## DATSUN INTEGRAL HOUSING

**280ZX**
**810 Sedan**
**4-WD Pickup (Front Axle)**

### 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.

### AXLE RATIO & IDENTIFICATION

One basic type of axle assembly is used in these Datsun models. Differences exist in ring gear diameter used between model application. The R180 (180 mm ring gear) is used as rear axle assembly in all 810 sedans, all automatic transmission 280ZX and 2-seater 280ZX with manual transmission. The R180 is also used as the front axle in all 4-WD pickups. The R200 (200 mm ring gear) is used in all 280ZX Grand Luxury and 2+2 models with manual transmission. To determine axle ratio, divide number of ring gear teeth by number of drive pinion gear teeth.

### REMOVAL & INSTALLATION

#### FRONT AXLE DRIVE SHAFTS & BEARINGS (4-WD PICKUP)

NOTE – *To remove locking hub, refer to Locking Hubs article in this Section, then proceed with removal procedure. Ensure locking knob is set to "Lock" before removal.*

**Removal – 1)** Raise and support vehicle; remove tire and wheel. Disconnect hydraulic line at brake caliper and remove caliper assembly. Remove locking hub cover retaining screws and remove cover. Remove drive clutch snap ring and drive clutch. Remove rebound bumper and stabilizer bar-to-lower link bolt. Remove axle shaft-to-differential carrier bolts and remove axle shaft. (To ease removal, turn steering wheel in opposite direction).

**2)** Remove knuckle arm-to-knuckle bolt. Loosen (DO NOT remove) upper and lower ball joint castellated nuts to within 3 threads of stud end. Separate ball joints from spindle using remover (ST29020001). Jack up lower link, then remove ball joint castellated nut. Separate knuckle from upper and lower links.

**3)** Using a screwdriver, pry up lock washer tab. Remove wheel lock nut with remover (KV40102500). Remove and discard lock washer, then remove special washer. Push wheel bearing support out of wheel hub, then separate hub from knuckle using a puller. Remove bearing collar from spindle.

**4)** Drive out inner wheel bearing and grease seal by tapping outer race with brass drift and hammer. Separate hub and rotor. Remove outer wheel bearing by tapping hub assembly against block of wood to shift bearing position, then remove bearing with bearing removal tool. Remove grease seal. Remove drive shaft bearing from bearing support with a drift.

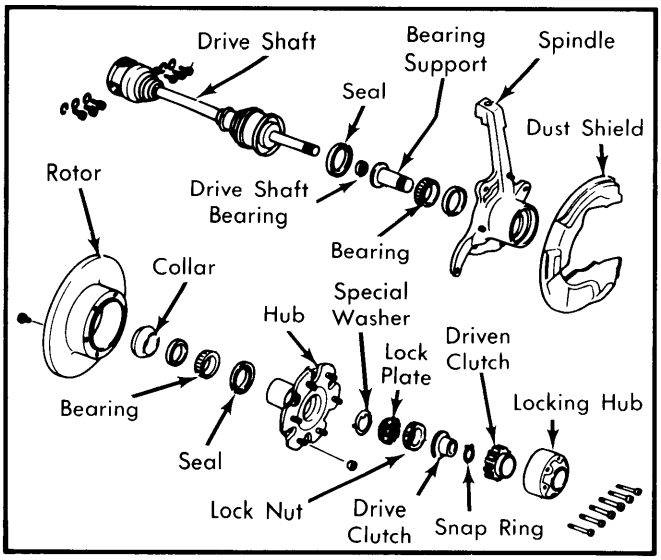


*Fig. 1 Exploded View of 4-WD Pickup Front Axle*

**Installation – 1)** To install, reverse removal procedure and note the following: Coat bearings and seals with suitable grease and ensure seals are installed properly. Install same bearing collar that was removed, or use new bearing collar of same number. Always use new lock washer.

**2)** Tighten lock nut to 108-145 ft. lbs. (15-20 mkg) and turn hub several times in both directions to seat bearings. Attach a spring gauge to wheel stud and check that wheel bearing preload is 2.2-9.5 lbs. (1.0-4.3 kg). If preload is higher than specified, replace bearing collar with a thicker collar (increase stamped number by 1). If preload is lower than specified, replace bearing collar with a thinner collar (decrease stamped number by 1). Repeat procedure until correct preload is obtained.

