

# Drive Axles

## SUBARU 4WD

### Station Wagon (4WD)

Driving power is transmitted to the rear axle by ball spline type driveshafts with universal joints at both ends.

### DESCRIPTION

The rear axle assembly of the 4WD vehicle is a hypoid type with integral carrier housing. The pinion bearing preload adjustment is made by a selective spacer and washer. The differential side bearing preload and the pinion depth adjustment are made by shims.

### AXLE RATIO & IDENTIFICATION

All 4WD vehicles use one basic type rear axle assembly. To determine axle ratio, divide number of ring gear teeth by number of pinion teeth.

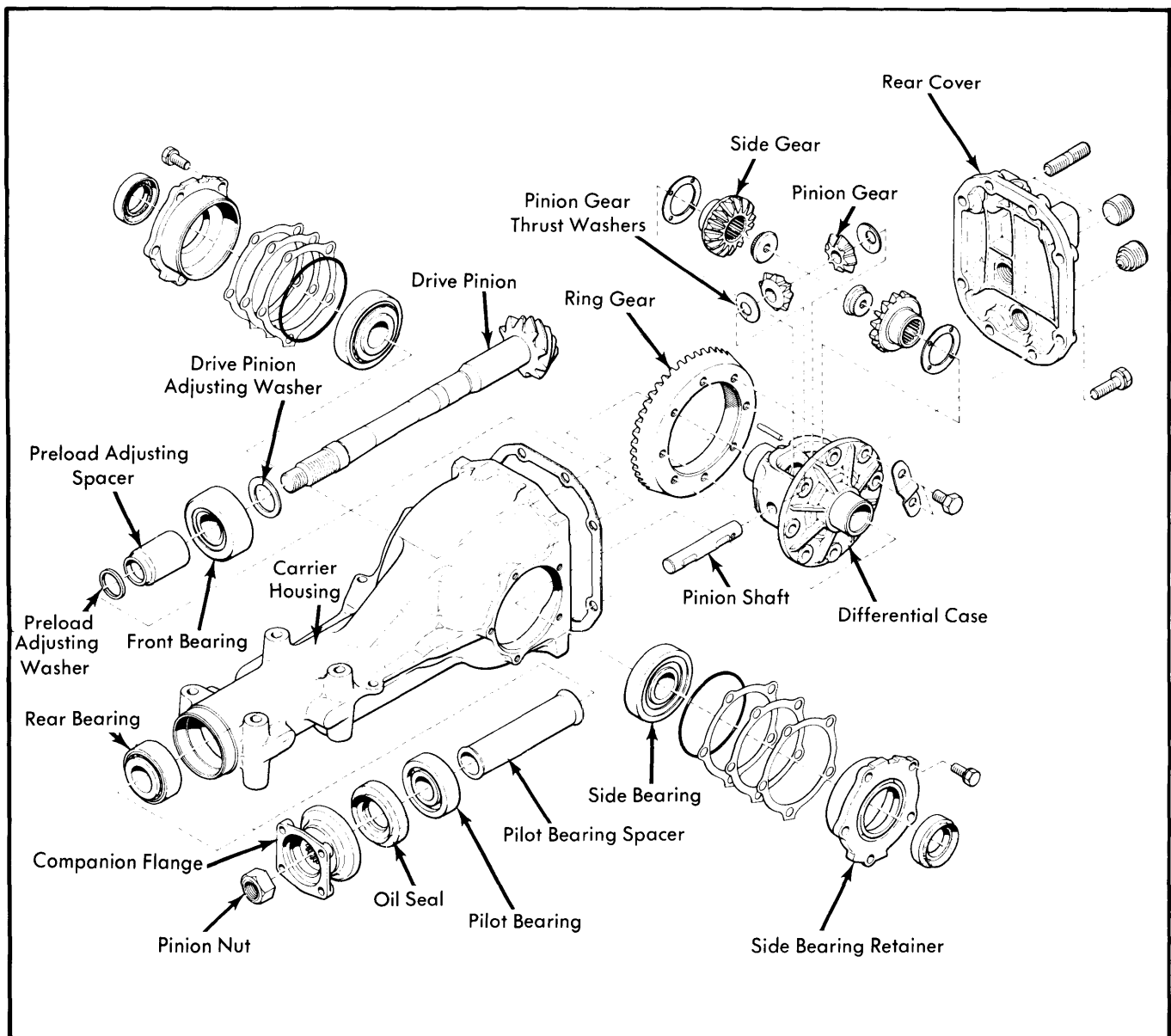


Fig. 1 Exploded view of Subaru 4WD Differential Assembly

## SUBARU 4WD (Cont.)

### REMOVAL & INSTALLATION

#### AXLE SHAFT & BEARINGS

**Removal** – 1) Raise and support the vehicle. Apply the parking brake or lock the front wheels with wheel blocks. Remove wheel, then loosen the axle nut, while applying foot brake.

