DIFFERENTIAL & AXLE SHAFTS - FRONT

1998 Mitsubishi Montero

1997-98 DRIVE AXLES
Mitsubishi Differentials & Axle Shafts - Front

Montero, Montero Sport

DESCRIPTION & OPERATION

Front axle assembly consists of a differential carrier, housing tube, inner shaft and drive axles. See Figs. 1 and 2. A full-floating axle design is used. Drive axles are flexible assemblies made up of a shaft and an inner Birfield Joint (BJ) and an outer Double Offset Joint (DOJ).

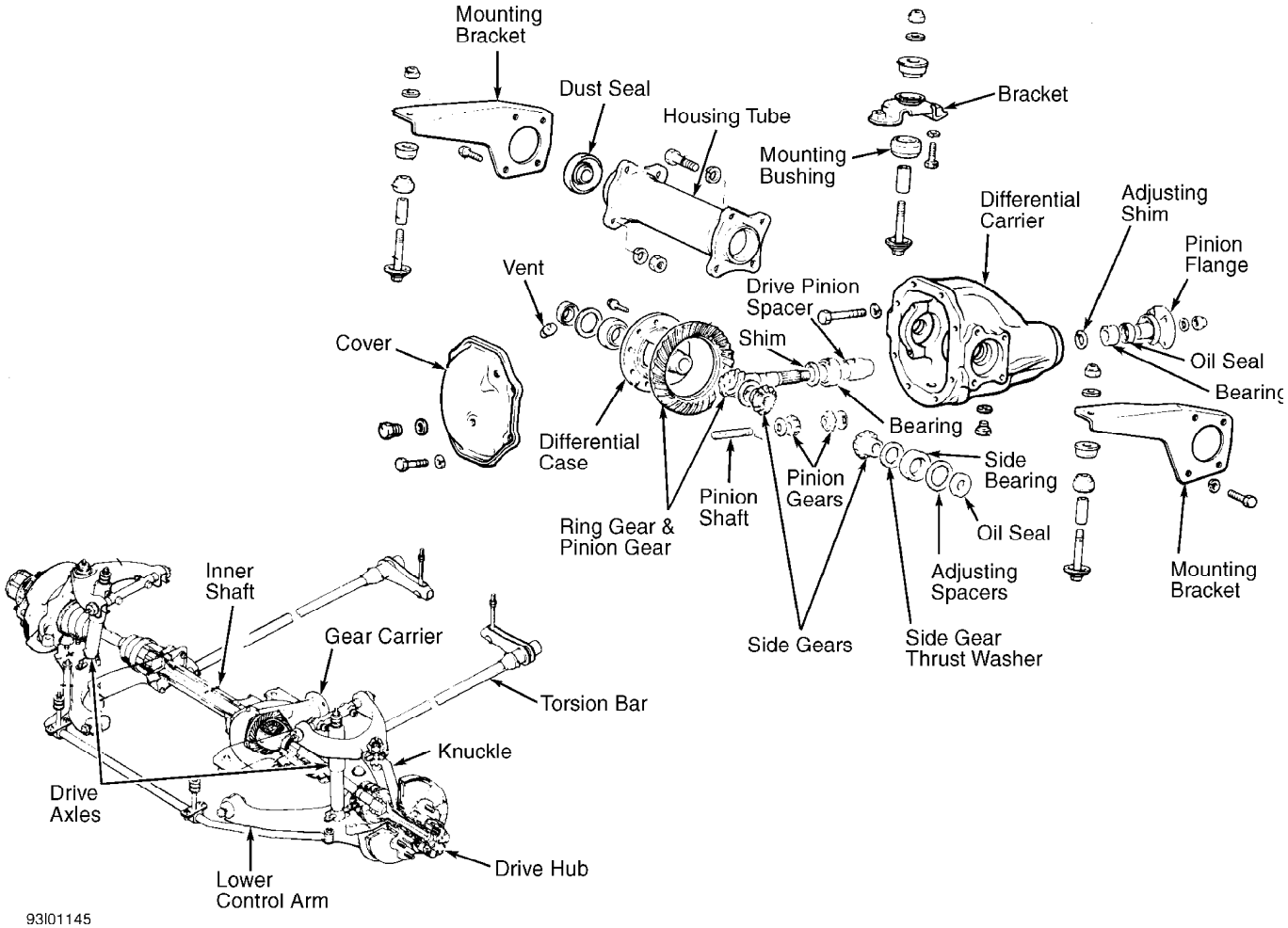
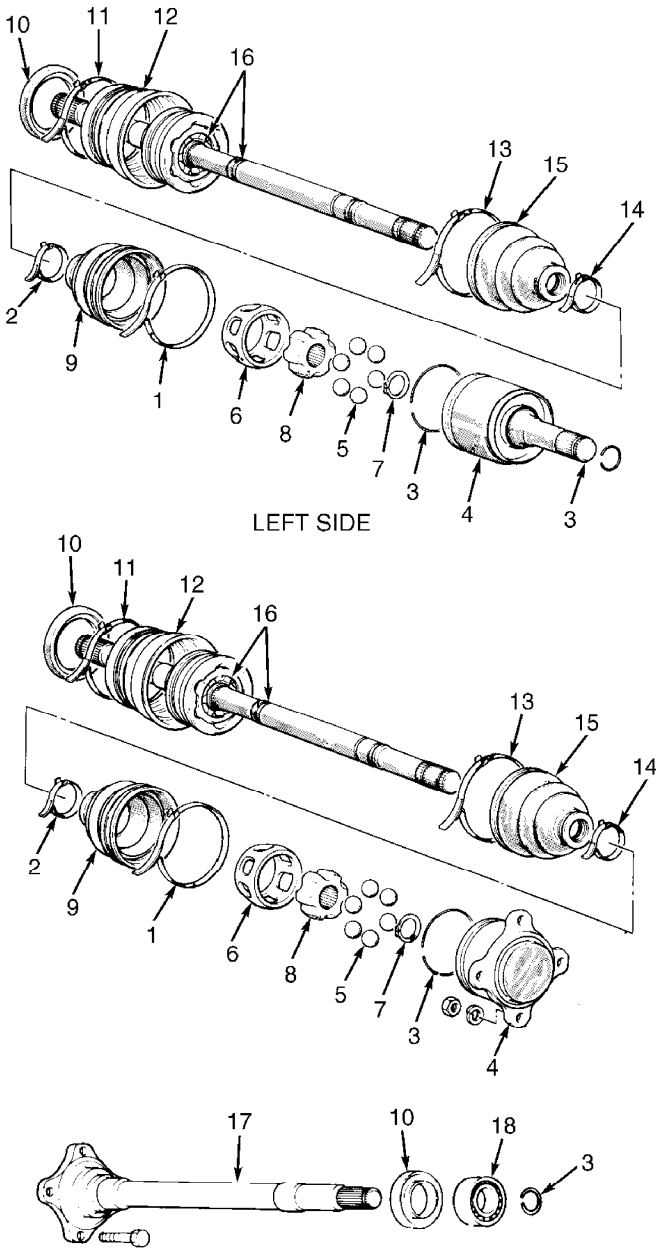


