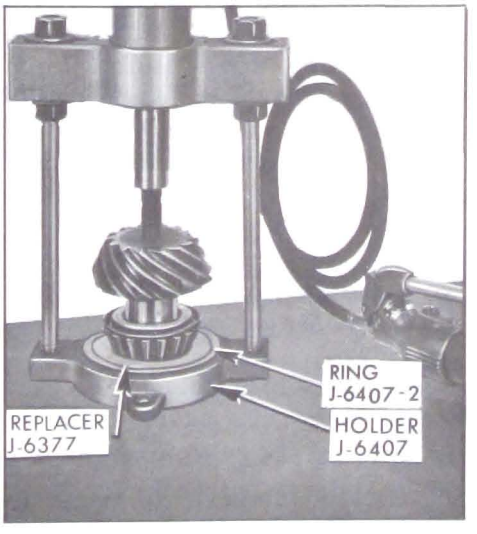


Fig. 6-70—Installing Rear Pinion Bearing

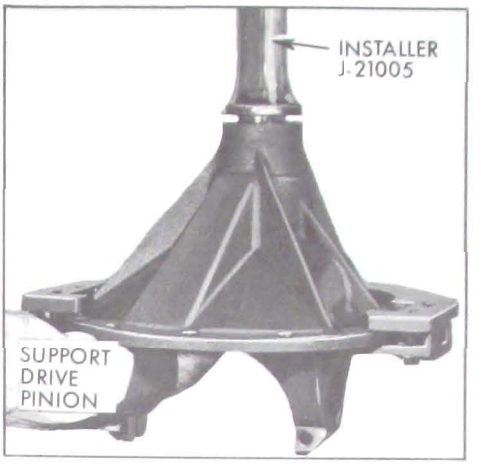


Fig. 6-71—Installing Front Pinion Bearing

5. Install new "O" ring seal on pinion. Coat O.D. of new pinion seal with sealing compound and install seal using Installer J-21005. See Figure 6-72.

6. Fill space between lips of oil seal with wheel bearing grease and apply a thin coat of the same

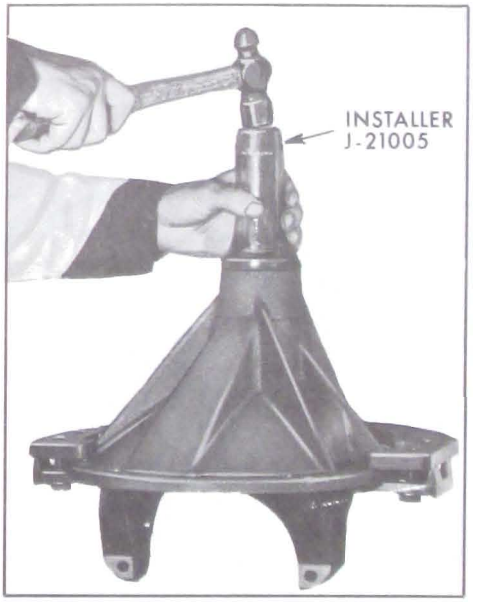


Fig. 6-72—Installing Pinion Seal

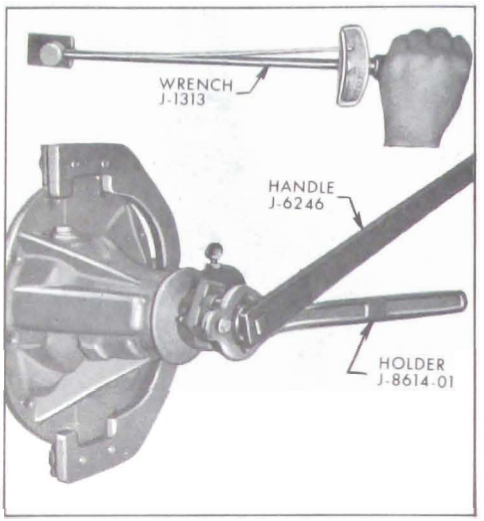


Fig. 6-73—Tightening Pinion Nut

grease on seal surface of pinion flange. Install pinion flange on pinion by tapping with a soft hammer until a few pinion threads project through the flange. Install pinion washer and nut. Hold pinion flange with Holder J-8614-01. (On 49000, hold pinion flange with Holder J-8614-01 and Adapters J-21619.) Torque pinion nut to 80 ft. lbs. using Torque Wrench J-1313 on outer end of Hnadle J-6246. (This amounts to an actual 250 ft. lbs. torque at nut.) See (Figure 6-73.)