2) Using chisel, relieve the staked portion of the axle nut. Apply oil around the thread and groove of axle shaft. Back off axle nut approximately .24" (6 mm), then tighten nut to original position. Repeat this operation several times so chips fall into shaft groove.

3) Disconnect drive shaft (rear) from rear axle companion flange. Apply foot brake and remove nut securing companion flange to spindle. **CAUTION** – Do not unstack this nut as the use of a chisel will damage the spindle thread. Take off companion flange.

4) Remove brake drum, spindle, outer seal, and bearing as a unit. Remove axle nut from spindle. Remove brake drum and outer seal. Press bearing from spindle.

5) Unlock link nut, then using suitable wrench (925350000), remove link nut and pull out inner oil seal. Using suitable press, remove inner and outer bearing race and bearing spacer from trailing arm housing.

**Installation** – 1) Using suitable bearing installation tool (925310000), press bearing inner race onto spindle until it reaches flange. Fit inner spacer and other bearing inner race onto spindle. Apply grease to each bearing.

2) Place outer side of trailing arm housing on a "V" block. Mount outer bearing race on suitable bearing installation tool (925310000) and press bearing into housing until seated. Fit outer spacer into housing, then press outer race of bearing (mounted on tool) into housing until seated.

3) Fit collar to housing and press until it touches outer race of bearing.

4) Apply grease on the outer spacer (installed in housing), then fit spindle to housing from outside. Place outer side of housing on "V" block. Use adequate means to prevent spindle from dropping.