**3)** When bearing preload is correct, bend lock washer tab up into lock nut groove and install hub and knuckle assembly. Before installing locking hub cover, adjust axle shaft end play to .004-.012" (.1-.3 mm) by using a snap ring of proper thickness. Snap rings are available in 5 thicknesses from .043-.075" (1.1-1.9 mm) in .008" (.2 mm) increments.

#### REAR AXLE DRIVE SHAFTS & BEARINGS (EXCEPT 4-WD PICKUP)

**Removal – 1)** Raise and support vehicle; remove tire and wheel. On 810 models, remove brake drum; on 280ZX models, disconnect hydraulic line at caliper and remove caliper and disc. Disconnect drive shaft from axle shaft outer flange. Remove differential side yoke attaching bolt. Remove wheel bearing lock nut while holding drive axle shaft outer flange stationary.

NOTE – *280ZX models with R200 differential use flanges on both ends instead of a removable yoke with single retaining bolt on inner end.*

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

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## DATSUN INTEGRAL HOUSING (Cont.)

bearing is installed with seal facing wheel and that inner bearing is installed with seal facing differential.

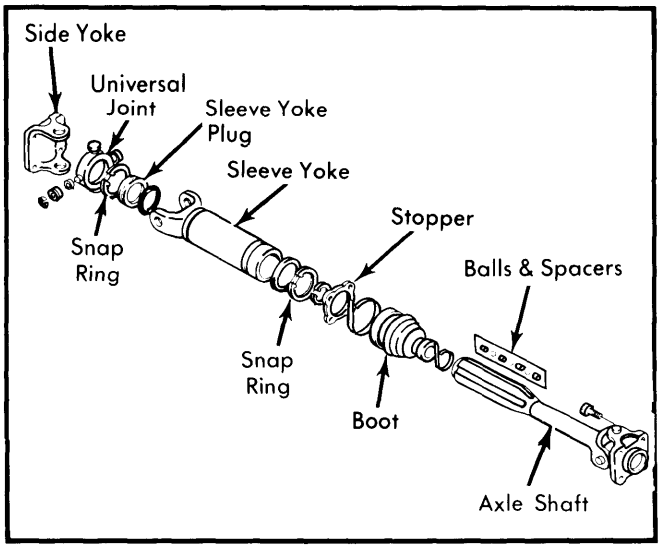


***Fig. 2 Exploded View of Rear Axle Drive Shaft Assembly (R200 Differential Shown – R180 Similar)***

**2)** Axle housings are stamped with letter "A", "B" or "C" (280ZX) or "M", "N" or "P" (810). Ensure bearing spacer of same stamping is installed. Tighten lock nut to 181-239 ft. lbs. (25-33 mkg) and check that axle shaft end play is 0-.012" (0-.3 mm) on 810 or .008-.020" (.2-.5 mm) on 280ZX and that turning torque of axle shaft is less than 2.6 INCH lbs. (1.2 cmkg) at hub bolt. If either adjustment is not correct, replace bearing spacer and repeat procedure. Bleed and adjust brakes.

### PINION FLANGE & OIL SEAL

**Removal** – Drain differential, then raise and support vehicle. Disconnect propeller shaft from pinion flange. On 280ZX only, remove muffler, insulator and exhaust tube mounting bolts to free them from body. On all models, hold pinion flange and remove pinion nut, then remove flange with puller. 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

NOTE – *Drive shafts of 280ZX models are connected to R180 differential with yokes and to R200 with companion flanges.*

**Removal** – Raise and support rear of vehicle. Drain differential gear oil. Disconnect propeller shaft at companion flange. Disconnect drive shafts at each wheel and remove side yoke fixing bolts at differential. Remove side yokes and drive shafts as assemblies. On 280ZX, remove front shield. On all models, support differential on suitable jack and remove mounting bolts at suspension members. On 810 models, remove nut on end of differential bracket. On all models, lower assembly on jack and remove from vehicle.

NOTE – *Support suspension member on a stand to prevent damage to insulators.*

**Installation** – To install, reverse removal procedure and tighten all nuts and bolts to specifications. Fill assembly to correct level with gear oil.

