

2007 Cadillac Escalade

2007 SUSPENSION Front Suspension - Avalanche, Escalade, Suburban, Tahoe & Yukon

2007 SUSPENSION

Front Suspension - Avalanche, Escalade, Suburban, Tahoe & Yukon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Hose Bracket Bolt	9 N.m	80 lb in
Brake Hose Clip Bolts	12 N.m	106 lb in
ESC Sensor Bracket Bolt	25 N.m	18 lb ft
Hub and Bearing Assembly to Steering Knuckle Bolts	180 N.m	133 lb ft
Lower Ball Joint Stud Nut	110 N.m	81 lb ft
Lower Control Arm to Frame Nuts	175 N.m	129 lb ft
Shock Absorber Module to Frame Nuts	50 N.m	37 lb ft
Shock Absorber Module to Lower Control Arm Bolt	50 N.m	37 lb ft
Shock Absorber Tenon Nut - 1500 Series	50 N.m	37 lb ft
Shock Absorber Tenon Nut - 2500 Series	24 N.m	17 lb ft
Shock Absorber to Lower Control Arm Bolts - 2500 Series	25 N.m	18 lb ft
Stabilizer Shaft Insulator Clamp Bolts	50 N.m	37 lb ft
Stabilizer Shaft Link Nuts - 1500 Series	23 N.m	17 lb ft
Stabilizer Shaft Link Nuts - 2500 Series	14 N.m	124 lb in
Suspension Position Sensor Bolt	12 N.m	106 lb in
Upper Ball Joint Stud Nut	50 N.m	37 lb ft
Upper Control Arm to Frame Nuts	190 N.m	140 lb ft
Wheel Drive Shaft to Front Hub Nut	240 N.m	177 lb ft
Wheel Speed Sensor Mounting Bolt	18 N.m	13 lb ft

REPAIR INSTRUCTIONS

STABILIZER SHAFT REPLACEMENT (1500 SERIES)

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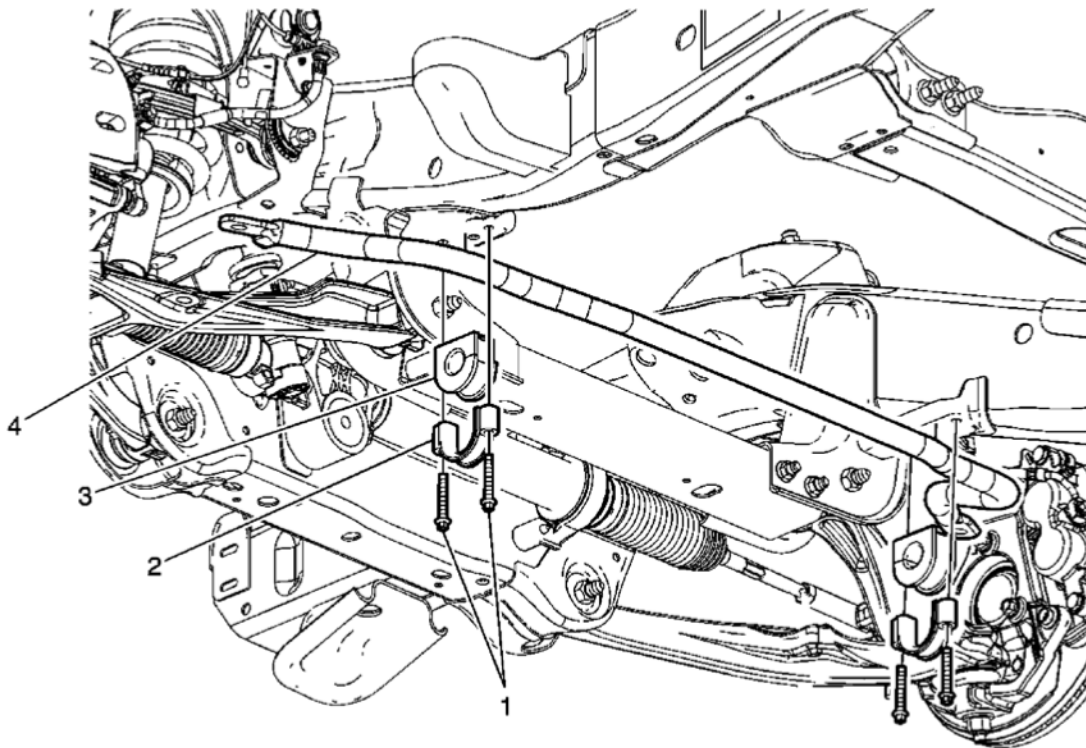


Fig. 1: View Of Front Stabilizer Shaft & Components

Courtesy of GENERAL MOTORS CORP.

Stabilizer Shaft Replacement (1500 Series)

Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the front stabilizer shaft links. Refer to <u>Stabilizer Shaft Link Replacement (1500 Series)</u> or <u>Stabilizer Shaft Link Replacement (2500 Series)</u>.	
1	Front Stabilizer Shaft Bracket Bolts (Qty: 4) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft) Tip: Remove the stabilizer shaft bolts.
2	Front Stabilizer Shaft Brackets (Qty: 2) Tip: Remove the stabilizer shaft insulator brackets from the insulators.
	Front Stabilizer Shaft Insulators (Qty: 2)

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3	Tip: • Remove the stabilizer shaft insulators from the stabilizer shaft. • The stabilizer shaft insulator slits must be facing the rear of the vehicle.
4	Front Stabilizer Shaft

STABILIZER SHAFT REPLACEMENT (2500 SERIES)

Removal Procedure

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

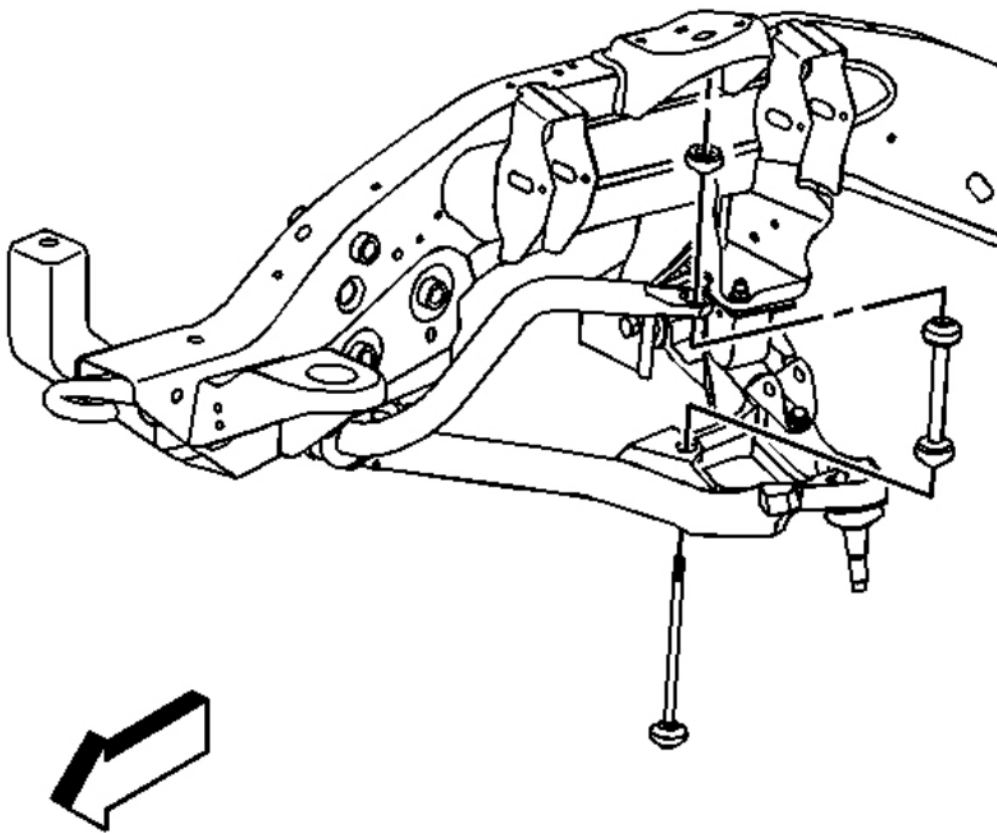


Fig. 2: Link Bolts & Link Assemblies
Courtesy of GENERAL MOTORS CORP.

2. Remove the nuts from the link bolt assemblies.

3. Remove the link bolts.
4. Remove the link assemblies.
5. Remove the engine protection shield. Refer to **Engine Shield Replacement** .

