SECTION 2C

FRONT SUSPENSION

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

FRONT SUSPENSION

The front suspension for this vehicle is a combination knuckle/strut and spring design.

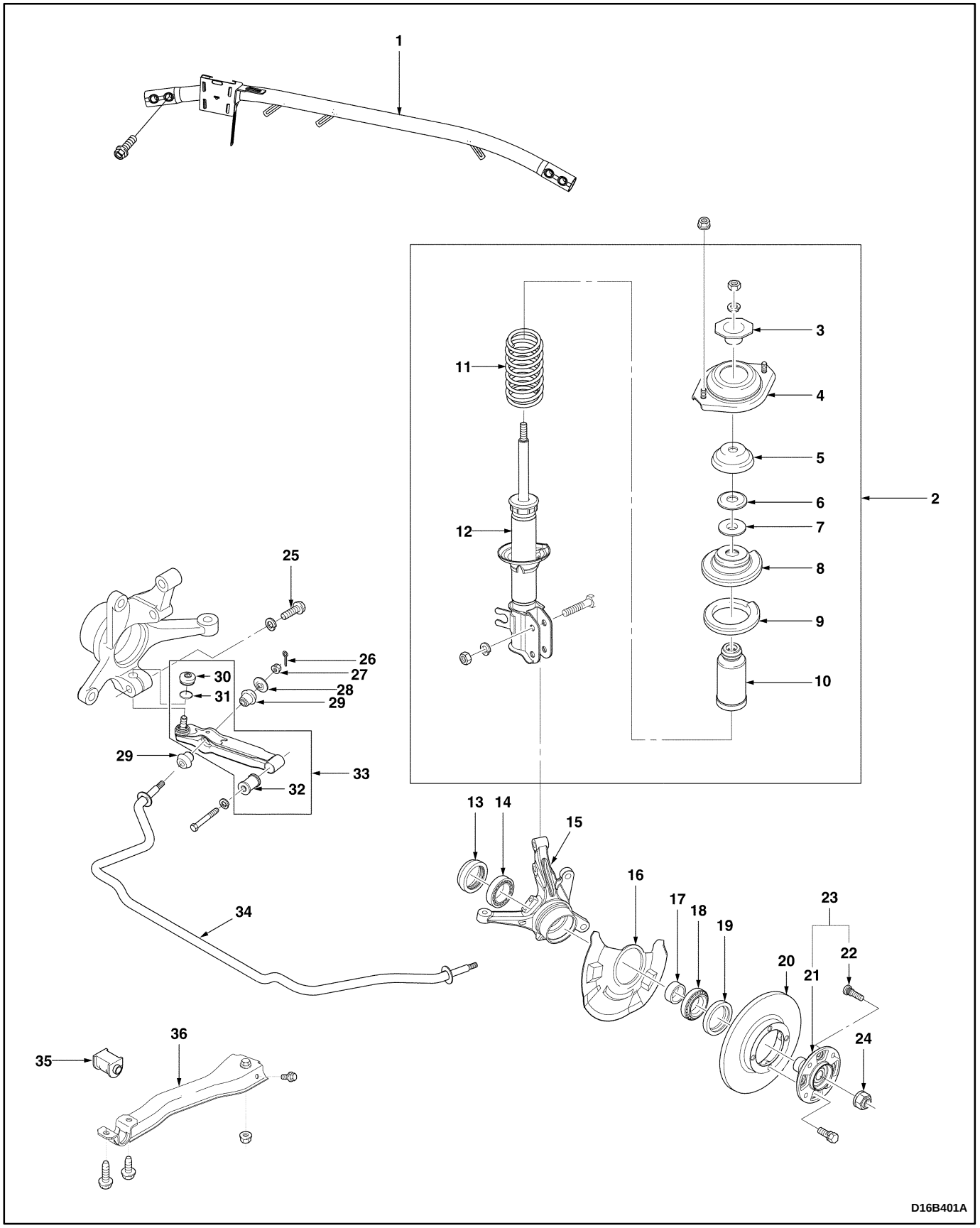
The control arms pivot from the body. The lower control arm pivots use rubber bushing. The upper end of the strut is isolated by a rubber mount and contains a bearing to allow the wheel to turn.

The lower end of the steering knuckle pivots on a ball joint bolted to the control arm. The ball joint is fastened to the steering knuckle with a bolt.

When servicing the control arm-to-body attachment and the stabilizer shaft-to-body insulators, make sure the attaching bolts are loose until the control arms are moved to the trim height, which is curb height. Trim height is the normal position to which the control arms move when the vehicle is sitting on the ground. Refer to “General Specifications” in this section.

COMPONENT LOCATOR

FRONT SUSPENSION



1. Strut Bar
2. Front Suspension Strut Assembly
3. Strut Inner Support
4. Strut Mount Assembly
5. Strut Mount Seat
6. Strut Bearing Seat
7. Strut Bearing
8. Coil Spring Upper Seat
9. Coil Spring Seat
10. Bumper Stopper
11. Coil Spring
12. Strut
13. Inner Bearing Oil Seal
14. Inner Hub Bearing
15. Steering Knuckle
16. Dust Cover
17. Hub Bearing Spacer
18. Outer Hub Bearing
19. Outer Bearing Oil Seal
20. Rotor
21. Wheel Hub
22. Hub Bolt
23. Hub Assembly
24. Drive Axle–to–Hub Caulking Nut
25. Control Arm Ball Stud Bolt
26. Cotter Pin
27. Castellated Nut
28. Washer
29. Stabilizer Shaft Bushing
30. Control Arm Dust Seal
31. Clip
32. Control Arm Bushing
33. Control Arm Assembly
34. Stabilizer Shaft
35. Stabilizer Shaft Mount
36. Front Under Longitudinal Frame

DIAGNOSTIC INFORMATION AND PROCEDURES

STRUT DAMPENER

A strut dampener is basically a shock absorber. However, strut dampeners are easier to extend and retract by hand than are shock absorbers. Strut dampeners are used only on the front in most vehicles, including this vehicle. Shock absorbers are used on the rear wheels.

Condition	Probable cause	Correction
Struts Seem Weak	• Improper tire pressures.	• Adjust the tire pressures to the specifications on the tire placard.
	• Abnormal load conditions.	• Consult with the owner to confirm the owner's understanding of normal load conditions.
	• Improper compression and rebound effectiveness of the strut dampener.	• Quickly push down and then lift up on the corner of the bumper nearest the strut dampener being tested. • Compare the compression and rebound with those of a similar vehicle that has an acceptable ride quality. • Replace the strut dampener, if needed.
Struts are Noisy	• Loose or damaged mountings.	• Tighten the strut dampener. • Replace the strut dampener if needed.
	• Improper compression and rebound effectiveness of the strut dampener.	• Quickly push down and then lift up on the corner of the bumper nearest the strut dampener being tested. • Compare the compression and rebound with those of a similar vehicle that has an acceptable ride quality. • Replace the strut dampener, if needed.
Leaks	• A slight trace of fluid.	• The strut dampener is OK.
	• Leaks of the seal cover on the fully extended strut.	• Replace the strut dampener.
	• Excessive leaks of fluid on the strut dampener.	• Replace the strut dampener.

BALL JOINT AND KNUCKLE

Ball Joint Inspection

1. Raise the front of the vehicle to allow the front suspension to hang free.
2. Grasp the tire at the top and the bottom.
3. Move the top of the tire in an in-and-out motion.
4. Look for any horizontal movement of the knuckle relative to the control arm.
5. Control arms assembly must be replaced if the following conditions exist:
   - The joint is loose.
   - The ball seal is cut.
   - The ball stud is disconnected from the knuckle.
   - The ball stud is loose at the knuckle.
   - The ball stud can be twisted in its socket with finger pressure.

Ball Stud Inspection

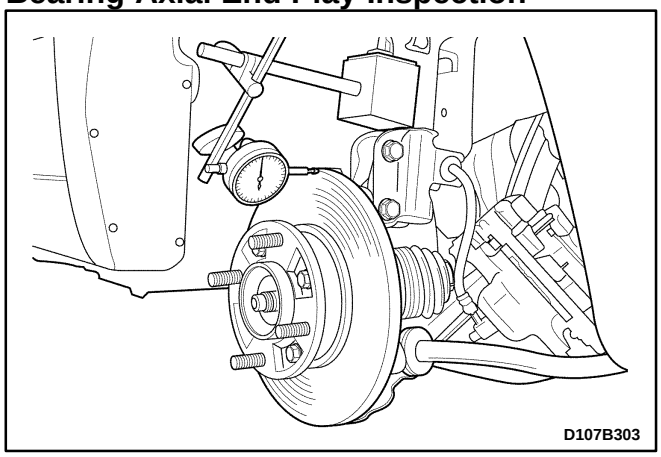
Make sure to check the tightness of the ball stud in the knuckle boss during each inspection of the ball joint. One way to inspect the ball stud for wear is to shake the wheel and feel for movement of the stud end or the castellated nut at the knuckle boss.

Another way to inspect the ball stud for wear is to check the fastener torque at the castellated nut. A loose nut can indicate a stressed stud or a hole in the knuckle boss.

Worn or damaged ball joints and knuckles must be replaced.

FRONT WHEEL BEARING

Bearing Axial End Play Inspection



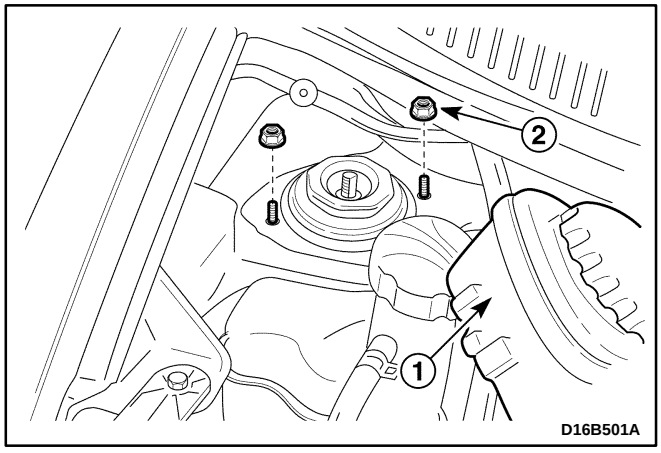
1. Lift and suitably support the vehicle.
2. Inspect the end play of the bearing.
3. If excessive play is defeeted, free shoes from the disc or remove the calipers.
4. Check the standard torque of the drive nut (spec. : 210 N•m (155 lb-ft)).
5. Check the bearing end play according to the following method.
   - Place a dial guage against the disc surface, grasp the disc.
   - Using a push–pull movement, note gage readings.