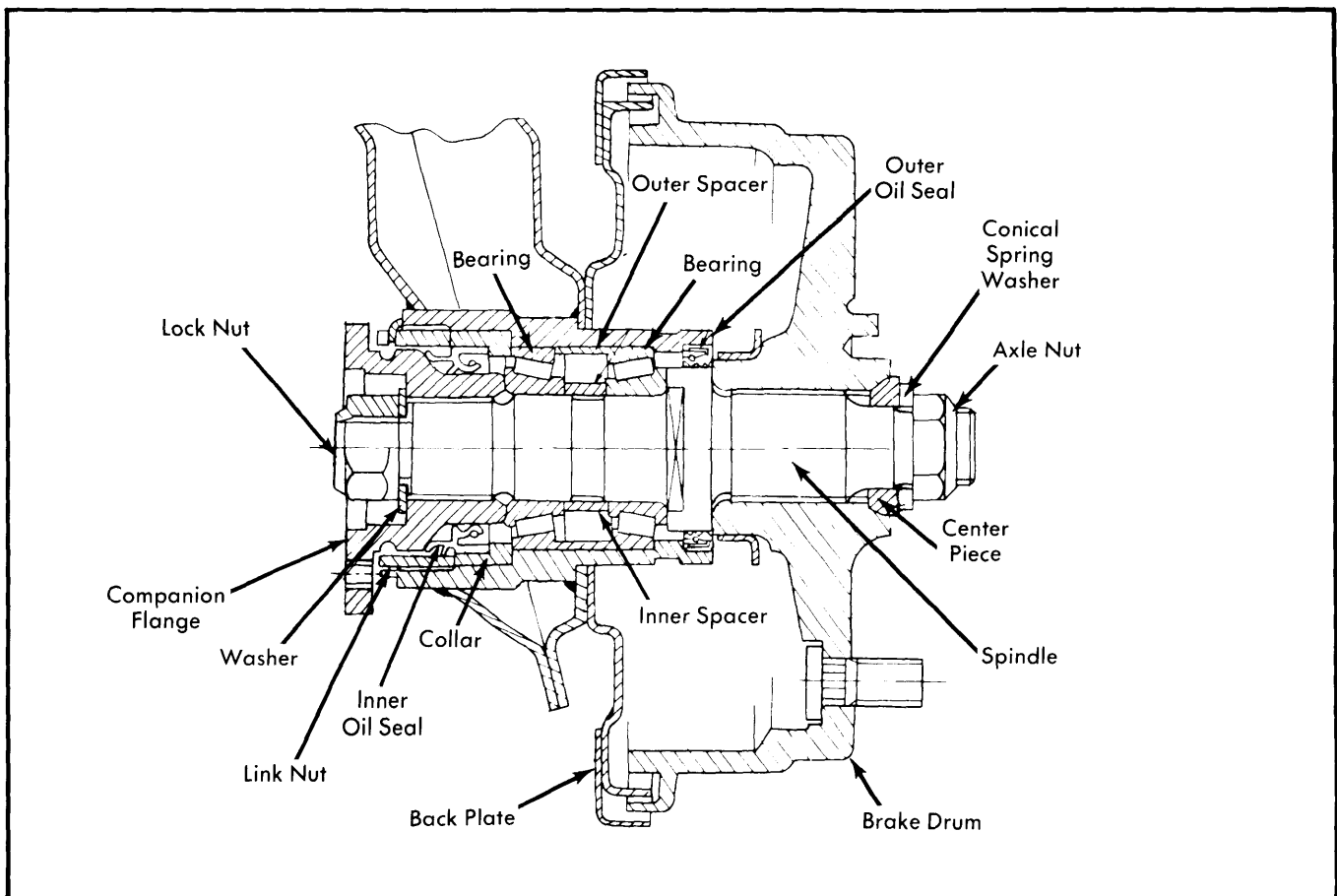


Fig. 2 Cutaway View of Subaru (4WD) Rear Axle Assembly

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5) Apply grease to oil seal lip and mount seal on the "I" marked side of suitable tool (925340000). Place tool and seal into housing and press down until seal is stopped by collar.

6) Turn trailing arm housing over in "V" block. Repeat the operation for the other oil seal, using the "O" marked end of the tool, and pressing seal into housing until seated.

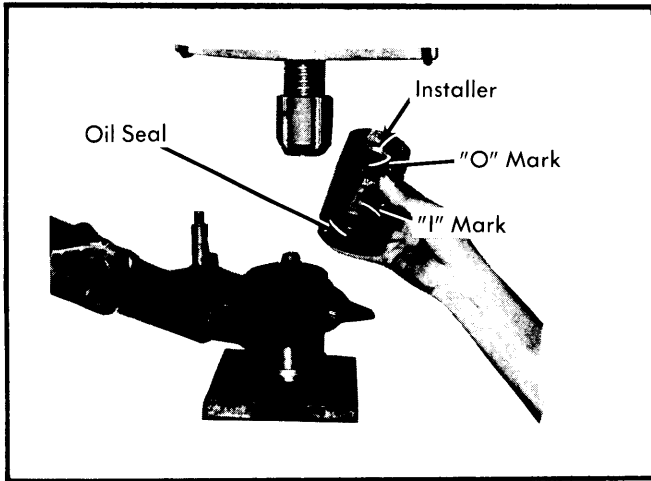


Fig. 3 Installing Oil Seal

7) Install remaining components in the reverse order of removal, noting the following: Tighten all nuts to specifications. **NOTE**— Apply foot brake while tightening nuts. Bleed brakes.

### DRIVE SHAFTS

**Removal & Installation** — Raise vehicle and support on safety stands. Disconnect drive shaft from axle shaft companion flange. Remove differential side yoke attaching bolt and lift out side yoke and drive shaft as an assembly. To install, reverse removal procedure and note the following: Use care when installing assembly to prevent damage to side yoke and oil seal. Tighten all bolts to specifications.

### PINION FLANGE & OIL SEAL

**Removal** — Drain gear oil from differential, then raise and support rear of vehicle. Disconnect propeller shaft from pinion flange. Measure and record turning torque of pinion flange. Hold pinion flange with suitable tool (398421600), then remove pinion nut. Extract pinion flange with suitable puller. Remove oil seal.

**Installation** — Apply chassis grease between oil seal lips, then install oil seal using suitable drift (398411600). Install pinion flange. Hold flange with suitable tool and tighten nut until turning torque is same as recorded before removal. Install the remaining components in reverse of disassembly procedures.

