

# Drive Axles

## DATSUN INTEGRAL HOUSING (I.R.S.)

810 Sedan  
280Z

### AXLE RATIO & IDENTIFICATION

All Datsun models with Independent Rear Suspension (I.R.S.), use one basic type rear axle assembly. Any differences in Removal & Installation or Overhaul procedures will be noted where they occur. To determine axle ratio, divide number of ring gear teeth by number of pinion teeth.

### DESCRIPTION

The axle assembly is the hypoid gear type with integral carrier housing. The pinion bearing preload adjustment is made with a spacer and washer between the front and rear bearing cones. The differential side bearing preload and the pinion depth adjustment are made by shims. Driving power is transmitted to the rear axle by ball spline type driveshaft with universal joints at both ends.

### REMOVAL & INSTALLATION

#### AXLE SHAFT & BEARINGS

**Removal** — Raise and support vehicle and remove wheel and brake drum. Disconnect driveshaft from axle shaft outer flange. Remove wheel bearing lock nut while holding axle

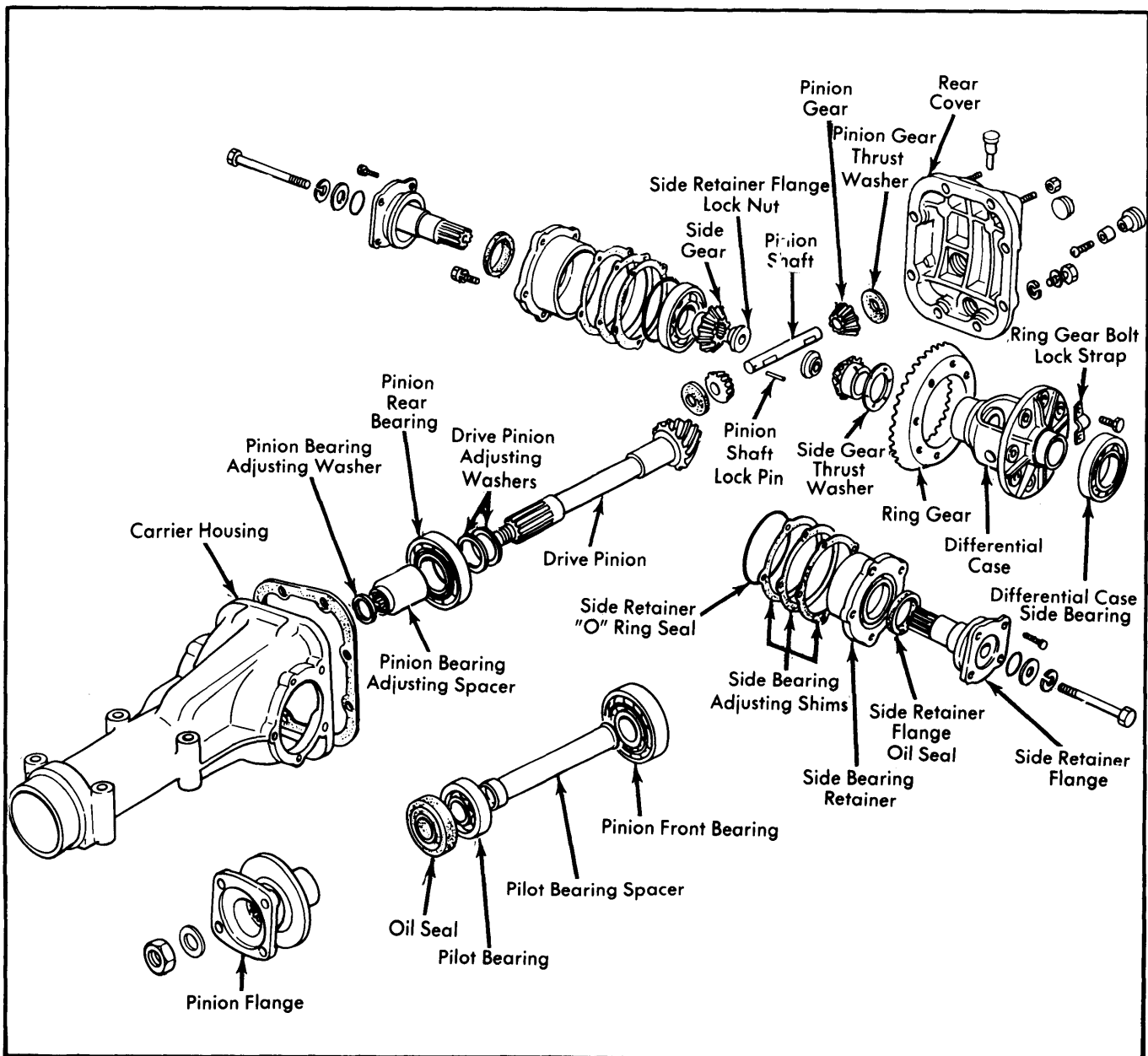


Fig. 1 Exploded View of Datsun Integral Rear Suspension (I.R.S.) Differential Assembly

## DATSUN INTEGRAL HOUSING (I.R.S.) (Cont.)

shaft outer flange stationary. Using suitable axle stand (KV40101000) and slide hammer, remove axle shaft. Remove wheel bearing spacer, companion flange and bearing washer, then remove inner wheel bearing and oil seal. Press or pull outer bearing from axle shaft.

**NOTE** — Do not reuse bearings or grease seal after removal.

**Installation** — To install, reverse removal procedure and note the following: Clean and inspect all parts for wear or damage and replace as necessary. Grease wheel bearings and housing before installation. When installing bearings ensure outer bearing is installed with seal towards wheel and that inner bearing is installed with seal facing differential. A mark A, B or C (280Z) or N, M or P (810) is stamped on axle housing. Ensure that bearing spacer with same mark is installed. Tighten all bolts and nuts and adjust wheel bearings.

**Wheel Bearing Adjustment** — After tightening wheel bearing lock nut to specification, check that axle shaft end play is .006" (.15 mm) or less. Check that turning torque of axle shaft is less than 1.8 lbs. (.8 kg) at hub bolt. If either adjustment is not to specification, disassemble axle shaft assembly and replace bearing spacer.