Specification	0.130mm or less (0.005 in)	Standard tighting torque of drive shaft nut : 210 N•m (155 lb-ft)

6. If the axial end play of the front wheel bearing exceed 0.130mm torque the drive shaft nut successively (Max. allowance : 240 N•m (177 lb-ft))
7. Check the axial end play again.
8. If the axial end play is above spec., replace the front wheel bearing.

REPAIR INSTRUCTIONS

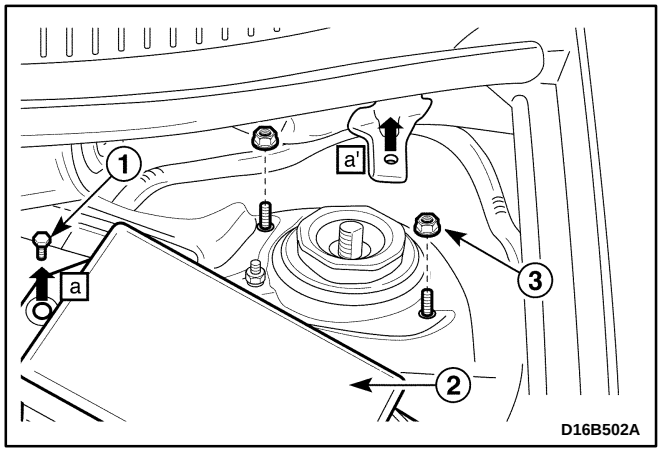
ON–VEHICLE SERVICE



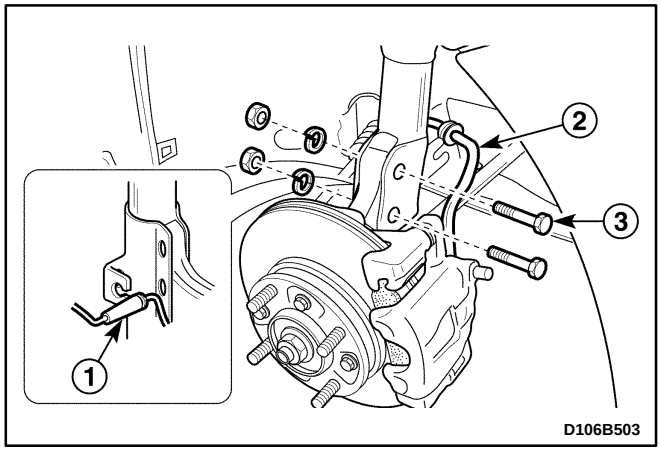
STRUT ASSEMBLY

Removal Procedure

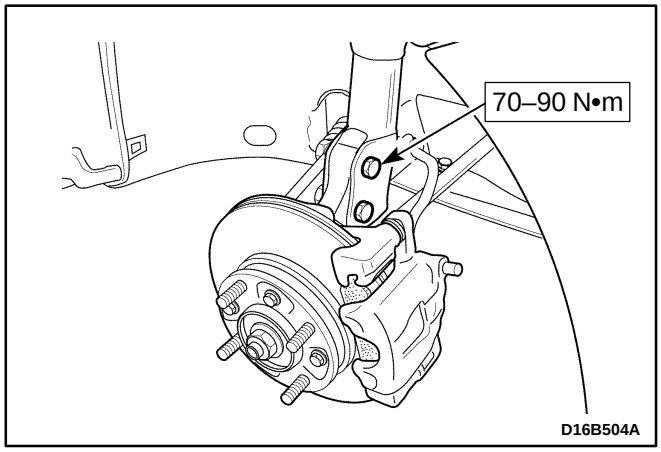
1. Open the hood.
2. Remove the top of the strut assembly at passenger seat side.
   - For vehicle with power steering, remove the power steering fluid reservoir (1).
   - Remove the nuts (2).



3. Remove the top of the strut assembly at driver side.
   - Remove the bolt and the fuse box (1, 2).
   - Remove the nuts (3).



4. Remove the lower of the strut assembly.
   - Raise and suitably support the vehicle.
   - Remove the wheel. Refer to *Section 2E, Tires and Wheels.*
   - Remove the ABS front speed sensor electrical wire from the bracket, if applicable (1).
   - Disconnect the brake hose from the bracket (2).
   - Remove the strut bracket bolts (3).
5. Remove the strut bracket assembly from the vehicle.



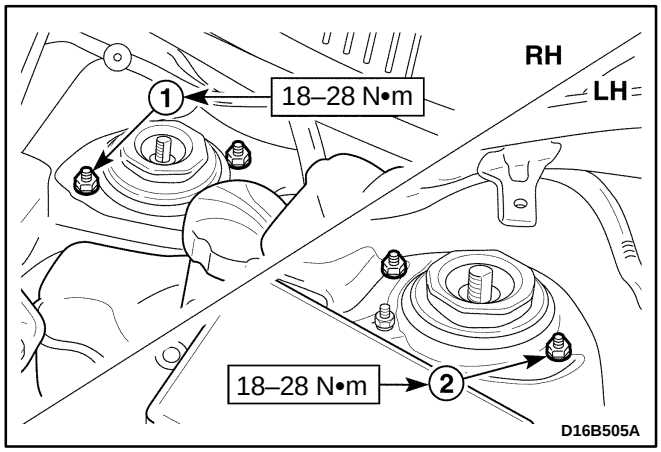
Installation Procedure

1. Install the strut assembly to the vehicle with the strut assembly–to–strut bracket bolts.

Tighten

Tighten the strut assembly–to–strut bracket bolts to 70–90 N•m (52–66 lb-ft).

2. Connect the brake hose to the bracket.
3. Install the ABS front speed sensor electrical wire to the bracket, if applicable.



4. Install the wheel. Refer to *Section 2E, Tires and Wheels.*
5. Lower the vehicle.
6. Install the nuts.
   - Install the nuts at passenger side (1).

Tighten

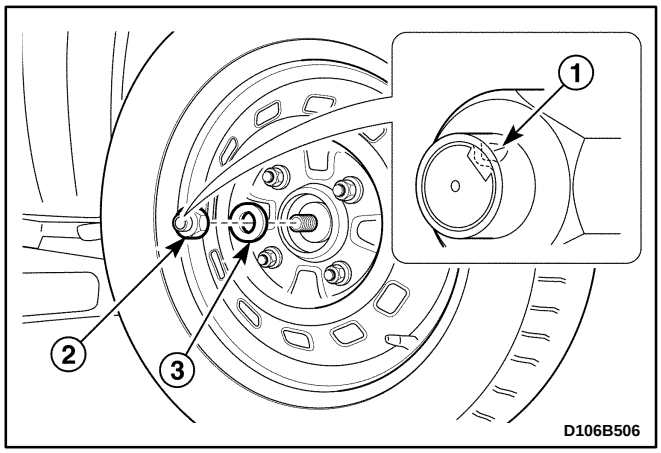
Tighten the nuts to 18–28 N•m (13–21 lb-ft).

- Install the nuts at driver side (2).

Tighten

Tighten the nuts to 18–28 N•m (13–21 lb-ft).

7. Install the power steering fluid reservoir.
8. Install the fuse box and bolt.



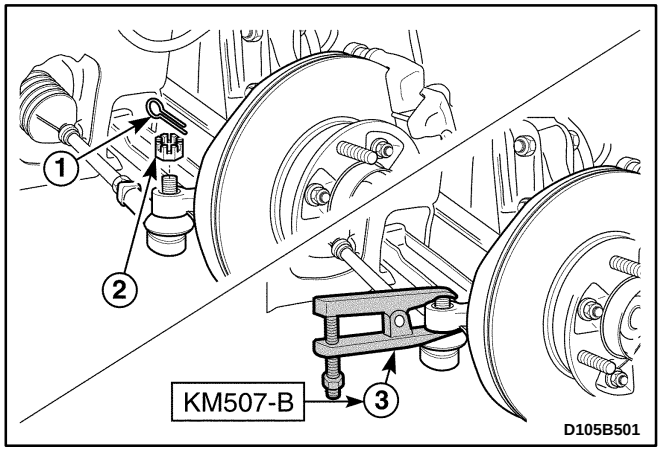
KNUCKLE ASSEMBLY

Tools Required

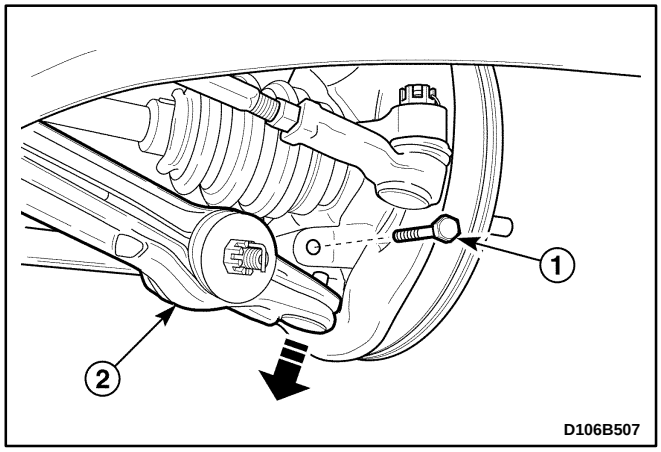
KM 507–B Ball Joint Remover

Removal Procedure

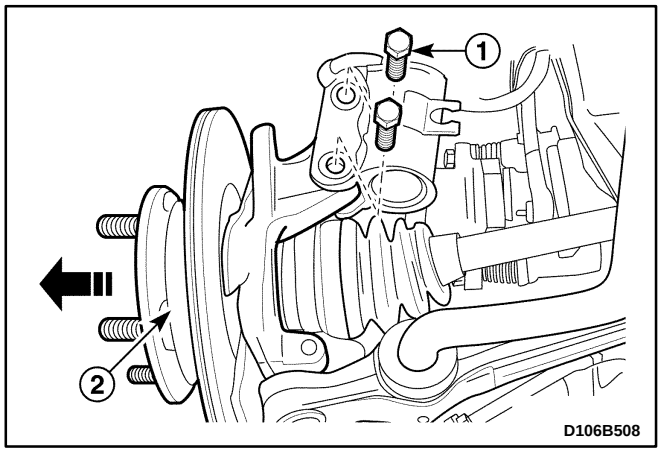
1. Remove the caulking nut.
   - Straighten the bent flange caulking nut (1).
   - Remove the caulking nut (2).
   - Remove the washer (3).
2. Remove the wheel. Refer to *Section 2E, Tires and Wheels.*