## OVERHAUL

### FRONT AXLE DRIVE SHAFT (4-WD PICKUP)

*Manufacturer does not recommend disassembly of front drive shaft on 4-WD pickup. Replace as complete assembly only.*

### REAR AXLE DRIVE SHAFT (EXCEPT 4-WD PICKUP)

**Disassembly** – 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.

**Cleaning & 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 necessary. Check all other components for wear, damage and distortion; replace complete drive shaft assembly if any faulty part is found. Check drive shaft play as shown in *Fig. 3*. Replace complete assembly if play exceeds .04" (1 mm) on 810 or .008" (.2 mm) on 280ZX.

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

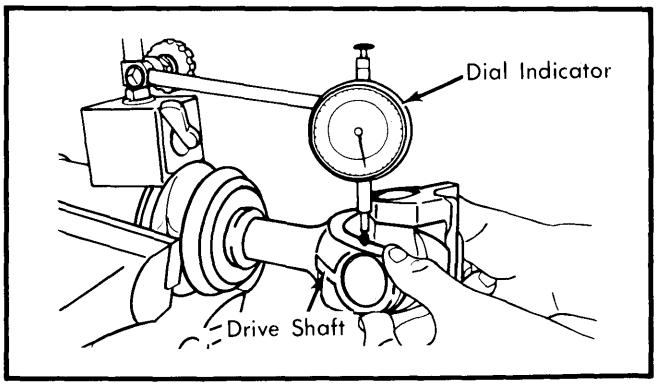


***Fig. 3 Measuring Play in Rear Drive Shaft***

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## DATSUN INTEGRAL HOUSING (Cont.)

**Reassembly** – **1)** To reassemble, reverse disassembly procedure and note the following: Align yokes and ensure steel balls and spacers are installed in correct order. Adjust distance between spider journals (measured from center to center) to length of 13.54" (344 mm). Cover sleeve yoke with boot and secure with boot band.

**2)** Adjust axial play of universal joint to within .0008" (.2 mm) by use of snap rings. Snap rings of equal thickness must be installed on each end of yoke sleeves. Apply grease to ball grooves and oil grooves with about 1¼ ozs. (35 g) of oil in bottom end of sleeve yoke.

### DIFFERENTIAL

NOTE – *Front axle assembly of 4-WD pickup is overhauled in same manner as that for 810 models (R180 differential).*

**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 reassembly assembly. On R180 differential, remove retainer bolts and pull side retainers from case with puller.

NOTE – *Retainers and shims of R180 differential must be marked for reassembly. Retainers and shims are not interchangeable.*

**2)** On R200 differential, pry side flange 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. On R180 differentials, remove side bearing outer races from retainers using puller (ST33290001).

