

TOYOTA INTEGRAL CARRIER

Celica, Corona, Starlet

DESCRIPTION

NOTE: Information on above models with limited slip drive axles appears in the Toyota Separate Carrier article in this section.

Final drive assembly has hypoid type ring and pinion gear and removable rear cover. Differential carrier is retained in the sides of the housing by retaining plates, and is supported by tapered roller bearings.

Side bearing preload is adjusted by turning adjusting nuts on each side of carrier. Drive pinion gear is supported by roller bearings and preload is maintained by a non-collapsible spacer between the bearings.

AXLE RATIO & IDENTIFICATION

The integral carrier type drive axle may be identified by the inspection cover on the rear of the carrier housing. To determine axle ratio, divide number of ring gear teeth by number of pinion gear teeth.

REMOVAL & INSTALLATION

AXLE SHAFTS

Removal

1) Raise and support vehicle. Remove tire and wheel. Remove brake drum. Working through hole in axle flange, remove bolts holding bearing retainer to axle housing flange.

2) Using slide hammer, remove shaft from housing, using care not to damage axle seal. If both axles are to be removed, be sure to index each for reinstallation

in original position. If axle housing seal is being replaced, coat sealing lip with grease before installing.

Installation

To install, reverse removal procedure.

Fig. 2: Exploded View of Rear Axle Shaft Assembly

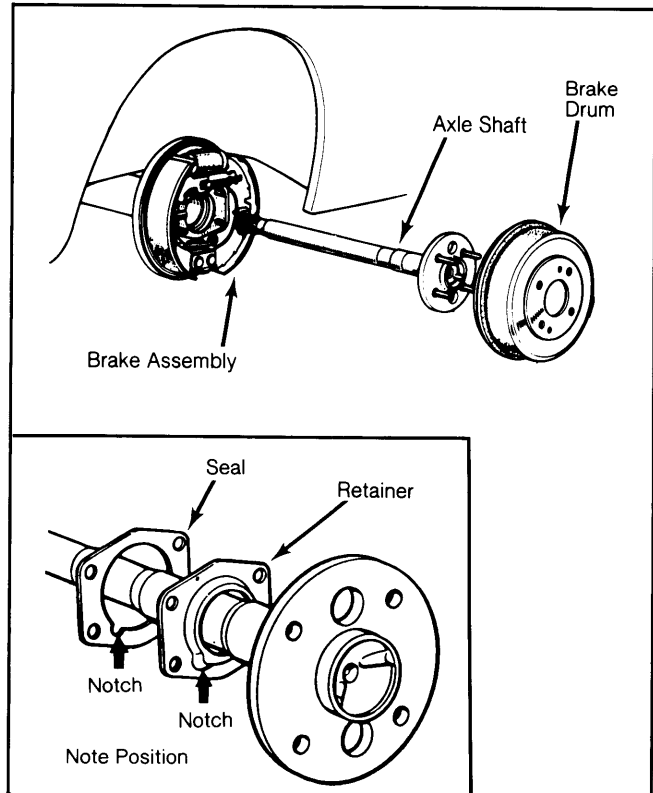
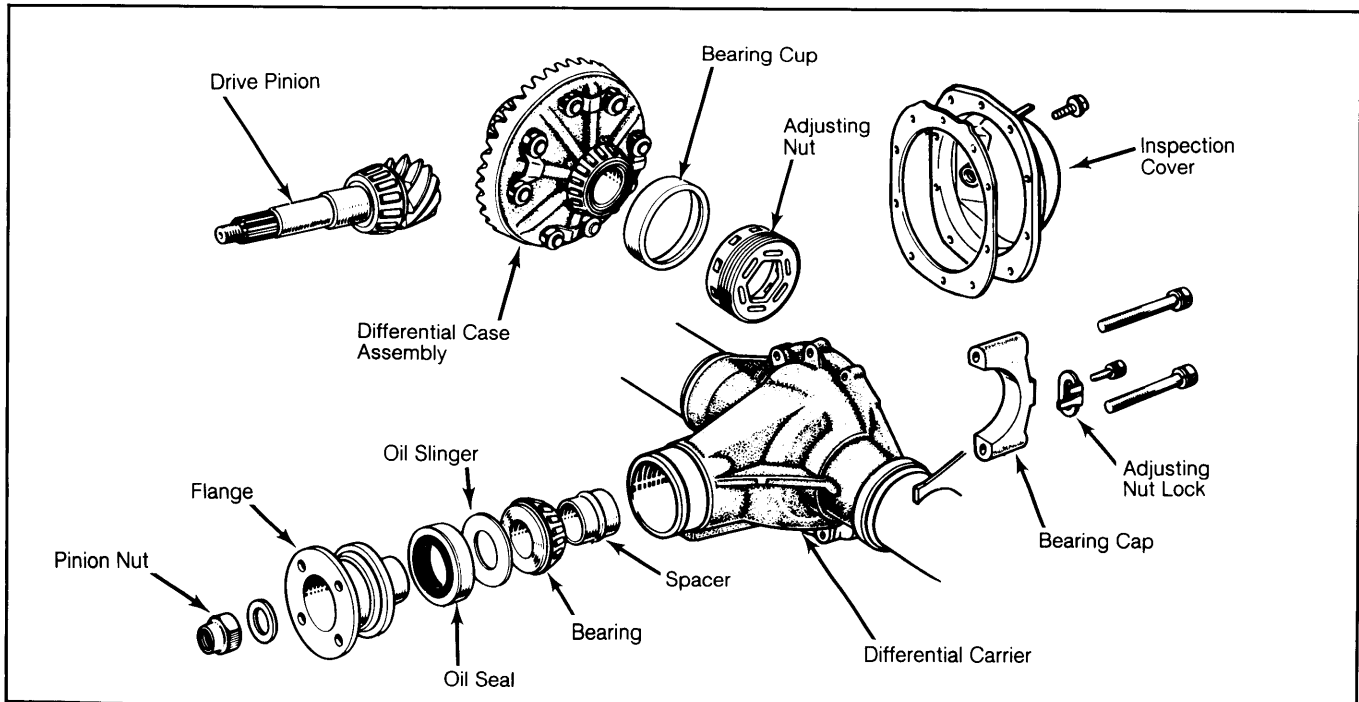