### DRIVE SHAFTS

**Removal & Installation** — Raise and support rear of vehicle 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: Exercise care when installing assembly to prevent damage to side yoke and oil seal. Tighten all bolts to specifications.

**NOTE** — Manual transmission 280Z uses flanges on both ends instead of a removable yoke with single retaining bolt on inner end.

### PINION FLANGE & OIL SEAL

**Removal** — Drain gear oil from differential, then raise and support rear of vehicle. Disconnect propeller shaft from pinion flange, then if necessary, remove muffler, insulator and exhaust tube mounting bolts to free them from car body. Hold pinion flange and remove pinion nut, then use puller to remove flange. Remove oil seal.

**Installation** — To install, reverse removal procedure and note the following: Apply suitable grease between seal lips before installation. Tighten pinion nut to specifications and ensure pinion bearing preload is correctly adjusted. Fill differential to proper level with gear oil.

### AXLE ASSEMBLY

**Removal** — Raise and support rear of vehicle. On 280Z, remove main muffler and loosen front side transverse link inner bolts. Support axle assembly on a jack, then remove nuts on both ends of axle assembly rear mounting member. Remove front mount attaching bolts, then lower assembly on jack and remove from vehicle.

**NOTE** — On 810 models, support suspension member on a stand to prevent damage to insulators. On 280Z, remove front mounting damper and front differential mounting insulator.

**Installation** — To install, reverse removal procedure and note the following: Install same size mounting spacer between axle

assembly and front mount. Tighten all nuts and bolts to specifications and fill assembly to correct level with gear oil.

**NOTE** — On 280Z, tighten transverse link inner bolts after installing wheels and with car on ground in standard load position. Differential front insulator must be installed with arrow towards front.

## DRIVE SHAFT OVERHAUL

### DISASSEMBLY

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

Remove universal joint from differential end of drive shaft. Remove snap ring from sleeve yoke plug and remove plug. Compress drive shaft and remove snap ring from stopper, then remove stopper. Disconnect boot and separate drive shaft carefully so as not to lose balls and spacers.