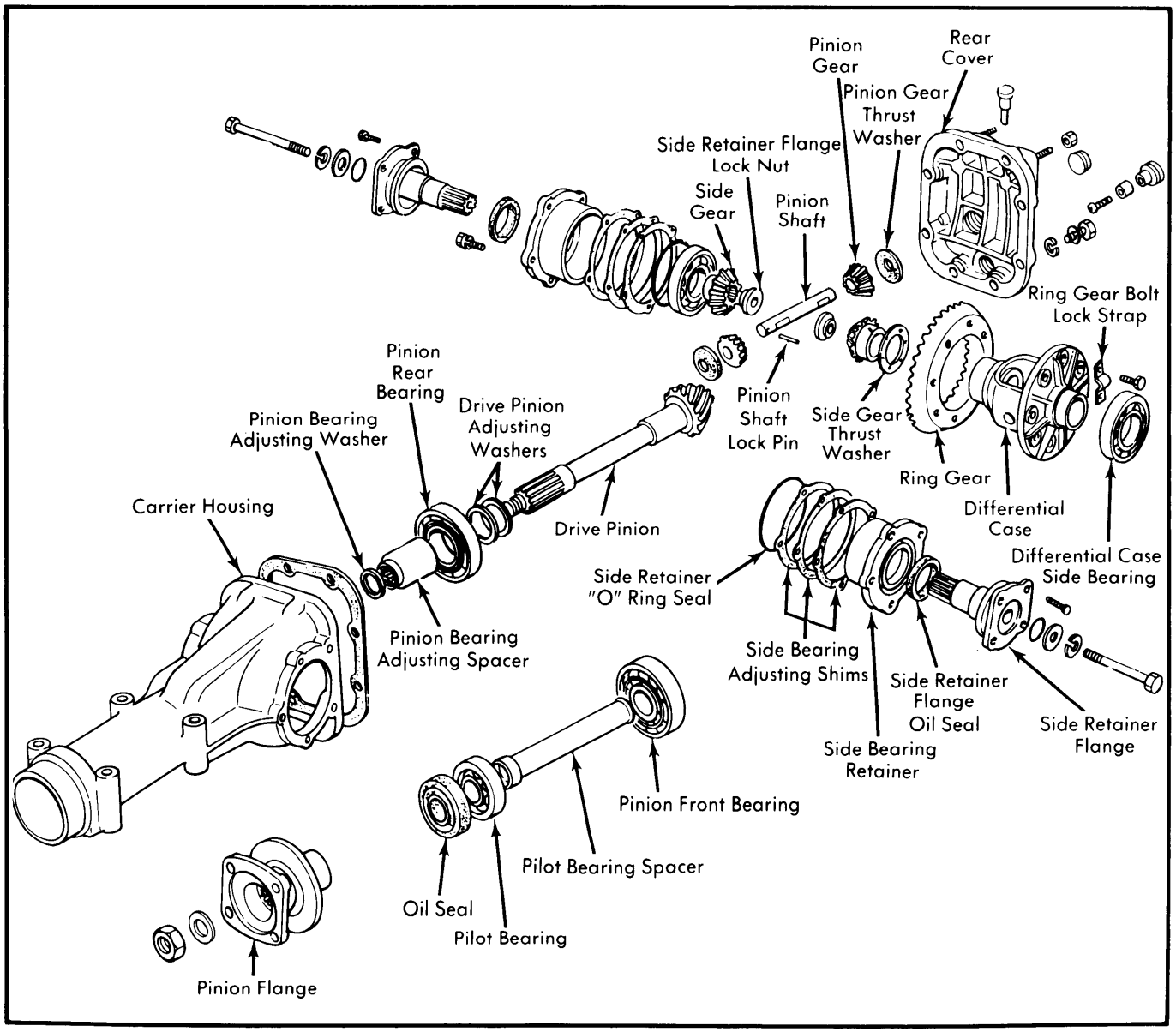


***Fig. 4 Exploded View of Datsun Integral Carrier Differential Assembly***

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## DATSUN INTEGRAL HOUSING (Cont.)

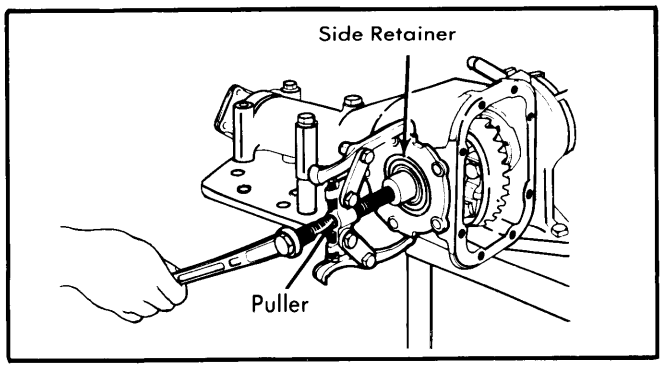


*Fig. 5 Removing R180 Differential Side Retainer*

**3)** Hold pinion flange stationary and remove pinion nut, then remove pinion flange with suitable puller. 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. Drive out front and rear bearing outer races with a drift.

NOTE – *Keep left and right side bearings separate, they are not interchangeable.*

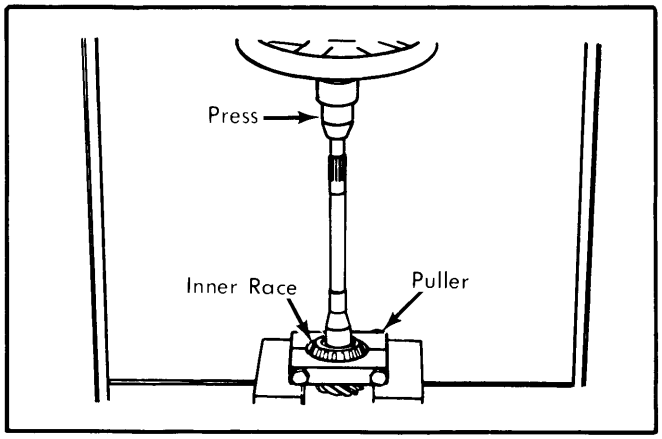


*Fig. 6 Removing Pinion Gear Bearing*

**4)** To disassemble differential case, remove side bearings with puller set (ST3306S001). 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. Thoroughly clean and inspect all parts for wear or damage and repair or replace as necessary.

