ARTICLE BEGINNING

2000-01 DRIVE AXLES
General Motors Differentials & Axle Shafts

Chevrolet; Camaro
Pontiac; Firebird

DESCRIPTION & OPERATION

Drive axle is a semi-floating, hypoid-gear type with integral housing. Center line of pinion is set below center line of ring gear. A removable steel cover, bolted to rear of housing, permits servicing differential case without removing axle assembly from vehicle.

On vehicles with ABS, sensor is located on top of axle housing. Speed sensor ring is pressed onto the differential case.

On vehicles equipped with Traction Control System (TCS), speed sensors are located in each backing plate. Speed sensor rings are press fit on axle shafts and are not serviceable.

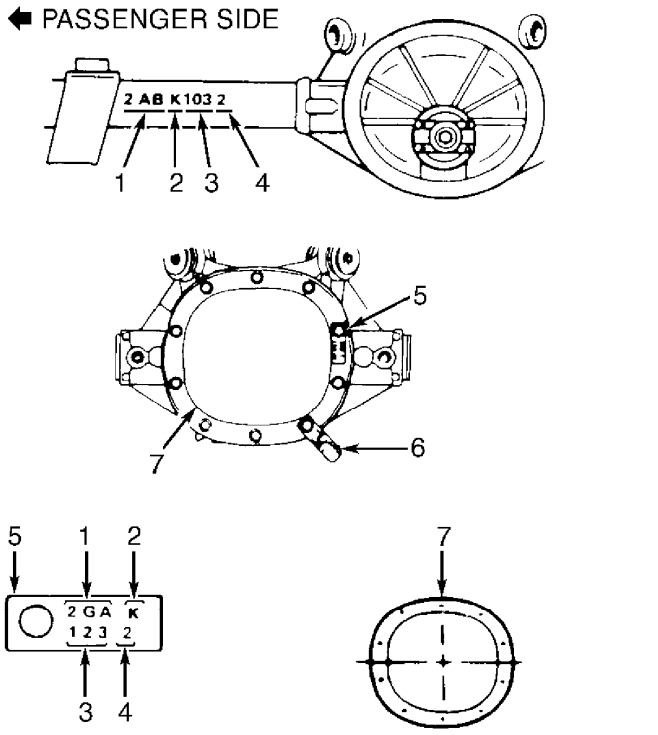
AXLE RATIO & IDENTIFICATION CODE

Rear axle ratio, differential type, manufacturer and build date information is stamped on forward side of right axle tube. Service parts identification label will have Regular Production Option (RPO) codes for rear axle identification. See Fig. 1. See AXLE RATIO IDENTIFICATION table.

AXLE RATIO IDENTIFICATION

Application	Teeth: Ring Gear/Pinion	RPO Code	Axle Code
7 5/8" Ring Gear			
2.73:1	41/15	GU2	(1)
3.08:1	40/13	GU4	(1)
3.23:1	42/13	GU5	(1)
3.42:1	41/12	GU6	(1)

(1) - Axle code not available from manufacturer.



1. Axle Code
2. Manufacturer Code
   "K" - GM Of Canada
   "G" - Saginaw Detroit
3. Build Date
4. Shift: 1 - Day; 2 - Night
5. Axle Code Tag
6. Limited Slip Tag
7. Ring Gear Cover 7 5/8"

99E08258

Fig. 1: Locating Rear Axle Identification Codes
Courtesy of General Motors Corp.

LUBRICATION

Fill differential with 75W-90 GL-5 Gear Lubricant. Add 4 ounces (.12L) of limited slip additive to all limited slip differentials. Lubrication capacity is 3.5 pts. (1.7L).

NOTE: Fill no lower than 9/16" (15 mm) below edge of filler hole.

TROUBLE SHOOTING

NOTE: See appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.

REMOVAL & INSTALLATION

AXLE SHAFT & BEARING

Removal

1) Raise and support vehicle. Remove rear wheels and brake drums (or disc calipers and rotors). On vehicles equipped with ABS and TCS, install ABS Exciter Ring Protector Kit (J-39446) to speed sensor

rings.

2) Remove cover and drain lubricant from differential. Remove pinion shaft lock bolt and pinion shaft. Push axle shaft toward center of vehicle, and remove "C" lock from inner end of shaft. Carefully remove axle shaft from housing.

3) Remove brake backing plate (or caliper mounting bracket). Remove axle shaft seal using a pry bar behind steel case of seal. Insert Bearing Remover (J-22813-01) into bore. Position remover behind bearing so tangs engage bearing outer race. Using a slide hammer, remove bearing. Discard bearing and seal.

