DRIVE AXLE - REAR NON-INTEGRAL

1991 Mitsubishi Montero

1991—92 DRIVE AXLES
Differentials & Axle Shafts - Rear Non-Integral

Mitsubishi: Montero, Pickup

DESCRIPTION

Rear axle features a rigid banjo-type housing with semi-floating axle shafts. Differential consists of hypoid reduction gears and straight bevel differential gears. Limited Slip Differential (LSD) is available on all models.

AXLE RATIO & IDENTIFICATION

Ratio is determined by dividing number of ring gear teeth by number of drive pinion teeth.

AXLE RATIO SPECIFICATIONS

Application	Ratio
Montero	4.63
Pickup	
2WD w/Light Suspension	3.91
2WD w/Heavy Suspension	4.22
4WD	4.22

LUBRICATION

CAPACITY

REAR AXLE GEAR OIL CAPACITY

Application	Pts. (L)
Montero	5.4 (2.5)
Pickup	
Conventional	
2WD	3.2 (1.5)
4WD	5.5 (2.6)
LSD	5.5 (2.6)

FLUID TYPE

Conventional differentials use API classification GL-5 SAE 80W or 90W. Limited slip differentials use Mitsubishi Gear Oil (8149630 EX) or Mopar Gear Oil (4318058) and Mopar Friction Modifier (4318060).

TROUBLE SHOOTING

DRIVE AXLE (RWD) TROUBLE SHOOTING

PROBLEM Possible Cause	Action

KNOCKING OR CLUNKING

Differential Side Gear Clearance ..... Check Clearance

Worn Pinion Shaft ..... Replace Pinion Shaft

Axle Shaft End Play ..... Check End Play

Missing Gear Teeth ..... Check Diff./Replace Gear

Wrong Axle Backlash ..... Check Backlash

Misaligned Driveline ..... Realign Driveline

CLUNKING DURING ENGAGEMENT

Side Gear Clearance ..... Check Side Gear Clearance

Ring and Pinion Backlash ..... Check Backlash

Worn/Loose Pinion Shaft ..... Replace Shaft/Bearing

Bad "U" Joint ..... Replace "U" Joint

Sticking Slip Yoke ..... Lube Slip Yoke

Broken Rear Axle Mount ..... Replace Mount

Loose Drive Shaft Flange ..... Check Flange

CLICK/CHATTER ON TURNS

Differential Side Gear Clearance ..... Check Clearance

Worn Clutch Plates (1) ..... Replace Clutch Plates

Wrong Diff. Lubricant (1) ..... Change Lubricant

RHYTHMIC KNOCK OR CLICK

Flat Spot on Rear Wheel Bearing ..... Replace Wheel Bearing

HUM/LOW VIBRATION AT ALL SPEEDS

Faulty Wheel Bearings ..... Replace Bearings

Faulty "U" Joint ..... Replace "U" Joint

Faulty Drive Shaft ..... Balance Drive Shaft

Faulty Companion Flange ..... Replace Flange

Faulty Slip Yoke Flange ..... Replace Flange

(1) - Limited slip differential only.

DRIVE AXLE (FWD)

DRIVE AXLE (FWD) TROUBLE SHOOTING

PROBLEM Possible Cause	Action
GREASE LEAKING	
Ripped CV Boot	Replace Boot
CLICKING NOISE WHILE CORNERING	
Dry/Worn CV Joints	Replace Outer CV Joints
CLUNK ON ACCELERATION	
Dry/Worn CV Joints	Replace Inner CV Joints
Worn Trans. Gears/Bearings	Inspect Trans.
VIBRATION/SHUDDER ON ACCELERATION	
Dry/Worn CV Joints	Replace CV Joints
Alignment Out	Check Alignment
Incorrect Spring Height	Check Spring Height
SQUEALING OR HUMMING	
Dry/Worn CV Joints	Lube/Replace CV Joints
Faulty Wheel Bearing	Replace Wheel Bearing

TESTING & INSPECTION

AXLE SHAFT END PLAY

Using dial indicator, check axle shaft end play. End play must be .0020-.0079" (.05-.20 mm). If end play is not within specification, change shims to obtain correct end play. See AXLE SHAFTS under REMOVAL & INSTALLATION.

AXLE TOTAL BACKLASH

1) Raise and support rear axle. Place transmission in Neutral. Apply parking brake. Rotate drive shaft clockwise. Place reference marks on pinion dust cover and differential housing.

2) Rotate drive shaft counterclockwise and measure distance between reference marks. Differential must be removed and backlash adjusted if distance exceeds 0.2" (5.0 mm).

LIMITED SLIP DIFFERENTIAL PRELOAD

1) Place transmission in Neutral. Block front wheels. Raise one rear wheel free of ground and remove wheel. Use Axle Puller Adapter (MB990241) for Montero and Pickup models. Install adapter on wheel studs. Release parking brake.

2) Using torque wrench, measure starting torque on Pickup models while rotating wheel in forward direction. On Montero models, measure rotating torque. This measurement is read once axle is turning. Differential must be repaired if torque is less than specification. See TESTING SPECIFICATIONS table.

TESTING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Montero & Pickup	25 (34)

REMOVAL & INSTALLATION

AXLE SHAFTS

Removal

1) Block front wheels. Raise and support rear axle housing. Remove brake drum. See Fig. 1. Remove parking brake cable attaching bolts. Remove connection for parking brake cable end and rear brake assembly. Drain brake fluid from bleeder screw at left side of rear brake and disconnect brake tubes.

2) On all models, remove flange nuts and rear axle shaft assembly. Use Puller (MB990241) and Slide Hammer (MB990211) if necessary. DO NOT damage oil seal. Remove shim(s) and "O" ring. Replace if necessary.