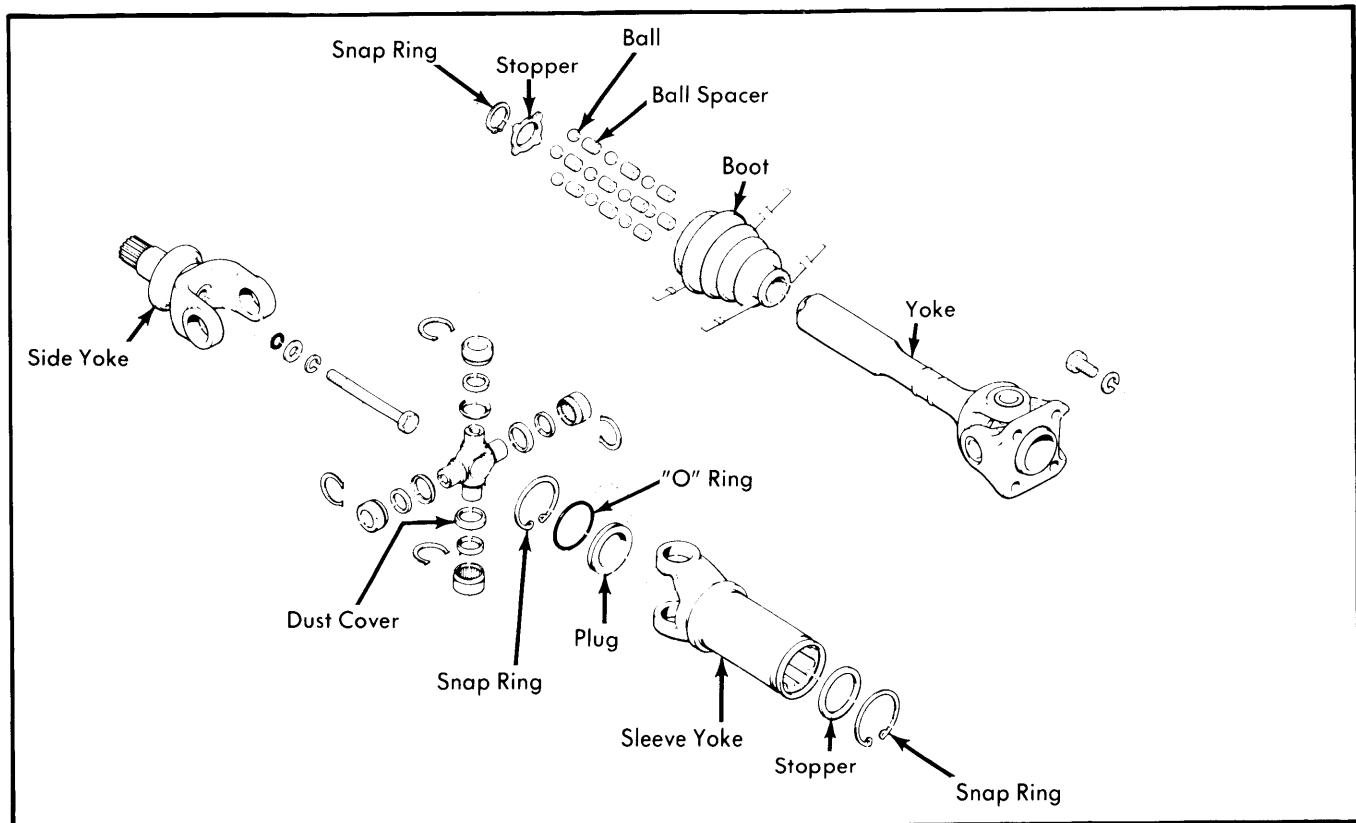


Fig. 4 Exploded View of Drive Shaft

## SUBARU 4WD (Cont.)

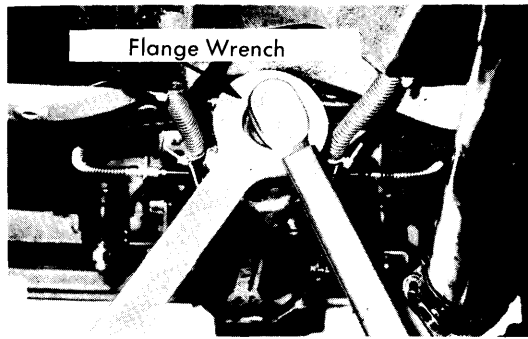


Fig. 5 Removing Drive Pinion Nut

### AXLE ASSEMBLY

**Removal** — Raise and support rear of vehicle. Drain gear oil. Remove exhaust pipe, muffler, propeller shaft and drive shafts. Support axle assembly with a jack, then remove nuts on mounting member. Remove two bolts retaining front end of differential carrier. Lower jack and remove axle assembly.