CAUTION – *Mark gears and thrust washers for installation in their original position.*

### 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.

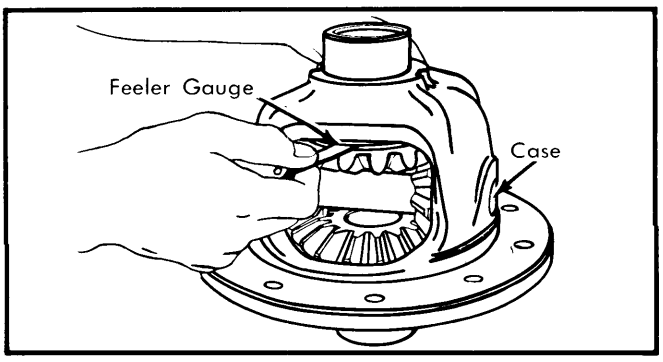


*Fig. 7 Measuring Side Gear-to-Thrust Washer Clearance*

**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 hammer.*

**3)** When replacing side bearings, measure bearing width with a .787" (20 mm) gauge and a 5.5 lb. (2.5 kg) weight block. 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.

NOTE – *R200 differential has non-removable side bearing retainers. R200 bearings are .827" (21 mm) wide.*

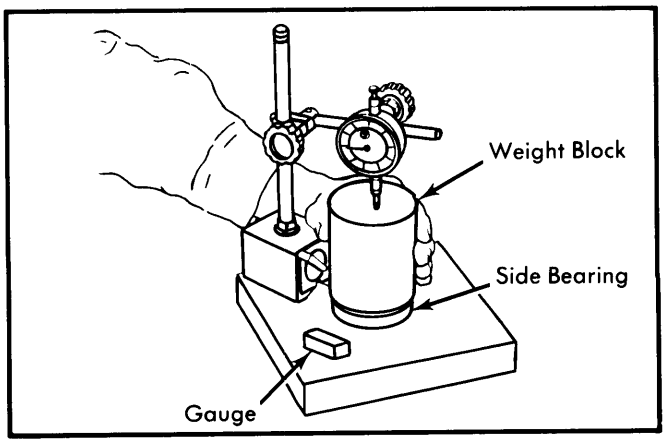


*Fig. 8 Measuring Side Bearing Width*

**Drive Pinion Bearing Preload Adjustment – 1)** Install front and rear bearing outer races into carrier. Install dummy pinion shaft (ST31212000 – R180 differentials; KV38100110 – R200 differentials) 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 – R180 differentials; KV38100130 – R200 differential), companion flange and nut onto dummy shaft. Do not install oil seal at

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## DATSUN INTEGRAL HOUSING (Cont.)

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.

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.

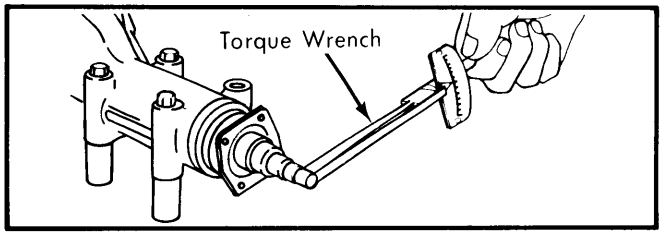


*Fig. 9 Checking Drive Pinion Bearing Preload*

**Drive Pinion Gear Installed Height** – 1) Leave dummy drive shaft installed (as described under Preload Adjustment) and install height gauge (ST31211000 – R180 differentials; KV38100120 – R200 differential) 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:

