

## SECTION 3C

# FRONT SUSPENSION

**CAUTION:** This vehicle is equipped with a Supplemental Inflatable Restraint (SIR). Refer to **CAUTIONS** in Section 9J under "ON-VEHICLE SERVICE" and the SIR component and wiring Locations View in Section 9J before performing service on or around SIR components or wiring. Failure to follow **CAUTIONS** could result in possible air bag deployment, personal injury or otherwise unneeded SIR repairs.

**NOTICE:** Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. General Motors will call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and joint clamping force, and may damage the fastener. When you install fasteners, use the correct sequence and tightening specifications. Following these instructions can help you avoid damage to parts and systems.

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## GENERAL DESCRIPTION

The front suspension is laterally independent and utilizes struts and separate coil springs. The upper end of a strut is anchored to the body by a strut support. The strut and strut support are isolated by a rubber mount.

The lower end of the strut is connected to the upper end of a steering knuckle. The lower end of the knuckle is attached to a ball stud which is incorporated into a unit with a control arm. The steering knuckle is connected to the tie rod end. Movement of the steering wheel is transmitted to the tie rod end and then to the knuckle, causing the wheel to turn (figure 1).

## DIAGNOSIS

For diagnosis of the front suspension, refer to SECTION 3.

## FRONT SUSPENSION INSPECTION

If complaints of hard ride are encountered, the first items to investigate are tire pressure, trim height, and strut condition; refer to SECTION 3. If these are correct, the amount of friction in the front suspension should be checked.

## ON-VEHICLE SERVICE

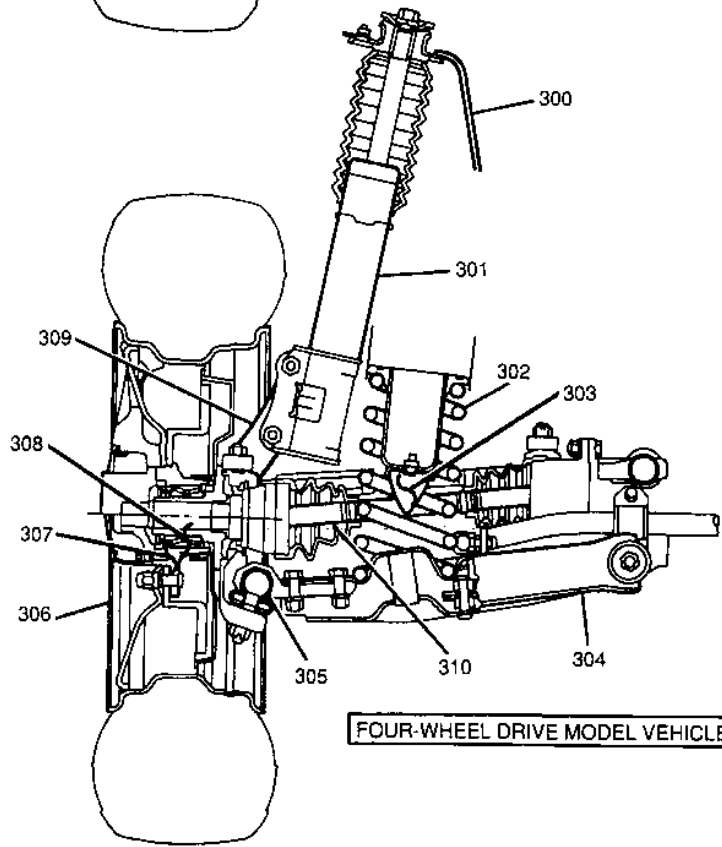
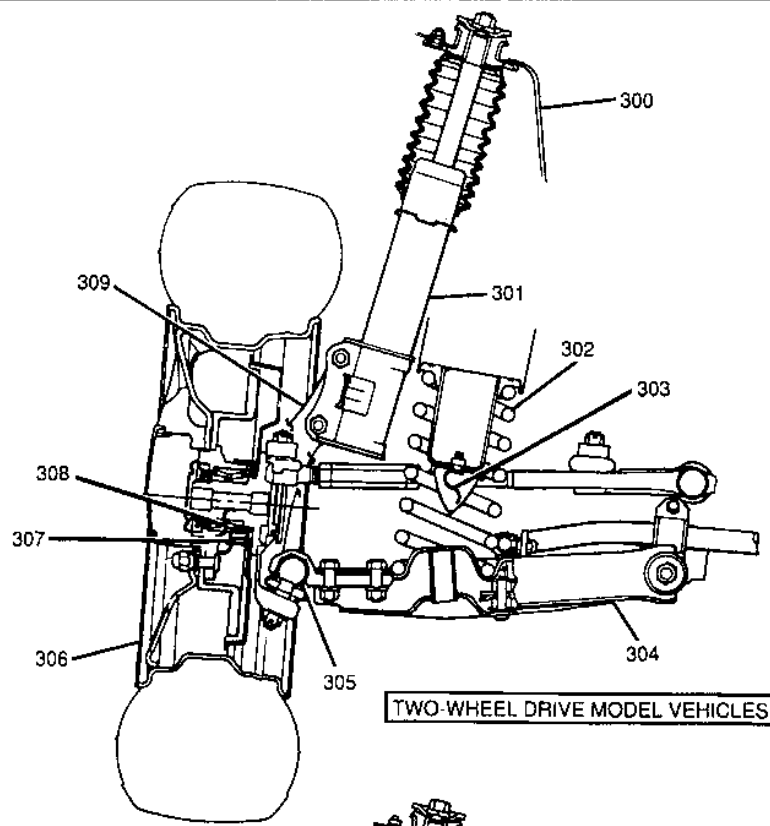
### STABILIZER SHAFT AND BUSHING

*Figure 2*

#### Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Engine skid plate, if equipped (four bolts).
3. Stabilizer shaft from right and left stabilizer joints by removing retaining nuts (Figure 2).
4. Right and left stabilizer shaft mounting bracket bolts and nuts.
5. Stabilizer shaft, mounting brackets and bushings from vehicle.

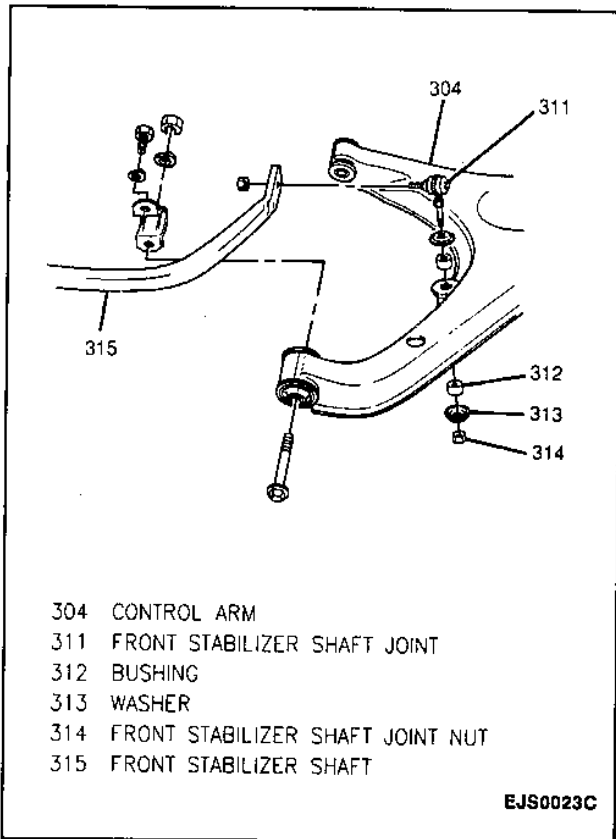
### 3C-2 FRONT SUSPENSION



- 300 BODY
- 301 STRUT
- 302 COIL SPRING
- 303 BUMP STOPPER
- 304 CONTROL ARM
- 305 BALL STUD
- 306 WHEEL
- 307 WHEEL HUB
- 308 WHEEL BEARING
- 309 STEERING KNUCKLE
- 310 DRIVE AXLE

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Figure 1—Front Suspension Components



- 304 CONTROL ARM
- 311 FRONT STABILIZER SHAFT JOINT
- 312 BUSHING
- 313 WASHER
- 314 FRONT STABILIZER SHAFT JOINT NUT
- 315 FRONT STABILIZER SHAFT

EJS0023C

Figure 2—Stabilizer Shaft and Bushings

**Install or Connect**

1. Stabilizer shaft, bushings and mounting brackets to vehicle; secure with nuts and bolts. Do not fully tighten nuts and bolts.
2. Stabilizer shaft to right and left stabilizer joints; secure with nuts. Do not fully tighten nuts.

