Drive Axles

DATSUN/NISSAN SEPARATE CARRIER

200SX, 210, Maxima Wagon, 2-WD & 4-WD Pickups (Rear)

DESCRIPTION

Differential gear carrier assembly has a hypoid type ring and pinion gear set. The gear carrier is constructed of cast iron. The drive pinion is mounted in 2 tapered roller bearings, preloaded by a collapsible spacer.

Drive pinion is aligned into position with a shim, located between shoulder on drive pinion and rear bearing.

Differential case is supported in carrier by 2 tapered roller side bearings. The side bearings are preloaded by inserting shims between bearings and differential. Case houses 2 side gears that mesh with 2 pinion gears, mounted on a lock pin. Pinion and side gears are set in front of thrust washers.

AXLE RATIO & IDENTIFICATION

Datsun does not identify rear axle with a particular outside identification marking. However, all models use same basic type of removable carrier rear axle.

It should be noted, that part or model numbers may vary between vehicle models, but the internal design is similar.

Various axle ratios are available, depending on model and whether vehicle is equipped with manual or automatic transmission. Ratio may be determined by dividing number of ring gear teeth by number of pinion gear teeth.

REMOVAL & INSTALLATION

AXLE SHAFTS & BEARINGS

Removal

1) Raise and support vehicle. Remove tire and wheel. Disconnect parking brake linkage and hydraulic line. On 200SX, remove brake caliper. On all other models, remove brake drum.

2) Remove brake back plate retaining nuts (dust shield nuts on 200SX), and pull assembly from housing with a slide hammer.

Disassembly

Mount axle shaft assembly in a vise or mounting fixture, and cut bearing collar with a chisel. On Pickups, bend lock tabs away, and remove wheel bearing lock nut. On all models, remove wheel bearing with brake back plate (dust shield on 200SX) using a puller.

NOTE: Axle bearings on Pickups are tapered roller type. Outer race may be removed from back plate after removing oil seal, by tapping it out with a brass drift.

Reassembly

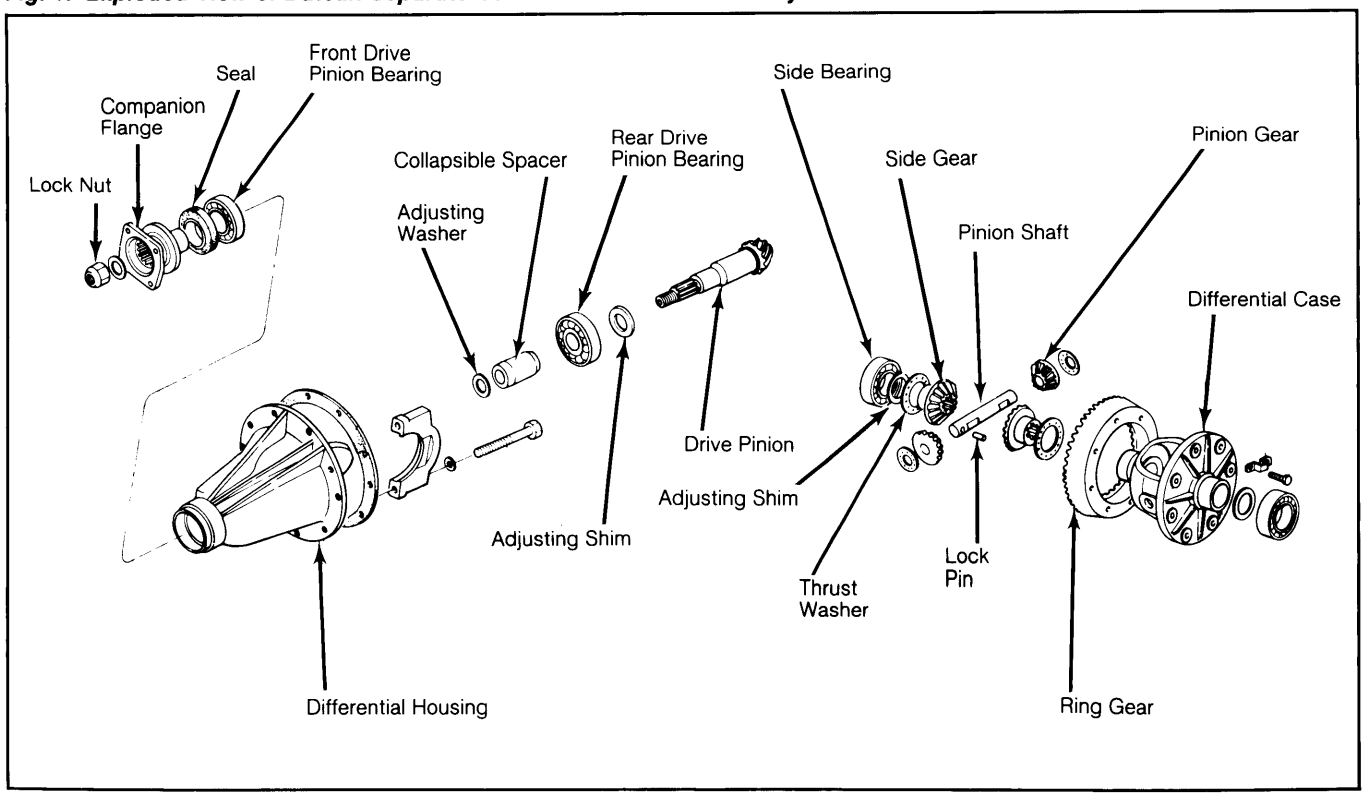
1) On Pickups only, fit bearing outer race into position in back plate using brass drift. Install oil seal. Pack seal lips with grease, and install bearing and nut lock washers. Tighten lock nut to specifications. Bend up lock tabs on washer.