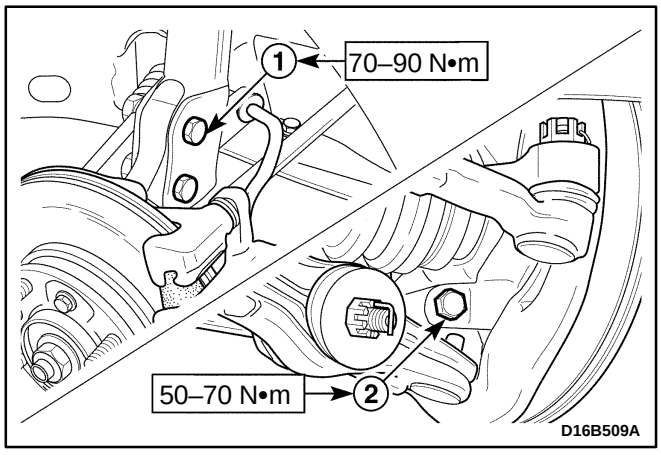
3. Separate the tie rod end from the knuckle assembly.
   - Remove the cotter pin (1).
   - Remove the castellated nut (2).
   - Install the ball joint remover KM 507–B.
   - Separate the tie rod end from the knuckle assembly using a ball joint remover KM 507–B (3).



4. Remove the control arm from the knuckle assembly.
   - Remove the stud bolt (1).
   - Separate the control arm from the knuckle assembly (2).



5. Remove the brake caliper from the knuckle assembly. Refer to *Section 4D, Front Disc Brakes.*
6. Remove the ABS wheel speed sensor from the knuckle assembly, if applicable. Refer to *Section 4F, Anti–lock Brake System*.
7. Remove the steering knuckle assembly from the vehicle.
   - Remove the strut bracket bolts (1).
   - Separate the knuckle assembly from the drive shaft by pulling the steering knuckle assembly (2).



Installation Procedure

1. Install in the reverse order of removal.
2. Install the steering knuckle assembly in the vehicle with strut bracket bolts (1).

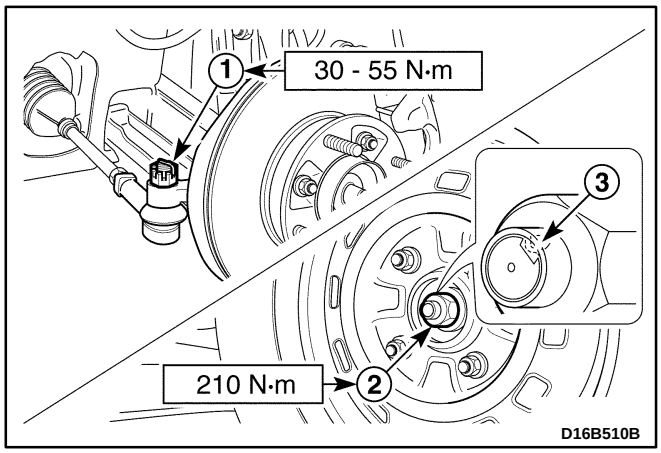
Tighten

Tighten the strut bracket bolts to 70–90 N•m (52–66 lb-ft).

3. Install the brake caliper from the knuckle assembly.
4. Install the control arm into the knuckle assembly with the stud bolt (2).

Tighten

Tighten the stud bolt to 50–70 N•m (36–52 lb-ft).



5. Install the tie rod end to the knuckle assembly.
6. Install the tie rod end–to–knuckle castellated nut (1) and the cotter pin.

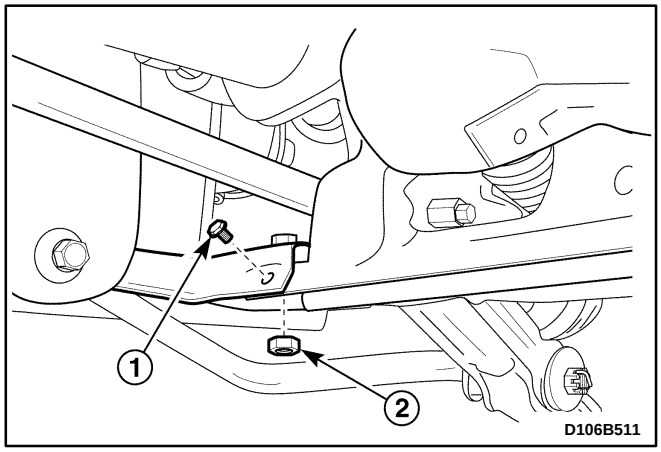
Tighten

Tighten the castellated nut to 30–55 N•m (22–41 lb-ft).

7. Install the caulking nut (2).
   - Bend the caulking nut flange (3).

Tighten

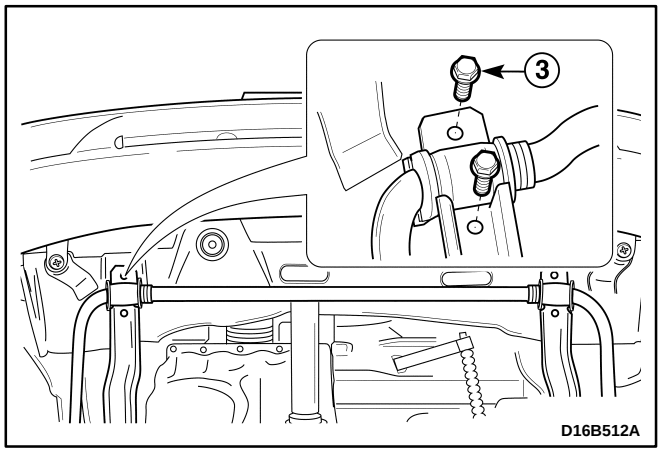
Tighten the caulking nut to 210 N•m (155 lb-ft).



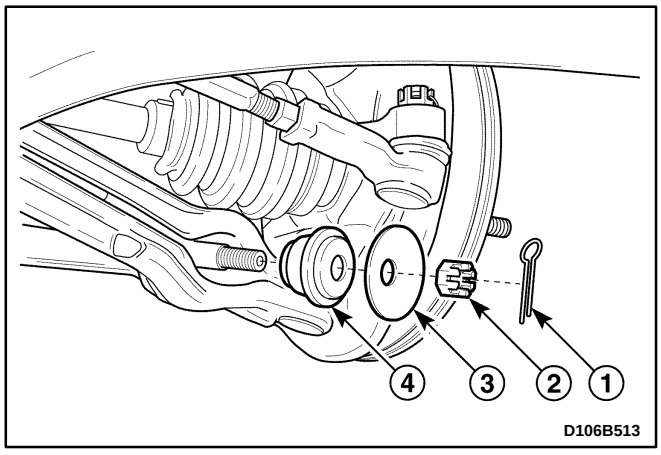
FRONT LONGITUDINAL FRAME AND STABILIZER SHAFT

Removal Procedure

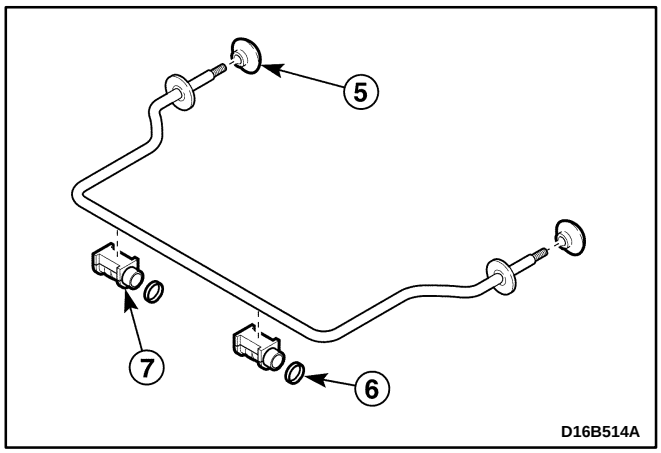
1. Removed the front under longitudinal frame.
   - Raise and suitably support the vehicle.
   - Remove the front wheel. Refer to *Section 2E, Tires and Wheels.*
   - Remove the transaxle under cover. Refer to *Section 5B, Manual Transaxle*.
   - Remove the front under longitudinal frame bolt (1).
   - Remove the front under longitudinal frame nut (2).



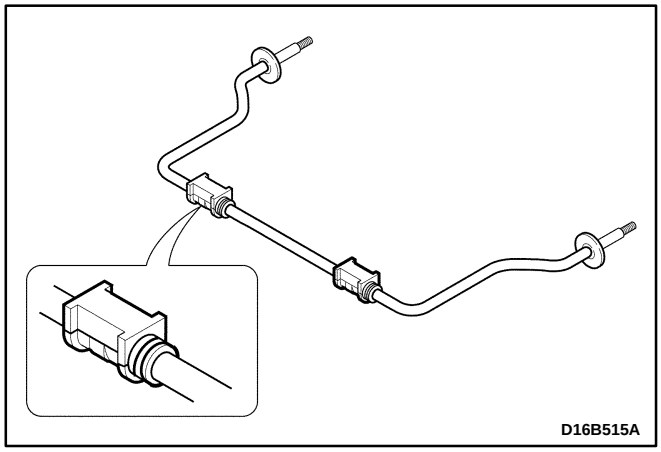
   - Remove the stabilizer shaft mounting bolts (3).
   - Remove the front under longitudinal frame.



2. Remove the stabilizer shaft from the vehicle.
   - Remove the cotter pin (1).
   - Remove the castellated nut (2).
   - Remove the washer (3).
   - Remove the rear bushing with separating the stabilizer shaft from the control arm (4).



