

2004 SUSPENSION

Rear Suspension - Corvette

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Lower Control Arm Ball Joint Stud Nut		
• First Pass	30 N.m	20 lb ft
• Final Pass	180 degrees	
Lower Control Arm (Front) Cam Bolt Nut	145 N.m	107 lb ft
Lower Control Arm (Rear) Cam Bolt Nut	95 N.m	70 lb ft
Outer Tie Rod End Stud Nut		
• First Pass	20 N.m	15 lb ft
• Second Pass	160 degrees	
• Final Pass	45 N.m	33 lb ft
Rear Crossmember Mounting Nuts (Use New Nuts)	110 N.m	81 lb ft
Rear Suspension Adjustment Link to Crossmember Nut	60 N.m	44 lb ft
Shock Absorber Lower Mounting Bolt	220 N.m	162 lb ft
Shock Absorber Upper Mounting Bolts	30 N.m	22 lb ft
Stabilizer Shaft Insulator (Upper) Clamp Bolt	65 N.m	49 lb ft
Stabilizer Shaft Insulator (Lower) Clamp Nut	95 N.m	70 lb ft
Stabilizer Shaft Link Nuts	72 N.m	53 lb ft
Transverse Spring Mounting Bracket Bolts	62 N.m	46 lb ft
Upper Control Arm Ball Joint Stud Nut		
• First Pass	20 N.m	15 lb ft
• Final Pass	250 degrees	
Upper Control Arm Mounting Bolt	110 N.m	81 lb ft
Wheel Hub Mounting Bolts	130 N.m	96 lb ft

REPAIR INSTRUCTIONS

CROSSMEMBER REPLACEMENT

Removal Procedure

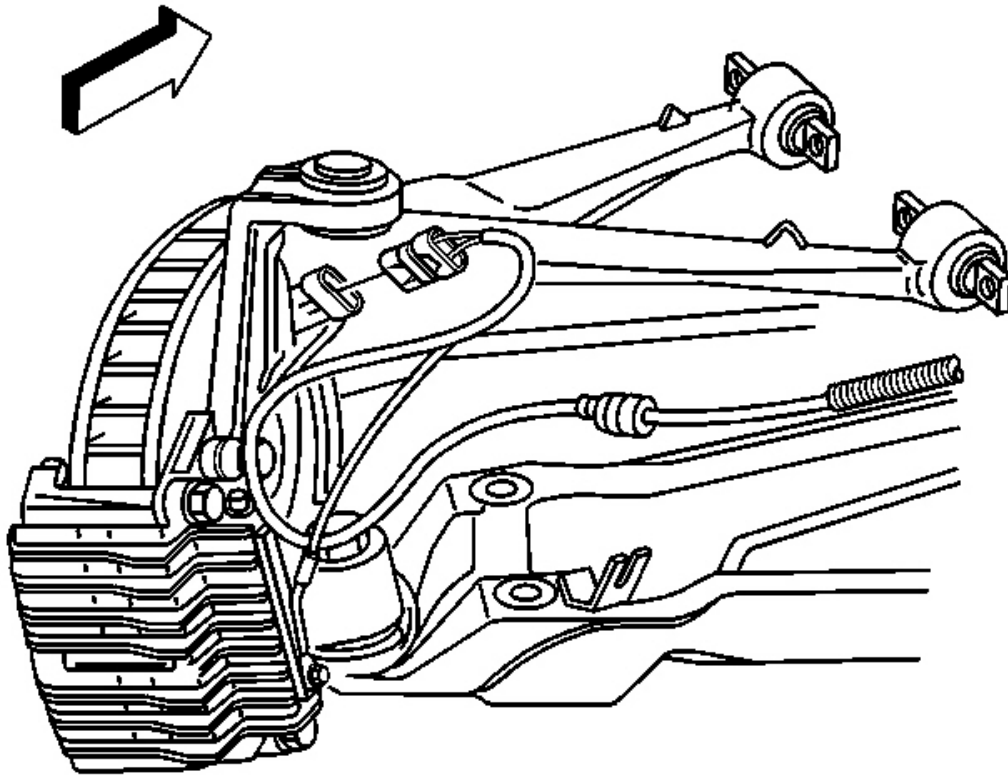


Fig. 1: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the electrical connectors from both wheel speed sensors.

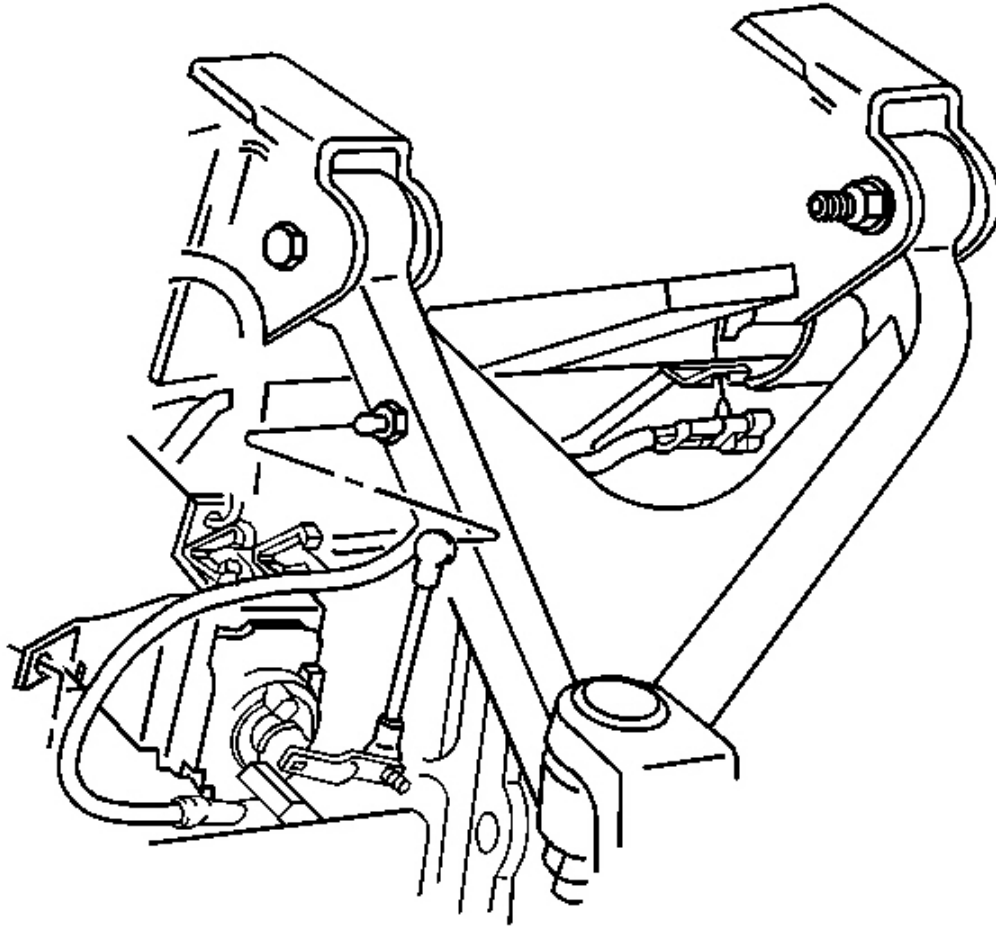


Fig. 2: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the electronic suspension control (ESC) position sensor links, if equipped.

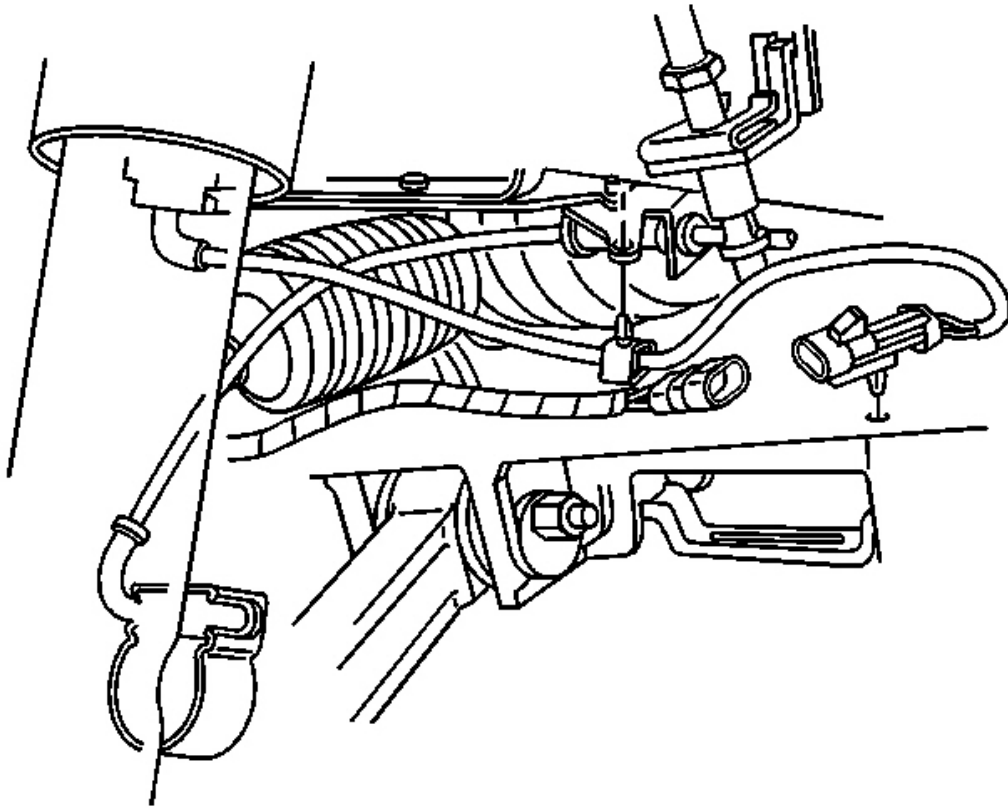


Fig. 3: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the shock absorber solenoid electrical connectors, if equipped.
6. Remove the transverse spring from the crossmember. Refer to **Rear Transverse Spring Replacement** .
7. Support the crossmember with a transmission jack.
8. Remove the stabilizer shaft from the vehicle. Refer to **Stabilizer Shaft Replacement** .
9. Disconnect the outer tie rod end studs from the rear suspension knuckles. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .

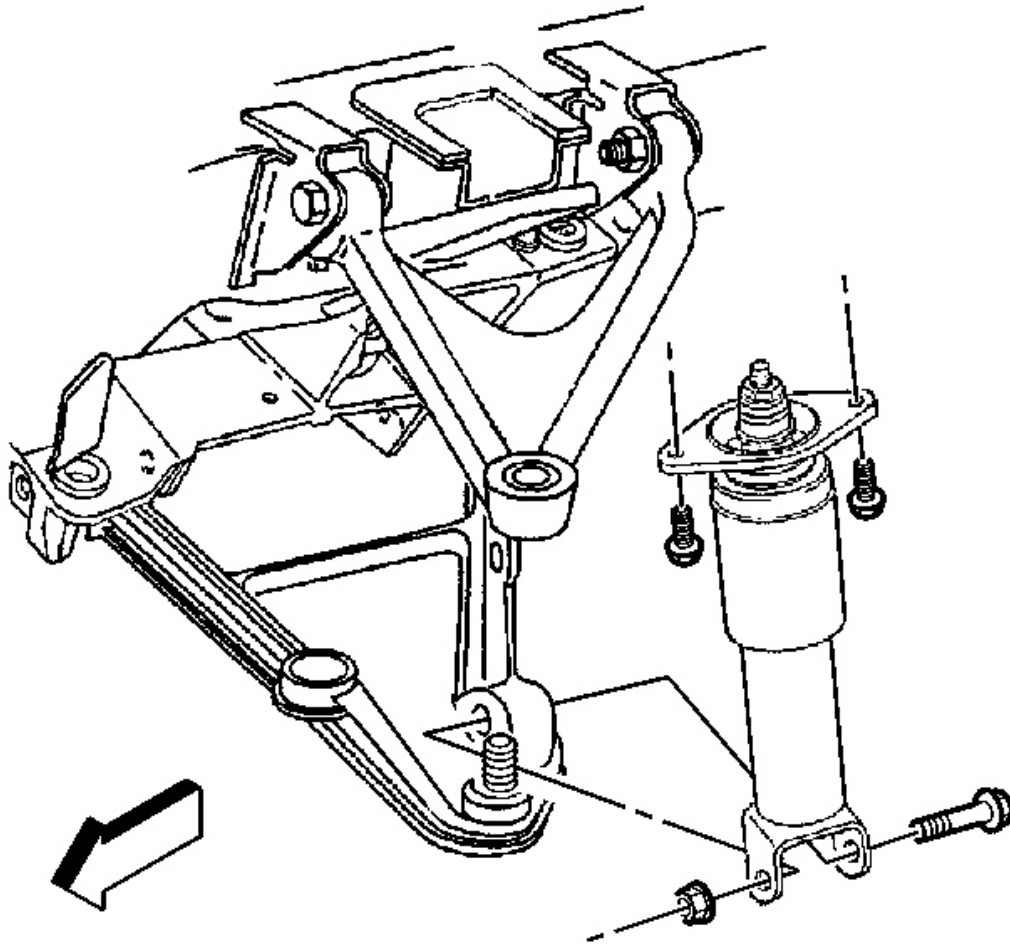


Fig. 4: Shock Absorber & Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

10. Remove the transaxle mount lower nuts. Refer to Transmission Mount Replacement in Rear Drive Axle.

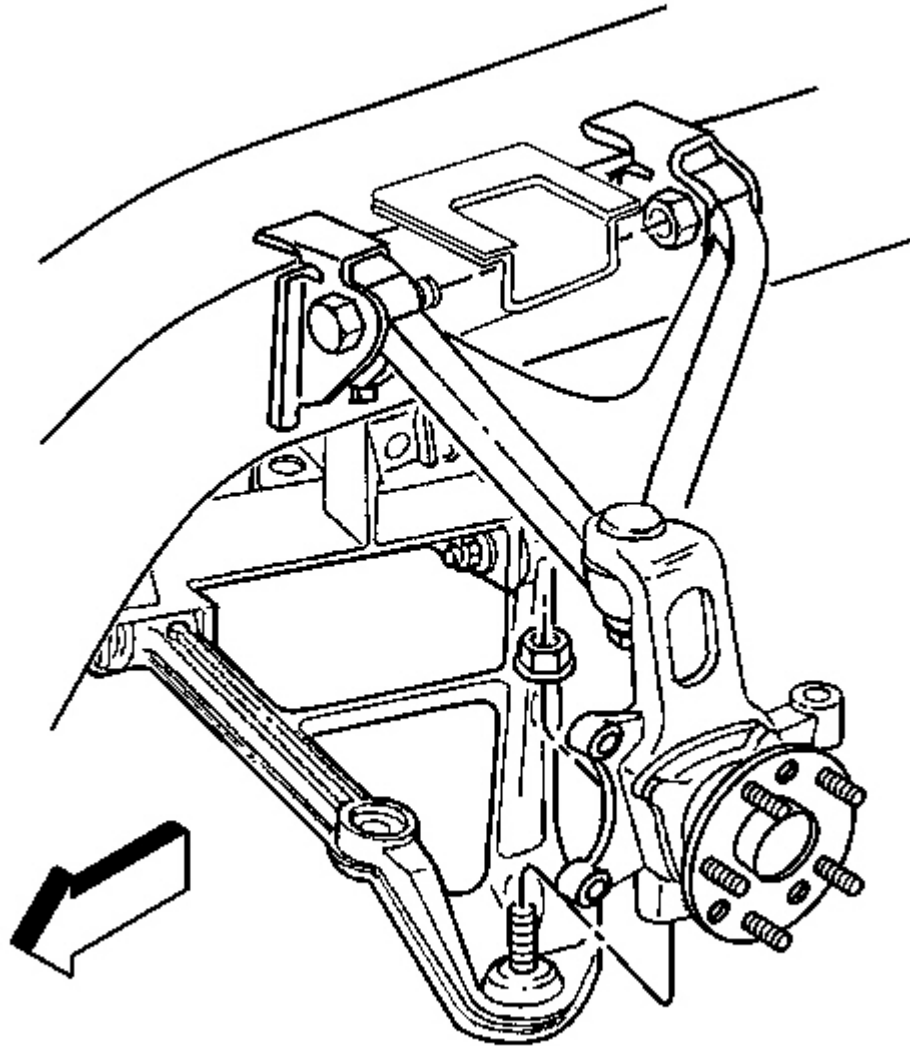


Fig. 5: Lower Ball Joint Stud Nut, Suspension Knuckle & Inner CV Joints
Courtesy of GENERAL MOTORS CORP.

11. Remove the shock absorber lower mounting bolts from the lower control arms.
12. Remove the upper control arm from the rear axle. Refer to **Rear Axle Upper Control Arm Replacement** .
13. Loosen the nut on the lower control arm ball joint stud. Do not remove.
14. Rotate the suspension knuckles backwards until the wheel drive shaft clears the differential. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

15. Support the wheel drive shafts and the rear suspension knuckles.
16. Disconnect all the electrical connectors from the crossmember.
17. Disconnect the brake pipes from the crossmember.
18. Support the transaxle under the transmission pan with a transmission jack.
19. Remove the rear crossmember mounting nuts.
20. Remove the crossmember from the vehicle.
21. Discard the rear crossmember mounting nuts.

Installation Procedure

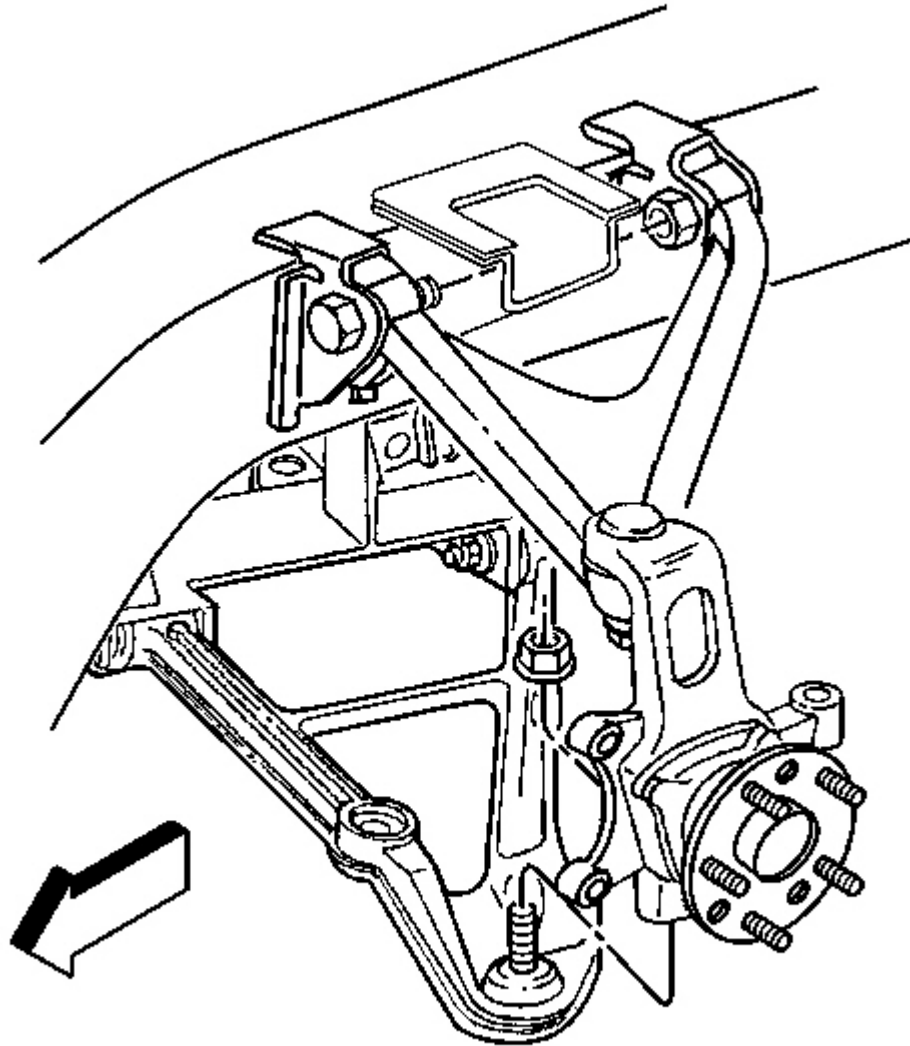


Fig. 6: Lower Ball Joint Stud Nut, Suspension Knuckle & Inner CV Joints
Courtesy of GENERAL MOTORS CORP.

1. Install the crossmember to the vehicle.
 - Align the crossmember dowel pins to the holes in the frame rails.
 - Align the transaxle mount studs to the crossmember.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install NEW rear suspension crossmember mounting nuts.

Tighten: Tighten the NEW rear crossmember mounting nuts to 110 N.m (81 lb ft).

3. Remove the transmission jack from the transmission pan.
4. Connect all electrical connectors to the crossmember.
5. Connect the brake pipes to the retainers in the crossmember.
6. Install the transaxle mount lower nuts. Refer to **Transmission Mount Replacement** in Rear Drive Axle.
7. Install the inner constant velocity (CV) joints to the differential. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
8. Install the rear suspension knuckles to the lower control arms. Refer to **Knuckle Replacement** .
9. Install the shock absorbers to the lower control arms. Refer to **Shock Absorber Replacement (W/O F55)** or **Shock Absorber Replacement (W/F55)** .
10. Install the outer tie rod end studs into the rear suspension knuckles. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
11. Install the stabilizer shaft to the crossmember. Refer to **Stabilizer Shaft Replacement** .
12. Remove the jack stands from under the lower control arms.
13. Install the transverse spring to the crossmember. Refer to **Rear Transverse Spring Replacement** .

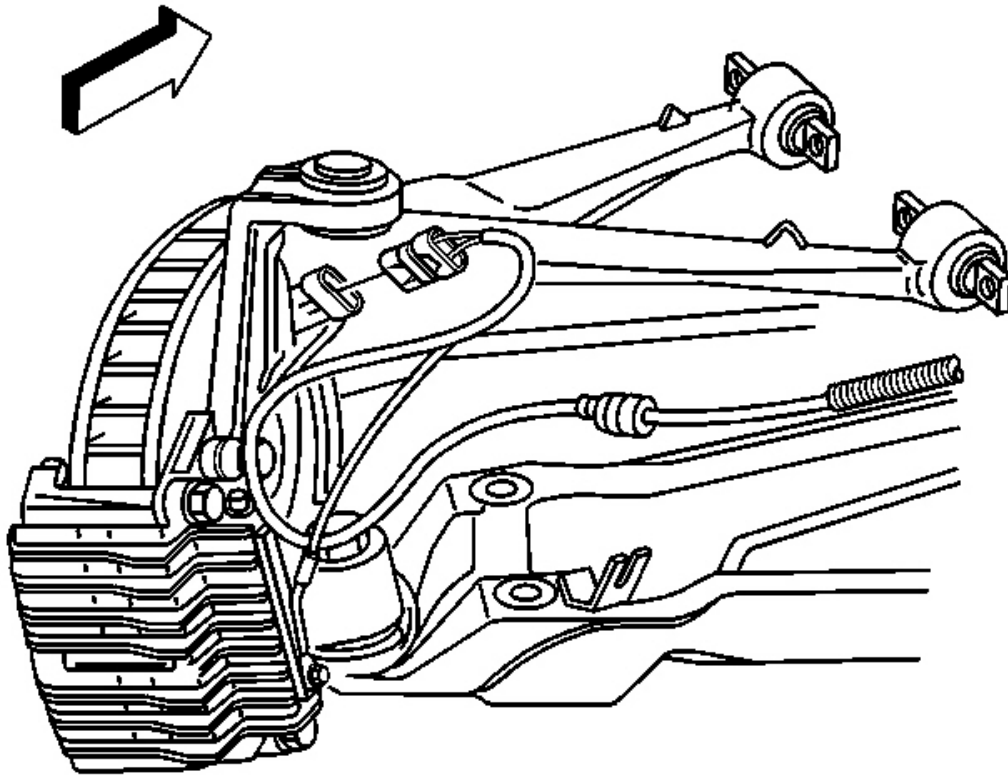


Fig. 7: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

14. Connect the electrical connectors to the wheel speed sensors.

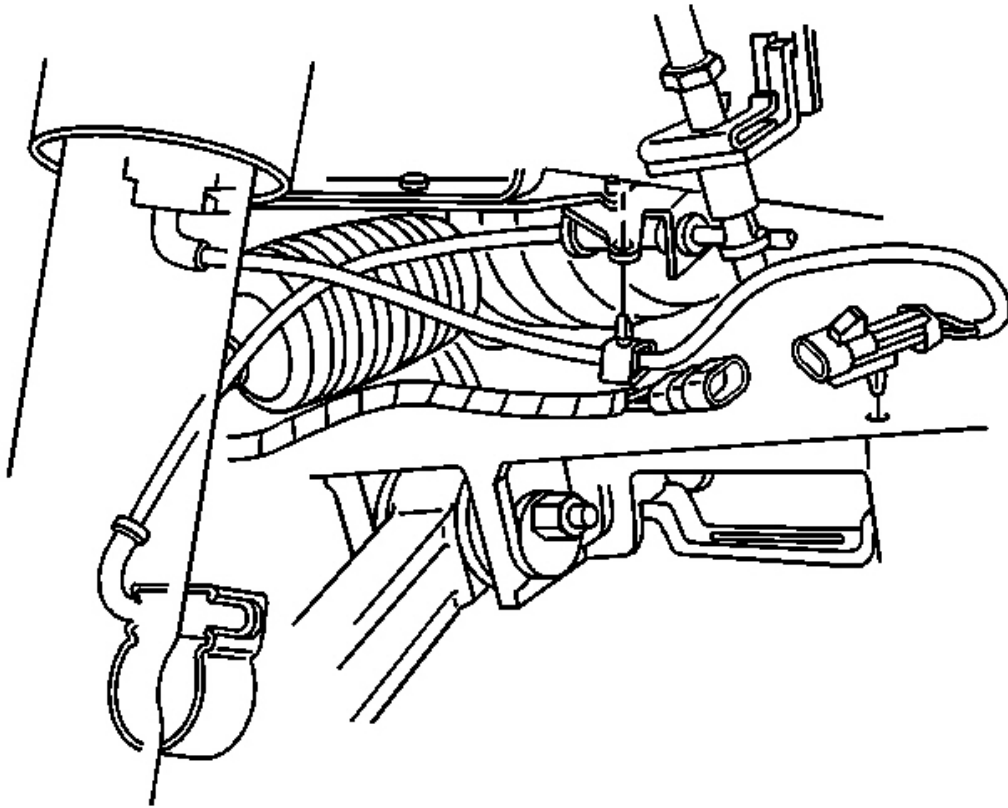


Fig. 8: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

15. Connect the shock absorber solenoid connectors, if equipped.

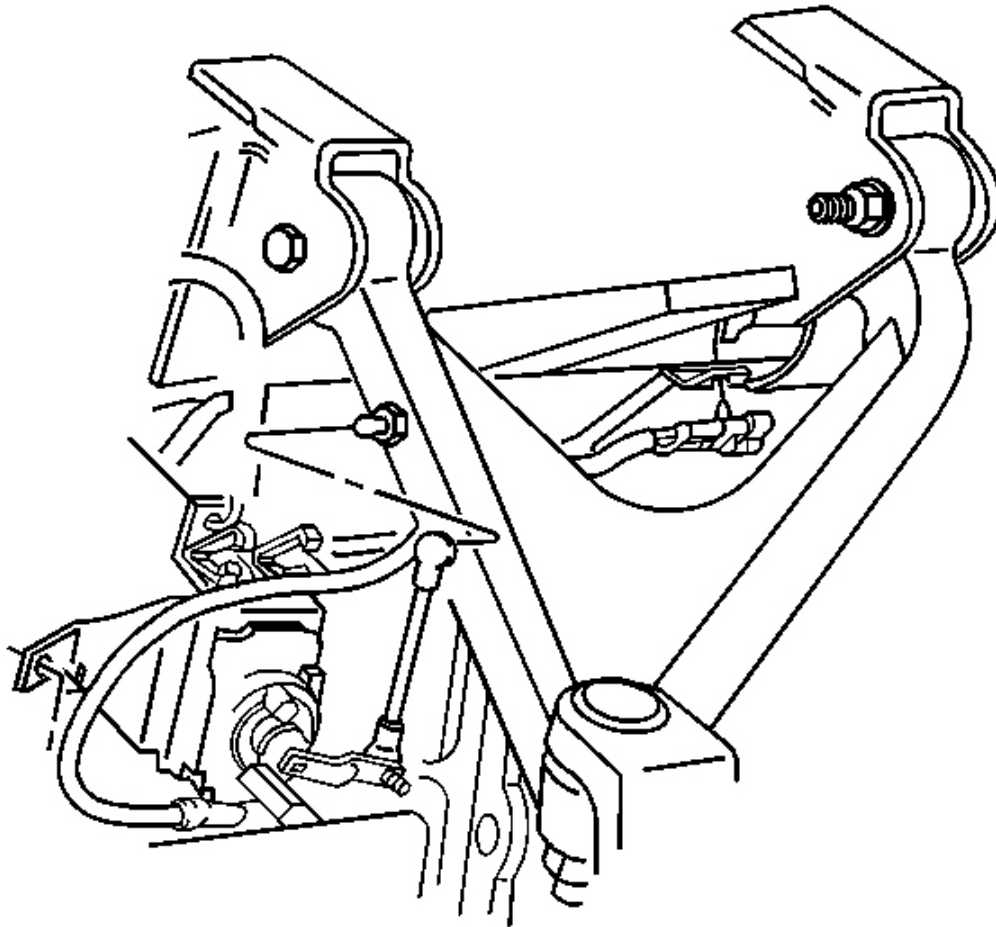


Fig. 9: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

16. Connect the ESC position sensor links, if equipped.

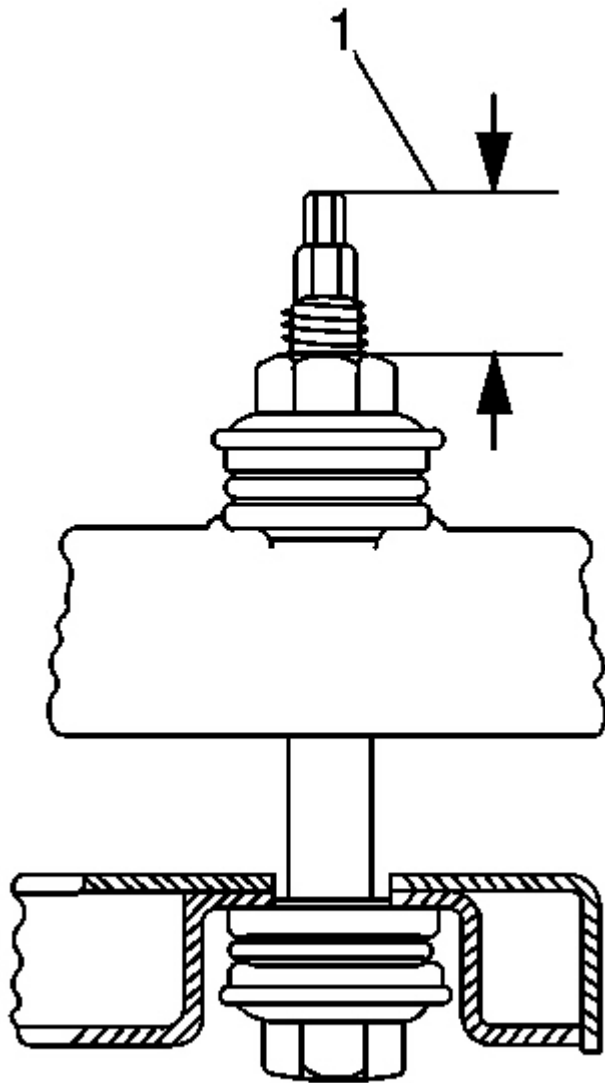


Fig. 10: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

17. Set the spring stud height (1) to the measurement taken before removal.
18. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
19. Lower the vehicle.

WHEEL BEARING/HUB REPLACEMENT - REAR

Removal Procedure

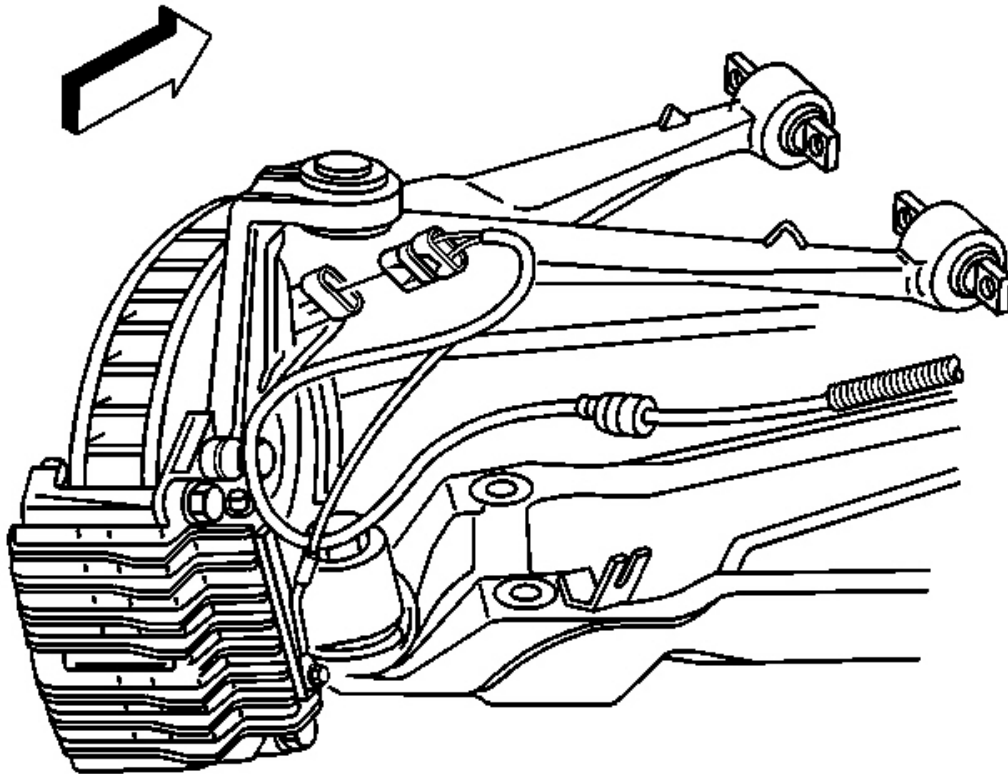


Fig. 11: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the wheel speed sensor electrical connector.