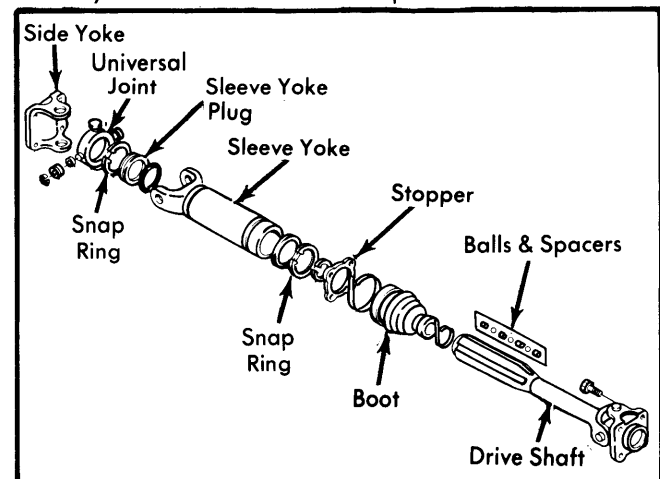


Fig. 2 Exploded View of Drive Shaft Assembly

### INSPECTION

Check rubber boot and oil seals for damage and replace as necessary. Inspect drive shaft for straightness, cracks, damage and distortion and replace drive shaft if necessary. Check all other drive shaft components for wear, damage and distortion and replace complete drive shaft assembly if any faulty part is found. Check drive shaft play as shown in illustration and replace complete assembly if play exceeds .004" (1 mm).

**NOTE** — Measurement should be taken with drive shaft fully compressed.

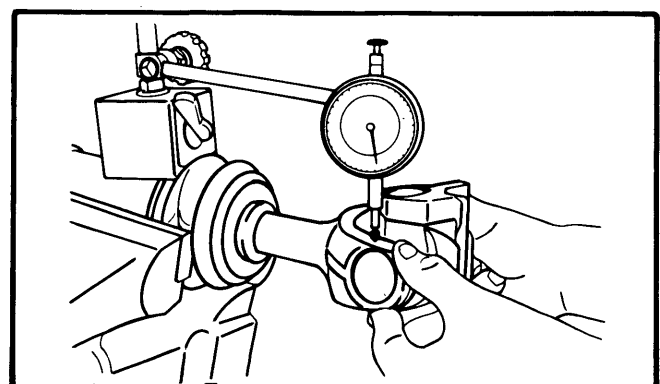


Fig. 3 Measuring Play in Drive Shaft

## DATSUN INTEGRAL HOUSING (I.R.S.) (Cont.)

### REASSEMBLY

To reassemble, reverse disassembly procedure and note the following: Align yokes and ensure steel balls and spacers are installed in correct order. Adjust axial play of universal joint to standard length of 13.54" (344 mm)  $\pm$  .001" (.02 mm) between journals by use of snap rings of equal thickness on opposite ends of yoke sleeve. Seven different snap ring thicknesses are available from .0587" (1.49 mm) to .0657" (1.67 mm). Apply grease to ball grooves and oil grooves and about 1 1/4 ozs. (35 g) in the bottom end of the sleeve yoke.

### AXLE ASSEMBLY OVERHAUL

#### DISASSEMBLY

1) Mount differential carrier assembly in holding fixture and remove rear mounting member and cover plate. Record backlash readings at several points around ring gear for use during assembly. Remove retainer bolts and pull side retainers from case with puller (810 and 280Z A/T). Retainers and shims must be marked for reassembly since they are not interchangeable. On 280Z with Manual Transmission, pry side flanges out while holding with hand to prevent them from jumping out of carrier. Remove bearing cap bolts and bearing caps. Mark carrier, caps and bearing outer races so they may be reinstalled in original position. On all models, extract differential case from carrier. If side bearings are to be replaced on 810 or 280Z A/T models, remove side bearing outer race from retainer using suitable puller.