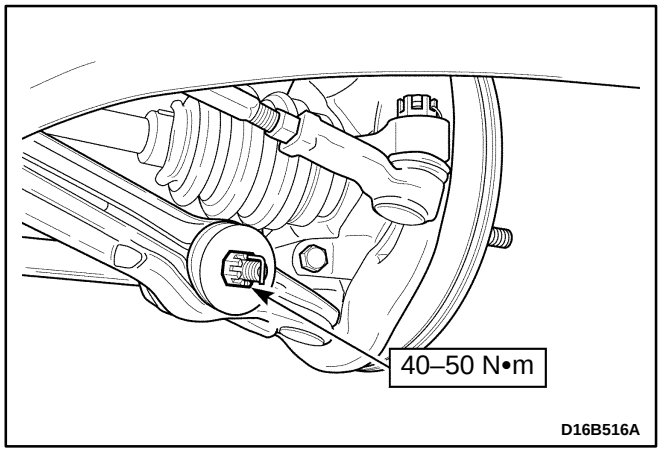
   - Remove the bushing (5).
   - Remove the wire clamps (6).
   - Remove the mountings (7).



Installation Procedure

1. Install in the reverse order of removal.

Important: When installing the mountings, position the opened mountings forward.

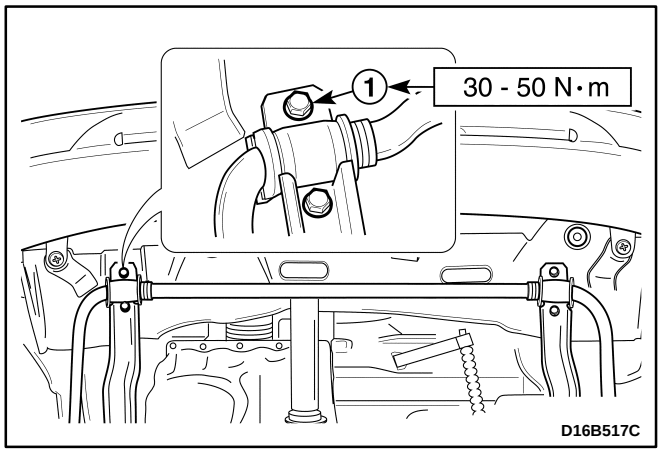


2. Install the stabilizer shaft to the vehicle.
   - Install the castellated nut.

Tighten

Tighten the stabilizer shaft–to–body castellated nut to 40–50 N•m (30–36 lb-ft).

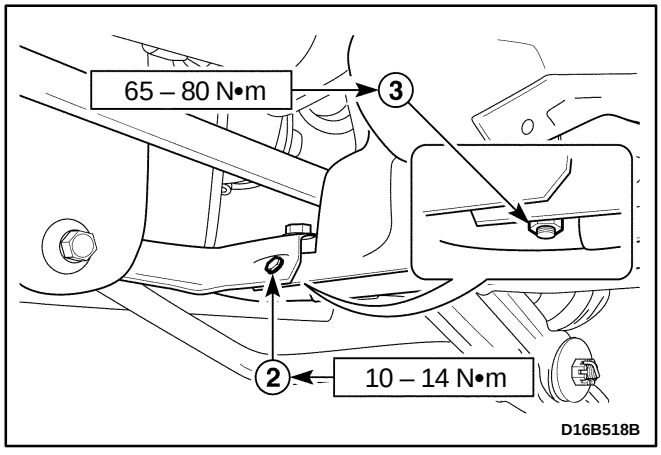
- Install the cotter pin.



3. Install the front under longitudinal frame.
   - Install the stabilizer shaft mounting bolts (1).

Tighten

Tighten the mounting bolts to 30–50 N•m (22–36 lb-ft).



- Install the front under longitudinal frame bolt (2).

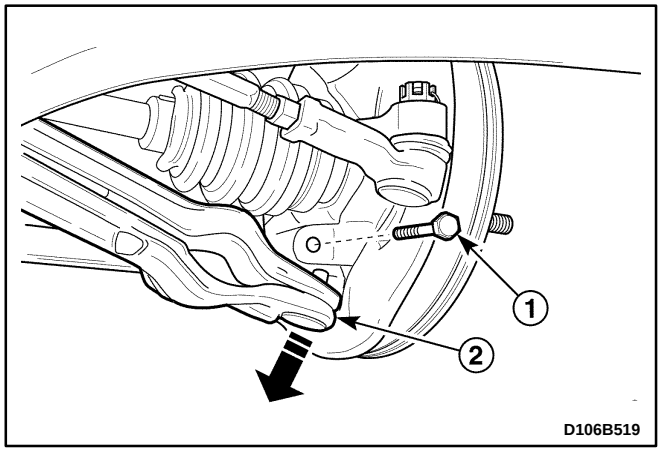
Tighten

Tighten to bolt to 10–14 N•m (89–124 lb-in).

- Install the front under longitudinal frame nut (3).

Tighten

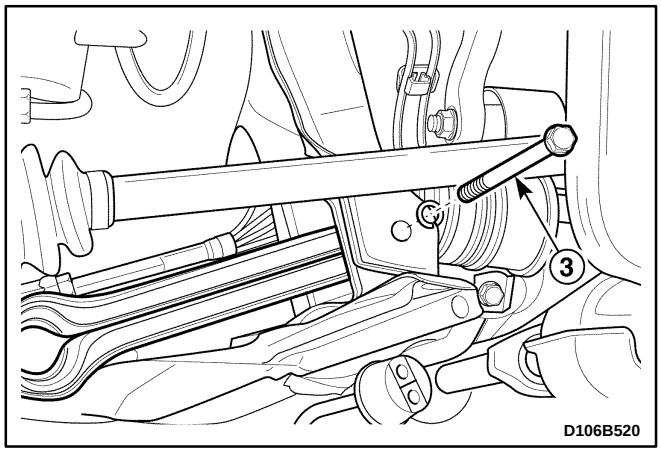
Tighten to nut to 65–80 N•m (48–59 lb-ft).



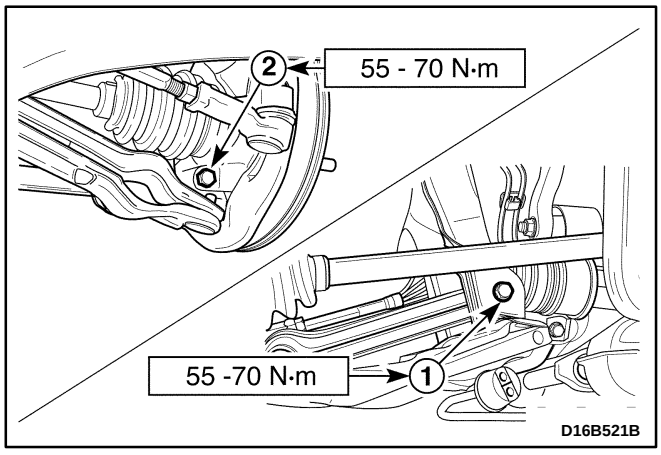
CONTROL ARM

Removal Procedure

1. Remove the stabilizer shaft. Refer to “Front Longitudinal Frame and Stabilizer Shaft” in this section.
2. Remove the control arm.
   - Remove the stud bolt (1).
   - Separate the control arm from the knuckle assembly using a lever (2).



   - Remove the bolt (3).
   - Remove the control arm.



Installation Procedure

1. Install the control arm onto the vehicle.
   - Install the control arm bolt (1).

Tighten

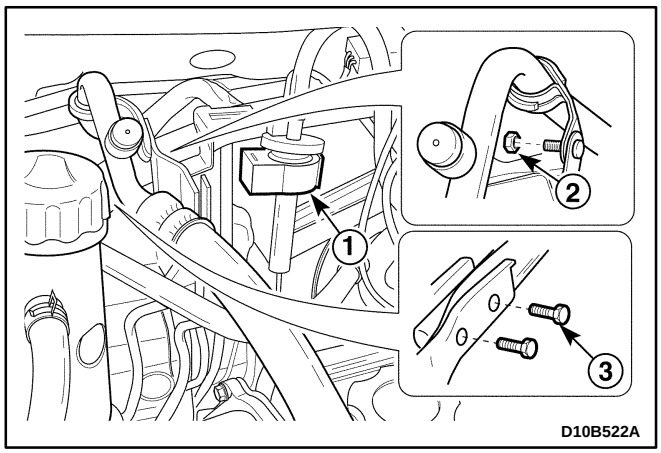
Tighten the control arm bolt to 55–70 N•m (41–52 lb-ft).

   - Install the control arm to the knuckle assembly.
   - Install the stud bolt (2).

Tighten

Tighten the stud bolt to 50–70 N•m (36–52 lb-ft).

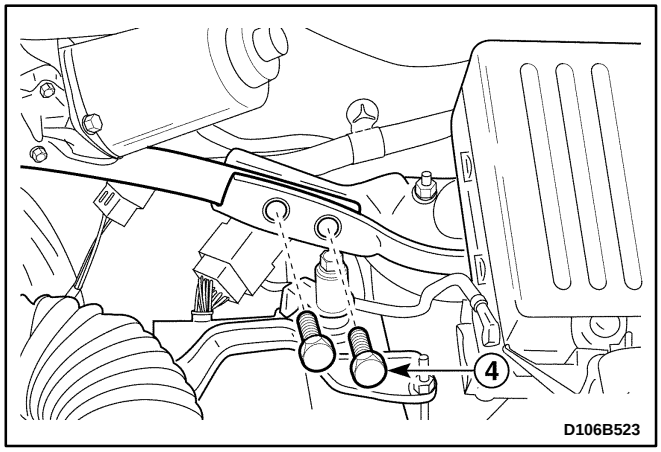
2. Install the stabilizer shaft.



STRUT BAR

Removal Procedure

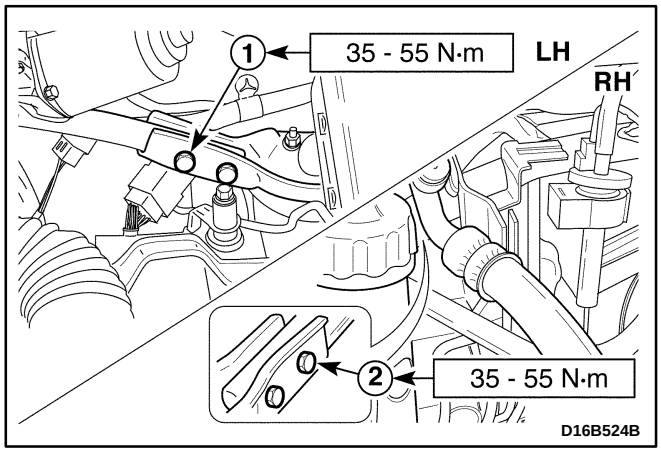
1. Open the hood.
2. Remove the strut bar from the vehicle.
   - Remove the purge control valve (1).
   - Remove the A/C low pressure pipe bracket–to–strut bar nut (2).
   - Remove the strut bar bolts at passenger side (3).