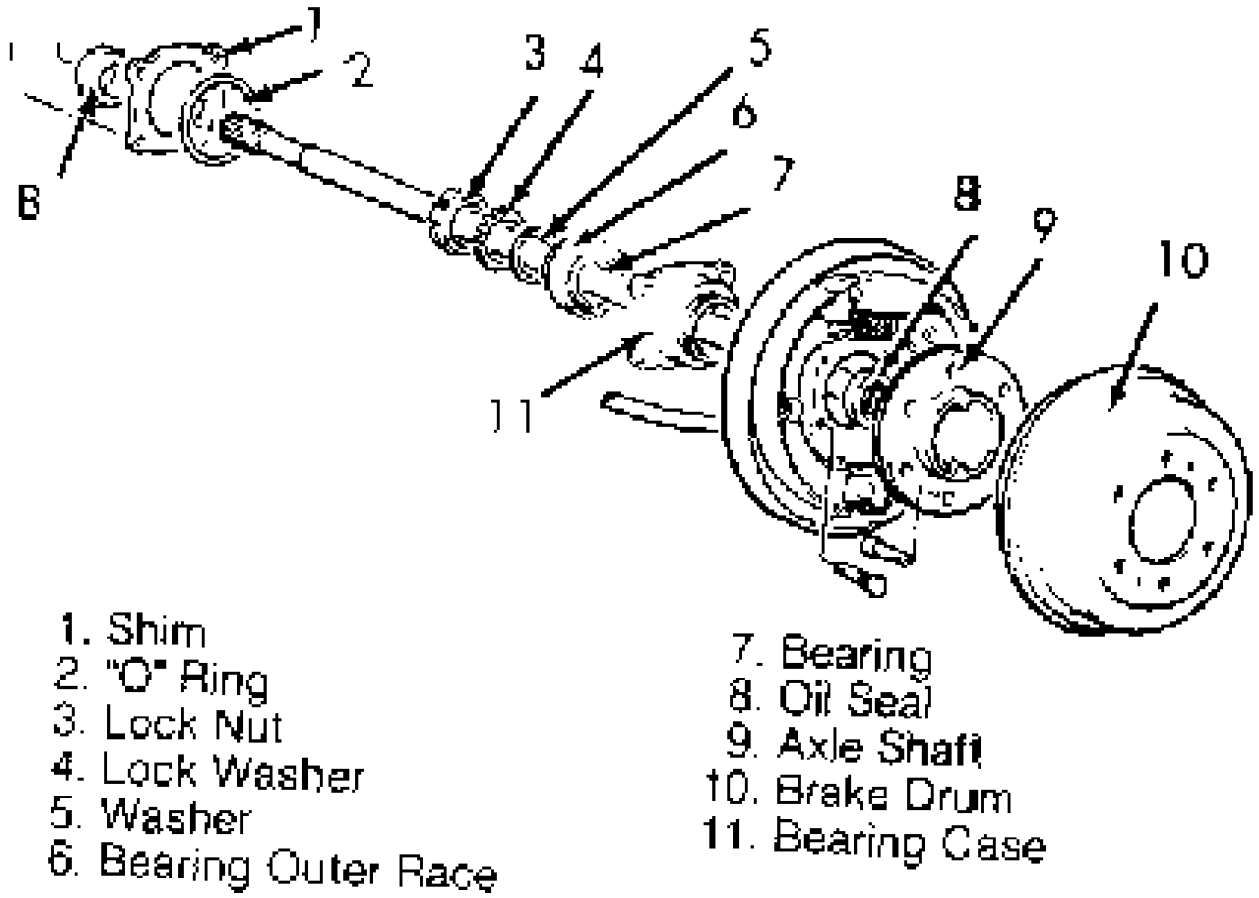


Fig. 1: Exploded View of Axle Shaft
Courtesy of Chrysler Motors.

Installation

1) Insert a new "O" ring and a shim of .04" (1.0 mm)

thickness into left side axle housing. Install left axle shaft assembly into axle housing and tighten nuts to specification. See TORQUE SPECIFICATIONS table at the end of this article.

2) Install right axle shaft assembly into axle housing WITHOUT a shim or "O" ring. Temporarily tighten nuts in diagonal sequence to 51.6 INCH lbs. (5.8 N.m) in 2 stages. Measure clearance between bearing case and rear axle housing end with a feeler gauge.

3) Select shims equal to the sum of the thickness of the measured clearance plus .0020-.0079" (.05-.20 mm). Remove right axle shaft and install the selected shim(s) and "O" ring into right axle housing end. Install right axle shaft assembly into rear axle housing. Tighten nuts in diagonal sequence to specification. See TORQUE SPECIFICATIONS table.

4) Using dial indicator, check end play of axle shaft. End play must be .0020-.0079" (.05-.20 mm). If end play is not within specification, change shim(s) to obtain correct end play. Reverse removal procedure to install remaining components. Adjust parking brake and bleed brake system.

DIFFERENTIAL CARRIER

Removal

Raise and support vehicle. Drain gear oil. Mark drive shaft flange-to-pinion flange position. Remove drive shaft. Remove axle shafts. See AXLE SHAFTS under REMOVAL & INSTALLATION. Support differential carrier with jack. Remove differential carrier retaining nuts. Remove differential carrier.

Inspection

Inspect for leakage at vent plug, differential carrier companion flange and where carrier joins axle housing.

Installation

Apply sealant to axle housing surface. To install, reverse removal procedure. Align marks on drive shaft and pinion flange.

DRIVE SHAFT

Removal

Make match marks on drive shaft yoke flange and pinion flange. Remove bolts. Remove drive shaft from vehicle.

Installation

To install, reverse removal procedure. Ensure match marks are aligned. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article.

OVERHAUL

AXLE SHAFTS

Disassembly

1) Mount backing plate and axle shaft assembly in soft-jawed vise. Bend over axle shaft bearing lock washer. Using Spanner Wrench (MD990785), remove lock nut from axle shaft. Remove washers. Reinstall lock nut on axle shaft approximately 3 turns.

2) Attach Bearing Puller (MB990787-01) to rear of backing plate to remove bearing case from axle shaft. See Fig. 2. Using equal pressure to avoid binding, tighten puller nuts diagonally to remove bearing case. Using hammer and drift, remove bearing outer race from bearing case. Remove oil seal from end of axle housing with Slide Hammer and Adapter (MB990211).

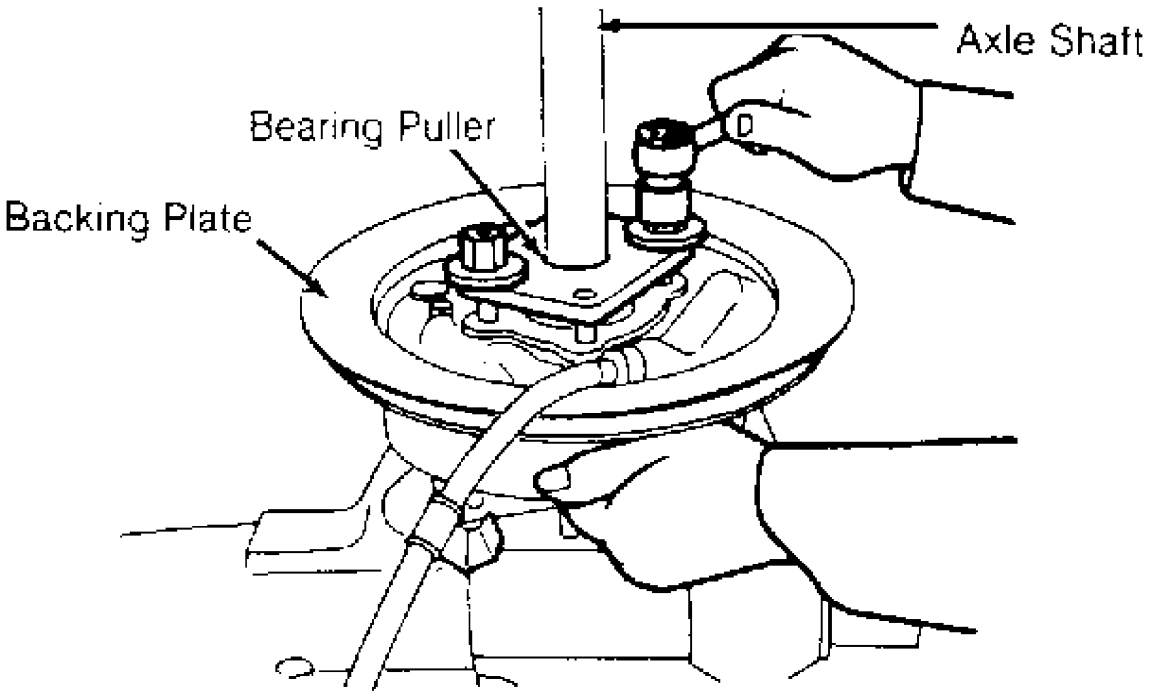


Fig. 2: Removing Bearing Case from Axle Shaft
Courtesy of Chrysler Motors.