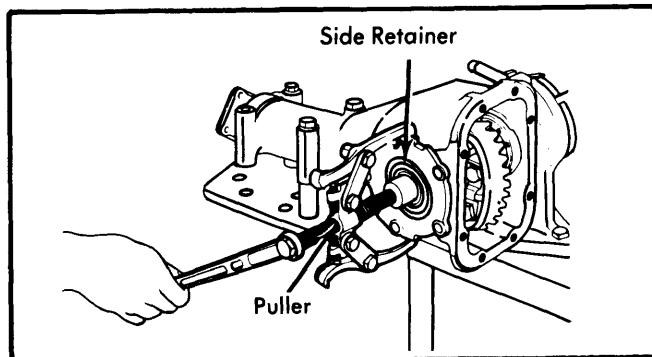


Fig. 4 Removing Side Retainer (810 and 280Z A/T)

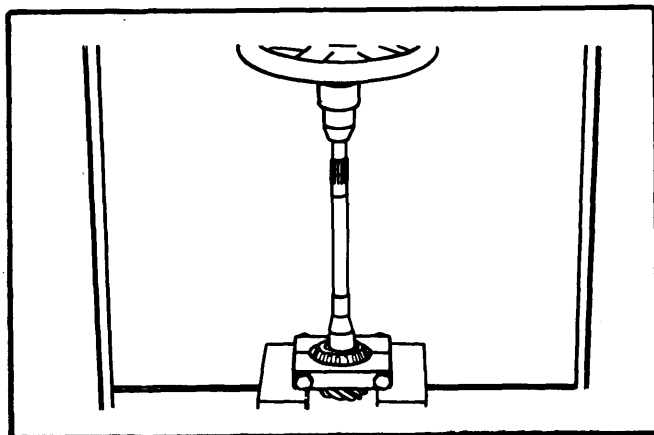


Fig. 5 Removing Pinion Gear Bearing Inner Race

2) 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 washers. 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 a drift, remove front and rear bearing outer races.

3) 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. Punch off pinion shaft lock pin from ring gear side, then 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 repair or replace as necessary.

#### REASSEMBLY & 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. Adjust side gear-to-pinion gear backlash or adjust clearance between rear face of side gear and thrust washer. Install pinion shaft lock pin and lock in place with punch.

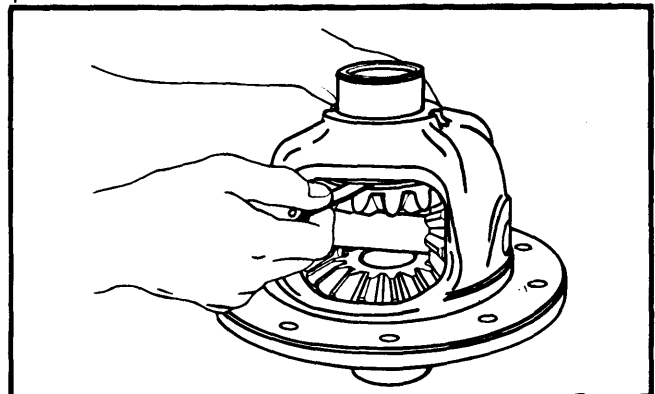


Fig. 6 Measuring Side Gear Clearance

2) Apply gear oil to gear tooth surface and thrust surfaces and ensure gears rotate smoothly. 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.

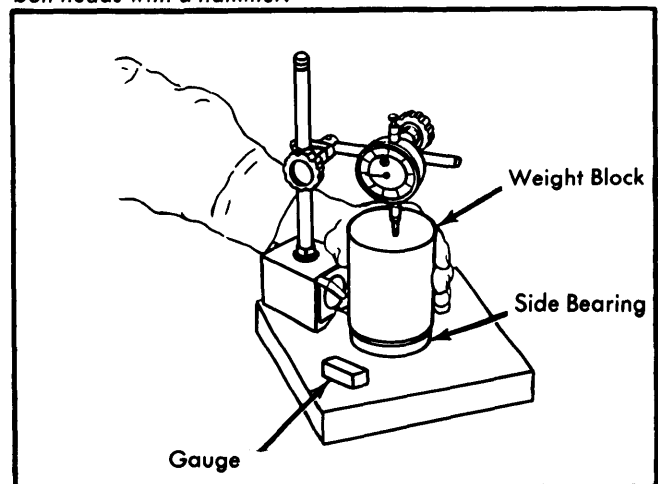


Fig. 7 Measuring Side Bearing Width

## DATSUN INTEGRAL HOUSING (I.R.S.) (Cont.)

3) When replacing side bearings, measure bearing width with a .787" (20 mm) gauge and a 5.5 lb. (2.5 kg) weight block. The manual transmission 280Z differential (without removable side bearing retainers) uses bearings .827" (21 mm) wide. Bearing width should be slightly smaller than gauge. Press fit side bearing inner race on differential case and side 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) Install front and rear bearing outer races into carrier. Install dummy pinion shaft (ST31212000 - 810 and 280Z A/T; KV38100110 - 280Z Manual Trans.) with rear bearing and original pinion depth washer between bearing and pinion head. If ring and pinion gear contact pattern was NOT correct at time of disassembly, use new pinion depth washer .122" (3.09 mm) thick.