- Remove the strut bar bolts at driver side (4).

Important: When removing the bolts using the tool, do not contact the battery terminal.

- Remove the strut bar at passenger side



Installation Procedure

1. Install the strut bar to the vehicle.
   - Install the strut bar at passenger side.
   - Install the strut bar bolts at driver side (1).

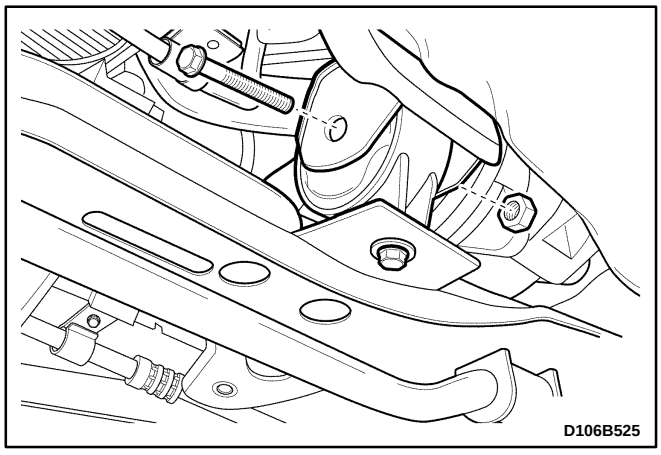
Important: When installing the bolts using the tool, do not contact the battery terminal.

- Install the strut bar bolts at passenger side (2).
- Install the A/C low pressure pipe bracket–to–strut bar nut.

Tighten

Tighten the strut bar bolts to 35–55 N•m (25–41 lb-ft).

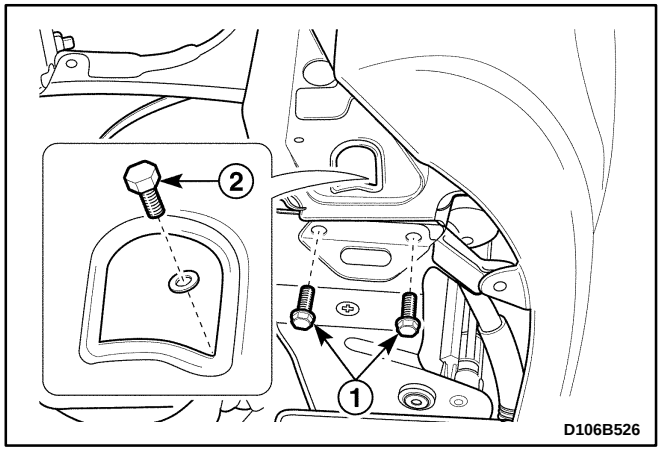
- Install the purge control valve to the strut bar.



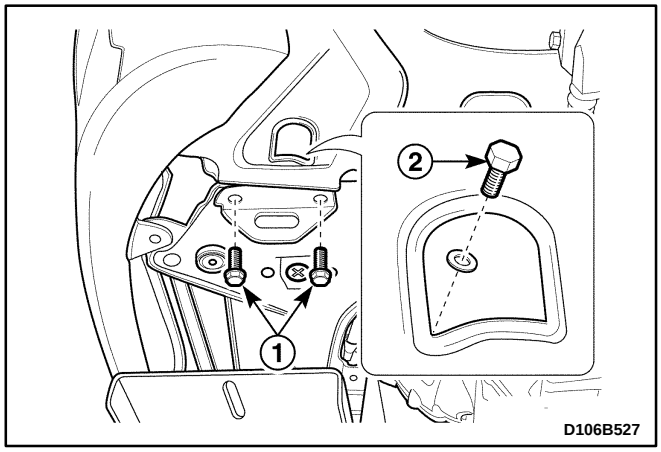
CROSSMEMBER

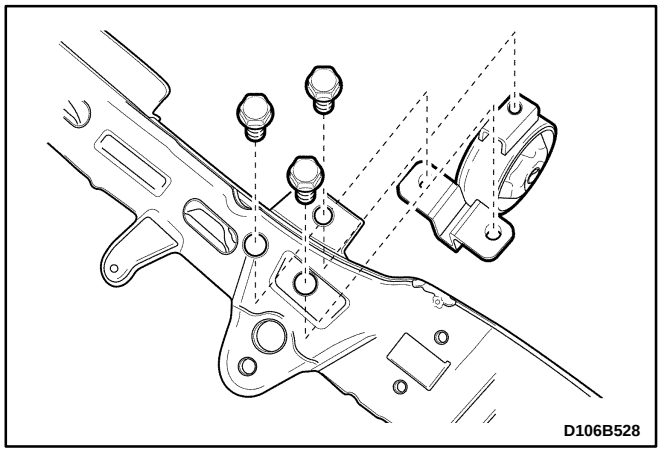
Removal Procedure

1. Remove the transaxle under cover. Refer to *Section 5B, Five–Speed Manual Transaxle.*
2. Remove the front under longitudinal frame. Refer to “Stabilizer Shaft” in this section.
3. Remove the damping bush bolt and nut.

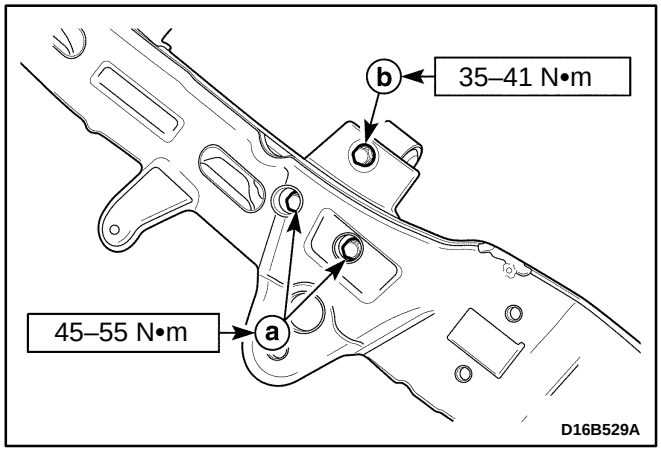


4. Disconnect the power steering pressure line from the crossmember. Refer to *Section 6B, Power Steering Pump.*
5. Remove the crossmember from the vehicle.
   - Place support jack under the crossmember.
   - Remove the bumper fascia screws.
   - Remove the rear bolts (1).
   - Remove the side bolts (2).
   - Lower the support jack and remove the crossmember from the vehicle.





6. Remove the front damping bush bolts and damping bush from the crossmember.

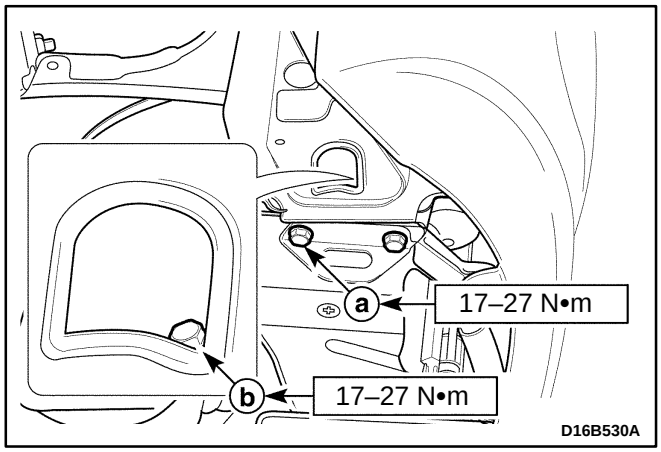


Installation Procedure

1. Install in the reverse order of removal.
2. Install the front damping bush to the crossmember.

Tighten

- Tighten the bolts to 45–55 N•m (33–41 lb-ft).
  a. Front damping bush bolt.
- Tighten the bolt to 35–41 N•m (25–30 lb-ft).
  b. Front damping bush bolt.

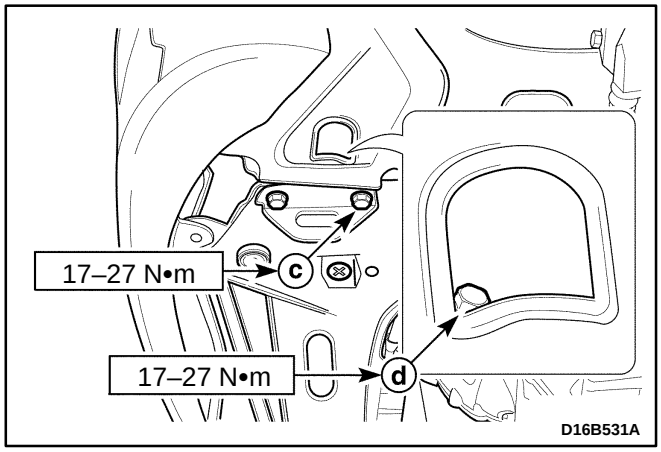


3. Install the crossmember to the vehicle with the bolts.

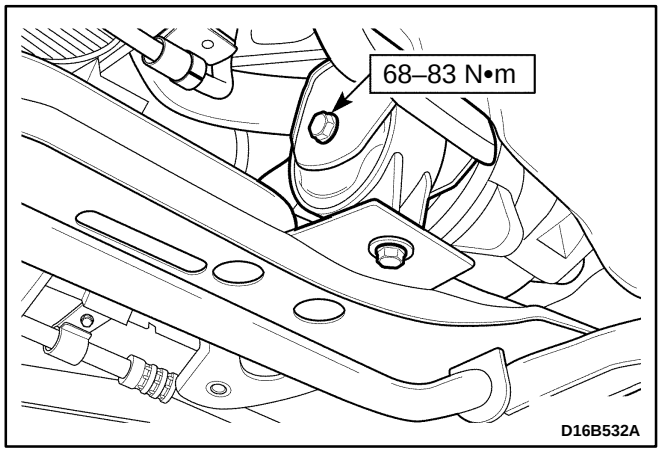
Tighten

Tighten the bolts to 17–27 N•m (13–20 lb-ft).

a. Crossmember right rear bolt.
b. Crossmember right side bolt.



c. Crossmember left rear bolt.
d. Crossmember leftt side bolt.



