

SUSPENSION - FRONT (4WD)

1993 Mitsubishi Montero

1993 SUSPENSION
Mitsubishi - Front - 4WD

Montero

DESCRIPTION

Independent front suspension is double wishbone construction with torsion bar. Components used with this system include upper control arm, lower control arm, shock absorber, stabilizer bar and steering knuckle. See Fig. 1.

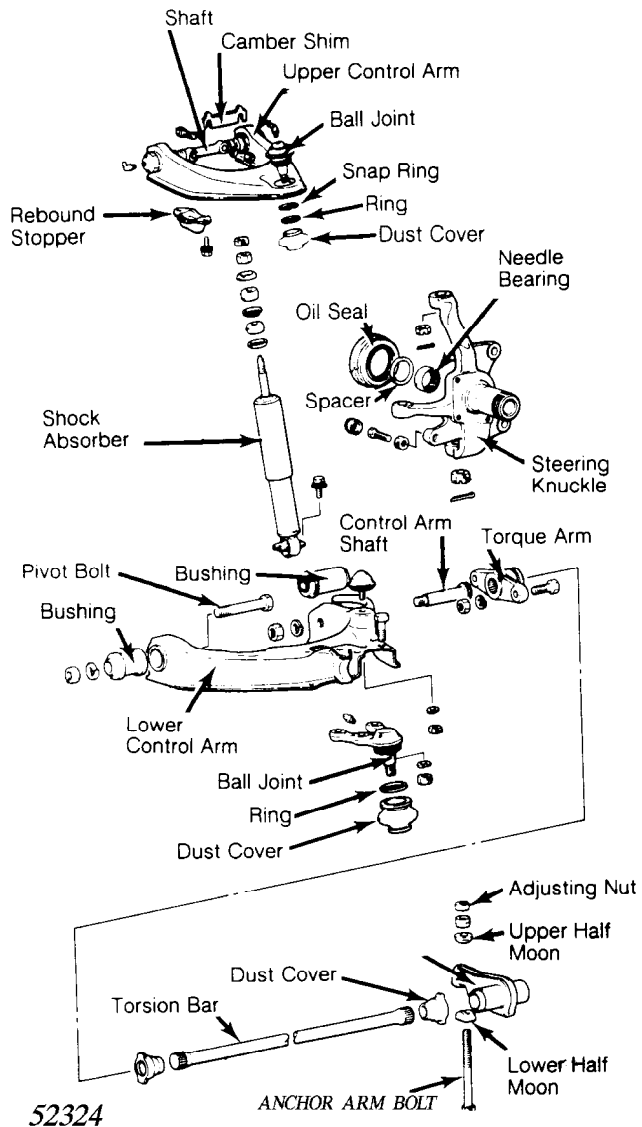


Fig. 1: Exploded View Of 4WD Front Suspension
Courtesy of Mitsubishi Motor Sales of America.

ADJUSTMENTS & INSPECTION

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

NOTE: See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

WHEEL BEARING

Preload

1) Remove locking hub assembly. See LOCKING HUB under REMOVAL & INSTALLATION. Remove lock washer screws. Remove lock washer. See Fig. 2. Remove brake caliper.

2) Using Socket (MB990954-01) and torque wrench, rotate front hub while tightening lock nut to 95-145 ft. lbs. (130-200 N.m). Loosen nut. Retighten nut to 18 ft. lbs. (24 N.m).

3) Loosen nut 30-40 degrees. Install lock washer. If lock washer hole is not aligned with lock nut hole, lock nut may be rotated up to 20 degrees to obtain alignment. After setting preload, check hub turning resistance and axial play.

Hub Turning Resistance & Axial Play

1) Using dial indicator, check front hub axial play. Axial play should be .002" (.05 mm) or less. Using INCH-lb. torque wrench or spring scale attached to wheel stud, measure hub turning resistance. Turning resistance should be 1-4 lbs. (0.45-1.80 kg) if measured using spring scale or 2.6-11.3 INCH lbs. (0.3-1.3 N.m) if measured using torque wrench.

2) Adjust wheel bearing so turning resistance and axial play are within specification. If turning resistance and axial play cannot be adjusted to specification, check wheel bearing condition and installation.