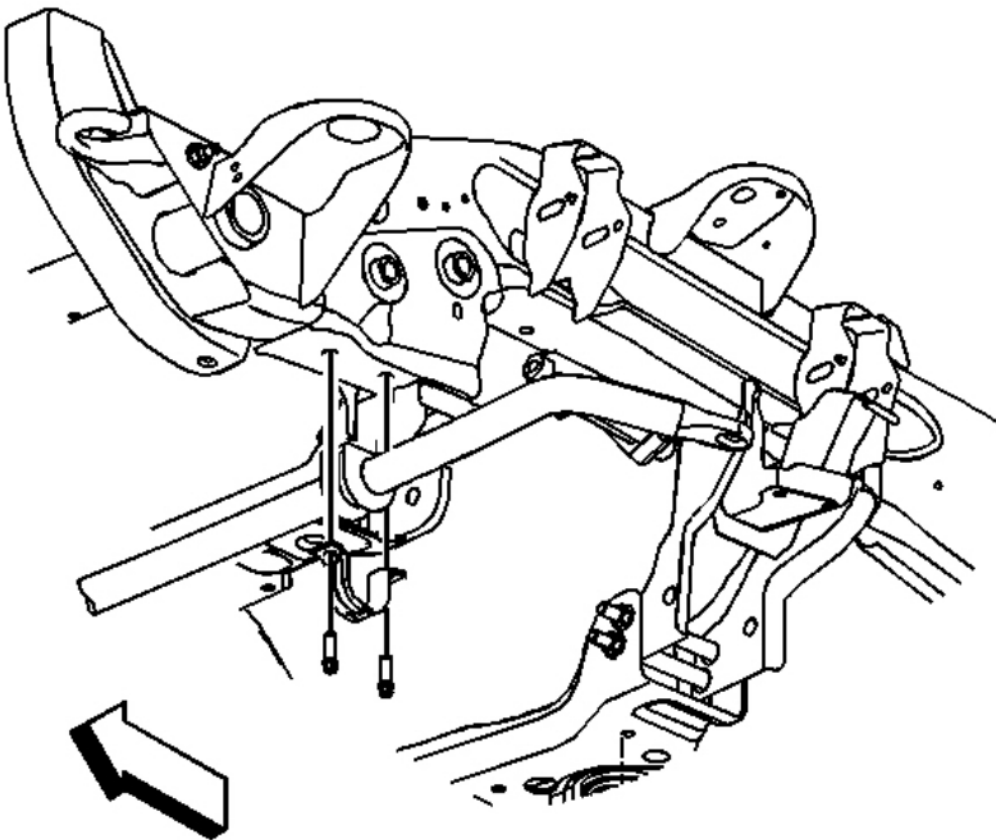


Fig. 3: Insulators & Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

6. Remove the insulator clamp bolts.
7. Remove the clamps.
8. Remove the stabilizer shaft.
9. Remove the insulators.
10. Inspect all of the parts for wear and damage.

Installation Procedure

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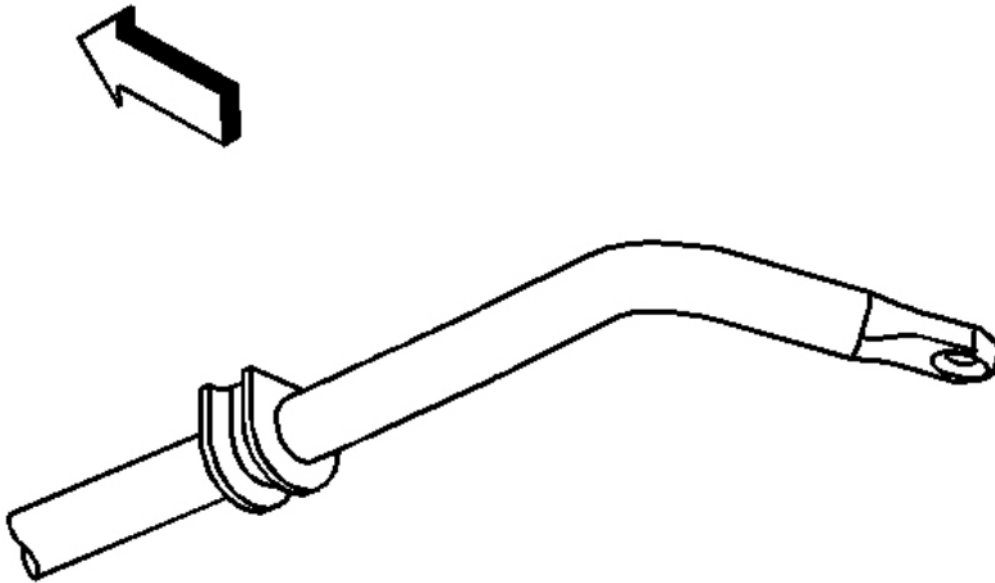


Fig. 4: View Of Insulators On Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

1. Place the insulators on the stabilizer shaft with the slits facing toward the front of the vehicle.

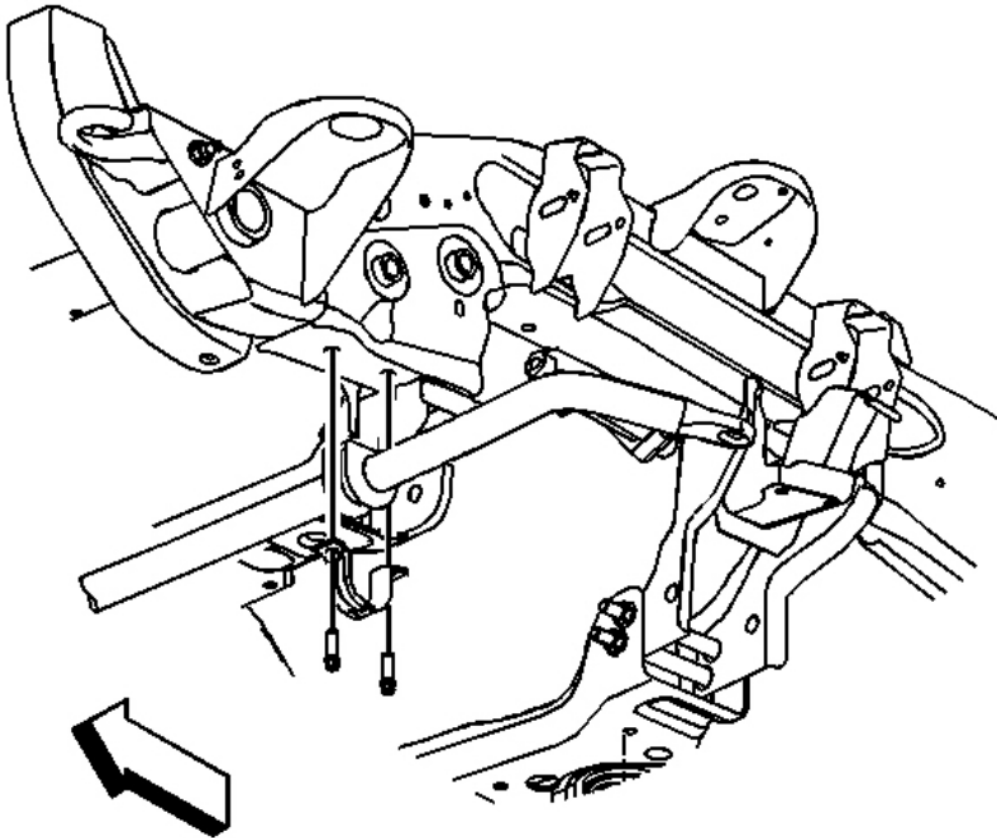


Fig. 5: Insulators & Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

2. Install the insulators to the stabilizer shaft.
3. Install the stabilizer shaft.
4. Install the clamps over the insulators and the stabilizer shaft.

NOTE: Refer to Fastener Notice .

5. Install insulator clamp bolts.

Tighten: Tighten the bolts to 50 N.m (37 lb ft).

6. Support the lower control arms at curb height.
7. Perform the following procedure before installing the bolts.

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- Remove all traces of the original adhesive patch.
- Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
- Apply Threadlocker GM P/N 12345382 (Canadian P/N 10953489).

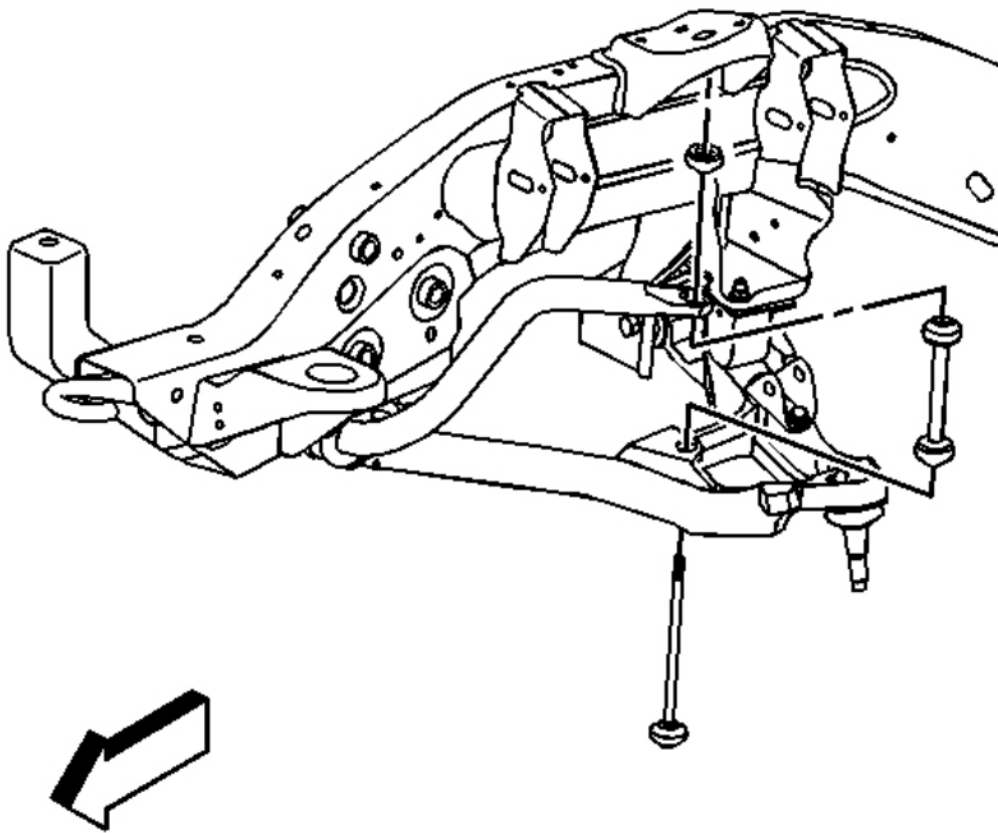


Fig. 6: Link Bolts & Link Assemblies
Courtesy of GENERAL MOTORS CORP.