**Installation** — To install, reverse removal procedure and note the following: Tighten bolts to specification and fill unit with gear oil.

## OVERHAUL

### DRIVE SHAFT

**NOTE** — Drive shaft should be disassembled only to lubricate ball spline.

**Disassembly** — Remove drive shaft. Hold drive shaft in vice and remove rubber boot. Remove snap ring and stopper, then disassemble the ball spline. Remove snap ring, needle bearing, and universal joint.

**Inspection** — Check rubber boot and oil seals for damage and replace as necessary. Inspect drive shaft for straightness, cracks, damage and distortion. Replace drive shaft if ball spline portion is worn or damaged. Check drive shaft play at ball spline and free play of needle bearing. Maximum play of ball spline is .04" (1 mm).

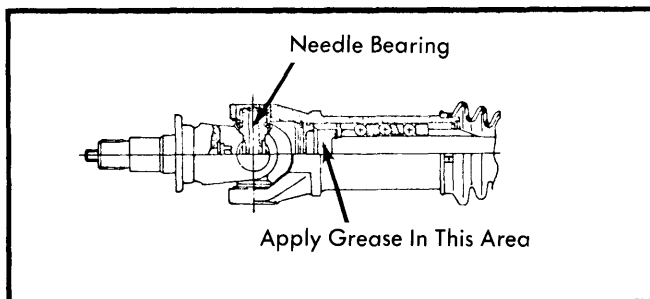


Fig. 6 Drive Shaft Grease Locations

**Reassembly** — To reassemble, reverse disassembly procedure and note the following: Apply grease to points shown in Fig. 6. Install rubber boot and adjust drive shaft length to 13.15" (334 mm). Adjust axial play to within .0008" (.02 mm) by selecting proper size snap ring. Tighten all bolts to specification.

### AXLE ASSEMBLY

**Disassembly** — 1) Mount axle assembly on suitable holding fixture, then remove axle assembly cover plate. Using suitable puller, remove side retainers. **NOTE** — Mark side retainers for reassembly reference; left and right retainers are not interchangeable. Remove differential case assembly from carrier.

2) If side bearings are to be replaced, remove bearing outer races from side retainers using a suitable puller.

3) Hold pinion flange stationary and remove pinion nut, then using suitable puller, remove pinion flange. Press drive pinion from carrier and remove rear bearing inner race, bearing spacer and adjusting washer.

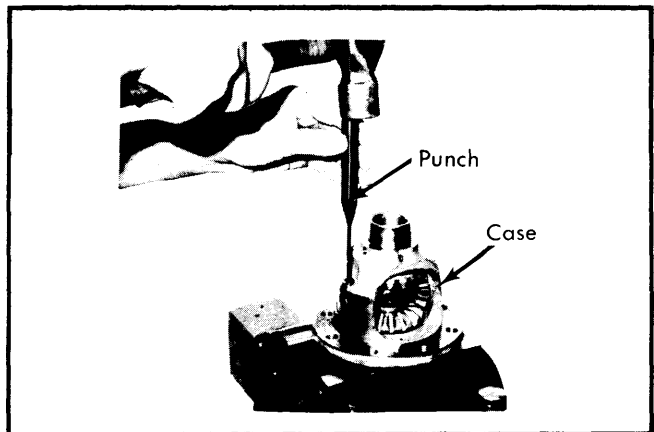


Fig. 7 Removing Lock Pin

4) Remove oil seal. Remove pilot bearing together with pilot bearing spacer and front bearing inner race. Press rear bearing inner race from drive pinion. Using suitable drift, remove front and rear bearing outer races.