Drive Axle End Play

Install drive axle shim and snap ring. See Fig. 2. Measure clearance between shim and snap ring. If clearance is not .016-.028" (.40-.70 mm) replace shim to bring clearance into specification.

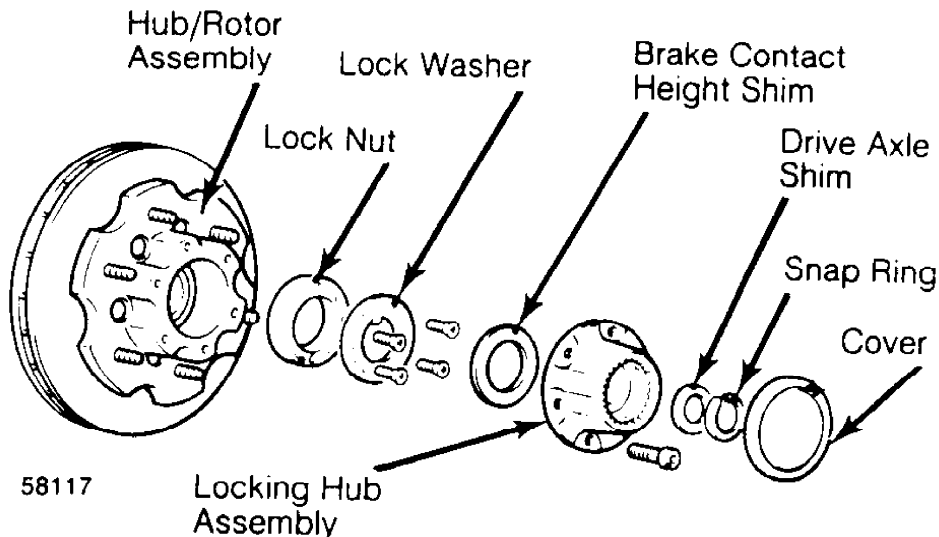


Fig. 2: Exploded View Of Automatic Locking Hub (Typical)
Courtesy of Chrysler Motors.

BALL JOINT CHECKING

Lower Ball Joint

Place ball joint in soft-jawed vise. Install dial indicator with stem resting on end of ball joint stud. Measure ball joint stud end play. Replace ball joint if end play exceeds .02" (.5 mm). For ball joint replacement, see LOWER BALL JOINT under REMOVAL & INSTALLATION.

Upper Ball Joint

1) Disconnect ball joint from steering knuckle. Place nut on ball joint stud. Using INCH-lb. torque wrench, measure starting torque required to rotate ball joint stud.

2) Starting torque should be 7-30 INCH lbs. (0.8-3.4 N.m). Replace ball joint if starting torque is not within specification. For ball joint replacement, see UPPER BALL JOINT under REMOVAL & INSTALLATION.

TROUBLE SHOOTING

VARIABLE SHOCK ABSORBERS

Variable Shock Absorber (VSA) Indicator Light Does Not Illuminate In Soft (S) Mode

1) Turn ignition on. Push VSA mode selector switch to soft (S) position. Switch is located on center console. If indicator light illuminates, circuit is functioning normally. If indicator light does not illuminate, remove control switch.

2) Disconnect VSA mode selector switch. Connect jumper wire between VSA mode selector switch harness connector terminal No. 4 (Red/Green wire) and vehicle ground. If indicator light illuminates, go to next step. If light does not illuminate, go to step 4).

3) Check continuity of VSA mode selector switch ground circuit. Using ohmmeter, check resistance between VSA mode selector switch harness connector terminal No. 2 (Black wire) and vehicle ground. If continuity exists, replace VSA mode selector switch. If continuity does not exist, inspect and repair circuit as needed.

4) Inspect condition of fuse No. 11. Fuse block is located behind left corner of driver's dash. Replace fuse as needed. If fuse is okay, inspect condition of indicator light (LED). Replace as needed. If light is okay, check resistance between indicator light harness connector terminal No. 201 (Red/Green wire) and VSA mode selector switch harness connector terminal No. 4 (Red/Green wire). If continuity does not exist, inspect and repair circuit as needed.

Variable Shock Absorber (VSA) Indicator Light Does Not Illuminate In Medium (M) Mode

1) Turn ignition on. Push VSA mode selector switch to medium (M) position. Switch is located on center console. If indicator light illuminates, circuit is functioning normally. If indicator light does not illuminate, remove control switch.