8. Install the link assemblies.
9. Install the link bolts.

NOTE: To avoid stabilizer shaft damage due to loss of clamp load, the threads of the link bolt must protrude 2 to 4 threads above the link nut after the specified torque is achieved.

10. Install the nuts to the link bolt assemblies.

Tighten: Tighten the nut to 14 N.m (124 lb in). Continue to tighten the nut until 2-4 threads protrude above the nut.

11. Install the engine protections shield. Refer to Engine Shield Replacement.
12. Lower the vehicle.

STABILIZER SHAFT LINK REPLACEMENT (1500 SERIES)

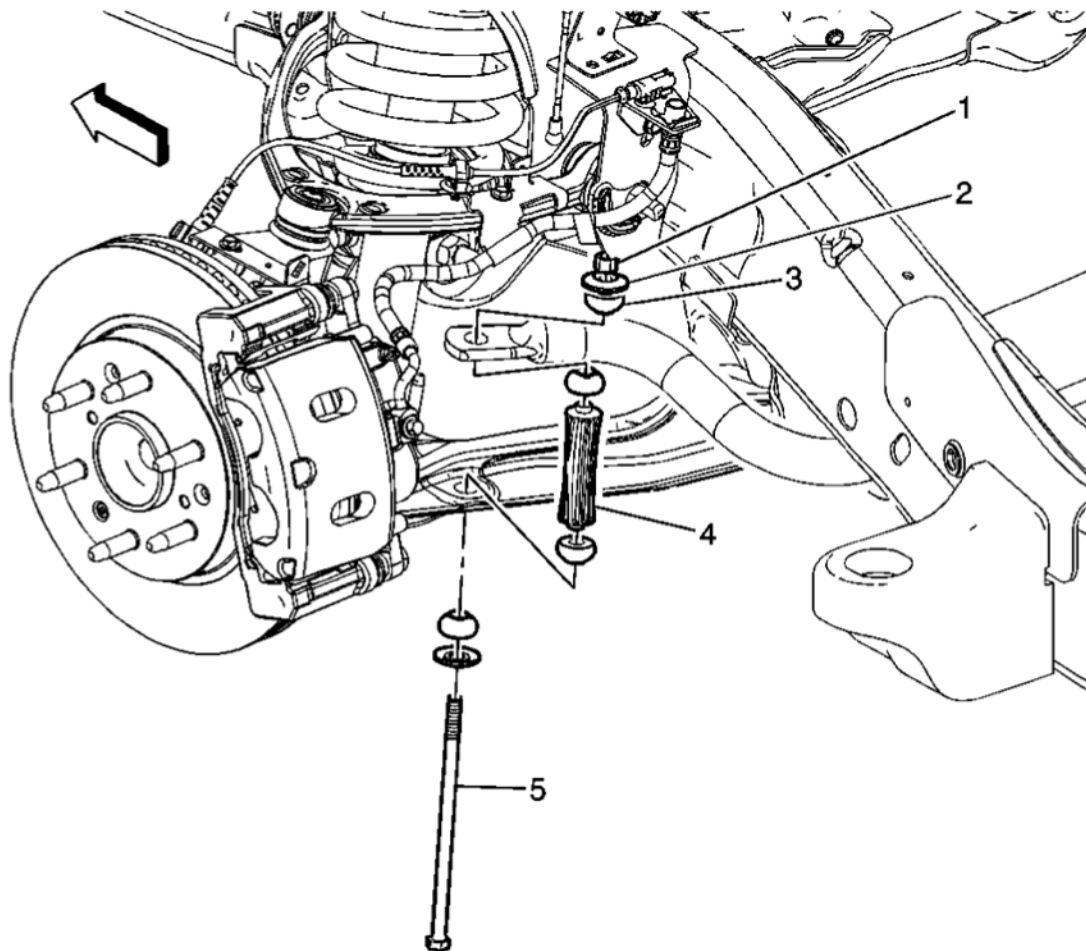


Fig. 7: View Of Stabilizer Shaft Link & Components
Courtesy of GENERAL MOTORS CORP.

Stabilizer Shaft Link Replacement (1500 Series)

Callout	Component Name
Preliminary Procedures	
1.	Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .
2.	Remove the front wheel and tire. Refer to <u>Tire and Wheel Removal and Installation</u> .

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1	Stabilizer Shaft Link Nut NOTE: Refer to <u>Fastener Notice</u> . Tighten: 23 N.m (17 lb ft) Tip: Remove the nut from the stabilizer link.
2	Stabilizer Shaft Link Washer (Qty: 2) Tip: Remove the washer from the link.
3	Stabilizer Shaft Link Insulator (Qty: 4) Tip: Remove the insulators from the link.
4	Stabilizer Shaft Link Spacer Tip: Remove the spacer from the link.
5	Stabilizer Shaft Link Bolt

STABILIZER SHAFT LINK REPLACEMENT (2500 SERIES)

Removal Procedure

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

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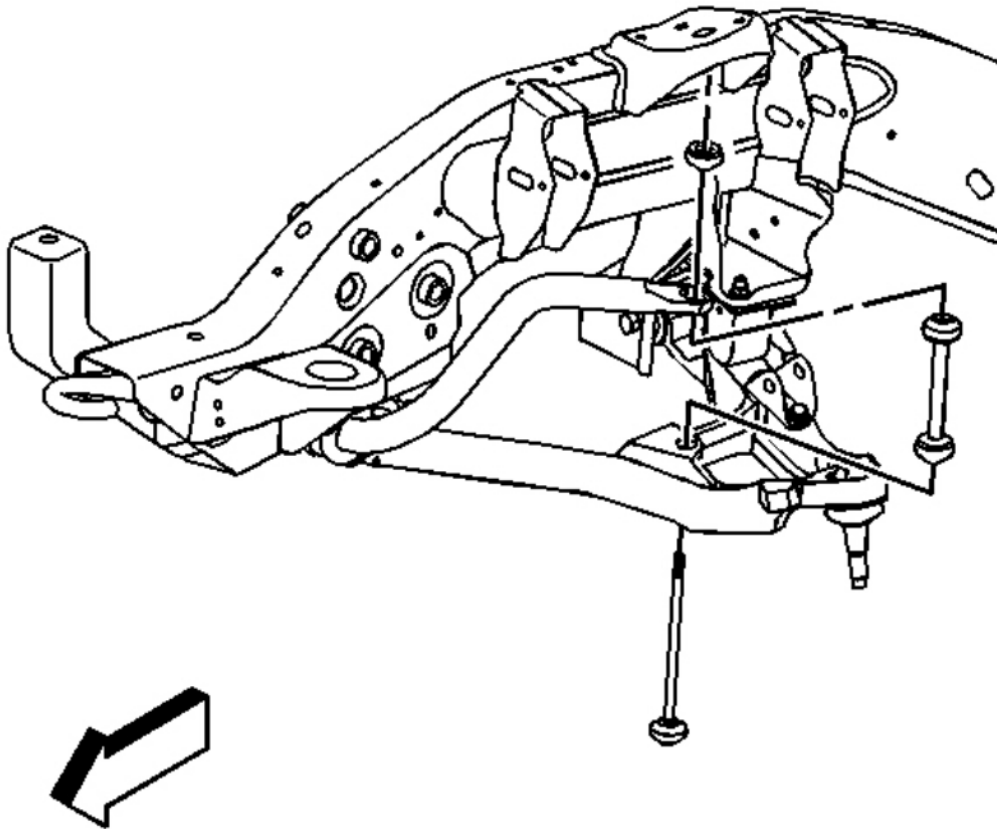


Fig. 8: Link Bolts & Link Assemblies
Courtesy of GENERAL MOTORS CORP.