7. Rotate pinion three or four times to seat bearings. Turn pinion slowly with an inch pound torque wrench; bearing preload

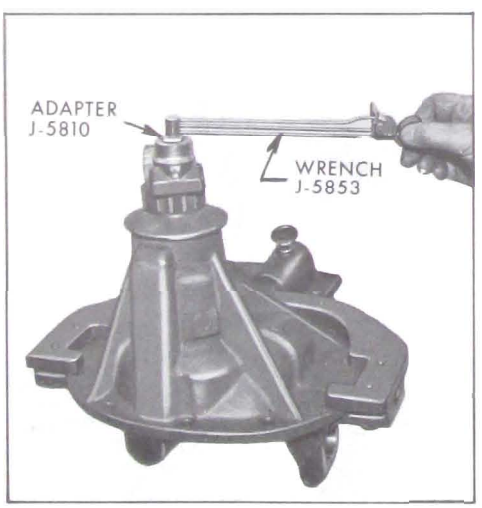


Fig. 6-74—Checking Pinion Bearing Preload

Fig. 6-75—Installing Differential Bearing Outer Race

including drag of new seal should be 15 to 35 inch pounds. See Figure 6-74.

If preload torque is low, reduce total pinion spacer thickness .001" for each added 10 in. lbs. preload needed; if preload is high, increase total pinion spacer thickness .001" for each 10 in. lbs. preload to be subtracted. These spacers are furnished to be used in pairs so that possible thicknesses range from .400" to .470" by thousandths. Service spacers are marked with their thickness in thousandths.

d. Assembly of Differential Case, Gears and Bearings

1. Drive differential bearing outer races into case, using Replacer J-9742. See Figure 6-75.

2. Install side gears, pinions, and washers in case. If same parts are used, replace in original sides. Install pinion axle. Drive

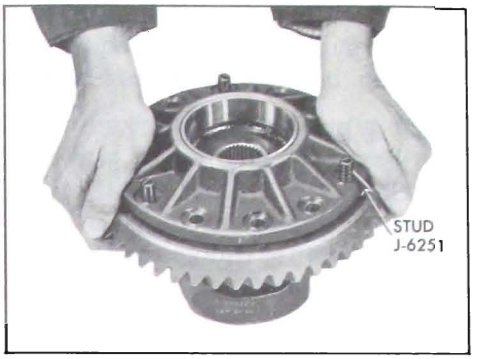


Fig. 6-76—Installing Ring Gear on Differential Case

spring pin through hole in pinion axle until flush with case.

3. Check matching numbers on ring gear and pinion to make sure the two parts have not been mixed with another gear set.

4. After making sure that mating surfaces of case and ring gear are clean and free of burrs, bolt ring gear to case using three Studs J-6251 to align parts. See Figure 6-76. If same ring gear and case are used, line up marks so they are assembled in same relative positions.

Do not use lock washers or any substitute bolts.

5. First tighten bolts alternately on opposite sides of the case to 35 ft. lbs. torque, then tighten in the same manner to 70 ft. lbs.

e. Installation and Adjustment of Ring and Case Assembly

1. Before installation of ring gear and case assembly make sure that differential bearing and bearing support surfaces in carrier pedestals are clean and free of burrs. Remove any burrs which might prevent bearings or bearing supports from seating properly.

2. Place case assembly and differential bearings in position in carrier. If same bearings are used, install in original positions. Insert Support Tools J-9743 through the pedestal bores into

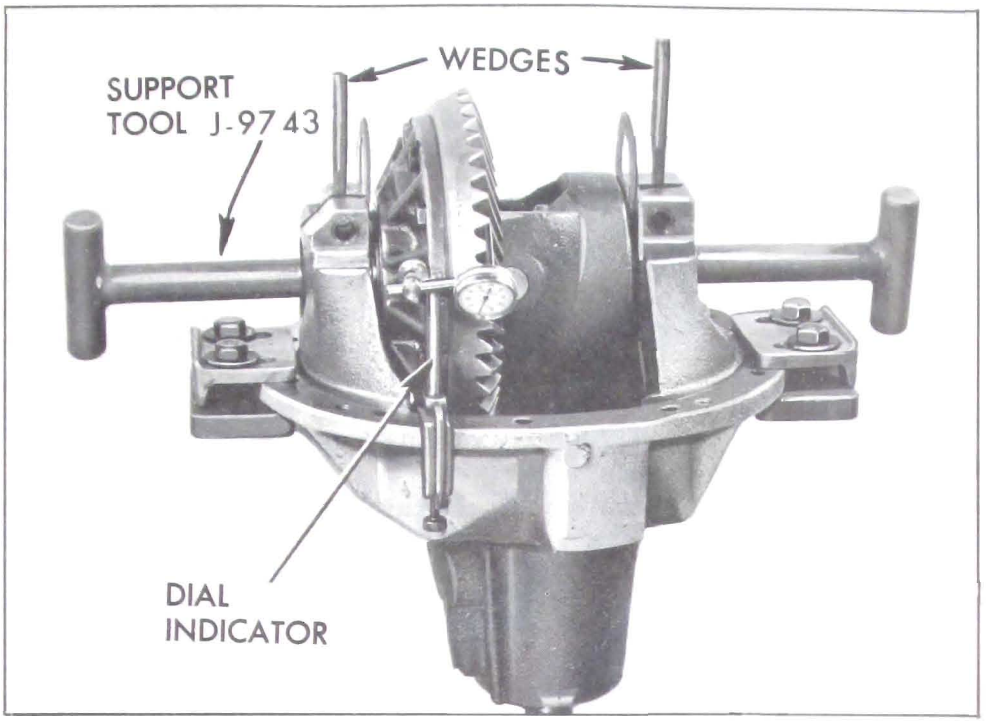


Fig. 6-77—Positioning Differential for Correct Backlash

the bearing inner races. Press tools toward each other to seat them, using hand pressure. If support tools are loose, install pedestal clamp bolts and nuts and tighten lightly until support tools can just be moved by twisting them. If support tools are too tight, loosen them as necessary by slightly wedging pedestals open with chisels. See Figure 6-77.