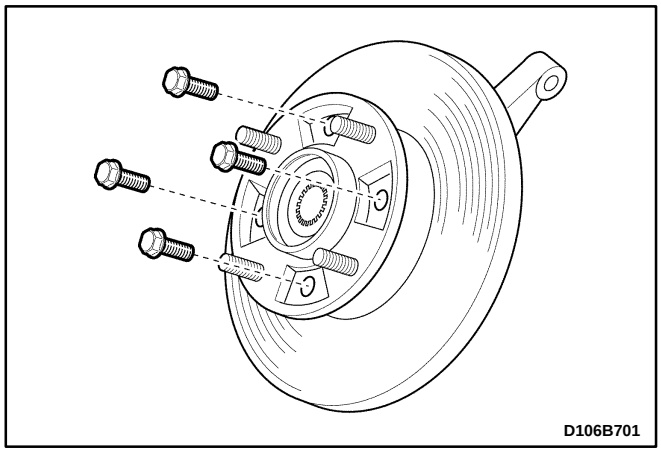
4. Install the front damping bush to the vehicle.

Tighten

Tighten the front damping bush bolt and nut to 68–83 N•m (51–61 lb-ft).

5. Install the front under longitudinal frame. Refer to “Stabilizer Shaft” in this section.

UNIT REPAIR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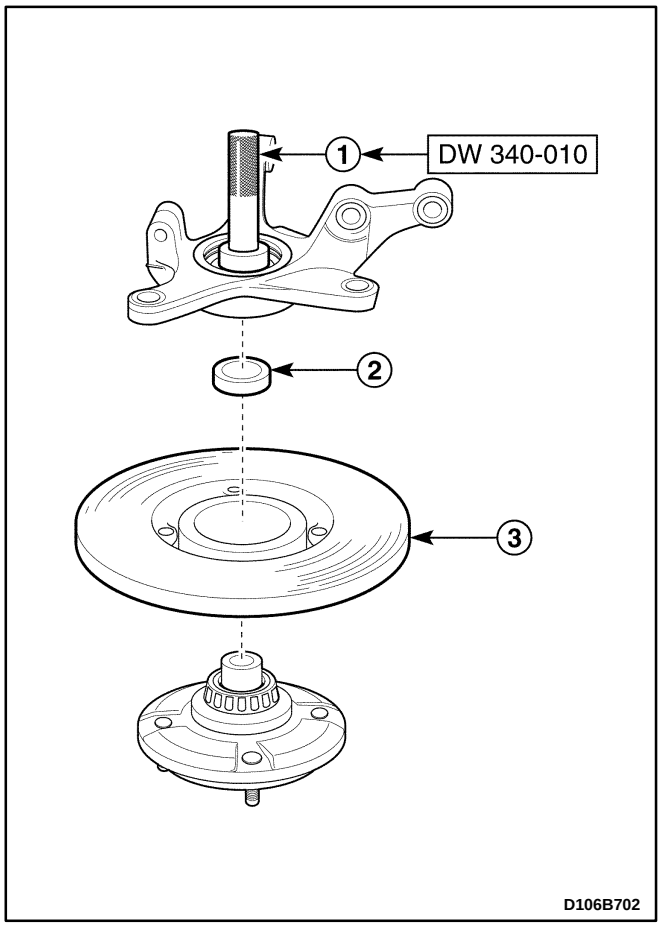

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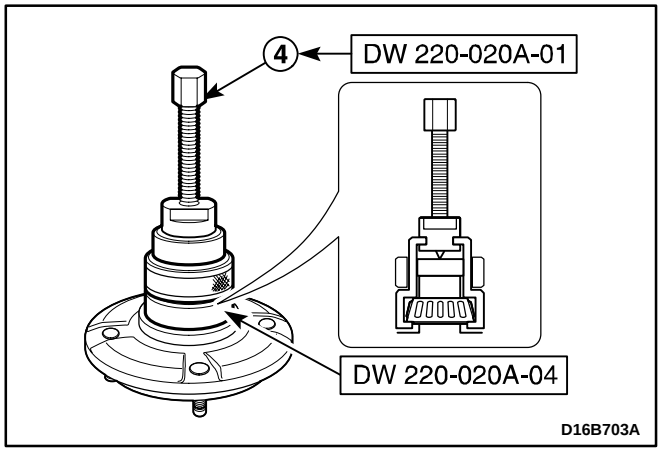
HUB BEARING AND KNUCKLE

Tools Required

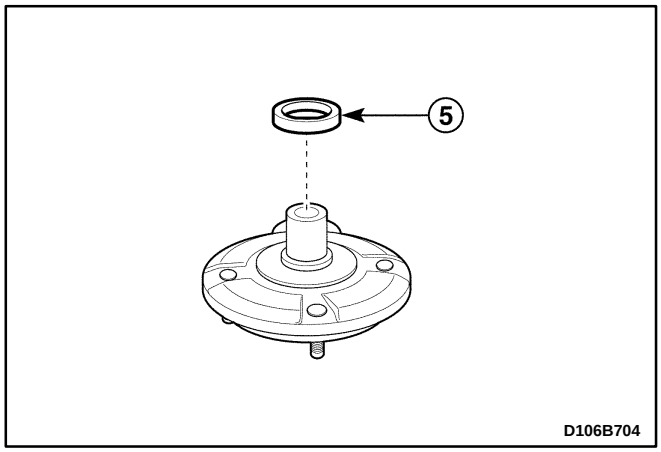
DW 220–020A–01	Differential Bearing Puller.
DW 220–020A–04	Differential Bearing Plate Adapter.
DW 340–010	Front Wheel Hub Remover.
DW 340–020	Front Wheel Bearing Race Installer.
DW 340–030	Front Wheel Bearing Installer.
09940–71430	Front Spring Compressor.

Disassembly Procedure

1. Remove the steering knuckle assembly. Refer to “Knuckle Assembly” in this section.
2. Remove the bolts from the wheel hub.
3. Remove the wheel hub from the knuckle assembly using the front wheel hub remover DW 340–010.
   - Remove the wheel hub using the front wheel hub remover DW 340–010 (1).
   - Remove the bearing spacer (2).
   - Remove the brake rotor (3).



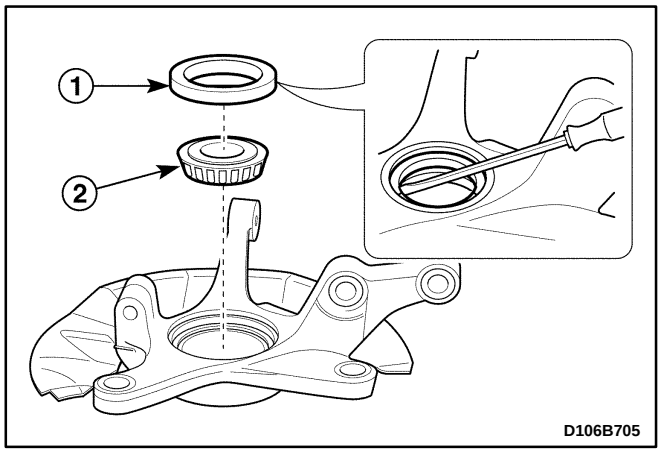
- Remove the wheel bearing from the wheel hub using the differential bearing puller DW 220–020A–01 and differential bearing plate adapter DW 220–020A–04 (4).



- Remove the oil seal from the wheel hub (5).

Important: Do not use removed oil seal.

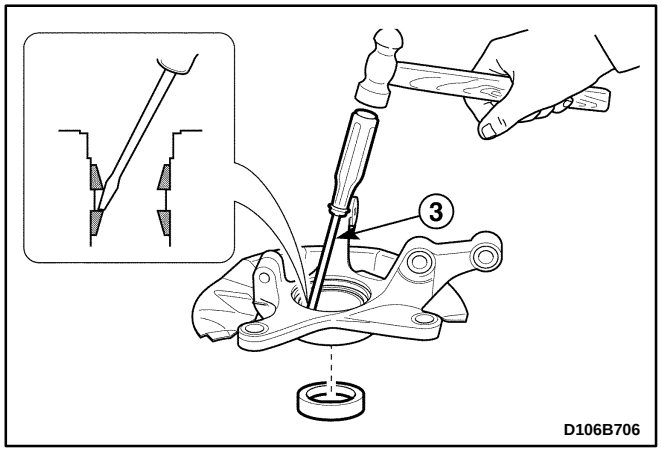
4. Remove the steering knuckle assembly.



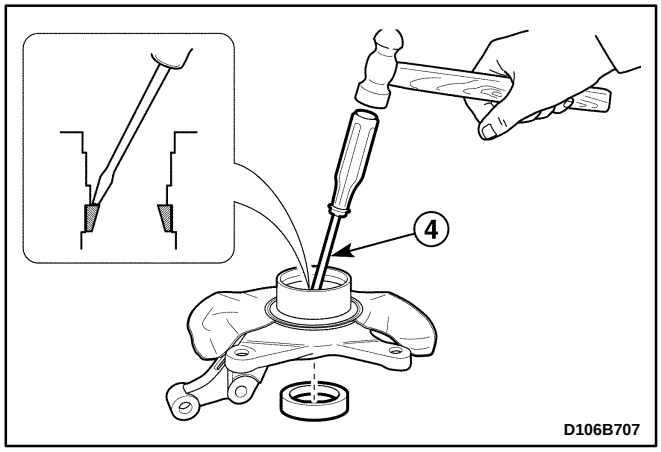
- Remove the oil seal (1).

Important: Do not use removed oil seal.