**Tighten**

- Stabilizer shaft-to-link nuts to 28 N.m (21 lb. ft.).
  - Stabilizer shaft mounting bracket bolts and nuts to 50 N.m (37 lb. ft.).
3. Engine skid plate to vehicle, if equipped; secure with four bolts.

**Tighten**

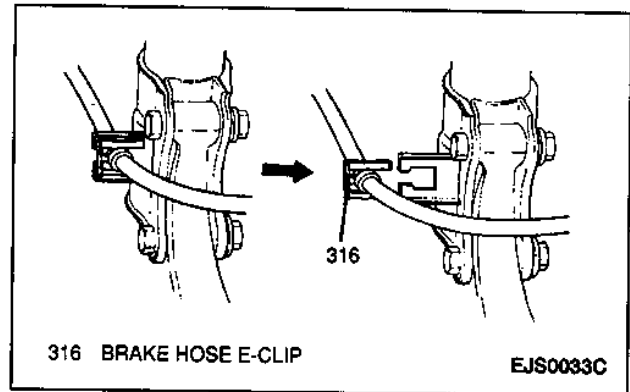
- Engine skid plate bolts to 54 N.m (40 lb. ft.).
4. Lower vehicle.

**STRUT**

Figures 3, 4 and 5

**Remove or Disconnect**

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Wheel and tire from vehicle. Refer to SECTION 3E.



316 BRAKE HOSE E-CLIP

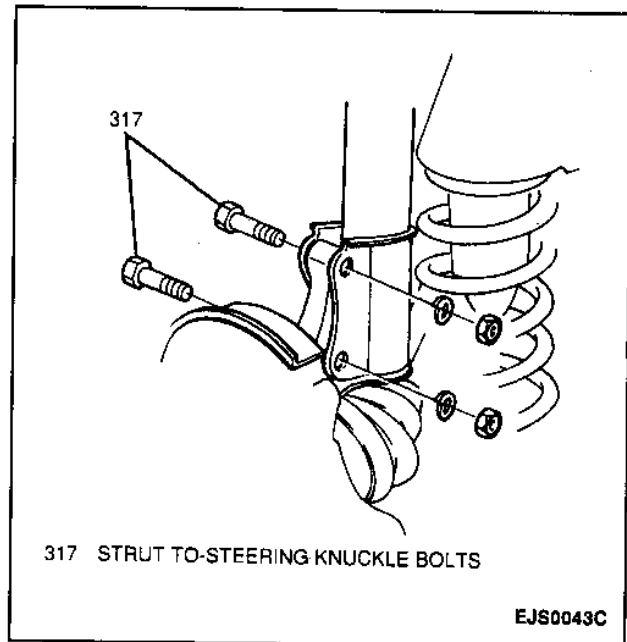
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Figure 3—Brake Hose E-Clip

3. One bolt and wheel speed sensor harness from strut. (ABS equipped).
4. E-clip securing brake hose and remove brake hose from strut (Figure 3).
5. Support control arm with floor jack.
6. Two strut-to-steering knuckle bolts and nuts, separating strut from knuckle (Figure 4).
7. Lower vehicle to allow access to strut upper support nuts.
8. Three strut upper support nuts (Figure 5).
9. Strut from vehicle.

**Install or Connect**

1. Strut to vehicle; secure with three support nuts (Figure 5). Do not tighten fully.
2. Strut to steering knuckle, secure with two bolts and nuts (Figure 4).



317 STRUT TO-STEERING KNUCKLE BOLTS

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Figure 4—Strut-to-Steering Knuckle Bolts and Nuts

## 3C-4 FRONT SUSPENSION

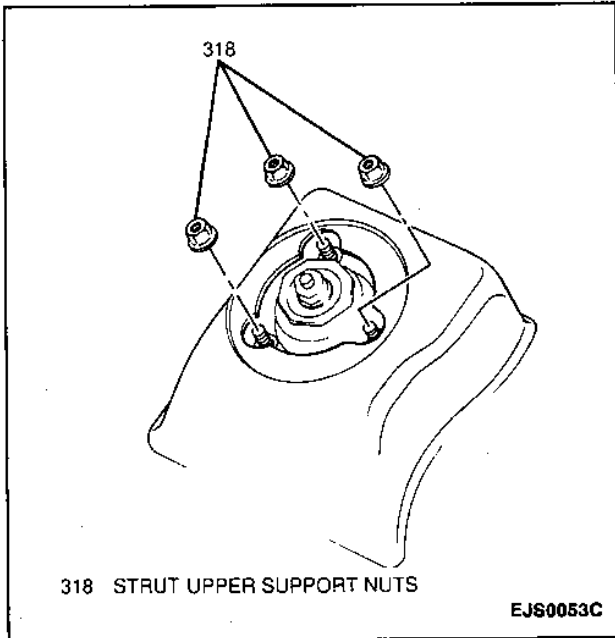


Figure 5—Strut Upper Support Nuts

### Tighten

- Strut-to-steering knuckle bolts and nuts to 90 N.m (66 lb. ft.).
  - Strut upper support nuts to 25 N.m (18 lb. ft.).
3. Remove floor jack.
  4. Brake hose to strut; secure with E-clip.
  5. Wheel speed sensor harness to strut; securing with one bolt. (ABS equipped).

### Tighten

- Wheel speed sensor harness bolt to 10 N.m (7 lb. ft.).
6. Wheel and tire. Refer to SECTION 3E.
  7. Lower vehicle.

## COIL SPRING

Figures 2, 6, 7 and 8

### Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Wheel and tire. Refer to SECTION 3E.
3. Engine skid plate, if equipped (four bolts).
4. Support control arm with floor jack (Figure 6).
5. Three nuts and bolts from control arm, separating ball stud and control arm.
6. Stabilizer joint from control arm by removing one nut (Figure 2).
7. Lower floor jack.
8. Coil spring from vehicle (Figure 7).