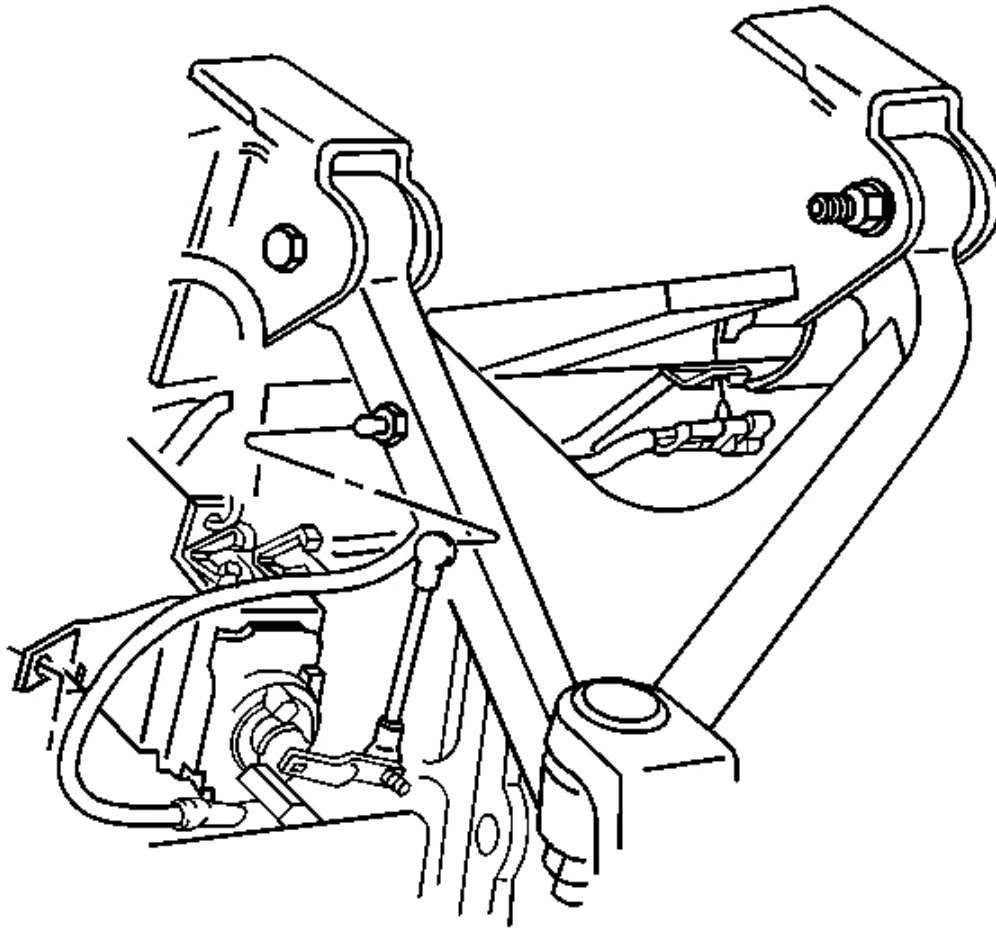


Fig. 12: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the real time damping (RTD) position sensor link, if equipped.
5. Remove the brake caliper and rotor. Refer to **Brake Caliper Bracket Replacement - Rear** and **Brake Rotor Replacement - Front** in Disc Brakes.

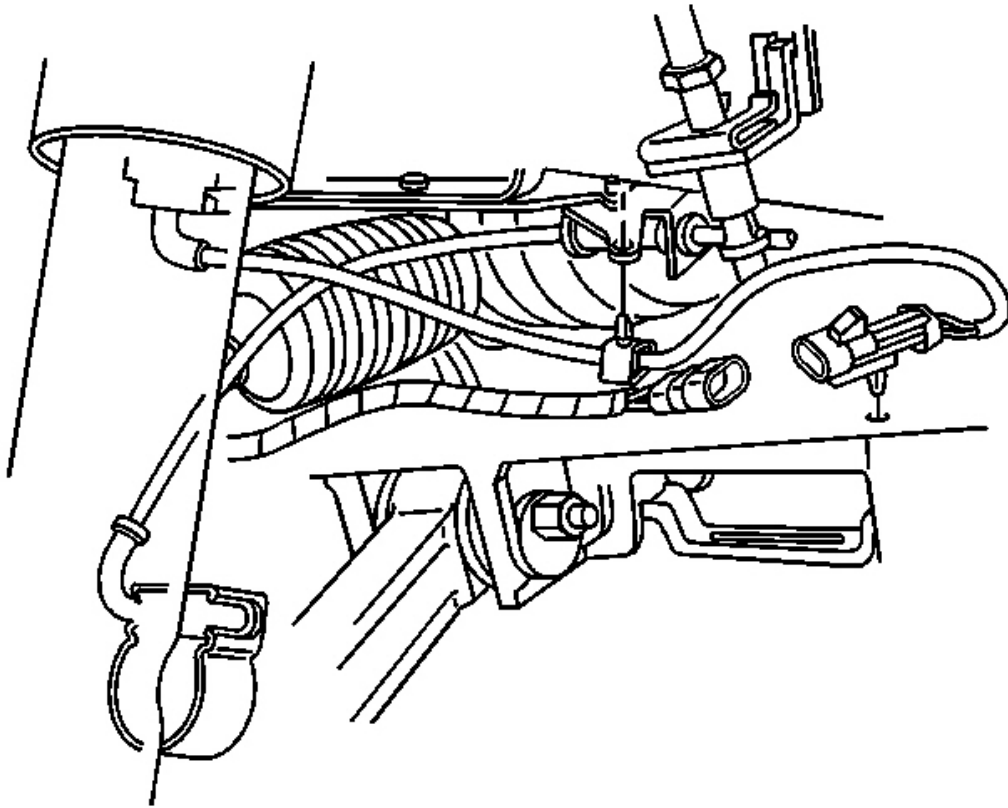


Fig. 13: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

6. Remove the shock absorber solenoid electrical connector, if equipped.
7. Separate the outer tie rod end from the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
8. Remove the spindle nut retainer, the spindle nut and the washer. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

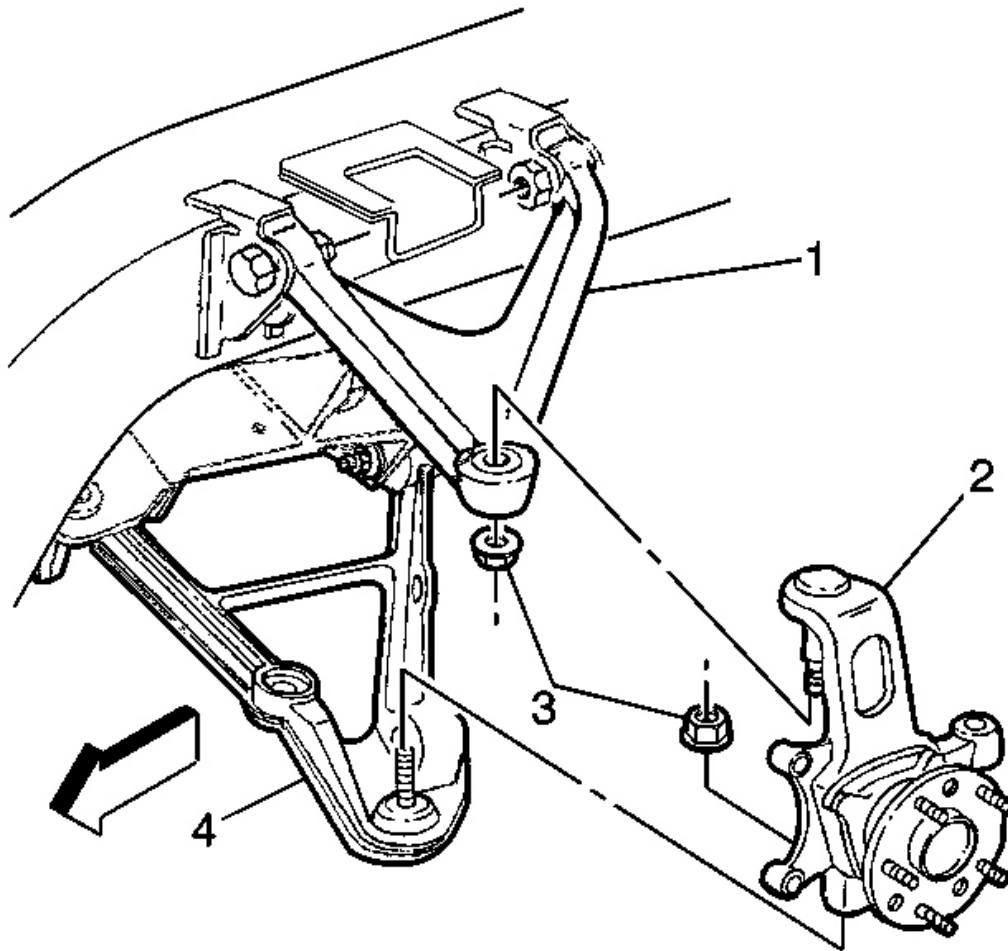


Fig. 14: Upper Control Arm, Lower Control Arm Ball Joint Stud & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

9. Separate the upper control arm (1) from the suspension knuckle. Refer to **Rear Axle Upper Control Arm Replacement** .
10. Separate the suspension knuckle from the lower control arm ball joint stud (4). Refer to **Rear Axle Lower Control Arm Replacement** .
11. Remove the suspension knuckle from the vehicle.

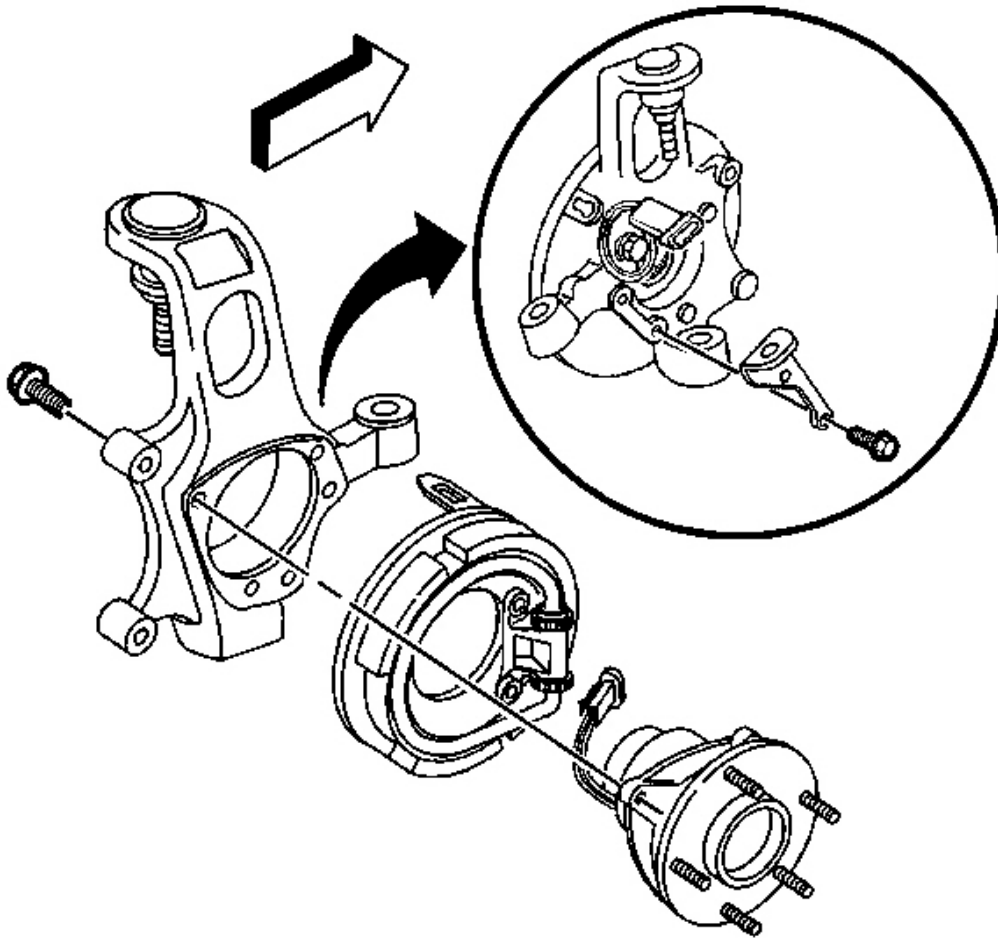


Fig. 15: Wheel Hub & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

12. Remove the wheel hub mounting bolts.
13. Remove the hub and bearing assembly from the suspension knuckle.

Installation Procedure

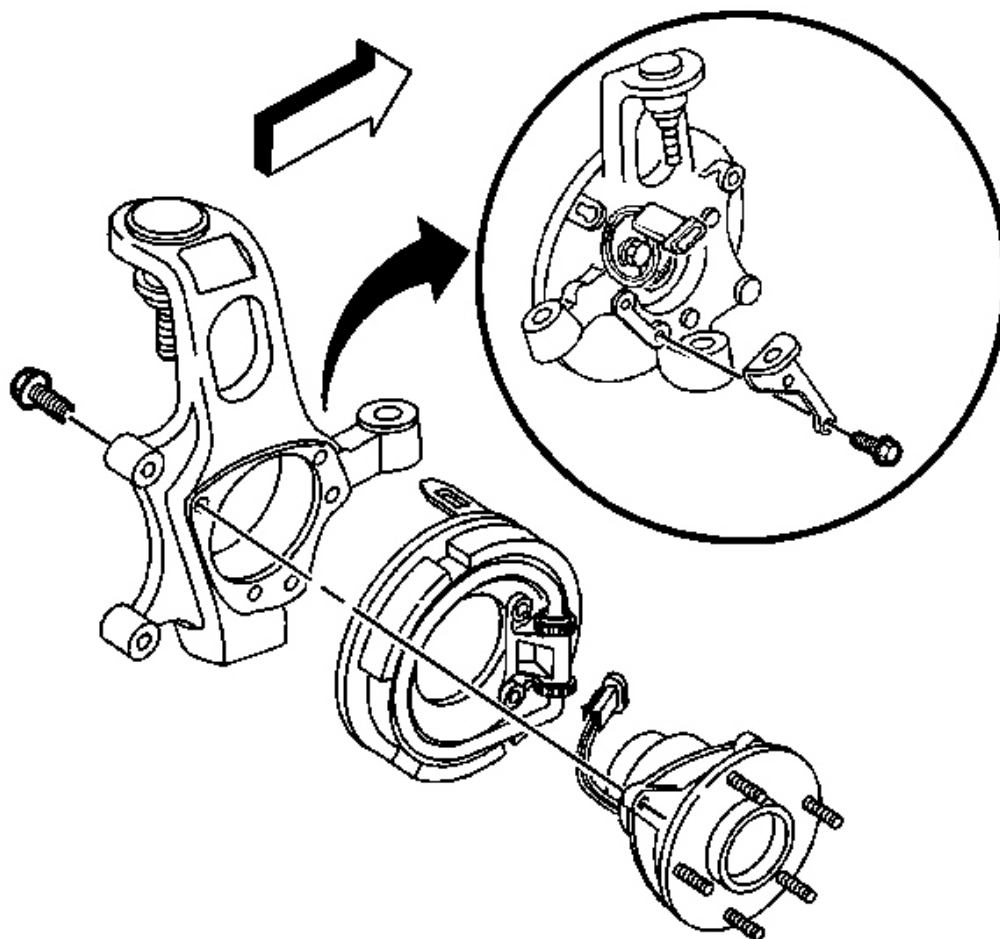


Fig. 16: Wheel Hub & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: The Front and Rear Wheel Hub/Wheel Speed Sensors are not interchangeable. When you are replacing a Wheel Hub/Wheel Speed Sensor be sure to use the correct Wheel Hub/Wheel Speed Sensor part number. Do not mount the Rear Wheel Hub/Wheel Speed Sensor in the front steering knuckle. The Rear Wheel Hub/Wheel Speed Sensor features a splined hole through the center of the bearing which mates to the drive axle. The Rear Wheel Hub/Wheel Speed Sensor requires the support of the drive axle and the drive axle nut clamped joint to properly carry the vehicle loads. Mounting the Rear Wheel Hub/Wheel Speed Sensor in the front steering knuckle can cause bearing failure and possible damage to the

vehicle.

1. Install the wheel hub and bearing assembly to the suspension knuckle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the wheel hub mounting bolts.

Tighten: Tighten the wheel hub mounting bolts to 130 N.m (96 lb ft).

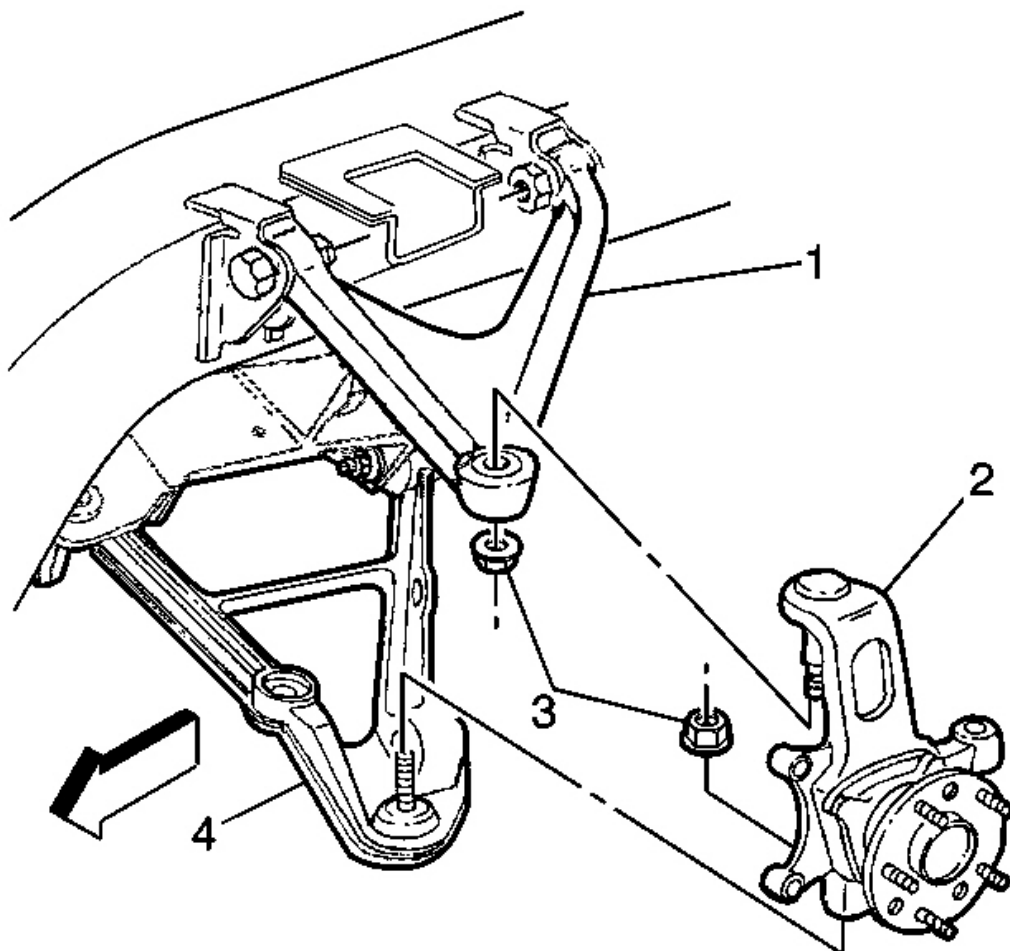


Fig. 17: Upper Control Arm, Lower Control Arm Ball Joint Stud & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

3. Install the suspension knuckle to the upper control arm (1). Refer to **Rear Axle Upper Control Arm Replacement** .
4. Install the suspension knuckle (2) to the lower control arm ball stud (4). Refer to **Rear Axle Lower Control Arm Replacement** .
5. Install the spindle nut, washer and retainer. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.
6. Install the outer tie rod end stud to the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
7. Install the brake rotor and caliper. Refer to **Brake Caliper Bracket Replacement - Rear** and **Brake Rotor Replacement - Front** in Disc Brakes.

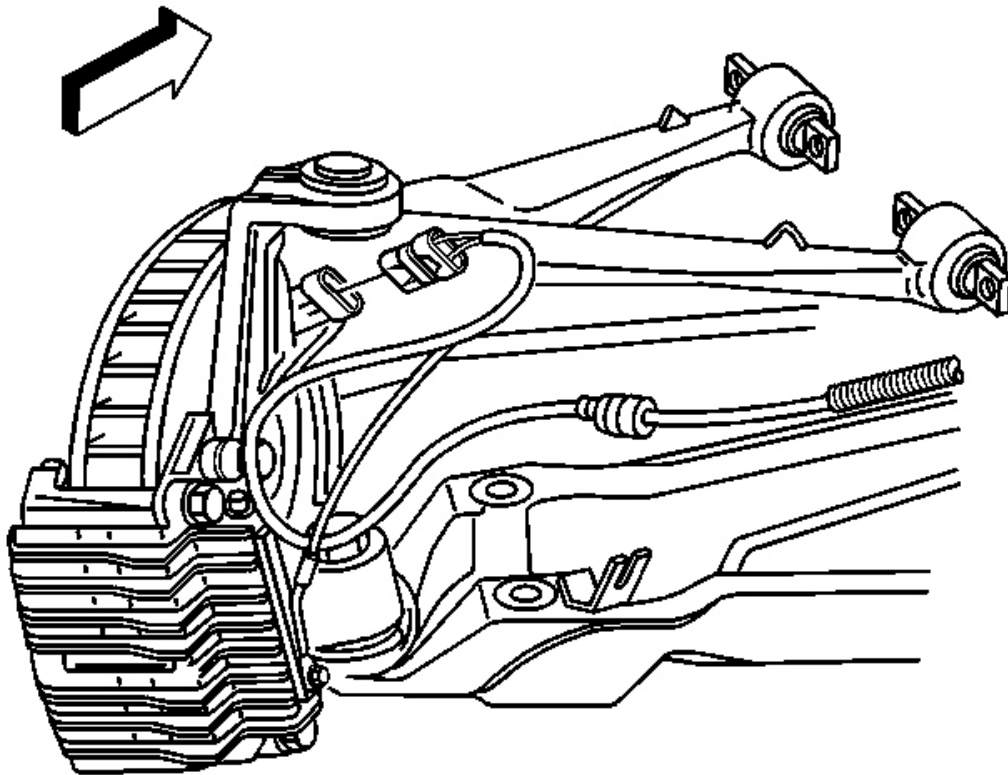


Fig. 18: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

8. Connect the wheel speed sensor electrical connector.

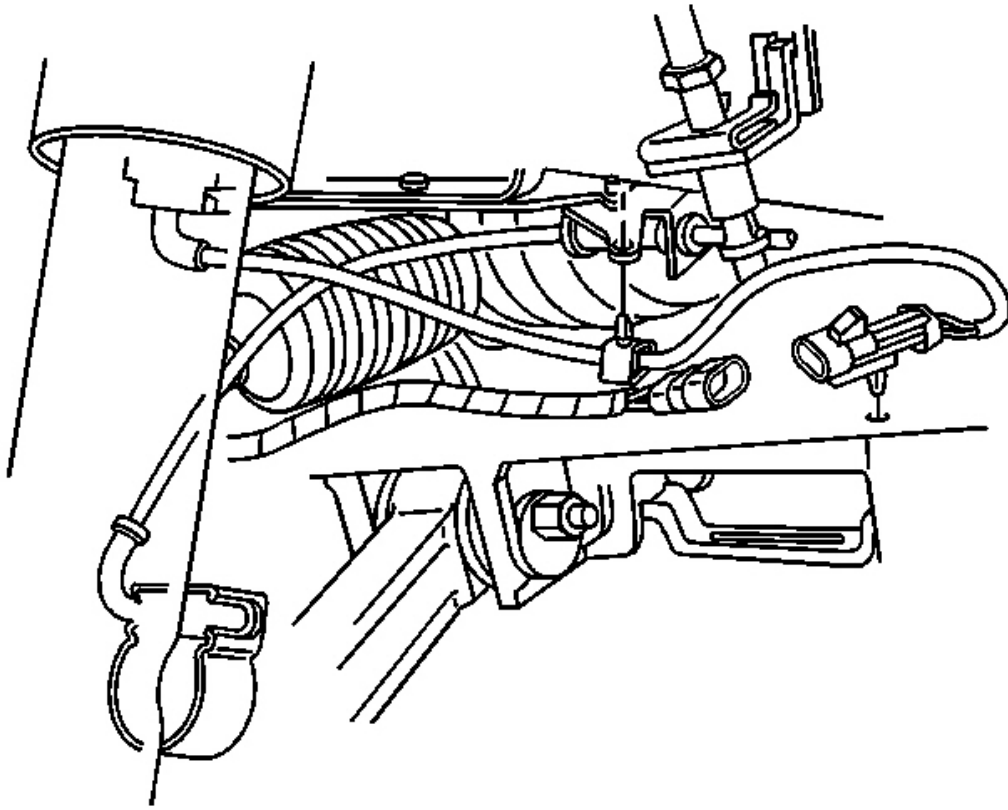


Fig. 19: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

9. Install the shock absorber solenoid electrical connector, if equipped.

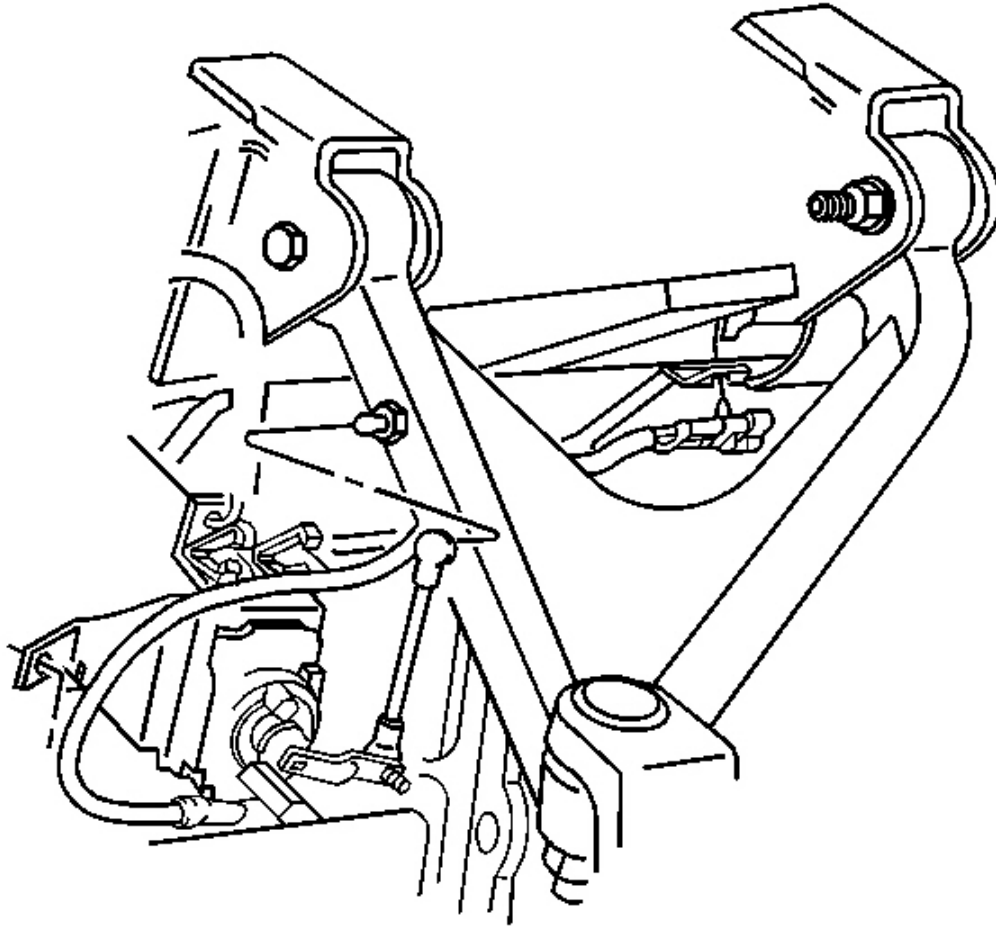


Fig. 20: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

10. Connect the real time damping position sensor link, if equipped.
11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
12. Lower the vehicle.

KNUCKLE REPLACEMENT

Removal Procedure

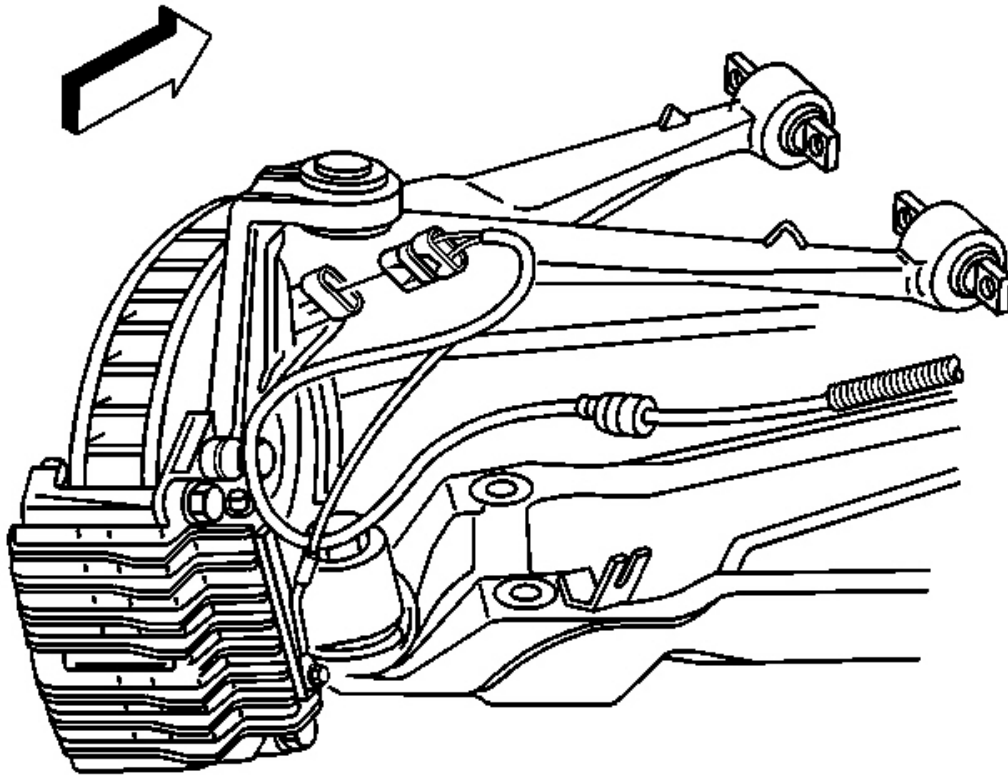


Fig. 21: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the wheel speed sensor electrical connector.

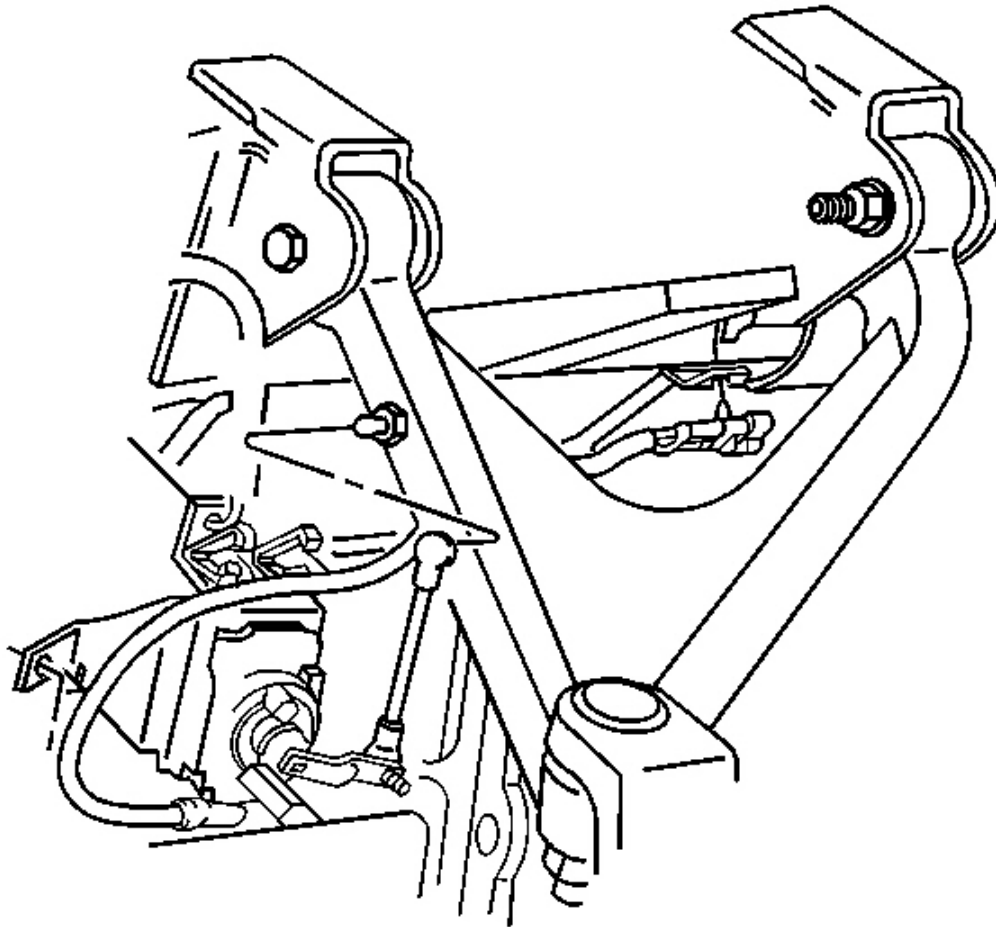


Fig. 22: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the electronic suspension control (ESC) position sensor link, if equipped.
5. Remove the brake rotor. Refer to **Brake Rotor Replacement - Rear** in Disc Brakes.