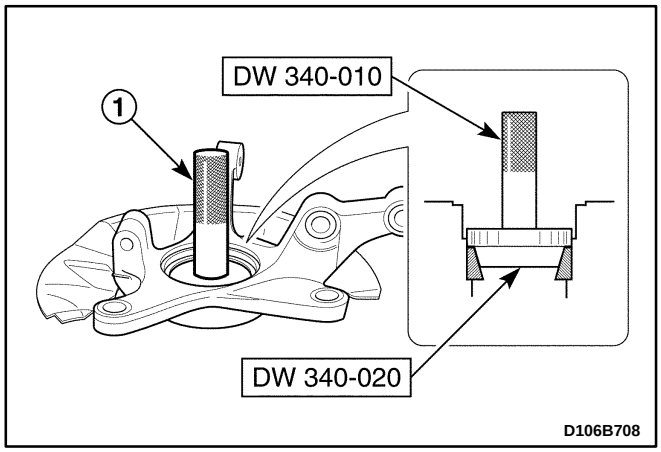
- Remove the wheel bearing (2).



- Remove the outer bearing race (3).

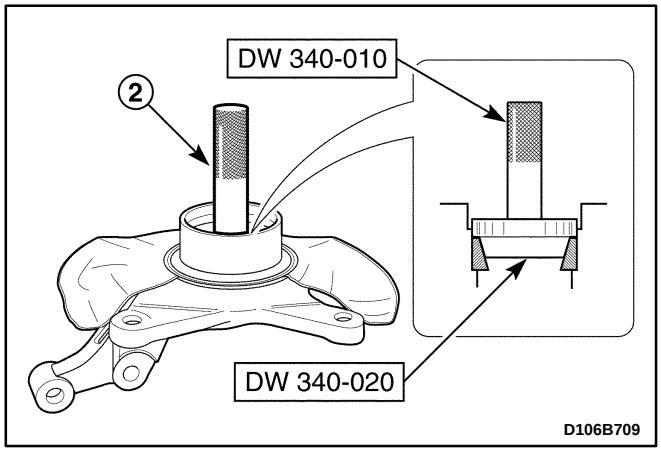


- Remove the inner bearing race (4).

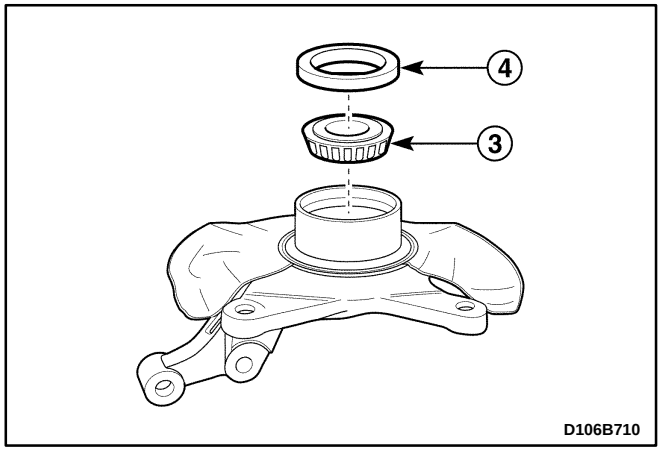


Assembly Procedure

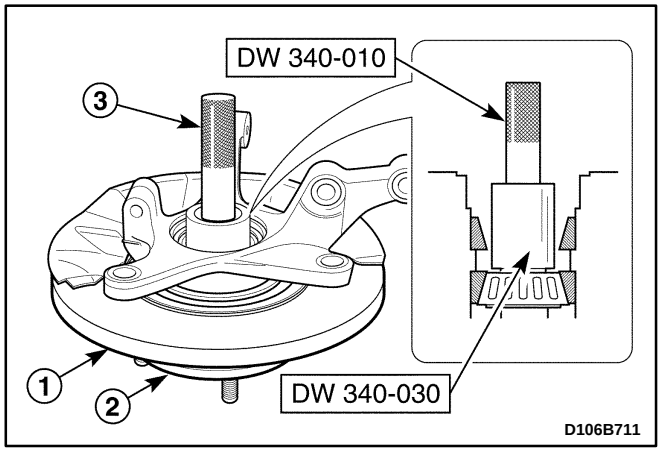
1. Assemble the steering knuckle assembly.
   - Assemble the inner bearing race using the front wheel hub remover DW 340–010 and the front bearing race installer DW 340–020 (1).



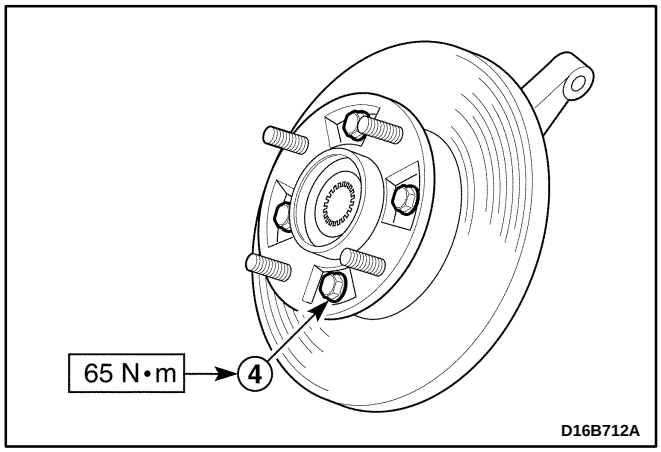
   - Assemble the outer bearing race using the front wheel hub remover DW 340–010 and the front wheel bearing race installer DW 340–020 (2).



   - Assemble the outer wheel bearing (3).
   - Assemble the outer wheel bearing oil seal (4).



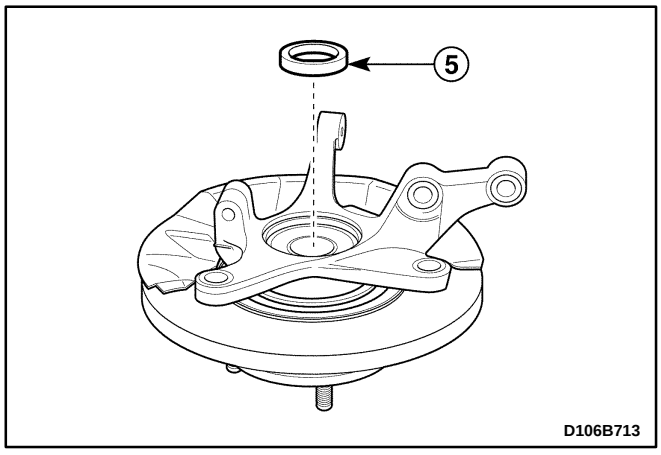
2. Install the wheel hub to steering knuckle assembly.
   - Install the brake rotor (1).
   - Install the wheel hub to the steering knuckle assembly temporary (2).
   - Press the outer wheel bearing into the wheel hub using the front wheel hub remover DW 340–010 and the front wheel bearing installer DW 340–030 (3).



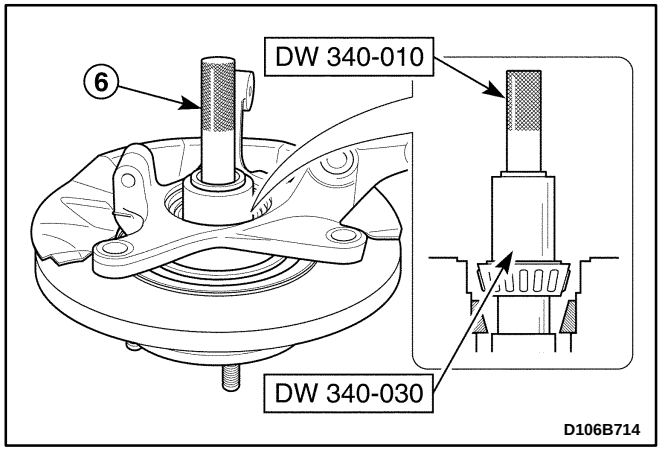
- Tighten the bolts (4).

Tighten

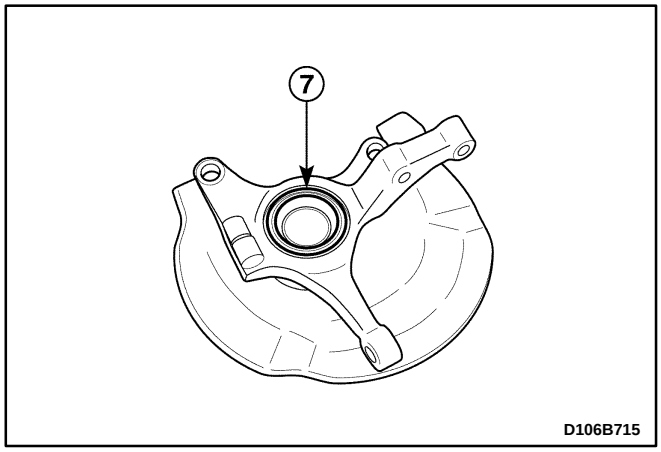
Tighten the bolt to 65 N•m (48 lb-ft).



- Install the bearing spacer (5).

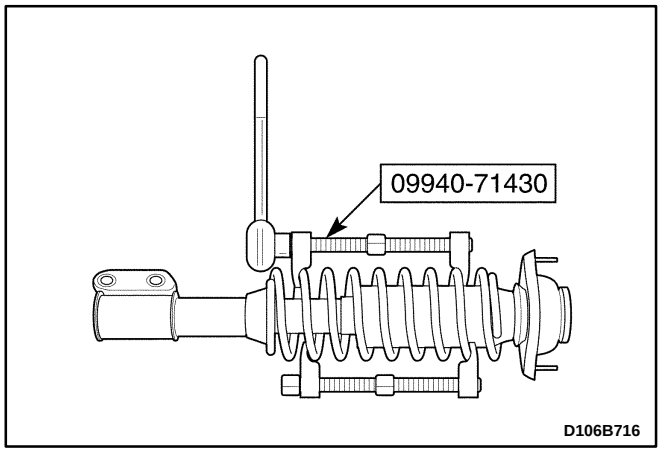


- Press the inner wheel bearing into the wheel hub using the front wheel hub remover DW 340–010 and the front wheel bearing installer DW 340–030 (6).



- Install the inner wheel bearing oil seal (7).