### Install or Connect

1. Coil spring to vehicle.

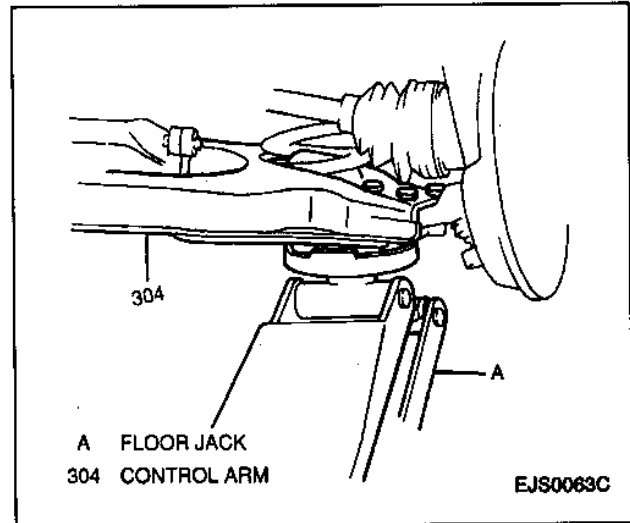


Figure 6—Supporting Control Arm With Floor Jack

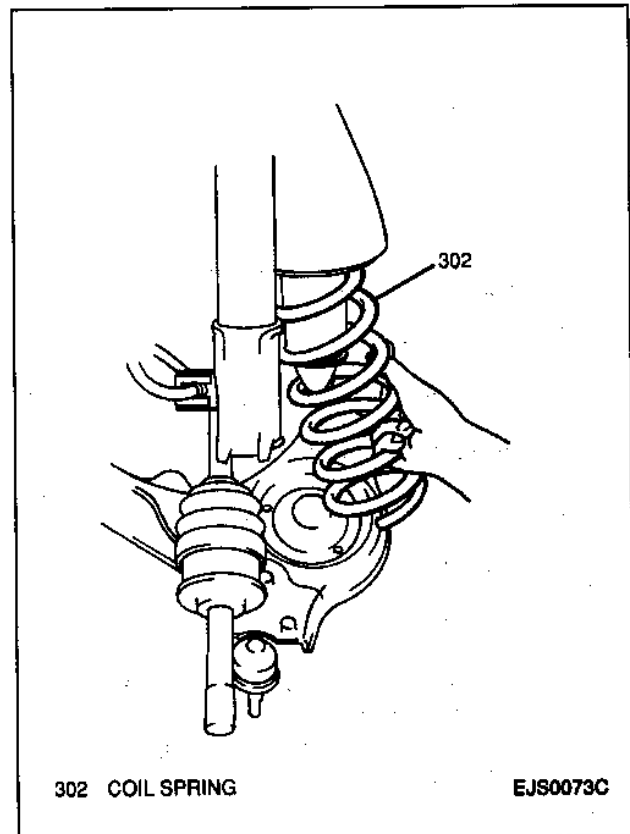


Figure 7—Removing Coil Spring

### Important

- The bottom of the coil spring has a larger diameter than the top. Be sure to install it correctly (Figure 8).
2. Raise floor jack.
  3. Stabilizer joint to control arm; secure with one nut.

### Tighten

- Stabilizer joint-to-control arm nut to 28 N.m (21 lb. ft.).

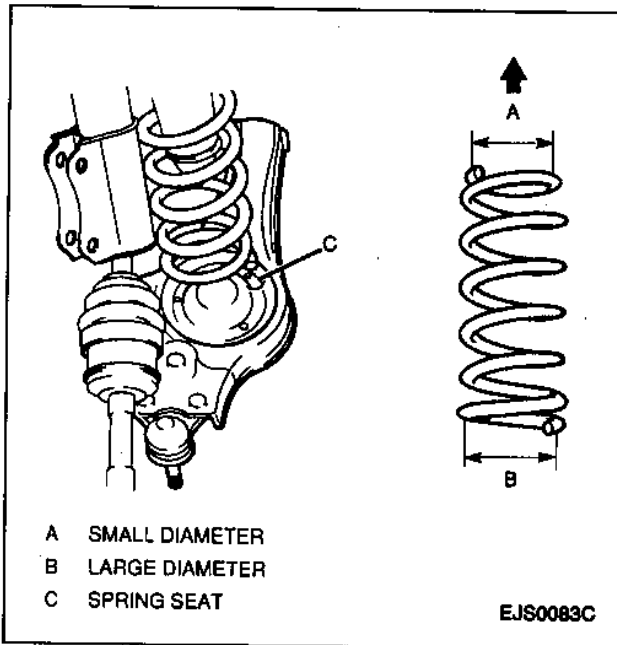


Figure 8—Coil Spring Diameter

- Control arm to ball stud; secure with three nuts and bolts.

 **Tighten**

- Ball stud nuts and bolts to 85 N.m (63 lb. ft.).

- Remove floor jack

- Engine skid plate, if equipped; secure with four bolts.

 **Tighten**


- Engine skid plate bolts to 54 N.m (40 lb. ft.).

- Wheel and tire. Refer to SECTION 3E.

- Lower vehicle.

## STEERING KNUCKLE AND SPINDLE

Figures 4, 6, 9, 10 and 11

 **Remove or Disconnect**

Tools Required:

- J 21687-02 Tie Rod End Remover
- J 22888-D Ball Stud Remover

- Raise and suitably support vehicle. Refer to SECTION 0A.
- Wheel and tire. Refer to SECTION 3E.
- Locking hub (four-wheel drive models). Refer to "Locking hubs—Four-Wheel Drive Models" later in this section.
- Hub end cap (two-wheel drive models).
- Brake caliper from steering knuckle by removing two caliper pin bolts. Suspend caliper assembly with wire so as not to damage brake hose (Figure 9).

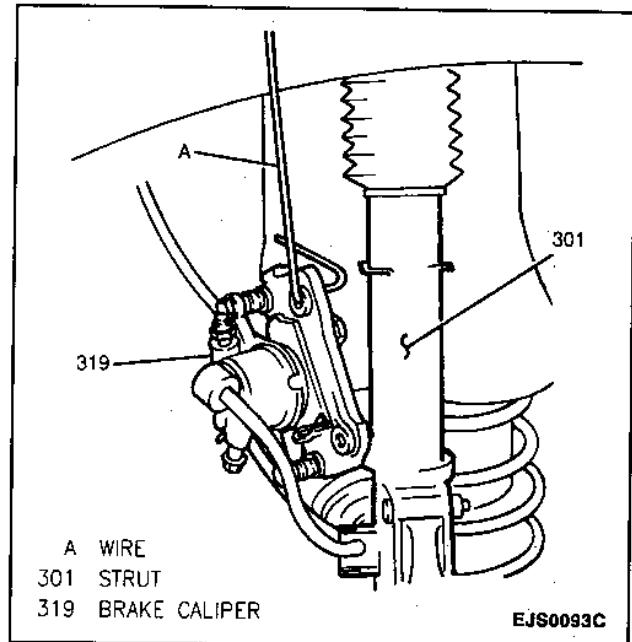


Figure 9—Suspending Brake Caliper Assembly

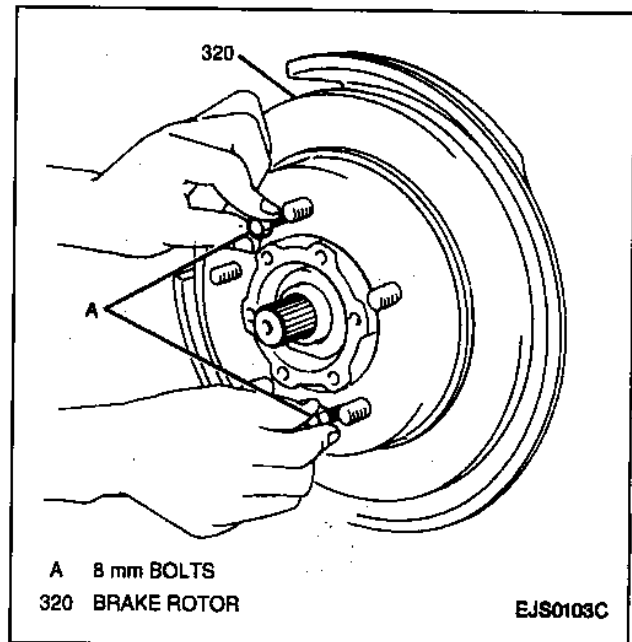


Figure 10—Removing Brake Rotor

- Brake rotor from wheel hub. If rotor cannot be removed by hand, install two 8 mm bolts into rotor. Tightening the bolts will force rotor off (Figure 10).
- Electrical connector from wheel speed sensor (ABS equipped).
- One bolt and wheel speed sensor from spindle (ABS equipped).
- Wheel hub and bearing. Refer to "Wheel Hub and Bearing" later in this section.
- Dust shield from steering knuckle (four bolts).
- Spindle from steering knuckle by tapping with hammer.
- Support control arm with floor jack (Figure 6).

