

DRIVE AXLE - 4WD MODELS WITH INTEGRAL HOUSING

1988 Toyota Celica

DRIVE AXLES
Toyota Integral Housing
Celica (Rear)

DESCRIPTION

Drive axle assembly is hypoid type with integral carrier housing.

AXLE RATIO & IDENTIFICATION

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

REMOVAL & INSTALLATION

AXLE SHAFTS & BEARINGS

See FWD AXLE SHAFTS or RWD AXLE SHAFTS article in this section.

DRIVE PINION FLANGE & OIL SEAL

Removal

1) Index drive shaft to drive pinion flange. Remove drive shaft. Remove rear crossmember. Loosen staked portion of drive pinion flange nut. Remove drive pinion flange nut.

2) Remove drive pinion flange. Remove oil seal from housing. Remove oil slinger. Using a puller, remove front bearing from housing. Remove collapsible spacer and discard.

NOTE: Toyota recommends replacing collapsible spacer anytime pinion flange is loosen or removed.

Installation

1) Install new collapsible spacer and front bearing. Install oil slinger with concave side facing front drive pinion bearing. Apply grease to seal lips. Install new oil seal to correct depth. See SEAL DEPTH table at end of this article. Install flange and lightly coat drive pinion threads with grease.

2) Install flange nut and hold flange. Tighten nut and measure preload. See TIGHTENING SPECIFICATIONS table and AXLE ASSEMBLY SPECIFICATIONS table at end of this article. If preload is lower than specification, tighten nut in increments of 108 INCH lbs. (12 N.m) until preload is correct. Check pinion nut torque.

3) Check longitudinal and latitudinal runout of drive pinion flange with dial indicator. Stake drive pinion nut. Install drive shaft. Ensure index marks are aligned.

DIFFERENTIAL ASSEMBLY

Removal

1) Drain gear oil. Remove rear crossmember. Disconnect drive axles from side gear flanges. Index drive shaft to drive pinion flange. Disconnect drive shaft. Remove nuts from differential

assembly-to-support bolts.

2) Support differential assembly with jack. Remove through bolts holding small support member (on differential case) to large support member. Remove bolts holding case to chassis crossmember. Lower differential carrier from vehicle.

Installation (All Models)

To install, reverse removal procedure. Align index marks on drive shaft and drive pinion flange.