2) On all other models, use a press to install bearing spacer, bearing, and new collar.

Installation

1) To install, reverse removal procedure, and note the following. On all models except Pickup, insert

Fig. 1: Exploded View of Datsun Separate Carrier Differential Assembly



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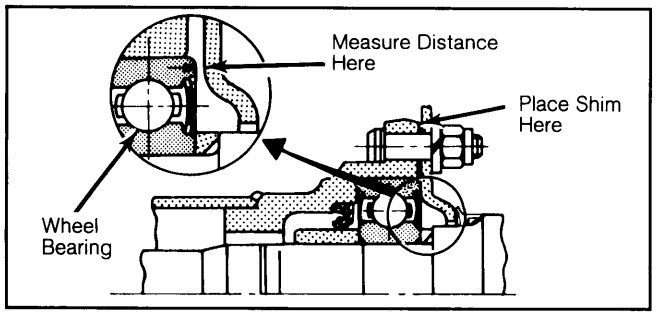
axle shaft. Adjust gap between wheel bearing and axle tube end to 0-.004" (.1 mm) by installing appropriate shim. *See Fig. 2.*

2) On Pickup models, insert shims between back plate and axle tube end so that measured axle shaft end play is .0008-.006" (.02-.15 mm).

3) On all other models, mount dial gauge and check axle shaft end play. End play should be .002-.016" (.05-.41 mm) on 200SX; .008-.020" (.20-50 mm) on Maxima and .004-.018" (.10-.46 mm) on 210.

Fig. 2: Checking Clearance Between Wheel Bearing & Axle Tube End (All Except Pickup)



PINION FLANGE SEAL

Removal

Raise and support rear end of vehicle. Drain gear oil. Scribe an index mark on propeller shaft and companion flange. Detach shaft, and wire out of way. Remove drive pinion nut and companion flange. Remove oil seal.

Installation

Set new oil seal into position, and pack grease between seal lips. Position companion flange and flat washer on drive pinion. Tighten nut, and check bearing preload.

DIFFERENTIAL CARRIER

Removal

1) Raise and support vehicle on safety stands placed under rear axle housing. Drain gear lubricant.

2) Scribe an index mark on propeller shaft, and remove. Withdraw rear axle shafts as previously described.

3) Remove nuts mounting differential gear carrier to rear axle housing, and lift out gear carrier.

Installation

To install differential gear carrier, reverse removal procedure and tighten nuts.

OVERHAUL

DISASSEMBLY

NOTE: Inspection of ring gear backlash and gear tooth contact prior to disassembly can indicate where possible problems may exist. See Gear Tooth Contact at beginning of this section.

Differential

1) Mount differential carrier in a holding fixture, scribe index marks on side bearing caps and carrier. Remove bearing caps, and lift out differential assembly.

2) Remove drive pinion lock nut, and pull companion flange off with a gear puller. Remove drive pinion together with rear bearing inner race, spacer, and washer. Drive pinion can be freed by tapping front end of assembly. If necessary, extract oil seal, and withdraw front bearing inner race.

3) Using inner race remover and press, extract bearing from drive pinion gear. Using a drift, remove front and rear bearing races. Disassemble differential case as follows. Using puller, remove side bearings. Keep right and left side components separate for reassembly reference.