2) Disconnect VSA mode selector switch. Connect jumper wire between VSA mode selector switch harness connector terminal No. 5 (Red/Yellow wire) and vehicle ground. If indicator light illuminates, go to next step. If light does not illuminate, go to step 4).

3) Check continuity of VSA mode selector switch ground circuit. Using ohmmeter, check resistance between VSA mode selector switch harness connector terminal No. 2 (Black wire) and vehicle ground. If continuity exists, replace VSA mode selector switch. If continuity does not exist, inspect and repair circuit as needed.

4) Inspect condition of fuse No. 11. Fuse block is located behind left corner of driver's dash. Replace fuse as needed. If fuse is okay, inspect condition of indicator light (LED). Replace as needed. If light is okay, check resistance between indicator light

harness connector terminal No. 206 (Red/Yellow wire) and VSA mode selector switch harness connector terminal No. 5 (Red/Yellow wire). If continuity does not exist, inspect and repair circuit as needed.

Variable Shock Absorber (VSA) Indicator Light Does Not Illuminate In Hard (H) Mode

1) Turn ignition on. Push VSA mode selector switch to hard (H) position. Switch is located on center console. If indicator light illuminates, circuit is functioning normally. If indicator light does not illuminate, remove control switch.

2) Disconnect VSA mode selector switch. Connect jumper wire between VSA mode selector switch harness connector terminal No. 6 (Red wire) and vehicle ground. If indicator light illuminates, go to next step. If light does not illuminate, go to step 4).

3) Check continuity of VSA mode selector switch ground circuit. Using ohmmeter, check resistance between VSA mode selector switch harness connector terminal No. 2 (Black wire) and vehicle ground. If continuity exists, replace VSA mode selector switch. If continuity does not exist, inspect and repair circuit as needed.

4) Inspect condition of fuse No. 11. Fuse block is located behind left corner of driver's dash. Replace fuse as needed. If fuse is okay, inspect condition of indicator light (LED). Replace as needed. If light is okay, check resistance between indicator light harness connector terminal No. 203 (Red wire) and VSA mode selector switch harness connector terminal No. 6 (Red wire). If continuity does not exist, inspect and repair circuit as needed.

NOTE: If damping force does not change for all shock absorbers, malfunction of wiring harness should be diagnosed first.

Damping Force Does Not Change With Mode Selector Switch Change

1) Turn ignition on. Have an assistant conduct a bounce test on each corner of vehicle as VSA mode selector switch is changed between each mode. If damping force does not change on a individual shock absorber, disconnect and remove actuator from malfunctioning shock.

2) Switch actuator removed with known good actuator and reinspect system operation. Replace actuator if malfunction of shock appears at other wheel. If initial shock absorber still does not function properly, remove actuator.

3) Turn control rod of shock absorber. Replace shock absorber, if rod does not turn easily without binding. If rod turns freely, disconnect actuator harness connector.

4) Using DVOM, measure voltage between actuator harness connector terminal No. 1 (Blue wire) and vehicle ground. If battery voltage does not exist, inspect condition of fuse No. 7. Fuse block is located behind left corner of driver's dash. Replace fuse as needed. If fuse is okay, inspect and repair power supply circuit between VSA control unit and actuator harness connector. VSA control unit is located in left rear corner of vehicle. See appropriate wiring diagram.

5) Replace VSA control unit if power supply circuit is okay. Check continuity of remaining ground circuits. See appropriate wiring diagram. Inspect and repair ground circuits as needed.

No Damping Force Change At All Wheels

Disconnect VSA control module. Control module is located in left rear corner of vehicle. Perform circuit continuity and voltage check. See VSA CONTROL MODULE CIRCUIT INSPECTION table. All continuity and voltage checks are between VSA control module terminal and vehicle ground. If all circuits test okay, replace VSA control module.

