1997-2003 SUSPENSION

Front - EuroVan

IDENTIFICATION

BRAKE CALIPER IDENTIFICATION

Several different front calipers are used on EuroVan. Calipers can be identified by the PR number on the vehicle identification plate. See Fig. 1. See FRONT BRAKE CALIPER IDENTIFICATION.

FRONT BRAKE CALIPER IDENTIFICATION

<table>
<thead>
<tr>
<th>PR Number (1)</th>
<th>Caliper Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1LU (2)</td>
<td>FN3</td>
</tr>
<tr>
<td>1LP (2)</td>
<td>Lucas C54</td>
</tr>
<tr>
<td>1LE (2)</td>
<td>Lucas RC54</td>
</tr>
<tr>
<td>1LB (3)</td>
<td>FN3 Or FNR</td>
</tr>
</tbody>
</table>

(1) Identify brake version by reading PR number on vehicle data plate. Data plate is located on left "A" pillar, next to central electronics. See Fig. 1.
(2) Used with 15" wheels.
(3) Used with 16" wheels.

NOTE: On vehicles with knee padding, vehicle data plate is located under central electric cover (under driver's side of dash).
**DESCRIPTION**

FWD independent suspension is an double-wishbone type with torsion bar mounted on upper control arm. Wheel is supported by a wheel bearing housing mounted between the upper and lower control arms. Torsion bars are mounted between the upper control arms and vehicle frame. Shock absorbers are mounted between the lower control arm and frame. See Fig. 2.
Fig. 2: Exploded View Of Front Suspension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

The upper control arm is pushed downward by the pre-tensioning strength of the torsion bar. Torsion bar must be relaxed for following services:

- Shock absorber, removing and installing.
- Removing and installing wheel bearing/wheel bearing housing.
- Removing and installing drive shaft.
- Removing and installing lower ball joint/control arm.
- Removing and installing upper ball joint.
- Removing and installing eccentric bushing at upper ball joint.
- Removing and installing stabilizer.
- Torsion bar, removing, installing, and adjusting.

ADJUSTMENTS

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

NOTE: See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

WHEEL BEARING

NOTE: The wheel bearing and wheel hub are installed together in a housing. Wheel bearing/hub unit is maintenance and adjustment free.

INSPECTION

RIDE HEIGHT

Standing height dimension is measured from upper shock absorber mount bolt head to center of lower shock absorber bolt. See Fig. 3. If necessary, adjust to prescribed height by turning nut on torsion bar tensioning lever. For standing height specification, see SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.
BALL JOINT CHECKING

Raise and support vehicle. Inspect ball joints for excessive play and damaged rubber boots. There should be no vertical or horizontal ball joint play. Replace ball joint if any play is present.

REMOVAL & INSTALLATION

BALL JOINTS

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal & Installation (Lower Ball Joint)

1. Raise and support vehicle. Relieve torsion bar tension. See TORSION BAR.
2. Remove lower shock absorber bolt. Remove stabilizer bar coupling link.
3. Remove ball joint-to-wheel bearing housing bolts. See Fig. 4.
4. Using Standard Puller (i.e. Kukko 204/2), press ball joint from control arm. See Fig. 5.
5. To install, reverse removal procedure. Ensure all nuts and bolts are tightened to specification. See TORQUE SPECIFICATIONS.

Fig. 4: Exploded View Of Lower Control Arm Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

G93H83516
Fig. 5: Removing Lower Ball Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removal & Installation (Upper Ball Joint)

1. Remove wheel bearing housing. See WHEEL BEARING HOUSING.
2. Remove eccentric bushing. See Fig. 6 and Fig. 7. Using a flat-bladed tool pry out securing ring.
3. Using ball joint puller, remove ball joint from upper control arm. See Fig. 8.
4. Place NEW ball joint into control arm. Using Two-Arm Puller (Kukko 20/2) or equivalent, install ball joint into upper control arm. See Fig. 9.
5. Reverse remaining removal procedure to complete installation. Ensure all nuts and bolts are tightened to specification. See TORQUE SPECIFICATIONS.
Fig. 6: Exploded View Of Upper Control Arm Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Fig. 7: Removing Eccentric Bushing  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Fig. 8: Removing Upper Ball Joint  
Courtesy of VOLKSWAGEN UNITED STATES, INC.
G00222189