2. Remove the nuts from the link bolt assemblies.
3. Remove the link bolts.
4. Remove the link assemblies.

Installation Procedure

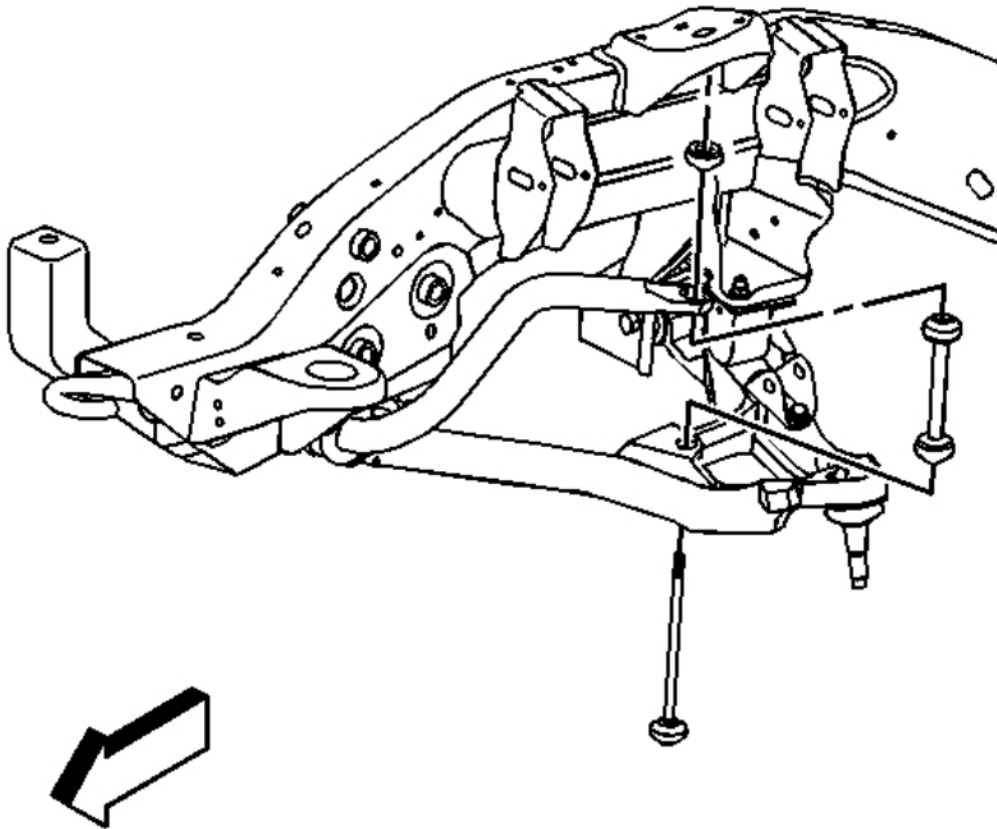


Fig. 9: Link Bolts & Link Assemblies
Courtesy of GENERAL MOTORS CORP.

1. Support the lower control arms at curb height.
2. Perform the following procedure before installing the bolts:
 - Remove all traces of the original adhesive patch.
 - Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 - Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489).
3. Install the link assemblies.
4. Install the link bolts.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the nuts to the link bolt assembly.

Tighten: Tighten the nuts to 23 N.m (17 lb ft).

6. Lower the vehicle.

STABILIZER SHAFT INSULATOR REPLACEMENT (1500 SERIES)

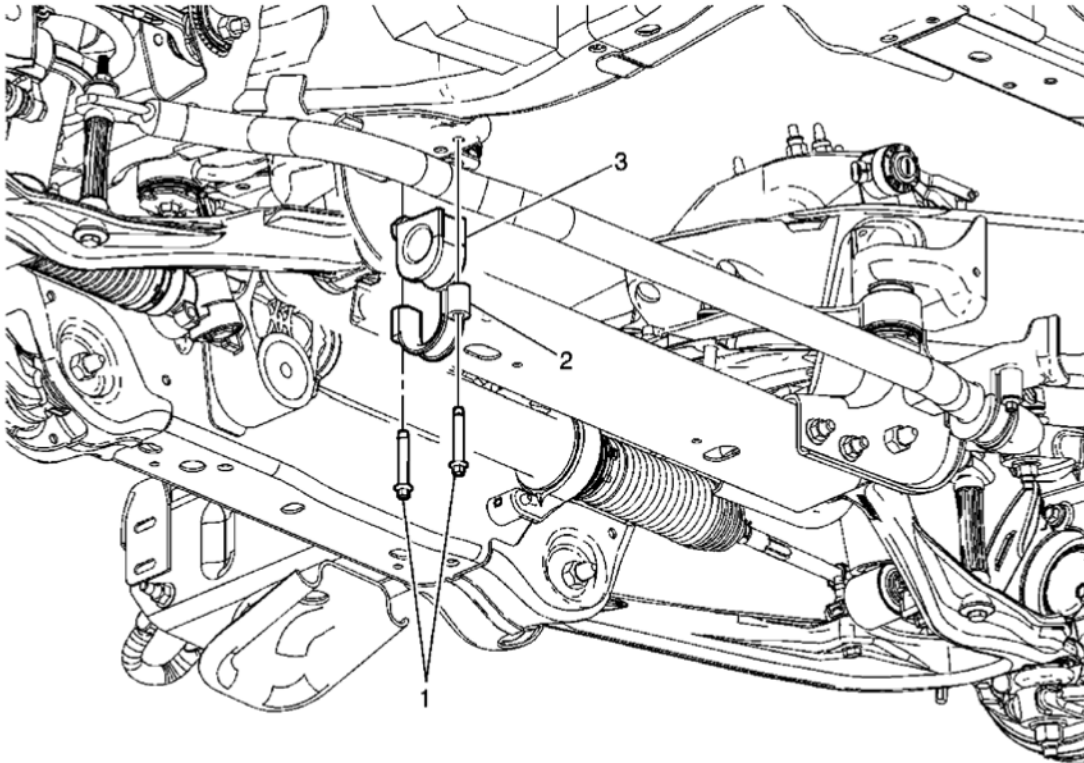


Fig. 10: View Of Stabilizer Shaft Insulator & Components
Courtesy of GENERAL MOTORS CORP.

Stabilizer Shaft Insulator Replacement (1500 Series)

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	
1	Stabilizer Shaft Bolts (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft) Tip:

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	1. Remove the bolts from the stabilizer shaft bracket. 2. Loosen the other stabilizer/shaft bracket bolts. DO NOT remove.
2	Stabilizer Shaft Bracket Tip: Remove the bracket from the stabilizer shaft insulator.
3	Stabilizer Shaft Insulator Tip: • Remove the stabilizer shaft insulator from the stabilizer shaft. • The stabilizer shaft insulator slits must be facing the rear of the vehicle.

STABILIZER SHAFT INSULATOR REPLACEMENT (2500 SERIES)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the engine protection shield. Refer to [Engine Shield Replacement](#) .

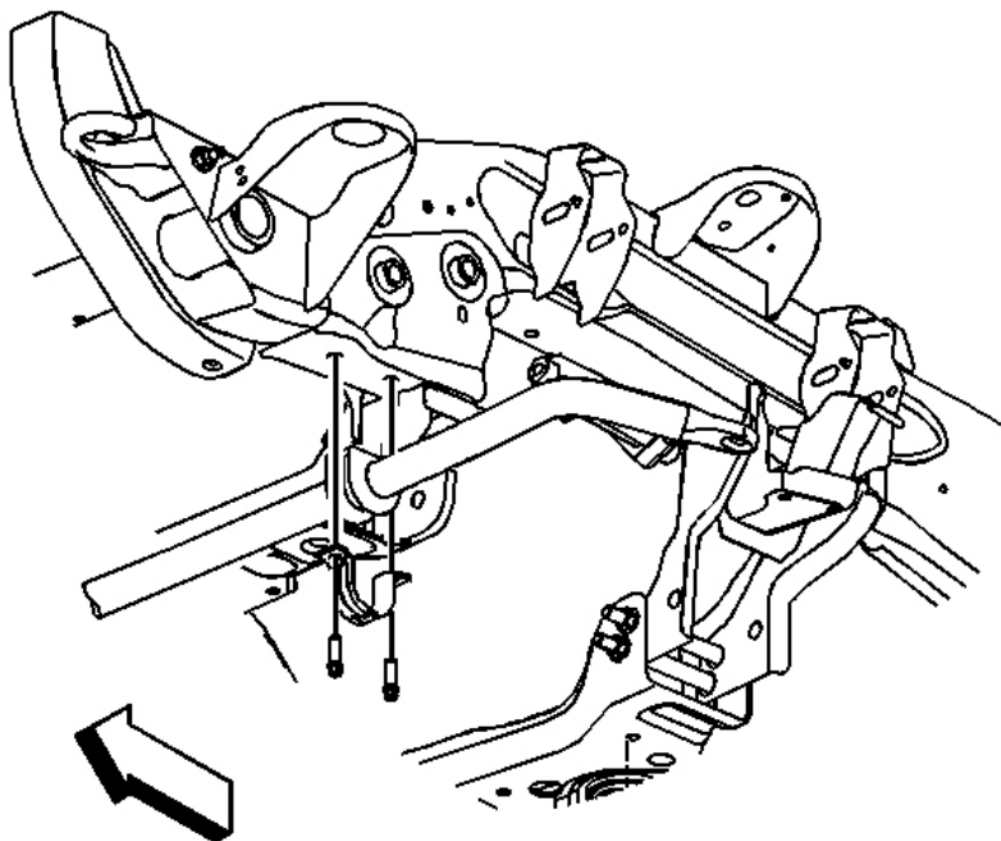


Fig. 11: Insulators & Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

3. Remove the insulator clamp bolts.
4. Remove the clamps.
5. Remove the insulators.
6. Inspect all of the parts for wear and damage.