3. Rotate the differential assembly three or four times to seat bearing rollers, then manually adjust the whole assembly sideways to get .008" gear backlash. The assembly tools may be tapped lightly with a hammer to seat them. Check backlash as follows:

(a) Mount dial indicator as shown in Figure 6-78. Use a small button on indicator stem so that contact can be made near heel end of tooth. Set dial indicator so that indicator stem is as nearly as possible in line with gear rotation and perpendicular to the tooth surface. If stem bears against edge of tooth, or stem is at considerable angle to the line of gear rotation, or at a considerable angle to face of the tooth, a false indication of backlash will be obtained.

(b) Check gear lash at three or four points around ring gear. Lash must not vary more than .003" around ring gear. If lash varies over .003" check for burrs, uneven bolting conditions, or distorted case flange, and make necessary corrections.

CAUTION: Any gear lash check must be made with pinion locked to carrier to be sure it cannot turn.

(c) Adjust gear lash at the point of minimum lash to .008" for all new gears. If original gear set is being reinstalled, the original lash should be maintained.

4. Measure with a shim between each bearing and its pedestal. Do not remove support tools for measuring. Select shim that measures .002" thicker than largest shim that can be inserted for each side; this should preload each differential bearing .002". These shims are furnished to be used singly in thicknesses ranging from .040" to .082" by two thousandths. Service shims are marked with their thickness in thousandths.

5. Remove support tool farthest from ring gear, insert shim for that side, and replace support tool.

6. Place other shim in position for insertion. While keeping a heavy hand pressure on shim, spread carrier pedestals just enough to start shim, using Spreader J-6185.

CAUTION: Do not spread pedestals any farther apart than is absolutely necessary to push differential shim into position. If pedestals are sprung too far, they may take a permanent set. See Figure 6-79. Leave support tool in position until after shim is started to keep case assembly from dropping out of line.

7. Remove left assembly tool and push shim into final position. Center it first with fingers through pedestal bore, then with a support tool. Remove spreader tool and pedestal wedges.

8. Lubricate support bushings with hypoid gear lubricant. Drive

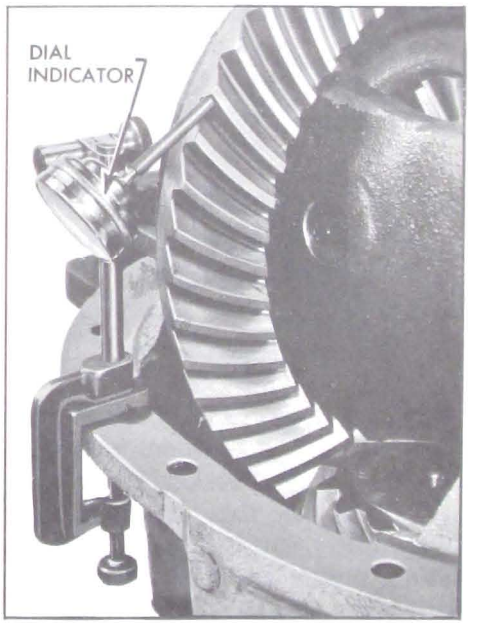


Fig. 6-78—Checking Backlash with Dial Indicator

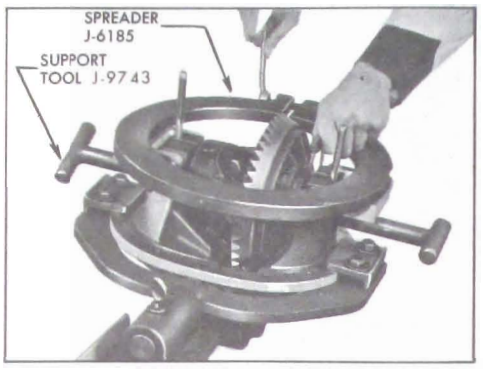


Fig. 6-79—Installing Differential Bearing Shims

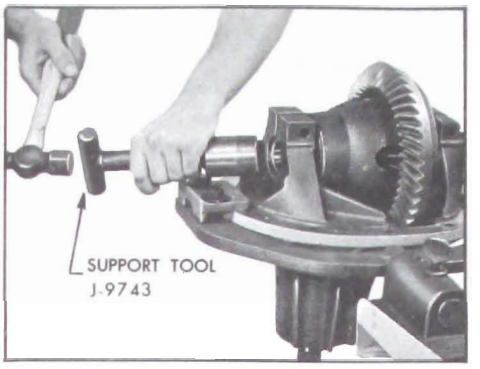


Fig. 6-80—Installing Differential Bearing Supports

each differential bearing support into its pedestal until seated solidly in the bearing, using Support Tool J-9743. See Figure 6-80. Tighten pedestal clamp bolts and nuts to 50 ft. lbs.