3. Install the steering knuckle assembly.
   Refer to “Knuckle Assembly” in this section.



FRONT STRUT (INCLUDING COIL SPRING)

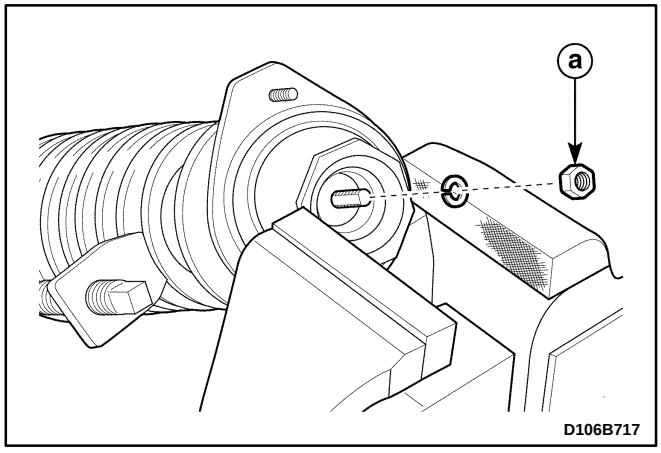
Tools Required

09940–71430 Front Spring Compressor.

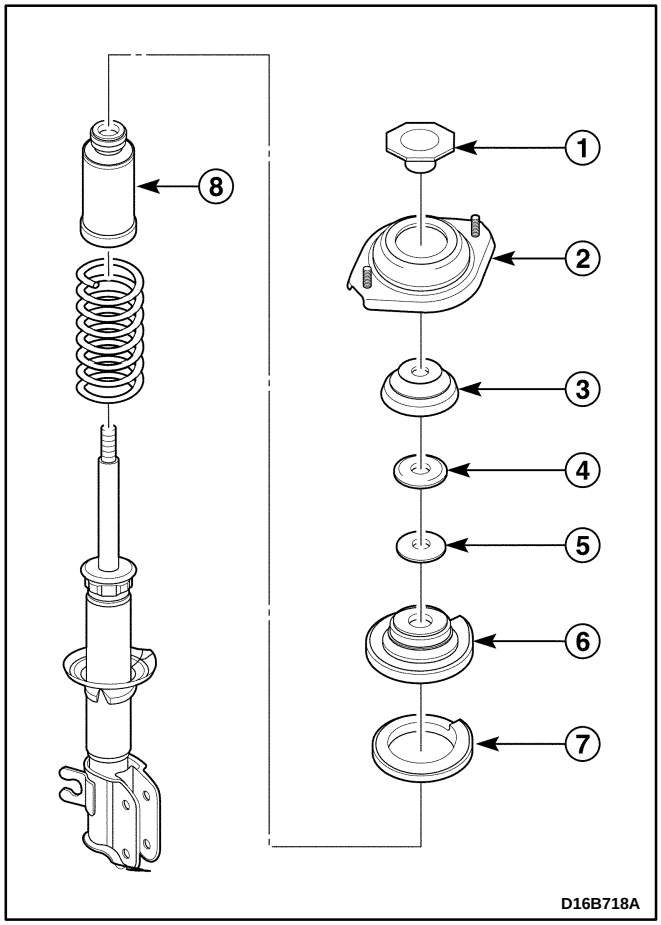
Disassembly Procedure

1. Remove the strut assembly. Refer to “Strut Assembly” in this section.
2. Compress the front spring with the front spring compressor 09940–71430.

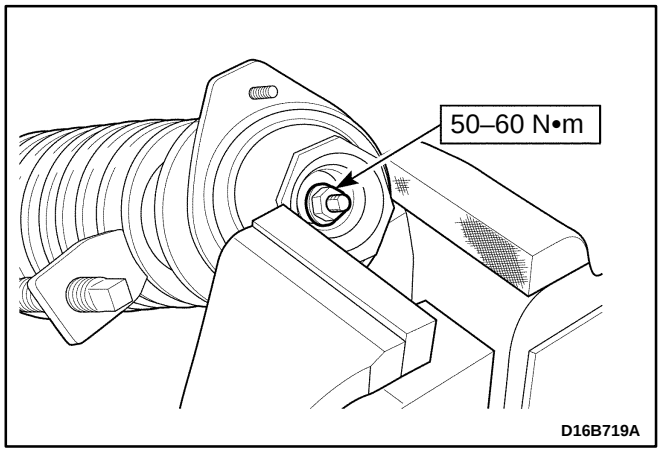
Caution: During compressing spring, do not make spring end point to operator or dangerous direction.



3. Fix the strut support using the bench vise and remove the strut nut.
   a. Strut nut.



4. Remove the coil spring.
   - Remove the strut inner support (1).
   - Remove the strut mount assembly (2).
   - Remove the strut mount seat (3).
   - Remove the strut bearing seat (4).
   - Remove the strut bearing (5).
   - Remove the coil spring upper seat (6).
   - Remove the coil spring seat (7).
   - Remove the bumper stopper (8).

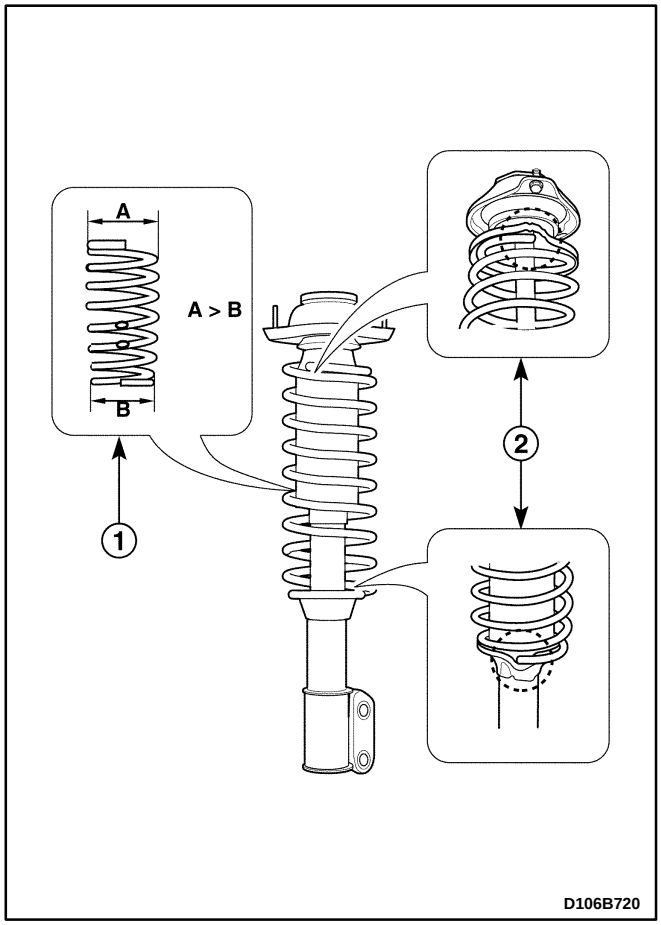


Assembly Procedure

1. Install the coil spring, front bumper stopper, coil spring seat, coil spring upper seat, strut bearing, bearing seat, mounting seat, mount assembly and inner support to the strut.
2. Tighten the strut nut.
   - Fix the strut support using the bench vise.
   - Tighten the nut.

Tighten

Tighten the strut nut to 50–60 N•m (36–44 lb-ft).



3. Inspect the installation of coil spring (1, 2).
4. Install the strut assembly. Refer to “Strut Assembly” in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

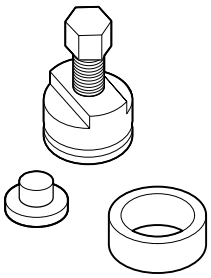
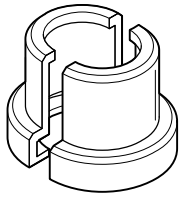
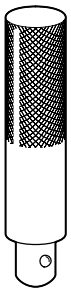
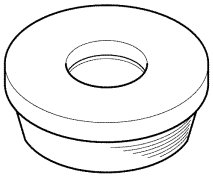
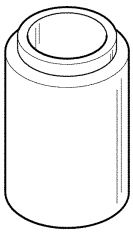
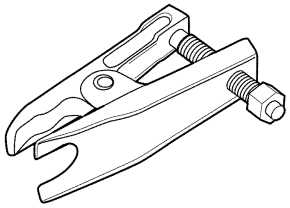
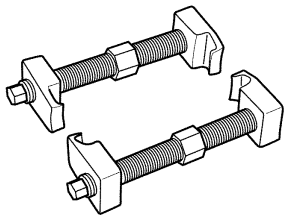
Application		Unit	Description
Suspension Type		–	Mcpherson (Strut)
Shock Absorber	Maximum Length	mm (in.)	475–481 (18.7–18.94)
	Minimum Length	mm (in.)	321–327 (12.64–12.87)
	Stroke	mm (in.)	154 (6.06)
Stabilizer Shaft Diammeter		mm (in.)	24 (0.94)
Coil Spring Height (No Load)		mm (in.)	374 (14.72)
Grease Type (Front Wheel Bearing and Hub)		–	M–8143 ANTIF BRG GREASE

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Strut Assembly–to–Body Nuts	18 – 28	13 – 21	–
Strut Closure Nut	50 – 60	36 – 44	–
Strut Assembly–to–Knuckle Bolts	70 – 90	52 – 66	–
Control Arm Mounting Bolt	55 – 70	41 – 52	–
Control Arm Ball Stud Bolt	50 – 70	36 – 52	–
Stabilizer Shaft Castellated Nut	40 – 50	30 – 36	–
Stabilizer Shaft Mounting Bolt	30 – 50	22 – 36	–
Front Under Longitudinal Frame Bolts	10 – 14	–	89 – 124
Front Under Longitudinal Frame Nut	65 – 80	48 – 59	–
Drive Axle–to–Hub Caulking Nut	210	155	–
Crossmember Bolt	17 – 27	13 – 20	–
Strut Bar Bolts	35 – 55	25 – 41	–
ABS Front Speed Sensor Retaining Bolt	18 – 28	13 – 21	–
Wheel Hub–to–Brake Disc Bolt	55 – 75	41 – 55	–

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS TABLE

 D13B112A	**DW 220–020A–01** **Differential Bearing Puller**
 D13B113A	**DW 220–020A–04** **Differential Bearing Plate Adapter**
 D16B101A	**DW 340–010** **Front Wheel Hub Remover**
 D106B102	**DW 340–020** **Front Wheel Bearing Race Installer**
 D106B103	**DW 340–030** **Front Wheel Bearing Installer**
 D105B101	**KM 507–B** **Ball Joint Remover**
 D106B104	**09940–71430** **Front Spring Compressor**