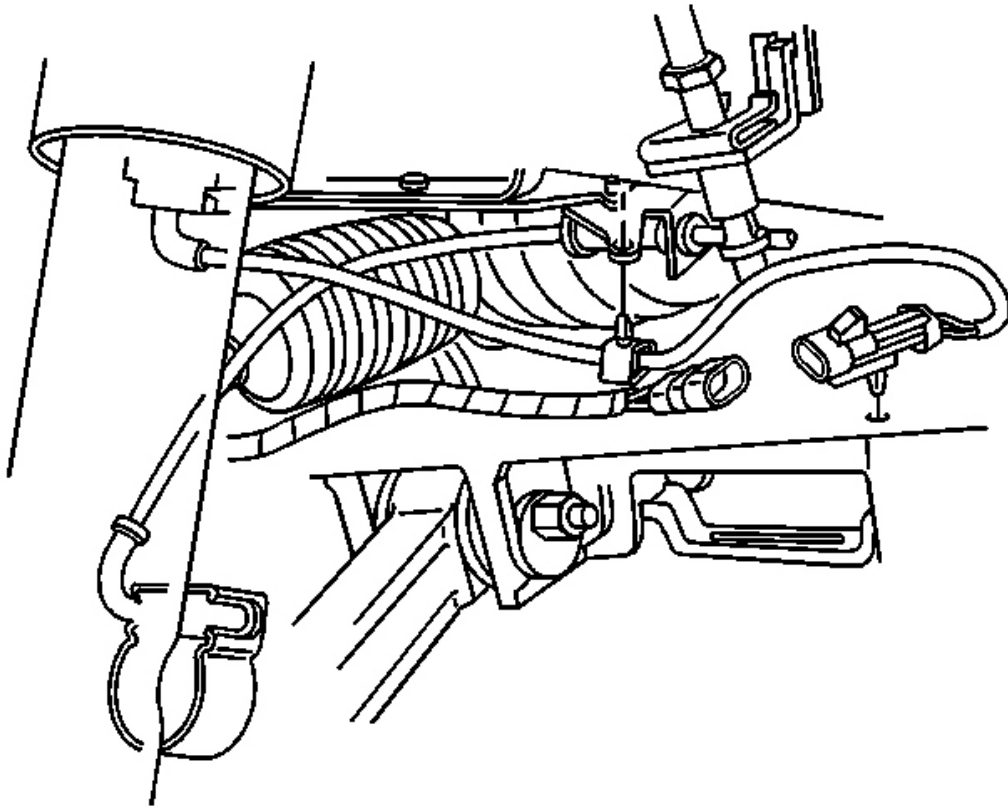


Fig. 23: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

6. Remove the shock absorber solenoid electrical connector, if equipped.
7. Separate the outer tie rod end from the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
8. Remove the spindle nut retainer, the spindle nut and the washer. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

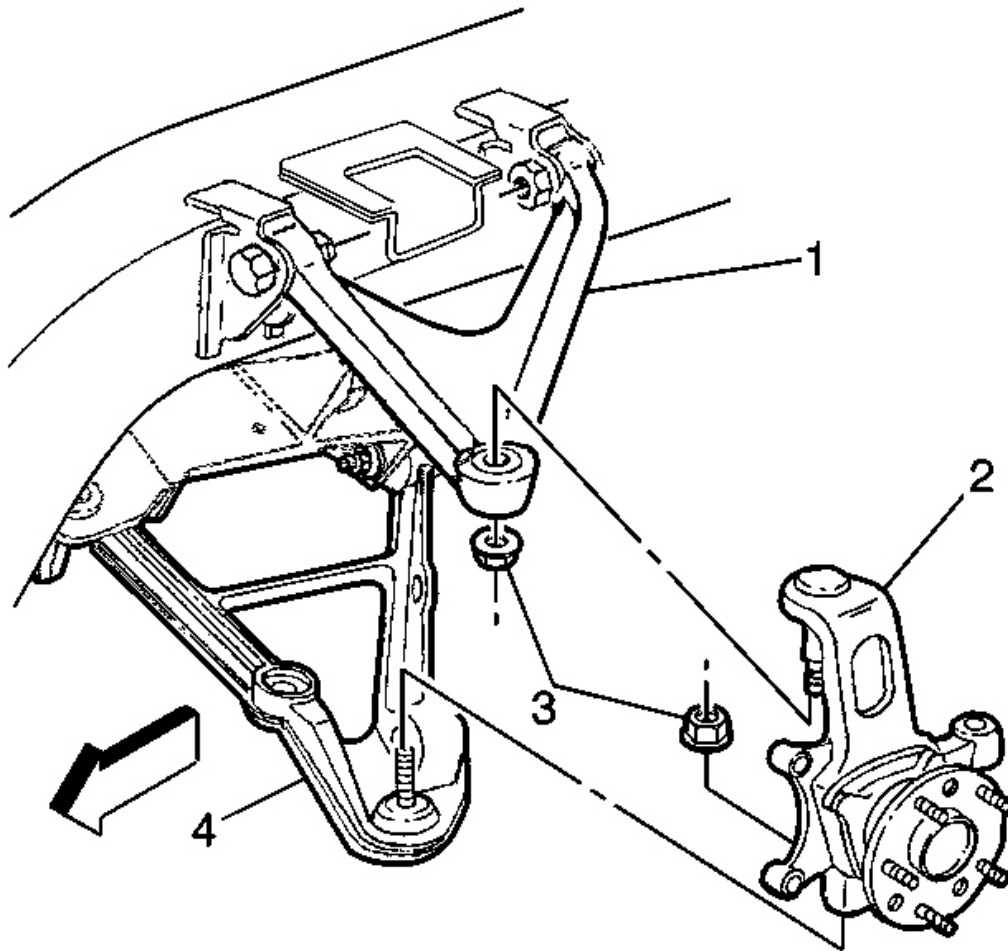


Fig. 24: Upper Control Arm, Lower Control Arm Ball Joint Stud & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

9. Separate the suspension knuckle (2) from the upper control arm (1). Refer to **Rear Axle Upper Control Arm Replacement** .
10. Separate the suspension knuckle (2) from the lower control arm ball joint stud (4). Refer to **Rear Axle Lower Control Arm Replacement** .
11. Remove the suspension knuckle.

Installation Procedure

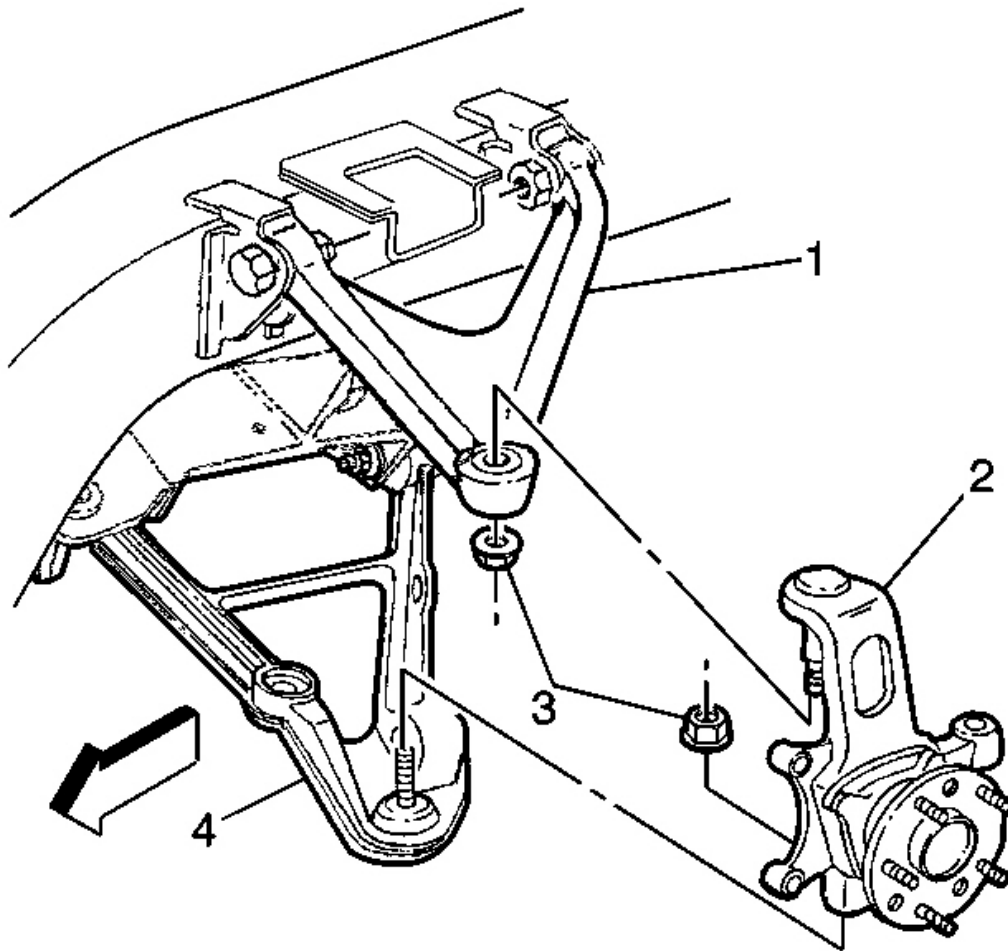


Fig. 25: Upper Control Arm, Lower Control Arm Ball Joint Stud & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

1. Install the suspension knuckle (2) to the lower control arm (4) ball joint stud. Refer to **Rear Axle Lower Control Arm Replacement** .
2. Install the suspension knuckle ball joint stud (2) to the upper control arm (1). Refer to **Rear Axle Upper Control Arm Replacement** .
3. Install the spindle nut, washer and retainer. Refer to **Wheel Drive Shaft Replacement** in Wheel Drive Shafts.

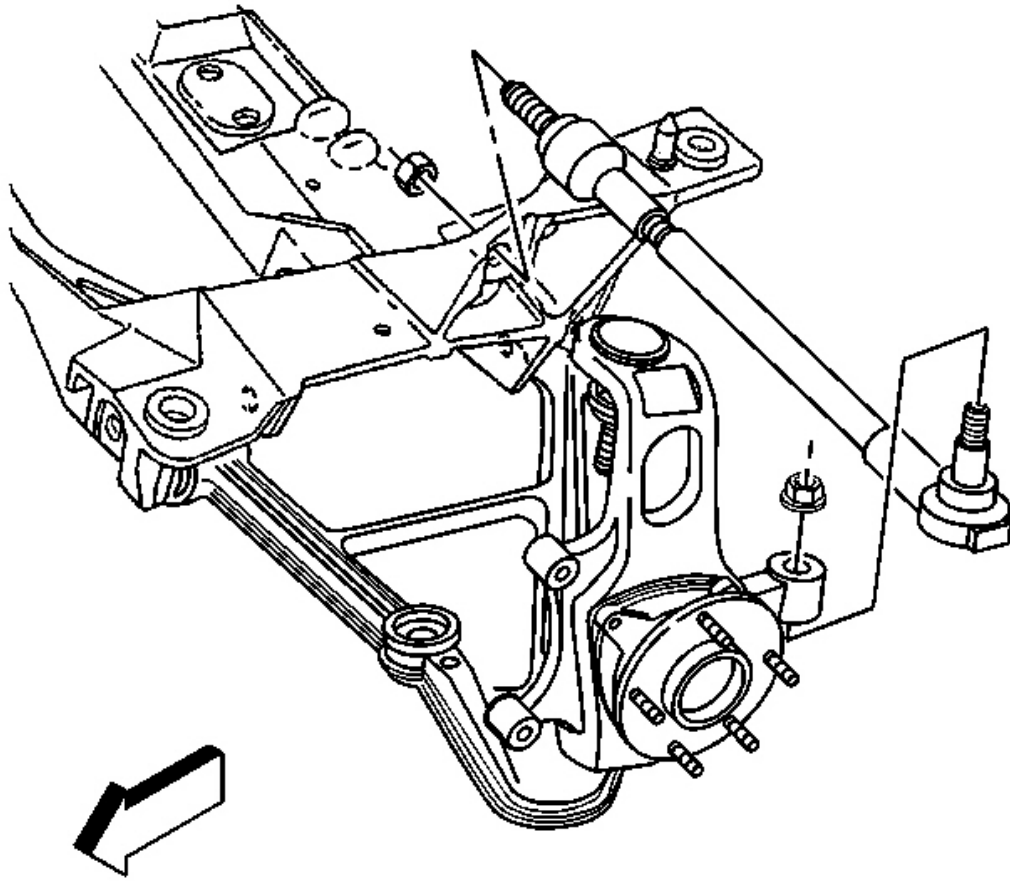


Fig. 26: Outer Tie Rod End, Brake Rotor & Caliper
Courtesy of GENERAL MOTORS CORP.

4. Install the outer tie rod end to the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
5. Install the brake rotor and caliper. Refer to **Brake Caliper Bracket Replacement - Rear** and **Brake Rotor Replacement - Front** in Disc Brakes.

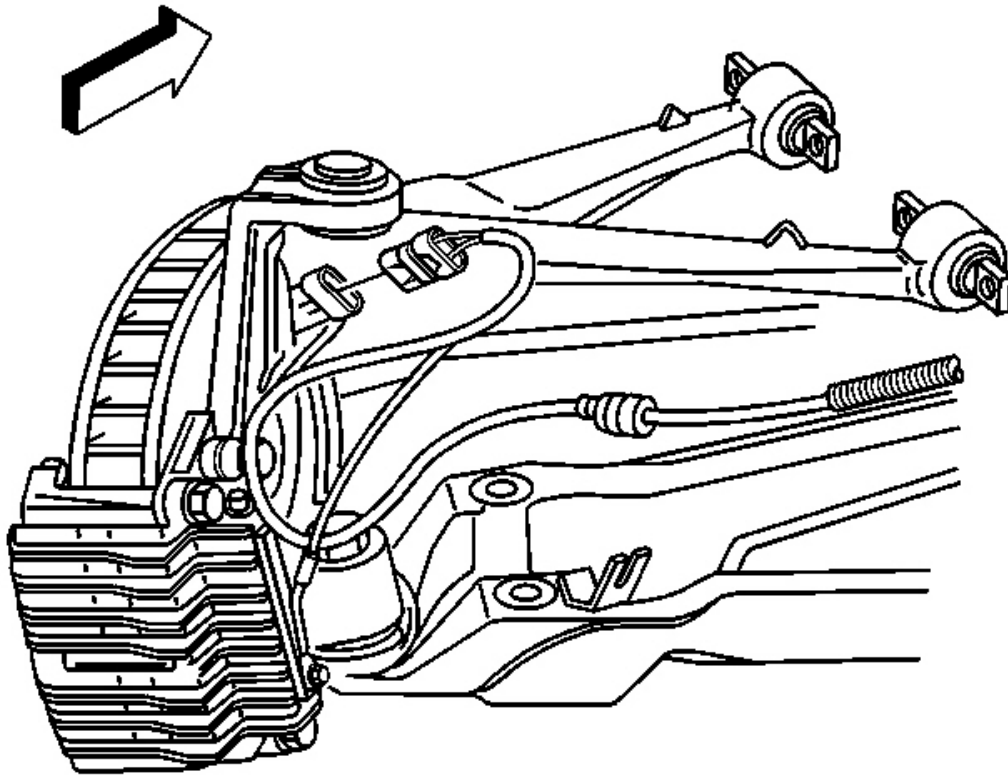


Fig. 27: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

6. Connect the wheel speed sensor electrical connector.

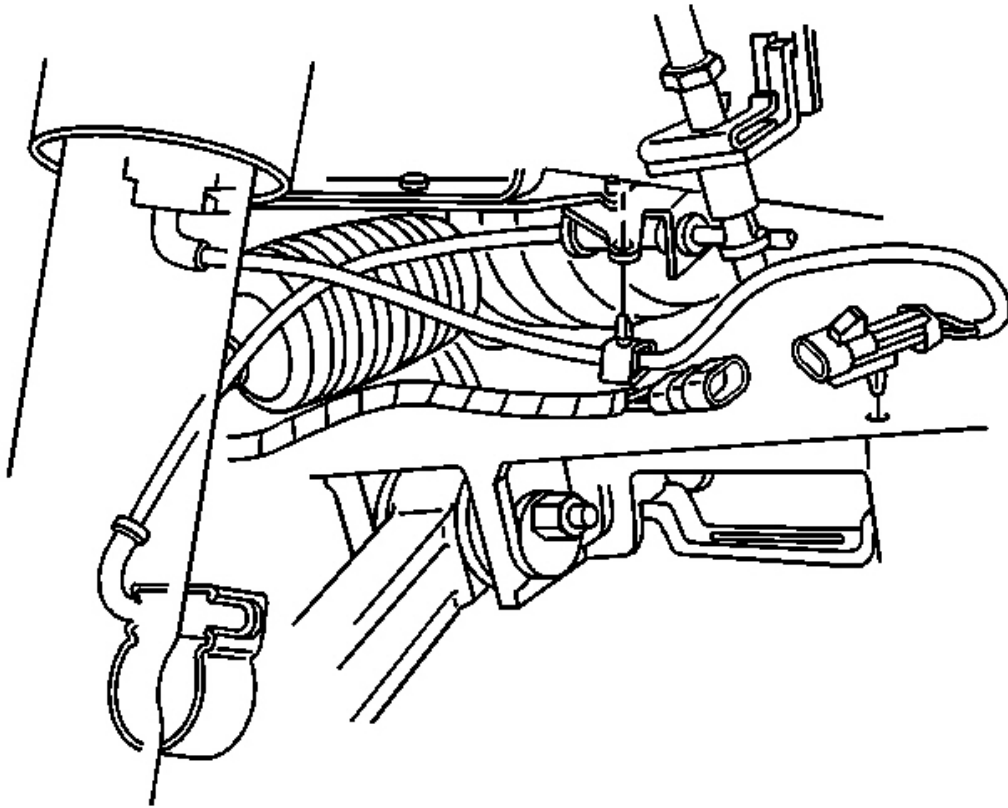


Fig. 28: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

7. Connect the shock absorber solenoid electrical connector, if equipped.

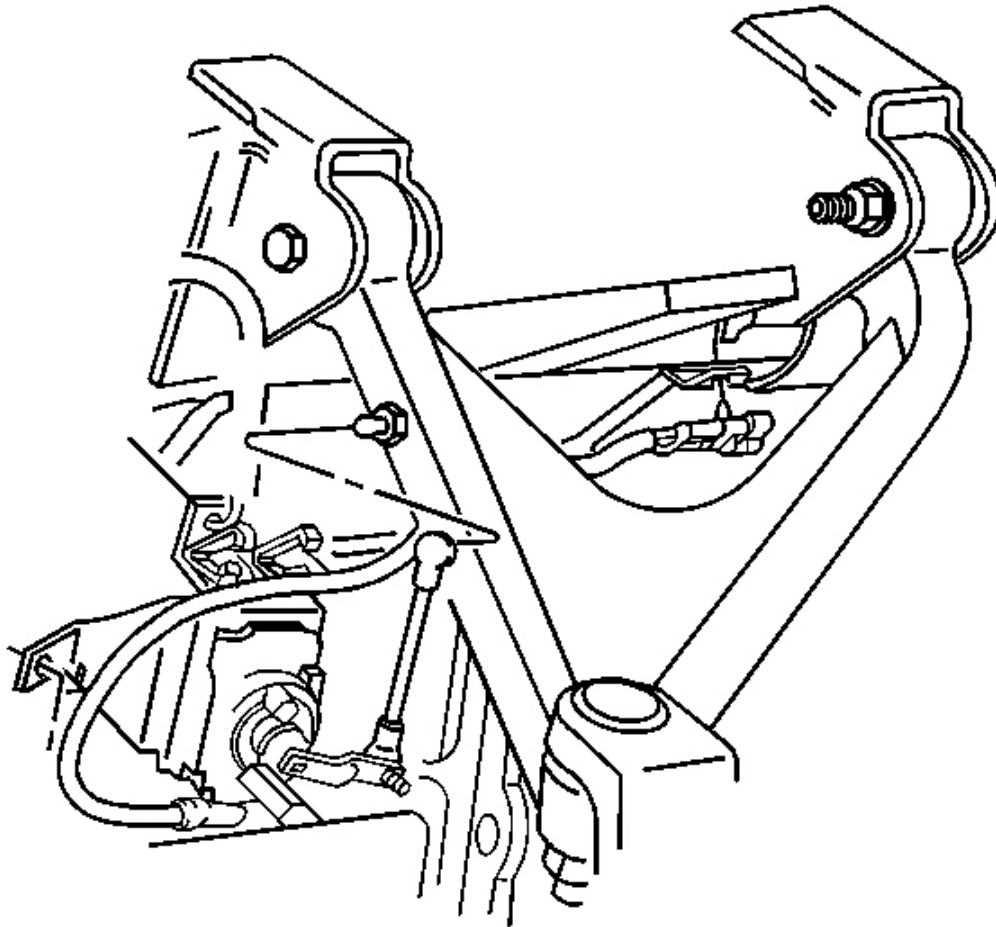


Fig. 29: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

8. Connect the ESC sensor link, if equipped.
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
10. Lower the vehicle.
11. Perform a rear wheel alignment. Refer to **Measuring Wheel Alignment** in Wheel Alignment.

REAR AXLE UPPER CONTROL ARM REPLACEMENT

Tools Required

J 42188 Ball Joint Separator

Removal Procedure

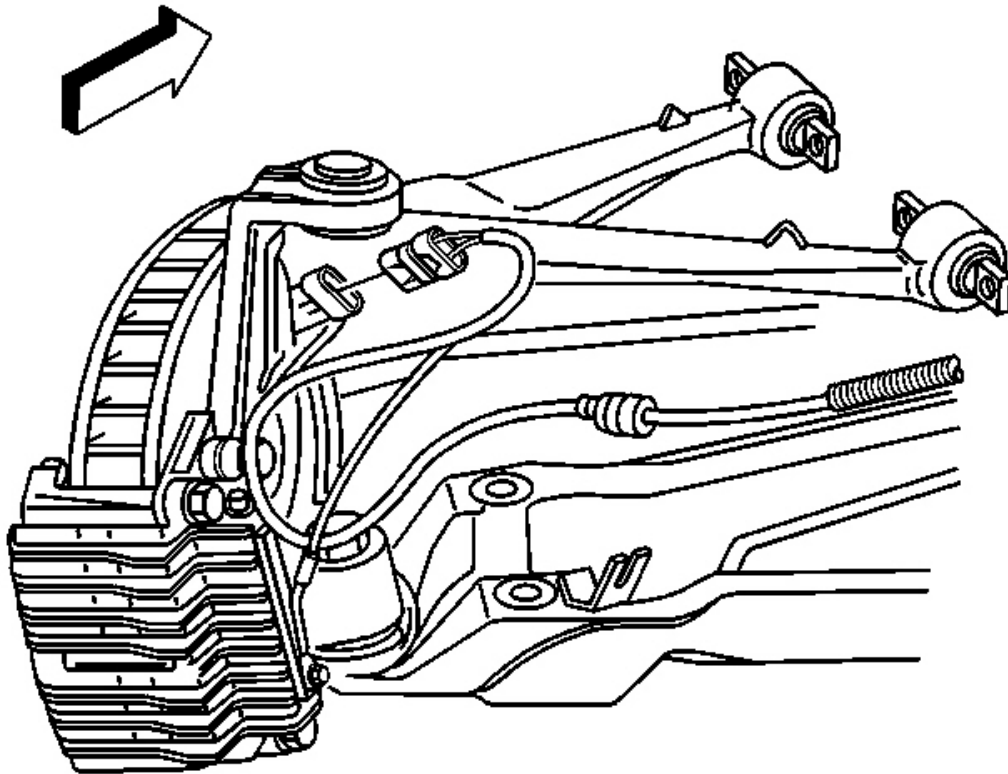


Fig. 30: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the wheel speed sensor electrical connector.

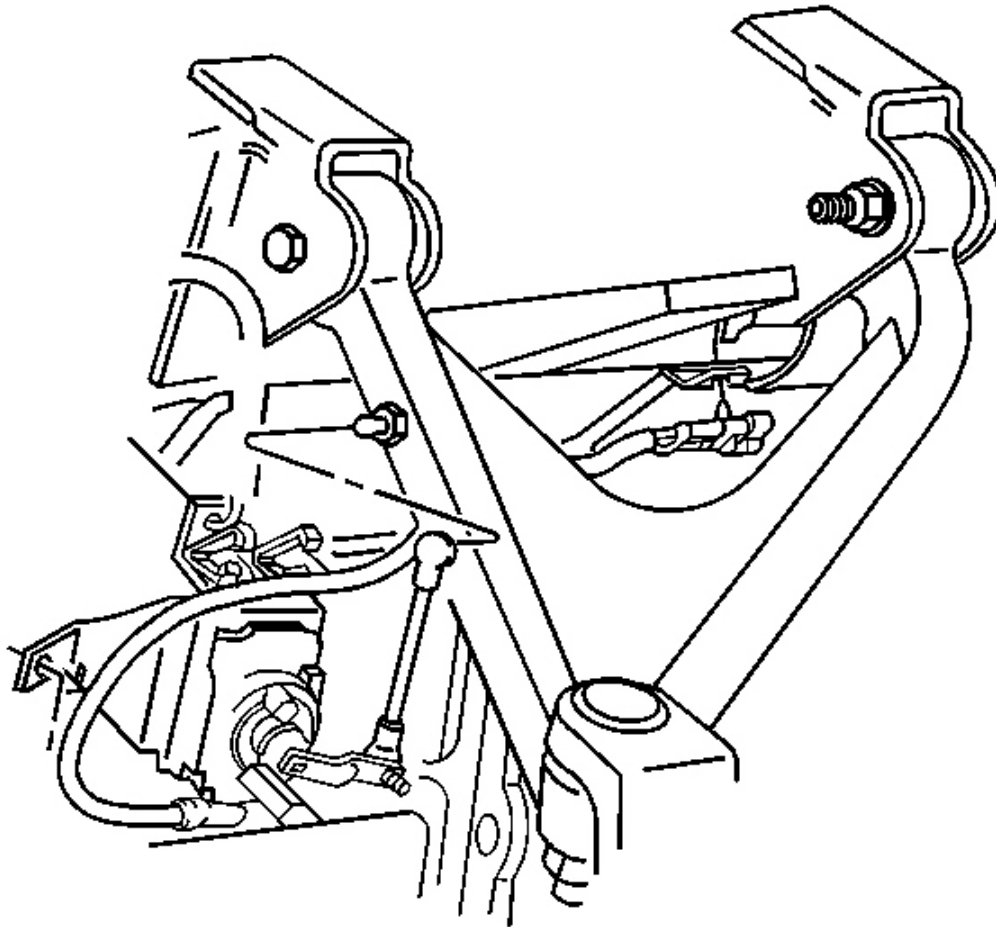


Fig. 31: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the electronic suspension control (ESC) position sensor link, if equipped.

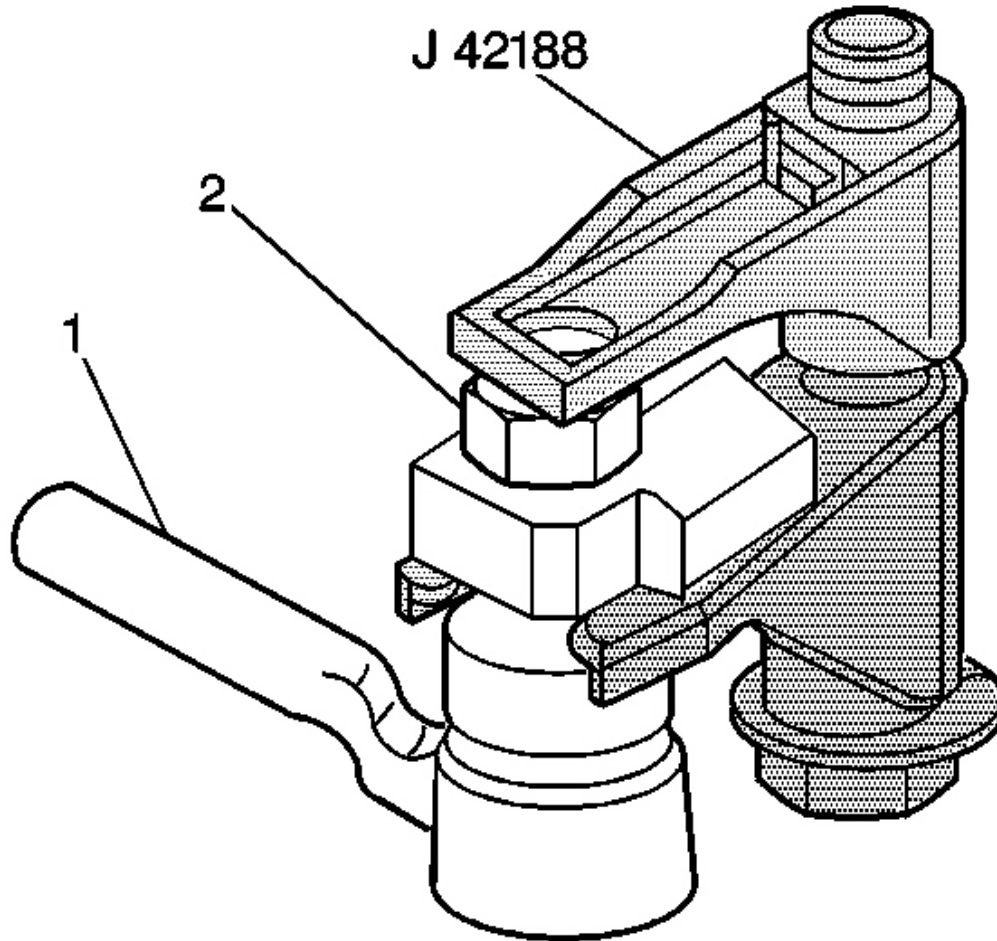


Fig. 32: , Ball Joint Stud Nut & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

5. Separate the suspension knuckle (1) from the upper control arm using **J 42188** .
6. Support the lower control arm with a jack stand.
7. Loosen the upper ball joint stud nut, but do not remove the nut.
8. Remove **J 42188** and the ball joint stud nut (2) from the ball joint stud.

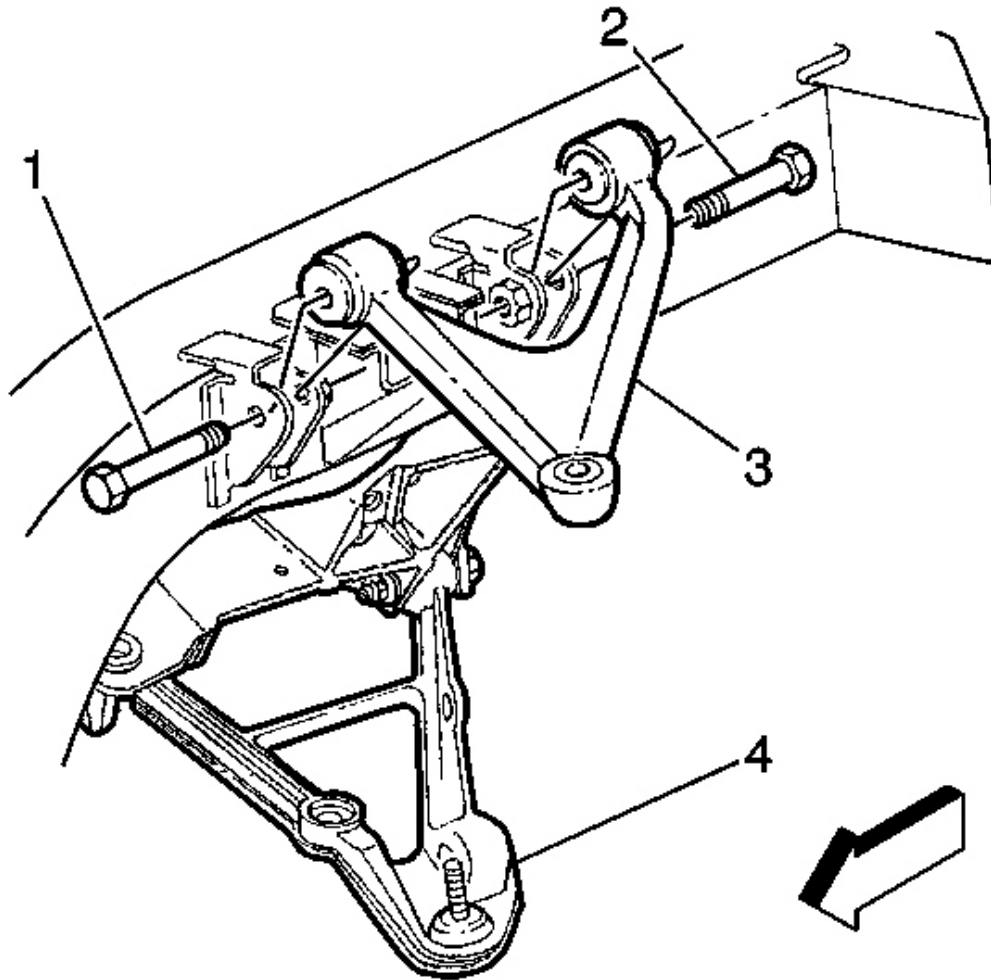


Fig. 33: Upper Control Arm & Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the bolts (1) and (2) retaining the upper control arm (3) to the frame.
10. Remove the upper control arm (3) from the vehicle.