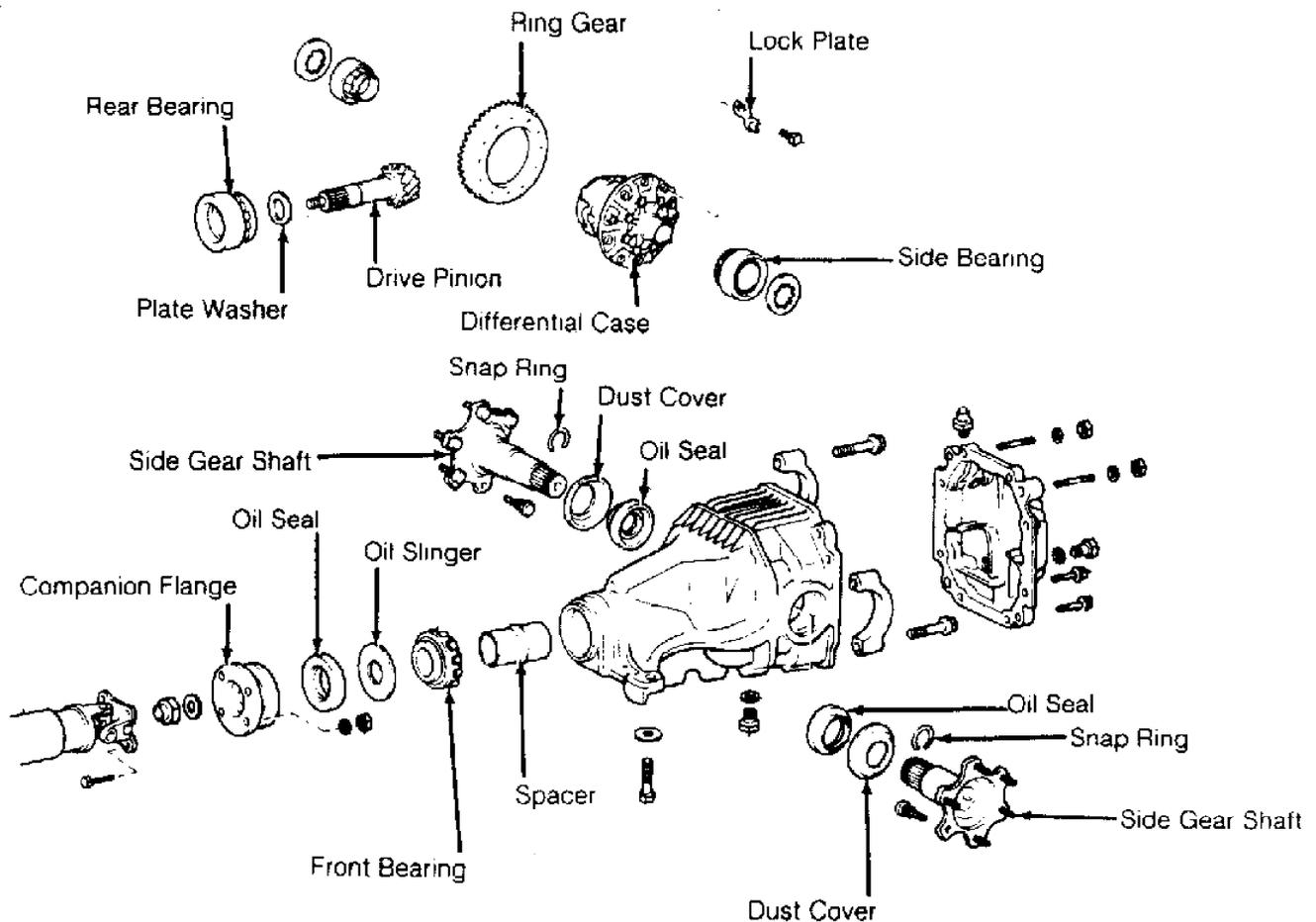


Fig. 1: Exploded View of Differential Assembly
Courtesy of Toyota Motor Sales, U.S.A., Inc.

OVERHAUL

DISASSEMBLY

NOTE: For overhaul information on front drive axles, see FWD AXLE SHAFTS article in this section. On rear drive axles, see RWD AXLE SHAFTS article in this section.

Differential Case (Conventional)

1) Remove differential carrier cover. Remove side gear shaft and oil seal. Check ring gear runout and backlash. Check gear tooth contact pattern. Check side gear backlash while holding one pinion gear toward case. Measure drive pinion preload and total preload.

2) Put alignment marks on bearing cap and differential

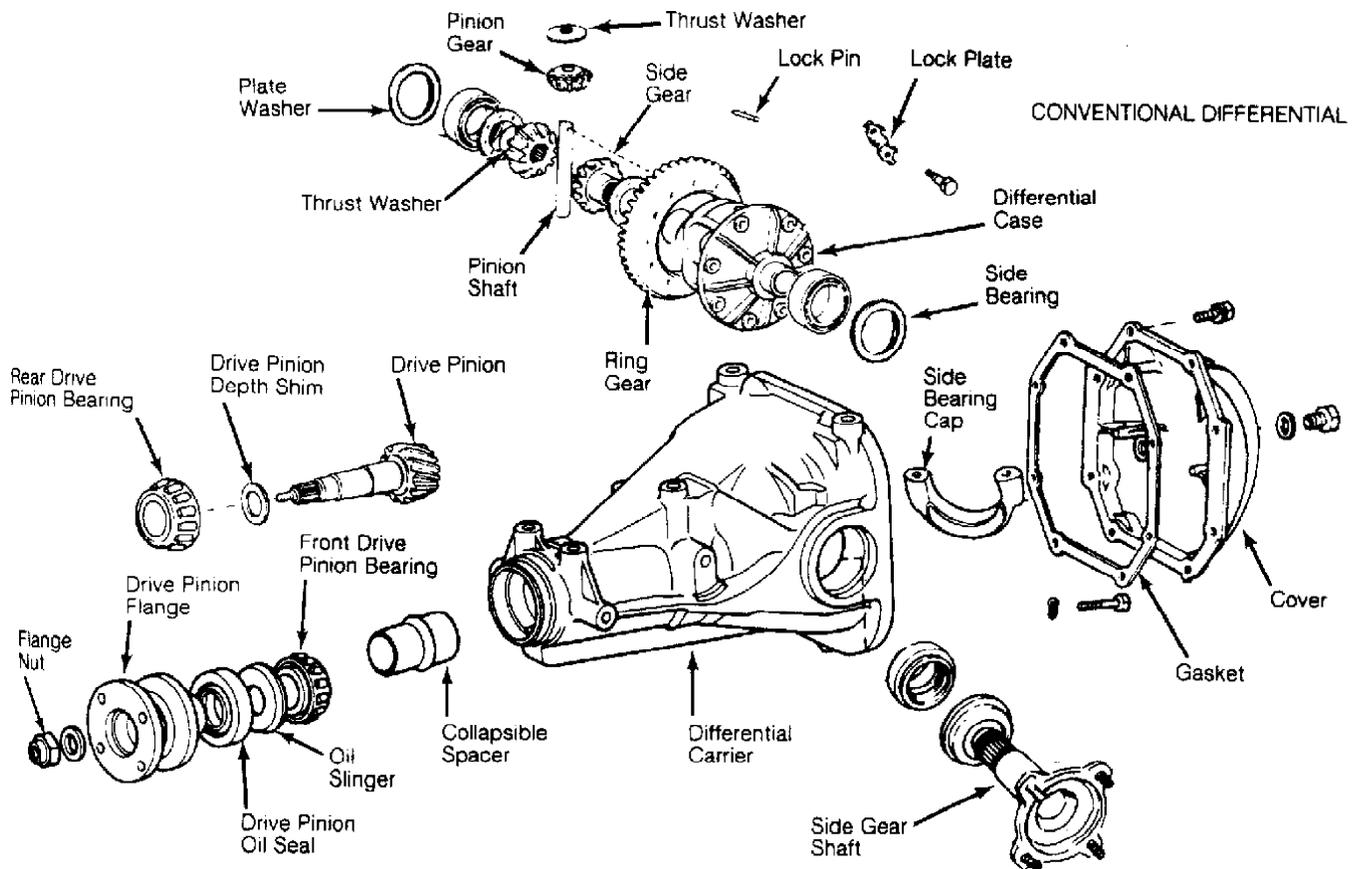
carrier. Remove caps. Remove 2 side bearing preload adjusting plate washers. Measure plate washers and record thicknesses. Remove differential case and ring gear. Remove differential case side bearing outer races. Place reference marks on bearings, gears and thrust washers.