Fig. 1: Exploded View of Toyota Integral Carrier Differential



Drive Axles

TOYOTA INTEGRAL CARRIER (Cont.)

AXLE BEARINGS

Removal

To remove bearing, grind part way through bearing retainer ring. Use caution not to nick axle shaft. Cut remaining portion of retaining ring, using a cold chisel. Remove split retaining ring, and press bearing off shaft. Remove spacer from shaft.

Installation

1) To install, place spacer and bearing onto shaft, and press into place. Heat new retaining ring to about 300°F (150°C), and press into place.

NOTE: The retaining ring will show a faint, yellow color when heated to proper temperature.

2) Install gaskets on shaft so they will be between bearing retainer and backing plate. Install axle shaft, checking to ensure gaskets and retainer are installed with notch pointed in correct direction. See Fig. 2. Tighten bolts.

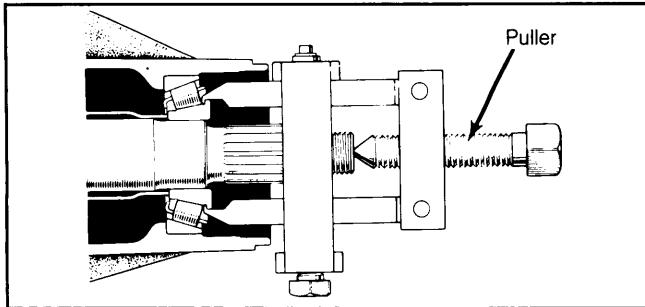
PINION SEAL REPLACEMENT (ON-VEHICLE)

Removal

1) Remove drain plug, and drain carrier lubricant. Reinstall plug, and index companion flange to propeller shaft. Remove propeller shaft. Set parking brake. Unstake pinion nut, install pinion flange holder, and remove pinion nut.