Fig. 1: Exploded View Of Front Differential Assembly & Suspension Components (Typical)
Courtesy of Mitsubishi Motor Sales of America.



1. Boot Band
2. Boot Band
3. Circlip
4. DOJ Outer Race
5. Balls
6. DOJ Cage
7. Snap Ring
8. DOJ Inner Race
9. DOJ Boot
10. Dust Cover
11. Boot Protector Band
12. Boot Protector
13. Boot Band
14. Boot Band
15. BJ Boot
16. Drive Shaft & BJ Assembly
17. Inner Shaft
18. Bearing

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Fig. 2: Exploded View Of Drive Axles (Typical)
Courtesy of Mitsubishi Motor Sales of America.

AXLE RATIO & IDENTIFICATION

AXLE RATIO SPECIFICATIONS

Application	Ratio
Montero	4.27:1
Montero Sport	(1)

(1) - On vehicles equipped with wide fender, ratio is 4.64:1. On vehicles with narrow fender, ratio is 4.27:1.

LUBRICATION

CAPACITY

DIFFERENTIAL FLUID CAPACITY

Application	Specification
Montero & Montero Sport	2.4 Pts. (1.1L)

FLUID TYPE

All models use fluid type SAE 80W-90/API GL-5.

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING - BASIC PROCEDURES article in the GENERAL TROUBLE SHOOTING section.

REMOVAL & INSTALLATION

AXLE SHAFTS R & I

Removal

1) Raise and support vehicle. Remove wheels and undercover. Ensure hub is in free-wheeling position. Place transfer case in 2H position. Remove drive hub cover, snap ring and shim from axle shaft. See Fig. 3. Remove brake calipers and support aside.

2) Disconnect tie rod assembly. Support lower control arm with jack. Separate ball joints from knuckle. Remove knuckle and front hub assembly. Using flat-blade pry bar, carefully remove left axle shaft from differential carrier. DO NOT damage oil seal. On right axle shaft, remove axle shaft-to-inner shaft flange retaining bolts. Remove right axle shaft.

CAUTION: Replace circlips on BJ/DOJ splined shaft end.

Installation

1) Install right axle shaft on inner shaft flange. Install new circlip on DOJ side of left axle shaft. Carefully install left axle shaft into differential. DO NOT damage oil seal.

2) Reinstall knuckle with front hub assembly. To complete installation, reverse removal procedure. Install shim and snap ring. Check axle end play. See Fig. 4. End play should be .016-.028" (.4-.7 mm). If end play is not within specification, install correct shim.