Fig. 9: Installing Upper Ball Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

CONTROL ARM BEARINGS & BUSHINGS

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Use following illustrations to replace upper and lower control arm bearings (bushings). See Fig. 10 - Fig. 15.
Pressing out front bearing -A- for upper control arm

Pressing in front bearing for upper control arm
- Press in far enough so that the collar of the bearing protrudes even on both sides.

**Note:**
*Before pressing in, coat using lubricant, e.g. lubricating grease.*

Rear bearing for upper control arm, pressing out at pressing in
- Press in far enough so that the collar of the bearing protrudes evenly on both sides.

**Note:**
*Before pressing in, coat using lubricant, e.g. lubricating grease.*

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**Fig. 10: Removing & Installing Bearings For Upper Control Arm**

Courtesy of VOLKSWAGEN UNITED STATES, INC.
Remove rubber collar from bonded rubber bushing.

Bend up metal collar -1- in area -a-.

Pressing out front bearing for lower control arm.

Fig. 11: Removing Front Bearing For Lower Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Pressing in front bearing for lower control arm
- Press in bearing up to stop.

Re-pressing in front bearing for lower control arm
- Insert a bolt -A- into bearing for re-pressing (e.g. 10-203).
- Re-press until the rubber collar jumps out from the control arm.

Fig. 12: Installing Front Bearing For Lower Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Pressing out rear bonded rubber bushing from lower control arm
- Mark installation position beforehand, e.g. via punch indentat arrow B.

Installation or rear bonded rubber bushings
Bonded rubber bushing must be pressed in so that the lug (arr
points upward and is offset by 11° to symmetrical axis of contr
(left and right).

Note:
Control arm must be held in installation position to do so.

Fig. 13: Removing & Installing Rear Bushing For Rear Lower Control Arm (1 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Pre-tension rear bonded rubber bushing for lower control arm

- Next, pre-tighten bonded rubber bushings using hose clamp seen in illustration, until both metal shells of the bearing α each other (arrow).

Press in rear bonded rubber bushing into lower control arm.

- Press in pre-tightened bonded rubber bushings in installa position far enough so that a distance of 371 ± 1 mm is ci between inner tube of front bonded rubber bushing and inner tube of rear bonded rubber bushing.

![Diagram](image1)

**Fig. 14: Removing & Installing Rear Bushing For Rear Lower Control Arm (2 Of 3)**

*Courtesy of VOLKSWAGEN UNITED STATES, INC.*

![Diagram](image2)

**Installation measurement of bonded rubber bushing lower control arm.**

Dimension $a = 371 \pm 1\text{ mm}$
Fig. 15: Removing & Installing Rear Bushing For Rear Lower Control Arm (3 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

LOWER CONTROL ARM

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal

1. Relieve torsion bar tension. See TORSION BAR.
3. Remove ball joint-to-wheel bearing housing bolts. See Fig. 4.
4. Remove control arm-to-subframe pivot bolts. Slide out control arm.

Inspection

Check lower control arm bushings for excessive wear, cracks or contamination. Replace bushings if necessary. See CONTROL ARM BEARINGS & BUSHINGS.

Installation

Installation is reverse of removal procedure. Tighten control arm bolts with vehicle on ground. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

SHOCK ABSORBER

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal & Installation

1. Relieve torsion bar tension. See TORSION BAR.
2. Raise and support vehicle. Remove wheel. Remove nuts and bolts securing shock absorber to lower control arm.
3. Remove shock absorber mount from body. Remove washers and cushions from shaft of shock absorber. Compress shock absorber and remove from vehicle. To install, reverse removal procedure. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS.