4) Bend back ring gear retaining bolt lock tabs, and remove bolts by loosening in a diagonal sequence. Tap ring gear off gear case, using a soft hammer.

5) Drive out pinion shaft lock pin. Remove pinion gears, side gears, and thrust washers. Identify gears and thrust washers for installation in original positions.

CLEANING & INSPECTION

Clean all disassembled parts and visually inspect for excessive wear. Check all gears for wear and replace if necessary. Inspect thrust washer surfaces and be sure they are free from surface scratches.

NOTE: Drive pinion and ring gear are replaced only as a set.

REASSEMBLY & ADJUSTMENT

Case Assembly

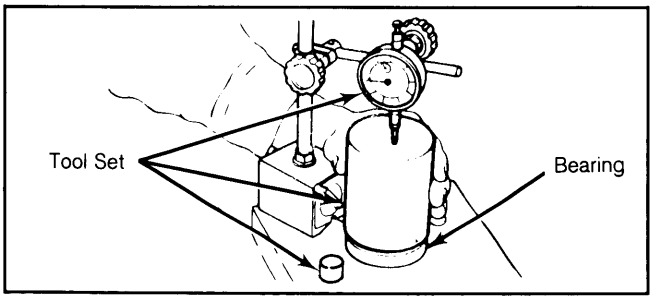
1) Fit pinion, side gears, and thrust washers in differential case. Assemble pinion shaft to differential case, so that lock pin holes align with shaft.

2) To obtain specified clearance, insert side gear thrust washers of proper thickness between rear face of side gear and thrust washer. Insert pinion shaft lock pin and secure by peening with a punch.

3) Lightly oil gear tooth areas and all thrust surfaces. Check that gears turn freely and smoothly. Fit ring gear on differential case, tighten bolts in diagonal manner, and bend over lock tabs.

4) If side bearing is to be replaced, measure thickness of new one, using a tool set as shown in *Fig. 3.* Normal bearing thickness should be as specified. Using a press, seat side bearing cone into differential case.

Fig. 3: Measuring Side Bearing Thickness



Drive Pinion Height

1) Pinion height is adjusted with drive pinion adjusting washer placed behind drive pinion gear. Variation from the standard size to the drive gear center is marked on drive pinion gear head. If tolerance is greater

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than standard size, number is marked in "+", if less than standard size, marking is "—".

2) Install front and rear drive pinion outer races in gear carrier. Fit drive pinion adjusting washers and rear bearing on a dummy shaft. Position dummy shaft in final drive housing without drive pinion adjusting spacer. Install front pinion bearing and companion flange.

3) Tighten drive pinion nut to specified preload setting. DO NOT overtighten pinion nut. Install drive pinion height gauge on final drive housing. Measure clearance between end of gauge and surface of dummy shaft as shown in *Fig. 4*.

4) To calculate thickness of needed drive pinion adjusting shim, use the appropriate formula in the Drive Pinion Shim Thickness table.

DRIVE PINION SHIM THICKNESS

Application	Formula
210	T = W + N - (H x .01) - .18
200SX	T = N - (H - D' - S) x .01 + 2.98
Maxima & Pickup	T = N - (H - D' - S) x .01 + 2.18

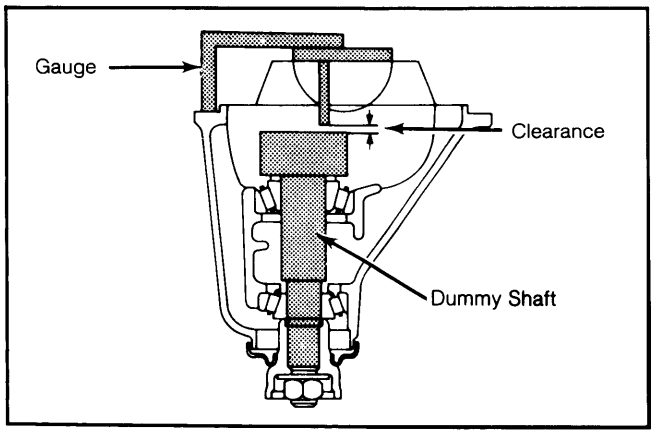
T = Thickness of needed shim.
W = Thickness of temporary shim.
N = Clearance between depth gauge and dummy shaft.
H = Figure stamped on drive pinion head.
D = Figure stamped on dummy shaft.
S = Figure marked on height gauge.

NOTE: Formula values are expressed in millimeters.

5) Remove dummy shaft from gear carrier. Take pinion rear bearing out of dummy shaft. Select correct shims, based upon calculations. Refit pinion rear bearing and drive pinion. Ensure face side of shims are toward back of pinion gear.