2) Install pinion bearing preload spacer and washer, front bearing cone, drive pinion dummy collar (ST31214000 - 810 and 280Z A/T; KV38100130 - 280ZM/T), companion flange, and nut onto dummy shaft. Do not install oil seal at this time. Tighten nut to specified torque. If pinion shaft can not be turned by hand during entire process of tightening nut, replace preload spacer and washer with thicker ones. Spacers are available in six different lengths and washers in 15 different thicknesses.

3) Using an inch pound torque wrench, check rotating torque of pinion shaft. If preload is not within specification, install thicker adjusting washer to decrease preload torque or thinner washer to increase preload torque.

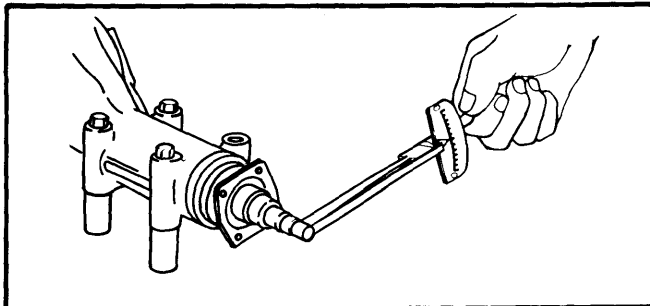


Fig. 8 Checking Drive Pinion Bearing Preload

**Drive Pinion Gear Installed Height** - 1) Leave dummy drive pinion shaft installed (as described under Preload Adjustment) and install height gauge (ST31211000 - 810 and 280Z A/T; KV38100120 - 280Z M/T) in bearing bores of carrier. Measure clearance between end of pinion gearhead and height gauge using feeler gauge. Thickness of drive pinion height adjusting washer can be determined by one of the following formulas:

$$\begin{aligned} 810 \text{ and } 280Z \text{ A/T} & \quad T = W + N - [(H - D' - S) \times .01] - .2 \\ 280Z \text{ M/T} & \quad T = N - (H - D \times .01) + 3.0 \end{aligned}$$

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

- T = Thickness of adjusting washer needed.
- W = 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 values signifying H, D, and S are not given, regard them as zero.

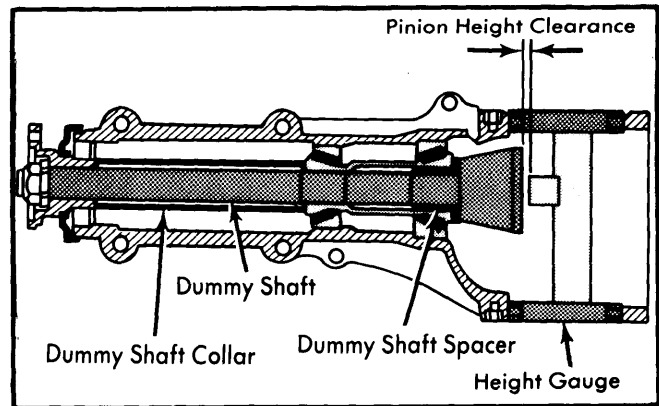


Fig. 9 Measuring Drive Pinion Gear Installed Height

2) After determining correct thickness of required pinion height adjusting washer, remove dummy shaft and height gauge. Fit correct pinion height adjusting washer on drive pinion gear and press fit rear bearing inner race. Lubricate pinion bearings then install drive pinion gear, pinion bearing spacer and washer, pilot bearing race, pilot bearing spacer, pilot bearing and oil seal. Install pinion flange and tighten pinion nut to specified torque.