STABILIZER BAR

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal & Installation

1. Relieve torsion bar tension. See TORSION BAR.
2. Raise and support vehicle. Remove wheels. Unbolt shock absorbers from control arms, and push
3. Disconnect coupling links from lower control arm.
4. Disconnect clamp and push steering rack boot from steering rack. Unscrew tie rods from steering gear.
5. Unclip wire for oxygen sensor at bracket. Separate exhaust system behind front exhaust pipe. Remove exhaust system heat shield (loosen exhaust system as necessary).
6. On vehicles equipped with heavy duty stabilizer bar 1.1" (27 mm), remove universal joint bolt on steering pinon and separate steering gear from steering column. Remove steering gear from subframe assembly. Go to next step. On vehicles NOT equipped with heavy duty stabilizer bar, go to next step.
7. Remove stabilizer bar mounting clamp bolts. Remove stabilizer bar by turning bar 90 degrees upwards, and remove bar to left in one motion.
8. Installation is reverse of removal. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Check toe in. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

Bushing Replacement

Use illustrations to aid in replacing stabilizer bar bushings. See Fig. 16 and Fig. 17.

Unbolt and bolt on coupling rod at stabilizer (27 mm diameter)
1 - Reinforced stabilizer 27 mm -2- coupling rod

Tightening torque of coupling rod to stabilizer: 100 Nm

Note:
After mounting coupling rod, make sure the rubber joint of coupler is not twisted.

Removing and installing rubber bushing for coupling rod, on stabilizer side.
- Pry out rubber bushing using screwdriver as shown in illustration
- Press in new rubber bushing.

Note:
Before pressing in, coat using lubricant, e.g. lubricating soap.
Remove rubber bushing for coupling rod on control arm side
- Press out bushing as shown in illustration.
- Pry out rubber bushing using screwdriver.

Install rubber bushing for coupling rod on control arm side
- Press rubber bushing into coupling rod.
- Press in bushing -A- as shown in illustration.

Note:
Before pressing in, coat parts using lubricant, e.g. lubricating

Fig. 17: Replacing Stabilizer Bar Bushings (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

SUBFRAME ASSEMBLY
Removal

1. Raise and support vehicle. Remove wheels. Remove brake calipers. Support brake calipers with mechanics wire. DO NOT allow caliper to hang by it's own weight.
2. Disconnect ABS wheel speed sensor harness connectors.
3. Remove fuel tank.
4. Unclip wire for oxygen sensor at bracket. Separate exhaust system behind front exhaust pipe. Remove exhaust system heat shield (loosen exhaust system as necessary).
5. Relieve torsion bar tension. See TORSION BAR.
6. Remove bolt for drive axle at steering gear and remove wires from power steering gear as necessary. Remove drive axles from final drive. Unbolt pendulum support from transmission. See Fig. 19.
7. Place Transmission Jack (VAG1383) with Front Axle Support (VAG1712) or equivalent, below subframe. See SPECIAL TOOLS. Remove bolts for subframe. Lower subframe using transmission jack. Guide torsion bar between separated location of exhaust pipe front/catalytic converter and also guide drive axle past left side of transmission.
Installation

Installation is reverse of removal. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

TORSION BAR

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal

1. Raise and support vehicle. Remove wheels. Remove fuel tank.
2. Unclip wire for oxygen sensor at bracket. Separate exhaust system behind front exhaust pipe. Remove exhaust system heat shield (loosen exhaust system as necessary).


Installation

1. To install, reverse removal procedure. Tighten adjusting nut so stud protrusion is equal to original measurement. Check and adjust ride height as necessary. See RIDE HEIGHT under INSPECTION.

2. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

UPPER CONTROL ARM

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal

NOTE: Upper control arm can only be removed after subframe has been removed from vehicle.

1. Remove subframe assembly. See SUBFRAME ASSEMBLY.

2. Disconnect upper ball joint from wheel bearing housing. See REMOVAL & INSTALLATION (UPPER BALL JOINT) under BALL JOINTS.