Inspection

Inspect bearings for roughness, pitting or damage. Inspect axle shaft for damaged splines or flange. Inspect bearing case for cracks or damage. Measure axle shaft O.D. in bearing area. Correct O. D. is 1.57" (39.8 mm). Axle shaft must be replaced if O.D. is not to specification.

Reassembly

1) Apply grease to outer surface of bearing outer race and oil seal.Install outer race in bearing case. Install oil seal in bearing case until it is even with bearing case surface. Apply grease to bearing rollers. Install brake assembly, bearing case and bearing onto axle shaft.

2) Apply grease to bearing rollers. Press inner bearing onto axle shaft. Pack bearing case with grease. Coat lock nut threads with grease. Install washer, NEW lock washer and lock nut. Lock nut must be installed with chamfered edge toward axle shaft flange. Tighten lock nut to specification. See TORQUE SPECIFICATIONS table at end of article. Bend tab on lock washer into groove on lock nut.

DIFFERENTIAL

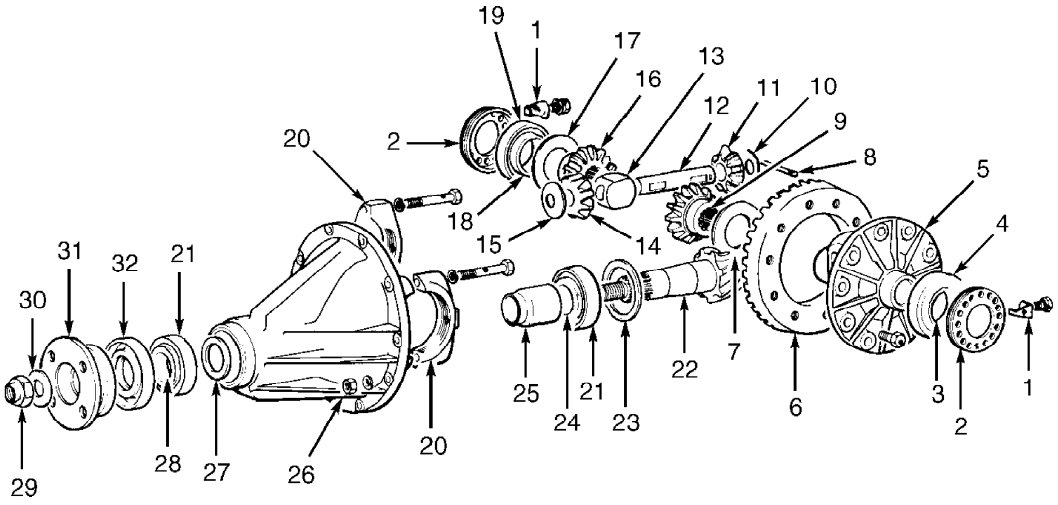
NOTE: Check pinion and side gear backlash, ring gear backlash and ring gear runout before disassembly.

Disassembly

1) Remove differential carrier from axle housing. Remove lock

plates and side bearing nuts. See Fig. 3. Mark bearing caps for location. Remove bearing caps. Remove differential case assembly from differential carrier.

CAUTION: Ensure side bearing nuts, bearing caps and side bearings are marked for location. Components must be installed in original location.



1. Lock Plate
2. Side Bearing Nut
3. Bearing
4. Bearing Race
5. Differential Case
6. Ring Gear
7. Thrust Spacer
8. Lock Pin
9. Side Gear
10. Pinion Washer
11. Pinion Gear
12. Pinion Shaft
13. Thrust Block (Some Models)
14. Pinion Gear
15. Pinion Washer
16. Side Gear
17. Thrust Spacer
18. Bearing
19. Bearing Race
20. Bearing Cap
21. Bearing Race
22. Pinion
23. Pinion Rear Shim
24. Bearing
25. Spacer
26. Differential Carrier
27. Pinion Front Shim
28. Bearing
29. Lock Nut
30. Washer
31. Pinion Flange
32. Oil Seal

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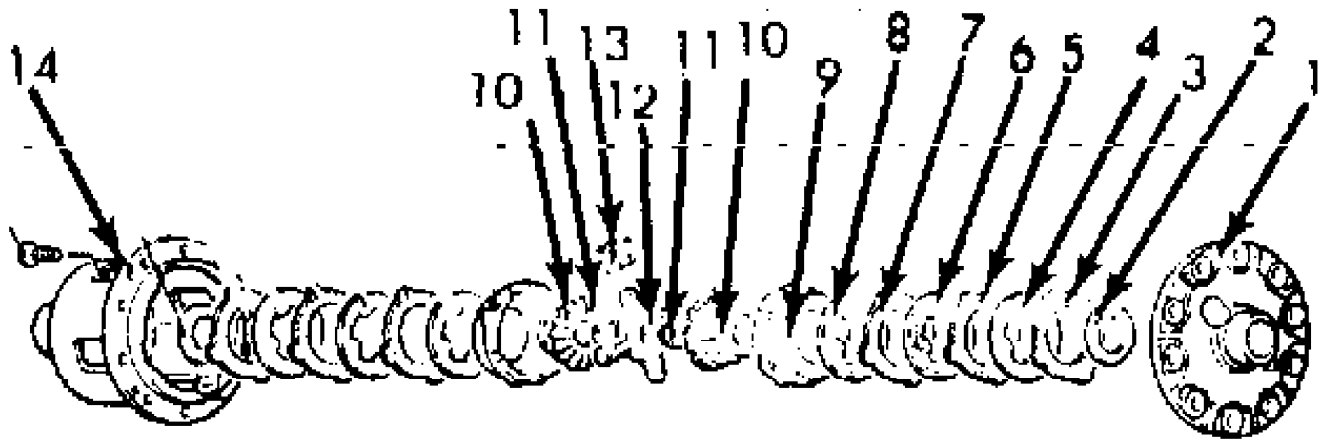
Fig. 3: Exploded View of Conventional Rear Differential
Courtesy of Chrysler Motors.

2) Using bearing puller, remove differential case side bearings. Place alignment marks on ring gear and differential case for reassembly. Loosen ring gear bolts in diagonal sequence. Remove ring gear.

3) On conventional axles, remove drive pinion shaft lock pin from differential case. Remove differential pinion shaft and thrust block (if equipped). Remove pinion gears and washers. Remove side gears and thrust spacers. Mark components for reassembly reference.

4) On limited slip units, mark differential case and differential case cover for reassembly reference. Remove differential case retaining screws. Separate differential case and cover. Remove components from case. See Fig. 4. Mark components for location.



1. Differential Case Cover
2. Thrust Washer
3. Spring Plate
4. Spring Disc
5. Friction Plate
6. Friction Disc
7. Friction Plate
8. Friction Disc
9. Pressure Ring
10. Side Gear
11. Thrust Block
12. Pinion Shaft
13. Pinion Gear
14. Differential Case

Fig. 4: Exploded View of Typical Limited Slip Differential
Courtesy of Chrysler Motors.

