CADILLAC – EXC. ELDORADO & SEVILLE

Cadillac, Except Eldorado & Seville

NOTE – See General Motors Integral Housing article for information on Seville rear axle.

DESCRIPTION

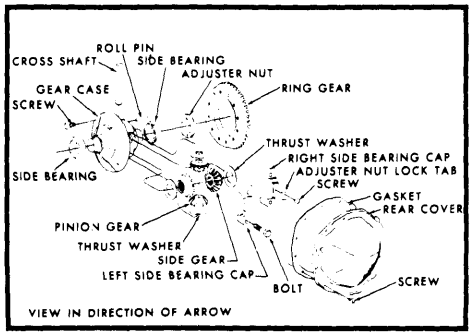
Hypoid gear, unitized carrier and housing design, with coil spring rear suspension on all models except commercial chassis. Heavier commercial chassis uses semi-eliptical leaf spring suspension. Unit utilizes two tapered roller bearings and a straight roller straddle bearing to support drive pinion and provide rigidity.

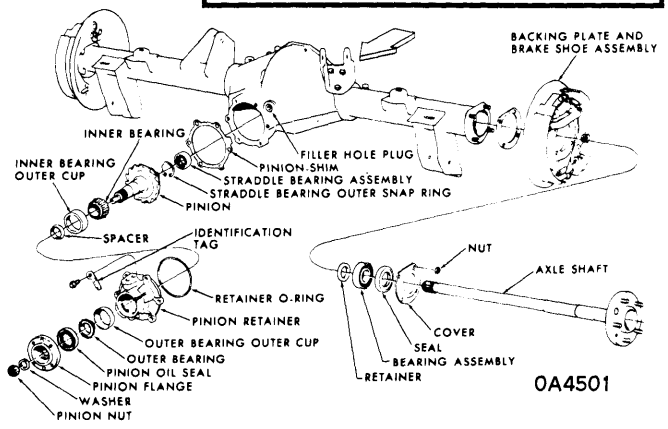
AXLE RATIO & IDENTIFICATION

Identification number is stamped on front face of pinion bearing retainer. Controlled (Limited Slip) differential can be identified by letter "G" preceding code number. Following ratios are available:

Axle Ratio Identification

Ratio	Identification No.
2.73-1	8
3.15-1	5





CADILLAC REAR AXLE ASSEMBLY

REMOVAL & INSTALLATION

AXLE SHAFTS, OIL SEALS & BEARINGS

Removal – Raise rear end of vehicle, then remove wheel and brake drum. Remove nuts and lock washers that secure cover, gasket and backing plate to rear axle housing. Install a suitable slide hammer and remove axle shaft. Using a cold chisel, split bearing retainer next to bearing, using care not to damage bearing, then remove and discard retainer. Using suitable tool, pry oil seal away from bearing. Using arbor press and suitable adapters, remove bearing from shaft, then remove oil seal.

Reassembly – Install bearing cover on axle shaft with raised side of cover against axle shaft flange. Install a suitable seal protector on axle shaft, lubricate lip of new oil seal with wheel bearing grease, then install seal on axle shaft by pressing seal down over protector. Apply a light coat of grease to wheel bearing. If tapered roller bearing is used, position bearing on axle shaft with narrow ring of bearing facing flanged end of axle shaft. If straight roller bearing is being used, the loose ring at one end of inner race must be installed toward flange. Press bearing on shaft until bearing bottoms against shoulder of shaft, then press bearing retainer on shaft until it bottoms against bearing.

Installation – Apply a thin film of grease to wheel bearing bore, oil seal and outer race of bearing. Install new gasket on brake backing plate. Install axle shaft into housing, aligning oil seal cover with axle housing mounting bolts. Install nuts on axle housing flange bolts to hold gasket, brake backing plate and oil seal cover in place, then tighten nuts. Install brake drum and one push nut, then install wheel, lower vehicle, and tighten wheel mounting nuts.

PINION FLANGE & OIL SEAL

Removal – Marking parts for reassembly reference, remove propeller shaft. Mark position of pinion flange, pinion shaft and nut so proper pinion bearing preload can be maintained. Using suitable tools, remove pinion nut and washer, then remove pinion flange. Remove oil seal by driving it out with a chisel.

Installation – Pack inner lip of new oil seal with wheel bearing grease, then position seal on retainer. Using suitable tool, tap seal into place in retainer. Install pinion flange on pinion shaft aligning marks made at disassembly, then install pinion nut and washer and tighten only enough to remove bearing end play. Install suitable tightening and holding tools, then tighten pinion nut ⅛" beyond alignment marks.