Installation

1) Lubricate new bearing with gear oil. Using Bearing Installer (J-23765) and Handle (J-8092), install bearing. Bearing is properly seated when installer bottoms against bore.

2) Lubricate new seal with gear oil. Position seal onto Seal Installer (J-23771). Drive seal until flush with axle tube.

3) To complete installation, reverse removal procedure. Pull axle shaft outward after installing "C" lock to seat lock into counterbore of axle side gear. Install pinion shaft and lock screw, and tighten to specification. See TORQUE SPECIFICATIONS (DIFFERENTIAL ASSEMBLY) table. Remove ABS Exciter Ring Protector Kit (J-39446) from speed sensor rings, if installed.

COMPANION FLANGE & OIL SEAL

Removal

1) Raise and support vehicle. Mark drive shaft to companion flange for installation reference. Remove drive shaft. Scribe alignment mark on companion flange, pinion and pinion nut so proper drive pinion preload can be maintained.

2) Using an INCH lb. torque wrench, measure and record pinion bearing preload. Remove pinion nut and washer. Using a puller, remove companion flange. See Fig. 2. Using care not to damage housing, drive seal out of housing with a blunt chisel.

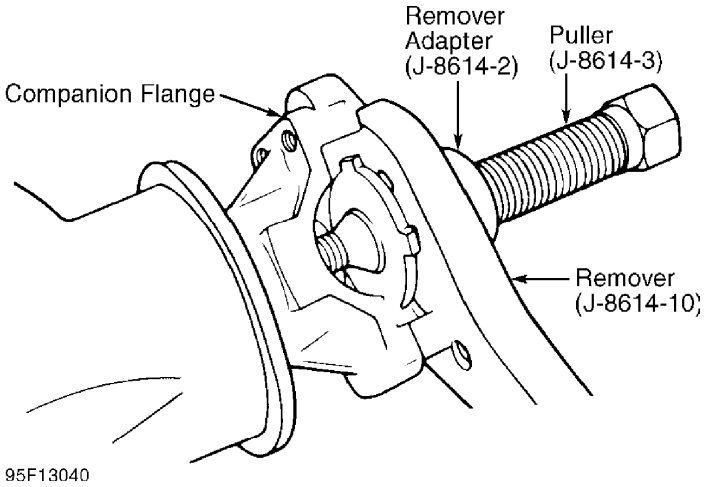


Fig. 2: Removing Companion Flange
Courtesy of General Motors Corp.

Installation
1) Pack seal lip of new seal with lithium-based, extreme-pressure grease. Drive seal into housing until seated against shoulder. Install companion flange, washer and pinion nut.

NOTE: If preload specification is exceeded, a new collapsible spacer must be installed and nut retightened until correct preload is obtained.

2) Gradually tighten pinion nut. Turn drive pinion several times during tightening to seat bearings. Ensure pinion bearing preload is 3-5 INCH lbs. (.3-.6 N.m) more than reading obtained during removal. Install drive shaft.

REAR AXLE ASSEMBLY

Removal
1) Raise and support vehicle. Remove rear tires. Place supports under rear axle assembly. Disconnect shock absorbers from axle.
2) Loosen parking brake cable adjuster nut. Remove parking brake cables from adjuster and body clips. Remove stabilizer bar. Scribe alignment mark on companion flange and drive shaft for installation reference. Remove drive shaft.
3) Remove brakeline junction block bolt from axle. Disconnect brakelines from junction block and wheel cylinders/calipers.
4) Disconnect brakeline from axle mounting clips. Remove or clear brakelines away from axle assembly. Disconnect lower control arms, rear axle tie rod and torque arm from axle.
5) Lower axle and remove springs. Remove brake drums and backing plates (or calipers and rotors), and support out of way. Carefully lower axle and remove from vehicle.

Installation
To install, reverse removal procedure. Use a NEW cover gasket when installing cover. Refill axle housing with proper lubricant. Bleed and adjust brakes.

OVERHAUL

All models equipped with limited slip use the Zexel Torsen (limited slip) differential unit. The Zexel Torsen differentials is not serviceable and must be replaced as a unit.

DISASSEMBLY

NOTE: On ABS equipped vehicles, speed sensor ring is located either on pinion shaft or on differential case. If removed, DO NOT reuse speed sensor ring.