9. Recheck backlash as in Step 3. Final backlash must be .007"-.009" at point of minimum lash, with not more than .003" variation around gear.

10. Add lubricant and fill to level of filler plug opening to 1/4" below.

CAUTION: If the ring gear and pinion are changed only factory hypoid lubricant should be used for filling because of its special anti-scoring properties. For this reason the proper lubricant is included in the carton with the replacement gears as received from the Buick warehouses. See paragraph 1-9.

6-18 DESCRIPTION OF POSITIVE TRACTION DIFFERENTIAL

a. General Description

The Positive Traction (non-spin) Differential is optional equipment on all series Buicks. Its primary advantage is that it reduces the possibility of the car becoming stuck under adverse driving conditions. Unlike the conventional differential assembly, when one wheel is on a slippery surface the car will still move forward since both wheels tend to rotate at the same speed, allowing the wheel on dry surface to provide the necessary traction.

A secondary advantage of the Positive Traction Differential is that bumps do not adversely effect rear wheel action. During power application, with a conventional differential, when one rear wheel hits a bump and bounces clear of the road, it spins momentarily. When this rapidly spinning wheel contacts the road again, the sudden shock may cause the car to swerve. This is also hard on the complete drive train and tires. With a non-spin differential, the free wheel continues rotating at the same speed as the wheel on the road, thereby minimizing the shock and its resulting swerve.

The Positive Traction Differential consists of a different type of differential case assembly which is used in place of the conventional case assembly. All rear axle parts are identical.

b. Operation

The Positive Traction Differential has pinion gears and side gears which operate in a manner similar to those in a conventional differential. However, this unit has in addition clutch packs installed behind each side gear. These clutch packs are statically spring preloaded to provide an internal resistance to the differential action within the case itself. See Figures 6-81 and 82. This preload assures an adequate amount of pull when extremely low tractive conditions are encountered at one wheel such as mud, snow or wet ice. It also provides smooth transfer of torque when traveling over alternating tractive conditions at both rear wheels. In effect, the function of the preloaded clutch packs is to hold the side gears to the case which tends to hold the axle shafts together.

During application of torque to the axle, the initial spring loading of the clutch packs is supplemented by the gear separating forces between the side and spider gears which progressively increases the resistance in the differential. The unit therefore provides greater resistance under greater torque loads. This is not, however, a positive lock differential and it will release before excessive driving force can be applied to one rear wheel.

CAUTION: When working on a car with a Positive Traction Differential, never raise one rear wheel and run the engine with the transmission in gear. The driving force to the wheel on the floor may cause the car to move.

6-19 LUBRICATION OF POSITIVE TRACTION DIFFERENTIAL

The lubricant level should be checked every 6000 miles. Maintain level between the bottom of the filler plug opening and 1/4 inch below the opening by adding Special Positive Traction lubricant available through the GM Parts Department under Part #5786991. Never use lubricant other than this special lubricant or its equivalent, even for adding, or a severe clutch chatter may result when turning corners.