2) Install pinion flange remover, and remove flange. Remove oil seal with seal puller. Remove oil slinger. Remove bearing with bearing puller. Remove bearing spacer. See Fig. 3.

Fig. 3: Removing Drive Pinion Gear Front Bearing

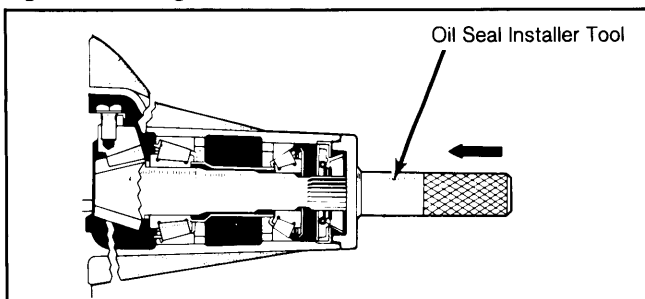


Install bearing puller as illustrated.

Installation

1) Install new bearing spacer. Install bearing and oil slinger. Apply grease to seal lip and drive seal into carrier. Oil seal drive-in depth is .16" (4 mm). See Fig. 4.

Fig. 4: Installing Pinion Oil Seal



Seal drive-in depth is .16" (4 mm).

2) Install pinion flange. Install new pinion nut. Rotate pinion in both directions to seat bearing. Measure preload. Tighten pinion nut to 80 ft. lbs. (109 N.m).

3) Set parking brake, and install INCH lb. torque wrench. Measure preload within range of backlash, between drive pinion and ring gear. Preload for a new bearing should be 8.7-13.9 INCH lbs. (1.0-1.6 N.m) and 4.3-6.9 INCH lbs. (.5-.8 N.m) for a used bearing.

4) If preload is greater than specification, replace bearing spacer. If preload is less than specification, retighten nut 10 ft. lbs. (13 N.m) at a time until specified preload is obtained.

5) After adjustment, stake pinion nut. Align companion flange and propeller shaft index marks and install propeller shaft.

NOTE: If maximum torque of 173 ft. lbs. (235 N.m) is exceeded, replace bearing spacer and repeat procedure. DO NOT back off pinion nut to reduce preload.

OVERHAUL

DISASSEMBLY

Differential Case

1) Raise and support vehicle. Drain differential lubricant. Remove axle shafts as previously described. Remove rear inspection cover.

2) Remove propeller shaft, lateral control rod, and brake line (at top of differential housing). Remove companion flange, oil seal, slinger, bearing, and spacer.

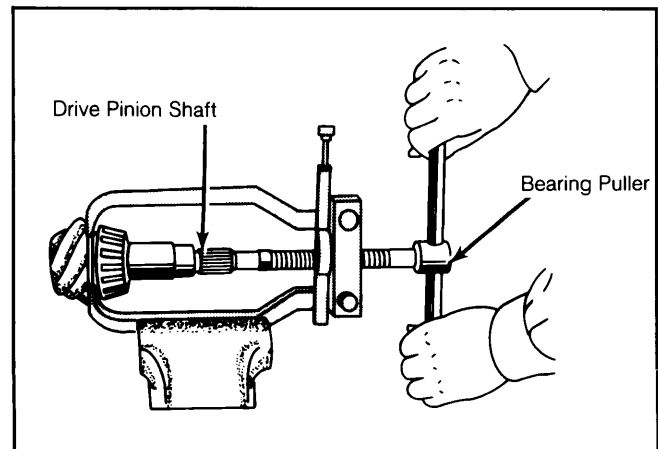
3) Punch alignment marks on bearing caps and differential carrier. Remove adjusting nut locks and bearing caps. Tag left and right bearing caps for reassembly reference.

4) Using adjusting tool, loosen adjusting nuts and remove differential case from the carrier. Remove bearing races, and keep with matching bearing cap.

5) Remove drive pinion, and place in holder. Remove drive pinion rear bearing. Drive out front and rear pinion shaft bearing cups. See Fig. 5.

6) Remove side bearings from differential case. Straighten lock plates on ring gear bolts. Index ring gear and case, and remove bolts.