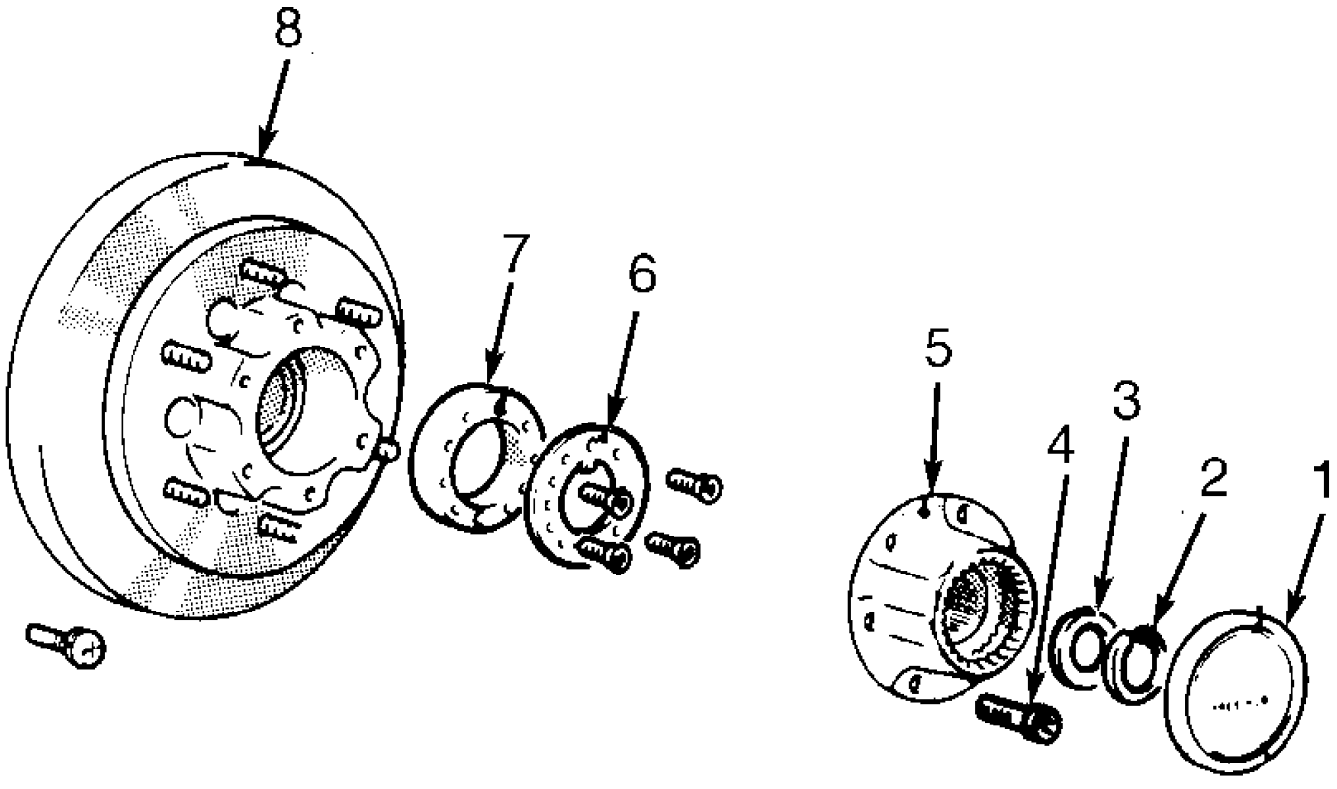

Fig. 3: Exploded View Of Auto-Locking Hub Assembly (Typical)
Courtesy of Mitsubishi Motor Sales of America.

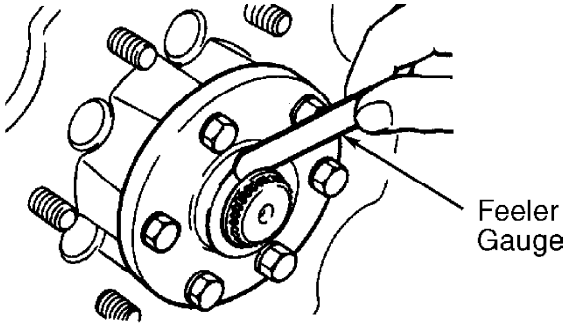

Fig. 4: Measuring Axle Shaft End Play
Courtesy of Mitsubishi Motor Sales of America.

DIFFERENTIAL CARRIER ASSEMBLY

Removal

1) Raise and support vehicle. Drain gear oil. Support differential carrier. Remove axle shafts and inner shaft. See AXLE SHAFTS R & I and INNER SHAFT & BEARING. Place alignment mark on drive shaft and pinion companion flange for reassembly reference.

2) Remove drive shaft. Remove differential mounting brackets at differential and frame. See Fig. 1. Disconnect front crossmember from frame. Remove differential carrier assembly and front crossmember. Remove differential carrier from front crossmember.

Installation

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

INNER SHAFT & BEARING

Removal

Remove right axle shaft. See AXLE SHAFTS R & I. Using slide hammer, remove inner shaft from differential carrier. See Fig. 1. If dust seal replacement is required, pry dust seal from housing tube assembly using a screwdriver. To remove bearing, bend outer area of dust cover inward on inner shaft. Press shaft out of bearing. Remove dust cover from shaft.

Inspection

Inspect inner shaft for damaged splines or threads. Inspect bearing for roughness or damage.

Installation

1) Install housing tube. Using Seal Installer (MB990955) and Handle (C-4171), install NEW dust seal in housing tube. Dust seal must be even with housing tube. Coat seal lip with grease.