## 3C-6 FRONT SUSPENSION

13. Two strut-to-steering knuckle bolts and nuts, separating strut from knuckle (Figure 4).
14. Tie rod end cotter pin and castle nut.
15. Tie rod end from steering knuckle using a J 21687-02.
16. Cotter pin and castle nut from ball stud.
17. Separate ball stud from steering knuckle using a J 22888-D and remove knuckle from vehicle.
18. Oil seal from knuckle.

### ↔ Install or Connect

Tool Required:

J 37750 Steering Knuckle Oil Seal Installer

1. New oil seal to steering knuckle using a J 37750 (Figure 11).
2. Steering knuckle to ball stud; secure with castle nut. Do not tighten fully.
3. Steering knuckle to strut; secure with two nuts and bolts (Figure 4).

### ⌚ Tighten

- Ball stud castle nut to 85 N.m (63 lb. ft.).
- Strut-to-knuckle nuts and bolts to 90 N.m (66 lb. ft.).

4. Tie rod end to knuckle; secure with castle nut.

### ⌚ Tighten

- Tie rod end castle nut to 40 N.m (30 lb. ft.).

5. Remove floor jack.
6. Cotter pins to ball stud and tie rod end.
7. Fill recess in wheel spindle with 10 g (0.35 oz.) of GM Lubricate(lubricant P/N 1052196, or equivalent).
8. Spindle to steering knuckle.

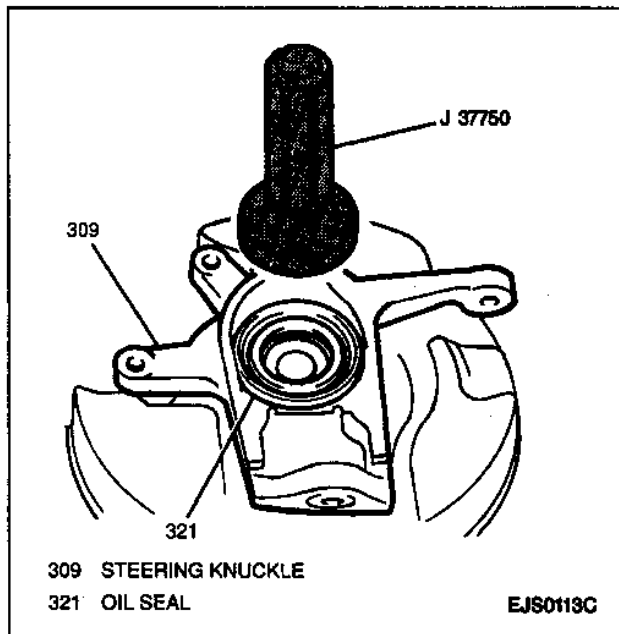


Figure 11—Installing Steering Knuckle Oil Seal

9. Dust shield to steering knuckle; secure with four bolts.

### ⌚ Tighten

- Dust shield bolts to 15 N.m (11 lb. ft.).

10. Wheel hub and bearing. Refer to "Wheel Hub and Bearing" later in this section.
11. Wheel speed sensor to spindle; secure with one bolt (ABS equipped).

### ⌚ Tighten

- Wheel speed sensor retaining bolt to 10 N.m (7 lb. ft.)

12. Electrical connector to wheel speed sensor (ABS equipped).
13. Brake rotor to wheel hub.
14. Brake caliper to rotor and steering knuckle; secure with two caliper pin bolts.

### ⌚ Tighten

- Brake caliper pin bolts to 88 N.m (65 lb. ft.).

15. Hub end cap (two-wheel drive models).
16. Locking hub (four-wheel drive models). Refer to "Locking Hubs—Four-Wheel Drive Models" later in this section.
17. Wheel and tire. Refer to SECTION 3E.
18. Lower vehicle.

## CONTROL ARM AND BALL STUD

Figures 2, 6, 7, 8, 12 and 13

### ↔ Remove or Disconnect

Tool Required:

J 22888-D Ball Stud Remover

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Wheel and tire. Refer to SECTION 3E.
3. Engine skid plate, if equipped (four bolts).
4. Support control arm with floor jack (Figure 6).
5. Cotter pin and castle nut from ball stud.
6. Separate ball stud from control arm using a J 22888-D.

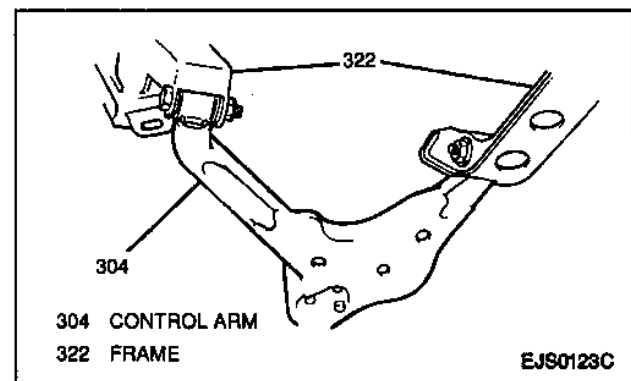


Figure 12—Control Arm

7. Stabilizer joint from control arm by removing one nut (Figure 2).
8. Lower floor jack.
9. Coil spring from vehicle (Figure 7).
10. Front through bolt and nut from control arm (Figure 12).
11. Rear through bolt and nut from control arm and remove control arm from vehicle chassis (Figure 12).
12. Ball stud from control arm by removing three ball stud nuts and bolts (Figure 13).

**↔ Install or Connect**

1. Ball stud to control arm; secure with three nuts and bolts (Figure 13).

**⌚ Tighten**

- Ball stud nuts and bolts to 85 N.m (63 lb. ft.).

2. Control arm to vehicle chassis; secure with front and rear through bolts and nuts.

**⌚ Tighten**

- Control arm-to-chassis through bolts and nuts to 100 N.m (74 lb. ft.).

3. Coil spring to vehicle.

**! Important**

- The bottom of the coil spring has a larger diameter than the top. Be sure to install it correctly (Figure 8).

4. Raise floor jack.
5. Stabilizer joint-to-control arm; secure with one nut.

**⌚ Tighten**

- Stabilizer joint-to-control arm nut to 28 N.m (21 lb. ft.).

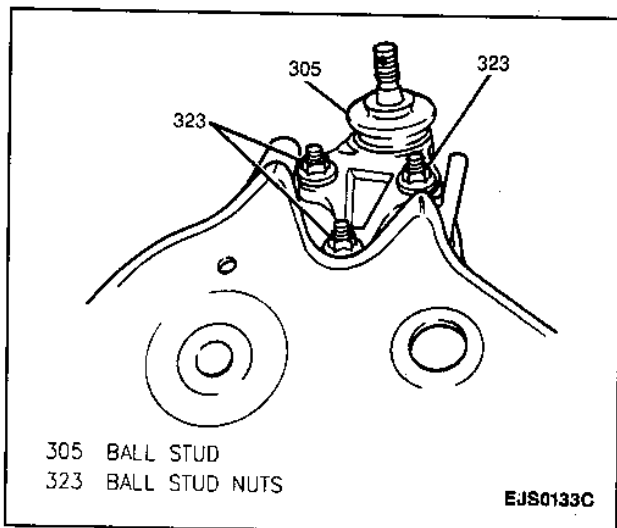


Figure 13—Ball Stud Mounting

6. Ball stud to steering knuckle; secure with castle nut.

**⌚ Tighten**

- Ball stud castle nut to 85 N.m (63 lb. ft.).

7. Cotter pin to ball stud.
8. Remove floor jack.
9. Engine skid plate, if equipped; secure with four bolts.

**⌚ Tighten**

- Engine skid plate bolts to 54 N.m (40 lb. ft.).