**Side Bearing Preload** - 1) Required thickness of left and right side retainer shims can be obtained by the following formulas:

$$\begin{aligned} 810 \text{ \& } 280Z \text{ A/T} & \quad T_1 = (A + C + G_1 - D) \times .01 + .76 - E \\ & \quad T_2 = (B + D + G_2) \times .01 + .76 - F \\ 280Z \text{ M/T} & \quad T_1 = (A - C + D - H') \times .01 + E + 2.05 \\ & \quad T_2 = (B - D + H') \times .01 + F + G + 1.95 \end{aligned}$$

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

- T<sub>1</sub> = Required thickness of left side retainer shim.
- T<sub>2</sub> = 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<sub>1</sub> & G<sub>2</sub> = Figure marked on left or right retainers.
- G = Thickness difference from standard (8.10 mm) spacer.
- H' = Variation figure marked on ring gear.

**NOTE** - If values signifying A, B, C, D, G<sub>1</sub>, and G<sub>2</sub> are not given, regard them as zero.

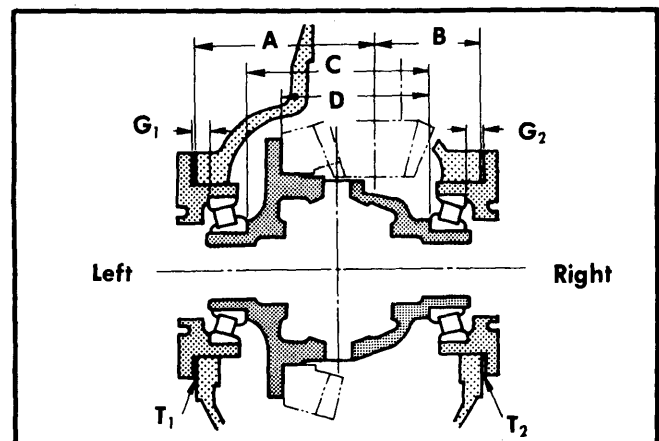


Fig. 10 Side Bearing Preload Formula Values

# Drive Axles

## DATSUN INTEGRAL HOUSING (I.R.S.) (Cont.)

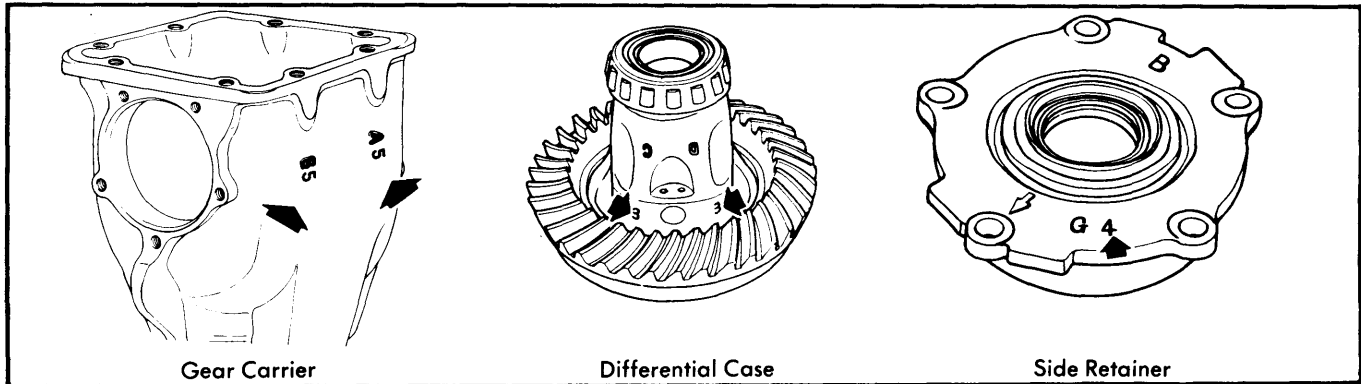


Fig. 11 Side Bearing Preload Identification Marks (810 and 280Z A/T Shown)

2) On 810 and 280Z A/T models, install differential case assembly in gear carrier in reverse order of disassembly. Fit correct shims and "O" ring seal in both side retainers in carrier. Arrow should point as shown in Fig. 12.

3) On 280Z M/T models, install differential case assembly with side bearing outer races into gear carrier. Insert side bearing washers and drive in spacer between right side washer and housing. Align marks on bearing cap and carrier and install bolts. Tighten to specifications.