VSA CONTROL MODULE CIRCUIT INSPECTION TABLE

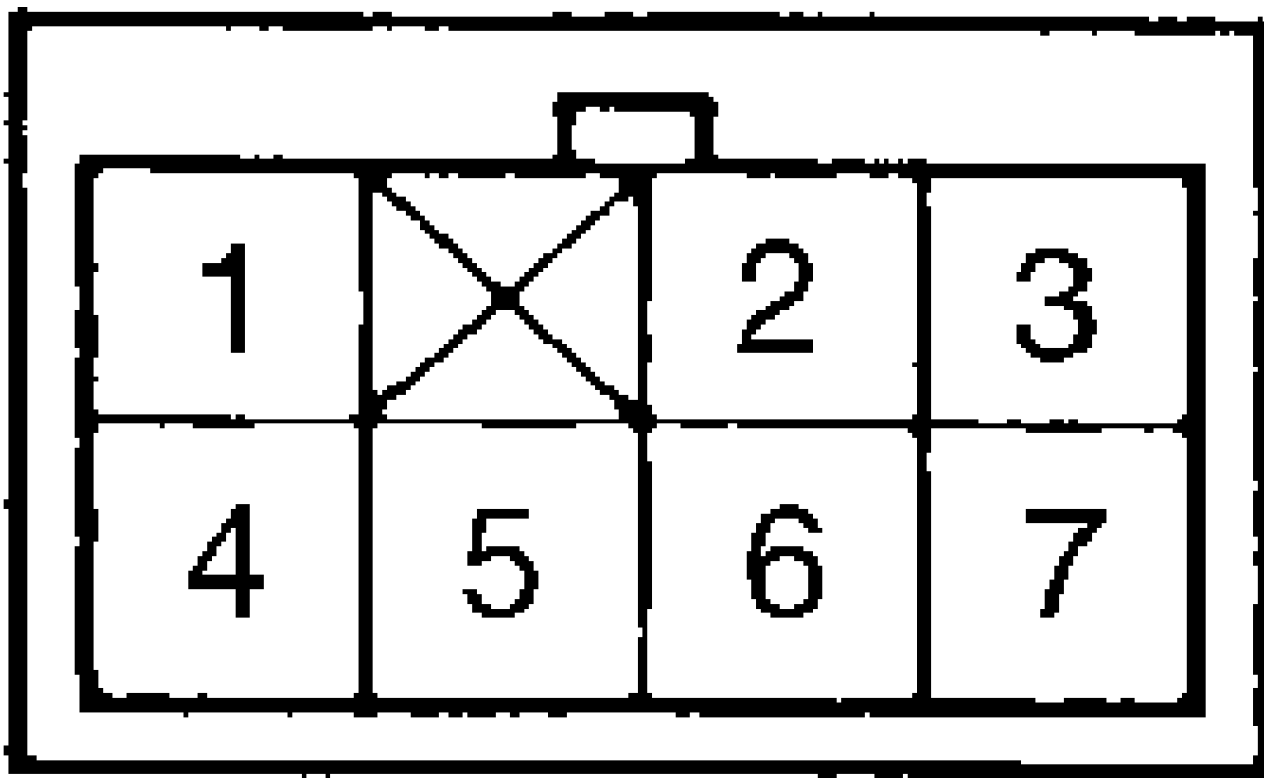
Terminal No. (1)	Mode Selection	Measurement
1	All	Continuity
2	Soft Or Medium	No Continuity
2	Hard	Continuity
3	Medium Or Hard	No Continuity
3	Soft	Continuity
4 (2)	Ignition Off	Zero Volts
4 (2)	Ignition On	Battery Voltage
6 (3)	Any Selection (4) ..	Battery Voltage
7	Soft Or Hard	No Continuity
7	Medium	Continuity

(1) - See Fig. 3.

(2) - Power Supply (voltage measurement).

(3) - Terminal number 5 is not used.

(4) - Battery voltage is temporarily present 5 seconds after operating VSA mode selector switch.



93D82167

Fig. 3: Identifying VSA Control Module Connector
 Courtesy of Mitsubishi Motor Sales of America.

REMOVAL & INSTALLATION

STEERING KNUCKLE

Removal

1) Raise and support vehicle. Remove wheel assembly. Remove brake caliper. Remove hub/rotor assembly. See WHEEL BEARING under REMOVAL & INSTALLATION. Remove dust cover from steering knuckle.

2) Disconnect tie rod end from steering knuckle. Mark torsion bar adjusting nut for installation reference. Loosen torsion bar anchor arm assembly adjusting nut. Loosen, but DO NOT remove, ball joint-to-steering knuckle nuts.