NOTE: Pinion nut, oil seal, and collapsible spacer must NEVER be reused. Always use new parts during overhaul.

Fig. 4: Measuring Clearance Between Height Gauge and Dummy Shaft



Drive Pinion Preload

1) After obtaining final pinion bearing height, lubricate front bearing and place into carrier. Fit new oil seal in carrier, and fill space between seal lips with grease.

2) Slip new collapsible spacer on drive pinion. Lubricate pinion rear bearing. Insert companion flange in oil seal, while holding flange tightly against pinion front bearing cone.

3) Working from rear of carrier, insert drive pinion into companion flange. Ensure drive pinion threads and mounting nut are dirt free. Holding companion flange, tighten nut.

4) This will pull drive pinion into front bearing cone and flange. When drive pinion is pulled into front bearing cone, bearing end play will be reduced.

5) With end play still in evidence, companion flange will be felt bottoming on collapsible spacer. Slowly turn nut, continuously checking end play to ensure bearing preload does not exceed specifications.

6) When end play is eliminated, final preload is being approached. Turn pinion in both directions to seat bearing. Adjust bearing preload to specifications using an INCH lb. torque wrench.

NOTE: Never try to decrease bearing preload by backing off pinion nut. Always replace collapsible spacer.

Backlash & Side Bearing Preload

1) Preload is adjusted with shims after overhaul work has been completed on differential assembly. When assembling without changing side bearings, install shims of original thickness.

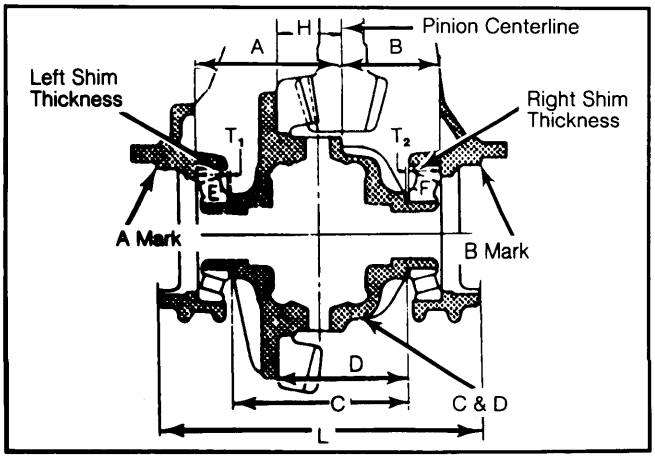
SIDE BEARING SHIM THICKNESS

Application	Formula
210	T_1 = (A - C + D - H') x .01 + .20 + E
	T_2 = (B - D + H') x .01 + .20 + F
200SX	T_1 = (A - C + D - H') x .01 + .20 + E
	T_2 = (B - D + H') x .01 + .09 + F
Maxima & Pickup	T_1 = (A - C + D - H') x .01 + .175 + E
	T_2 = (B - D + H') x .01 + .150 + F

T_1 = Left shim thickness.
T_2 = Right shim thickness.
A = Figure marked on left bearing carrier.
B = Figure marked on right bearing carrier.
C & D = Figure stamped on differential case (+ or - number).
E & F = Deviation from standard bearing thickness.
H' = Figure stamped on ring gear.

NOTE: Formula values are expressed in millimeters.

Fig. 5: Calculating Side Bearing Shim Thickness



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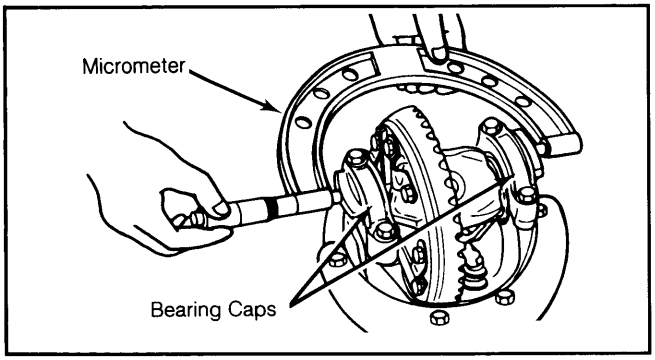
2) If bearings are being replaced, use the appropriate formula in the Side Bearing Shim Thickness table to determine required shim thickness.

3) Side bearing thickness is measured using a press and applying approximately 5.5 lbs. (2.5 kg). Measure thickness in at least 3 locations.

4) Fit side bearing shim of differential case, and press in both side bearing inner races. Place differential case assembly into gear carrier, using a rubber mallet. Align index marks on bearing cap and gear carrier. Install bearing cap on carrier.