2) Using a pipe with O.D. of 2.00" (75.0 mm), wall thickness of .16" (4.0 mm) and overall length of 2.00" (50.0 mm), install dust cover on shaft. Coat inside of dust cover with grease. Press bearing on shaft. Install new circlip on inner shaft. Carefully drive inner shaft into differential. DO NOT damage oil seal. To complete installation, reverse removal procedure.

OVERHAUL

AXLE SHAFTS & BEARINGS

NOTE: References to BJ and DOJ refer to Birfield Joint and Double Offset Joint, respectively.

Disassembly

1) Remove boot bands. Remove circlip from DOJ outer race. Separate axle shaft from DOJ outer race. Remove balls from DOJ cage. Remove DOJ cage from DOJ inner race in direction of BJ. See Fig. 2.

2) Remove snap ring from axle shaft shaft. Remove DOJ inner race from shaft. Remove circlip from shaft. Wrap tape around splines of shaft to prevent boot damage during removal. Remove DOJ boot. Note size of boot. Remove dust cover from shaft. Move boot protector toward BJ side of shaft and remove. Remove BJ boot.

CAUTION: Axle shaft and BJ are serviced as a unit. DO NOT attempt to disassemble BJ and axle shaft.

Reassembly

1) Coat shaft with light coat of grease. Wrap splines with

tape. Install BJ boot, bands and DOJ boot on shaft. Ensure correct size boot is installed in proper location.

2) Pack proper amount of grease in BJ and BJ boot. See CV JOINT GREASE CAPACITY table. Boot bands must be installed so lever is pulled toward rear of vehicle when band is tightened.