3) Using ball joint separator, separate ball joints from steering knuckle. Detach upper and lower ball joints from steering knuckle. Remove steering knuckle from drive axle. Remove oil seal and spacer from steering knuckle.

Inspection

Inspect steering knuckle for cracks. Inspect spindle for wear and heat damage.

Installation

1) If needle bearing needs replacement, drive bearing from steering knuckle. Use Bearing Driver (MB990956-01) and Handle (MB9909938-01) to install needle bearing.

NOTE: DO NOT reuse steering knuckle needle bearing if it is removed.

2) Using bearing installer and handle, install NEW needle bearing until it is even with steering knuckle end face. Lubricate bearing roller surface and spacer-to-steering knuckle contact areas. Install spacer with chamfered side toward inside of vehicle.

3) Using Seal Installer (MB990985-01) and handle, install seal in steering knuckle until seal is even with steering knuckle end face. Apply grease to seal lip area and inside of seal. To complete installation, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

LOWER BALL JOINT

Removal

1) Raise and support vehicle. Remove skid plate (if equipped). Remove wheel assembly. Mark torsion bar adjusting nut for reassembly reference. Release torsion bar tension.

2) Loosen, but DO NOT remove, lower ball joint stud nut. Using ball joint separator, separate ball joint from steering knuckle. Remove ball joint stud nut. Remove ball joint-to-lower control arm bolts. Remove ball joint.

Installation

Lubricate ball joint. Reverse removal procedure to complete installation. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

LOWER CONTROL ARM

Removal

1) Raise and support vehicle. Remove wheel assembly. Remove front skid plate and undercover (if equipped). Remove torsion bar. See TORSION BAR. Remove stabilizer bar bolt from control arm.

2) Remove shock absorber-to-control arm bolts. Loosen, but DO NOT remove, lower ball joint-to-steering knuckle nut. Using ball joint fork, separate lower ball joint from steering knuckle.

3) Remove ball joint stud nut from steering knuckle. Remove

control arm shaft. See Fig. 1. Remove torque arm. Remove lower control arm pivot bolt. Remove lower control arm.

Inspection

1) Inspect control arm for cracks and deformation. Check ball joints. See BALL JOINT CHECKING under ADJUSTMENTS & INSPECTION.

2) Inspect ball joint dust covers for damage. Replace damaged dust covers. Inspect control arm bushing and frame bracket bushing for damage. Replace bushings if necessary.

NOTE: Differential carrier may require detachment in order to replace left bracket bushing.

3) Use press and Bushing Remover/Installer (MB990883-01) if control arm bushing needs replacement. Press bushing from control arm. See Fig. 4.