10. Wheel and tire. Refer to section 3E.
11. Lower vehicle.

**CONTROL ARM BUSHINGS**

Figures 14 through 17

**↔ Remove or Disconnect**

Tools Required:

- J 35561 Front Control Arm Bushing
- J 29792 Front Control Arm Bushing Service Set
- J 9519-7 Bearing Remover
- J 9519-17 Bearing Remover

1. Control arm from vehicle. Refer to "Control Arm and Ball Stud" earlier in this section.
2. Using a J 35561-1, a J 29792-2 and a press, remove the bushing from the short branch of the control arm (Figure 14).
3. Using a J 29792-1, a J 9519-7, a J 9519-17 and a press, remove the bushing from the long branch of the control arm (Figure 15).

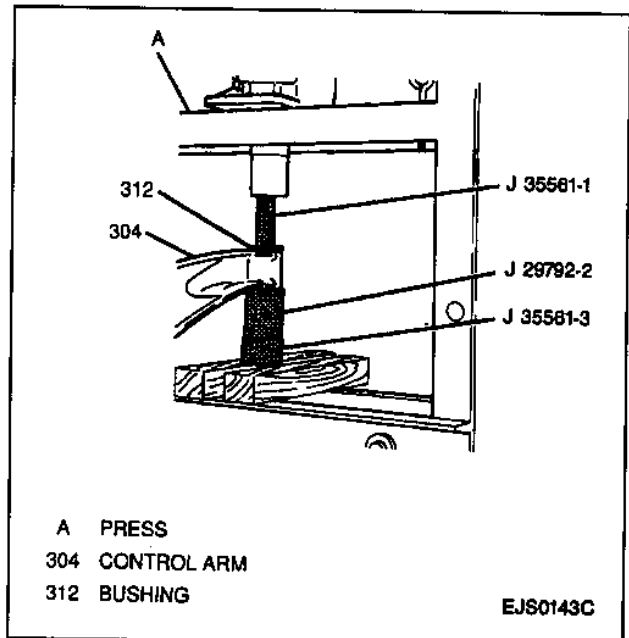


Figure 14—Removing Control Arm Bushing—Short Branch

## 3C-8 FRONT SUSPENSION

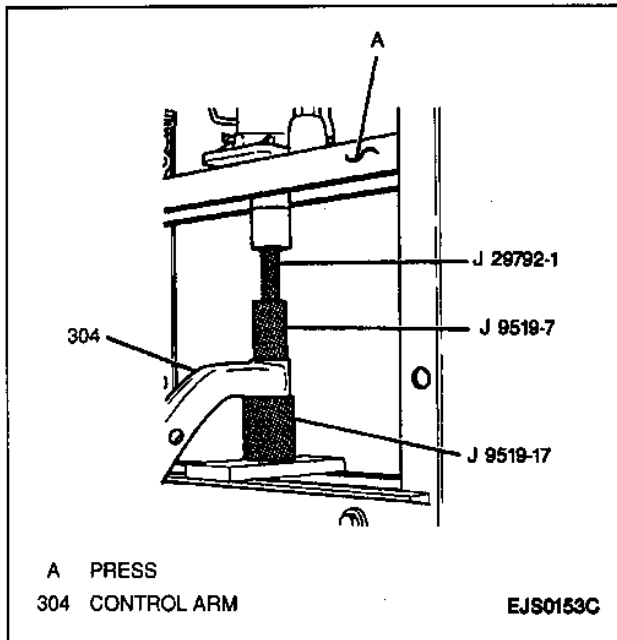


Figure 15—Removing Control Arm Bushing—Long Branch

### Install or Connect

#### Tools Required

- J 35561 Front Control Arm Bushing Service Set
- J 29792 Front control Arm Bushing Service Set
- J 9519-16 Bearing Remover
- J 9519-9 Bearing Remover

1. Using a J 35561, a J 29792-2 and a press, install a new bushing into the short branch of the control arm (Figure 16).
2. Using a J 29792-1, a J 9519-9 and J 9519-16 and a press, install a new bushing into the long branch of the control arm (Figure 17).
3. Control arm to vehicle. Refer to "Control Arm and Ball Stud" earlier in this section.

## LOCKING HUB—FOUR-WHEEL DRIVE MODELS

### Figures 18 and 19

Manual locking hubs are standard on Geo Tracker four-wheel drive Base models. Automatic locking hubs are standard on LSi four-wheel drive models.

### Important

- Front locking hubs must be packed with grease. If hubs are not operating properly, clean sliding surfaces of hubs and lubricate each sliding surface with locking front hub lubricant GM P/N 1052750, or equivalent. If hubs still do not operate properly, they should be replaced.

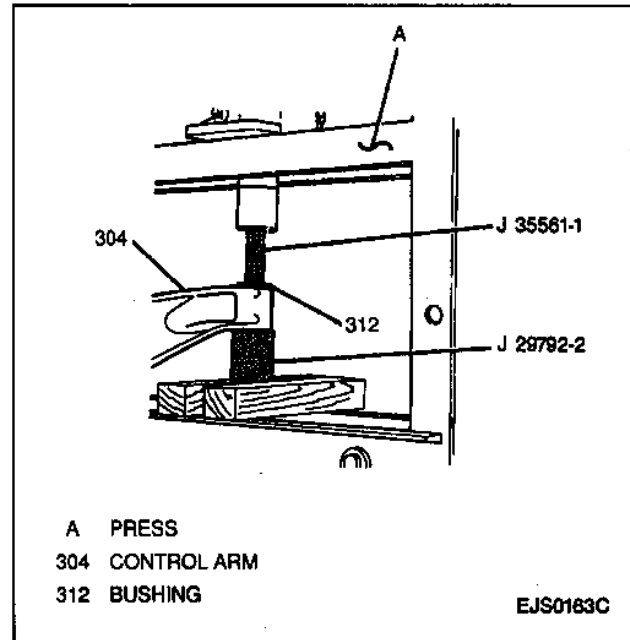


Figure 16—Installing Control Arm Bushing—Short Branch

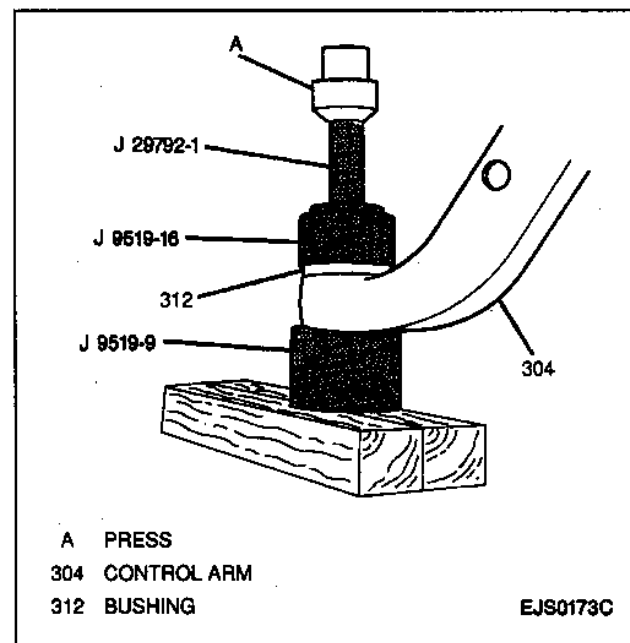


Figure 17—Installing Control Arm Bushing—Long Branch

## Manual Locking Hub

### Figures 18 and 19

Manual locking hub operation is accomplished by placing the transmission in "N" (neutral), moving the transfer case shift lever to "4H" or "4L," and then moving the locking hub knob from the "FREE" to the "LOCK" position. Inspect the wheels for smooth operation with knob in either position.