3) Place DOJ cage on shaft with smaller diameter installed first. Install circlip, DOJ inner race and snap ring on shaft. Apply grease to DOJ inner race and cage. Install balls into cage. Apply proper amount of grease to outer DOJ race. See CV JOINT GREASE CAPACITY table. Install shaft into DOJ outer race. Install circlip.

4) Place DOJ boot over DOJ outer race. Install boot bands so lever is pulled toward rear of vehicle when band is tightened. Adjust DOJ boot bands to have proper distance between center line of boot bands. Distance should be 3.03-3.27" (76.9-83.0 mm). This distance is necessary to control air in DOJ boot. Tighten boot bands. Install boot protector and band. Install dust cover on shaft.

CV JOINT GREASE CAPACITY

Application	(1) Ozs. (g)
BJ Boot & Joint	
Montero	4.6 (130)
Montero Sport	4.2 (120)
DOJ Boot & Joint	
Montero	3.5 (100)
Montero Sport	4.9 (140)

(1) - Apply 1/2 of the amount of grease specified to joint, the other half to inside of CV boot.

DIFFERENTIAL ASSEMBLY

Disassembly

1) Remove differential carrier from vehicle. See DIFFERENTIAL CARRIER ASSEMBLY under REMOVAL & INSTALLATION. Remove cover. Mark bearing caps for reassembly reference. Remove bearing caps. Remove differential case assembly from carrier.

CAUTION: Ensure adjusting spacers, bearing caps, gears and side bearings are marked for reassembly reference. Components must be installed in original location.

2) Using bearing puller, remove differential case side bearings. Loosen ring gear retaining bolts in diagonal sequence. Remove ring gear. Remove drive pinion shaft lock pin from ring gear side. Remove pinion shaft and pinion gears. Remove side gears and thrust spacers.

Drive Pinion Removal

Remove pinion flange nut. Scribe alignment mark on pinion companion flange and drive pinion. Remove flange. Using soft-faced hammer, drive out pinion. Remove rear bearing and oil seal from carrier. Remove rear adjusting shim from pinion. See Fig. 1. Press front bearing from pinion. Remove front adjusting shim and spacer from pinion.

Cleaning & Inspection

Use cleaning solvent to rinse gears and components. Check bearings for wear or discoloration. Check gear carrier for cracks or damage. Check pinion, side gear and flange splines for excessive wear.

Check ring gear, pinion and side gears for wear or damage. Replace components as necessary.

Reassembly & Adjustments

1) Place side gear thrust spacers behind side gears, in original position. Assemble side gears in differential case. Install pinion gears and washers. Rotate pinion gears to mesh with side gears.

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. If backlash cannot be adjusted within specifications, replace side and pinion gears as matched set.

4) Install pinion shaft lock pin. Using a punch, securely stake lock pin in 2 places. Ensure adhesive is removed from ring gear mounting bolts and gear mounting surface. Clean internal threads with tap.

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

PINION & SIDE GEAR BACKLASH SPECIFICATIONS

Application	In. (mm)
Standard	.003 (.08)
Wear Limit	.008 (.20)