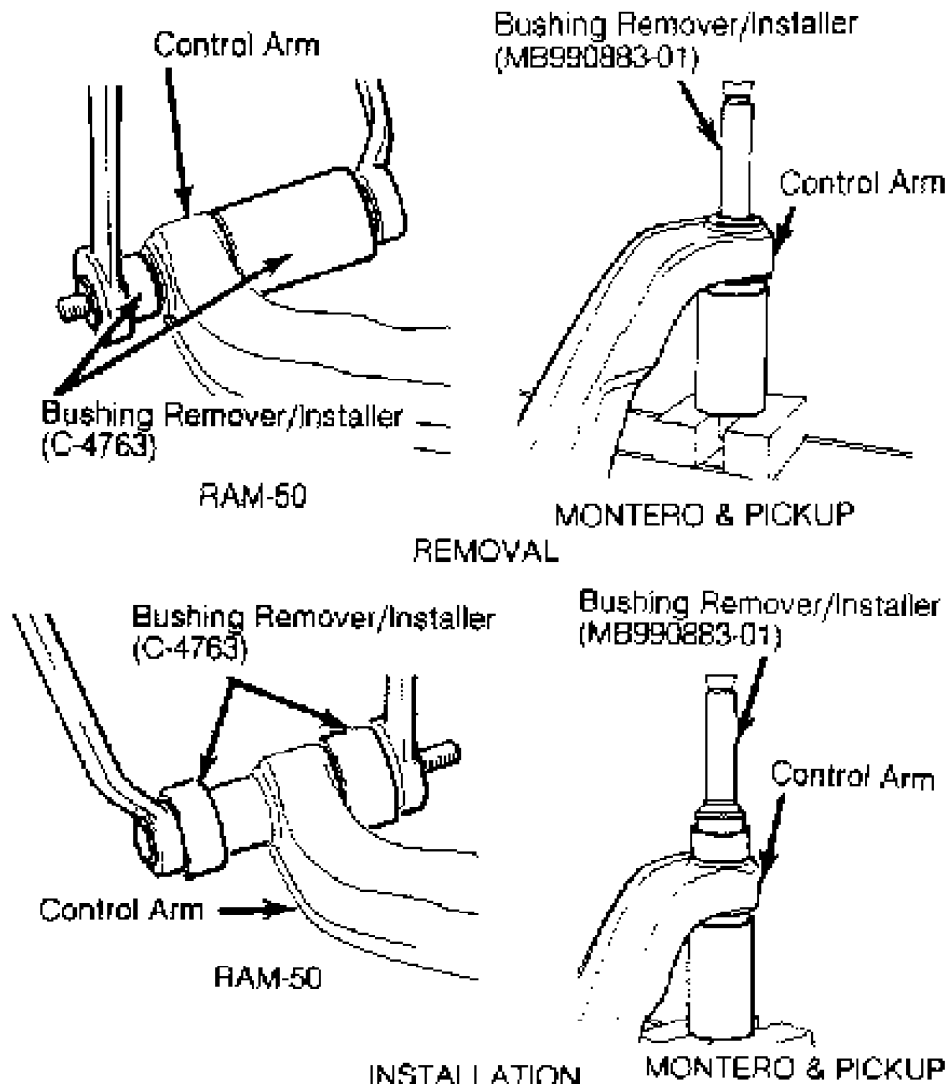


Fig. 4: Replacing Lower Control Arm Bushing
Courtesy of Mitsubishi Motor Sales of America.

4) Coat bushing and control arm with soapy solution. Using press and bushing remover/installer, press bushing into control arm.

Position bushing so distance from bushing to control arm is equal at both ends.

5) Reverse bushing remover/installer to install bushing.

Position bushing so distance from bushing to control arm is equal at both ends.

NOTE: Tighten lower control arm shaft and pivot bolt to specification with vehicle at normal operating height.

Installation

To install, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article. Tighten lower control arm shaft and pivot bolt to specification with vehicle at normal operating height.

STABILIZER BAR

Removal

Remove skid plate (if equipped). Remove stabilizer bar bolt from lower control arm. Remove stabilizer bar clamp-to-hanger bolts. Remove stabilizer bar and bushings. Remove stabilizer bar-to-frame hangers (if necessary).

Installation

1) To install, reverse removal procedure. Install stabilizer bar-to-frame hangers and stabilizer bar-to-control arm bolt using new nuts.

2) Tighten hanger-to-frame nut and stabilizer bar-to-control arm nut until distance from threaded end of bolt to nut is .16-.20" (4.0-5.0 mm).

TORSION BAR

NOTE: Mark torsion bar and anchor arm location for reassembly reference before removing.

Removal

1) Raise and support vehicle. Support lower control arm using jackstand. Loosen anchor arm adjusting bolt lock nut. Remove heat protector from frame (right side only). Loosen anchor arm bolt to release torsion bar tension.

2) Mark front of torsion bar and torque arm for reassembly reference. Remove anchor arm. See Fig. 1. Remove dust covers from torsion bar. Remove heat cover (left side only) located between dust cover and torsion bar. Remove torsion bar.

Inspection

Inspect all splined areas for damage. Inspect dust covers for cracks and damage. Check for bent anchor arm bolts. Replace components as necessary.

Installation

1) Apply grease to splined areas of torsion bar, anchor arm, torque arm splines, anchor arm bolt threads and inside of dust cover. Check for left and right identification marks on torsion bar ends. Ensure torsion bars are installed in correct locations.

2) Install torsion bar in torque arm, with identification mark toward front of vehicle. Align mark on torque arm with mating mark on torsion bar. When installing a new torsion bar, align White paint spline with index mark on front torque arm.

3) Tighten anchor arm bolt adjusting nut to obtain correct final bolt protrusion. See FINAL ANCHOR ARM BOLT PROTRUSION table. Final bolt protrusion depends upon curb weight of vehicle.