3. Remove upper control arm-to-subframe bolts. Remove control arm.

Inspection

Check upper control arm bushings for excessive wear, cracks or contamination. Replace bushings if necessary. See CONTROL ARM BEARINGS & BUSHINGS.

Installation

Installation is reverse of removal. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

WHEEL BEARING

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal & Installation

1. Remove wheel bearing housing. See WHEEL BEARING HOUSING.

2. Use illustrations to aid in removal and installation of wheel bearing. See Fig. 20 - Fig. 22. To identify special tools used during procedure, see SPECIAL TOOLS.

3. Installation is reverse of removal. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN.
EUROVAN article in WHEEL ALIGNMENT.

Press out wheel hub. Remove securing ring.

Pressing out wheel bearing from wheel bearing hub.

Fig. 20: Removing & Installing Wheel Bearing (1 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Remove bearing inner race from wheel hub

Press wheel bearing into wheel bearing hot
Install securing ring.

Fig. 21: Removing & Installing Wheel Bearing (2 Of 3)
Courtesy of VOLKSWAGEN UNITED STATES, INC.
WHEEL BEARING HOUSING

NOTE: Use exploded view illustration when removing or installing front suspension components. See Fig. 2.

Removal & Installation

1. Relieve torsion bar tension. See TORSION BAR. Remove hubcap and loosen drive axle bolt 90°.
2. Raise and support vehicle. Remove brake calipers. Support brake calipers with mechanics wire. DO NOT allow caliper to hang by it's own weight. Remove drive axle bolt completely.
4. Mark position of eccentric bushing to wheel bearing housing. See Fig. 6. Remove upper ball joint nut.
5. Disconnect tie rod from wheel bearing housing. Unbolt eccentric washer securing bolt from wheel bearing housing. Remove wheel bearing housing.
6. Installation is reverse of removal. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Counter-hold upper ball joint with 7-mm Allen wrench while torquing nut. Check wheel alignment. See SPECIFICATIONS & PROCEDURES - EUROVAN article in WHEEL ALIGNMENT.

SPECIAL TOOLS

Use following illustrations to identify special tools. See Fig. 23 -Fig. 26.
Fig. 23: Identifying Special Tools (1 Of 4)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Fig. 24: Identifying Special Tools (2 Of 4)
Courtesy of VOLKSWAGEN UNITED STATES, INC.
Fig. 25: Identifying Special Tools (3 Of 4)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

V.WG 1332

V.WG 1712

Fig. 26: Identifying Special Tools (4 Of 4)

1. 20/10 Kukko two-arm puller
2. Extension arms
3. 204/2 Kukko puller
4. 128/2 Kukko ball joint separator
WHEEL LUG BOLT APPLICATIONS

From 2001 and up models, a new version of lug bolts has been installed. The dimensions and tightening torques of the previous and changed lug bolts are the same. New version lug bolts are not permissible on vehicles which were produced up to model year 2000. Wheel rims of vehicles which were produced up to model year 2000 are not permissible on vehicles 2001 and up. To identify wheel lugs, see Fig. 27.

1. Previous wheel bolt
For vehicles up to m.y. 2000.
Surface coated in black.
Part nr. 701 601 139 B

2. Wheel bolt for vehicles as of m.y. 2001
Collar (arrow) is not tightly connected to the hex head.
Surface is layered in silver.
Part nr. 7M3 601 139 B

Tightening torque:
Wheel bolt to wheel hub for all vehicles: 125 ft.lbs (170 N.m)

Fig. 27: Identifying Wheel Lug Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