Installation Procedure

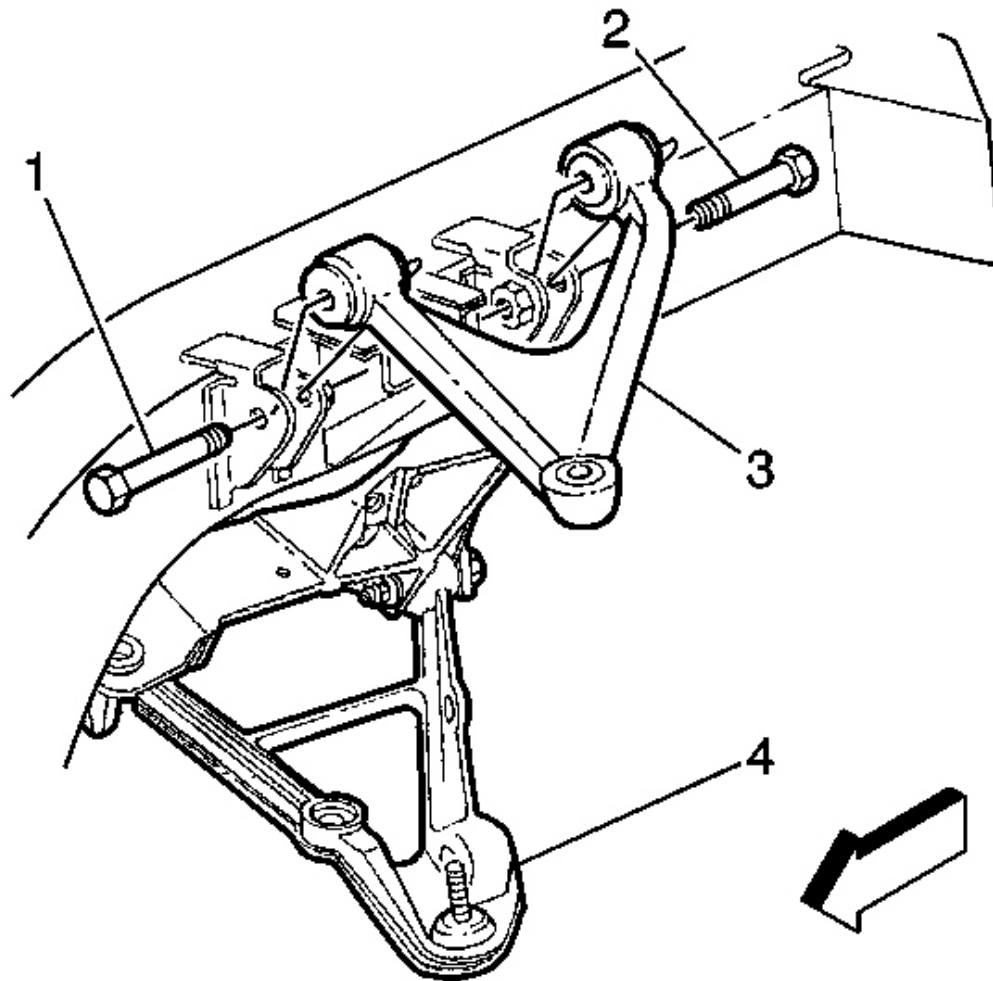


Fig. 34: Upper Control Arm & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the upper control arm (3) to the vehicle.

NOTE: Refer to Fastener Notice .

2. Install the upper control arm mounting bolts (1) and (2) to the frame.

Tighten: Tighten the upper control arm mounting bolts to 110 N.m (81 lb ft).

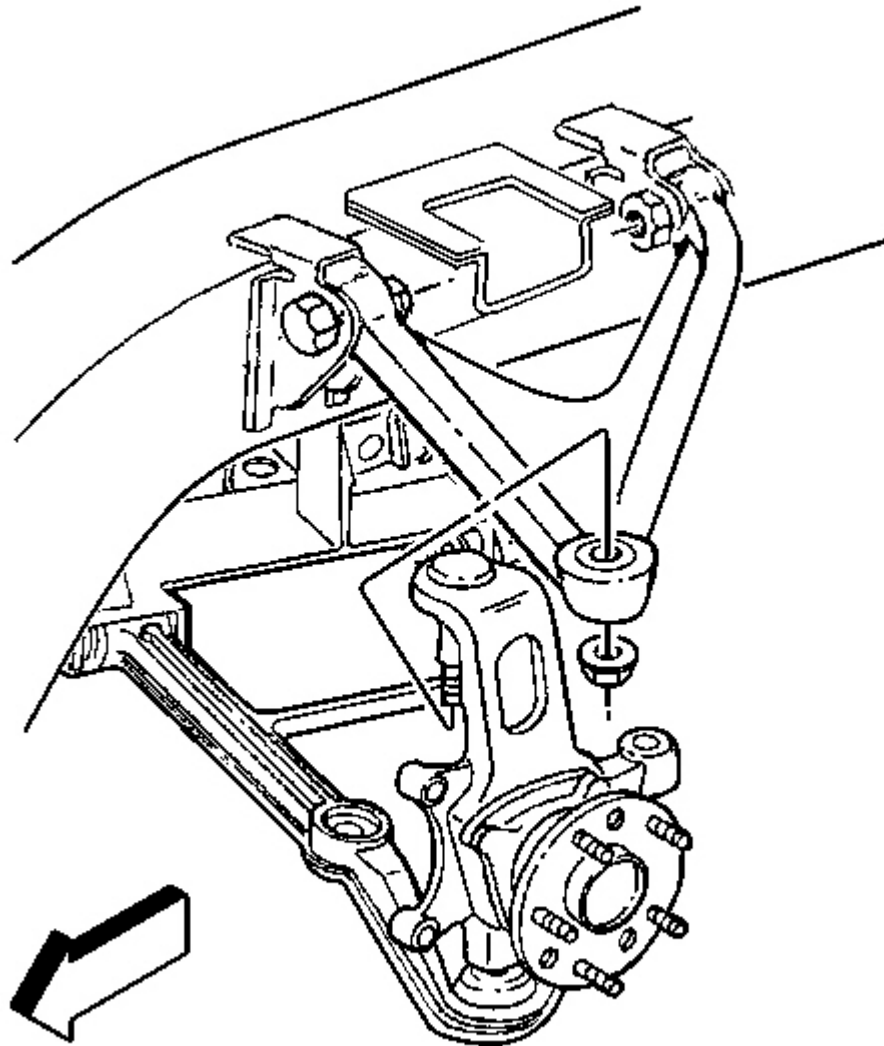


Fig. 35: Suspension Knuckle Upper Ball Joint Stud & Upper Control Arm
Courtesy of GENERAL MOTORS CORP.

3. Install the suspension knuckle upper ball joint stud into the upper control arm.

It may be necessary to use an Allen wrench to keep the ball joint stud from spinning while tightening the ball joint stud nut.

4. Install the upper ball joint stud nut.

Tighten: Tighten the suspension knuckle ball joint stud nut to 20 N.m (15 lb ft) plus 250 degrees.

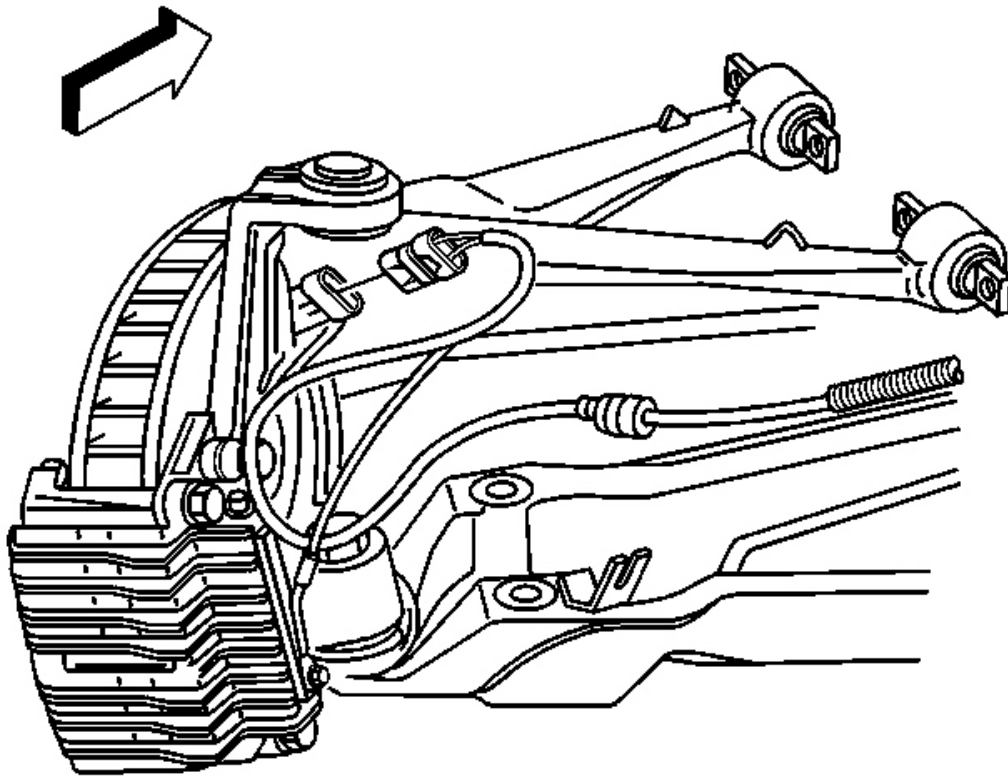


Fig. 36: View Of LF ABS Connector
Courtesy of GENERAL MOTORS CORP.

5. Connect the wheel speed sensor electrical connector.

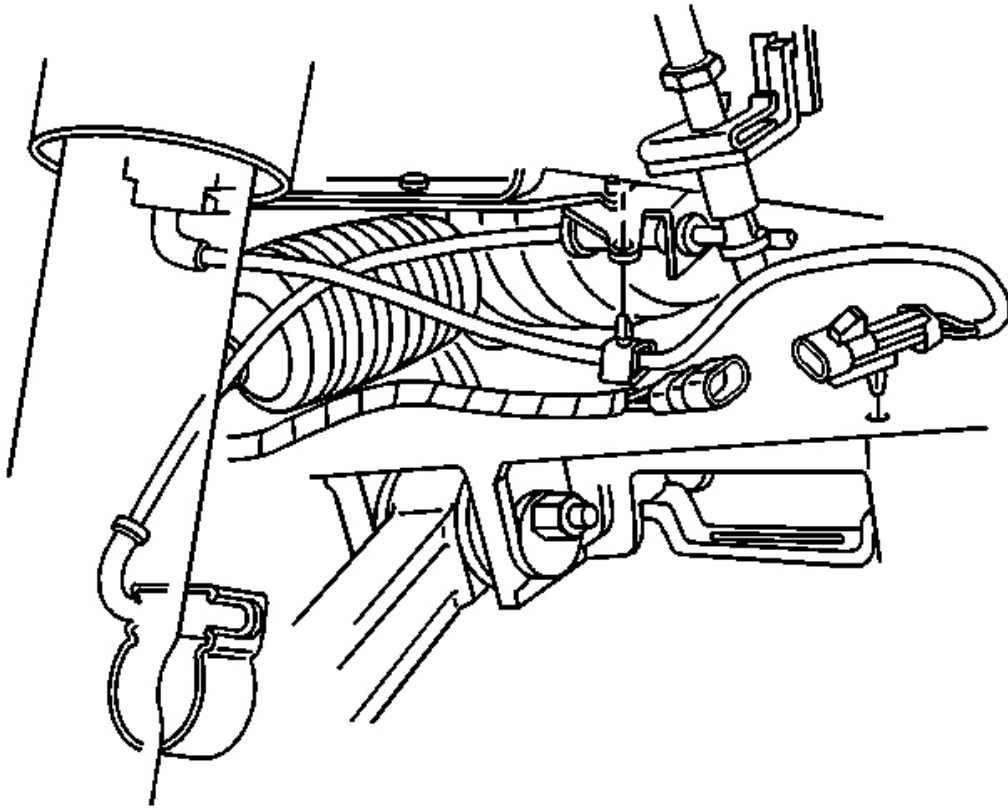


Fig. 37: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

6. Install the shock absorber solenoid electrical connector, if equipped.

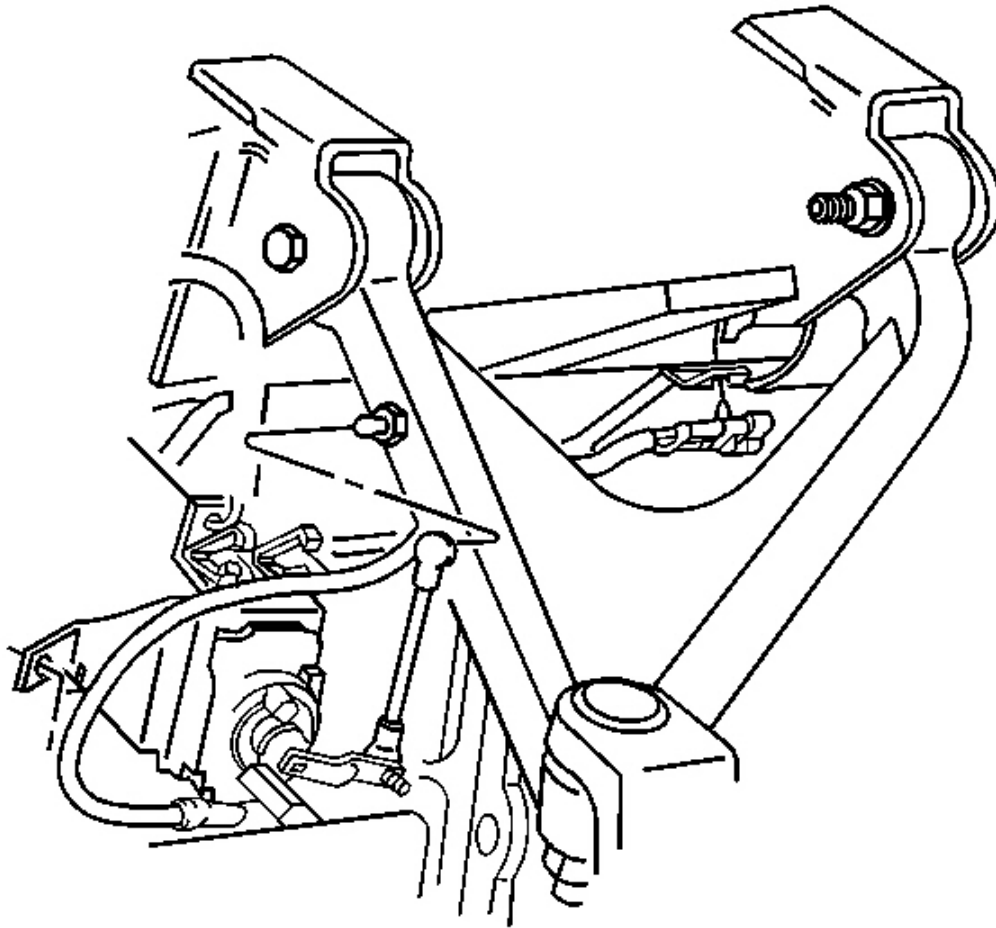


Fig. 38: ESC Position Sensor Links
Courtesy of GENERAL MOTORS CORP.

7. Connect the ESC position sensor link, if equipped.
8. Remove the jack stand from the lower control arm.
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
10. Lower the vehicle.
11. Perform a rear wheel alignment. Refer to **Measuring Wheel Alignment** in Wheel Alignment.

REAR AXLE LOWER CONTROL ARM REPLACEMENT

Tools Required

- **J 33432-A** Transverse Spring Compressor
- **J 42188** Ball Joint Separator

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

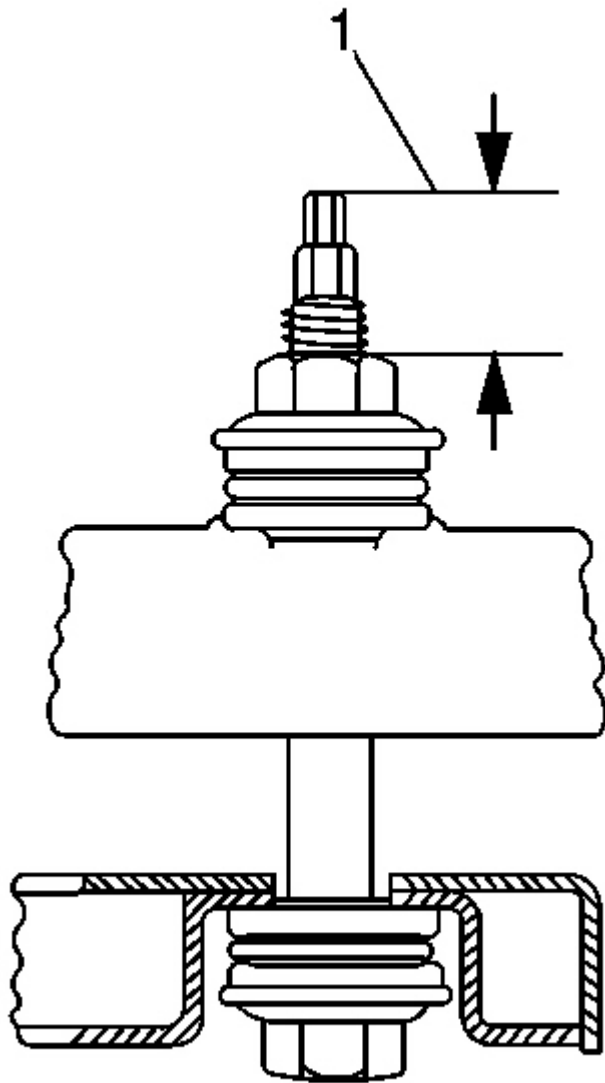
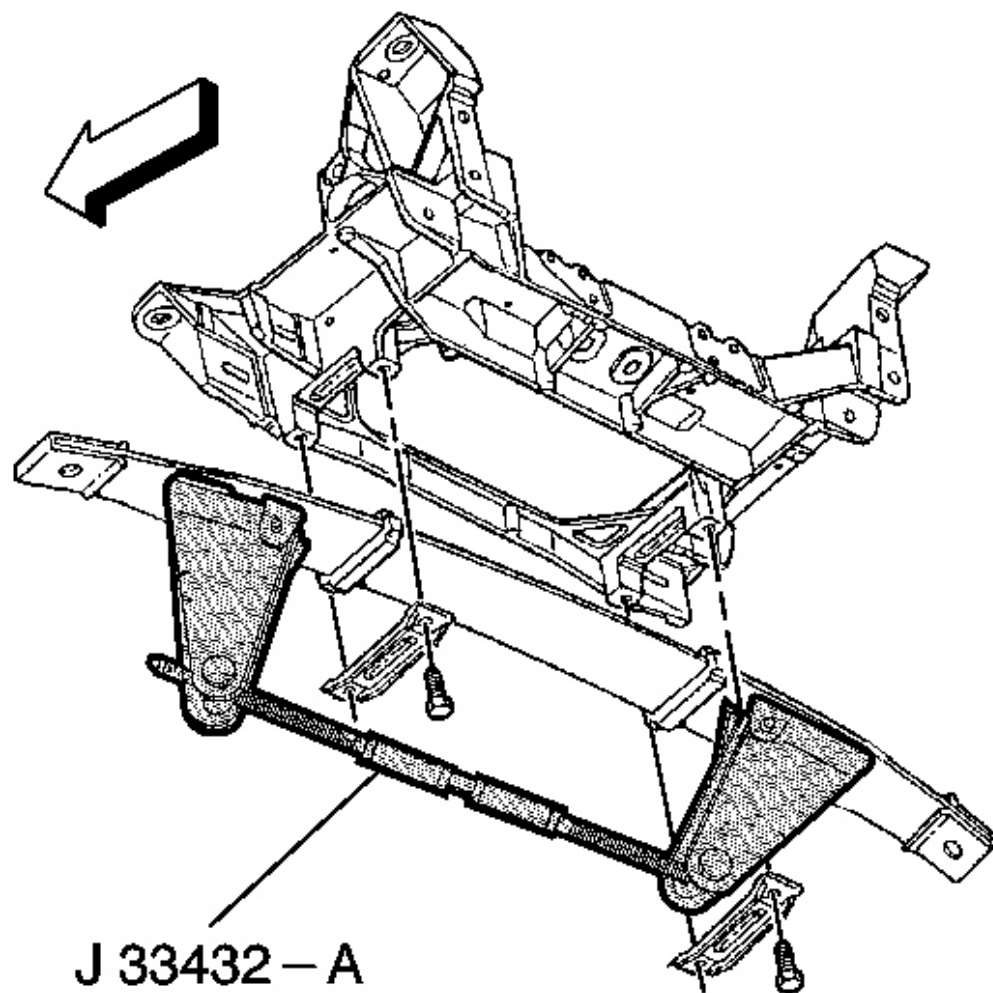


Fig. 39: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

3. Measure the spring stud height (1) before removing the transverse spring mounting bolt.



J 33432 - A

Fig. 40: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

4. Install **J 33432-A** to the spring.
5. Compress the spring.

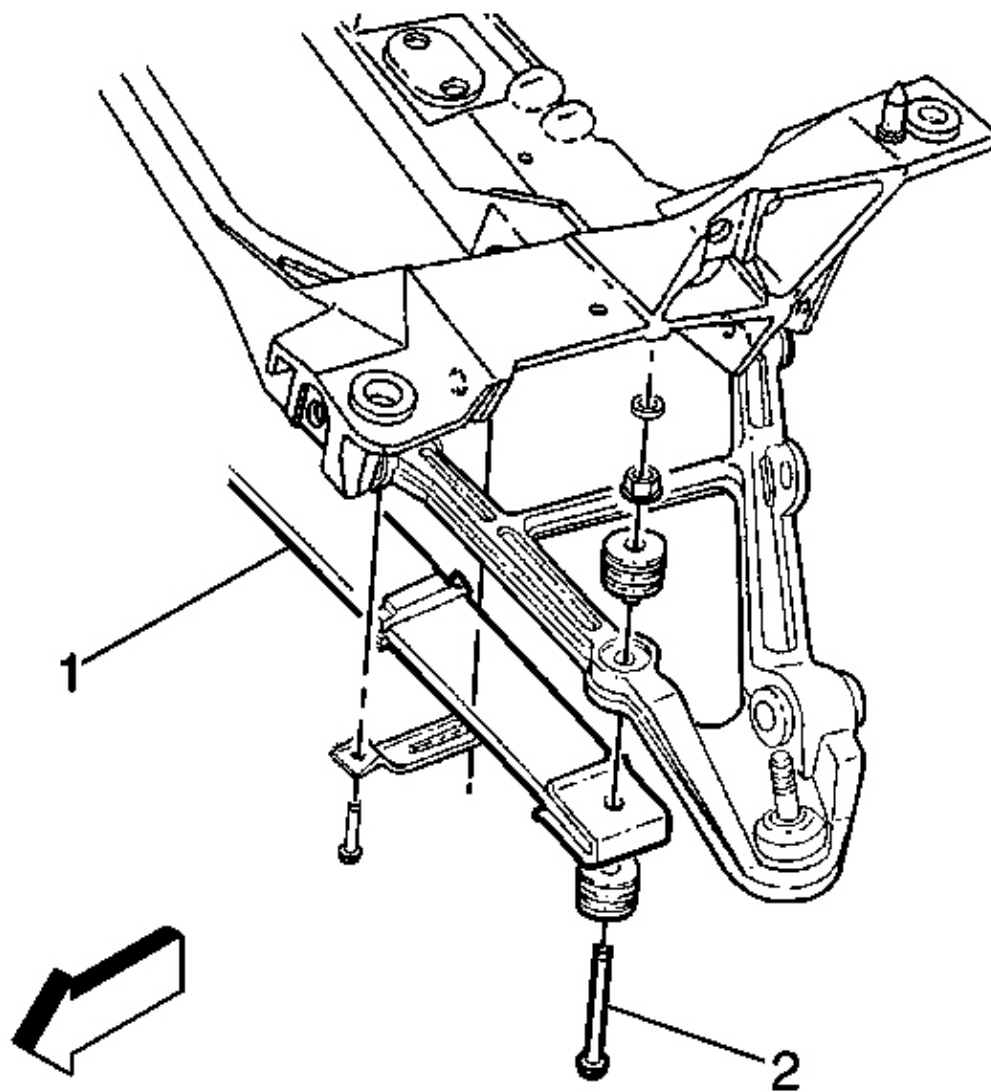


Fig. 41: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

6. Remove the nuts, bolts (2), and insulators retaining the transverse spring to the lower control arm.
7. Remove the transverse spring from the control arm.

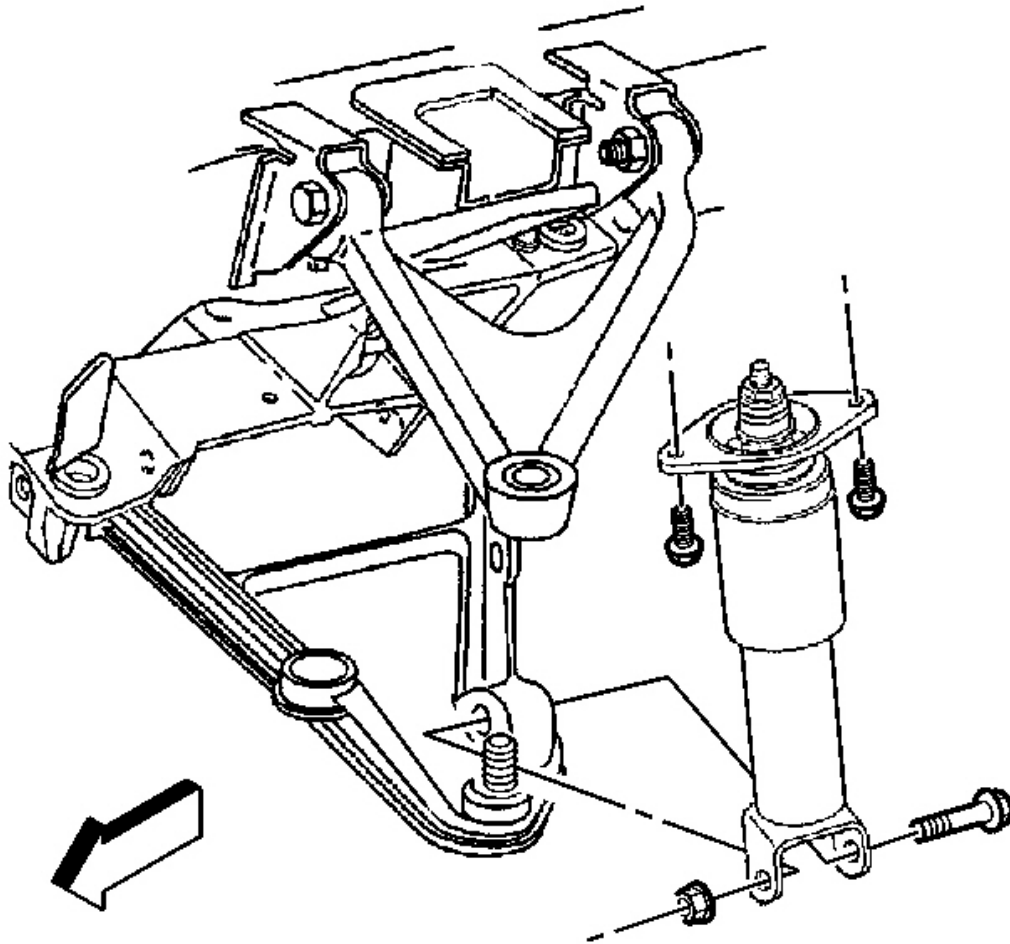


Fig. 42: Shock Absorber & Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

8. Support the lower control arm with a jack stand.
9. Disconnect the shock absorber from the lower control arm.

IMPORTANT: The ball joint must be prevented from rotating. Use a TORX(R) inserted into the top of the ball stud while removing the ball stud nut.

10. Loosen, but do not remove the upper ball joint stud nut.
11. Use the **J 42188** in order to separate the upper ball joint stud from the suspension knuckle.
12. Remove the **J 42188** and the upper ball joint stud nut from the suspension knuckle.

13. Remove the nut from the wheel drive shaft on the suspension knuckle.

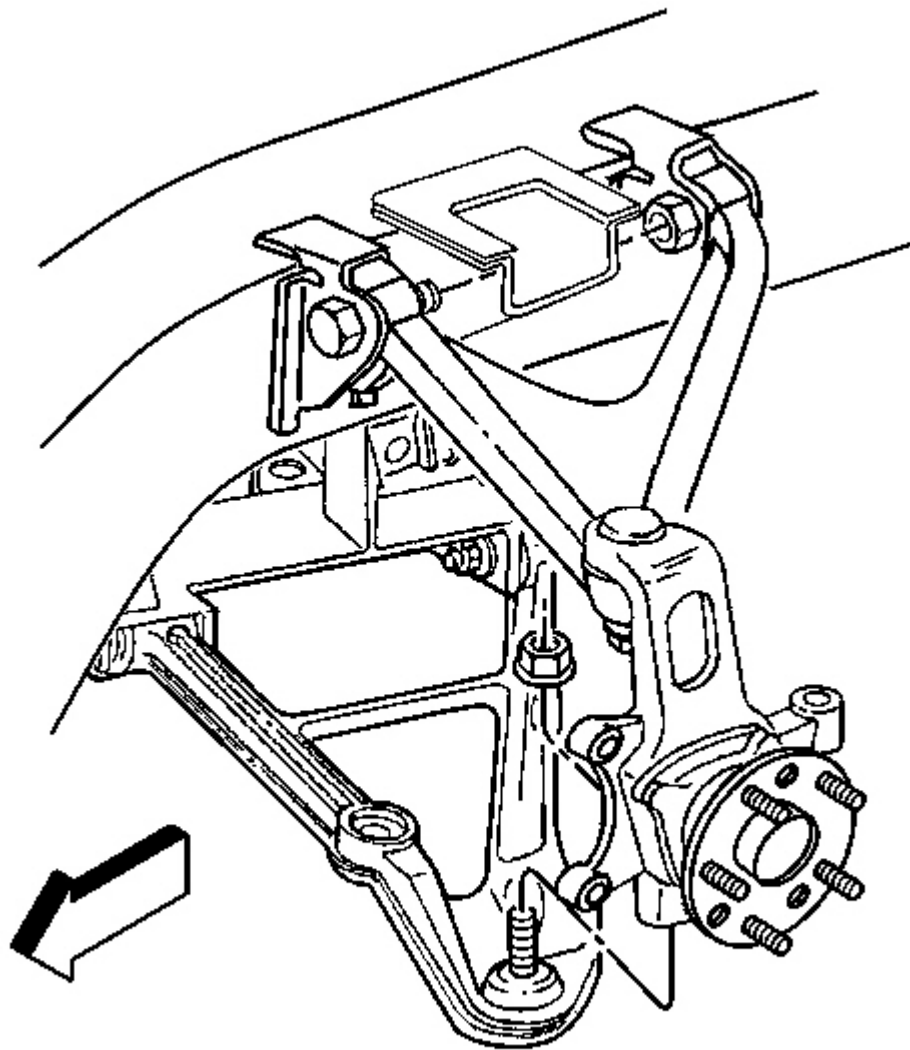


Fig. 43: Lower Ball Joint Stud Nut, Suspension Knuckle & Inner CV Joints
Courtesy of GENERAL MOTORS CORP.

14. Loosen, but do not remove the lower ball joint stud nut.
15. Separate the lower ball joint stud from the suspension knuckle using **J 42188** .
16. Remove **J 42188** and the lower ball joint stud nut from the suspension knuckle.