Drive Pinion

1) Remove pinion flange retaining nut. Scribe alignment marks on drive pinion and pinion flange for reassembly. Using soft-faced hammer, drive out pinion. Remove front adjusting shim and spacer from pinion.

2) Using bearing puller, remove rear bearing from pinion. Remove rear adjusting shim from pinion. Remove oil seal and bearing races from differential carrier.

Inspection

1) Inspect all gears for cracked or flaking teeth. Inspect pinion shaft for wear. Inspect pinion flange and drive pinion for damaged splines.

2) Inspect bearings and races for roughness or flaking. Replace worn components. On limited slip axles, inspect clutch components and contact areas for wear or overheating. Inspect friction plates, friction discs, spring plates and pressure rings for signs of seizure, excessive heat, severe friction or nicks.

NOTE: Outer areas of friction surfaces will wear heavier due to clutch plate and preload spring.

3) Using dial indicator, check friction plate and friction disc for warpage. Replace components if beyond specification. See FRICTION PLATE & DISC SPECIFICATIONS table.

4) Measure friction plates and disc thickness at projection areas not within wear area. Measure plate and disc thickness in friction surface. Difference between thickness of projections and friction surface indicates amount of wear. Replace components if not

within specification. See FRICTION PLATE & DISC SPECIFICATIONS table.

FRICTION PLATE & DISC SPECIFICATIONS

Application	In. (mm)
Warpage Limit	.003 (.08)
Wear Limit	.004 (.10)

DIFFERENTIAL OVERHAUL

CASE ASSEMBLY (CONVENTIONAL)

1) Install thrust spacers, side gears, pinion washers and pinion gears in differential case. DO NOT install thrust block (if equipped) at this time.

2) Install pinion shaft without lock pin. Check pinion and side gear backlash. Install wooden wedge to lock side gears. Using dial indicator, measure gear backlash. See Fig. 5.

3) Backlash must be within specification. See PINION & SIDE GEAR BACKLASH SPECIFICATIONS table. Adjust backlash by using different side gear spacers. Ensure both sides are equally shimmed.

PINION & SIDE GEAR BACKLASH SPECIFICATIONS

Application	In. (mm)
4-Cylinder Engine	
Standard	.0004-.0030 (.010-.076)
Wear Limit	.008 (.20)
V6 Engine	
Standard	0-.0030 (0-.076)
Wear Limit	.008 (.20)

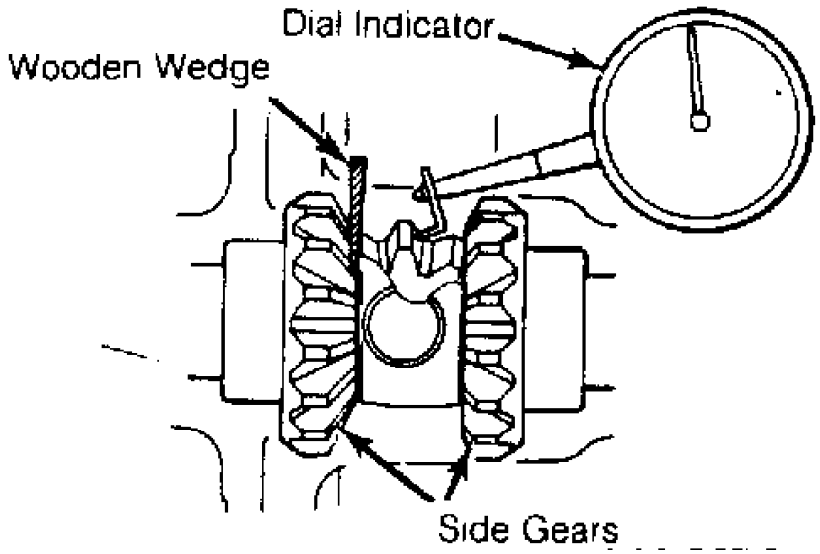


Fig. 5: Checking Pinion & Side Gear Backlash
Courtesy of Chrysler Motors.

4) Install thrust block (if equipped) once correct backlash is obtained. Install pinion shaft lock pin from back side of ring

gear. Securely stake pin in 2 places. Ensure adhesive is removed from ring gear mounting bolts and gear mounting surface. Clean internal threads with tap.

5) Ensure alignment marks on differential case and ring gear are aligned. Apply Loctite 271 to bolts and install ring gear on differential case. Tighten bolts in diagonal sequence to specification. See TORQUE SPECIFICATIONS table at the end of this article.

CASE ASSEMBLY (LIMITED SLIP)

1) Assemble 2 friction discs and 2 friction plates; assemble plate, disc, plate and disc. Measure assembly thickness. Assemble discs and plates to give standard difference of .002" (.05 mm) between the 2 sides.

2) Assemble spring plates and spring discs with one on each side. Measure assembly thickness. Assemble disc and plates to obtain minimum difference in thickness between each assembly.

3) Assemble clutch assemblies, pressure rings, pinion gears, side gears and pinion shaft. Measure overall width of assembly plus spring plates and spring discs. This measurement is "C". See Fig. 6.