Fig. 5: Removing Drive Pinion Gear Rear Bearing



Mount bearing remover tool in vise.

TOYOTA INTEGRAL CARRIER (Cont.)

7) Mount differential case and ring gear assembly in vise so ring gear teeth are pointed down. Bend down tabs of lock washers, and remove ring gear bolts. Tap ring gear from case using a soft hammer.

8) Remove pinion gear shaft retaining pin from case. Drive out gear shaft. Remove pinion gears, side gears, and thrust washers.

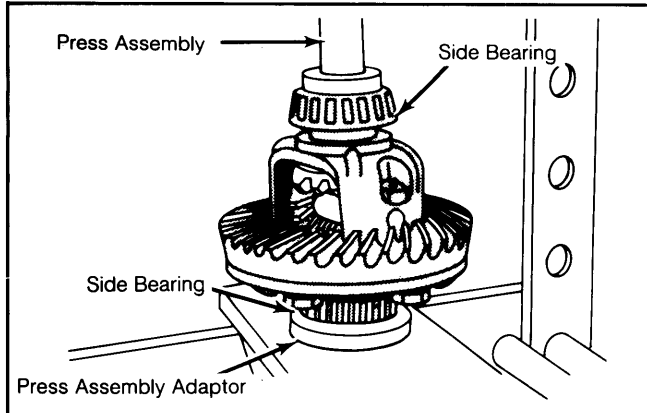
REASSEMBLY & ADJUSTMENT

Case Assembly

1) Lubricate all components with hypoid gear lubricant. Assemble side gears and pinion gears into differential case. Make sure oil groove, if present, on side gear thrust washer faces toward gear. See Fig. 6.

2) Check backlash between side gears and pinion gears. If backlash is not .002-.008" (.05-.20 mm), install selective fit thrust washers in equal thicknesses on both sides. Install pinion shaft lock pin and peen over hole.

Fig. 6: Installing Side Bearing on Differential Case

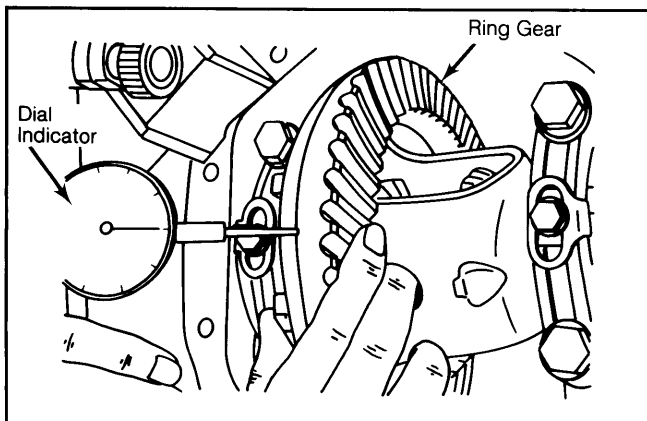


Oil groove on side gear thrust washer must face gear.

3) Press differential side bearings onto differential case. Heat ring gear in oil bath to approximately 212°F (100°C). Quickly wipe off gear and install on differential case. Fit bolts and tighten evenly. Bend over lock tabs.

4) Install differential case assembly in differential carrier, and measure ring gear runout. If runout exceeds .003" (.07 mm), replace ring gear. See Fig. 7.

Fig. 7: Measuring Ring Gear Runout



If runout is excessive, replace ring gear.

Drive Pinion Depth

1) Remove differential case from carrier. Install drive pinion bearing cups in carrier. Install pinion shaft rear bearing onto base rod. Install base rod head and bolts. Insert this assembly into carrier from rear.