5) To disassemble differential case, use suitable puller and remove side bearings. **NOTE** — Keep left and right side bearings separate, they are not interchangeable. Remove ring gear by unfolding lock strap and loosening bolts. Unstake pinion shaft lock pin and punch out pin from flange side.

6) Remove pinion shaft, pinion gears, side gears and thrust washers. **NOTE** — Mark gears and thrust washers for installation in their original position. Thoroughly clean and inspect all parts for wear or damage and replace as necessary.

## SUBARU 4WD (Cont.)

## REASSEMBLY &amp; ADJUSTMENT

**Differential Case Assembly** – 1) Assemble pinion gears, side gears and thrust washers in original positions in differential case. Fit pinion shaft to differential case so that it aligns with lock pin holes.

2) Adjust clearance between differential case and back of side gear to .004-.008" (.1-.2 mm) by selecting proper thrust washer. Thrust washers are available in the following sizes: .030-.032" (.75-.80 mm), .032-.034 (.80-.85 mm), and .034-.036" (.85-.90 mm).

3) Install pinion shaft lock pin and lock in place on both sides. Apply gear oil to gear tooth surface and thrust surfaces and make sure gears rotate smoothly.

4) Install ring gear on differential case and install bolts and new lock washers.

**NOTE** – Tighten ring gear bolts diagonally while tapping around bolt heads with a hammer.

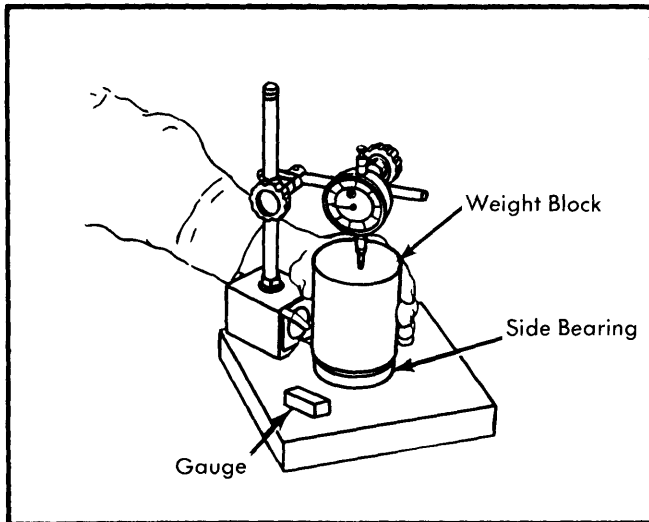


Fig. 8 Measuring Side Bearing Width

5) When replacing side bearings, measure bearing width by using a weight block of approximately 5.5 lb. (2.5 kg). Standard bearing width is .787" (20 mm). Press side bearing inner race onto differential case and bearing outer race into side retainers. Install new oil seal on side retainer and apply grease to cavity between seal lips.

**Drive Pinion Bearing Preload Adjustment** – 1) Press front and rear bearing outer races into carrier. Install dummy pinion shaft (389501600) with rear bearing and pinion depth washer into the carrier.

**NOTE** – If ring and pinion gear tooth contact pattern show normal pattern, reuse original washer.

2) Install preload adjusting spacer and washer, front bearing inner race, dummy collar (398501600), companion flange and

nut onto dummy shaft. Do not install oil seal. Rotate pinion by hand until it is seated.

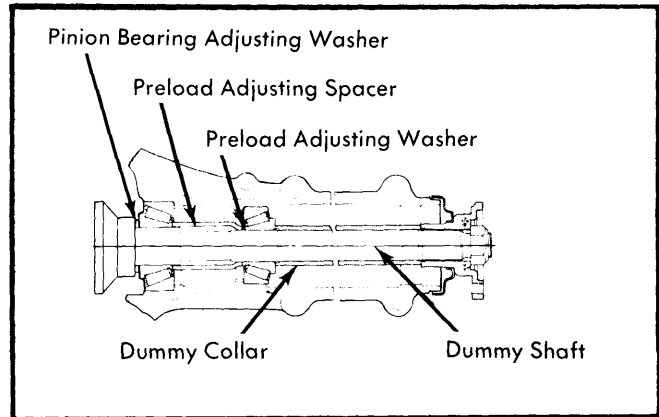


Fig. 9 Installing Dummy Shaft

3) Tighten nut to specified torque. **CAUTION** – Do not exceed specified preload torque. Using an inch pound torque wrench, check rotating torque of pinion shaft. If preload is not within specification, select the correct washer and spacer so that specified preload is obtained when nut is tightened to correct torque.