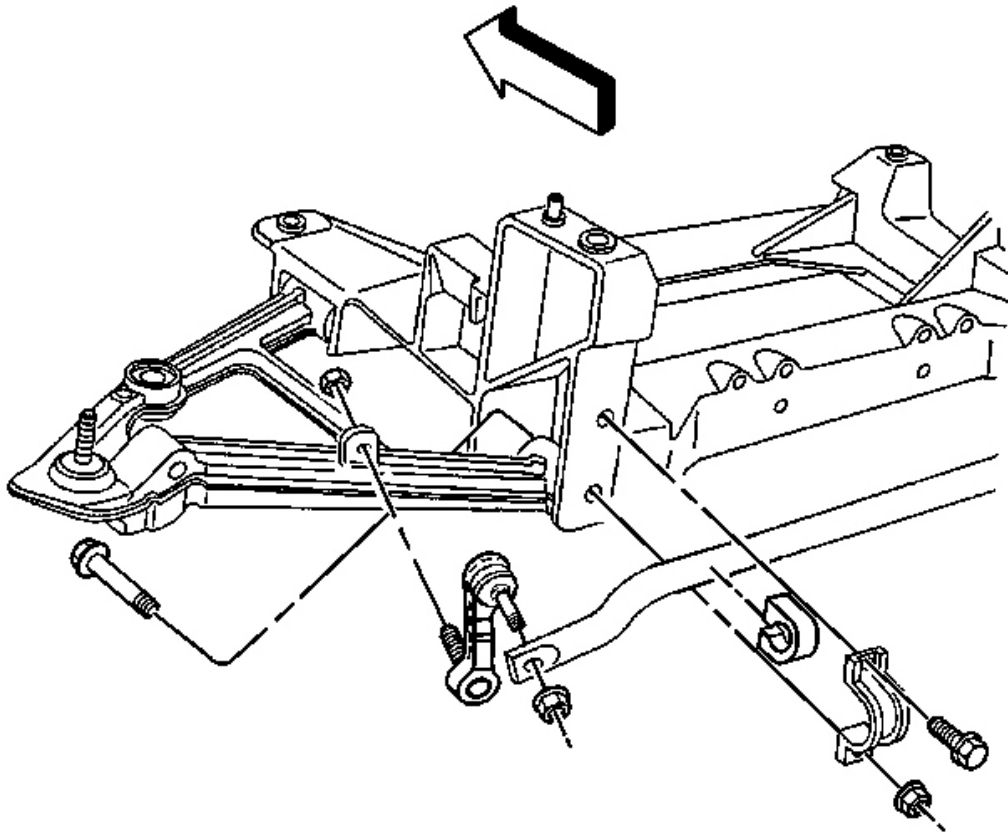


Fig. 44: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

17. Remove the stabilizer shaft link from the lower control arm.

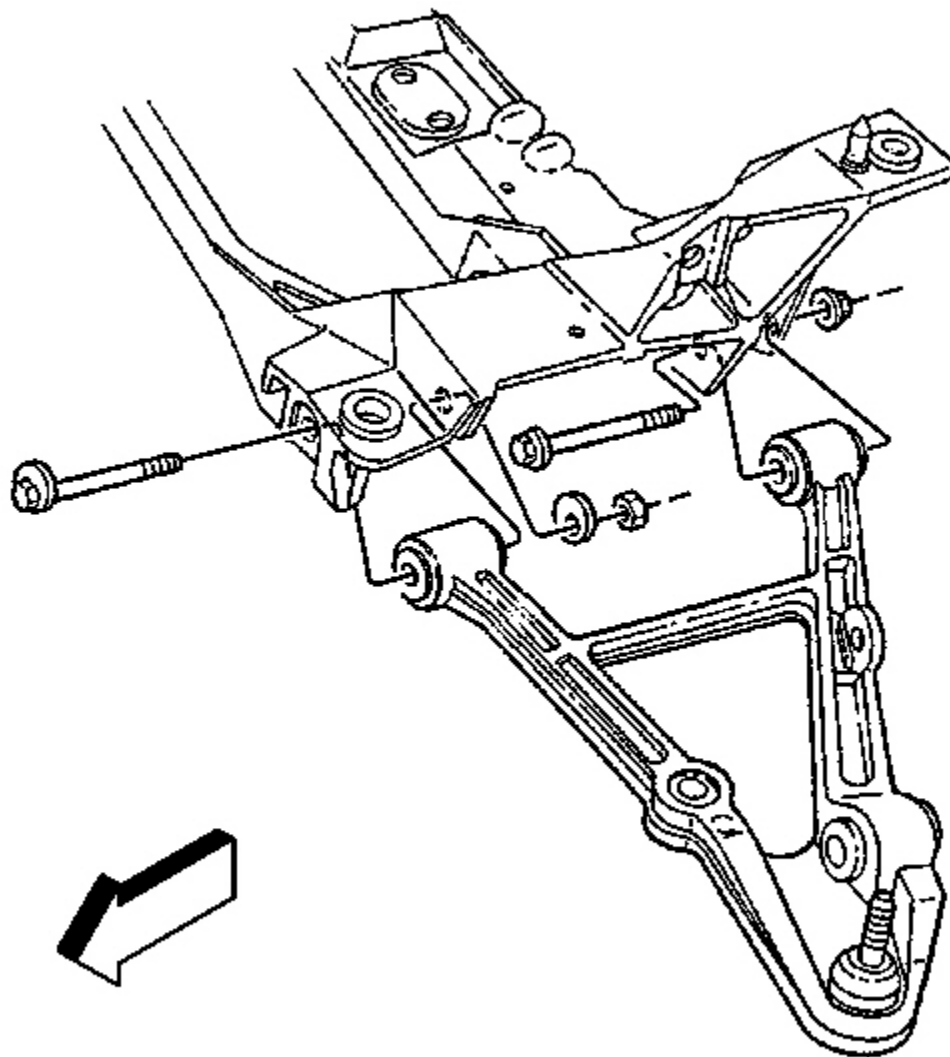


Fig. 45: Lower Control Arm, Cam Bolts, Washers, & Nuts
Courtesy of GENERAL MOTORS CORP.

18. Mark the position of, and then remove the cam bolts, washers, and nuts retaining the control arm to the crossmember.
19. Remove the jack stand.
20. Remove the lower control arm from the vehicle.

Installation Procedure

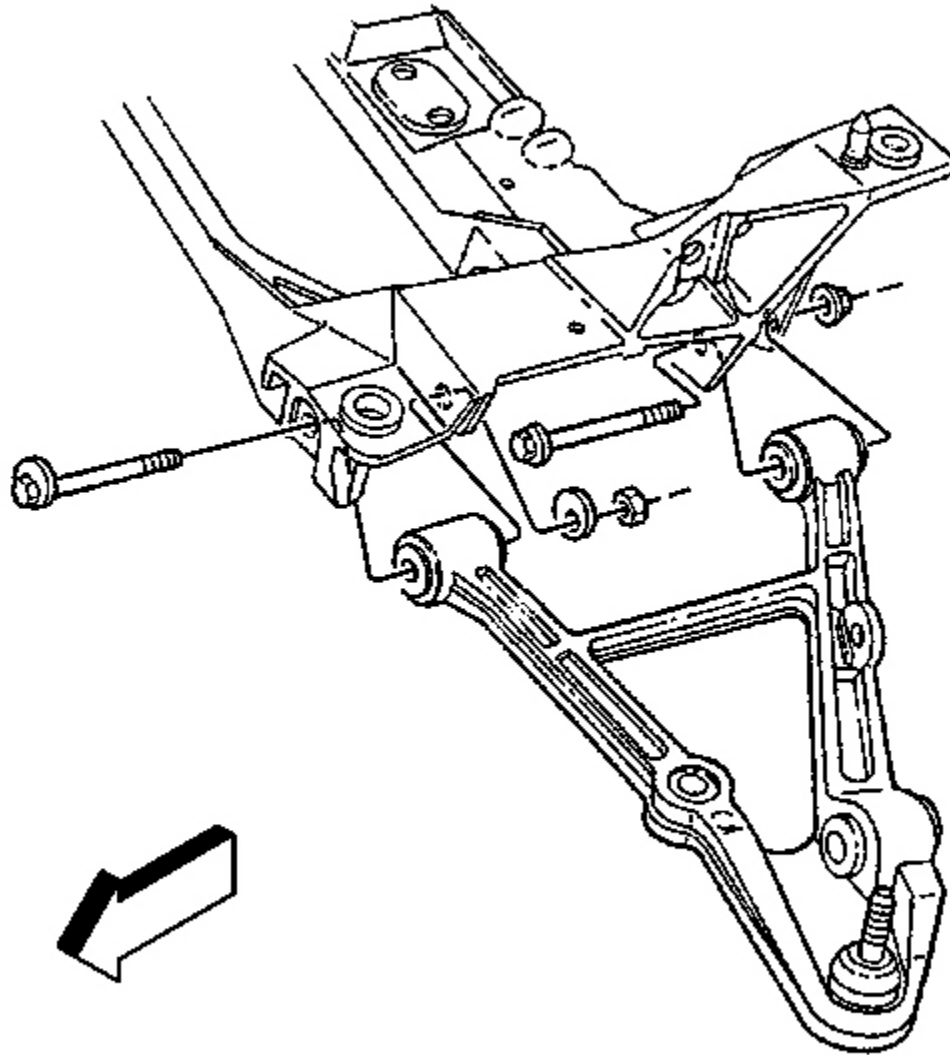


Fig. 46: Lower Control Arm, Cam Bolts, Washers, & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the lower control arm to the vehicle.
2. Support the lower control arm with a jack stand.
3. Install the cam bolts, washers, and nuts retaining the lower control arm to crossmember.
 1. Place the cam bolts at the position marked during removal.
 2. Due to a required wheel alignment, tighten the cam bolts but do not set them to the final torque

specification at this time.

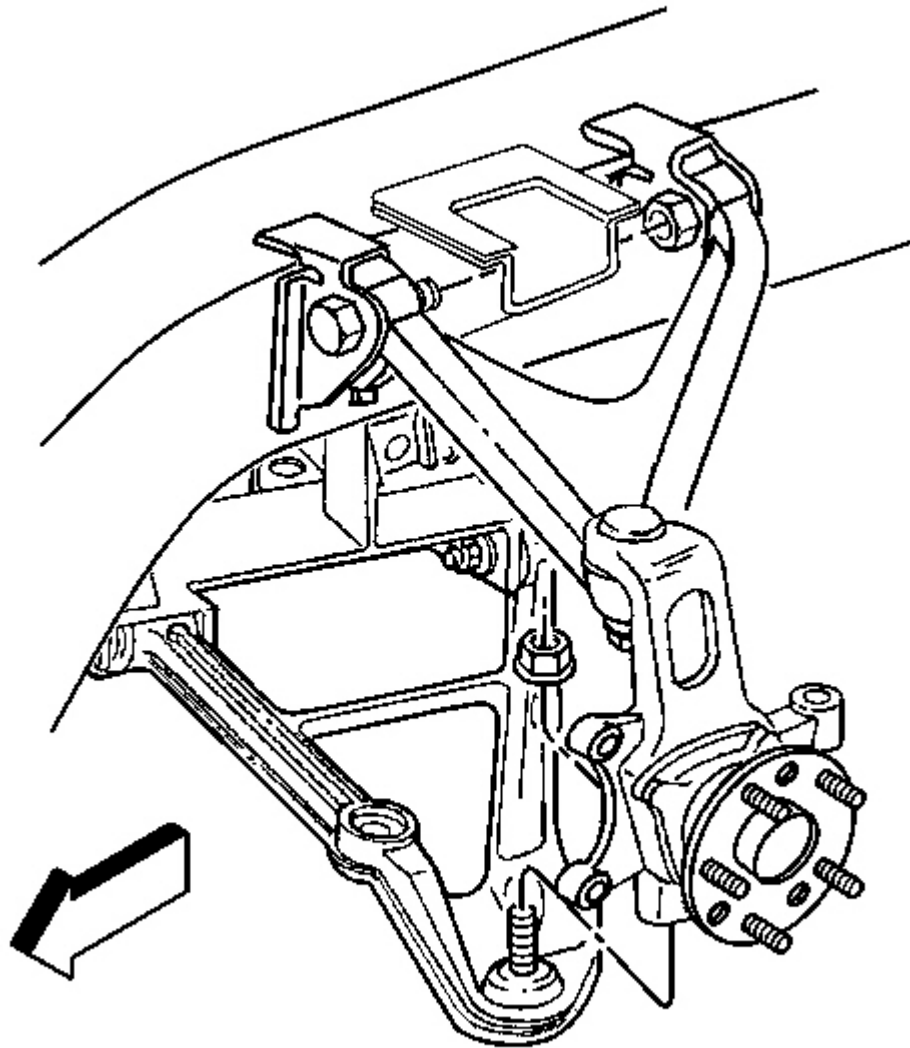


Fig. 47: Lower Ball Joint Stud Nut, Suspension Knuckle & Inner CV Joints
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Install the lower control arm ball joint stud into the suspension knuckle.

It may be necessary to use an Allen wrench to keep the ball joint stud from spinning while tightening the ball joint stud nut.

Tighten: Tighten the lower control arm ball joint stud nut to 30 N.m (20 lb ft) plus 180 degrees.

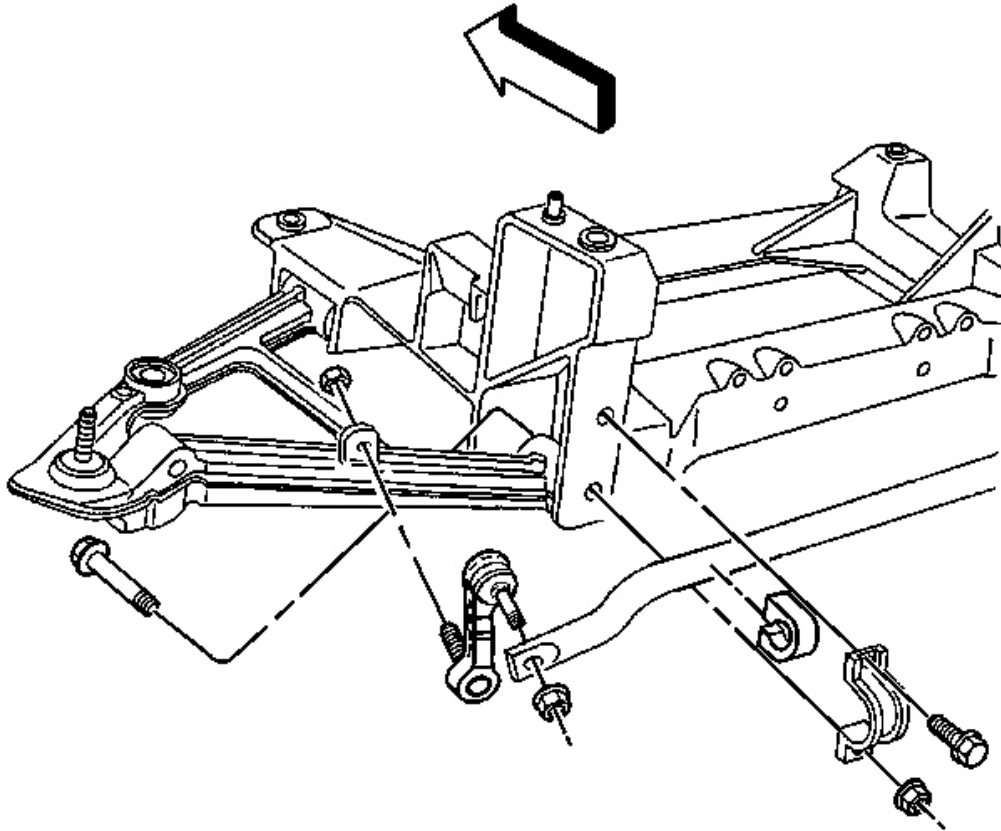


Fig. 48: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install the stabilizer shaft link to control arm.

Tighten: Tighten the stabilizer shaft link nuts to 72 N.m (53 lb ft).

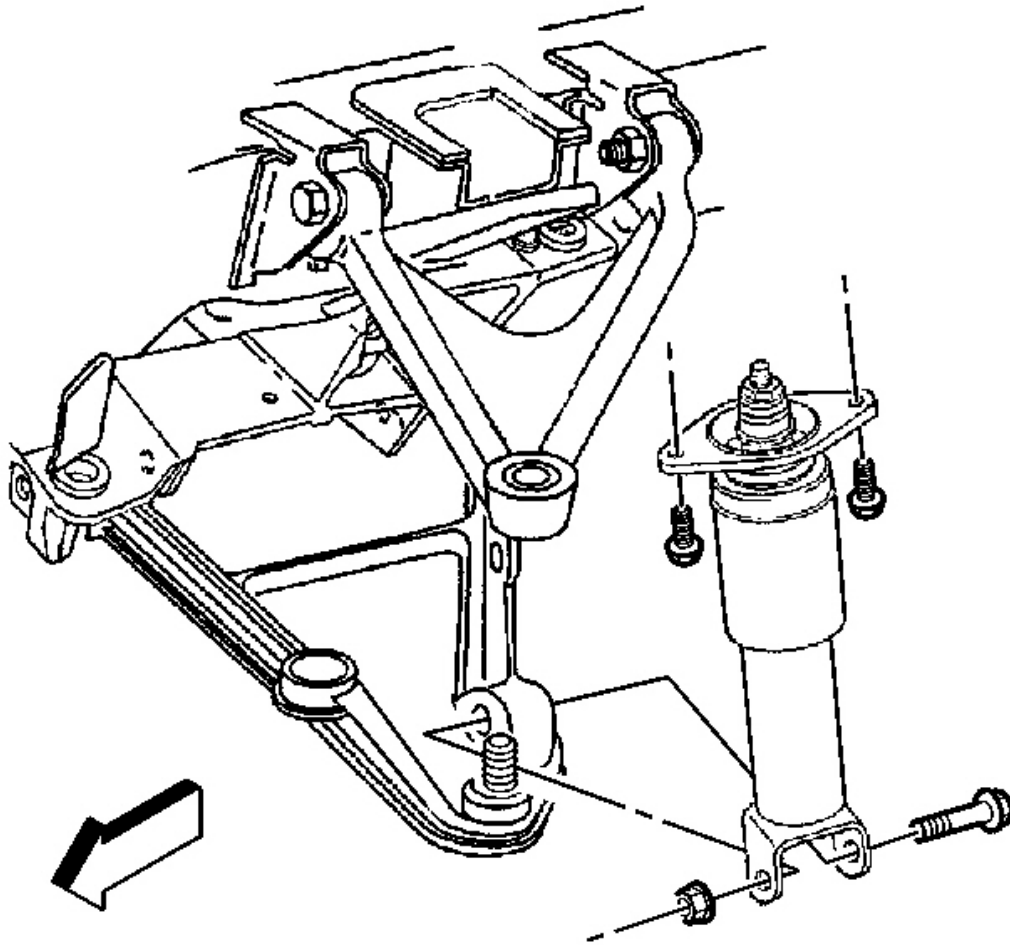


Fig. 49: Shock Absorber & Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

6. Install the shock absorber to the lower control arm.

Tighten: Tighten the shock absorber lower mounting bolt to 220 N.m (162 lb ft).

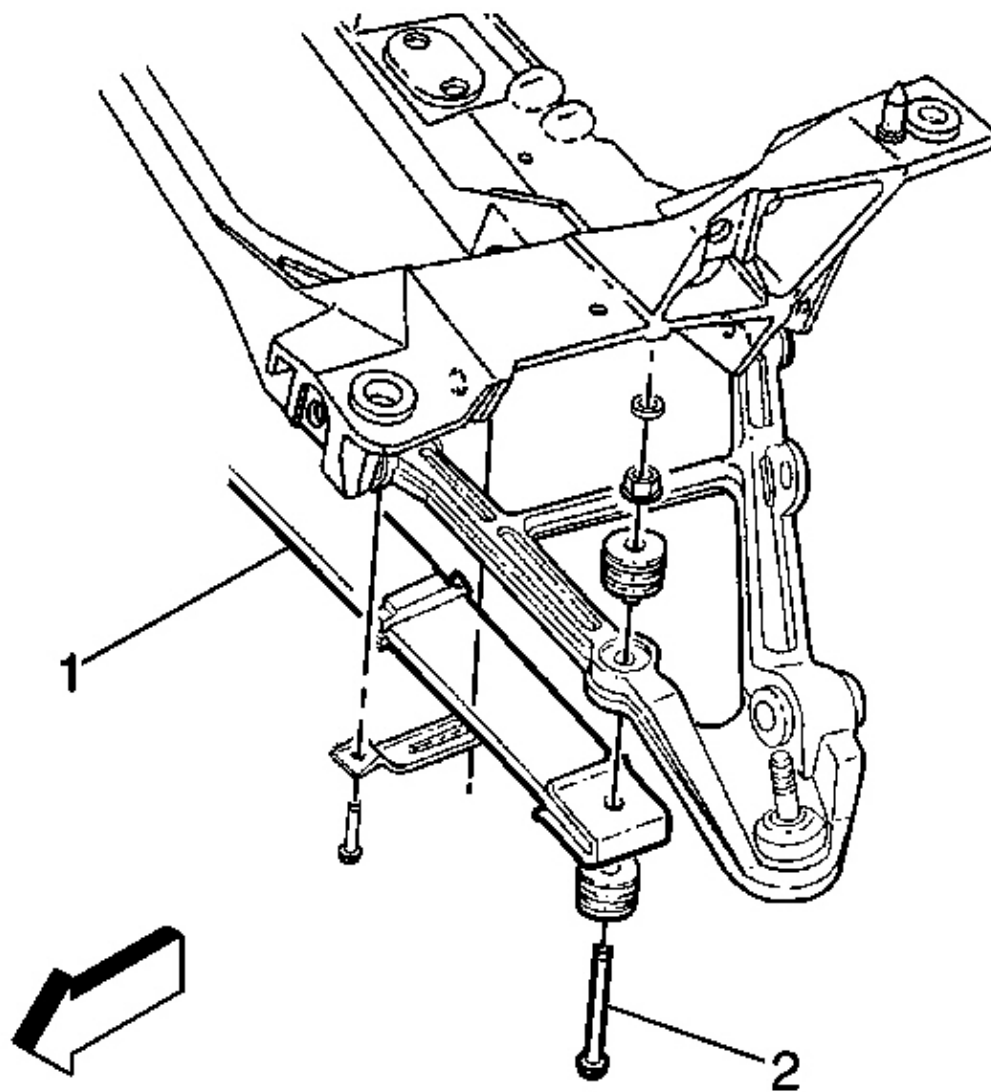


Fig. 50: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

7. Install the transverse spring (1) to the lower control arm.
8. Install the transverse spring insulators and mounting bolts (2).

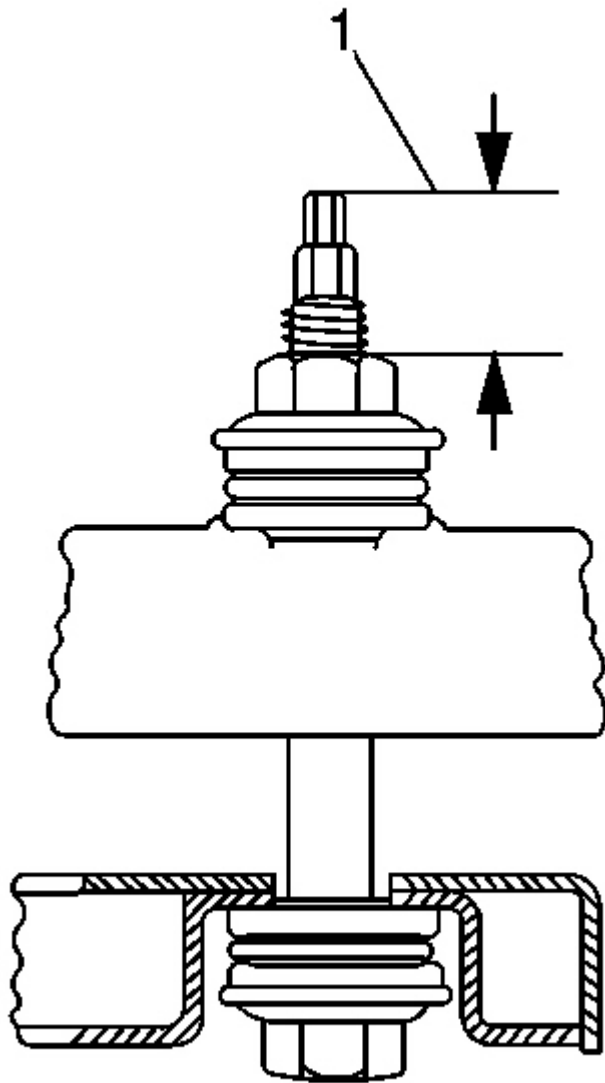


Fig. 51: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

9. Remove the jack stand.
10. Set the transverse spring stud height (1) to the height measured during removal.
11. Release and remove **J 33432-A** from the transverse spring.
12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

13. Perform a rear wheel alignment. Refer to **Measuring Wheel Alignment** in Wheel Alignment.

Tighten:

- Tighten the lower control arm (front) cam bolt to 145 N.m (107 lb ft).
- Tighten the lower control arm (rear) cam bolt to 95 N.m (70 lb ft).

REAR TRANSVERSE SPRING REPLACEMENT

Tools Required

J 33432-A Transverse Spring Compressor

Removal Procedure

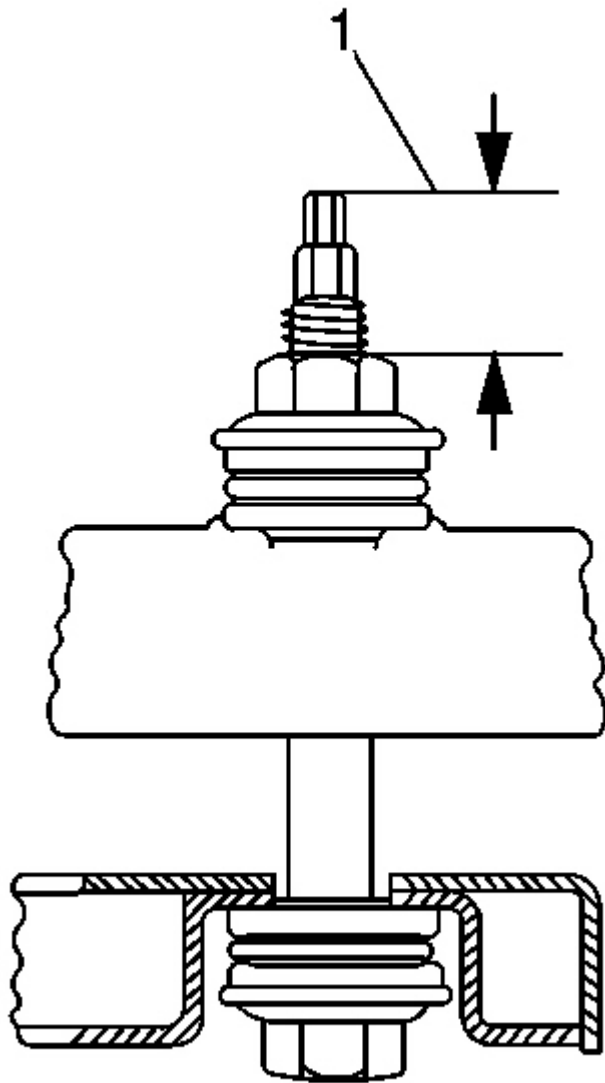


Fig. 52: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Measure the transverse spring stud height (1).

This measurement will be used in the installation to set-up the vehicle trim height.

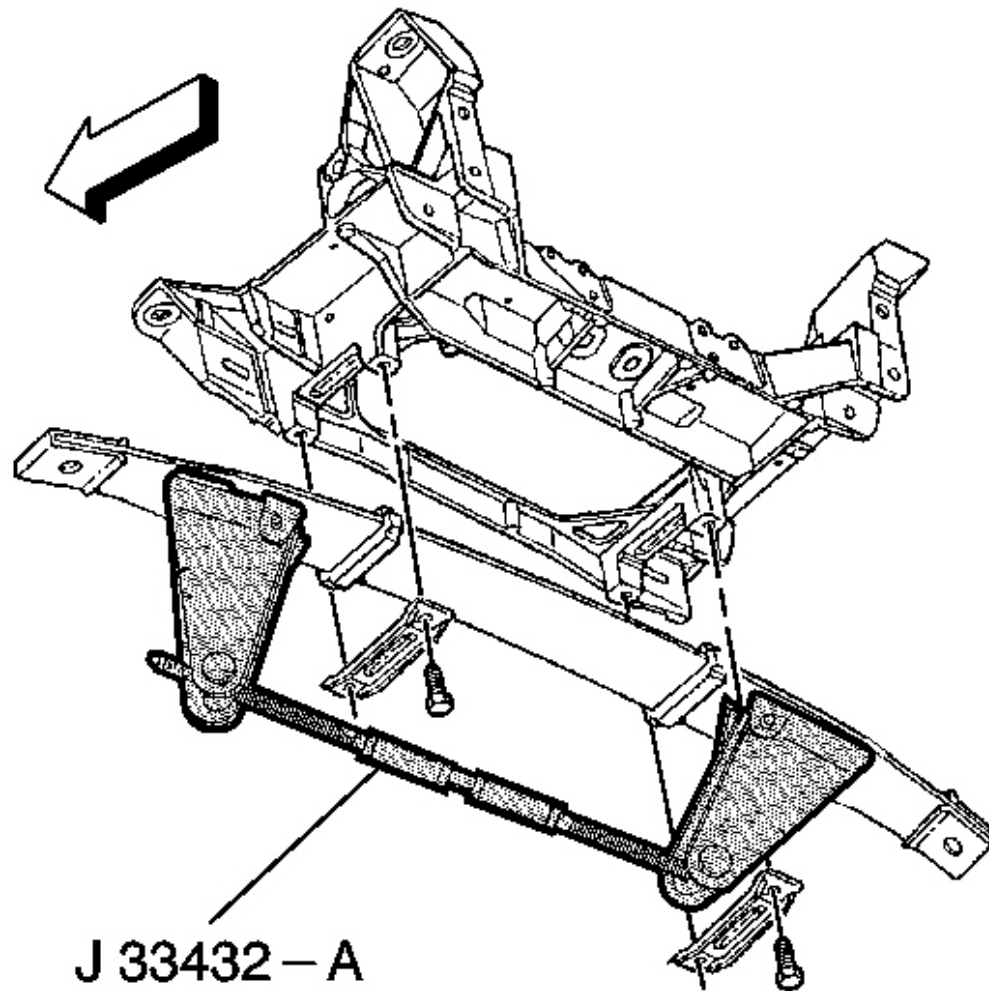


Fig. 53: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: During this procedure, use care not to scratch the rear transverse spring.

4. Install J 33432-A to the rear transverse spring, and compress the spring.

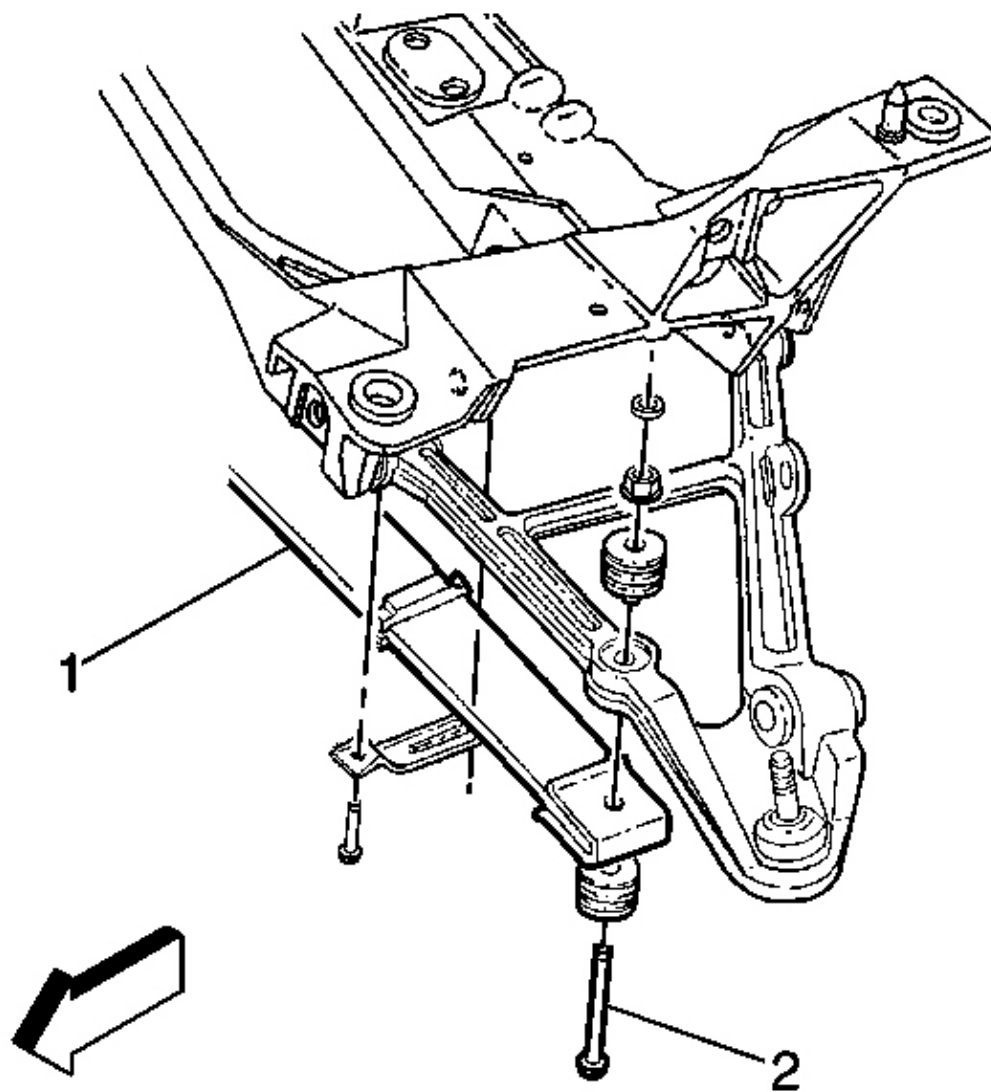


Fig. 54: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the retainers, nuts, bolts (2) and insulators retaining the transverse spring (1) to the lower control arms.

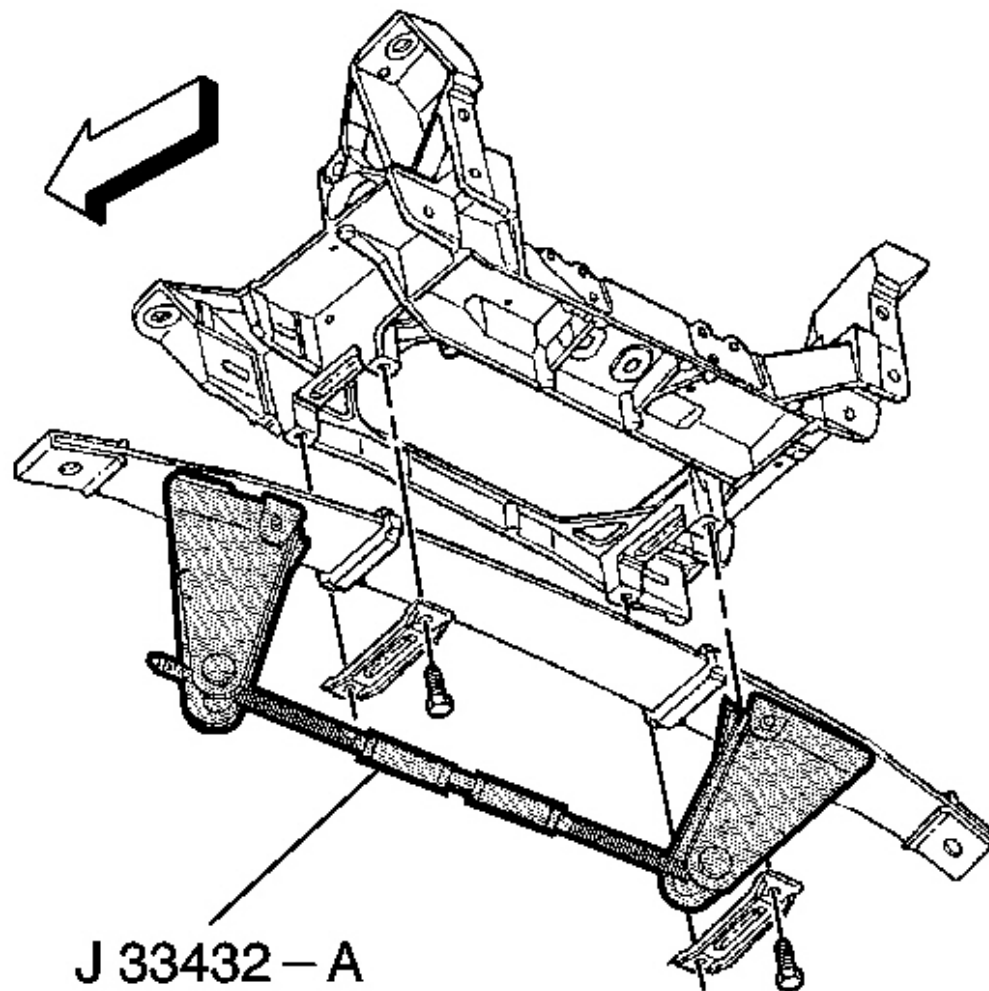


Fig. 55: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

6. Remove the rear transverse spring mounting bolts, spring spacers and insulators from the crossmember.
7. Remove the rear transverse spring from the vehicle.
8. If the transverse spring is to be replaced, release and remove **J 33432-A** from the transverse spring.