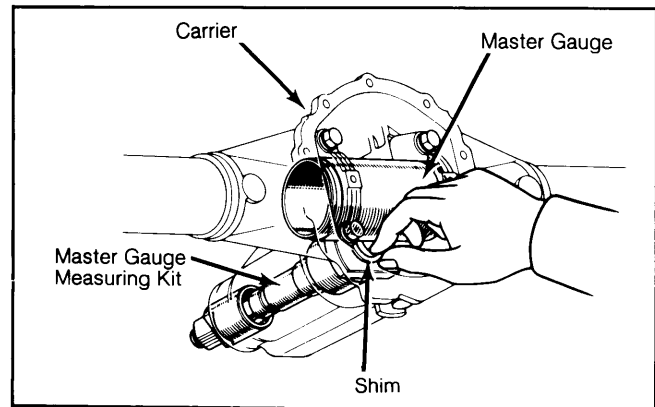
2) Install front pinion bearing into carrier from front end. Install collar and nut onto front end of base rod.

NOTE: Tighten nut only to extent that driving pinion bearing has no play.

3) Install Toyota Master Gauge into differential side bearing bores. See Fig. 8. Install bearing caps and bolts. Ensure left and right bearing caps are matched with correct bore. Tighten bearing cap bolts to specification.

4) Select a shim that snugly fits between master gauge and base rod head. One shim or none must be used. Do not use more than one shim. After selecting shim, remove all components of master gauge kit. Press bearing and shim onto drive pinion. If shim has chamfered edge, install that edge toward pinion gear.

Fig. 8: Measuring Drive Pinion Installed Height



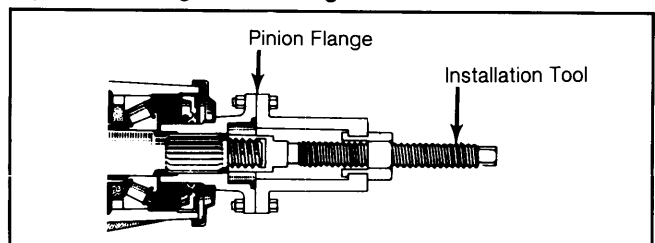
Do not use more than one shim. Select correct thickness.

Pinion Bearing Preload

1) Install pinion shaft assembly into carrier. Insert shims (if any were removed during disassembly) onto pinion shaft. Install new bearing spacer. Install front bearing and oil slinger.

2) Press oil seal into carrier .08" (2.0 mm). Install companion flange, washer and new nut. Torque pinion flange nut to 80 ft. lbs. (109 N.m). See Fig. 9.

Fig. 9: Installing Pinion Flange



Torque pinion flange nut to specifications.

3) Using an INCH lb. torque wrench, measure pinion bearing preload. If preload is excessive, replace spacer and repeat procedure. If preload is not to specification, tighten nut in small increments. Recheck preload each time, until specified preload is reached.

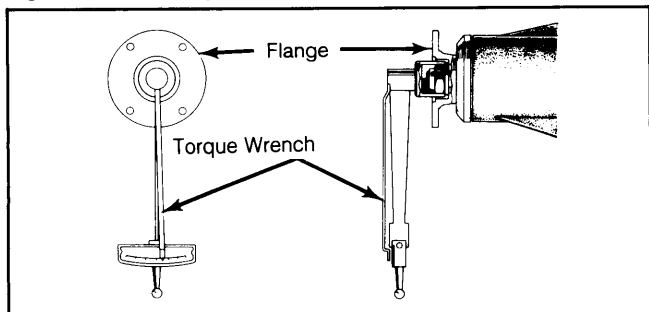
Drive Axles

TOYOTA INTEGRAL CARRIER (Cont.)

4) If preload is not to specification even after specified torque is reached, loosen nut and repeat procedure. See Fig. 10.

NOTE: If maximum torque of 173 ft. lbs. (235 N.m) is exceeded, replace bearing spacer and repeat procedure. Do not back off pinion nut to reduce preload.

Fig. 10: Measuring Bearing Preload



If preload is excessive, replace spacer and repeat measuring procedure.

