

## ROCKWELL 12" RING GEAR

### Chevrolet & GMC Rear Axle

**NOTE:** **DRIVE AXLE USAGE** — The Rockwell 12" ring gear drive axle is used on some Chevrolet P30 and GMC P3500 models.

### DESCRIPTION

The Rockwell drive axle uses a heavy duty hypoid drive pinion and ring gear. The differential and gear assembly is mounted on tapered roller bearings.

The straddle-mounted pinion has 2 tapered roller bearings in front of the pinion teeth.

The 3rd bearing is behind the pinion teeth. The preload on the differential side bearings is set by adjusting nuts on which bearing cups rest. The differential has a 2-piece case and 4 differential pinion gears.

### AXLE RATIO & IDENTIFICATION

The 12" ring gear drive axle assembly is the only one used on General Motors vehicles that has a removable carrier. To determine axle ratio, refer to *Drive Axle Ratio Identification* in this Section.

### REMOVAL & INSTALLATION

#### AXLE SHAFT

##### Removal

Remove dust cap, and install adapter (J-8117) in tapped hole on shaft flange. Install slide hammer, and remove axle shaft.

##### Installation

To install, reverse removal procedure, using new gaskets.

#### WHEEL HUB & SEAL

##### Removal

1) Remove axle shaft. Remove lock nut retainer, lock nut, adjusting nut retainer, adjusting nut, and thrust washer from axle housing.

2) Pull hub and drum assembly straight off axle housing. Pry old oil seal from wheel hub, using care not to damage bore surface. Thoroughly clean seal contact surface area.

##### Installation

1) Pack cavity between seal lips with high melting point wheel bearing lubricant. Position seal in hub bore.

2) Using seal installer (J-24428), carefully press seal into hub until seal is flush with edge of hub. Install hub onto axle housing, and install axle shaft.

#### WHEEL BEARINGS

##### Removal

1) With wheel hub removed from vehicle, use a long drift or punch to drive inner bearing, cup, and oil seal from hub.

2) Remove outer bearing retaining ring. Drive outer bearing out of hub, using outer bearing cup tool (J-24426).

**CAUTION:** Inner bearing cup and outer bearing retaining ring must be removed before attempting to remove outer bearing cup.

##### Installation

1) Place outer bearing assembly into hub. Using bearing cup installer (J-8608), drive bearing past retaining ring groove in hub. Be sure chamfer of bearing cup installer (J-8608) does not contact bearing cup.

2) Install outer bearing retaining ring, and drive cup into hub until seated. Place inner bearing cup into hub. Using bearing cup driver (J-24427), drive cup into hub until seated against shoulder.

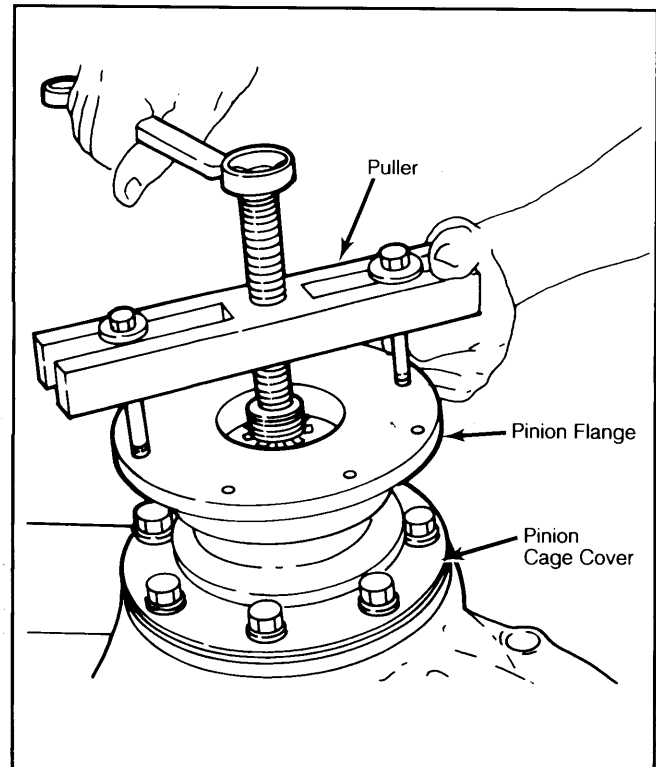
3) Install new oil seal with oil seal installer (J-24428). Place hub assembly onto axle housing. Install adjusting nut, and adjust rear wheel bearing.