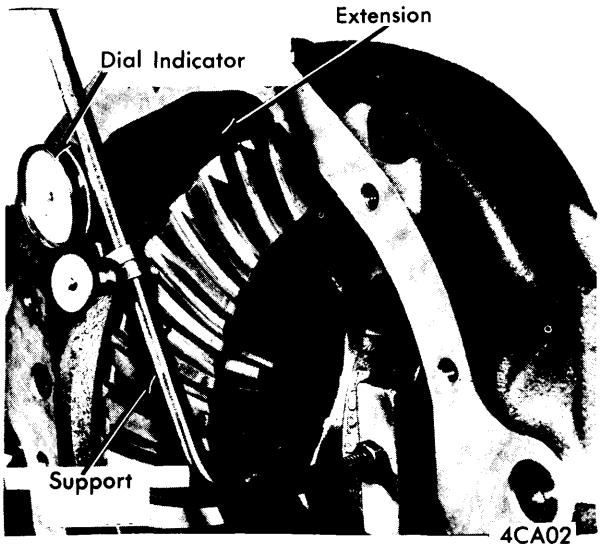
OVERHAUL

DISASSEMBLY

Raise vehicle on hoist, then remove wheels, brake drums, axle shafts and propeller shaft. Place a drain pan under differential, then loosen differential cover to housing screws, slide cover back over screws, and allow fluid to drain. Remove cover screws, then remove cover and gasket.

CADILLAC – EXC. ELDORADO & SEVILLE (Cont.)

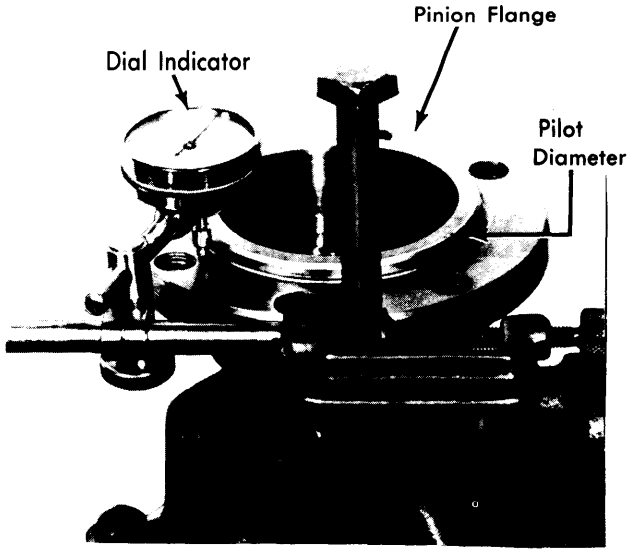
Backlash Check – *NOTE – If original ring gear and pinion set is to be used on reassembly, it is important to re-establish exact backlash found on disassembly.* Remove adjuster nut lock tab, then position a dial indicator so that button on end of extension touches ring gear tooth on face of drive side at heel. Angle between indicator button and tooth face must be 90°. With pinion securely held in place, rock ring gear back and forth and note indicator reading. Repeat procedure at two other locations evenly spaced around ring gear. Backlash readings should be .005-.010", and should not vary from each other by more than .003".



CHECKING RING GEAR TO PINION BACKLASH

Pinion Assembly Removal – Remove all but one pinion retainer-to-differential carrier screws, then loosen, but do not remove, remaining screw. Install suitable guide pins into carrier bolt holes, then install suitable slide hammer and adapter to pinion flange. Using slide hammer, unseat pinion assembly from differential housing, leaving shims installed on guide pins. Remove remaining screw, then slide pinion assembly over guide pins and out of differential carrier.

Pinion Flange Runout – Remove pinion shim from carrier, record thickness, then remove and discard pinion retainer "O" ring. Install pinion in a suitable holding fixture, then thoroughly clean pinion flange face with a wire brush. Install a dial indicator on pinion retainer so that button of indicator touches flange between bolt holes and pilot diameter at a 90° angle. Set dial indicator to zero, then rotate pinion flange one complete revolution in each direction and note indicator reading. Reposition indicator so that stem of indicator touches side of pinion flange pilot diameter. Reset dial to zero, rotate flange one revolution in each direction, and note radial runout. Combined face and radial runout should not exceed .005".