Differential Case
1) Remove axle shafts. See AXLE SHAFT & BEARING under REMOVAL & INSTALLATION. Check ring and pinion gear backlash and pinion bearing

preload. This will indicate gear or bearing wear, or an error in backlash or preload setting. On ABS equipped vehicles, remove speed sensor and install ABS Exciter Ring Protector Kit (J-39446) to speed sensor ring.

2) Mark differential bearing caps and housing for reassembly reference. Remove caps and differential case from housing. Remove bearing cups and shims. Keep each shim set with proper bearing cap for reassembly.

3) Remove differential pinion shaft, gears and side gears with thrust washers. See Fig. 3. Keep components in order for reassembly. Remove ring gear bolts (left-hand threads). Tap ring gear off differential case using soft drift and hammer. On ABS models, DO NOT pry between speed sensor ring and ring gear. Using brass hammer, remove speed sensor ring (if necessary).

4) Check pinion bearing preload. Remove pinion nut and companion flange. See COMPANION FLANGE & OIL SEAL under REMOVAL & INSTALLATION. Remove drive pinion and front bearing. If necessary, remove pinion bearing cups from housing using a brass drift. Remove and discard collapsible spacer and speed sensor ring (if equipped). Press drive pinion out of rear bearing and note thickness of pinion depth shim pack.