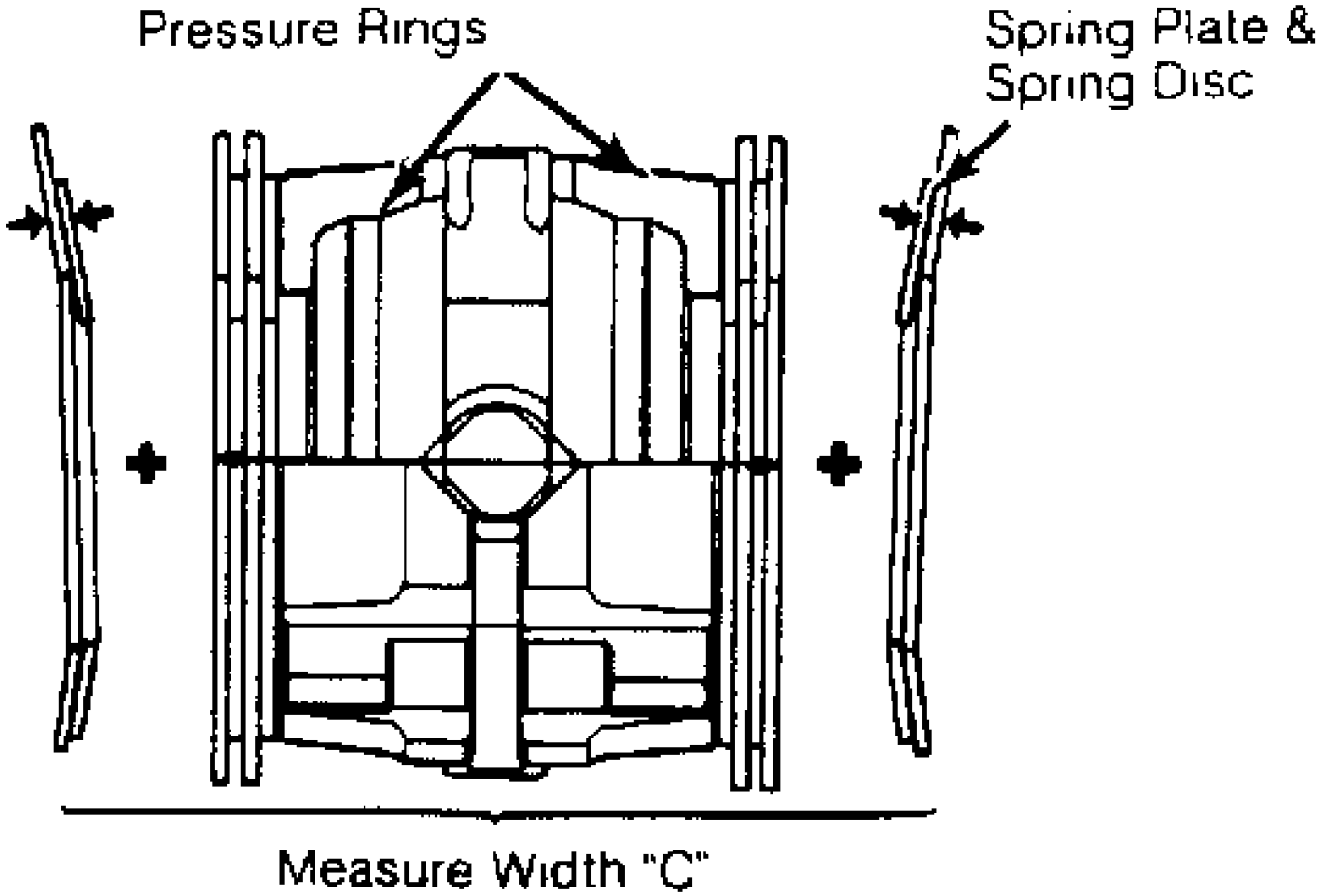


Fig. 6: Measuring Clutch Assembly Width
Courtesy of Chrysler Motors.

4) Determine depth "D" of differential case, using formula "D"="E"+"F"-"G" or "D"="E"+"H"-"F"-"G" . See Fig. 7. Subtract measurement "C" from measurement "D" to determine spring plate-to-case

clearance. Adjust spring disc thickness to obtain proper spring plate-to-case clearance. Correct clearance is .0024-.0079" (.060-.200 mm).

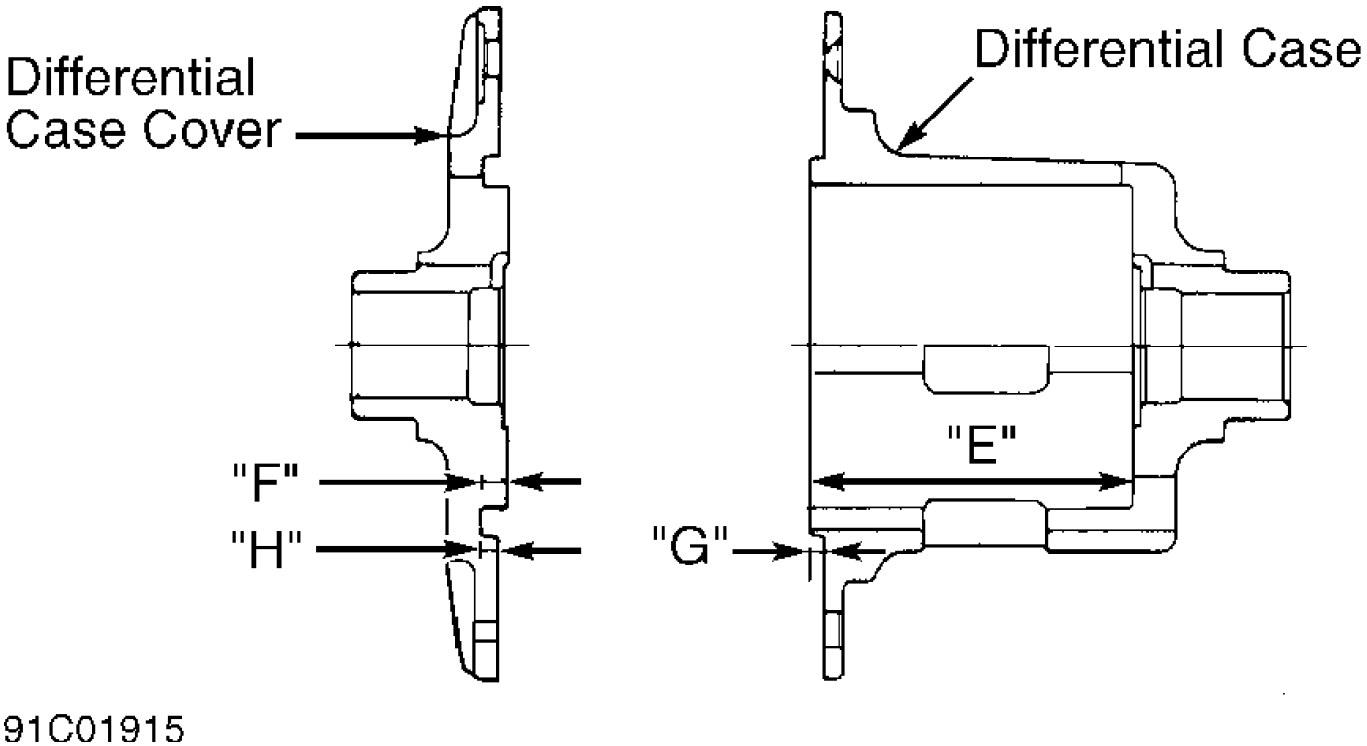


Fig. 7: Measuring Limited Slip Case Depth (Montero 3.0L & Pickup) Courtesy of Chrysler Motors.

CAUTION: DO NOT interchange clutch components for right and left sides. Mark clutch components for location.

5) Remove spring plates, spring discs, friction plates and friction disc from pressure rings. Mark components for location. Install thrust washers on each end of pressure rings. See Fig. 8.

6) Measure distance from end of thrust washer to rear face of pressure ring. Select proper thickness thrust washers to obtain a .002" (.05 mm) or less difference between measurements.

7) Once correct thrust washers are determined, install thrust washers on pressure rings. Squeeze pressure rings together and measure width from end of thrust washer to remaining thrust washer. This is dimension "H". See Fig. 8.

8) Determine distance between thrust washer surfaces when differential case is assembled. This is dimension "I" ("I"="J"+"K"+"L"). See Fig. 8. Dimension "J" is the same as dimension "D" in step 4).