Installation Procedure

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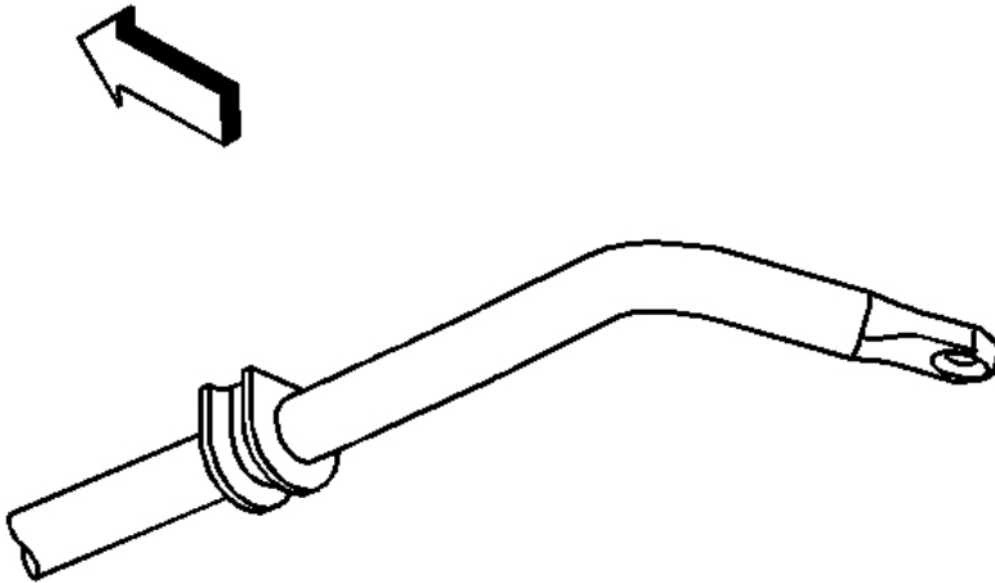


Fig. 12: View Of Insulator On Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

1. Place the insulators on the stabilizer shaft with the slits facing toward the front of the vehicle.

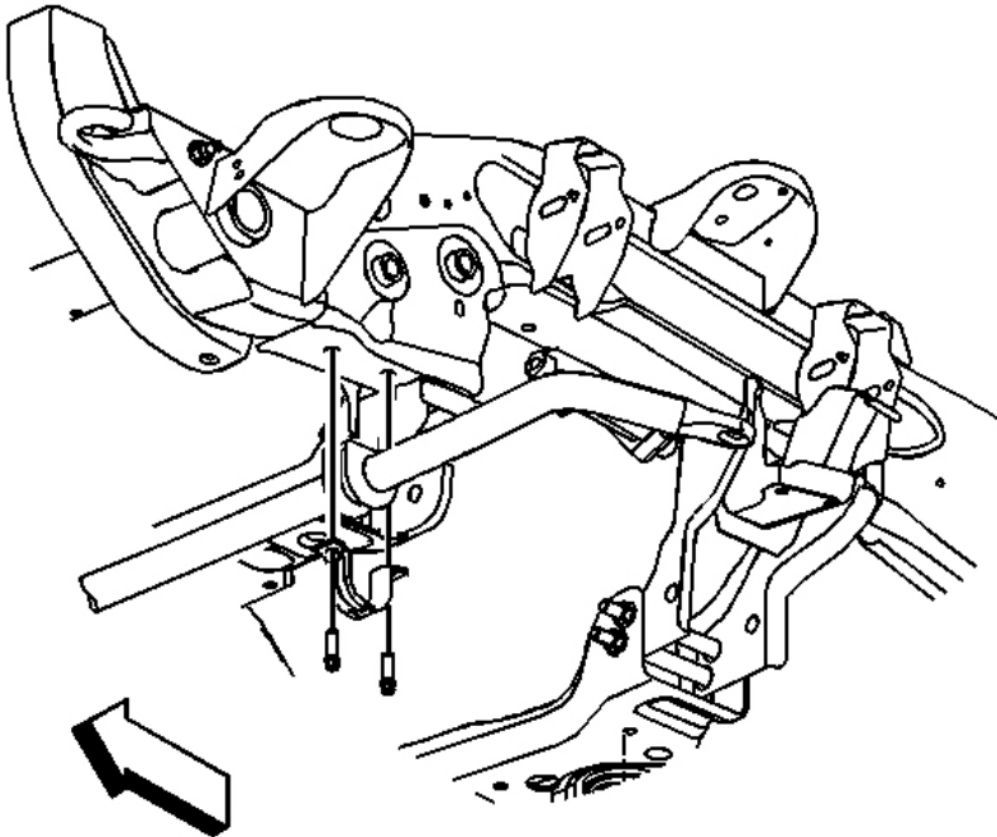


Fig. 13: Insulators & Stabilizer Shaft
Courtesy of GENERAL MOTORS CORP.

2. Install the insulators to the stabilizer shaft.
3. Install the stabilizer shaft.
4. Install the clamps over the insulators and the stabilizer shaft.

NOTE: Refer to Fastener Notice .

5. Install insulator clamp bolts.

Tighten: Tighten the bolts to 50 N.m (37 lb ft).

6. Install the engine protection shield. Refer to Engine Shield Replacement .
7. Lower the vehicle.

LOWER BALL JOINT REPLACEMENT (2500 SERIES)**Removal Procedure**

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the lower control arm. Refer to **Lower Control Arm Replacement (1500 Series)** or **Lower Control Arm Replacement (2500 Series)**.
4. Place the lower control arm in a bench vice.
5. Using a chisel, remove the securing crimps from the ball joint body, if equipped.
6. Using a press, remove the ball joint from the lower control arm.

Installation Procedure

IMPORTANT: Use the outer flange of the ball joint in order to press the ball joint into place.

1. Install the new ball joint using a press.
2. Place the lower control arm in a bench vice.
3. Using a punch, install crimps to the ball joint, if necessary. Use the replaced ball joint as a reference.
4. Install the lower control arm. Refer to **Lower Control Arm Replacement (1500 Series)** or **Lower Control Arm Replacement (2500 Series)**.
5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Remove the safety stands.
7. Lower the vehicle.
8. Verify the wheel alignment. Refer to **Measuring Wheel Alignment** .

STEERING KNUCKLE REPLACEMENT (1500 SERIES)

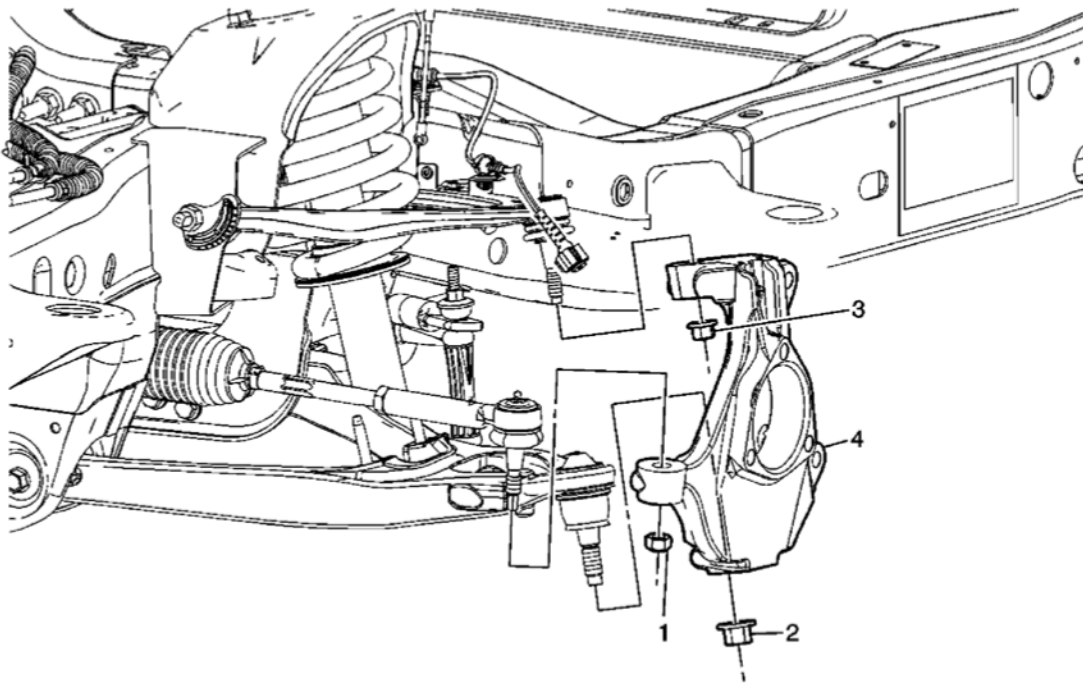


Fig. 14: View Of Steering Knuckle & Components
Courtesy of GENERAL MOTORS CORP.

Steering Knuckle Replacement (1500 Series)

Callout	Component Name
Tools Required • J 24319-B Steering Linkage and Tie Rod Puller • J 36660-A Torque Angle Meter. See <u>Special Tools</u>. • J 43631 Ball Joint Separator. See <u>Special Tools</u>. • J-42188-B Ball Joint Separator. See <u>Special Tools</u>.	
Preliminary Procedures 1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u>. 2. Remove the front tire and wheel assembly. Refer to <u>Tire and Wheel Removal and Installation</u>. 3. Place a suitable support under the lower control arm and load the suspension. 4. Remove the front wheel bearing/hub assembly. Refer to <u>Wheel Hub, Bearing, and Seal Replacement (1500 Series)</u> or <u>Wheel Hub, Bearing, and Seal Replacement (2500 Series)</u>.	
	Outer Tie Rod End Nut NOTE: Do not attempt to disconnect a steering linkage joint by driving a wedge between the

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1	joint and the attached part. Seal damage may result which will cause premature failure of the joint. NOTE: Refer to <u>Fastener Notice</u> . Tighten: 61 N.m (45 lb ft) plus an additional 95 degrees Tip: 1. Remove the outer tie rod nut from the tie rod stud. 2. Use the J 24319-B to separate the tie rod from the steering knuckle. 3. Use the J 36660-A for the final torque. See <u>Special Tools</u>.
2	Lower Ball Joint Nut Tighten: 110 N.m (81 lb ft) Tip: 1. Remove the lower ball joint nut from the ball joint stud. 2. Use the J 43631 to separate the ball joint from the steering knuckle. See <u>Special Tools</u>.
3	Upper Ball Joint Nut Tighten: 50 N.m (37 lb ft) Tip: 1. Remove the upper ball joint nut from the ball joint stud. 2. Use the J-42188-B to separate the ball joint from the steering knuckle. See <u>Special Tools</u>.
4	Steering Knuckle Tip: Remove the steering knuckle from the vehicle.