#### PINION FLANGE & SEAL

##### Removal

1) Disconnect propeller shaft and tie out of the way. Scribe a line down pinion nut, pinion stem and pinion flange for reassembly reference. Remove pinion nut and pull pinion flange from stem. See Fig. 1.

**Fig. 1: Removing Pinion Flange from Rockwell 12" Axle.**



*Do not use hammer to drive off flange.*

2) Remove bolts holding oil seal retainer to carrier. Remove retainer and pry out oil seal from bore, using care not to damage machined surface.

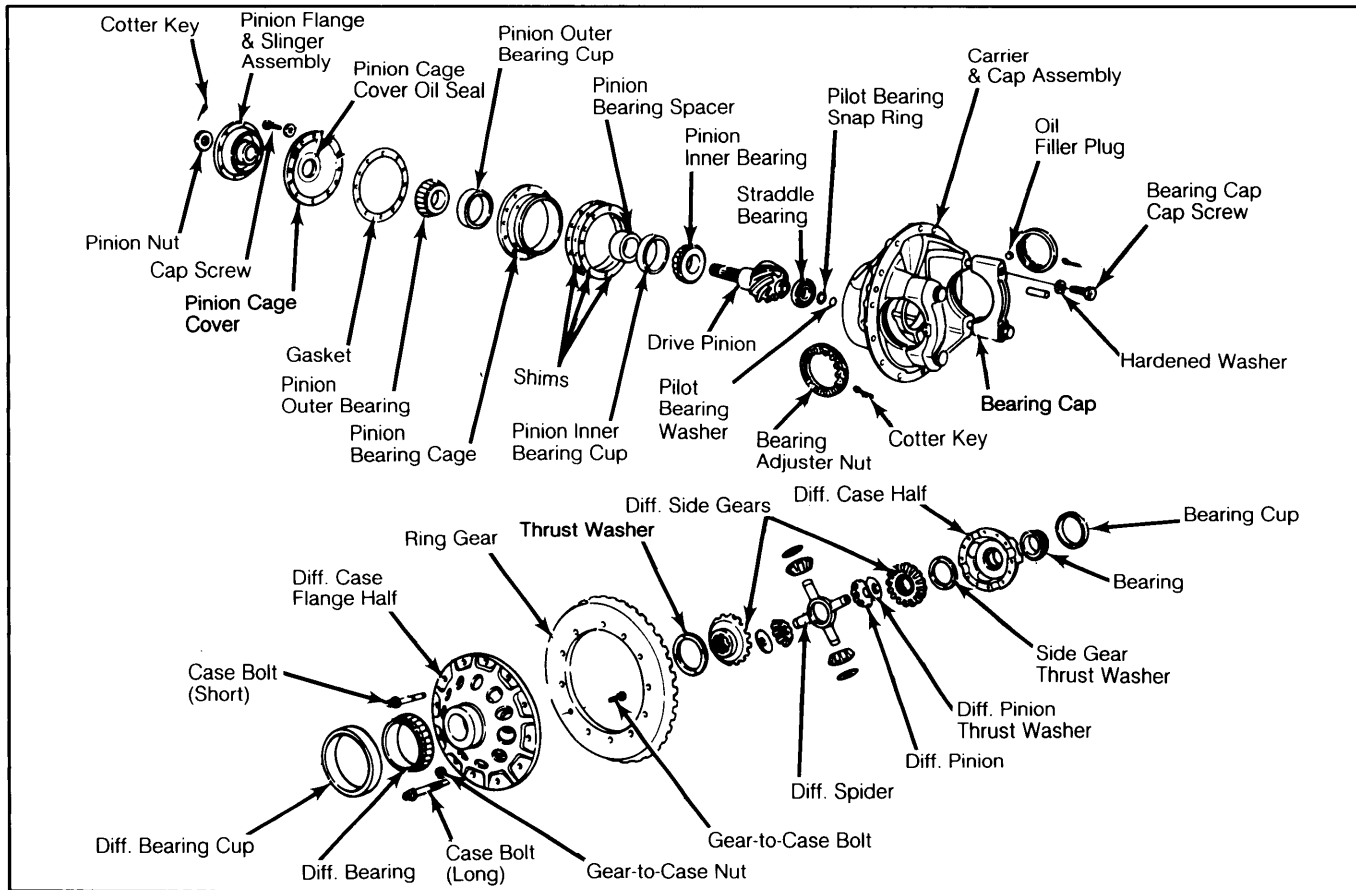
##### Installation

Lubricate cavity between seal lips with bearing lubricant. Install a new pinion oil seal into bore, using (J-22281). Be sure seal bottoms against shoulder in bore. Install bearing retainer to carrier. Install pinion flange, pinion nut, and propeller shaft.