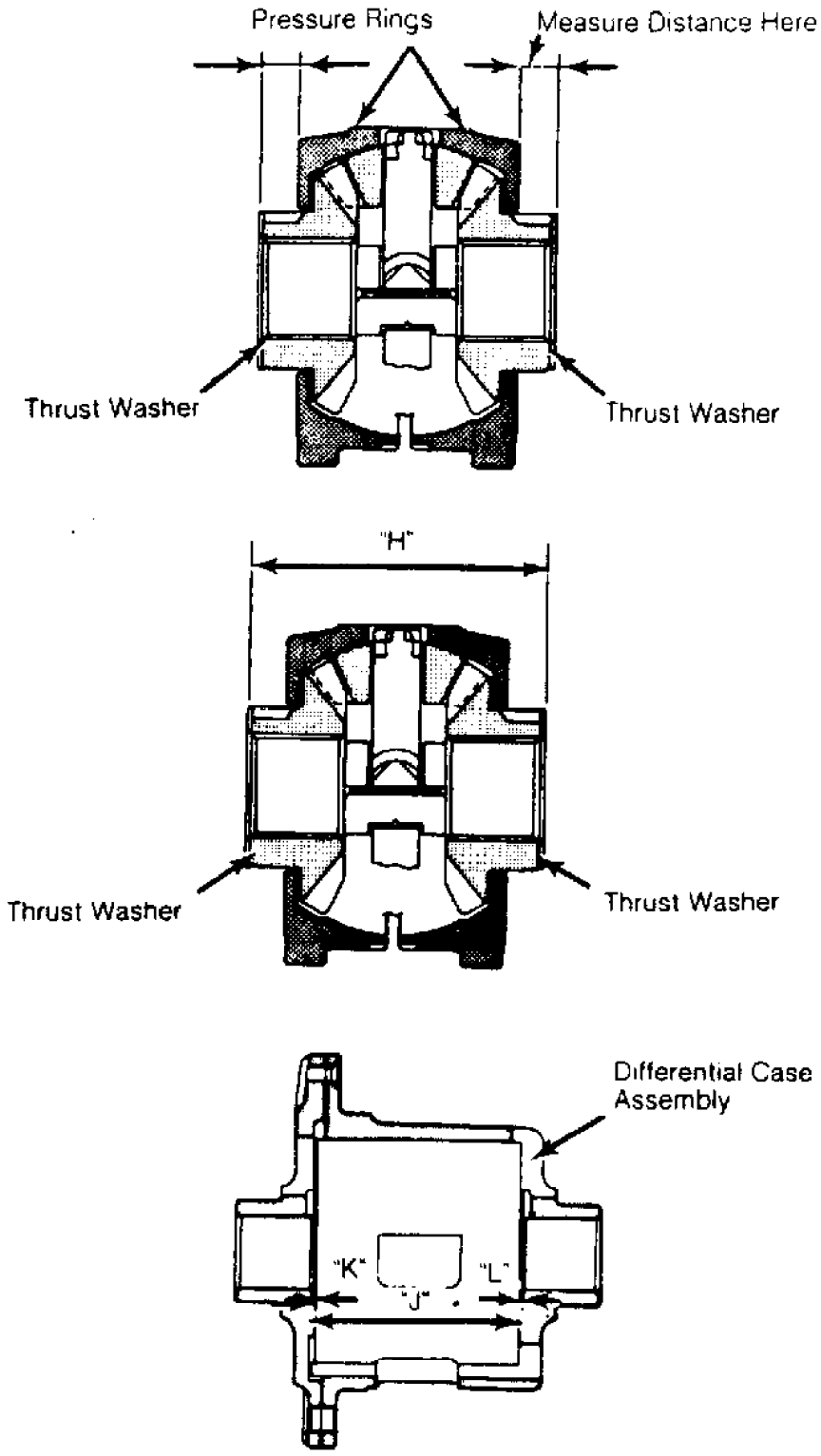


Fig. 8: Measuring Thrust Washer Clearance
Courtesy of Chrysler Motors.

9) Subtract dimension "H" from dimension "I". See Fig. 8. This is the clearance between thrust washer and differential case.

Thrust washer must be changed to obtain correct specification. Correct clearance is .002-.008" (.05-.20 mm).

10) Select thrust washers to obtain correct clearance from pressure ring face and end of thrust washer surface. Thrust washers are available in 3 sizes.

11) Apply gear oil and friction modifier to all components. Install components in differential case. Ensure assembly order and direction of clutch components are correct. See Fig. 9.

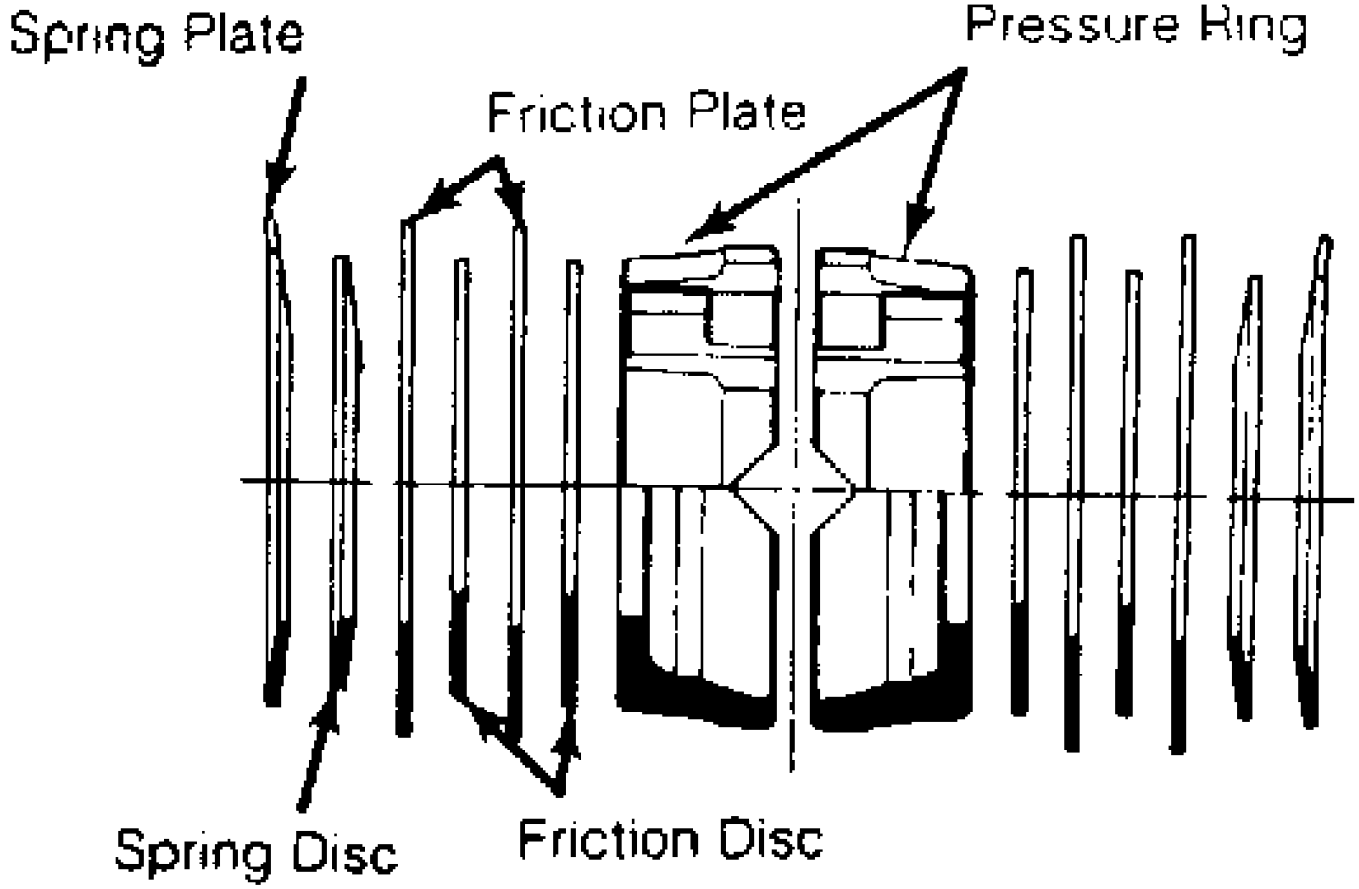


Fig. 9: Limited Slip Differential Assembly
Courtesy of Chrysler Motors.