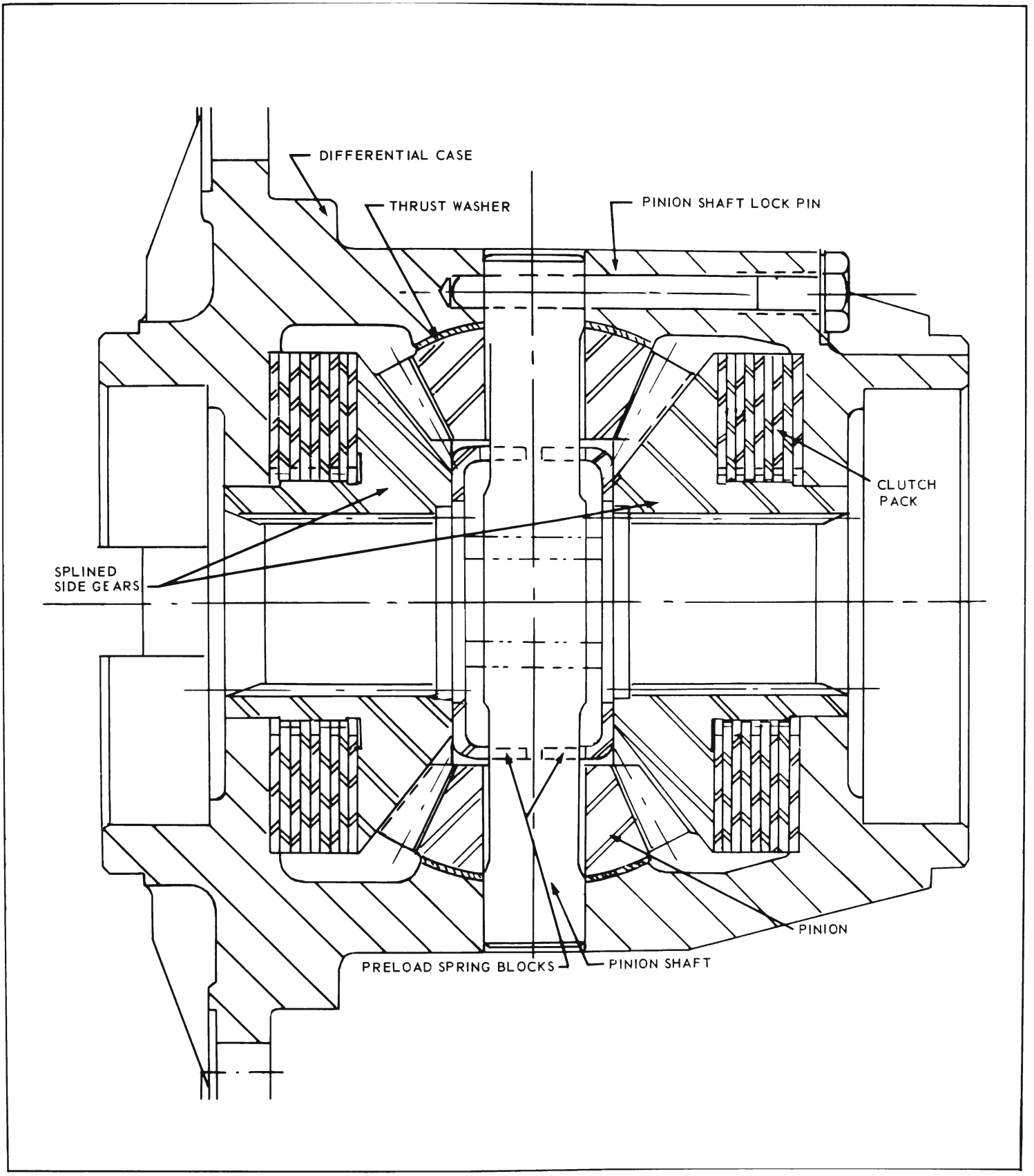


Figure 6-81—Positive Traction Differential

Positive Traction Differentials can be easily identified either by a stainless steel plate around the filler plug or by an X in a circle stamped on the bottom edge of the carrier housing flange. See Figure 6-83. However, if the wrong lubricant is accidentally added, it will be necessary to completely