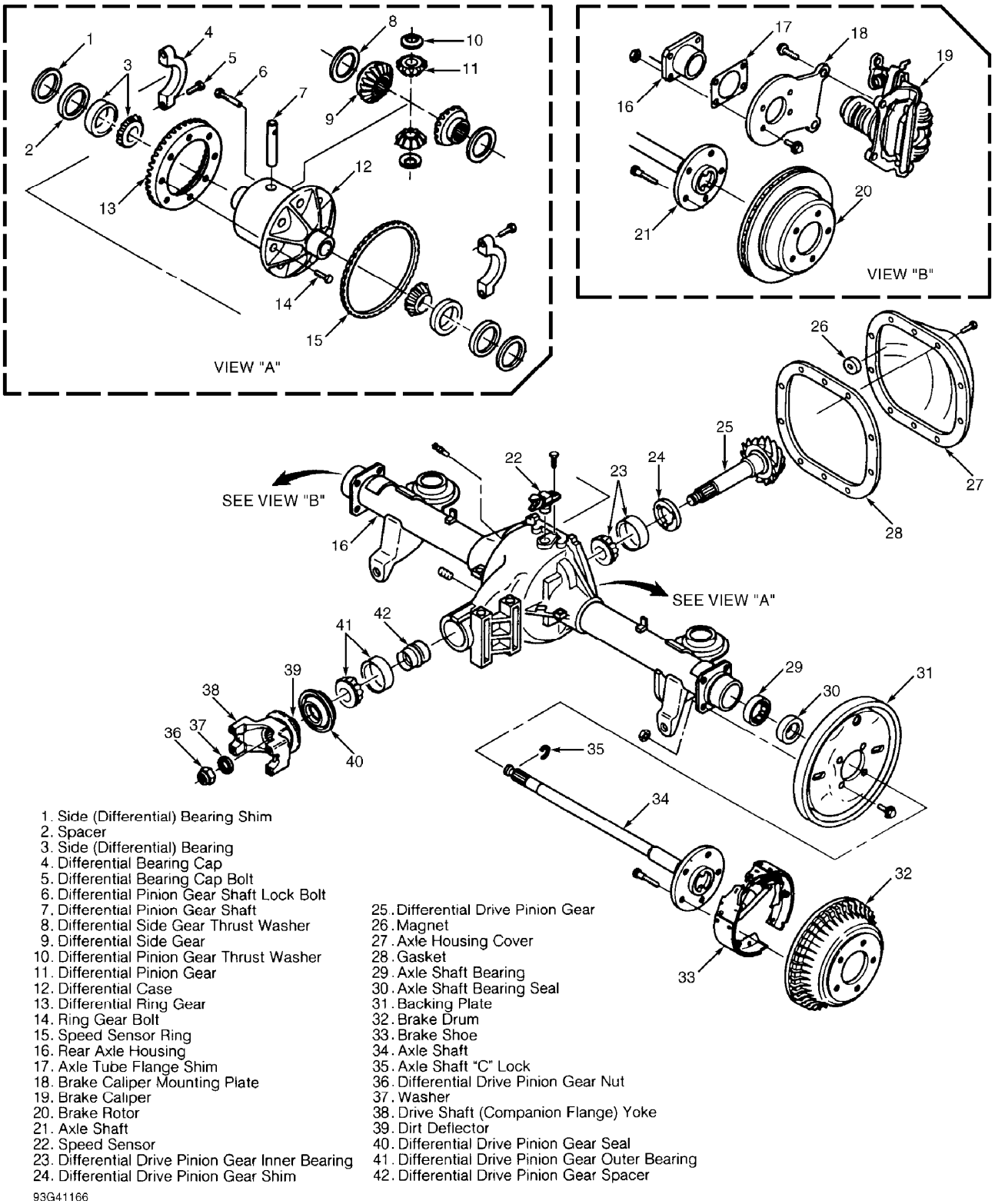


Fig. 3: Exploded View Of Rear Axle Assembly
Courtesy of General Motors Corp.

REASSEMBLY

Pinion Depth Adjustment

1) Thickness of drive pinion rear bearing shim must be determined whenever a new axle housing, ring and pinion set, or pinion bearings and races are installed. Depth of mesh is determined using Pinion Setting Gauge Set (J-21777). See PINION DEPTH GAUGE SET table.

NOTE: Checking procedure for different axle sizes is the same. However, gauge set components vary between axles.

2) If removed, lubricate and install pinion bearings into races. Install lubricated pinion bearings. Position gauge plate and rear pinion bearing pilot on preload stud. Install assembly through rear pinion bearing, front pinion bearing and front pinion bearing pilot. See Fig. 4.

3) Install hex nut until snug. Rotate bearings to ensure proper seating. Hold preload stud stationary with a wrench on flats. Tighten hex nut until 20 INCH lbs. (2.3 N.m) is required to rotate bearings.

PINION DEPTH GAUGE SET

Tool Name & Application	Tool Number
Arbor	J-23597-1
Dial Indicator	J-8001
Gauge Plate	J-23597-11
Front Pinion Bearing Pilot	J-21777-42
Preload Stud	J-21777-43
Rear Pinion Bearing Pilot	J-21777-40
Side (Differential) Bearing Gauge Discs	J-21777-45

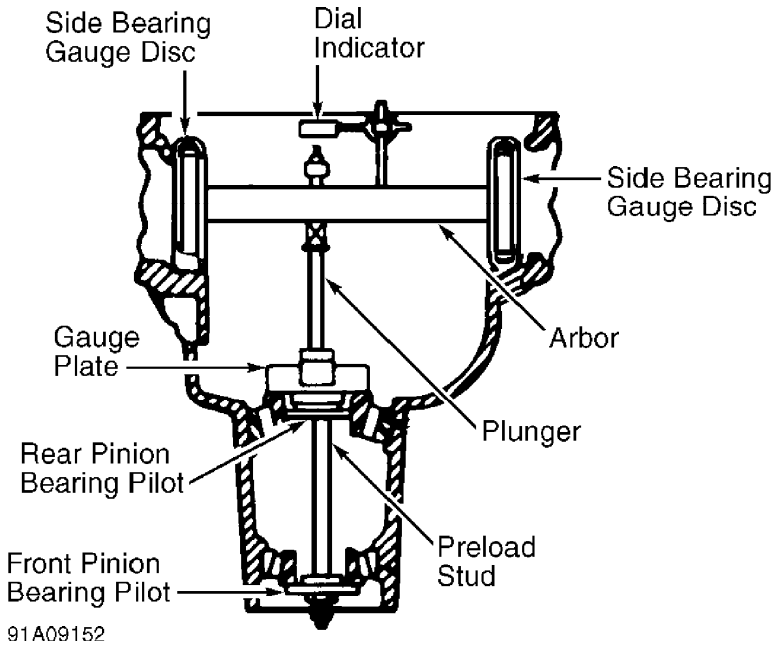


Fig. 4: Installing Pinion Depth Gauge Set
Courtesy of General Motors Corp.

4) Mount side bearing gauging discs onto ends of arbor. Place arbor into carrier ensuring discs are properly seated. Install side bearing caps and bolts. Tighten bolts to avoid movement.

5) Position dial indicator onto mounting post of arbor with contact button resting on top surface of plunger. Preload dial indicator one-half revolution and tighten. Place plunger onto gauging area of gauge plate.

6) Rock plunger rod slowly back and forth across gauging area until dial indicator reads greatest deflection. Set indicator to zero. Repeat rocking action several times to verify setting. Once zero reading is obtained, remove plunger from gauging area.