### Remove or Disconnect

1. Manual locking hub cover and gasket by removing six Allen-head bolts.



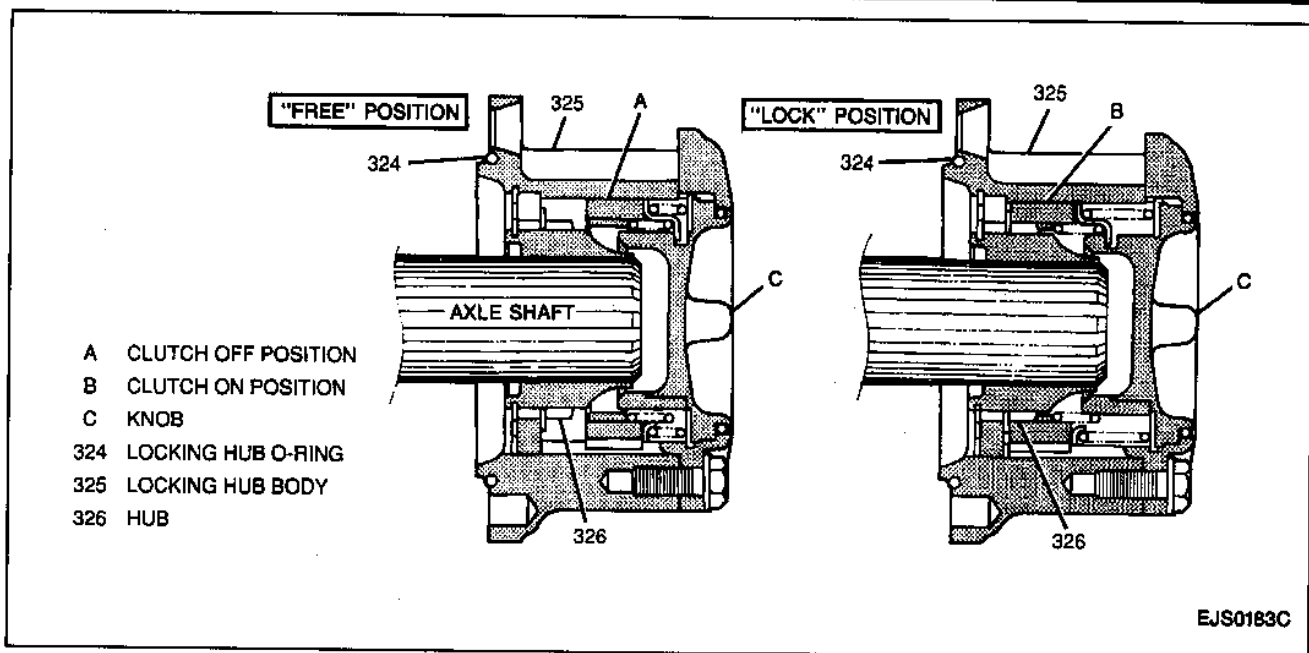


Figure 18—Locking Hub Operation

2. Locking hub body and O-ring by removing six bolts from locking hub and locking hub from wheel flange (Figure 19).

**Install or Connect**

1. New O-ring to manual locking hub body.
2. Locking hub body to wheel flange; secure with six bolts.

**Tighten**

- Manual locking hub body bolts to 25 N.m (18 lb. ft.).
3. New gasket to locking hub cover.
  4. Locking hub cover; secure with six Allen-head bolts.

**Important**

- "O" mark on hub knob must be in the "FREE" position.
- Hub cover clutch must be pulled out toward locking hub cover (Figure 18).

**Tighten**

- Manual locking hub cover bolts to 12 N.m (106 lb. ft.).

**Automatic Locking Hub**

**Figures 20 and 21**

1. Unscrew automatic locking hub cover and remove O-ring from hub body.
2. Locking hub body and O-ring by removing six Allen-head bolts from wheel hub flange (Figure 20).

**Install or Connect**

1. New O-ring to automatic locking hub body.
2. Locking hub body to wheel hub flange, aligning indexing tab on locking hub with notched portion of spindle (Figure 21). Secure locking hub with six Allen-head bolts.

**Tighten**

- Automatic locking hub body bolts to 25 N.m (18 lb. ft.).
3. New O-ring to locking hub cover.
  4. Locking hub cover to locking hub body; screw on.

**WHEEL HUB AND BEARING**

**Two-Wheel Drive Models**

**Figures 9, 10, and 22 through 29**

**Remove or Disconnect**

**Tools Required:**

- J 37763 Wheel Bearing socket
- J 8092 Driver Handle
- J 37781 Front Wheel Hub Remover
- J 37772 Front Wheel Hub Bearing Race Remover
- J 2619-01 Slide Hammer

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Tire and wheel. Refer to SECTION 3E.
3. Brake caliper from rotor and steering knuckle by removing two caliper pin bolts. Suspend caliper assembly with wire so as not to damage brake hose (Figure 9).

## 3C-10 FRONT SUSPENSION

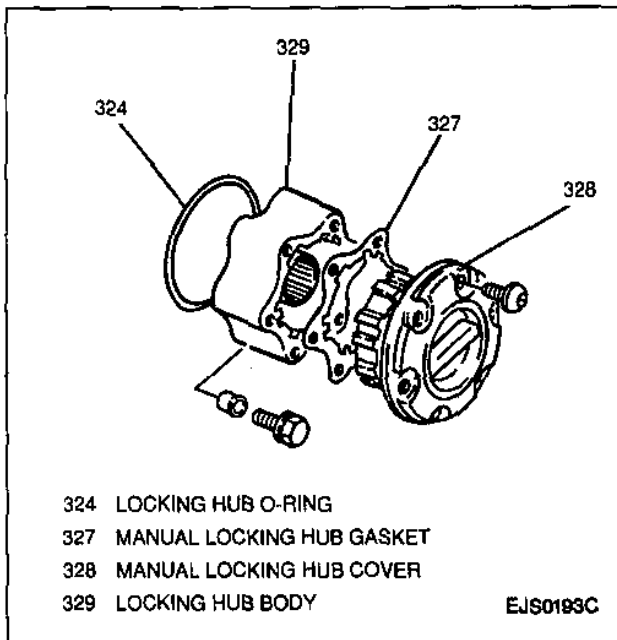


Figure 19—Manual Locking Hub

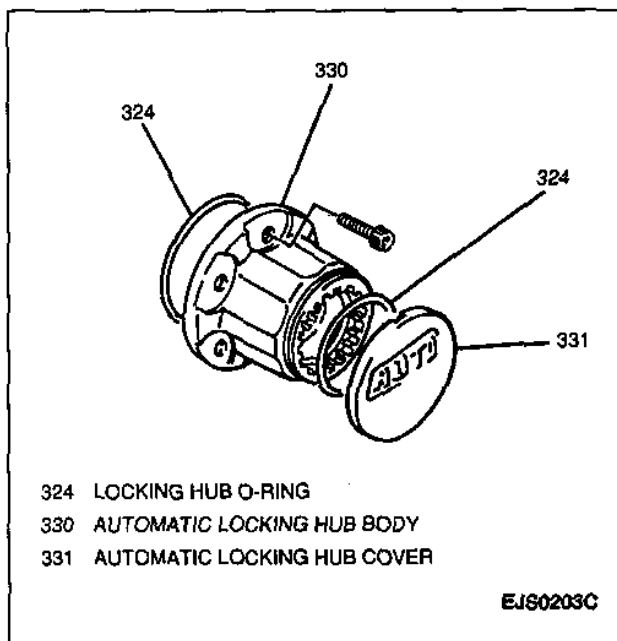


Figure 20—Automatic Locking Hub

4. Brake rotor from wheel hub. If rotor cannot be removed by hand, install two 8 mm bolts into rotor. Tightening the bolts will force rotor off (Figure 10).
5. Hub end cap.
6. Wheel bearing lock plate by removing four screws (Figure 22).
7. Wheel bearing locknut by using a J 37763 (Figure 23).
8. Wheel hub complete with bearings and oil seals from spindle. If wheel hub cannot be removed by hand, use a J 37781 with a J 2619-01 (Figure 24).
9. Outer bearing from hub (Figure 25).