# Drive Axles

## ROCKWELL 12" RING GEAR (Cont.)

Fig. 2: Exploded View of Rockwell 12" Axle Assembly



### DIFFERENTIAL CARRIER

#### Removal

1) Drain differential. Remove axle shaft from drive unit and housing. Disconnect universal at pinion shaft. Remove carrier to housing stud nuts and washers. Loosen 2 top nuts and leave on studs to prevent carrier from falling out.

2) Break carrier loose from axle housing with soft mallet. Remove top nuts and washers, and work carrier free. Use a roller jack to safely remove carrier from housing.

#### Installation

To complete installation, reverse removal procedure.

### OVERHAUL

#### DIASSEMBLY

**NOTE:** Check and record ring gear backlash and pinion bearing preload before disassembly.

#### Case & Gear Assembly

1) With carrier in holding fixture. Loosen jam nuts, and back off thrust adjusting screw. Center punch 1 differential carrier leg and bearing cap to identify for reassembly.

2) Remove differential adjusting nut locks and bearing cap bolts. Mark bearing caps and carrier for reassembly. Remove adjusting nuts and bearing caps. Remove differential and ring gear assembly from carrier.

3) Mark differential case halves for reassembly. Remove bolts, and separate case halves. Remove spider, pinions, side gears, and thrust washers. If necessary, remove rivets and separate gear and case.

#### Pinion & Cage Assembly

Hold flange and remove pinion nut and washer. Remove flange with puller. Remove pinion cage capscrews. Remove bearing cover and seal assembly. Remove drive pinion bearing cage. Wire shim pack together, and save for reassembly reference.

#### CLEANING & INSPECTION

1) Clean all parts in cleaning solvent. Inspect all bearings, bearing cups, races, and rollers for scoring, chipping, or excessive wear. Inspect axle shaft and side gear splines for excessive wear.

2) Inspect ring gear and pinion for scoring, cracking, or chipping. Inspect differential case, pinion side gears, thrust washers, and pinion shaft for cracks, scoring, galling, or excessive wear.

#### REASSEMBLY & ADJUSTMENT

##### Selecting Pinion Cage Shim Pack

To accurately install a new pinion and cage assembly into carrier, mathematically calculate the proper pinion cage shim pack thickness:

Example:

Original Pack Thickness	.030"
Original Variation Number (+2)	-.002"

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Standard Pack Thickness	.028"
New Variation Number (+5)	+ .005"
New Pack Thickness	.033"

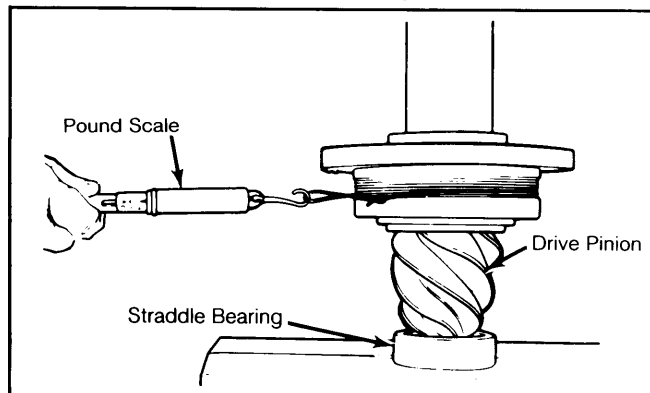
### Pinion & Cage

1) If new cups are to be used, press firmly against pinion bearing cage shoulders. Lubricate bearings and cups. Press rear thrust and radial bearings firmly against pinion shoulders with a sleeve that will bear only on inner race.

2) Install radial bearing lock ring, and squeeze ring into pinion shaft groove with pliers. Insert pinion and bearing assembly in pinion cage, and position spacer(s) over pinion shaft. Press front bearing firmly against spacer.