TORQUE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Application</th>
<th>Ft. Lbs. (N.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axle Shaft Outer Bolt (1)</td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>111 (150)</td>
</tr>
<tr>
<td>Step 2</td>
<td>Plus Additional 90 Degree Turn</td>
</tr>
<tr>
<td>Axle Shaft-To-Final Drive Flange (1)</td>
<td></td>
</tr>
<tr>
<td>M10 x 48</td>
<td>59 (80)</td>
</tr>
<tr>
<td>M12 x 1.5 x 55</td>
<td>74 (100)</td>
</tr>
<tr>
<td>Ball Joint-To-Control Arm Nut (Lower &amp; Upper) (1)</td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>44 (60)</td>
</tr>
<tr>
<td>Step 2</td>
<td>Plus Additional 90 Degree Turn</td>
</tr>
<tr>
<td>Ball Joint Eccentric Clamp Bolt</td>
<td>44 (60)</td>
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<tr>
<td>Ball Joint (Lower)-To-Wheel Bearing Housing Bolts (1)</td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>66 (90)</td>
</tr>
<tr>
<td>Step 2</td>
<td>Plus Additional 90 Degree Turn</td>
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<tr>
<td>Brake Caliper-To-Wheel Bearing Housing (2)</td>
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<td>Lucas CS4 (1LP, 15&quot; Wheel)</td>
<td>207 (280)</td>
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<td>Component</td>
<td>Part Number</td>
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<tr>
<td>Lucas RC54 (1LE, 15&quot; Wheel)</td>
<td>207 (280)</td>
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<tr>
<td>FN3 (1LU, 15&quot; Wheel)</td>
<td>207 (280)</td>
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<td>Brake Caliper Self-Locking Bolt-To-Caliper Carrier (1), (2)</td>
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<td>C54 (1LP, 15&quot; Wheel)</td>
<td>26 (35)</td>
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<tr>
<td>Brake Caliper Guide Pins-To-Caliper Carrier (2)</td>
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<td>FN3 (1LU, 15&quot; Wheel)</td>
<td>18 (25)</td>
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<tr>
<td>FN3 (1LB, 16&quot; Wheel)</td>
<td>18 (25)</td>
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<tr>
<td>FNR (1LB, 16&quot; Wheel)</td>
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<tr>
<td>Control Arm Pivot Hex Nut (1), (3)</td>
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<tr>
<td>Lower</td>
<td>96 (130)</td>
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<tr>
<td>Upper</td>
<td>74 (100)</td>
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<tr>
<td>Pendulum Support-To-Subframe Bolt (1)</td>
<td>148 (200)</td>
</tr>
<tr>
<td>Pendulum Support-To-Transmission Bolt (1)</td>
<td></td>
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<tr>
<td>Step 1</td>
<td>59 (80)</td>
</tr>
<tr>
<td>Step 2 Plus Additional 90 Degree Turn</td>
<td></td>
</tr>
<tr>
<td>Shock Absorber-To-Lower Control Arm Nut</td>
<td>118 (160)</td>
</tr>
<tr>
<td>Shock Absorber-To-Mounting Bracket Nut</td>
<td>18 (25)</td>
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<tr>
<td>Shock Absorber Mounting Bracket-To-Subframe Bolt/Nut</td>
<td>74 (100)</td>
</tr>
<tr>
<td>Stabilizer Bar Mounting Bracket Bolts</td>
<td>41 (55)</td>
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<tr>
<td>Subframe Mounting Bolts (M12 x 1.5 X 32)</td>
<td>74 (100)</td>
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<tr>
<td>Subframe Mounting Bolts (M14 x 1.5 x 40)</td>
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<tr>
<td>Tie Rod Castle Nut</td>
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<td>Torsion Bar-To-Upper Control Arm Bolt (M14 x 1.5)</td>
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<tr>
<td>Wheel Lug Bolt (4)</td>
<td>125 (170)</td>
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</tbody>
</table>

(1) Always replace with NEW fastener.

(2) Five different styles of front brake calipers can be used on this vehicle. To identify calipers, see BRAKE CALIPER IDENTIFICATION under IDENTIFICATION.

(3) Tighten only when vehicle is standing on its own weight.

(4) Note lug bolt version change for vehicles produced for 2001 and later models. See WHEEL LUG BOLT APPLICATIONS.