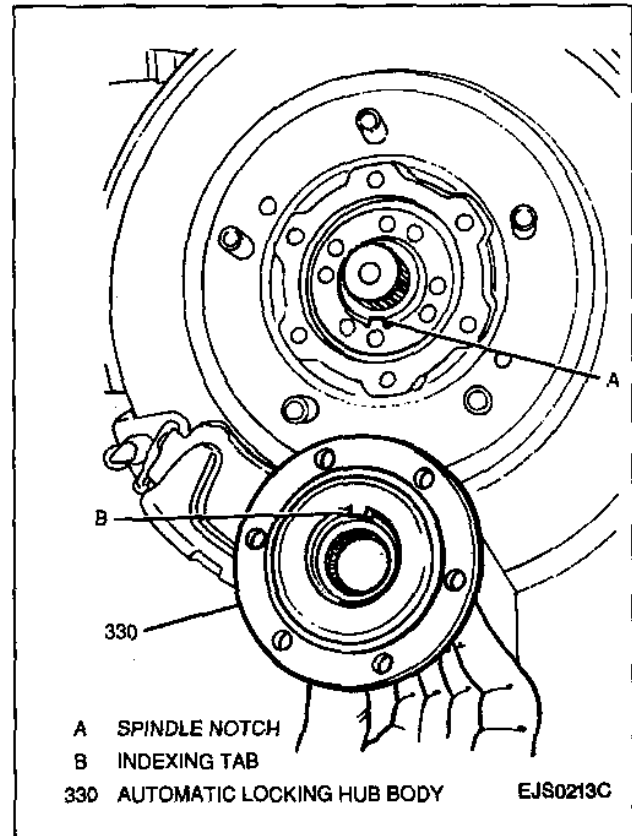


Figure 21—Aligning Automatic Locking Hub

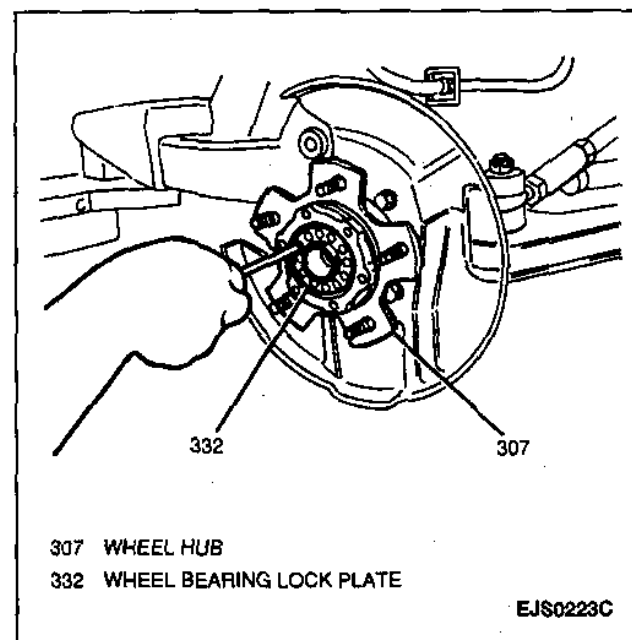


Figure 22—Removing Wheel Bearing Lock Plate

10. Wheel bearing oil seal from hub (Figure 26).
11. Snap ring from hub (Figure 27).
12. Inner bearing from hub (Figure 28).
13. Inner and outer bearing races from hub using a J 37772 and a J 8092. Remove bearing races only if they are scored or pitted.