3) Rotate cage several revolutions to ensure normal bearing contact. While in press under pressure, check bearing preload torque. Wrap soft wire around cage, and pull on horizontal line with pound scale. Record rotating torque, not starting torque. See Fig. 3.

Fig. 3: Checking Cage Preload Torque on Pinion Shaft.



Preload torque is checked with a soft wire & pound scale.

4) Press flange or yoke against forward bearing and install washer and pinion shaft nut. Place pinion and cage assembly over carrier studs, hold flange and tighten pinion shaft nut to correct torque.

5) Recheck pinion bearing preload torque. Hold flange, and remove pinion shaft nut and flange. Lubricate pinion shaft oil seal, and cover outer edge of seal body with a non-hardening sealing compound. Press seal against cover shoulder with seal driver.

6) Install new gasket and bearing cover. Press flange against forward bearing, and install washer and pinion shaft nut. Tighten nut to correct specifications.

### Differential & Ring Gear

Heat ring gear to 180°F (82°C) for 10 minutes before assembling to differential. Do not press or drive ring gear onto case. New differential case and ring gear bolts should be used in place of rivets (if required).

### Differential Pinion & Side Gear

1) Position thrust washer and side gear in ring gear and case half assembly. Place spider with pinions and thrust washers in position. Install components, side gear, and thrust washer.

2) Align mating marks, position component case half, and draw assembly together with 4 bolts. Check assembly for free rotation of differential gears, and correct if necessary.

3) Install remaining bolts, and tighten to specifications. If bearings are to be replaced, press

squarely and firmly on differential case halves. Place differential in vise.

4) Insert checking tool (made from splined axle shaft end, with nut welded on the end) into differential nest. Allow splines of tool to engage with spline of 1 side gear only. Using torque wrench, rotate differential. Correct rolling resistance is 50 ft. lbs. (68 N.m).

5) Temporarily install bearing cups, threaded adjusting rings, and bearing caps. Tighten cap screws to proper torque. Bearing cups must be of a hand fit in bores. Once cups fit, remove bearing caps. Coat differential bearings cones and cups with rear axle lubricant.

6) Place bearing cups over assembled differential bearing cones. Position differential assembly in carrier. Insert bearing adjusting nuts, and turn hand tight against bearing cups.

7) If bearing caps do not position properly, adjusting nuts may be cross threaded. Remove caps and reposition adjusting nuts. Install flat washers and cap screws. Tighten stud nuts or cap screws to correct torque.

### Bearing Preload

1) Use dial indicator at back face of gear. Loosen bearing adjusting nut on side opposite gear, but only enough to notice end play on indicator. Tighten same adjusting nut until zero end play is obtained.

2) Check gear for runout. If runout exceeds .008" (.20 mm), remove differential, and check for cause. Tighten adjusting nuts 1 notch each from zero end play to preload differential bearings.

### Backlash

1) If drive gear is not going to be replaced, use established backlash recorded before disassembly. For new gears, the new backlash should be initially set at .010" (.25 mm).

2) Adjust backlash by moving gear only. This is done by backing off 1 adjusting ring, and advancing the opposite ring the same amount. Install cotter keys. Remove carrier from stand, and position with back face of hypoid (spiral bevel) gear upward.

3) Remove adjusting screw and lock nut. Install thrust screw and lock nut, and tighten thrust screw sufficiently to locate thrust block firmly against back face of hypoid gear.

4) To secure correct adjustment of .010-.015" (.25-.38 mm) clearance, loosen adjusting screw (thrust screw) ¼ turn and lock securely with nut. Recheck to ensure minimum clearance of .010" (.25 mm) during full rotation of bevel gear.

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Pinion Bearing Cage Bolts	
Grade 5 .....	25-35 (34-48)
Grade 7 .....	30-40 (41-54)
Grade 8 .....	35-50 (48-68)
Pinion Shaft Nut .....	300-400 (408-544)
Thrust Screw Jam Nut .....	150-190 (204-258)
Adjusting Ring Lock .....	20-30 (27-41)
Bearing Cap Bolts .....	115-140 (156-190)
Ring Gear-to-Case .....	85-115 (116-156)
Diff. Case Capscrews .....	60-75 (82-102)