5) As a second check, measure distance between bearing caps with a micrometer. *See Fig. 6.* Specification obtained should be as indicated in table. Correct any deviation with shim of proper thickness.

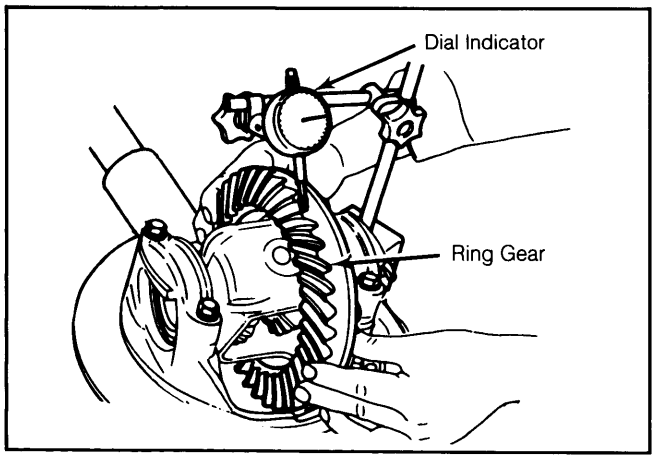
Fig. 6: Measuring Distance Between Bearing Caps



6) Using a dial indicator, measure ring gear-to-drive pinion backlash. Measurement should be as indicated in specifications. If backlash is less than specified, decrease thickness of left shim and increase thickness of right shim by same amount.

7) If backlash is more than specified, reverse placement of shims in procedure above. Using same dial indicator, check ring gear deflection. Runout should be as specified.

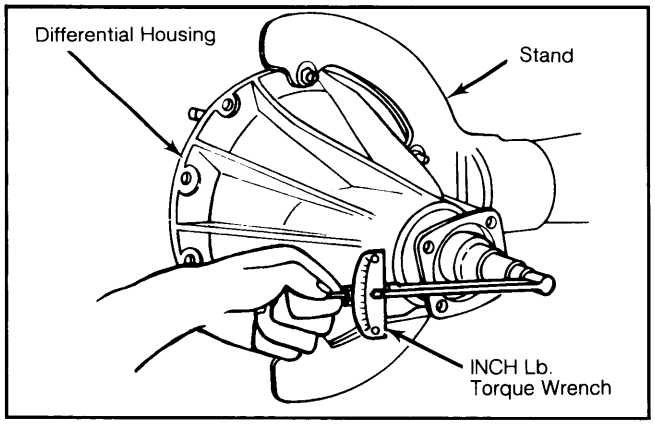
Fig. 7: Measuring Ring Gear Backlash



8) Check drive pinion preload by measuring the amount of rotating torque needed to turn companion flange. *See Fig. 8.* Check gear tooth contact pattern and correct any problem.

NOTE: See Gear Tooth Patterns at beginning of this section.

Fig. 8: Measuring Drive Pinion Preload



AXLE ASSEMBLY SPECIFICATIONS

Application	INCH Lbs. (N.m)
Drive Pinion Preload	
With Oil Seal Installed	
200SX	6-9 (.7-1.0)
210	5.7 (.6-.8)
Maxima	6-13 (.7-1.5)
Pickup	9.5-14 (1.1-1.6)
	In. (mm)
Ring Gear-to-Pinion Backlash	
210	.004-.006 (.10-.15)
200SX	.005-.007 (.13-.18)
All Others	.006-.008 (.15-.20)
Pinion Gear-to-Side Gear Backlash	
All Models	.004-.008 (.10-.20)
Ring Gear Backface Runout	
200SX	.0016 (.04)
Pickup	.0031 (.08)
Standard Side Bearing Thickness	
200SX	.7283 (18.5)
210	.6890 (17.5)
All Others	.7874 (20)
Distance Between Bearing Cap Edges	
210	6.039-6.041 (153.40-153.45)
Maxima	7.811-7.817 (198.40-198.55)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Drive Pinion Nut	94-217 (127-294)
Ring Gear Retaining Bolts	
200SX, Maxima, & Pickup	58-72 (78-98)
210	43-51 (59-69)
Side Bearing Cap Bolts	
200SX, Maxima, & Pickup	36-43 (49-59)
210	40-51 (54-69)
Differential Carrier-to-Axle Housing	
200SX & Maxima	18-25 (25-34)
210 & Pickup	12-17 (17-24)
Companion Flange-to-Propeller Shaft	17-24 (24-32)