Installation Procedure

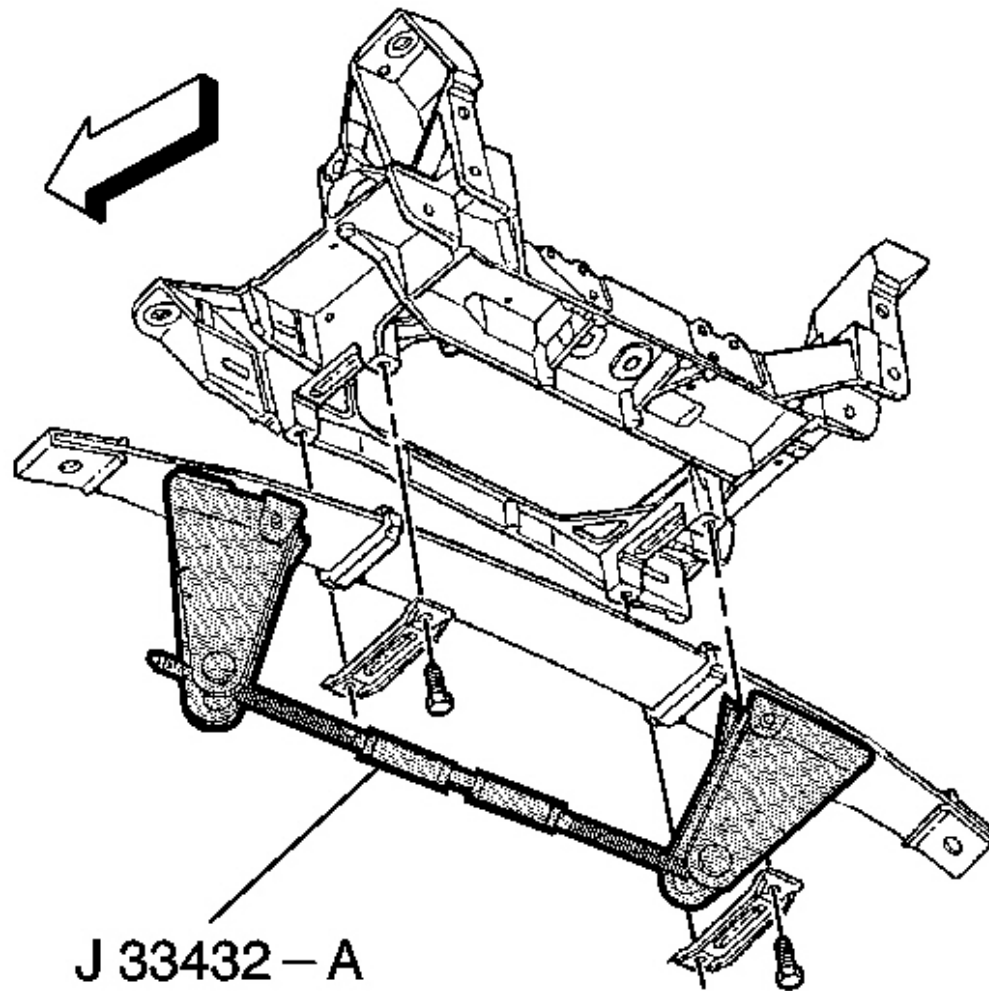


Fig. 56: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

1. If the transverse spring is a replacement, install **J 33432-A** to the transverse spring and compress the spring.
2. Install the rear transverse spring to the vehicle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the rear transverse spring spacers, insulators and mounting brackets to the crossmember.

Tighten: Tighten the rear transverse spring mounting bracket bolts to 62 N.m (46 lb ft).

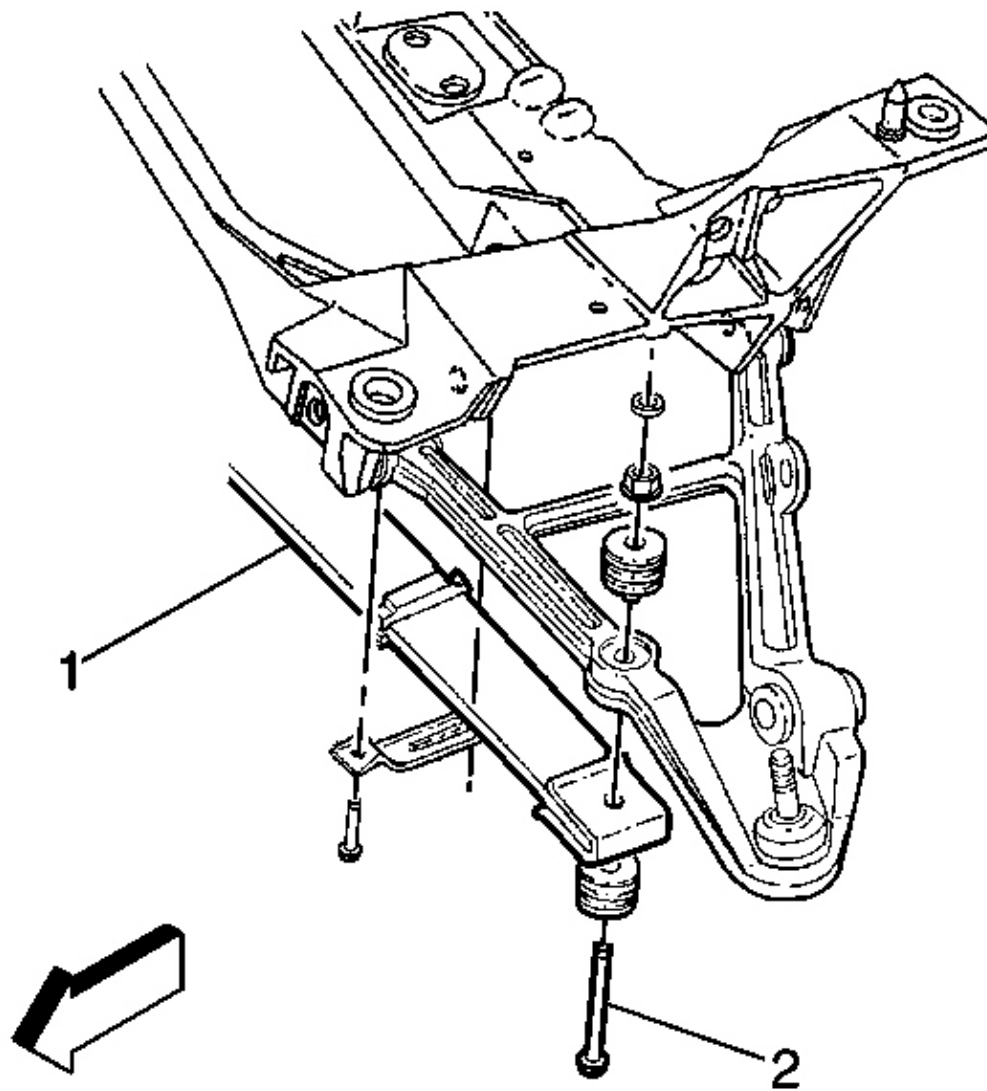


Fig. 57: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Position the transverse spring (1) to the lower control arms and install the spring bolts (2), insulators and nuts.
5. Release and remove **J 33432-A** from the transverse spring.

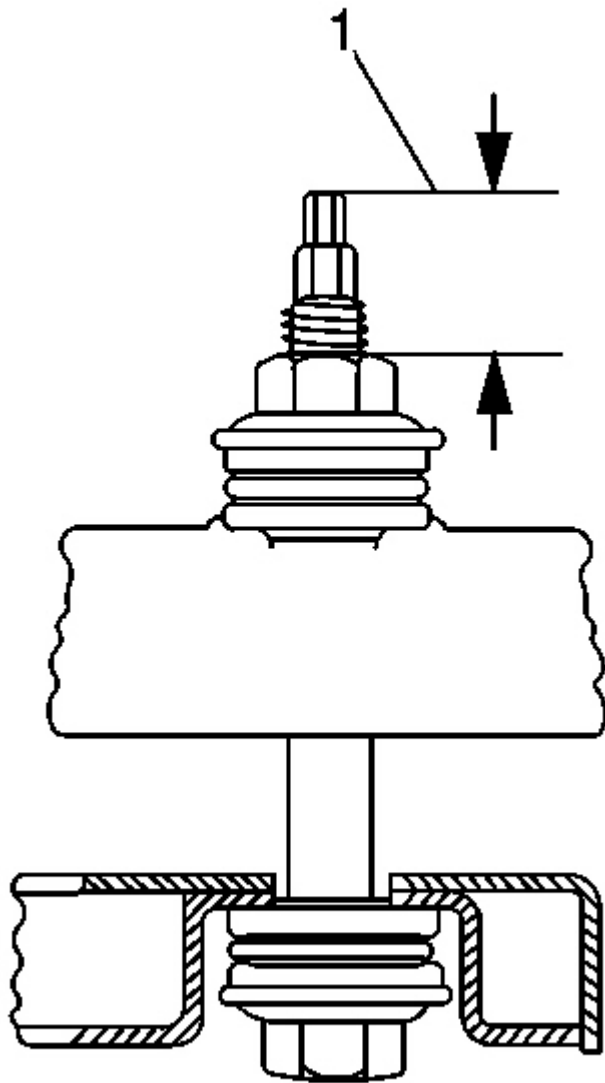


Fig. 58: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The rear transverse spring stud bolt must have a minimum of 2 threads showing above the nut.

6. Set the transverse spring stud height (1) to the height measured during removal.
7. Install the retainers to the bolts.

8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
9. Lower the vehicle.

TIE ROD REPLACEMENT (OUTER END)

Tools Required

J 42188 Ball Joint Separator

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

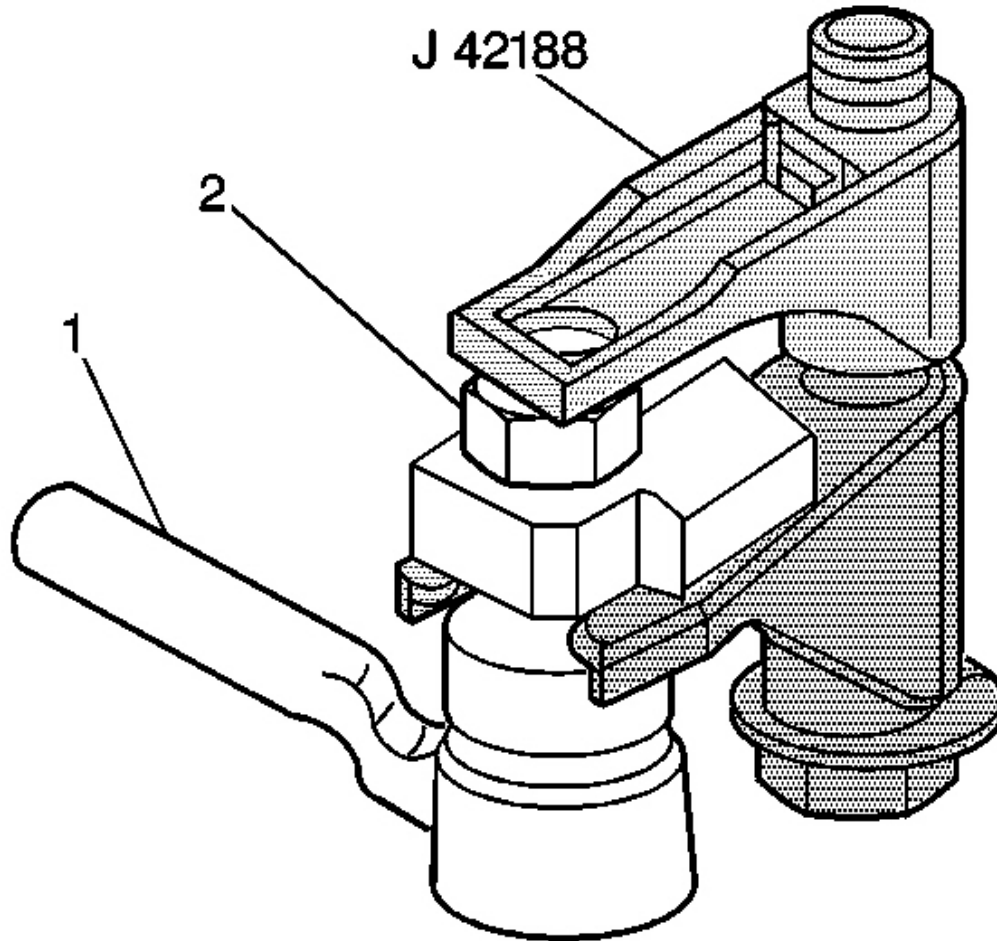


Fig. 59: , Ball Joint Stud Nut & Suspension Knuckle
Courtesy of GENERAL MOTORS CORP.

3. Loosen, do not remove, the outer tie rod end stud nut (2) from the outer tie rod end ball stud.
4. Install **J 42188** between the steering knuckle and the outer tie rod end stud.
5. Tighten the bolt on **J 42188** until the steering knuckle and the outer tie rod end stud separate.
6. Remove **J 42188** and the outer tie rod end stud nut.
7. Remove the outer tie rod end stud from the suspension knuckle.

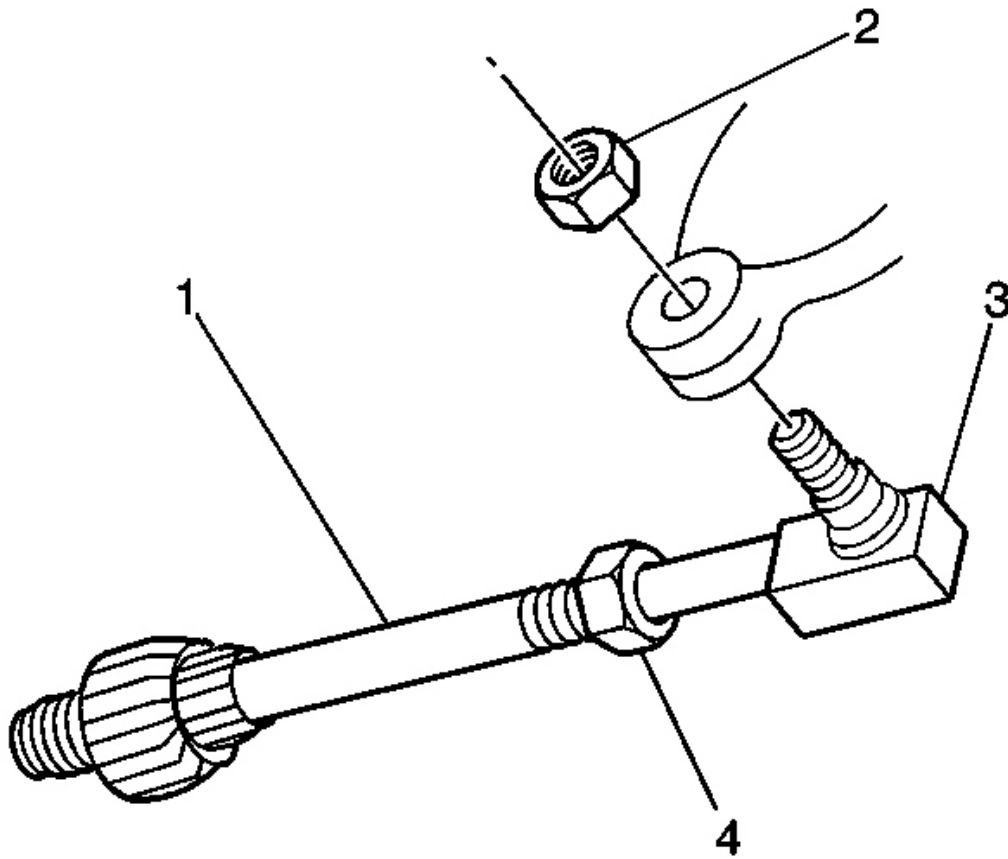


Fig. 60: Outer Tie Rod End, Rear Suspension Adjustment Link & Jam Nut
Courtesy of GENERAL MOTORS CORP.

8. Loosen the jam nut (4) on the rear suspension adjustment link.
9. Remove the outer tie rod end (3) from the rear suspension adjustment link (1).

Installation Procedure

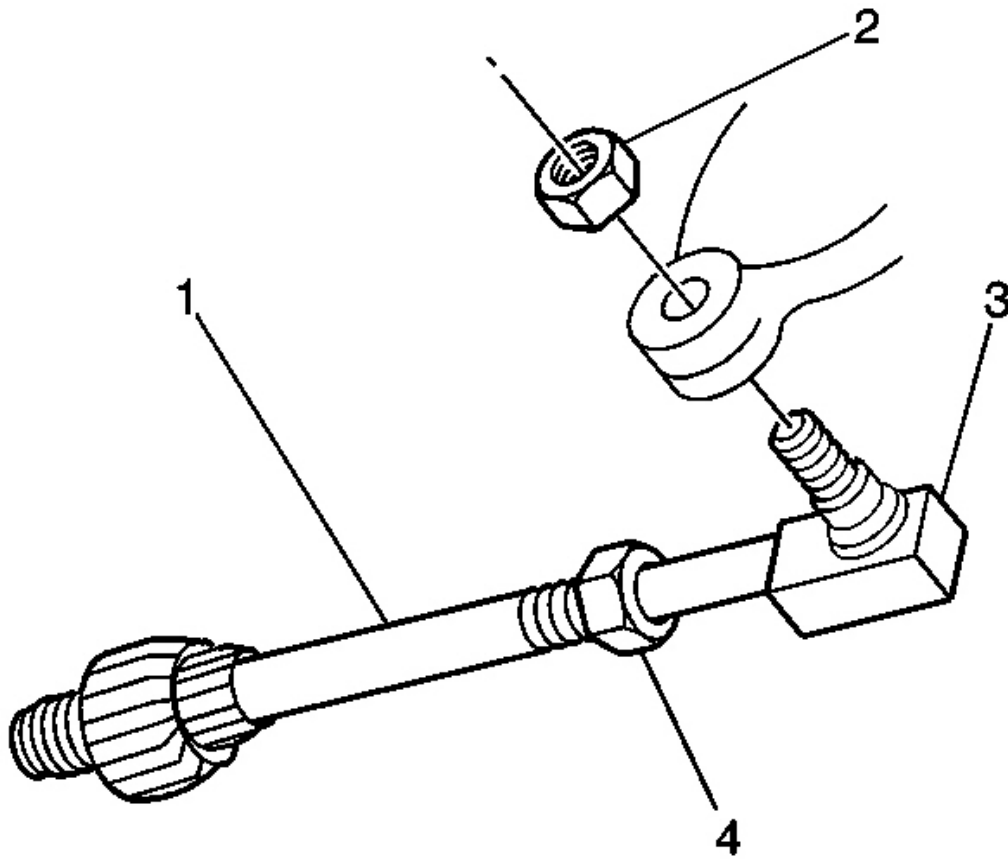


Fig. 61: Outer Tie Rod End, Rear Suspension Adjustment Link & Jam Nut
Courtesy of GENERAL MOTORS CORP.

1. Install the outer tie rod end (3) to the rear suspension adjustment link (1).
2. Install the outer tie rod end into the suspension knuckle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the outer tie rod end nut (2).

Tighten:

- Tighten the outer tie rod end nut (2) to 20 N.m (15 lb ft) to seat the outer tie rod stud.
- Turn the nut an additional 160 degrees.
- Check the outer tie rod end nut for a minimum torque of 45 N.m (33 lb ft).

4. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Lower the vehicle.
6. Adjust the rear wheel toe as necessary and tighten the rear suspension adjustment link lock nut. Refer to **Rear Toe Adjustment** in Wheel Alignment.

TIE ROD REPLACEMENT (SUSPENSION LINK)

Removal Procedure

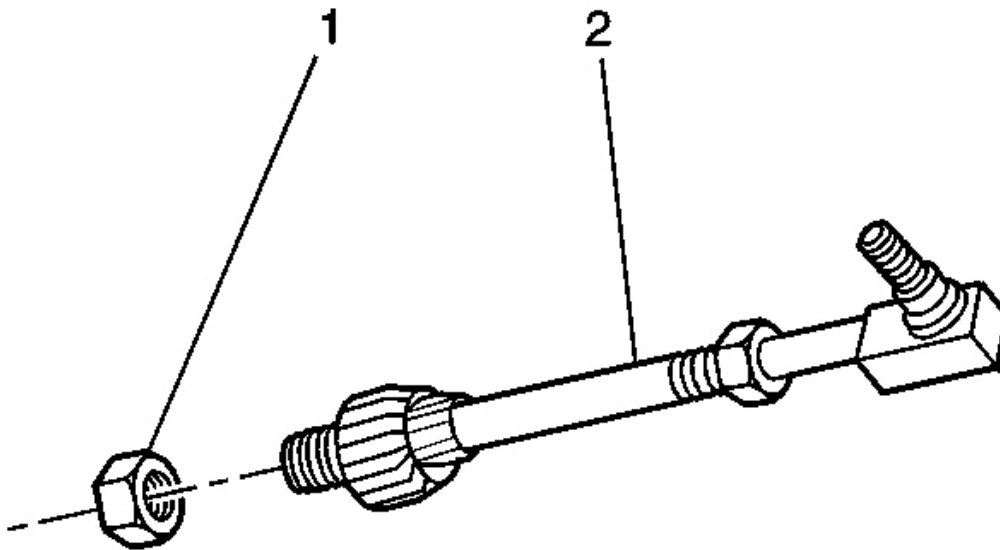


Fig. 62: Tie Rod Rear Suspension Link & Nut
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the outer tie rod end from the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
4. Remove the nut (1) retaining the rear suspension adjustment link to the crossmember.
5. Remove the rear suspension adjustment link (2) from the vehicle.

Installation Procedure

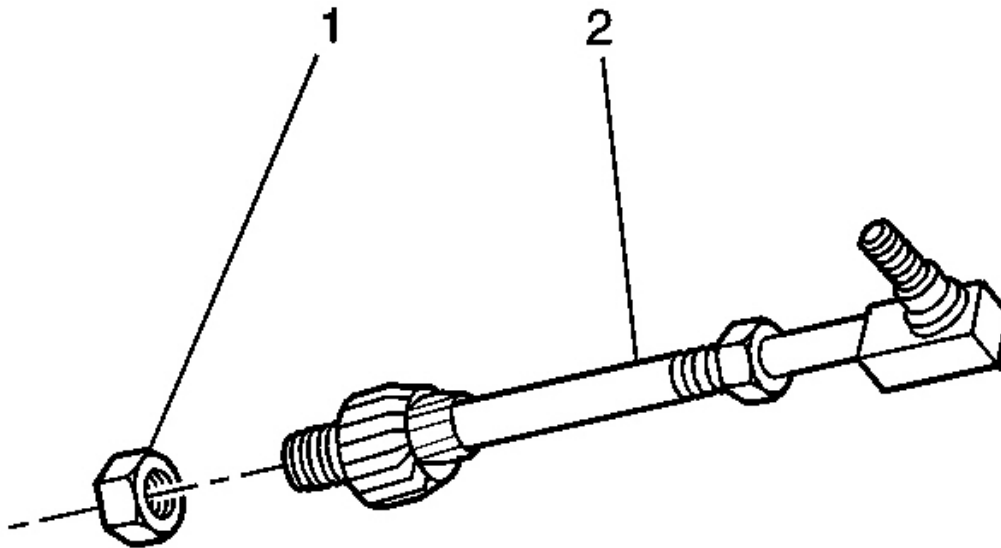


Fig. 63: Tie Rod Rear Suspension Link & Nut
Courtesy of GENERAL MOTORS CORP.

1. Install the rear suspension adjustment link (2) to the vehicle.

NOTE: Refer to **Fastener Notice in Cautions and Notices.**

2. Install the rear suspension adjustment link nut (1) to the back side of the crossmember.

Tighten: Tighten the rear suspension adjustment link nut to 60 N.m (44 lb ft).

3. Install the outer tie rod end into the suspension knuckle. Refer to **Tie Rod Replacement (Outer End)** or **Tie Rod Replacement (Suspension Link)** .
4. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Lower the vehicle.
6. Adjust the rear wheel toe as necessary. Refer to **Rear Toe Adjustment** in Wheel Alignment.

STABILIZER SHAFT REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

2. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

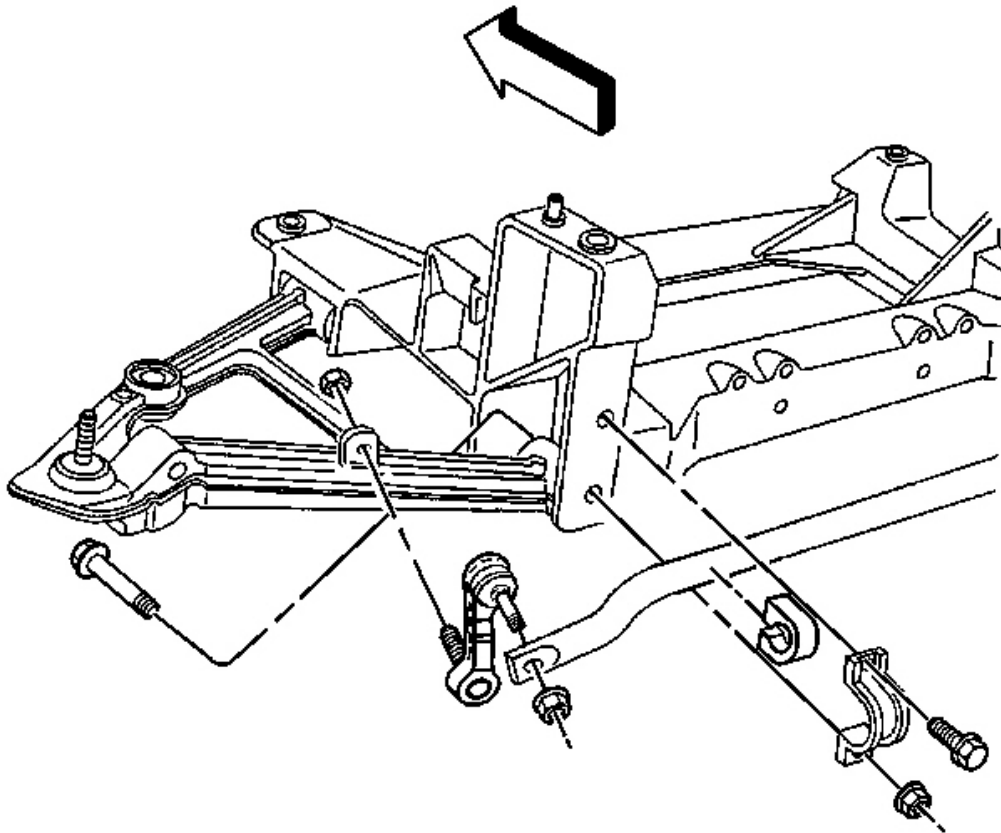


Fig. 64: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

3. Remove the stabilizer shaft link nuts from the stabilizer shaft.
4. Remove the stabilizer shaft clamps, bolts and nuts retaining the shaft to the crossmember.
5. Remove the stabilizer shaft from the vehicle.

Installation Procedure

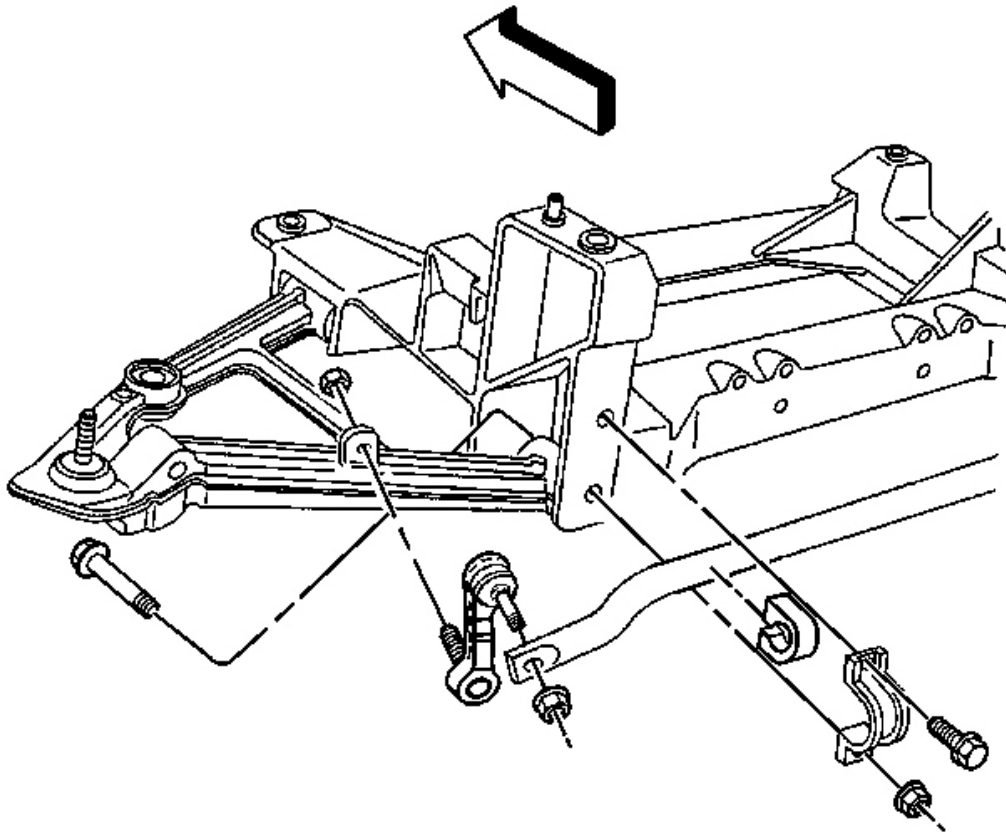


Fig. 65: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the stabilizer shaft to the vehicle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the stabilizer shaft insulator clamps to the stabilizer shaft and the crossmember.

Tighten:

- Tighten the stabilizer shaft insulator clamp bolts to 65 N.m (49 lb ft).
- Tighten the stabilizer shaft insulator clamp nuts to 95 N.m (70 lb ft).

3. Install the stabilizer shaft links to the stabilizer shaft.

Tighten: Tighten the stabilizer shaft link nuts to 72 N.m (53 lb ft).

4. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Lower the vehicle.