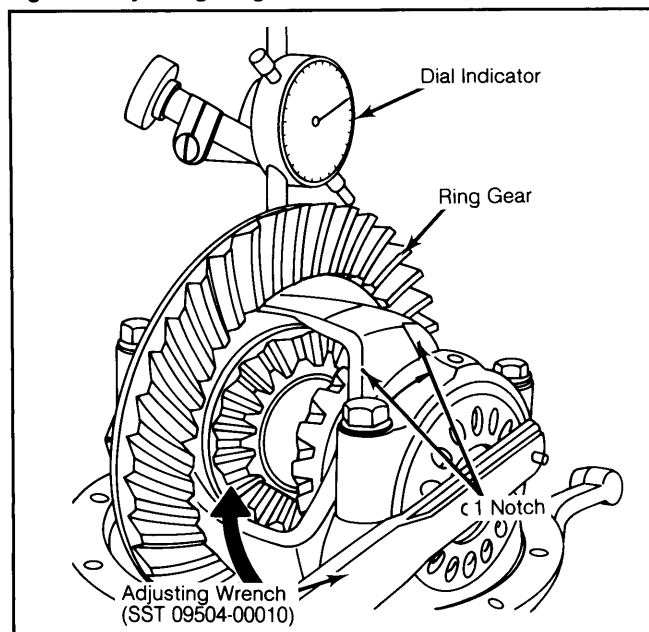
5) Mount dial indicator to differential carrier. Measure companion flange longitudinal and latitudinal deviations. If specifications are exceeded, replace companion flange and recheck.

Backlash & Side Bearing Play

1) Install side bearing adjusting nuts in carrier. Match bearings and bearing cups. Install differential case and bearings into carrier. Install bearing caps, and tighten bolts until washers are slightly compressed.

2) Install dial indicator so plunger touches flange side of ring gear. Using bearing adjusting wrench, tighten flange side adjusting nut so ring gear has free play of about .008" (.2 mm). See Fig. 11.

Fig. 11: Adjusting Ring Gear Backlash



If incorrect, turn right and left adjusting nuts to reposition differential assembly.

3) During adjustment procedure, rotate ring gear through several revolutions to seat side bearings. Tighten drive pinion side adjusting nut to the point where free play is eliminated. If tightening nut creates free play, loosen nut so that backlash is eliminated.

4) At the point where zero preload is obtained, tighten drive pinion adjusting nut an additional 1-1 1/2 notches to preload side bearings. Mount dial indicator so plunger is perpendicular to ring gear tooth.

5) Measure ring gear backlash. If not within specifications, turn left and right adjusting nuts to shift differential assembly in proper direction. If left side is loosened 1 notch, the right side must be tightened 1 notch to maintain side bearing preload.

6) Tighten side bearing cap bolts. Using an INCH lb. torque wrench, measure total (combined) bearing preload. If preload is not to specifications, repeat adjustment procedures for side bearings and pinion bearings.

COMBINED (SIDE & PINION) BEARING PRELOAD

Application	New Bearing INCH Lbs. (N.m)
All Models	11.3-18.2 (1.3-2.0)

7) Install bearing adjusting nut locks. Stake drive pinion flange nut. Install inspection cover and tighten bolts.

8) Connect brake line, install lateral control arm, and align and install propeller shaft. Install axle shafts, add lubricant to differential carrier, and bleed brake system.

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Drive Pinion Bearing Preload	
New	8.7-13.9 INCH Lbs. (1.0-1.6 N.m)
Used	4.3-6.9 INCH Lbs. (.49-.78 N.m)
Side-to-Pinion	
Gear Backlash002-.008" (.05-.20 mm)
Pinion-to-Ring Gear	
Backlash005-.007" (.13-.18 mm)
Ring Gear Runout	¹ .003" (.07 mm)
Companion Flange Deviation	
Longitudinal	¹ .004" (.10 mm)
Latitudinal	¹ .004" (.10 mm)
Gear Oil Capacity	1.3 Qts. (1.2L)
¹ — Maximum clearance.	

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Drive Pinion Flange Nut	80-173 (109-235)
Differential Bearing Cap Bolts	51-65 (69-88)
Ring Gear-to-Case Bolts	67-75 (91-102)
Axle Shaft Bearing Retainer	44-53 (60-72)
Carrier Inspection Cover	15-21 (20-29)
Lateral Control Arm Bolts	
Body Side Bolt	51-65 (69-88)
Axle Side Bolt	30-55 (41-75)
Adjusting Nut Lock Bolt	8-11 (11-15)