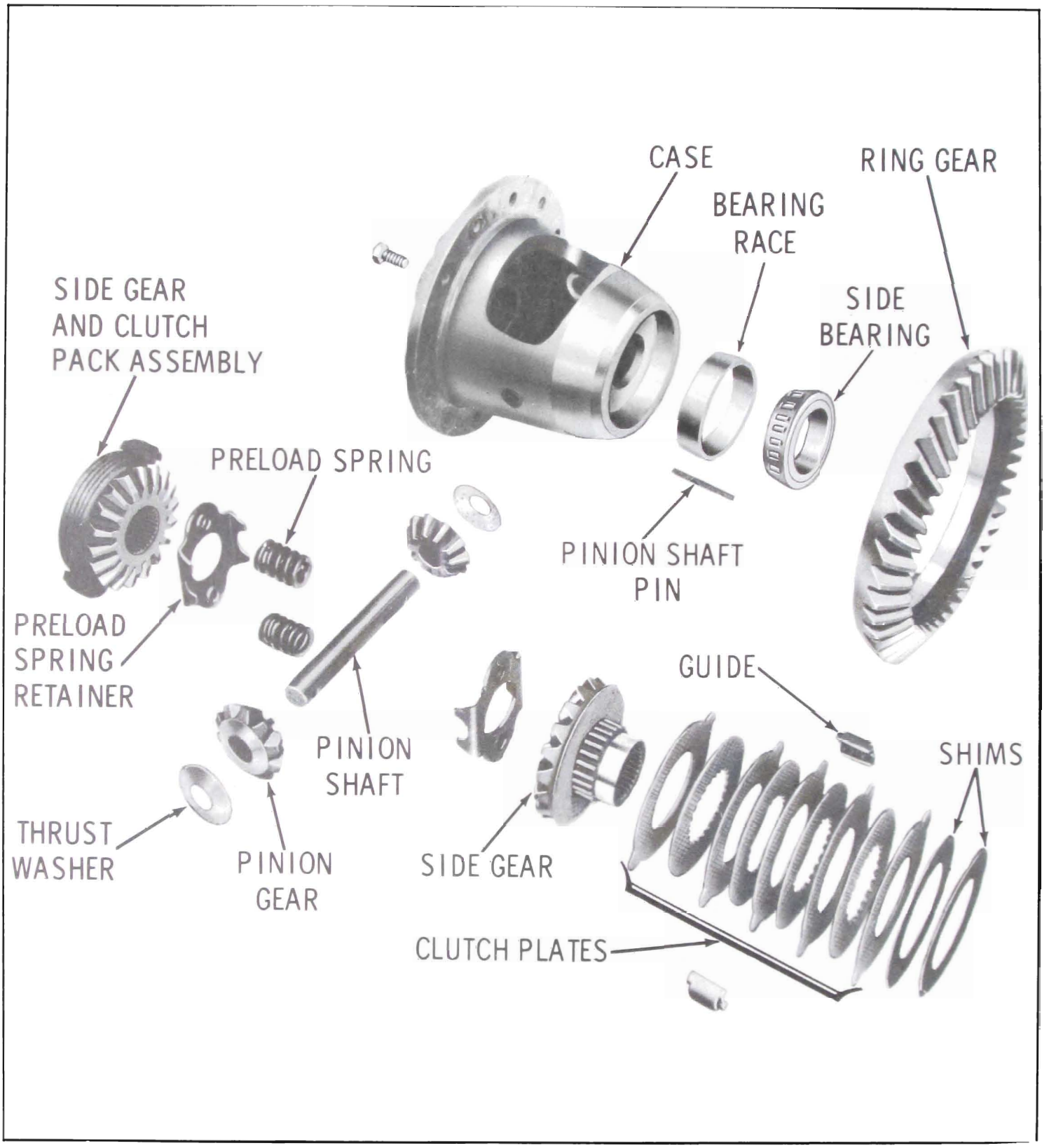


Figure 6-82—Positive Traction Differential—Exploded View

remove all lubricant, flush with light engine oil, and then fill with the special lubricant. Capacity of the rear axle housing is 4-1/2 pints.

6-20 POSITIVE TRACTION DIFFERENTIAL SERVICE PROCEDURES

All rear axle service procedures are the same in the Positive Traction rear axle as in a conventional rear axle, except for servicing the internal parts of the differential assembly. All rear

Figure 6-83—Identification of Positive Traction Differential Axle

axle parts outside of the differential such as the ring gear, differential side bearings, and axle shafts are the same in either rear axle assembly.

a. Disassembly of Differential

1. If ring gear or differential case is to be replaced, remove ring gear from case. Otherwise ring gear need not be removed.

2. If a differential bearing is to be replaced, pull bearing outer race from case using Remover J-6552 as shown in Figure 6-57.

3. Clamp case assembly in a brass jawed vise by ring gear or by case flange.

4. Remove pinion shaft lock screw and lock washer, then remove pinion shaft from case.

5. Remove the preload spring thrust blocks and spring from the case. See Figure 6-84.

6. Rotate side gears until the pinions are in the open area of the case. Remove the pinions and thrust washers.

7. Remove a side gear, clutch pack and shims from the case, noting location in the case to aid in reassembly. Remove the side gear clutch pack and shims from the opposite side.

8. Remove the clutch plate guides and separate the shims and clutch plates from the side gears.

NOTE: Keep the clutch plates in their original location in the clutch pack.

b. Cleaning and Inspection of Parts

1. Make certain that all differential parts are absolutely clean and dry.

2. Inspect cross shaft, pinions and side gears. Replace any parts which are excessively scored, pitted or worn.

3. Inspect clutch discs and plates for worn, cracked or distorted condition. If any of these defects exist, new clutch packs must be installed.

c. Assembly of Differential

1. If ring gear was removed, install ring gear on case flange using three Studs J-6251 as shown in Figure 6-76.

2. If a differential bearing outer race was removed, drive new race into case using Replacer J-9742 as shown in Figure 6-75.