R180 Differential $T=W+N-[(H-D'-S)x.01]-.2$

R200 Differential $T=N-[(H-D')x.01]+3.0$

**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.*

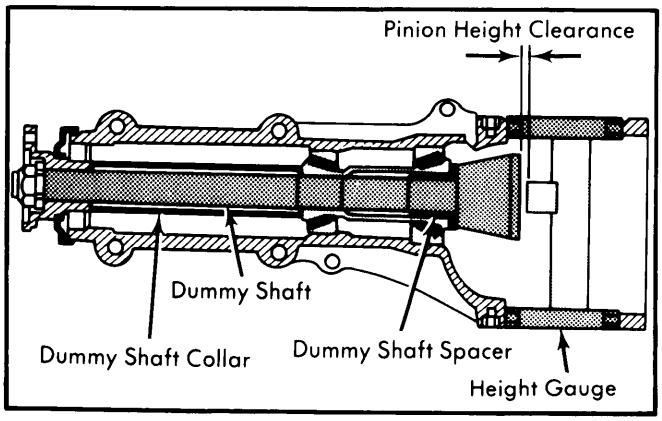


*Fig. 10 Measuring Drive Pinion Gear Installed Height*

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:

R180 Differential $T_1=(A+C+G_1-D)\ x.01+.76-E$
$T_2=(B+D+G_2)x.01+.76-F$

R200 Differential $T_1=(A-C+D-H')x.01+E+2.05$
$T_2=(B-D+H')x.01+F+G+1.95$

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

$T_1$ = 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.
$G_1$ **& G**$_2$ = 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, $G_1$, and $G_2$ are not given, regard them as zero.*

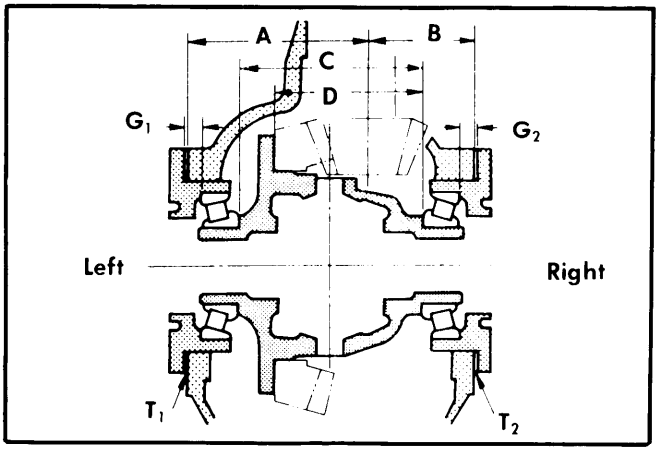


*Fig. 11 Side Bearing Preload Formula Values*

2) On R180 differentials, 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. 13*.

3) On R200 differentials, 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.*

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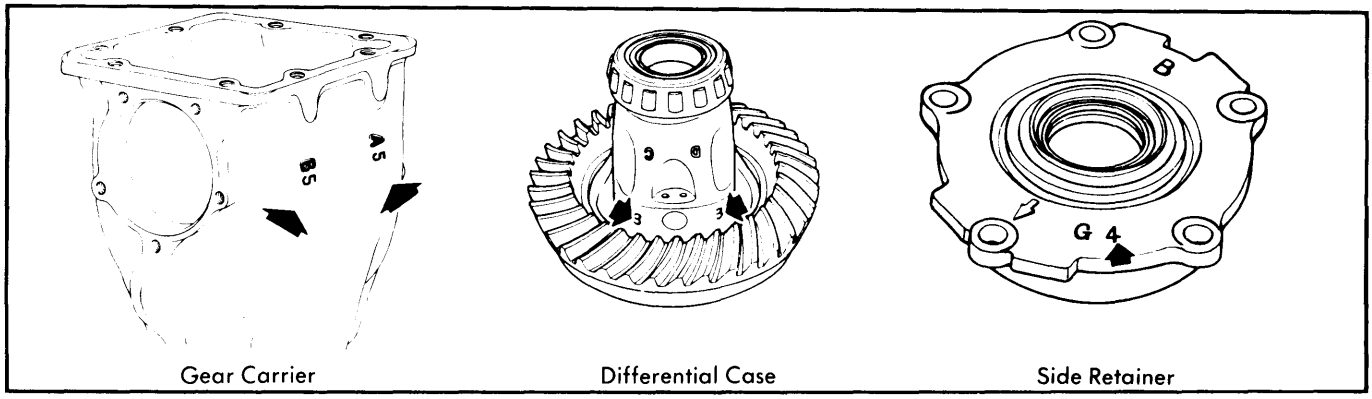
## DATSUN INTEGRAL HOUSING (Cont.)