STEERING KNUCKLE REPLACEMENT (2500 SERIES)

Tools Required

- **J 43631** Ball Joint Remover. See **Special Tools**.
- **J 45851** Ball Joint Separator Protector Adaptor. See **Special Tools**.
- **J-42188-B** Ball Joint Separator. See **Special Tools**.

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Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Support the lower control arm.
4. Remove the wheel hub and bearing assembly. Refer to **Wheel Hub, Bearing, and Seal Replacement (1500 Series)** or **Wheel Hub, Bearing, and Seal Replacement (2500 Series)**.
5. Disconnect the outer tie rod to the steering knuckle. Refer to **Tie Rod Replacement - Outer** .
6. Remove the brake hose bracket retaining bolt from the steering knuckle.

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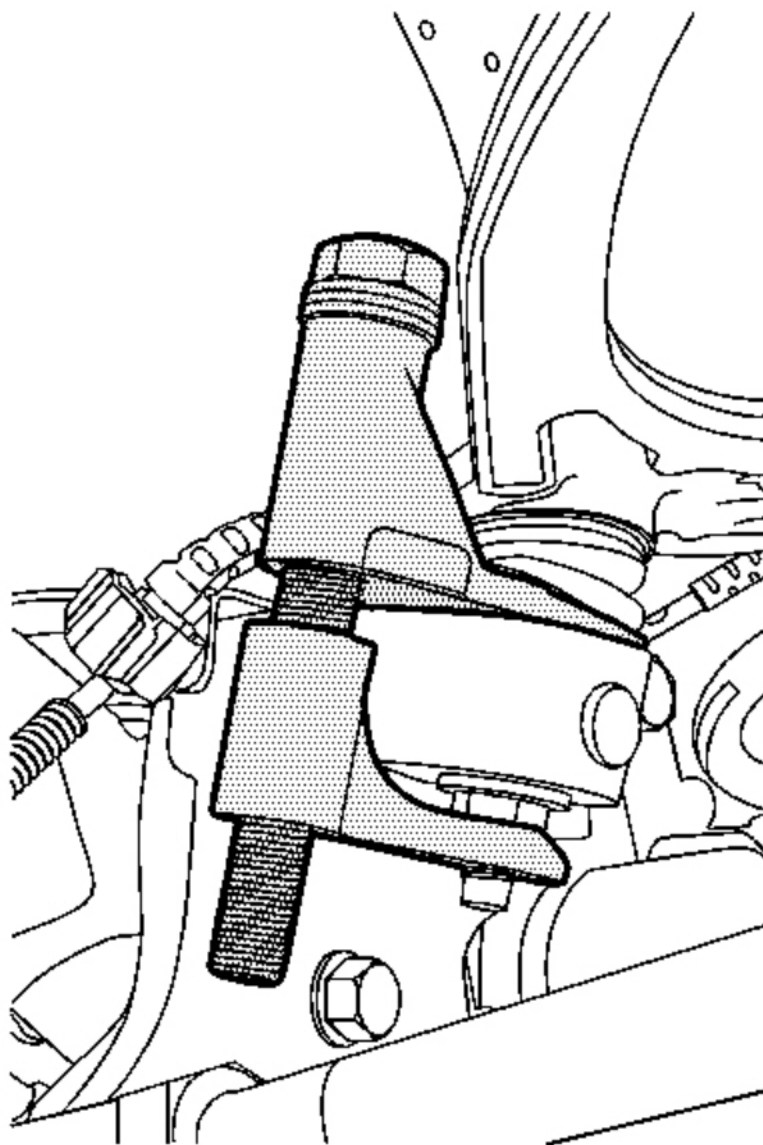


Fig. 15: View Of Special Tool At Upper Ball Joint & Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

7. Remove the upper control arm retaining nut and separate the upper ball joint from the steering knuckle using the **J-42188-B** . See **Special Tools**.

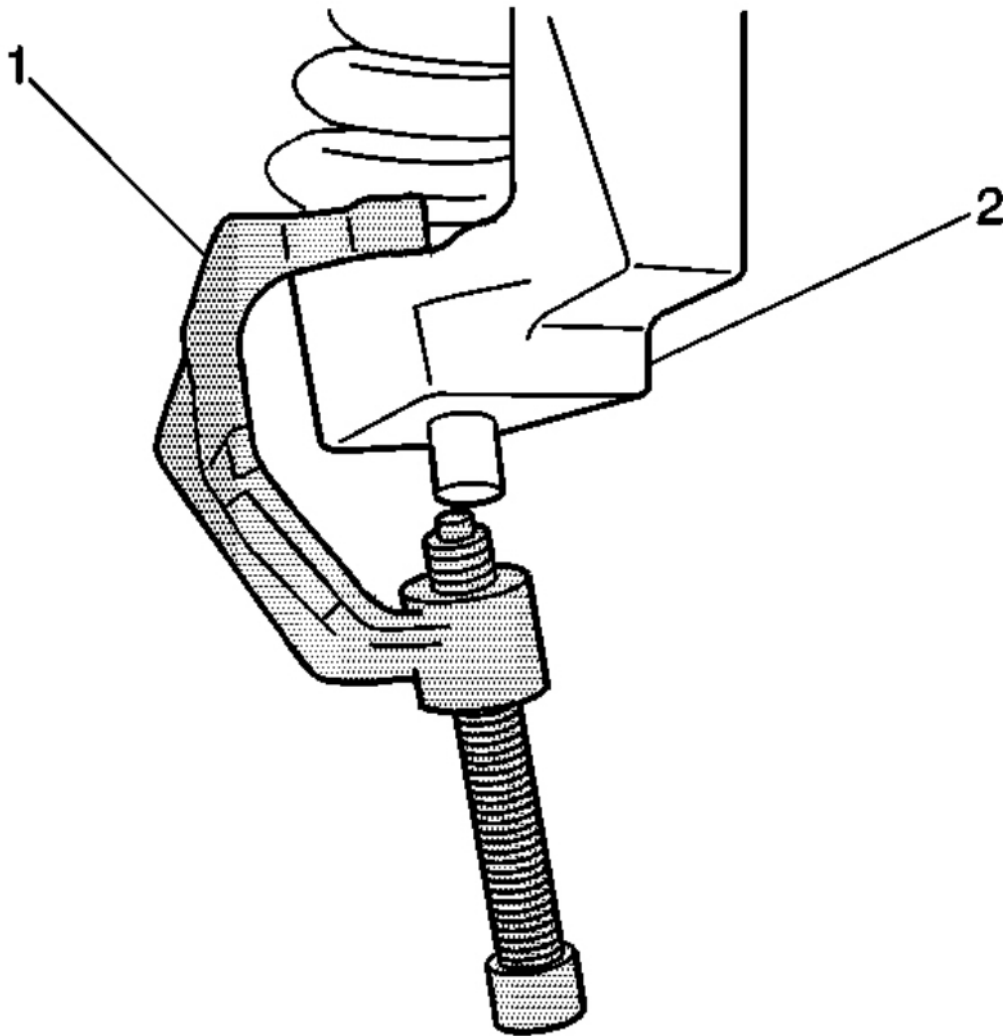


Fig. 16: View Of Special Tool At Lower Ball Joint & Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

8. Remove the lower control arm retaining nut. Separate the lower ball joint from the steering knuckle (2) using the **J 43631** and the **J 45851** (1). See **Special Tools**.