3) Remove side bearings from case with puller. Keep side bearings with correct outer races and mark for reassembly. Put alignment marks on ring gear and differential case. Remove ring gear bolts and locking tabs. Remove ring gear by tapping on gear with a plastic hammer.

Drive Pinion

1) Hold drive pinion flange and remove nut. Remove drive pinion flange and oil seal. Remove oil slinger, front bearing and collapsible spacer. Remove drive pinion from differential carrier. Press rear bearing from pinion shaft.

2) Drive front and rear drive pinion bearing outer races from carrier. Inspect bearings, outer races and pinion shaft for wear or damage. Discard collapsible spacer. Ring gear and drive pinion must be replaced as a set.



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Fig. 2: Exploded View of Differential Assembly (Cessida)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

REASSEMBLY & ADJUSTMENT

Differential Case (Conventional)

1) Install side gears and thrust washers in case. Thrust washers should be same size for both sides if possible. Install pinion

gears with thrust washers and tap pinion shaft into place. Check side gear backlash while holding one pinion gear toward case.

2) If backlash is incorrect, change thickness of thrust washers until backlash is within range of .002-.008" (.05-.20 mm). Install lock pin through case and hole in pinion shaft. Stake pin to differential case. Press side bearings onto case.

3) Clean contact surfaces of differential case. Heat ring gear to 212°F (100°C) in oil bath. Clean ring gear contact surface with solvent. Install on case while still hot. Align index marks on ring gear and case. Coat ring gear bolts with hypoid oil and install with lock plates.

CAUTION: Do not heat ring gear above 230°F (110°C).

4) Tighten ring gear bolts gradually in diagonal sequence. When bolts are snug, tighten to 71 ft. lbs. (97 N.m). Stake lock plates with one tab flush against flat of bolt head. Tab resting on point should be staked on tightening side of point.

5) Install case with side bearings into carrier. Snug down adjusting nut until there is no play in bearing. Check ring gear runout with a dial indicator against back of gear (opposite teeth) in 4 places.

6) Maximum allowable runout is .003" (.07 mm). If runout is excessive, rotate ring gear on case and remeasure. If runout cannot be brought within specified range, case or ring gear must be replaced.

Drive Pinion Bearing Preload

1) Install front and rear bearing outer races into carrier. Press rear drive pinion bearing onto drive pinion with depth shim under bearing. Install drive pinion into carrier. Install front bearing.

NOTE: Drive pinion preload is set in 2 stages. Initial adjustment is made without spacer, oil slinger or oil seal installed. Final adjustment is made after differential case is installed and ring and pinion backlash have been set.

2) Install drive pinion flange and lightly grease threads of pinion flange nut. Install flange nut and adjust drive pinion preload by slowly tightening nut. Measure preload with torque wrench. See AXLE ASSEMBLY SPECIFICATIONS table at end of article..