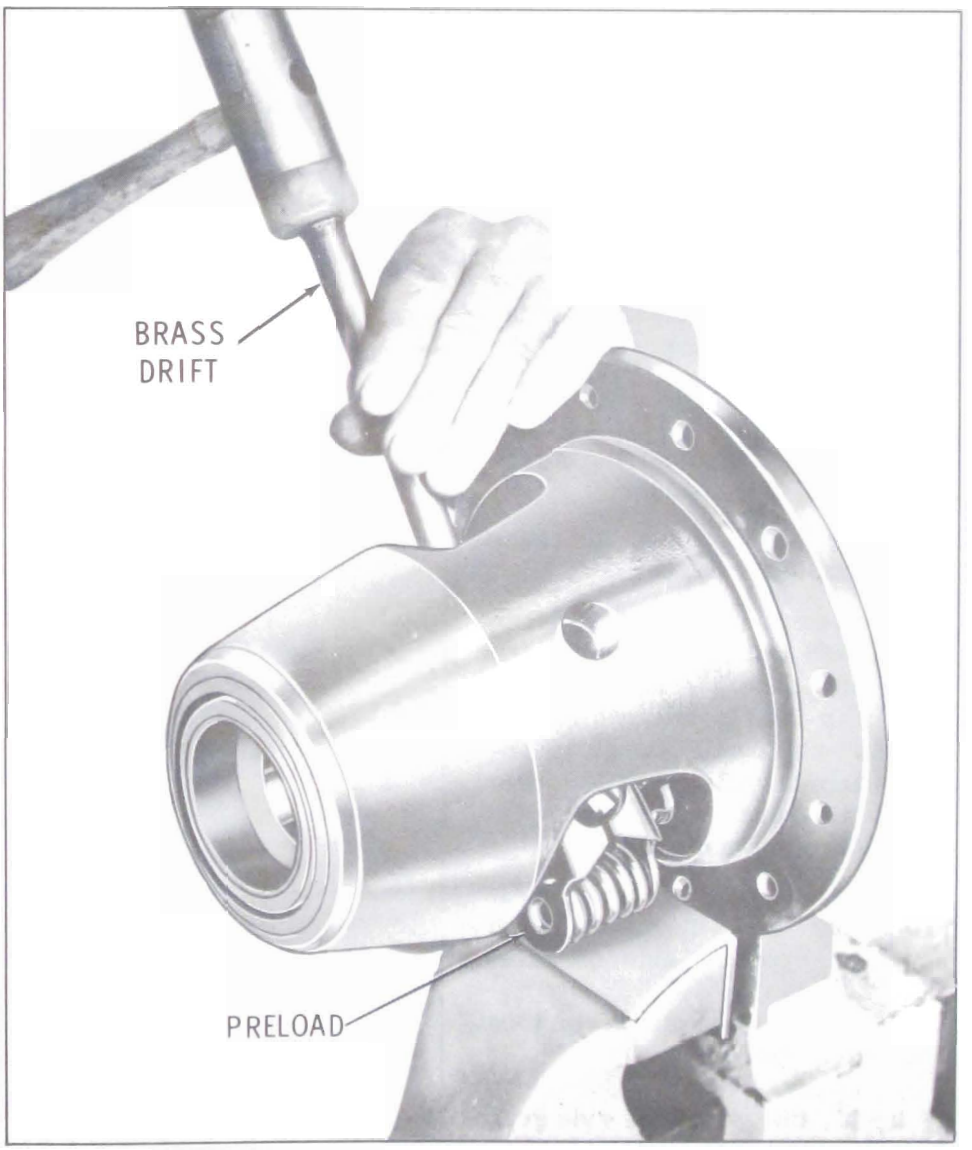


Fig. 6-84—Removing Preload Thrust Blocks and Springs

3. Apply Special Positive Traction Lubricant to the clutch plates.

4. Assemble the clutch packs as follows:

a. Alternately position nine clutch plates on the side gear, starting and ending with a clutch plate with the external lugs.

b. Install the two clutch guides over the clutch plate lugs.

c. Install the same shims which were removed or an equal amount on the clutch plate.

d. Repeat Steps a, b, and c on the other clutch pack.

5. Check the pinion to side gear clearance as follows:

a. Install one side gear with clutch pack and shims in the case.

b. Position the two pinion gears and thrust washers on the side gear and install the pinion shaft.

c. Compress the clutch stack by inserting a screwdriver or wedge between the side gear and the pinion shaft.

d. Install dial indicator with the contact button against the pinion gear. See Figure 6-85.

e. Rotate pinion gear. Clearance should be .001" to .006".

f. If clearance is more than .006", add shims between clutch pack and case. If clearance is less than .001", remove shims. A .002" shim will change clearance approximately .001". Recheck clearance after adding or subtracting shims.

g. Remove side gear and repeat procedure with opposite clutch pack, on opposite side of case.