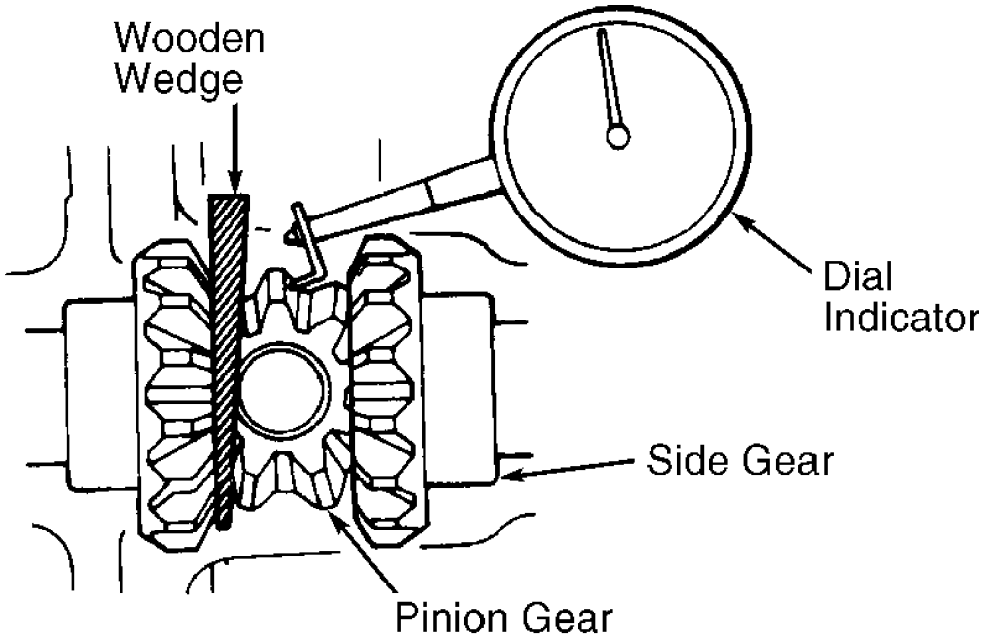

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Fig. 5: Checking Pinion & Side Gear Backlash
Courtesy of Mitsubishi Motor Sales of America.

Drive Pinion Depth

1) Install pinion bearing races in carrier housing. Ensure

races are fully seated. Install Pinion Height Gauge (MB990901-01) with pinion bearings. See Fig. 6. DO NOT install oil seal.

2) Using INCH-lb. torque wrench, measure pinion rotating torque. Gradually tighten pinion height gauge to increase rotating torque to proper specification. See PINION ROTATING TORQUE SPECIFICATIONS table. Install Cylinder Gauge (MB990903-01). Ensure flat areas are aligned and that gauge contacts carrier bearing bores firmly. See Fig. 6.

3) Select adjusting shim with same thickness as gap between cylinder gauge and pinion height gauge. Use minimum amount of adjusting shims. Install selected adjusting shims between drive pinion gear and rear drive pinion bearing. Using Bearing Installer (MB990802-01), install rear pinion bearing.

PINION ROTATING TORQUE SPECIFICATIONS

Application	INCH Lbs. (N.m)
Oil Seal Not Installed	
With Lubrication	1.3-2.2 (.15-.25)
Without Lubrication	2.6-4.3 (.30-.50)
Oil Seal Installed	
With Lubrication	3.1-3.9 (.35-.45)
Without Lubrication	4.3-6.1 (.50-.70)

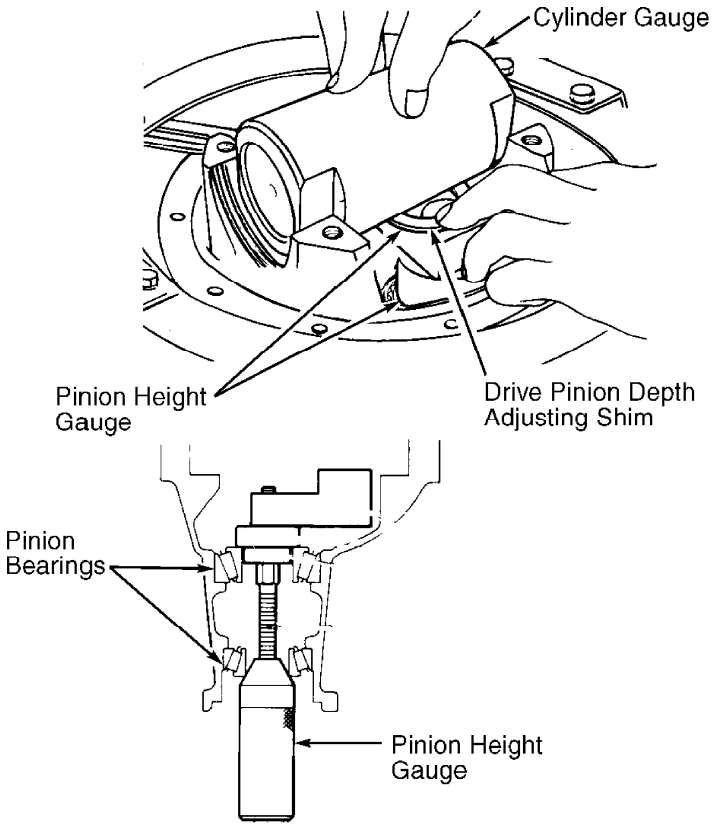

Fig. 6: Setting Drive Pinion Depth
Courtesy of Mitsubishi Motor Sales of America.