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CHECKING PINION FLANGE FACE RUNOUT

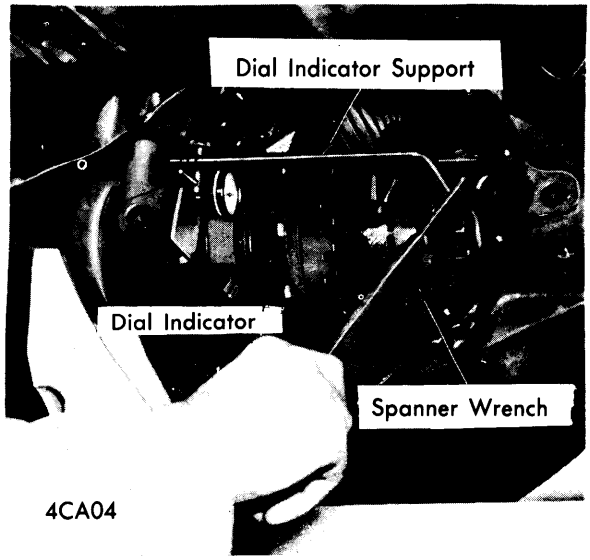
Pinion Disassembly – 1) *NOTE – Differential ring gear and pinion are serviced as a matched set. If one or the other is damaged, both ring gear and pinion must be replaced.* With pinion mounted in a suitable holding fixture, determine preload of pinion assembly using an INCH lb. torque wrench and a 1 ¼" socket. Rotate pinion two revolutions in each direction and, disregarding breakaway torque, record maximum reading required to keep pinion rotating.

2) Install a suitable retaining device under pinion to prevent damage to parts or personal injury. Using suitable tools, remove pinion nut and washer. Scribe alignment marks on pinion shaft and flange to aid in reassembly, then remove flange. *CAUTION – Pinion may fall into retaining device when flange is removed.* If pinion did not fall, tap loose with a soft faced hammer, while supporting pinion from below. Remove retaining device and pinion from holding fixture.

3) Pry pinion oil seal from retainer, taking care not to damage inner surface of retainer. Remove outer bearing from retainer, then remove collapsible spacer from pinion shaft and discard. Using suitable pullers and adapters, remove pinion inner bearing from shaft. Place unit on an arbor press, then using suitable adapters, press inner and outer pinion bearing cups from retainer.

Checking Cap Spread & Gear Case Removal – Install a suitable dial indicator, support and plate (see illustration) to housing and bearing cap. Indicator should make a firm contact at a 90° angle with plate. Set dial indicator to zero, then loosen but do not remove bolts securing left bearing cap to carrier. *NOTE – Do not disturb dial indicator reading.* Using suitable spanner wrench, loosen adjuster nut until tension on nut is released, then note and record dial indicator reading. Remove indicator assembly, then remove bearing caps and adjuster nut. Slide gear case to right to remove differential shim, then remove differential gear case from carrier housing.

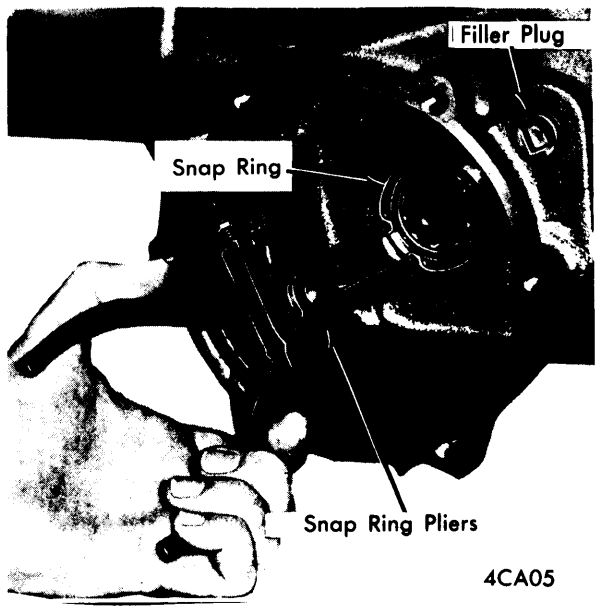
CADILLAC – EXC. ELDORADO & SEVILLE (Cont.)



CHECKING CAP SPREAD

Gear Case Disassembly – 1) Install differential case in a suitable holding fixture, then scribe aligning marks on differential case and ring gear. Loosen LEFT HAND THREAD ring gear-to-case bolts, remove three of the bolts, then install guide pins into open holes. Remove case from holding fixture and place on a table covered with cardboard, with ring gear facing downward. Remove remaining gear-to-case bolts, then tap on guide pins to remove ring gear.

2) Using a ¼" diameter pin punch, remove differential cross shaft pin, then remove cross shaft using a brass drift. Rotate internal pinion gears until one gear lines up with hole in case, then remove gear and thrust washer. Rotate assembly, remove remaining pinion gear and thrust washer, then remove both side gears and thrust washers. If required, use suitable pullers and adapters to remove differential side bearings.