Gear Carrier | Differential Case | Side Retainer

*Fig. 12 Side Bearing Preload Identification Marks (R180 Differential Shown)*

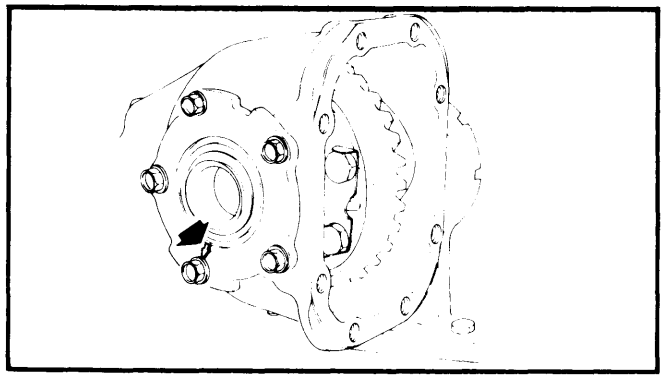


*Fig. 13 Aligning Side Retainer During Installation*

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.

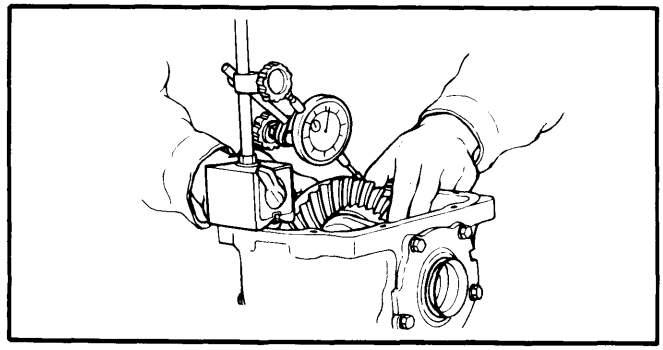


*Fig. 14 Measuring Ring Gear Backlash*

NOTE – *If side bearing preload is readjusted, ring 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 | Specification INCH Lbs. (cmkg) |
|---|---|
| Pinion Bearing Preload | |
| Without Oil Seal | |
| All Models | 9-11 (10.3-12.6) |
| With Oil Seal | |
| Pickup | 8-15 (9.2-17.3) |
| All Others | 9.5-12 (10.9-13.8) |
| | **In. (mm)** |
| Ring Gear-to-Pinion Backlash | |
| 280ZX (R180 Differential) | .004-.008 (.10-.20) |
| All Others | .005-.007 (.13-.18) |
| Side Gear Backlash | .004-.008 (.10-.20) |

### TIGHTENING SPECIFICATIONS

| Application | Ft. Lbs. (mkg) |
|---|---|
| Wheel Bearing Lock Nut | |
| Pickup (Front) | 108-145 (15.0-20.0) |
| All Others (Rear) | 181-239 (25.0-33.0) |
| Drive Shaft Flange Bolts | |
| R180 Differential | 23-31 (3.2-4.3) |
| R200 Differential | 36-43 (5.0-6.0) |
| Pinion Flange-to-Propeller Shaft Flange | |
| 810 | 17-24 (2.4-3.3) |
| All Others | 25-33 (3.5-4.5) |
| Rear Cover Bolts | |
| 280ZX (R200 Differential) | 12-17 (1.7-2.4) |
| 810 | 14-19 (1.9-2.6) |
| All Others | 29-30 (4.0-4.2) |
| Rear Cover-to-Mount | |
| R180 Differential | 43-51 (6-7) |
| R200 Differential | 54-69 (7.5-9.5) |
| Drive Pinion Nut | |
| R180 Differential | 123-145 (17-20) |
| R200 Differential | 137-159 (19-22) |
| Ring Gear Bolts | |
| R180 Differential | 65-72 (9-10) |
| R200 Differential | 43-51 (6-7) |
| Side Bearing Retainer Bolts | |
| R180 Differential | 6.5-8.7 (.9-1.2) |
| Side Bearing Cap Bolts | |
| R200 | 65-72 (9-10) |

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