FINAL ANCHOR ARM BOLT PROTRUSION TABLE

Application	Right Bolt In. (mm)	Left Bolt In. (mm)
Montero	3.15 (80.0)	3.15 (80.0)

4) To complete installation, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article. Check riding height and front wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

UPPER BALL JOINT

Removal

1) Raise and support vehicle. Remove wheel assembly. Mark torsion bar adjusting nut for reassembly reference. Release torsion bar tension. Loosen, but DO NOT remove, upper ball joint-to-steering knuckle nut.

2) Using ball joint separator, separate ball joint from steering knuckle. Remove ball joint nut from steering knuckle. Remove ball joint-to-upper control arm bolts. Remove ball joint.

Installation

Lubricate ball joint. Reverse removal procedure to complete installation. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

UPPER CONTROL ARM

Removal

1) Support lower control arm using jackstand. Remove wheel assembly. Mark anchor arm bolt for reassembly reference. Loosen anchor arm bolt to release torsion bar tension. Disconnect and plug brake hose at frame mount bracket.

2) Remove cotter pin from ball joint stud. Loosen, but DO NOT remove, ball joint stud nut. Using ball joint fork, loosen ball joint from steering knuckle. Remove ball joint stud nut. Remove rebound stopper and brake hose support from control arm.

3) Remove ABS sensor bracket (if equipped). Remove upper control arm mounting bolts and shim(s). Note direction of bolt installation and locations of camber adjustment shims. Remove control arm. If clearance is inadequate for control arm removal, remove shock absorber.

Inspection

Inspect control arm for cracks and deformation. Check ball joints. See BALL JOINT CHECKING under ADJUSTMENTS & INSPECTION. Inspect ball joint dust cover for damage, and replace cover as necessary.

Installation

1) To install, reverse removal procedure. Install control arm bolts from outside of frame, with nuts against control arm.

2) Ensure alignment shims are placed in original locations.

3) Tighten shock absorber upper nut to end of threads, and install lock nut. Tighten shock absorber upper nut until distance from end of threads to nut is .04-.08" (1.0-2.0 mm). Install lock nut.

4) Tighten bolts to specification. See TORQUE SPECIFICATIONS. Bleed brakes. Adjust anchor arm bolt to proper torsion bar setting.

See TORSION BAR under REMOVAL & INSTALLATION. Check wheel alignment, and adjust it if necessary. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

WHEEL BEARING

Removal

1) Raise and support vehicle. Remove wheel assembly. Remove brake caliper assembly. Remove locking hub. See LOCKING HUB.

2) Remove lock washer. Using Socket (MB990954-01), remove lock nut. Remove front hub assembly from steering knuckle. Remove oil seal and bearings from hub. If bearing races need to be replaced, drive bearing races from hub using brass drift and hammer.

Installation

1) Lubricate bearings. Install bearing races in hub. Ensure bearing races are fully seated. To complete installation, reverse removal procedure. Adjust wheel bearings. See WHEEL BEARING under ADJUSTMENTS & INSPECTION.

2) Install seal in hub using Seal Installer (MB990955-01). Install seal until it is even with hub surface. Apply sealant to locking hub-to-front hub contact surface. Apply sealant to front hub-to-cover surface.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Anchor Arm Bolt Lock Nut	29-36 (39-49)
Automatic Hub Cover	13-25 (18-34)
Ball Joint Nut	
Lower	87-130 (118-176)
Upper	43-65 (58-88)
Ball Joint-To-Lower Control Arm Bolt	39-54 (53-73)
Caliper Bolt	58-72 (79-98)
Control Arm-To-Frame Bolt/Nut	
Lower	(1) 101-116 (137-157)
Upper	72-87 (98-118)
Locking Hub-To-Hub/Rotor Bolt	36-43 (49-58)
Manual Hub Cover Bolt	10 (14)
Shock Absorber Lower Mount Bolt	11-16 (15-22)
Shock Absorber Shaft Nut	10-13 (14-18)
Tie Rod Nut	33 (45)
Torque Arm Nut	69-87 (94-118)

INCH Lbs. (N.m)

Stabilizer Bar Clamp Bolt

84-108 (8-12)

(1) - Tighten with vehicle at normal operating height.