**NOTE** – Spacers are available in lengths from 2.213" (56.2 mm) to 2.252" (57.2 mm) in increments of .008" (.20 mm) and washers are available in thicknesses from .1020" (2.59 mm) to .0909" (2.31 mm) in increments .008" (.20 mm).

**Drive Pinion Gear Installed Height** – Leave dummy drive pinion shaft installed (See Preload Adjustment) and install height gauge (398501600). Measure clearance between end of pinion gear head and height gauge using a feeler gauge. Determine the thickness of the pinion height adjusting washer to be installed, using the following formula:

$$T = To + N - (H \times .01) + (D \times .01) + (S \times .01) - .20$$

**NOTE** – Formula values are given in Millimeters.

**T** = Thickness of adjusting washer needed.  
**To** = Thickness of washer temporarily installed.  
**N** = Clearance between gauge and dummy shaft.  
**H** = Figure marked on drive pinion head.  
**D** = Figure marked on dummy shaft.  
**S** = Figure marked on height gauge.

**NOTE** – If there is no mark on gauge (S), it means that figure is zero.

2) After determining the correct thickness of required pinion height adjusting washer, remove dummy shaft and height gauge. Install pinion height adjusting washer on drive pinion, then press rear bearing inner race into position with suitable tool (398511600).

## SUBARU 4WD (Cont.)

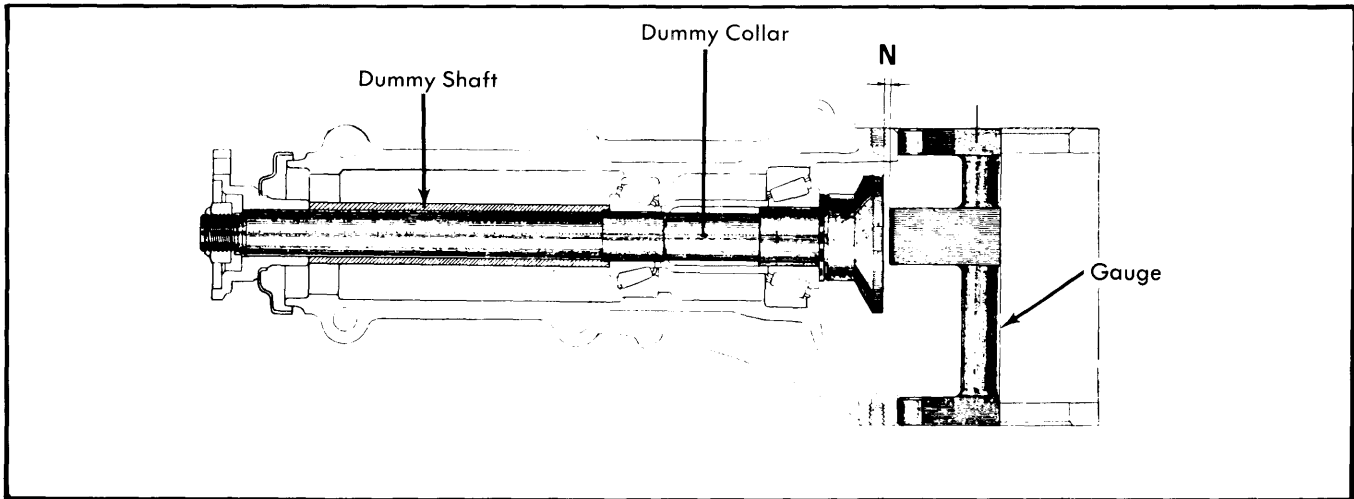


Fig. 10 Measuring Drive Pinion Gear Installed Height

3) Insert drive pinion into gear carrier. Install previously selected preload adjusting spacer, washer, oil seal, companion flange, and pinion nut. Tighten pinion nut to specification.

$$T_1 \text{ (Left)} = (A+C+G - D - E+H) \times .01 + .76 \text{ (mm)}$$

$$T_2 \text{ (Right)} = (B+D+G - F - H) \times .01 + .76 \text{ (mm)}$$

$T_1$  = Required thickness of left side retainer shim.