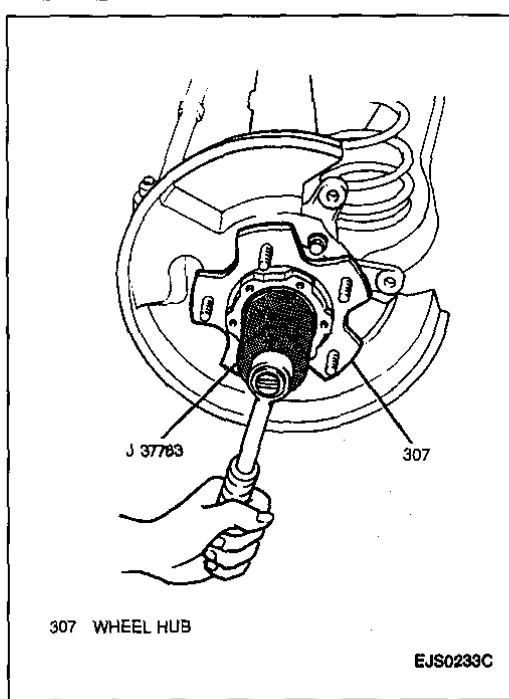


Figure 23—Removing Wheel Bearing Lockout

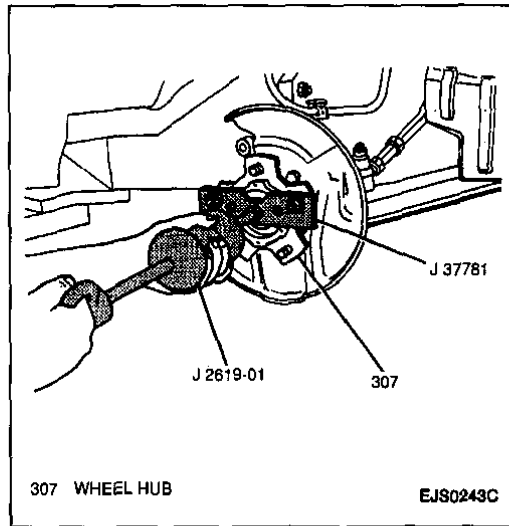


Figure 24—Removing Wheel Hub and Bearing

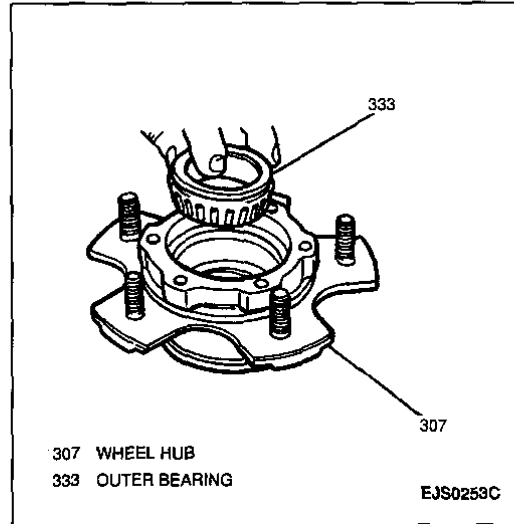


Figure 25—Removing Outer Bearing From Hub

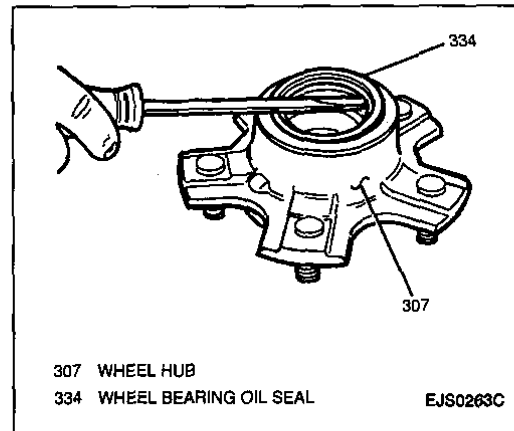


Figure 26—Removing Wheel Bearing Oil Seal

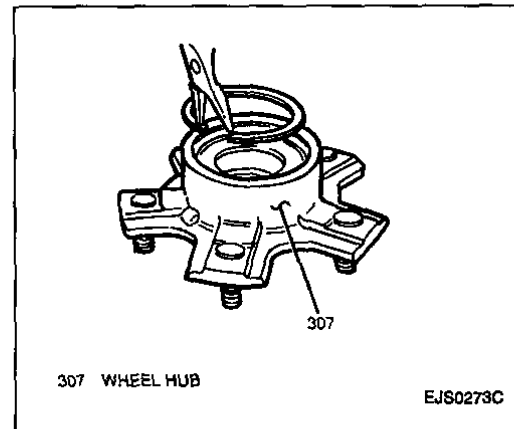


Figure 27—Removing Snap Ring

## 3C-12 FRONT SUSPENSION

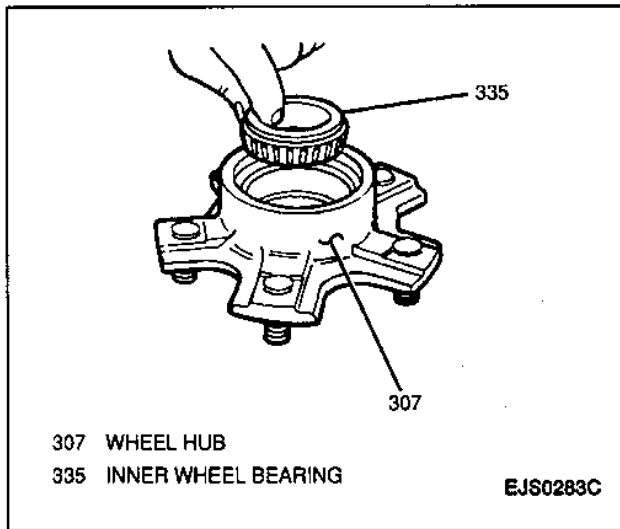


Figure 28—Removing Inner Bearing From Hub



### Clean

- Dirt and old grease using a suitable solvent where necessary.



### Install or Connect

#### Tools Required

- J 8092 Driver handle
- J 37777 Front Wheel Bearing Race Installer
- J 37774 Wheel Hub Oil Seal Installer
- J 37763 Wheel Bearing Socket

1. Pack inner and outer bearing assemblies with wheel bearing grease GM P/N 1051344, or equivalent.
2. New inner and outer bearing races (if old races were removed) to hub using a J 37777 and a J 8092.
3. Inner bearing to hub.
4. Snap ring to hub.
5. Wheel bearing oil seal to hub using a J 37774 (Figure 29).
6. Outer bearing to hub.
7. Wheel hub complete with bearings and oil seals to spindle.
8. Wheel bearing locknut by using a J 37763.

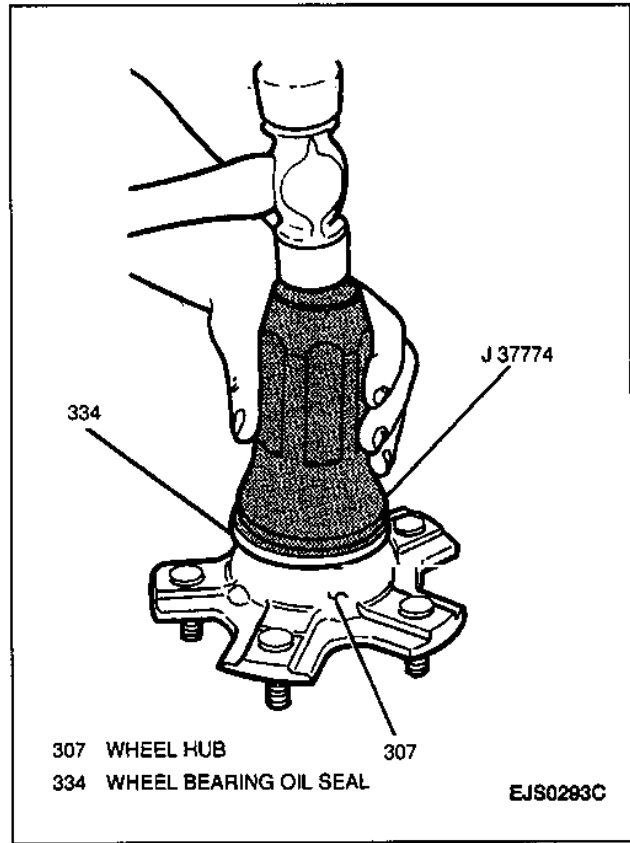


Figure 29—Installing Wheel Bearing Oil Seal



### Tighten

- Wheel bearing locknut to 210 N.m (155 lb. ft.).
9. Wheel bearing lock plate; secure with four screws.
  10. Hub end cap.
  11. Brake rotor to wheel hub.
  12. Brake caliper to rotor and knuckle; secure with two caliper pin bolts.



### Tighten

- Brake caliper pin bolt to 88 N.m (65 lb. ft.).
13. Tire and wheel. Refer to SECTION 3E.
  14. Lower vehicle.

## SPECIFICATIONS

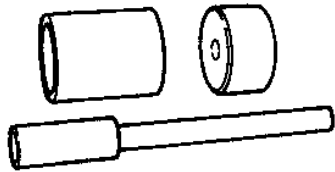
### FASTENER TORQUES

Stabilizer Shaft-to-link Nuts.....	28 N.m (21 lb. ft.)
Stabilizer Shaft Mounting Bracket Bolts and Nuts .....	50 N.m (37 lb. ft.)
Engine Skid Plate Bolts .....	54 N.m (40 lb. ft.)
Strut-to-Knuckle Bolts and Nuts.....	90 N.m (66 lb. ft.)
Strut Upper Support Nuts .....	25 N.m (18 lb. ft.)
Stabilizer Joint-to-Control Arm Nut .....	28 N.m (21 lb. ft.)
Ball Stud Nuts and Bolts .....	85 N.m (63 lb. ft.)
Ball Stud Castle Nut .....	85 N.m (63 lb. ft.)
Tie Rod End Castle Nut .....	40 N.m (30 lb. ft.)
Dust Shield Bolts.....	15 N.m (11 lb. ft.)
Brake Caliper Pin Bolts .....	88 N.m (65 lb. ft.)
Control Arm-to-Chassis Through Bolts and Nuts.....	100 N.m (74 lb. ft.)
Manual Locking Hub Body Bolts .....	25 N.m (18 lb. ft.)
Manual Locking Hub Cover Bolts .....	12 N.m (106 lb. ft.)
Automatic locking Hub Body Bolts .....	25 N.m (18 lb. ft.)
Wheel Bearing Locknut.....	210 N.m (155 lb. ft.)
Wheel speed sensor retaining bolt.....	10 N.m (7 lb. ft.)
Wheel speed sensor harness bolt.....	10 N.m (7 lb. ft.)

SPECIAL TOOLS

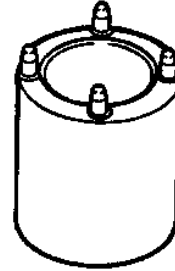
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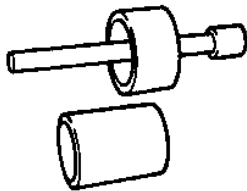
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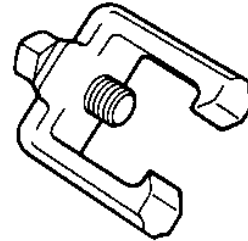
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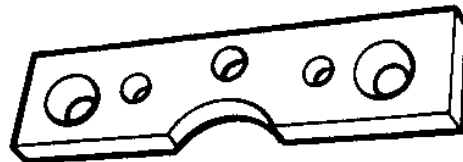
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- 1 FRONT CONTROL ARM BUSHING SERVICE SET
- 2 FRONT CONTROL ARM BUSHING SERVICE SET
- 3 BEARING REMOVERS
- 4 WHEEL BEARING SOCKET
- 5 TIE ROD END REMOVER
- 6 FRONT WHEEL HUB REMOVER