6. Remove pinion shaft, pinions and thrust washers.

7. Install the remaining side gear and clutch pack with correct shims in the case.

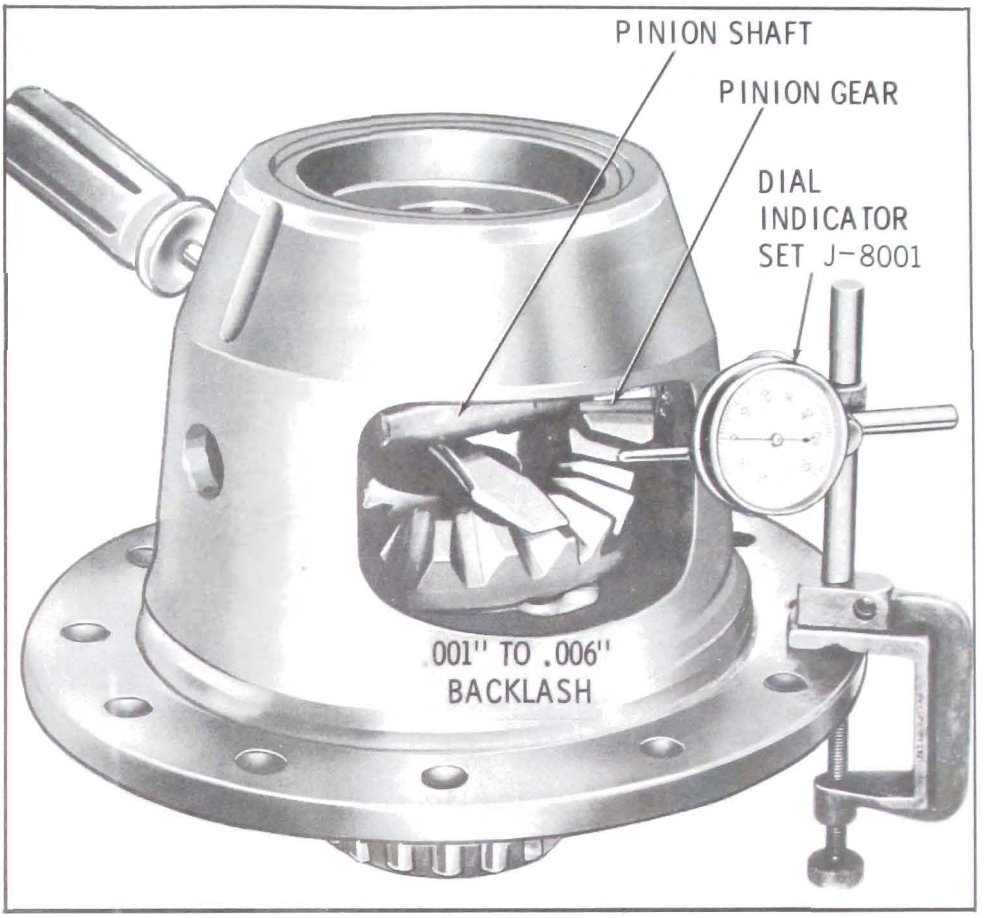


Figure 6-85—Checking Side Gear to Pinion Backlash

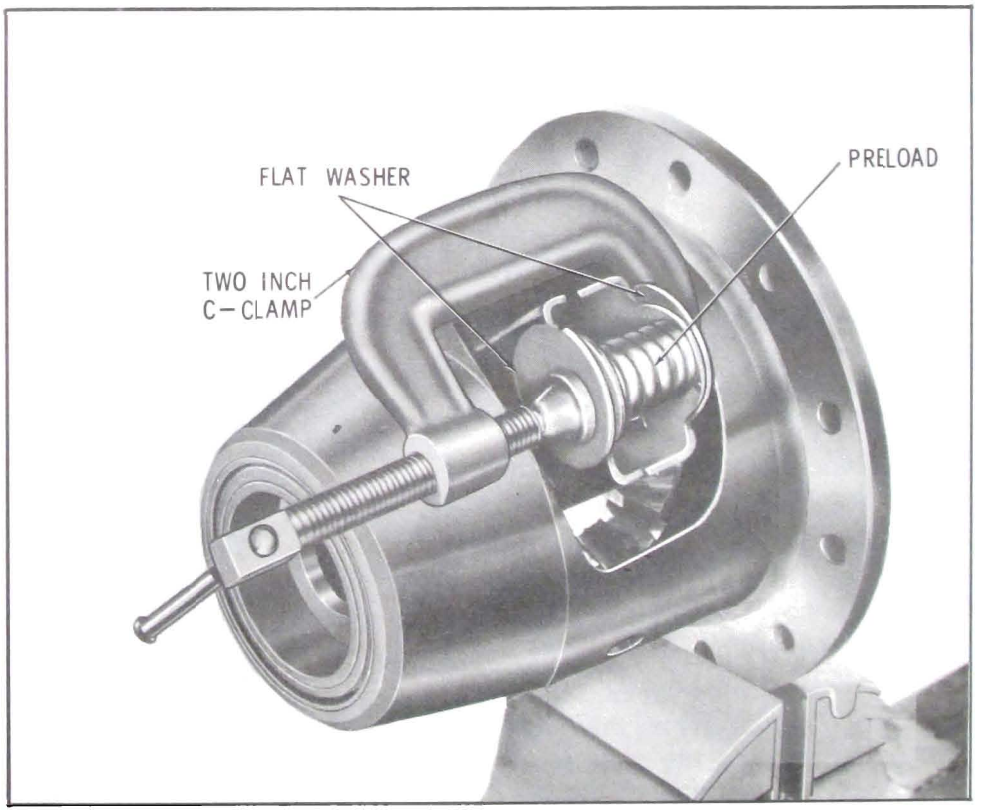


Figure 6-86—Compressing Preload Springs

8. Place the pinion gears on the side gears and rotate into correct position.

9. Compress the preload springs as shown in Figure 6-86 and install the preload thrust blocks and springs between the side gears.

10. Insert the thrust washers behind the pinion gears.

11. Install the pinion shaft and retain with the lock bolt. Tighten lock bolt 15 to 25 ft. lbs.

12. Check the side gear splined hole to be certain it is in line with the hole in the preload thrust blocks. The spring retainer can be moved slightly to correct misalignment.

d. Simple Procedure for Testing a Positive Traction Differential

If there is a doubt that a Buick is equipped with a Positive Traction Differential, or to determine if this option is performing satisfactorily, a simple test can be performed.

1. Place transmission in neutral.

2. Raise one wheel off floor and place a block of wood in front and rear of opposite wheel.

3. Remove wheel cover and install torque wrench with extension on lug nut.

4. Disregard breakaway torque and observe only torque required to continuously turn wheel smoothly. If torque reading is less than 30 ft. lbs., unit should be disassembled and repaired as required.