$T_2$  = Required thickness of right side retainer shim.

A & B = Figure marked on gear carrier.

C & D = Figure marked on differential case.

E & F = Difference in width of left or right bearing.

G = Figure marked on side retainer.

H = Figure marked on drive gear.

**NOTE** – If the figure is not marked, regard as zero.

2) Install differential case assembly into differential carrier in reverse order of disassembly. Fit selected shims and "O" ring on the side retainer and install retainers in carrier with arrow pointing as shown in Fig. 12.

3) Measure drive gear-to-drive pinion backlash. If reading is not within specification, correct by decreasing the shim thickness on one side and increasing the shim thickness on other side the same amount. Total shim thickness must be the same to maintain proper preload.

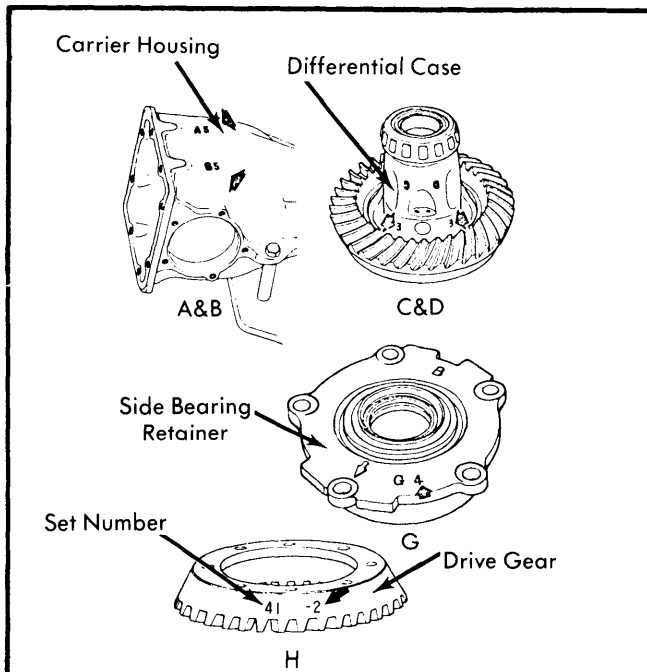


Fig. 11 Location of Markings

**Side Bearing Preload** – 1) Use the following formula to obtain the proper thickness of left and right side retainer shims.

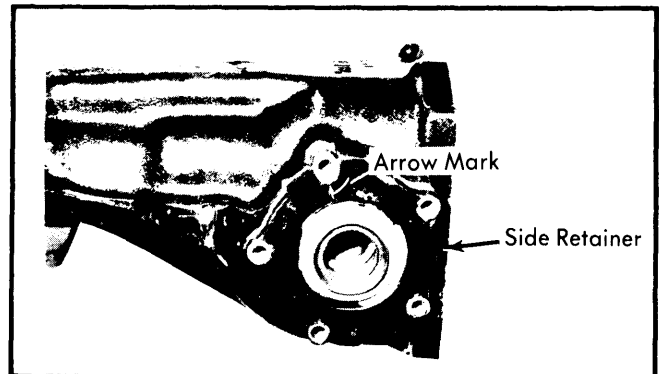


Fig. 12 Aligning Side Retainer

# Drive Axles

## SUBARU 4WD (Cont.)

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Pinion Nut .....	123-145 (17-20)
Ring Gear-to-Case Bolts .....	51-58 (7-8)
Side Yoke Retaining Bolt .....	14-19 (1.9-2.6)
Rear Cover Bolts .....	14-19 (1.9-2.6)
Front Carrier Mounting Bolts .....	58-72 (8-10)
Rear Carrier Mounting Bolts .....	43-51 (6-7)
Propeller Shaft Flange Bolts .....	13-18 (1.8-2.5)
Companion Flange Bolts .....	13-18 (1.8-2.5)

### AXLE ASSEMBLY SPECIFICATIONS

Pinion Bearing Preload	
New Bearing .....	.51-.72 Ft. Lbs. (7-10 mkg)
Used Bearing .....	.22-.43 Ft. Lbs. (3-6 mkg)
Side Bearing Clearance .....	.004-.008" (.1-.2 mm)
Drive Gear-to-Pinion Backlash ..	.004-.008" (.10-.20 mm)