12) Install differential case cover with reference marks aligned. Tighten screws to specification in several steps. See TORQUE SPECIFICATIONS table at end of article. Ensure cases contact each other completely when fully assembled. Check for incorrect clutch assembly if gap exists.

13) Using Clutch Plate Preload Tool (MB990988), Shaft (MB990989) and torque wrench, measure starting torque. Slightly rotate unit before measuring starting torque. See Fig. 10.

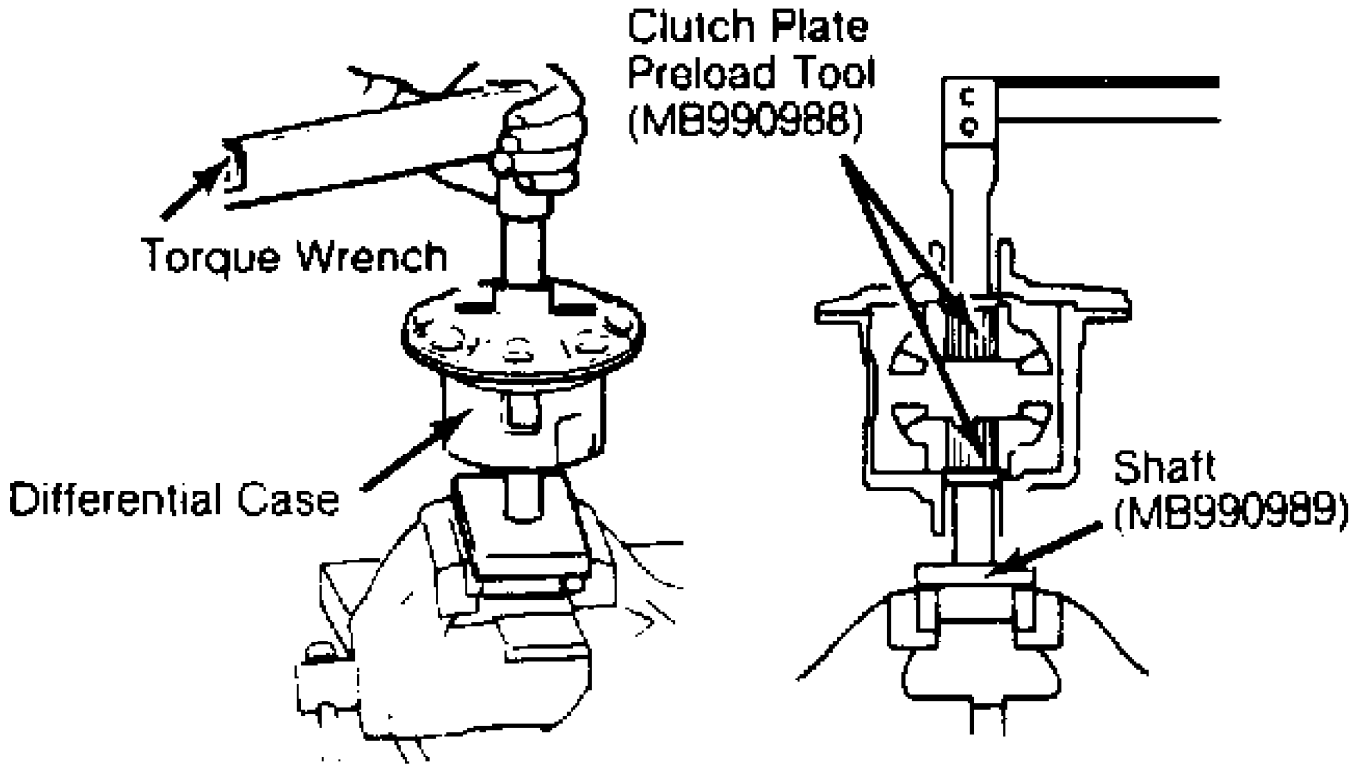


Fig. 10: Checking Differential Starting Torque
Courtesy of Chrysler Motors.

14) Starting torque must be within specification. See STARTING TORQUE SPECIFICATIONS table. Ensure adhesive is removed from ring gear mounting bolts and gear mounting surface. Clean internal threads with tap.

15) Ensure alignment marks on differential case and ring gear are aligned. Apply Loctite 271 to bolts and install ring gear on differential case. Tighten bolts in diagonal sequence to specification. See TORQUE SPECIFICATIONS table.

STARTING TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Used Clutch Plates	25-72 (34-98)
New Clutch Plates	47-72 (64-98)

DRIVE PINION HEIGHT

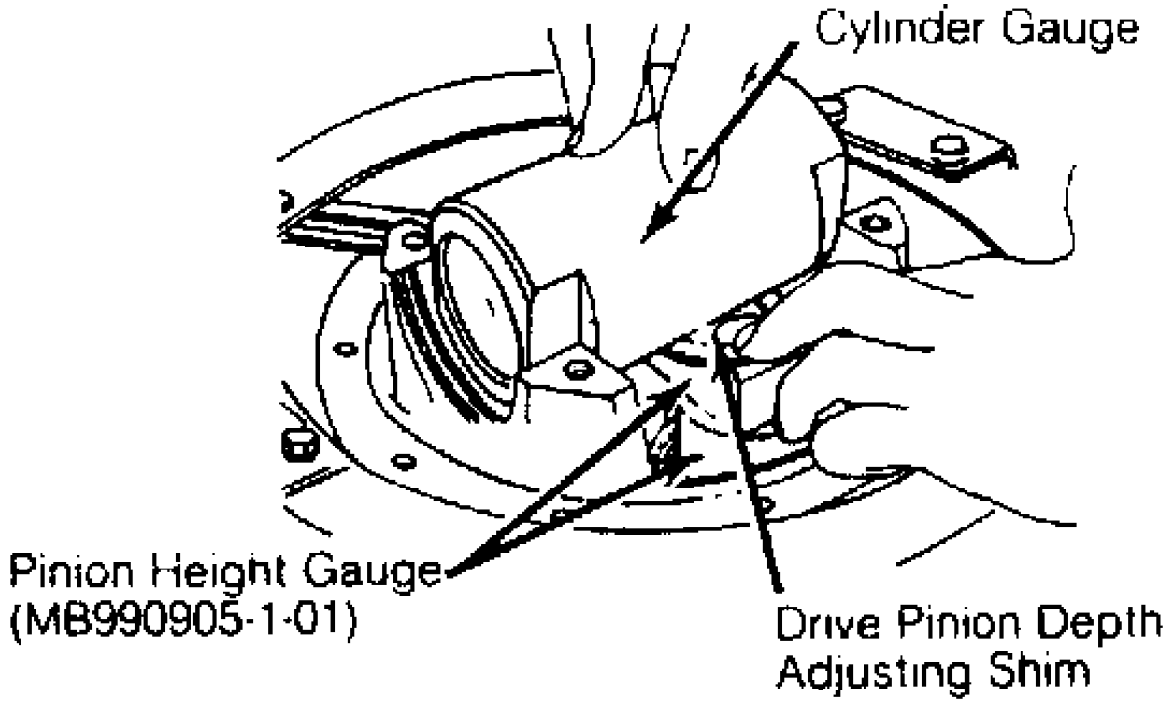
1) Install pinion bearing races in carrier. Ensure races are fully seated. Install pinion height gauge and pinion bearings. Use Pinion Height Gauge (MB990901) for all others. See Fig. 10. DO NOT install oil seal.