STABILIZER SHAFT INSULATOR REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

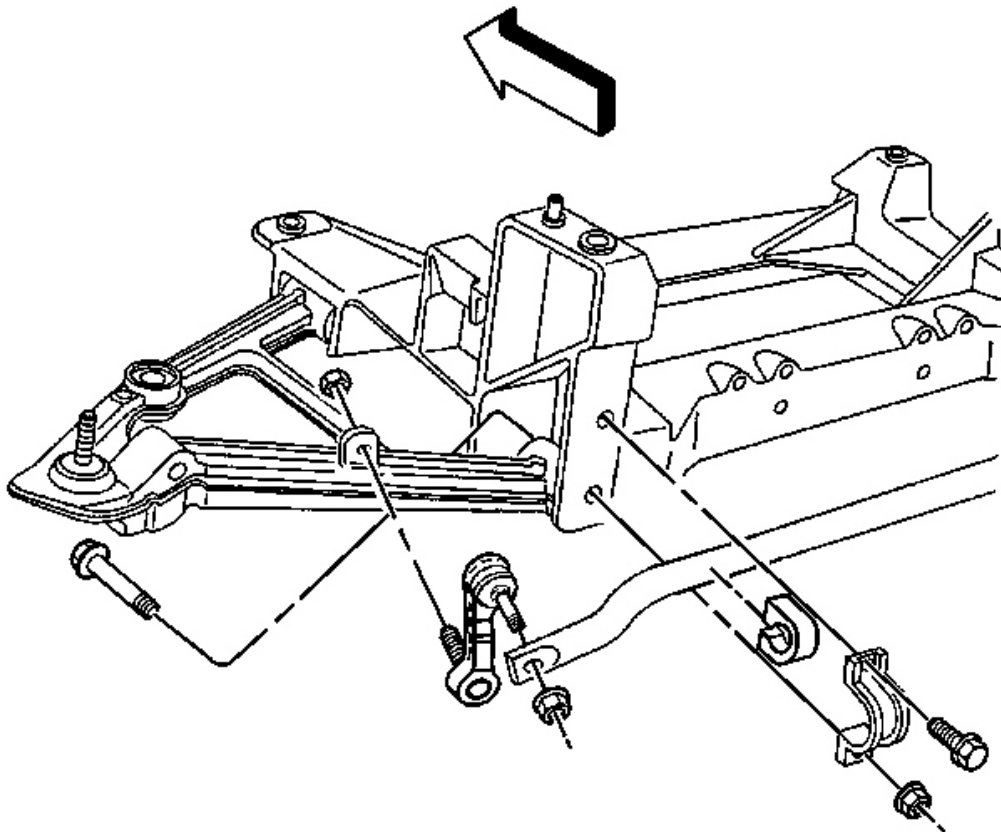


Fig. 66: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

3. Remove the stabilizer shaft clamps, bolts and nuts retaining the shaft to the crossmember.

4. Remove the stabilizer shaft insulators from the stabilizer shaft.

Installation Procedure

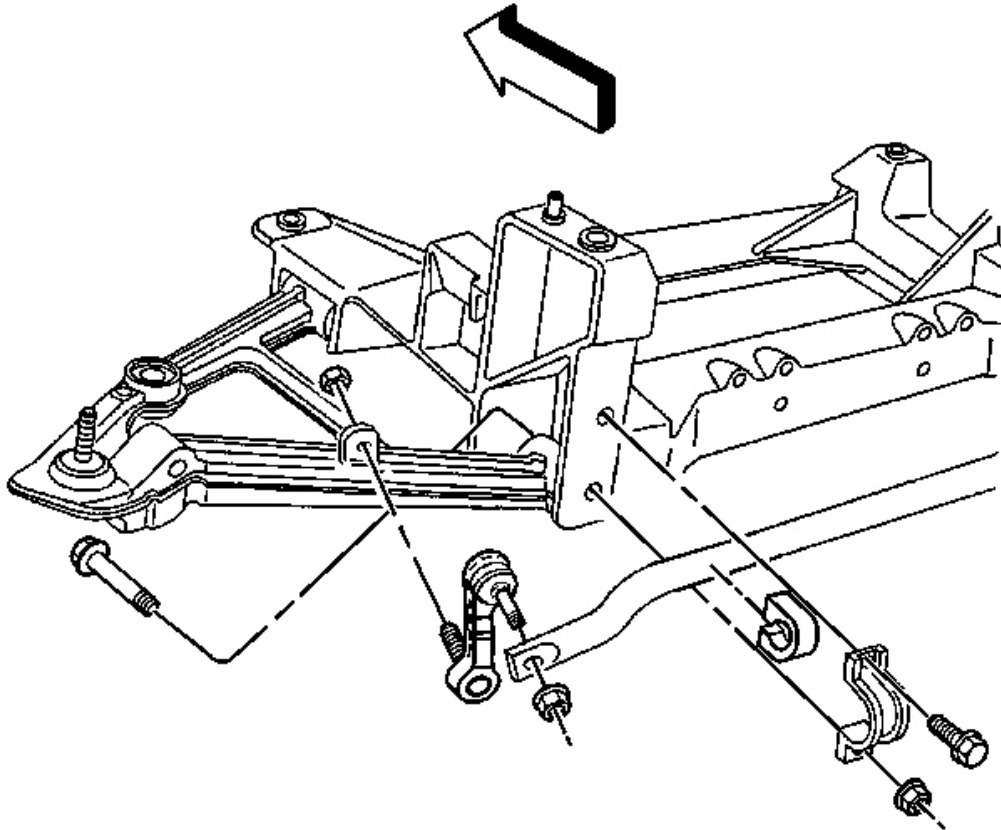


Fig. 67: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the stabilizer shaft insulators to the stabilizer shaft.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the stabilizer shaft insulator clamps to the stabilizer shaft and the crossmember.

Tighten:

- Tighten the stabilizer shaft insulator clamp bolts to 65 N.m (49 lb ft).
- Tighten the stabilizer shaft insulator clamp nuts to 95 N.m (70 lb ft).

3. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
4. Lower the vehicle.

STABILIZER SHAFT LINK REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

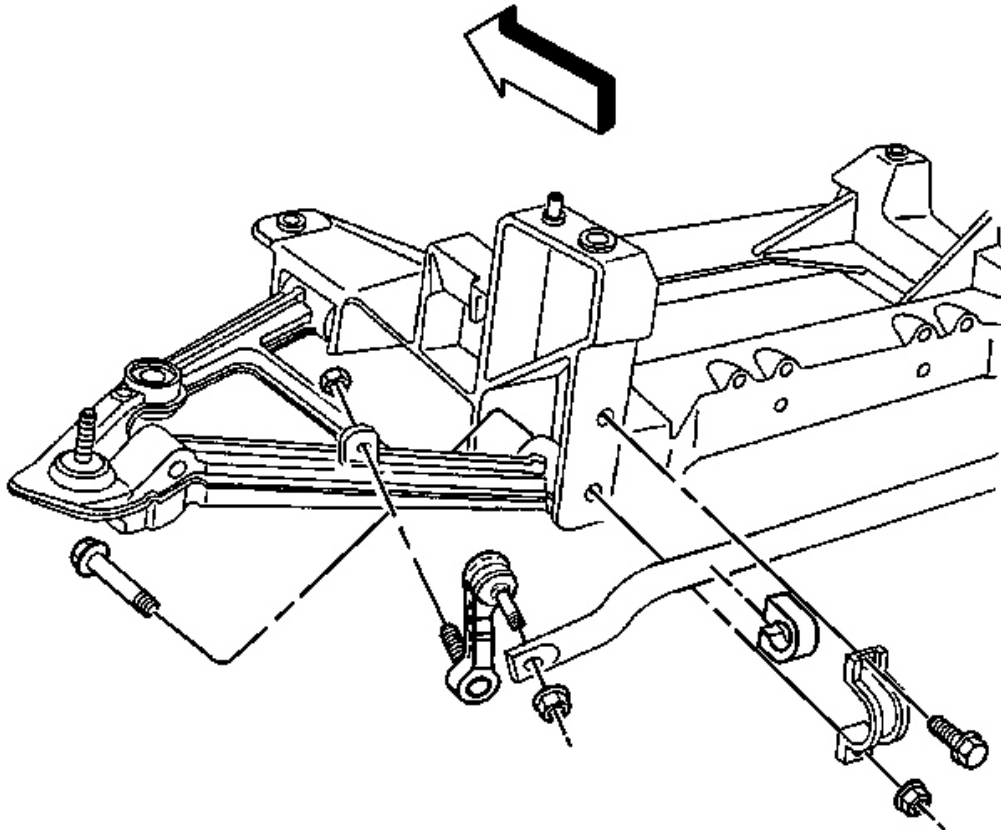


Fig. 68: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

3. Remove the stabilizer shaft link nuts from the lower control arms.

4. Remove the stabilizer shaft link nuts and links from the shaft.

Installation Procedure

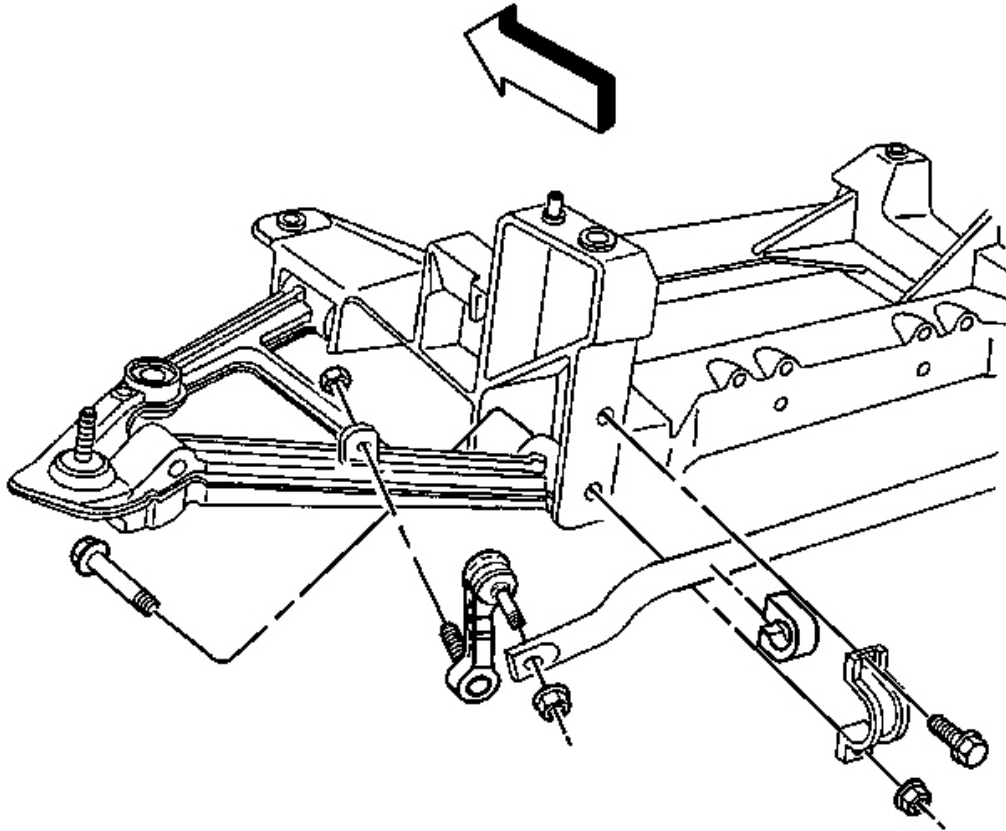


Fig. 69: Stabilizer Shaft Link & Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the stabilizer shaft links and link nuts to the stabilizer shaft and to the lower crossmember.

Tighten: Tighten the stabilizer shaft link nuts to 72 N.m (53 lb ft).

2. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Lower the vehicle.

SHOCK ABSORBER REPLACEMENT (W/O F55)

Removal Procedure

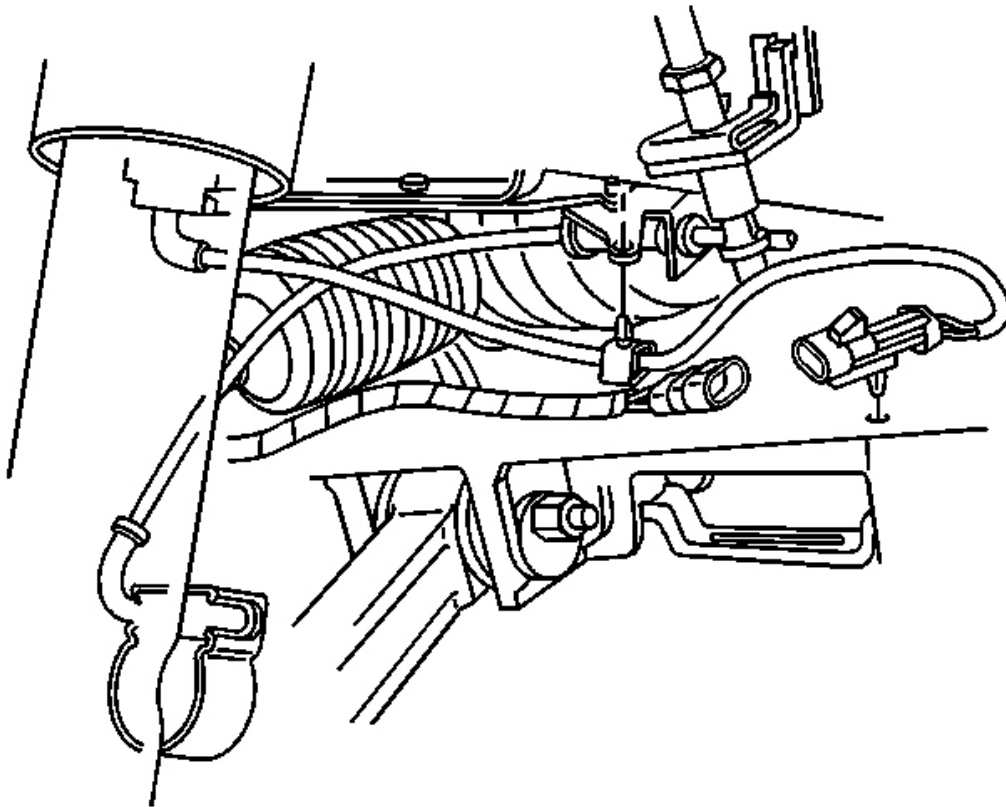


Fig. 70: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Disconnect the rear shock absorber electronic suspension control electrical (ESC) connector, if equipped.

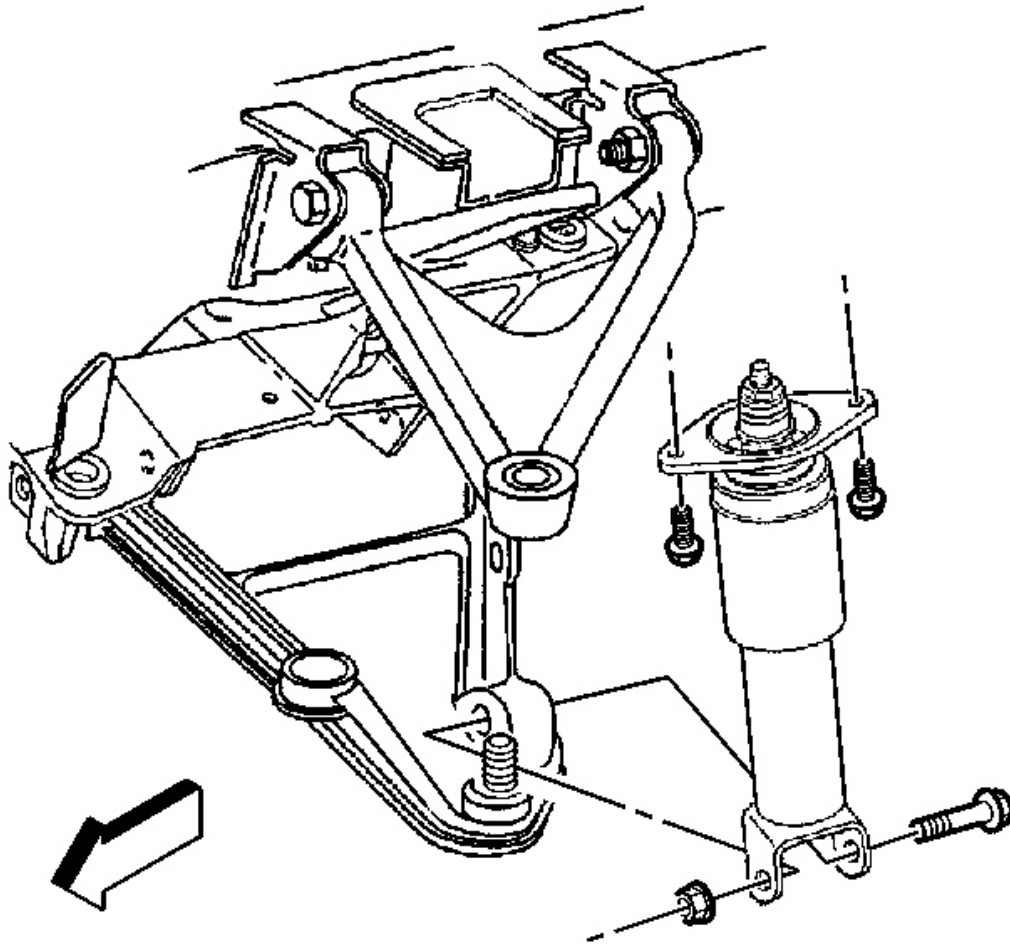


Fig. 71: Shock Absorber & Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

4. Remove the lower mounting bolt retaining the shock absorber to the lower control arm.
5. Remove the shock upper mounting bolts.
6. Remove the tie rod from the control arm. Refer to **Rack and Pinion Outer Tie Rod End Replacement** .
7. Remove the shock absorber from the lower control arm and shock tower.
8. Remove the upper insulator retainer and insulator from the shock absorber.

Installation Procedure

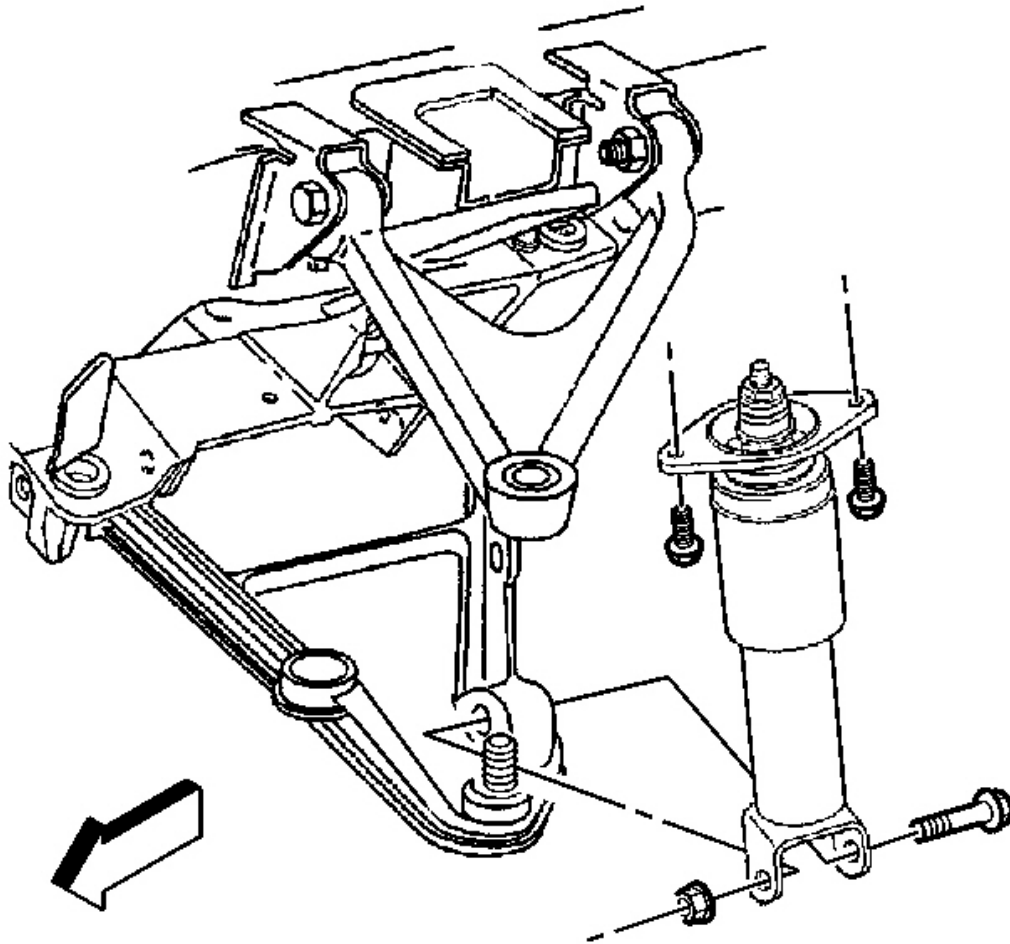


Fig. 72: Shock Absorber & Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

1. Install the upper insulator and insulator retainer to the shock absorber.
2. Install the shock absorber to the shock tower and to the lower control arm.
3. Install the tie rod from the control arm. Refer to **Rack and Pinion Outer Tie Rod End Replacement** .

NOTE: Refer to **Fastener Notice** in Cautions and Notices.

4. Install the upper shock absorber mounting bolts.

Tighten: Tighten the upper mounting bolts to 30 N.m (22 lb ft).

NOTE: To avoid breaking the mounting bolt that attaches the shock absorber to the lower control arm, tighten the bolt. Do NOT tighten the nut.

5. Install the lower shock absorber mounting bolt.

Tighten: Tighten the shock absorber lower mounting nut to 145 N.m (107 lb ft).

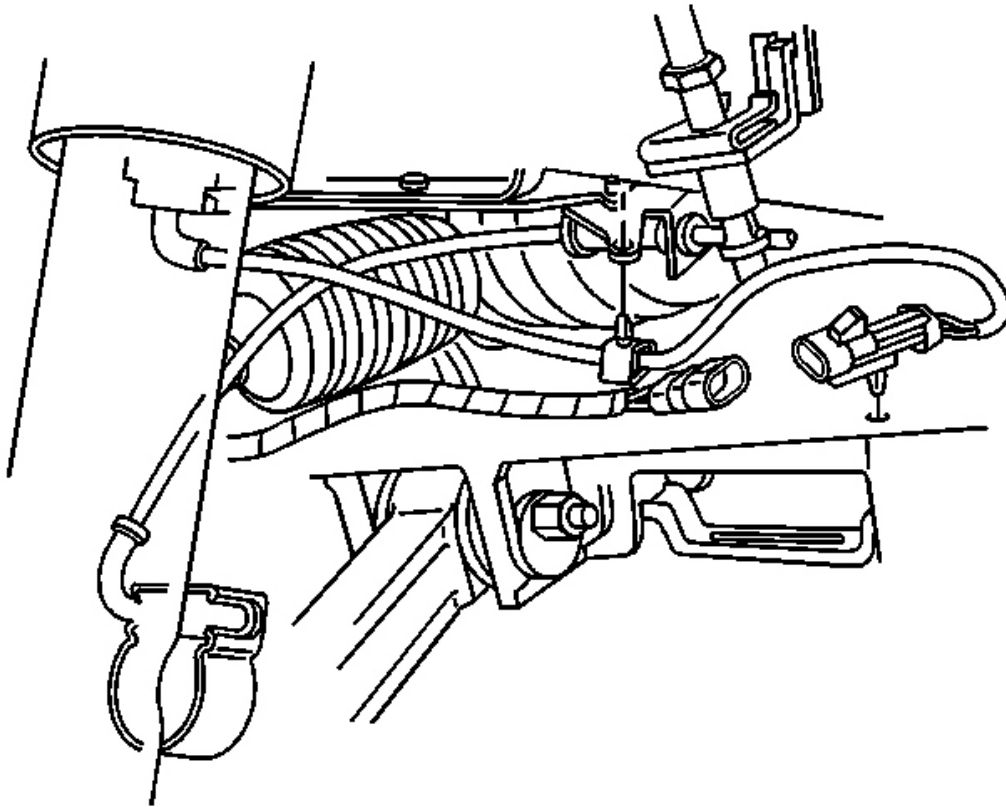


Fig. 73: Shock Absorber ESC Harness Connector
Courtesy of GENERAL MOTORS CORP.

6. Connect the shock absorber ESC electrical connector, if equipped.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
8. Lower the vehicle.

Removal Procedure

1. Raise and Support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

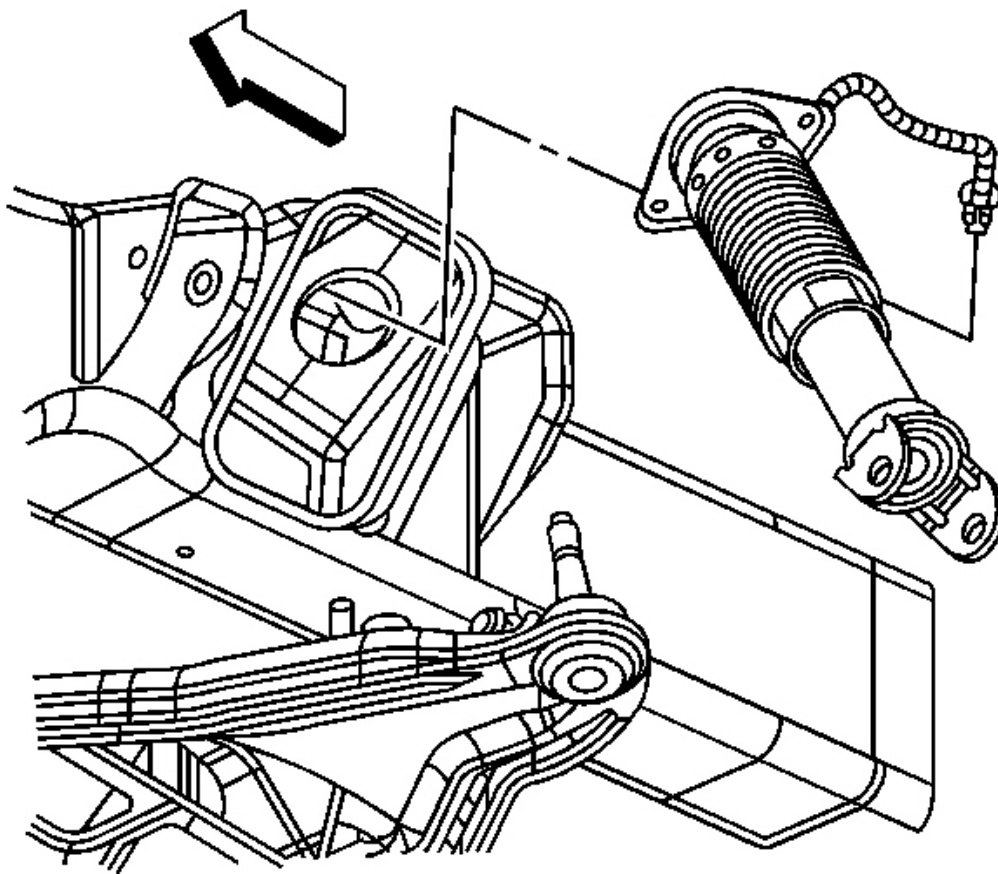


Fig. 74: Rear Shock ESC Harness Connector & Harness Pigtail
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the rear shock electronic suspension control (ESC) harness connector.
4. Disconnect the harness pigtail from the upper shock tower clip.

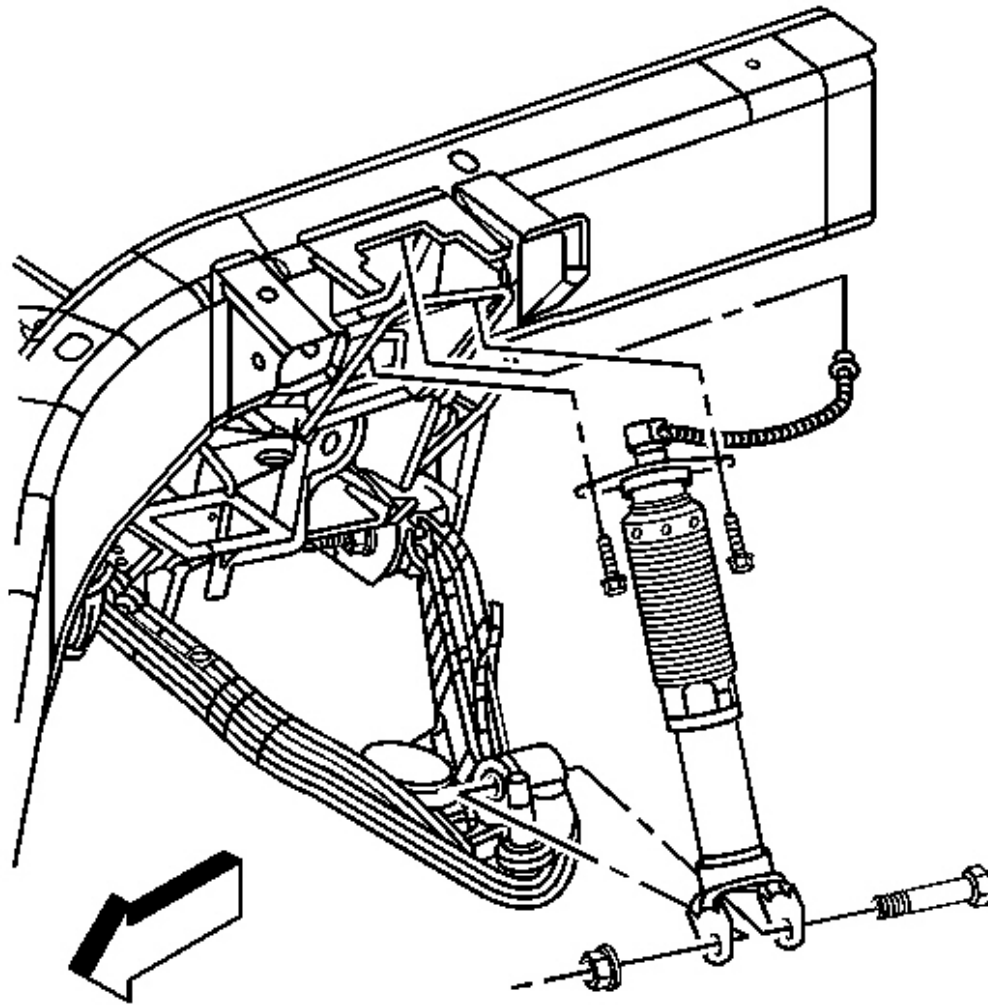


Fig. 75: Upper Shock Absorber & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the lower shock absorber to lower control arm retaining bolt.
6. Remove the upper shock absorber mounting bolts.
7. Disconnect the outer tie rod from the suspension knuckle. Refer to **Rack and Pinion Outer Tie Rod End Replacement** in Power Steering System.
8. Carefully remove the shock absorber from the vehicle. Take care when routing the ESC pigtail and connector through the upper shock tower.
9. Remove the upper insulator retainer and insulator from the shock absorber.

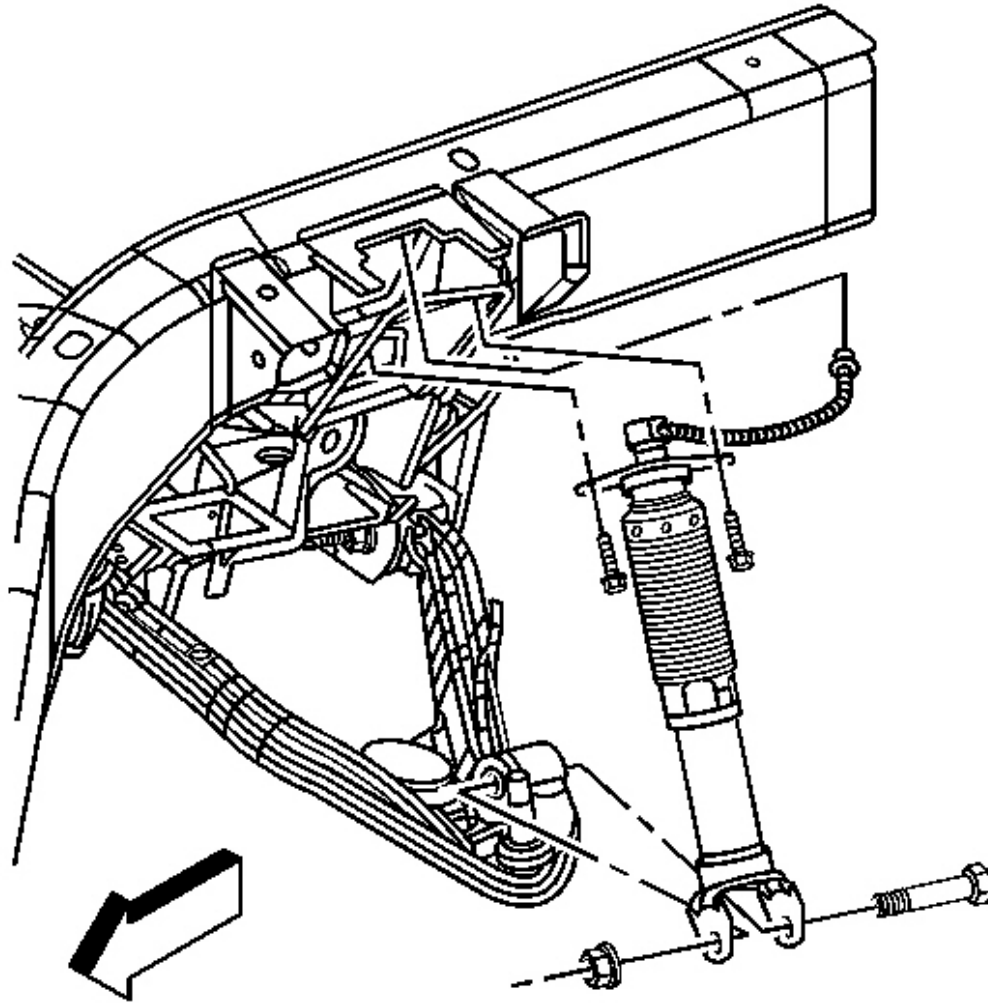


Fig. 76: Upper Shock Absorber & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the upper insulator retainer and insulator to the shock absorber.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: The ESC connector must be installed facing the inward position, while the

white paint mark on the bottom bracket must be facing outward. The bracket to ESC connector orientation is 180 degrees.

2. Carefully install the shock absorber to the shock tower and lower control arm. Take care when routing the ESC pigtail and connector through the upper shock tower.

Tighten: Tighten the upper shock absorber bolts to 30 N.m (22 lb ft).

NOTE: To avoid breaking the mounting bolt that attaches the shock absorber to the lower control arm, tighten the bolt. Do NOT tighten the nut.

3. Install the lower shock absorber mounting bolt.

Tighten: Tighten the lower shock absorber retaining nut to 145 N.m (107 lb ft).

4. Connect the outer tie rod to the suspension knuckle. Refer to **Rack and Pinion Outer Tie Rod End Replacement** in Power Steering System.
5. Connect the harness pigtail to the upper shock tower clip.