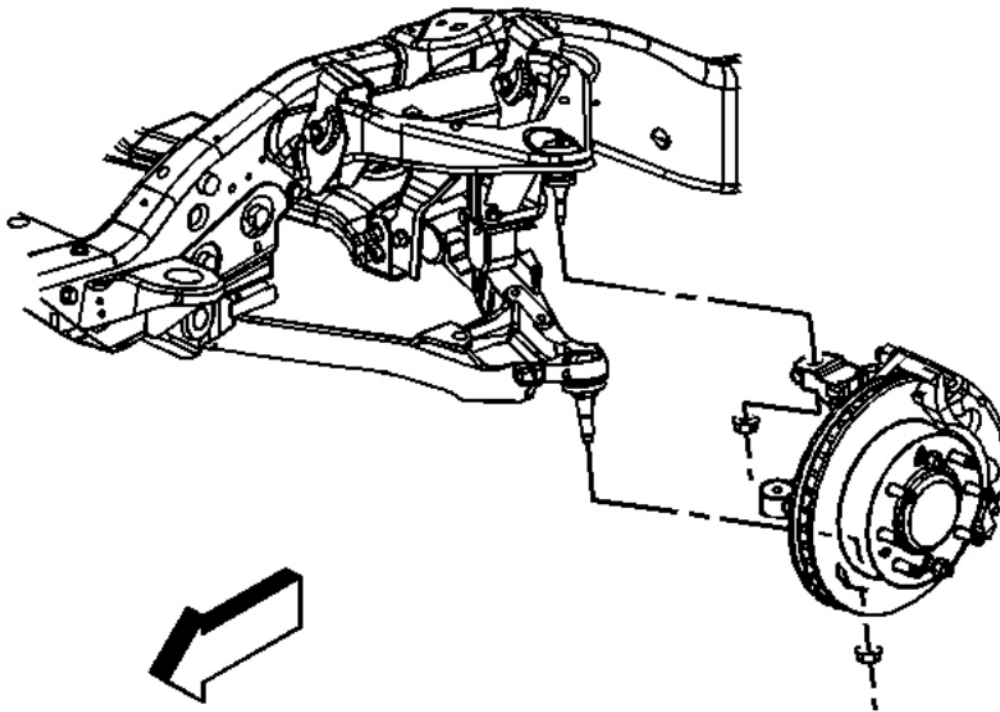


Fig. 17: Identifying Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

9. Remove the steering knuckle.

Installation Procedure

1. Clean all grease and contaminants from the tapered section and the threads of the upper ball joint, the lower ball joint, and the tie rod end.
2. Clean and inspect the taper holes and the mounting surfaces of the steering knuckle. If any of the tapered holes are elongated, out of round, or damaged, replace the steering knuckle.

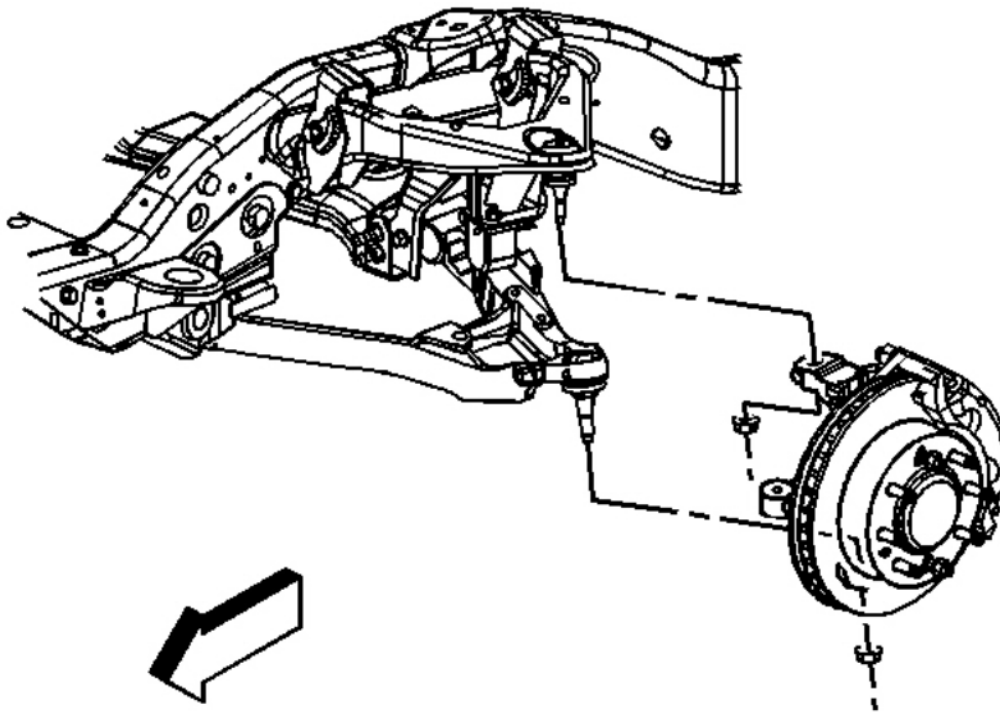


Fig. 18: Identifying Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

3. Install the steering knuckle.

NOTE: Refer to Fastener Notice .

4. Connect the lower ball joint to the steering knuckle and install the retaining nut.

Tighten: Tighten the nut to 110 N.m (81 lb ft).

5. Connect the upper ball joint to the steering knuckle and install the retaining nut.

Tighten: Tighten the nut to 50 N.m (37 lb ft).

6. Install the brake hose and the bracket retaining bolt to the steering knuckle

Tighten: Tighten the bolt to 9 N.m (80 lb in).

7. Connect the outer tie rod to the steering knuckle. Refer to **Tie Rod Replacement - Outer** .

8. Install the wheel hub and bearing assembly. Refer to Wheel Hub, Bearing, and Seal Replacement (1500 Series) or Wheel Hub, Bearing, and Seal Replacement (2500 Series).
9. Install the tire and wheel. Refer to Tire and Wheel Removal and Installation.
10. Remove the lower control arm support.
11. Lower the vehicle.
12. Verify the wheel alignment. Refer to Wheel Alignment Specifications.

UPPER CONTROL ARM REPLACEMENT (1500 SERIES)

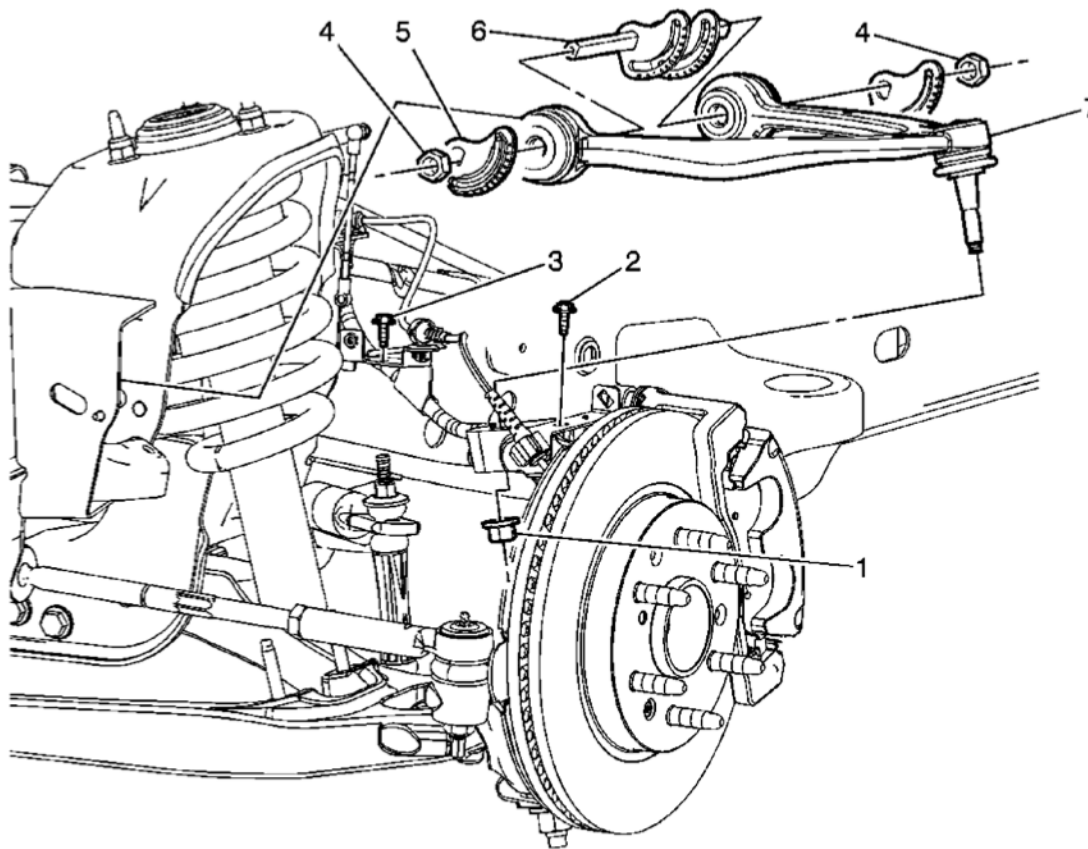


Fig. 19: View Of Upper Control Arm & Components
Courtesy of GENERAL MOTORS CORP.

Upper Control Arm Replacement (1500 Series)

Callout	Component Name
Tool Required: J-42188-B Ball Joint Separator. See <u>Special Tools</u> .	
Preliminary Procedures	

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1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Place a suitable support under the lower control arm and load the suspension.
4. Disconnect the height sensor rod from the upper control arm, if equipped.
5. Check for proper wheel alignment upon completion of the repair. Refer to **Wheel Alignment Specifications** .

1	Upper Ball Joint Nut NOTE: Do not attempt to disconnect a steering linkage joint by driving a wedge between the joint and the attached part. Seal damage may result which will cause premature failure of the joint. NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft) Tip: 1. Remove the upper ball joint nut from the ball joint stud. 2. Use the J-42188-B to separate the ball joint from the steering knuckle. See <u>Special Tools</u>.
2	Wheel Speed Sensor Wire Bolt Tighten: 10 N.m (89 lb ft) Tip: Remove the bolt from the steering knuckle.
3	Brake Hose/Wheel Speed Sensor Harness Retainer Bolt Tighten: 9 N.m (80 lb in) Tip: Remove the brake hose retainer bolt from the upper control arm.
4	Upper Control Arm Nut (Qty: 4) Tighten: 190 N.m (140 lb ft) Tip: Remove the upper control nuts from the cam bolts.
5	Upper Control Arm Alignment Cam (Qty: 4) Tip: Remove the adjusting cams from the bolts.