2) Using torque wrench, measure pinion rotating torque. Gradually tighten pinion height gauge to increase rotating torque to 3.5-4.3 INCH lbs. (.40-.48 N.m).

3) Install cylinder gauge in side bearing seats. Ensure flat areas are aligned and gauge contacts side bearing seat firmly. See Fig. 11. Select adjusting shim with same thickness as gap between cylinder gauge and pinion height gauge.

4) Use minimum amount of adjusting shims. Install selected

adjusting shims between drive pinion gear and rear pinion bearing.
Using bearing installer, install rear pinion bearing.



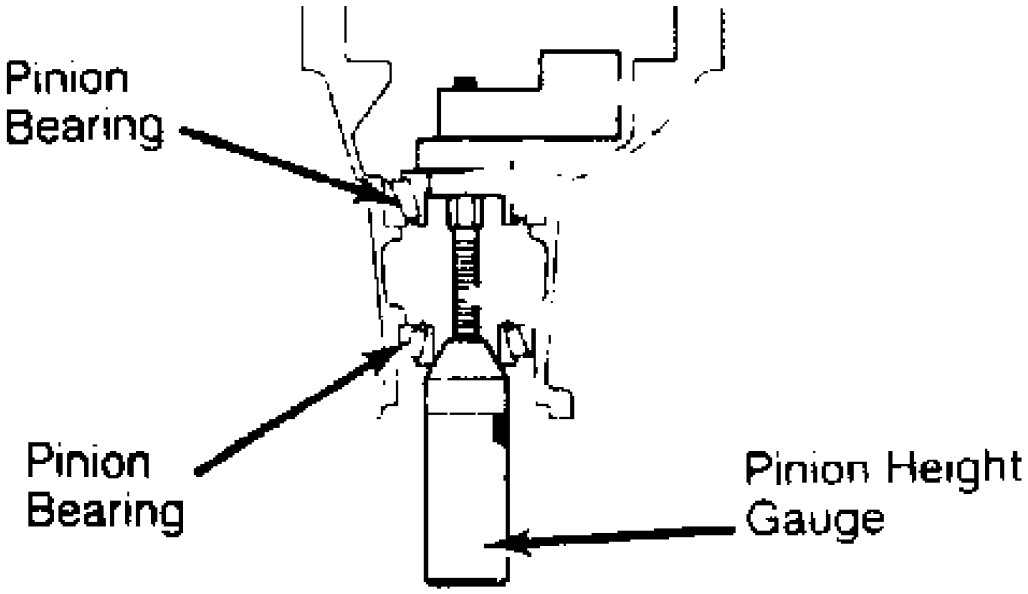


Fig. 11: Setting Pinion Height
Courtesy of Chrysler Motors.

DRIVE PINION PRELOAD

1) Install drive pinion in differential carrier. Install spacer, pinion front shim(s) and front pinion bearing. DO NOT install oil seal. Install pinion flange, washer and retaining nut. Tighten nut to specification. See TORQUE SPECIFICATIONS table.

2) Check pinion rotating torque. Rotating torque must be within specification. Correct specification is 3.5-4.3 INCH lbs. (.40-.48 N.m) without oil seal. Adjust rotating torque by replacing drive pinion front shims or spacer.

3) Once correct rotating torque is obtained, install oil seal. Coat seal lip with grease. Install pinion flange so alignment marks are correct. Apply light coat of grease to contact area of pinion flange washer.

4) Install new retaining nut. Recheck pinion rotating torque. Rotating torque must be within specification.

SIDE BEARING

1) Press side bearings onto differential case. Install outer races. Install differential case into differential carrier. Align bearing cap index marks, and snug carrier cap bolts. Ensure outer races and bearing caps are installed in original location. Tighten bearing cap bolts finger tight.

2) Install side bearing nuts. Tighten bearing cap bolts. See TORQUE SPECIFICATIONS table. Rotate bearing nuts in and out until rotation is smooth. Temporarily tighten side bearing nuts to preload side bearings. See TORQUE SPECIFICATIONS table. Adjust ring gear backlash.

RING GEAR BACKLASH

1) Lock drive pinion in place. Using dial indicator, check ring gear backlash at heel of ring gear tooth. Measure at 4 locations of ring gear. Gear backlash must be within specification. See RING GEAR BACKLASH SPECIFICATIONS table.

RING GEAR BACKLASH SPECIFICATIONS

Application	In. (mm)
2.4L	.0043-.0063 (.109-.160)
3.0L	.0051-.0071 (.130-.180)

2) If backlash is less than specification, loosen side bearing nut at back of ring gear and tighten side bearing nut on tooth side of ring gear by same amount. If backlash is beyond specification, loosen side bearing nut at tooth side of ring gear and tighten side bearing nut at back of ring gear by same amount.

3) After adjusting backlash, tighten both side bearing nuts half the distance between center of 2 neighboring holes on side bearing nut. Recheck backlash. Ensure bearing cap bolts are tightened to specification. See TORQUE SPECIFICATIONS table.

4) Lock plates are of 2 designs for hole location of side bearing nuts. Install proper type lock plate. Tighten lock plate bolt to specification. See TORQUE SPECIFICATIONS table. Check gear tooth contact using paint impression method. See GEAR TOOTH CONTACT PATTERNS in this article.

RING GEAR RUNOUT

Using dial indicator, measure runout at back side of ring gear. Runout must be within .002" (.05 mm). If runout is excessive, change ring gear-to-differential case mounting position. Recheck

runout.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Axle Bearing Lock Nut (Montero)	130-159 (176-216)
Bearing Cap Bolt	40-47 (54-64)
Bearing Case-To-Axle Housing Bolt	36-43 (49-58)
Brake Tube Flare Nut	10-12 (14-16)
Differential Carrier-To-Axle Housing Nut	
2.4L (2WD)	18-22 (24-30)
3.0L (4WD)	29-40 (39-54)
Drain Plug	43-50 (58-68)
Filler Plug	29-43 (39-58)
Lock Plate Bolt	11-16 (15-22)
Pinion Flange Nut	137-181 (186-245)
Drive Shaft-To-Flange Bolt	36-43 (49-58)
Ring Gear Bolt	58-65 (79-88)
Side Bearing Lock Plate Bolts	11-16 (15-22)
Wheel Lug Nut	
Montero	72-87 (98-118)
Pickup	87-101 (118-137)