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 at this time. Install pinion companion flange, washer and retaining nut. Tighten nut to 137 ft. lbs. (190 N.m).

2) Using INCH-lb. torque wrench, check pinion rotating torque without pinion oil seal. See PINION ROTATING TORQUE SPECIFICATIONS table. Adjust rotating torque by replacing drive pinion front shims or spacer. Once correct rotating torque is obtained, install oil seal. Coat seal lip with grease.

3) Install pinion flange so alignment marks are correct. Apply light coat of grease to flange washer contact area. Install NEW retaining nut. Check pinion rotating torque with pinion oil seal installed. Rotating torque must be within specification. See PINION ROTATING TORQUE SPECIFICATIONS table.

Side Bearing Installation

1) Using Bearing Installer (MB990802-01), install bearings on differential case. Select 2 side bearing adjusting shims thinner than those removed. Shims must be equal in thickness on both sides. Install shims on each side of case assembly. Install case assembly in differential carrier housing.

2) Push case assembly fully to one side of carrier. Using 2 feeler gauges (feeler gauges 180 degrees opposed), measure clearance between carrier and side bearing. Remove shims from one side of differential carrier.

3) Measure thickness of shims removed. Add .002" (.05 mm) to 50% of measured clearance and then add thickness measurement of removed shim. This is thickness of new shim that should be installed on each side of case. Install equal thickness shims on each side of case assembly.

NOTE: Ensure zero clearance exists between gear carrier and adjusting shim.

4) Install side bearing shims and differential case assembly in differential carrier. Using brass drift, tap shims to fit them to side bearing outer race. Install bearing caps. Tighten bolts to specification. See TORQUE SPECIFICATIONS. Check 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 should be .004-.006" (.10-.15 mm).

2) If backlash is not within specification, change side bearing adjusting shims and recheck backlash. See GEAR TOOTH CONTACT PATTERNS article in GENERAL INFORMATION. Check gear tooth contact using Prussian Blue.

CAUTION: When changing shims, total thickness of all shims must remain constant to ensure correct bearing preload.

Ring Gear Runout

Using dial indicator, measure runout at back side of ring gear. Runout should not exceed .002" (.05 mm). If runout is excessive, change ring gear-to-differential case mounting position. Ensure ring gear mounting bolts are tightened to correct specification. Recheck runout. Install cover and gasket.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)

Brake Caliper Bolt	65 (88)
Carrier-To-Housing Tube Bolt	
Montero	(1)
Montero Sport	58-72 (79-98)
Differential	
Cover Bolt	14 (19)
Drain Plug	
Montero	43-51 (58-69)
Montero Sport	(1)
Fill Plug	
Montero	39 (53)
Montero Sport	36 (49)
Drive Shaft Flange Bolt	36-43 (49-58)
Front Crossmember Bolt	72-87 (98-118)
Hub Cover Bolt	13-25 (18-34)
Knuckle-To-Ball Joint Nut	
Upper	
Montero	54 (73)
Montero Sport	44-65 (60-88)
Lower	
Montero	108 (146)
Montero Sport	87-130 (118-176)
Mounting Bracket-To-Frame Bolt	58-80 (79-108)
Mounting Bracket-To-Housing Tube Bolt	58-72 (79-98)
Pinion Flange Nut	
Montero	
A/T	137 (186)
M/T	159 (216)
Montero Sport	159 (216)
Right Drive Axle-To-Inner Shaft Bolt	36-43 (49-58)
Ring Gear-To-Case Bolt	58-65 (79-88)
Side Bearing Cap Bolt	40-47 (54-64)
Tie Rod-To-Knuckle Nut	
Montero	33 (45)
Montero Sport	32 (43)
Wheel Lug Nuts	
Montero	72-87 (98-118)
Montero Sport	
Aluminum Wheel	73-86 (99-117)
Steel Wheel	87-101 (118-137)

	INCH Lbs. (N.m)
Undercover-To-Frame Bolts (Montero)	84-108 (9.5-12.2)

(1) - Information is not available from manufacturer.