7) Dial indicator will now read required pinion shim thickness for a "nominal pinion". Record this reading. Check drive pinion for painted or stamped markings on pinion stem or a stamped code number on small end of pinion gear. See Fig. 5.

8) If marking is a positive number, subtract that many thousandths from indicator reading. If marking is a negative number, add that many thousandths to indicator reading. This will be the thickness of rear pinion bearing shim pack.

9) If no markings are found on pinion, use dial indicator reading as shim thickness. Remove bearing caps and gauging tools from housing. Place selected shim pack on drive pinion. Using a press, install lubricated pinion bearing on pinion shaft. Install NEW speed sensor ring (if equipped).

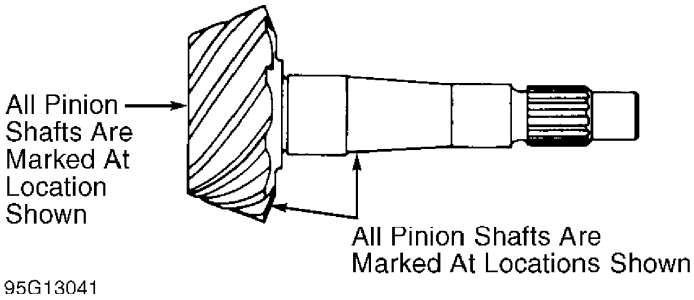


Fig. 5: Locating Pinion Shaft Markings
Courtesy of General Motors Corp.

Differential Case Reassembly

1) Install NEW speed sensor ring (if removed). Install ring gear onto case with new bolts. Alternately tighten bolts to specification to pull ring gear into position on case. See TORQUE SPECIFICATIONS (DIFFERENTIAL ASSEMBLY)table. Place side gear thrust washers over side gear hubs.

2) Install assemblies into case in their original positions. Install pinions and thrust washers into case. Install pinion shaft and lock bolt. Using bearing installer, install side bearings onto differential case.

Differential Shim Selection

1) Measure thickness of original side bearing preload shims. Select a standard .17" (4.3 mm) service spacer and service shims with a total thickness slightly less than original shims. Standard service shims are steel and are available from .040-.082" (1.02-2.08 mm).

Production shims are cast iron and available from .210-.272" (5.33-6.91 mm).

NOTE: Do not attempt to reuse production shims, because they may break when tapped into position.

2) Install differential case into housing. Install spacer between each bearing cup and housing with chamfered edge of spacer against housing. Install left bearing cap loosely so that differential case is free to move. With left bearing race and spacer against housing, install both left and right service shims between right bearing race and service spacer.

3) Insert progressively larger feeler gauges between right service spacer and shim pack until a slight drag is felt. Total thickness of required shim pack is equal to feeler gauge thickness plus shim thickness used in step 1). Remove differential case, shims and spacers from axle housing.

Pinion Preload Adjustment

1) Install a NEW collapsible spacer over pinion stem. Position pinion into housing. While holding pinion forward, carefully drive front pinion bearing onto pinion shaft until a few threads are exposed.

2) Install NEW oil seal, companion flange, washer and nut. Tighten nut until end play is removed. Rotate pinion several times to seat bearings.

CAUTION: If preload is exceeded, a new collapsible spacer must be installed and nut retightened until proper preload is obtained.

3) Check preload using an INCH lb. torque wrench. Continue tightening nut and checking preload until correct preload is obtained. DO NOT overtighten. See AXLE ASSEMBLY SPECIFICATIONS table.

Ring & Pinion Gear Backlash

1) With pinion depth set and pinion installed, place differential case and ring gear assembly into axle housing. Select 2 shims with a combined thickness equal to that of service shims and feeler gauge used in differential shim selection procedure. Install shims and spacers between bearing cups and housing. Install differential bearing caps and tighten cap bolts.

2) Rotate differential case several times to seat bearings. Check backlash using a dial indicator. Increase or decrease shim size where necessary to correct backlash reading. See Fig. 6. Recheck backlash at 4 points equally spaced around ring gear. Ensure that variation between points does not exceed .002" (.05 mm).