REMOVING STRADDLE BEARING SNAP RING

Straddle Bearing Removal – Using snap ring pliers, remove straddle bearing outer snap ring. Install straddle bearing remover (J-23323-5), centering remover on bearing. Install driver bolt in bearing cap mounting hole, then tighten driver bolt and remove straddle bearing assembly.

CLEANING & INSPECTION

Wash all parts in a suitable solvent or mineral spirits, then dry thoroughly using dry, compressed air. Using a clean cloth, wipe inside of axle housing and differential carrier clean. Visually inspect all parts for chips, nicks, or excessive wear.

REASSEMBLY

Straddle Bearing Installation – Using a suitable installing tool, install straddle bearing and outer race assembly into carrier housing. Using snap ring pliers, install outer snap ring to secure bearing outer race in differential carrier.

Pinion Reassembly – 1) Using an arbor press, position and install inner and outer bearing cups into pinion retainer. Lubricate outer pinion bearing with rear axle lubricant and install in retainer. Pack inner lip of new pinion oil seal with wheel bearing grease, then install onto retainer. *NOTE – When properly installed, oil seal should protrude approximately 1/16".* Apply a light coat of rear axle lubricant to inner pinion bearing, then press on pinion shaft using an arbor press.

2) Install a new collapsible spacer on pinion shaft, then insert pinion shaft through retainer and position pinion flange on shaft using alignment marks made at disassembly. Install pinion nut washer and pinion nut and tighten with fingers. *NOTE – If flange did not slip on far enough to start nut and washer, tap gently with a soft hammer until nut can be started.* Using suitable tools, tighten pinion nut **only until all end play has been removed.** Remove tools, then check flange runout. *See Pinion Flange Runout.*

3) If combined runout exceeds .005", remove and reindex flange 90° from its original position on pinion shaft splines. Install pinion nut and washer and tighten until end play is removed, then recheck runout. If runout still exceeds specifications, remove and reindex 180° and check runout. If still unacceptable, replace flange, then check runout of new flange.

4) After end play is removed and runout is within specifications, tighten pinion nut to build preload. *NOTE – Preload builds quickly. Tighten pinion nut no more than ⅛ of a flat.* Remove tightening tools, install an INCH lb. torque wrench, then rotate pinion two revolutions in each direction while noting torque required to keep pinion moving. Preload for new bearings should be 22-30 INCH lbs. If original bearings are used, set proload to 5 INCH lbs. more than original reading, but no more than 15 INCH lbs. total.

5) If reading is under specification, continue tightening, but never tighten more than ⅛ of a flat without checking preload. *CAUTION – If preload specification is exceeded, it will be necessary to disassemble pinion and install a new collapsible spacer. In addition, never back off pinion nut to gain proper preload.*

CADILLAC – EXC. ELDORADO & SEVILLE (Cont.)

Pinion Installation – Install original shim(s) over guide pins in differential carrier. Lubricate new "O" ring with differential lubricant, then install on pinion retainer. Slide pinion assembly over guide pins and into differential carrier. Install three pinion retainer-to-housing bolts finger tight, remove guide pins, then install remaining bolts and tighten evenly.

REMOVING & INSTALLING INTERNAL GEARS

Gear Case Assembly – 1) Lubricate all parts with rear axle lubricant. Install side gears and thrust washers in gear case, then install pinion gears and thrust washers through case openings. Rotate pinion gears and thrust washers so that holes line up with holes in case. Install cross shaft, aligning hole in cross shaft with roll pin hole in differential case. Install roll pin on counterbore side of roll pin opening with a ¼" diameter punch until top of roll pin aligns with bottom of counterbore.

2) Install guide pins in ring gear, then using marks made at disassembly, position ring gear to gear case. Install nine ring gear-to-case bolts finger tight, then using a soft hammer, tap ring gear onto case. Remove guide pins, install remaining bolts, then alternately tighten all bolts evenly. If removed, install side bearings using suitable adapters and arbor press.

Gear Case Installation – 1) Install bearing cups on differential side bearings. *NOTE – Make sure wider bearing cup is installed on left side bearing, which is shim side of unit.* Install gear case into differential carrier, then install differential case adjuster nut, making sure threads of adjuster align with threads of carrier. Install right side bearing cap and install, but do not tighten, two cap mounting bolts.

2) Align bearing cup threads with adjuster nut threads by pulling cap straight back on mounting bolts, then gently pushing cap forward and into position. *NOTE – Bearing cap and adjuster nut threads are properly aligned when bearing cap and carrier shoulder are flush.* Adjuster nut should turn freely. Tighten bolts finger tight to keep cap seated. Slide gear case to extreme right so that ring gear and pinion are fully engaged. Adjuster nut should not be contacting right hand bearing cup.