**NOTE** — Use care in installing spacer to avoid tilting side bearing outer race.

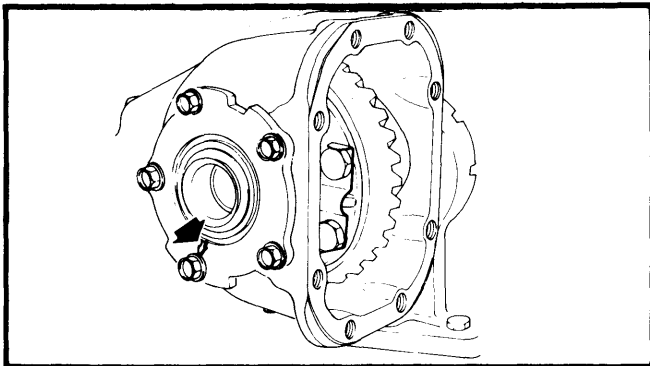


Fig. 12 Aligning Side Retainer During Installation

4) Using dial indicator, measure ring gear-to-drive pinion backlash and adjust if necessary. Check side bearing preload, and adjust if necessary by adding or removing side retainer shims. **NOTE** — If side bearing preload is readjusted, ring

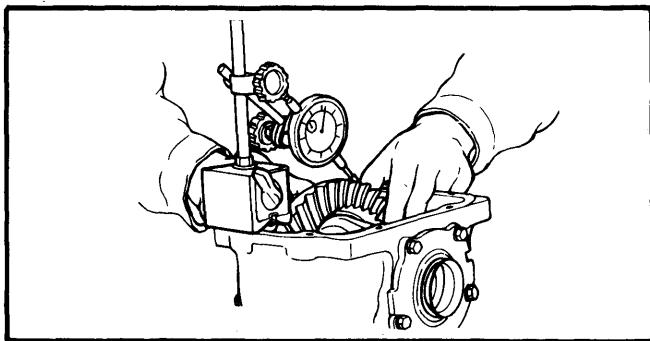


Fig. 13 Measuring Ring Gear Backlash

gear-to-drive pinion backlash must be checked and adjusted if necessary.

**Final Inspection & Assembly** — After all adjustments are to specifications, make tooth contact pattern test and make any necessary corrections. See *Gear Tooth Contact Pattern at beginning of this section*. Install rear cover and tighten nuts to specifications. Refill axle assembly to correct level with gear oil.

### AXLE ASSEMBLY SPECIFICATIONS

Application	Measurement
Pinion Bearing Preload	INCH Lbs. (cmkg)
Without Oil Seal .....	8.7-11.3 (10-13)
With Oil Seal .....	9.5-15.0 (11-17)
Ring Gear-to-Pinion Backlash	In. (mm)
280Z M/T .....	.005-.007 (.13-.18)
810 & 280Z A/T .....	.004-.008 (.10-.20)
Side Gear Backlash .....	.004-.008 (.10-.20)

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Rear Wheel Bearing Nut .....	181-239 (25-33)
Driveshaft Flange Bolts	
810 & 280Z A/T .....	23-31 (3.2-4.3)
280Z M/T .....	36-43 (5.0-6.0)
Pinion Flange to Propeller Shaft Flange	
810 .....	17-24 (2.4-3.3)
280Z .....	25-33 (3.5-4.5)
Rear Cover Bolts 810 & 280Z A/T .....	14-19 (1.9-2.5)
280Z M/T .....	12-17 (1.6-2.4)
Rear Cover to Mounting Member	
810 & 280Z A/T .....	65-72 (9.0-10.0)
280Z M/T .....	43-51 (6.0-7.0)
Drive Pinion Nut	
810 & 280Z .....	123-145 (17-20)
280 Z M/T .....	137-159 (19-22)
Ring Gear Bolts	
810 & 280Z A/T .....	65-72 (9.0 10.0)
280Z M/T .....	43-51 (6.0-7.0)
Side Bearing Retainer Bolts	
(810 & 280Z A/T) .....	6.5-8.7 (.9-1.2)
Side Bearing Cap Bolts (280Z M/T) .....	65-72 (9.0-10.0)