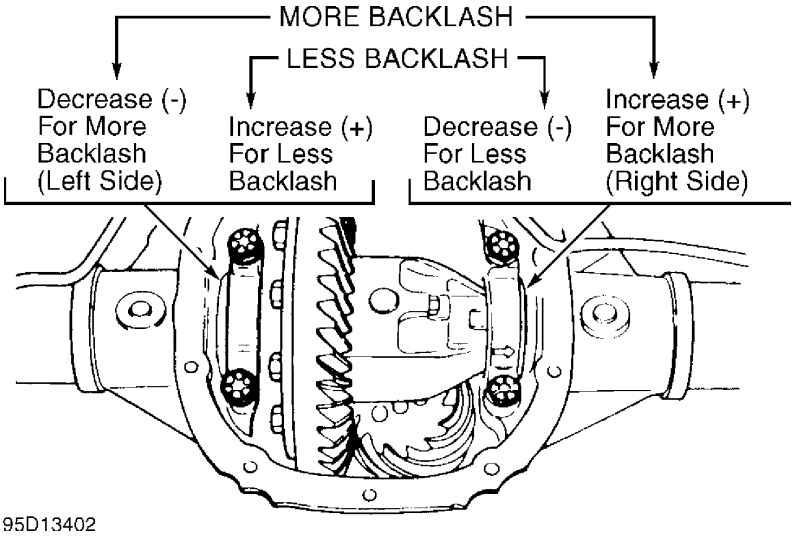


Fig. 6: Adjusting Ring & Pinion Gear Backlash
Courtesy of General Motors Corp.

Differential Bearing Preload

1) Remove differential bearing caps from ring gear and increase left and right shim sizes .004" (.10 mm). Gentle tapping may be necessary to install second shim. Ensure shims are seated and differential turns freely.

CAUTION: Avoid damaging seals when installing axle shafts.

2) On all ring gears, using gear marking compound, check gear tooth contact pattern to verify proper assembly and adjustment. See GEAR TOOTH CONTACT PATTERNS article in GENERAL INFORMATION. Complete necessary settings, and install axle shafts. Install differential cover, and fill with lubricant.

AXLE ASSEMBLY SPECIFICATIONS

AXLE ASSEMBLY SPECIFICATIONS

Application	INCH Lbs. (N.m)
Pinion Bearing Preload (1)	
New Bearing	15-30 (1.7-3.4)
Used Bearing	10-15 (1.1-1.7)
Total Assembly Preload (2)	
New Bearing	32-55 (3.6-6.2)
Used Bearing	16-28 (1.8-3.2)
	In. (mm)
Ring Gear Backlash	.005-.009 (.13-.23)

(1) - Measured with new collapsible spacer and seal, without ring gear installed.
(2) - Measured at drive pinion gear nut.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS (DIFFERENTIAL ASSEMBLY)

Application	Ft. Lbs. (N.m)
Drive Shaft "U" Joint Bolt	16 (22)
Differential Bearing Cap Bolt	55 (75)
Differential Filler Plug	26 (35)
Differential Shaft Lock Bolt (1)	27 (37)
Housing Cover Bolt	22 (30)
Ring Gear Bolt (Left-Hand Threads) (2)	89 (121)
Sensor Plug Mounting Bolt/Screw	7 (10)
Wheel Lug Nut	100 (136)
Wheel Speed Sensor Mounting Plug	7 (10)
	INCH Lbs. (N.m)
Differential Drive Pinion Gear Setting Gauge Nut	20 (2.3)

(1) - Threads must be coated with Loctite No. 242 before installation.
(2) - Always use NEW ring gear bolts.

TORQUE SPECIFICATIONS (REAR AXLE)

Application	Ft. Lbs. (N.m)
Drive Shaft "U" Joint Bolt	16 (22)
Height Sensor Control Mounting Bolt	10 (14)
Rear Axle Lower Control Arm	
Bolt	87 (118)
Nut	60 (81)
Rear Axle Tie Rod Brace Bracket Nut	60 (81)
Rear Axle Tie Rod Bracket-To-Brace Bracket Bolt	35 (48)
Rear Axle Torque Arm Bolt	96 (130)
Rear Axle Torque Arm Bracket Nut	33 (45)
Rear Axle Torque Arm Inner Bracket Bolt	37 (50)
Rear Axle Torque Arm Nut	97 (132)
Rear Axle Torque Arm Outer Bracket Bolt	20 (27)
Rear Axle Torque Arm Vibration Dampener Nut	37 (50)
Rear Shock Absorber Nut	
Lower	66 (89)
Upper	13 (18)
Rear Stabilizer Shaft Bolt/Nut	17 (23)
Rear Stabilizer Shaft Insulator Clamp Nut	18 (24)
Wheel Speed Sensor Mounting Bolt	7 (10)

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END OF ARTICLE