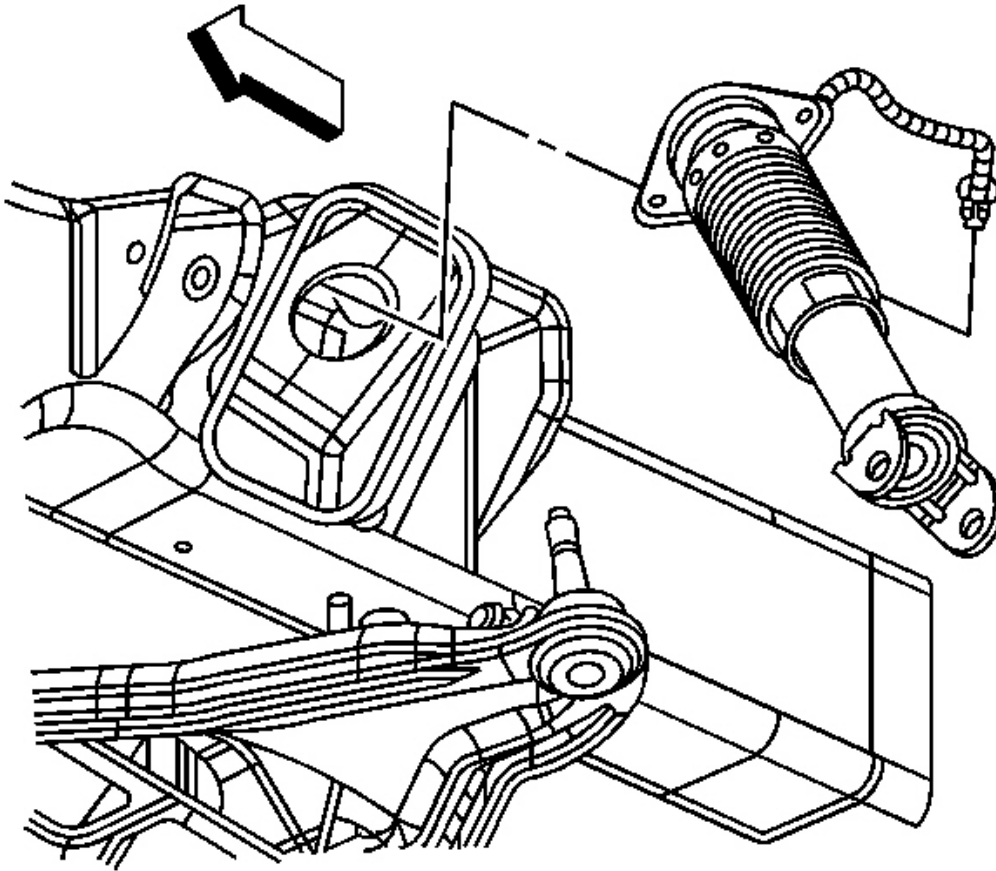


Fig. 77: Rear Shock ESC Harness Connector & Harness Pigtail
Courtesy of GENERAL MOTORS CORP.

6. Connect the rear shock ESC harness connector.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
8. Lower the vehicle.

SHOCK ABSORBER DISPOSAL

CAUTION: Gas charged shock absorbers contain high pressure gas. Do not remove the snap ring from inside the top of the tube. If the snap ring is removed, the contents of the shock absorber will come out with extreme force which may result in personal injury.

CAUTION: To prevent personal injury, wear safety glasses when centerpunching and drilling the shock absorber. Use care not to puncture the shock absorber tube with the centerpunch.

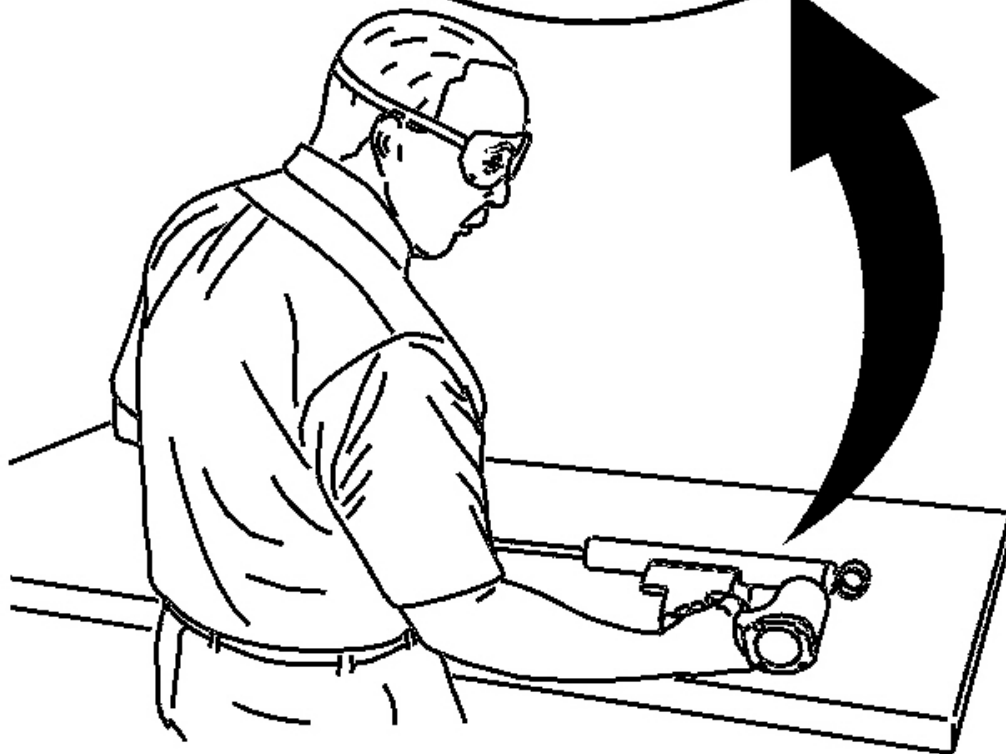
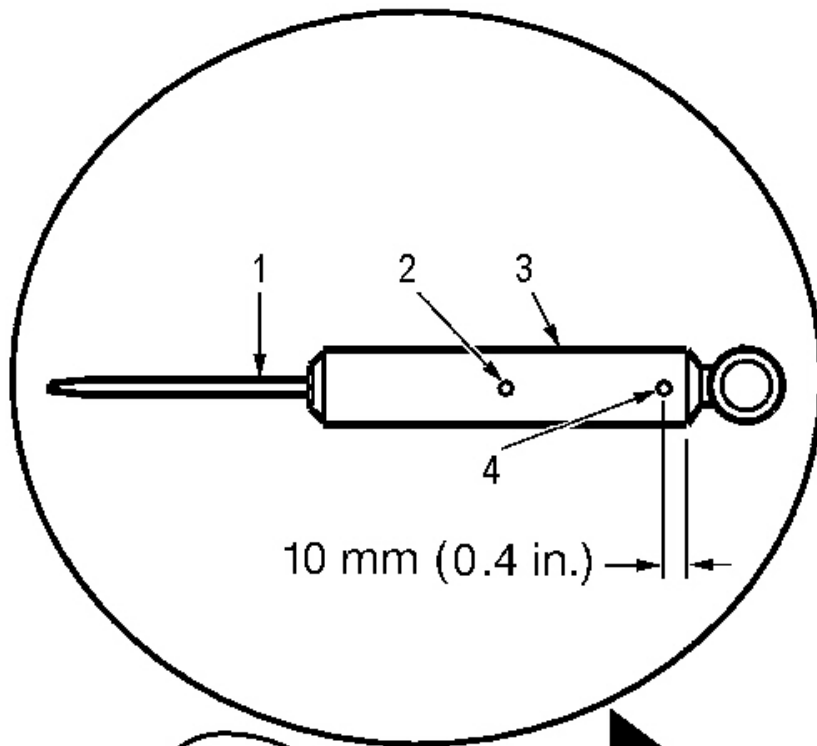


Fig. 78: Making An Indentation 10 mm (0.4 in) From The Bottom Of The Tube
Courtesy of GENERAL MOTORS CORP.

1. Make an indentation 10 mm (0.4 in) from the bottom (4) of the tube (3) using a centerpunch.
2. Clamp the shock absorber in a vise horizontally with the shock absorber rod (1) completely extended.
3. Drill a hole in the shock absorber at the centerpunch (4) using a 5 mm (3/16 in) drill bit. Gas or a gas/oil mixture will exhaust when the drill bit penetrates the shock absorber. Use shop towels in order to contain the escaping oil.
4. Make an indentation in the middle (2) of the tube (3) with a centerpunch.
5. Drill a second hole in the shock absorber at the centerpunch (2) using a 5 mm (3/16 in) drill bit. Oil will exhaust when the drill bit penetrates the shock absorber. Use shop towels in order to contain the escaping oil.
6. Remove the shock absorber from the vise. Hold the shock absorber over a drain pan horizontally with the holes down. Move the rod (1) in and out of the tube (3) to completely drain the oil from the shock absorber.

SPRING BOLT AND INSULATORS REPLACEMENT

Tools Required

J 33432-A Transverse Spring Compressor

Removal Procedure

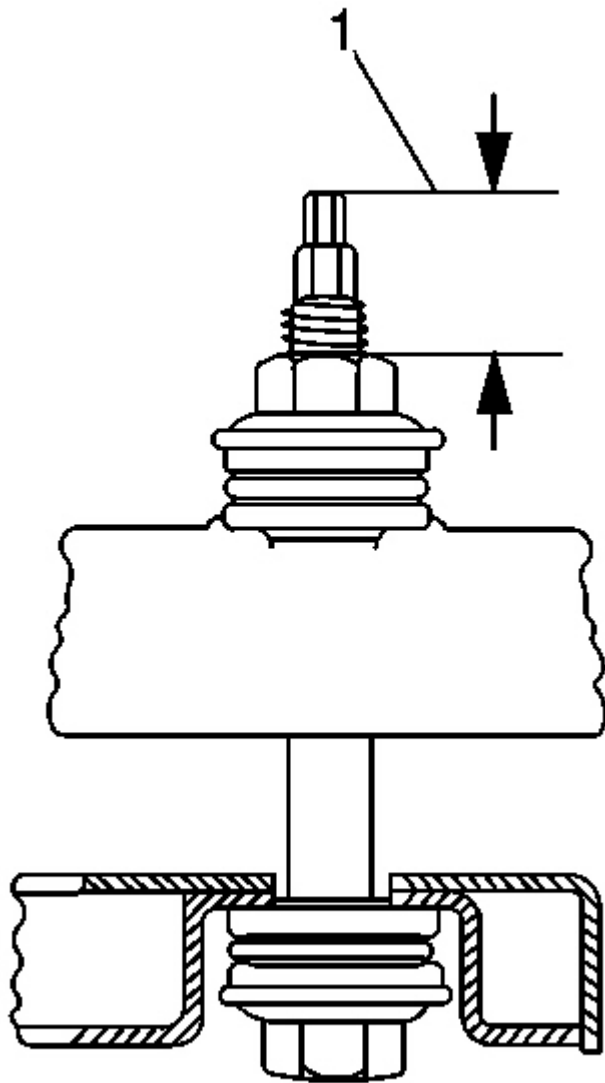


Fig. 79: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Measure the transverse spring stud height (1).

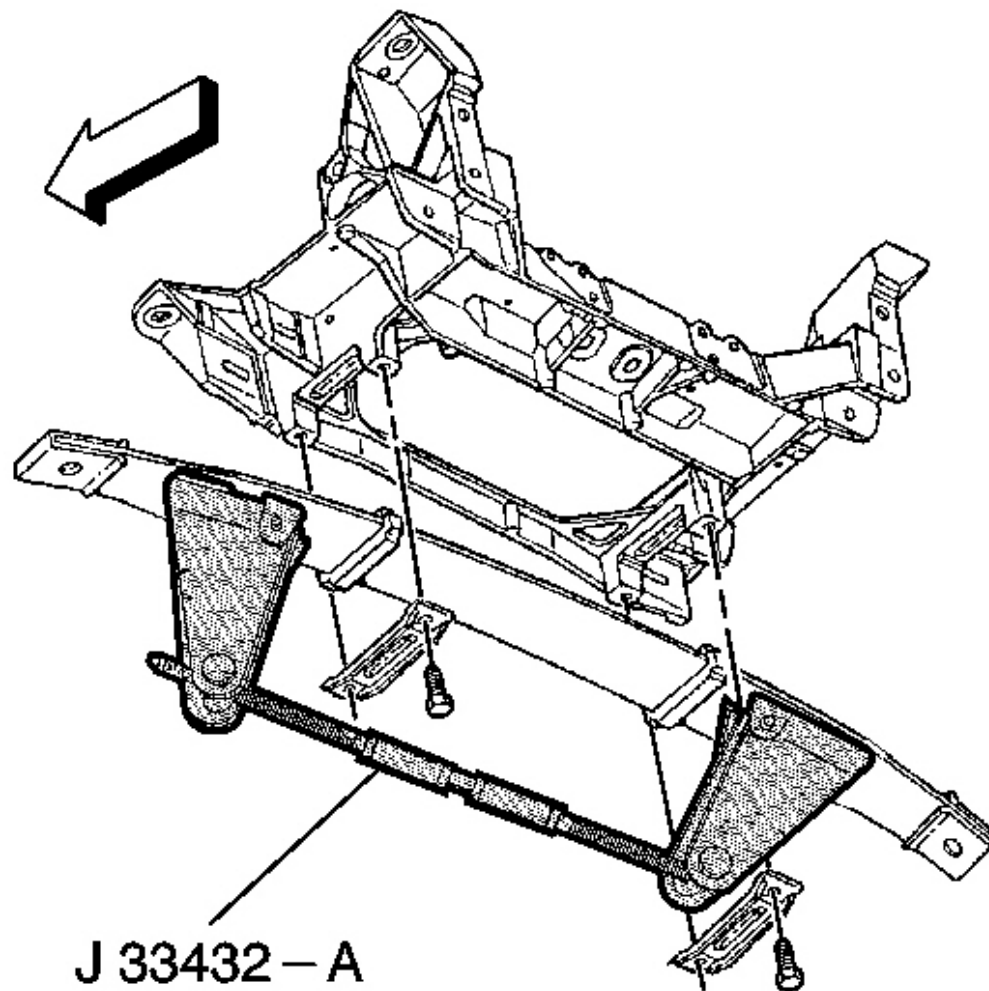


Fig. 80: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: During this procedure, use care not to scratch rear transverse spring.

4. Install J 33432-A to the rear transverse spring and compress the spring.

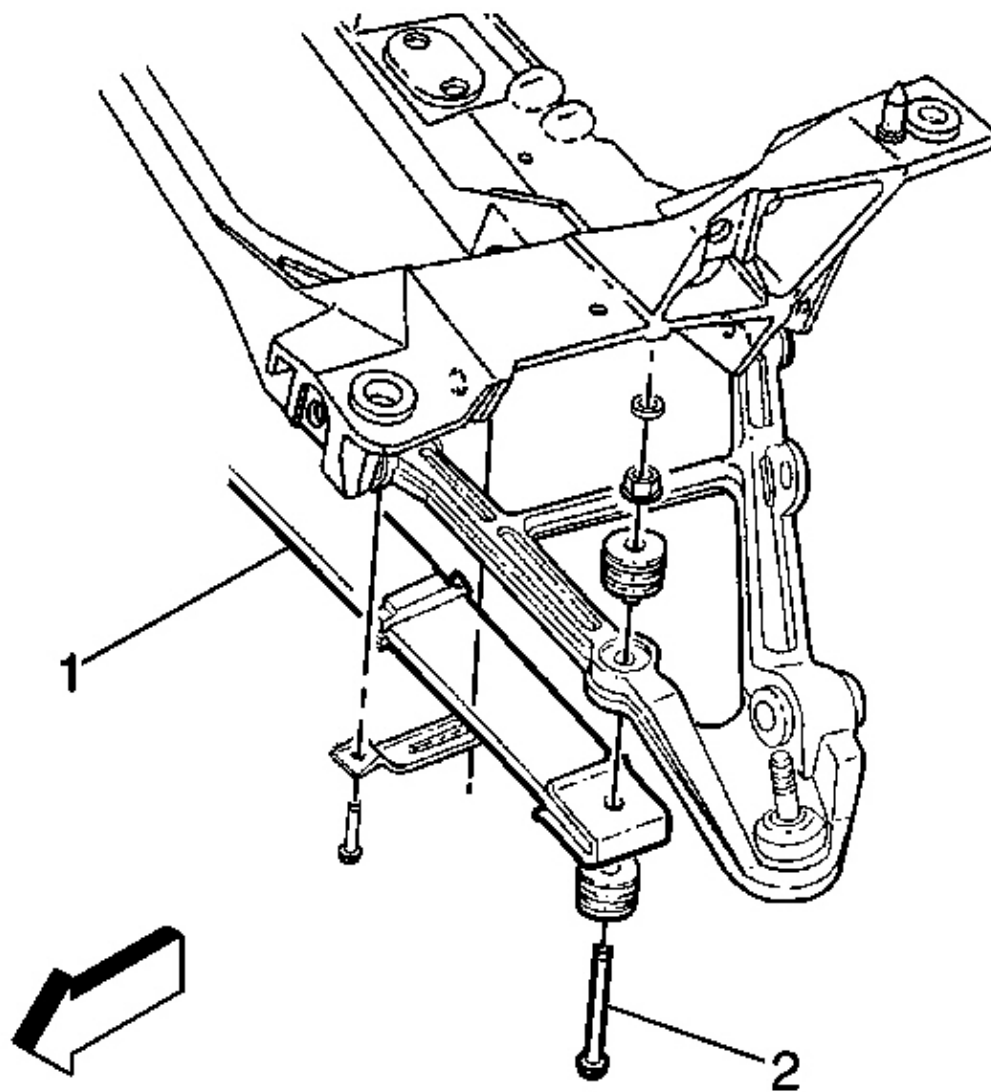


Fig. 81: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the retainers, nuts, insulators and spring bolts (2) from the lower control arm.

Installation Procedure

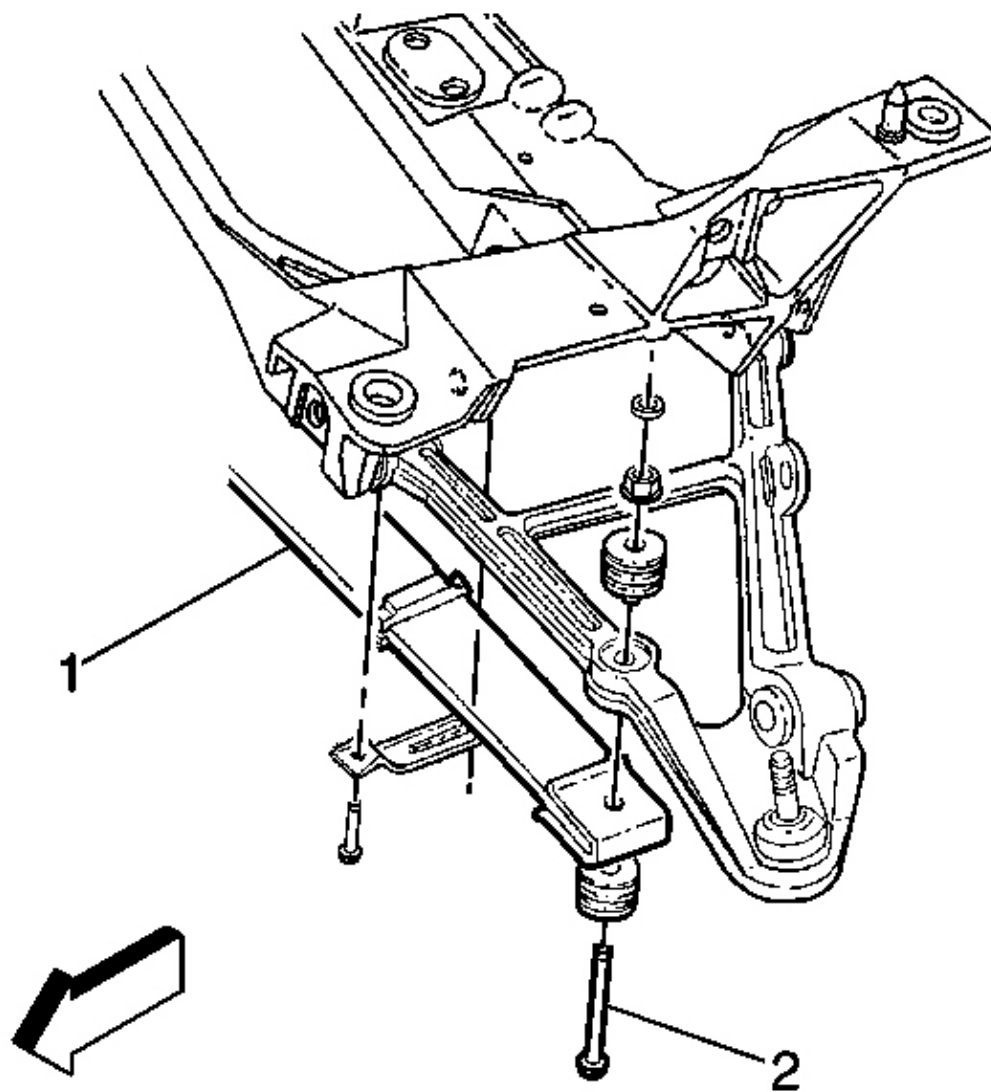


Fig. 82: Transverse Spring, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Position the rear transverse spring to the lower control arms.
2. Install the transverse spring bolts (2), insulators and nuts.

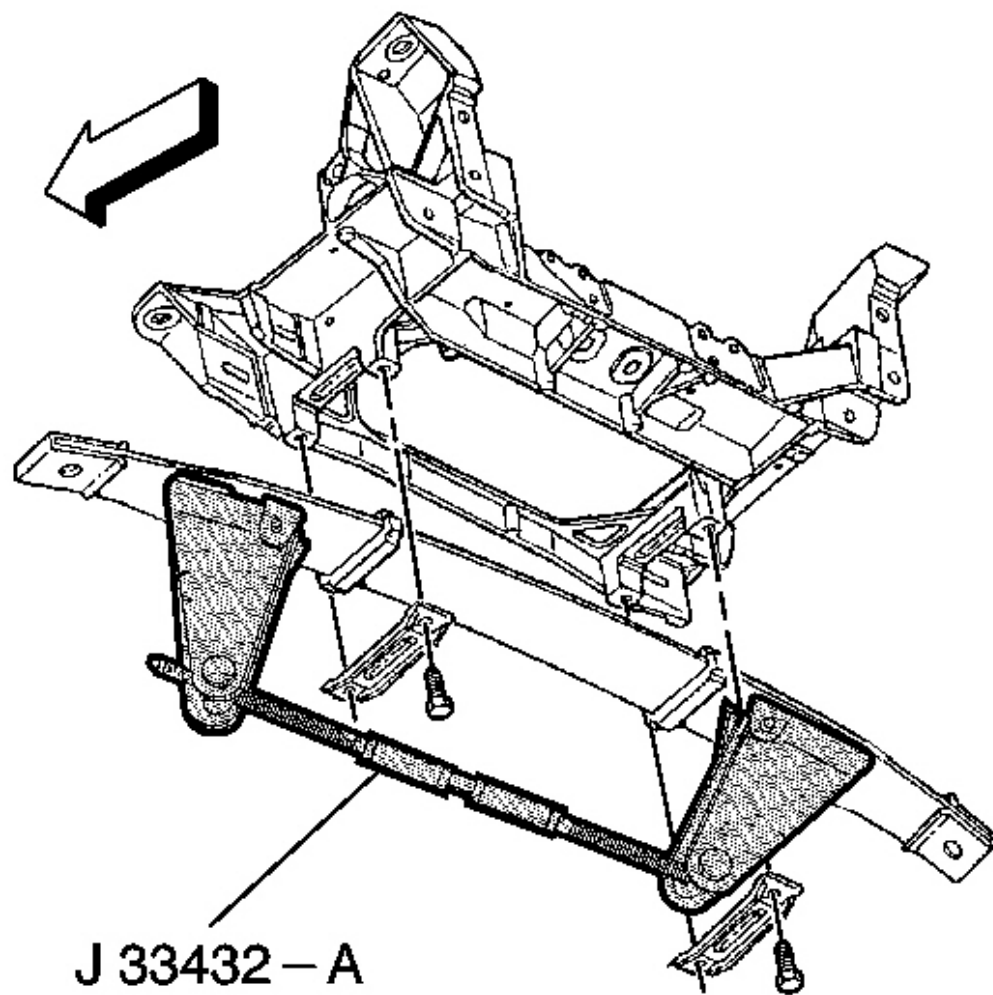


Fig. 83: J 33432-A & Spring
Courtesy of GENERAL MOTORS CORP.

3. Release and remove J 33432-A from the transverse spring.

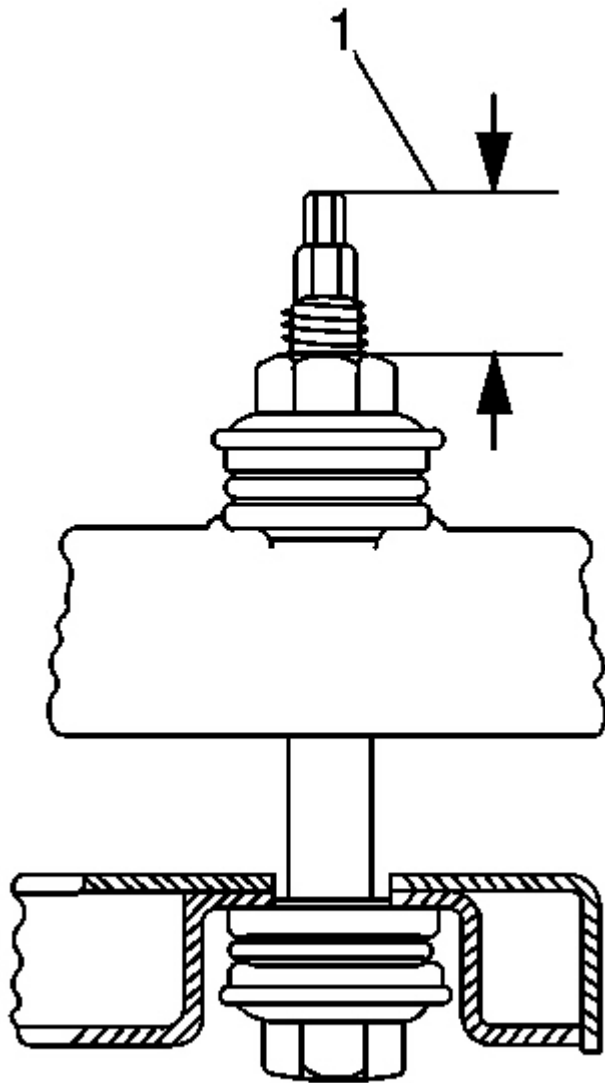


Fig. 84: Measuring The Spring Stud Height
Courtesy of GENERAL MOTORS CORP.

4. Set the transverse spring stud height (1) to the height measured during removal.
5. Install the retainers to the bolts.
6. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
7. Lower the vehicle.

WHEEL STUD REPLACEMENT

Tools Required

J 43631 Ball Joint Separator

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the rear wheel hub/speed sensor assembly from the suspension knuckle. Refer to **Wheel Bearing/Hub Replacement - Rear** .

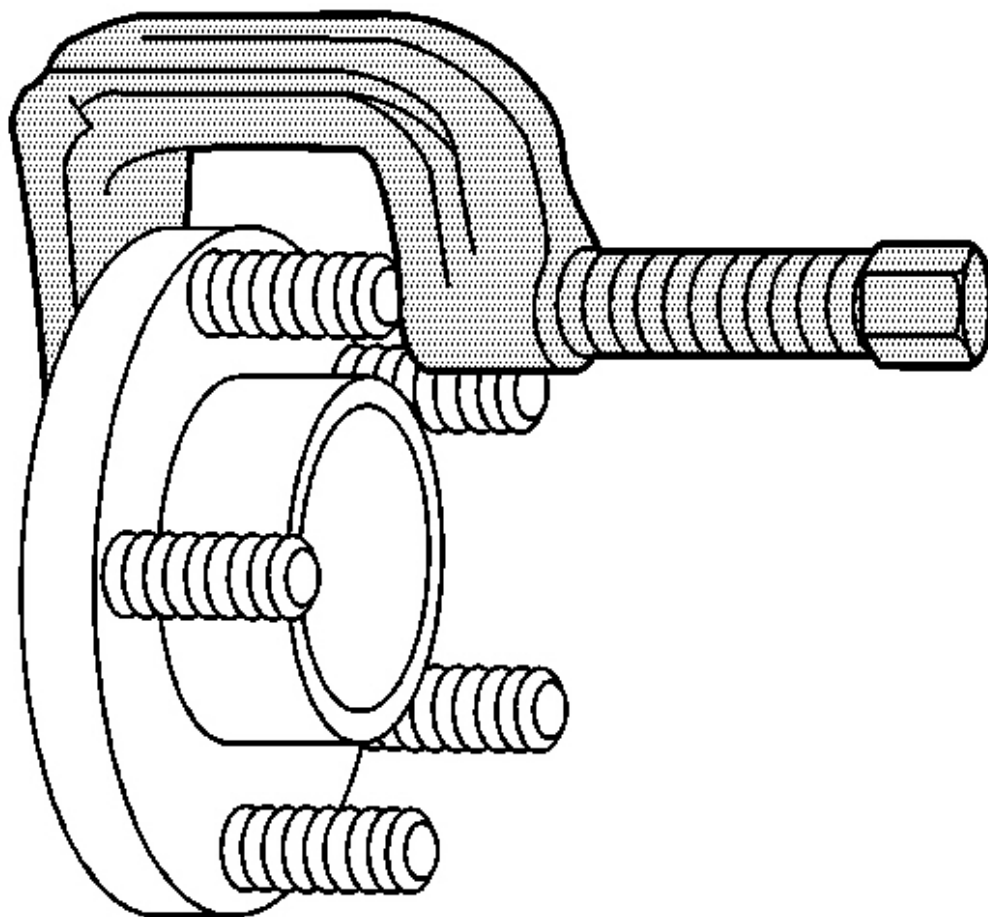


Fig. 85: Removing The Wheel Stud From The Axle Flange
Courtesy of GENERAL MOTORS CORP.

4. Install **J 43631** onto the wheel hub and stud.
5. Turn the forcing screw in until the stud is pushed out of the wheel hub.

Installation Procedure

1. Place a new stud in the wheel hub.

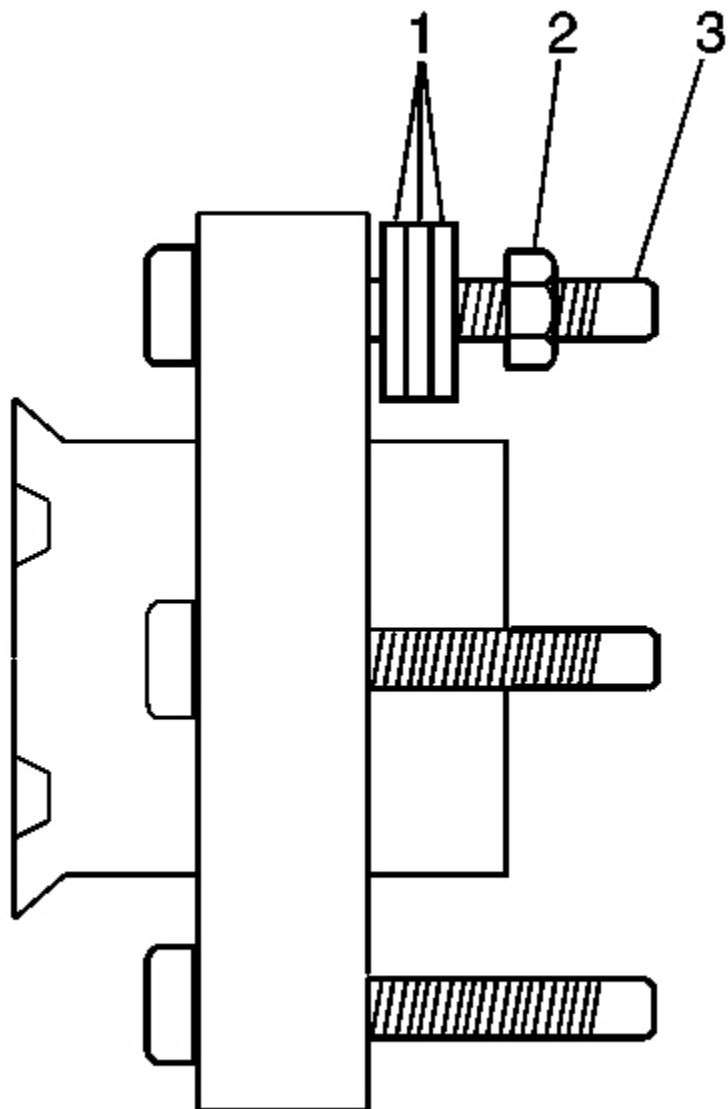


Fig. 86: Washers & Wheel Stud
Courtesy of GENERAL MOTORS CORP.

2. Place some washers (1) onto the wheel stud (3).

IMPORTANT: Make sure that the wheel stud is fully seated against the wheel hub flange.

3. With the flat side of a wheel nut against the washers, tighten the wheel nut until the wheel stud head seats against the wheel hub flange.
4. Remove the wheel nut and washers.
5. Install the rear wheel hub/speed sensor assembly into the suspension knuckle. Refer to **Wheel Bearing/Hub Replacement - Rear** .
6. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
7. Lower the vehicle.

DESCRIPTION AND OPERATION

GENERAL DESCRIPTION

The rear suspension uses a single lightweight fiberglass transverse spring mounted to the crossmember and lower control arms. The following lightweight aluminum components are used throughout the rear suspension:

- Rear suspension knuckles
- Upper control arms
- Lower control arms
- Rear suspension toe links
- Crossmember
- Drive shaft support tube

The shock absorbers attach at the upper end to the frame and at the lower end, to the lower control arm. Shock absorbers help keep the wheels in contact with the road surface under most road conditions. Shock absorbers reduce crash-through at full jounce and rebound.

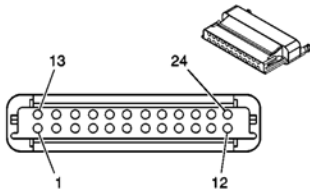
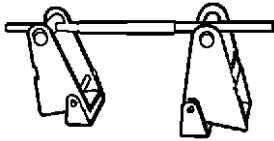
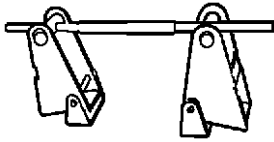
The standard gas shock and the optional Real Time Damping (RTD) shock absorbers are gas charged to reduce aeration (foaming) of the shock fluid. Aeration of the shock fluid results in poor damping control.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 33432-A Transverse Spring Compressor



J 42188
Ball Joint Separator

J 43631
Ball Joint Separator Tool