CAUTION: As there is no spacer installed at this time, tighten pinion nut slowly until desired preload is obtained. Be careful not to overtighten.

3) Install differential case and adjust ring gear-to-drive pinion backlash. See RING GEAR BACKLASH & SIDE BEARING PRELOAD procedure in this article. Remove drive pinion flange and front bearing. Install new bearing spacer, front bearing, oil slinger, and oil seal. Install drive pinion flange and tighten pinion nut.

4) Check total differential preload. Range for total preload is measured drive pinion preload plus 2.6-4.3 INCH lbs. (.29-.49 N.m) (.40-.59 N.m). Check that drive pinion flange longitudinal and latitudinal runout do not exceed .004" (.10 mm). Stake drive pinion nut.

Ring Gear Backlash & Side Bearing Preload

1) Place bearing outer races on respective bearings and install differential case into carrier. Install plate washer only on back side of ring gear (behind teeth). Tap ring gear with plastic hammer to seat washer and bearing.

2) Install a dial indicator with plunger on tooth surface of

ring gear. Apply downward pressure on side bearing boss. Measure ring gear-to-drive pinion backlash. Reference backlash should be .005" (.13 mm) on all models.

3) Select a ring gear (back side) plate washer using backlash as reference. Select a ring gear (tooth side) washer just thick enough to eliminate clearance between outer race and case. Remove plate washers and case from carrier.

4) Install plate washer into lower part of carrier. Place other plate washer on differential case with outer race. Install case assembly into carrier housing. Seat washer and bearing by tapping ring gear with plastic hammer. Measure ring gear backlash with dial indicator.

5) Backlash should be .005-.007" (.13-.18 mm). Adjust backlash by increasing or decreasing washers on both sides by equal amounts. There should be no clearance between plate washer and case. Ring gear backlash must exist at all times.

6) After adjustment of plate washers has been made, remove ring gear (tooth side) washer and measure thickness. Install washer .002-.004" (.05-.10 mm) thicker than washer removed.

NOTE: Select washer which can be pressed 2/3 of way in by finger.

7) Using a plastic hammer, tap washer in place. Recheck ring gear backlash. Backlash range is .005-.007" (.13-.18 mm). Adjust as necessary. Align index marks on caps and carrier. Install cap bolts and tighten to 58 ft. lbs. (78 N.m).

8) Measure total preload. Total preload must equal drive pinion preload plus 2.6-4.3 INCH lbs. (.29-.49 N.m)

9) Hold companion flange firmly and rotate ring gear in both directions. Inspect gear tooth contact pattern. Adjust as necessary by changing shims on drive pinion. See GEAR TOOTH PATTERNS article in this section.

10) Drive side gear shaft oil seal into carrier until flush. Coat oil seal lips with grease and replace snap ring on side gear shaft. Drive side gear shaft in until it contacts pinion shaft. Measure side gear runout at flange with dial indicator. Replace side gear shaft if runout exceeds .008" (.20 mm). Install differential carrier cover with new gasket and tighten bolts.

NOTE: Since shaft cannot be checked visually on LSD models, ensure that shaft is seated by change in sound made by hammer blow after shaft bottoms out.

AXLE ASSEMBLY SPECIFICATIONS TABLE

Application	In. (mm)
Stub Axle Flange Runout008 (.20)
Drive Pinion Flange Runout	
Longitudinal004 (.10)
Latitudinal004 (.10)
Ring Gear Backlash005-.007 (.13-.18)
Ring Gear Runout003 (.07)
Side Gear Backlash002-.008 (.05-.20)
Side Gear Shaft Runout008 (.20)

INCH Lbs. (N.m)

Drive Pinion Preload	
Assembled Preload (1)	2.6-4.3 (.29-.49)
Stub Axle Bearing Preload9-3.5 (.1-.4)

(1) - Add this amount to drive pinion preload to obtain

total preload which is sum of drive pinion preload and side bearing preload.

SEAL DEPTH TABLE

Application	In. (mm)
Drive Pinion Seal08 (2.0)

TIGHTENING SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Differential Carrier Bolts	35 (47)
Differential Mounting Bolt & Nut	
Front	70 (95)
Rear	108 (147)
Support Brace-to-Support Bolt	14 (19)
Support Brace-to-Differential Bolt	10 (14)
Support-to-Differential Bolt	53 (72)
Differential Tube Bolt	80-174 (108-236)
Drive Shaft Flange Bolts	54 (74)
Rear Cover Bolt	34 (46)
Rear Crossmember Bolt	53 (72)
Ring Gear Bolts	71 (97)
Side Bearing Cap Bolts	58 (78)
Stub Axle Flange Nut	51 (69)