INSTALLING ADJUSTER NUT

3) Slide left side bearing and cup to right and insert largest side bearing shim which will freely slide into place. Place beveled side of shim to the left. Install left bearing cap and lightly tighten mounting bolts, then tighten right bearing cap bolts to 50 ft. lbs.

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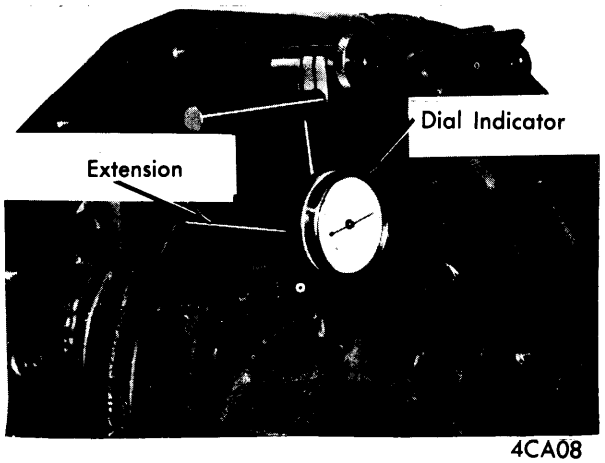
INSTALLING SIDE BEARING SHIM

CADILLAC – EXC. ELDORADO & SEVILLE (Cont.)

Side Bearing Preload – Install dial indicator and mounting tools on differential carrier. See *Checking Cap Spread & Gear Case Removal*. Position button on indicator so that it rests against inside face of plate, then set dial to zero. Using a spanner wrench, tighten adjuster nut until a reading of .003-.004" is obtained. Rotate ring gear at least one complete revolution. If cap spread reading has fallen, resume tightening adjuster nut until reading of .003-.004" is obtained. Rotate and tighten as necessary until continuous reading is obtained. Tighten left bearing cap mounting bolts to 50 ft. lbs. *NOTE – Do not hit or bump dial indicator during this procedure. If indicator is disturbed in any way, adjuster nut must be backed off and procedure repeated.*

Ring Gear & Pinion Backlash – 1) Install dial indicator and check backlash. See *Backlash Check*. Original backlash must be duplicated on any gear set that has been in use over 3,000 miles. Backlash of .006-.008" should be obtained on lower mileage or new gear sets. If backlash reading is too high, increase shim size. If reading is too low, decrease shim size. A .002" shim change will generally change backlash by .001" . Recheck backlash after every shim change.

2) If variation between three backlash readings evenly spaced around ring gear exceeds .003", proceed as follows: Remove gear case from housing, then remove ring gear from case. Check for any foreign material between ring gear and case. Replace gear case in housing without ring gear. Use a dial indicator to check runout of gear case. If runout exceeds .003", replace case. If runout is less than .003", replace ring and pinion gear set.



CHECKING GEAR CASE RUNOUT

NOTE – If backlash is only slightly above specification, .0035" for example, and gear case runout is only .002" for instance, re-index ring gear 180° from original position on gear case and test backlash variance. If reading is still greater than .003", re-index gear another 90° and test again for backlash variance.

Gear Tooth Pattern Check – A final tooth contact pattern should be made after backlash, pinion bearing preload and case spread have been set. See *Rear Axle Gear Tooth Patterns in this section*. Obtain correct ring and pinion backlash, while maintaining as close to desirable gear tooth pattern as possible. Three sizes of pinion shims are available: .010", .007", and .006". *NOTE – Recheck backlash after every pinion shim change.*

SPECIFICATIONS

ADJUSTMENT SPECIFICATIONS

Application	Clearance or Torque
Pinion Flange Combined Face & Radial Runout	.005"
Cap Spread	.003-.004"
Pinion Bearing Preload	
New Bearings	22-30 INCH lbs.
Used Bearings	15 INCH lbs. (Max)
Ring Gear to Pinion Backlash	
New Gear Set (Less than 3000 miles)	.006-.008"
Used Gear Set (Greater than 3000 miles)	①

① – Re-establish reading found on disassembly.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Bearing Cap Bolts	50
Ring Gear-to-Case Bolts	85
Pinion Retainer-to-Carrier Screws	30
Gear Case Bolts (Controlled Differential)	30
Carrier Cover Screws	30
Adjuster Nut Lock Tab Screw	18
Pinion Nut	①
Differential Carrier Nose Bumper Arm Screws	50
Pinion Flange-to-Universal Joint Flange Attaching Screws	70
Differenital Filler Plug	30

① – *See Pinion Reassembly*