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6	Upper Control Arm Bolt (Qty: 2) Tip: Remove the bolts from the control arm.
7	Upper Control Arm Tip: Remove the upper control arm from the vehicle.

UPPER CONTROL ARM REPLACEMENT (2500 SERIES)

Tools Required

J-42188-B Ball Joint Separator. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the retaining bolt for the brake hose and the wheel speed sensor brackets.
4. Remove the nut at the upper ball joint. Discard the nut.

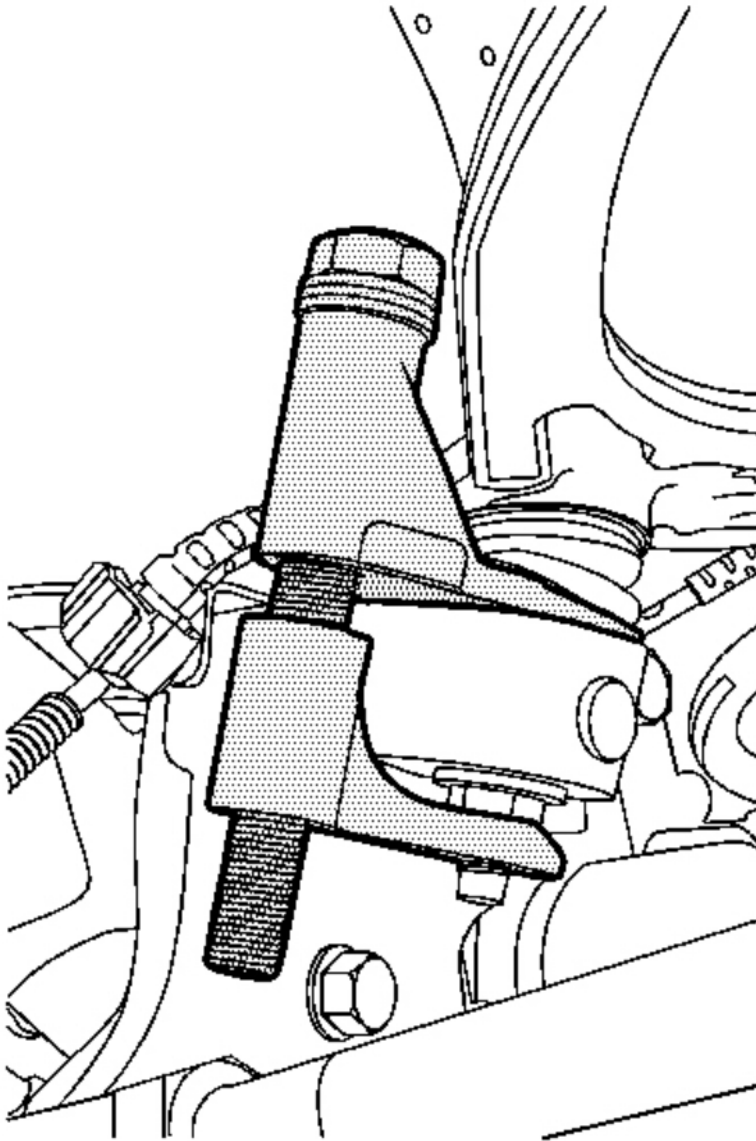


Fig. 20: View Of Special Tool At Upper Ball Joint & Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the upper control arm from the steering knuckle using the **J-42188-B** . See **Special Tools**.

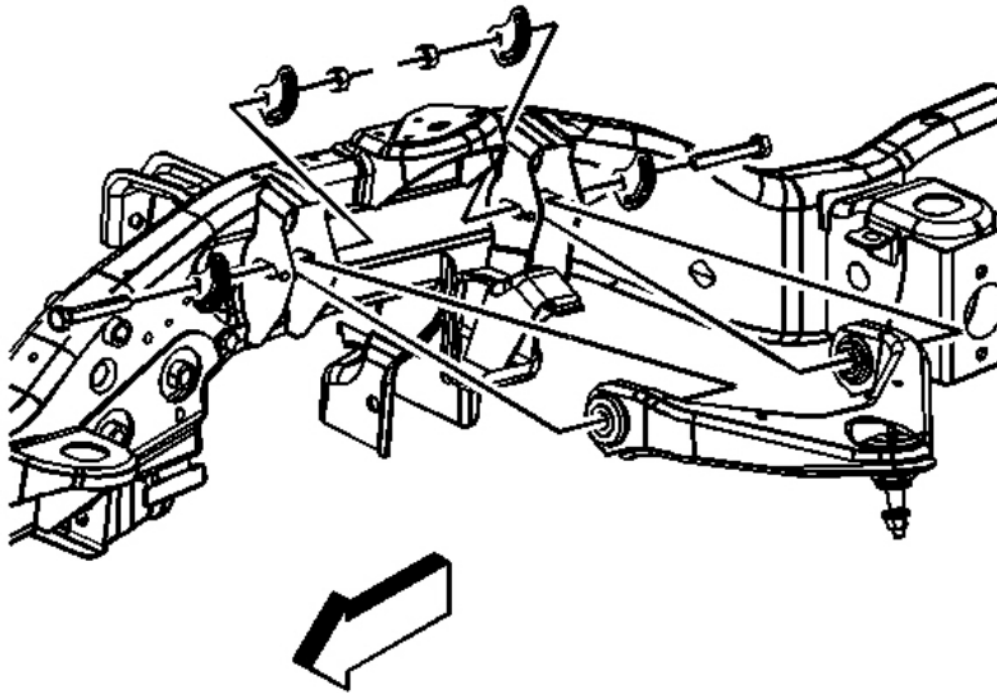


Fig. 21: View Of Upper Control Arm & Components
Courtesy of GENERAL MOTORS CORP.

6. Remove the upper control arm nuts and the adjustment cams.
7. Remove the upper control arm.

Installation Procedure

1. Install the upper control arm.

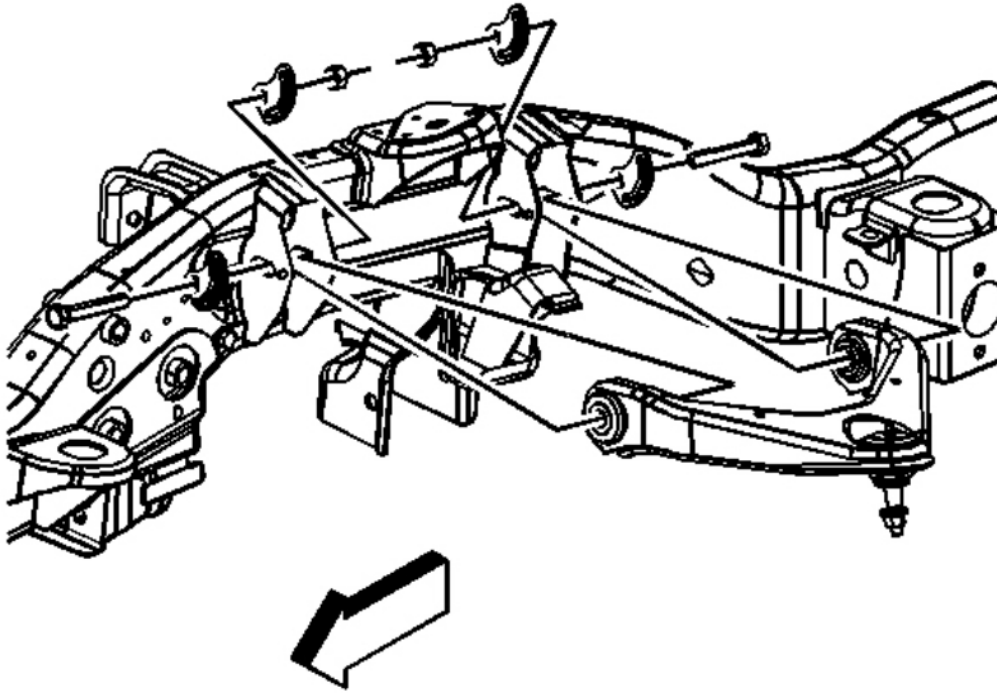


Fig. 22: View Of Upper Control Arm & Components
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the upper control arm bolts.

Tighten: Tighten the nuts to 190 N.m (140 lb ft).

3. Connect the upper control arm to the steering knuckle.
4. Install the new nut to the upper ball joint stud.

Tighten: Tighten the nut to 50 N.m (39 lb ft).

5. Install the retaining bolts for the brake hose and wheel speed sensor brackets.

Tighten: Tighten the bolts to 9 N.m (80 lb in).

6. Install the tire and wheel. Refer to Tire and Wheel Removal and Installation .

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7. Lower the vehicle.
8. Verify the wheel alignment. Refer to **Wheel Alignment Specifications** .

LOWER CONTROL ARM REPLACEMENT (1500 SERIES)

Tools Required

- **J 43631** Ball Joint Separator. See **Special Tools**.
- **J 45851** Ball Joint Separator Protector Adapters. See **Special Tools**.

Removal Procedure

IMPORTANT: The lower ball joint and control arm are serviced as an assembly and are not serviced separately.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Support the lower control arm with a safety stand.
3. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
4. Remove the stabilizer shaft links from the lower control arm. Refer to **Stabilizer Shaft Link Replacement (1500 Series)** or **Stabilizer Shaft Link Replacement (2500 Series)**.

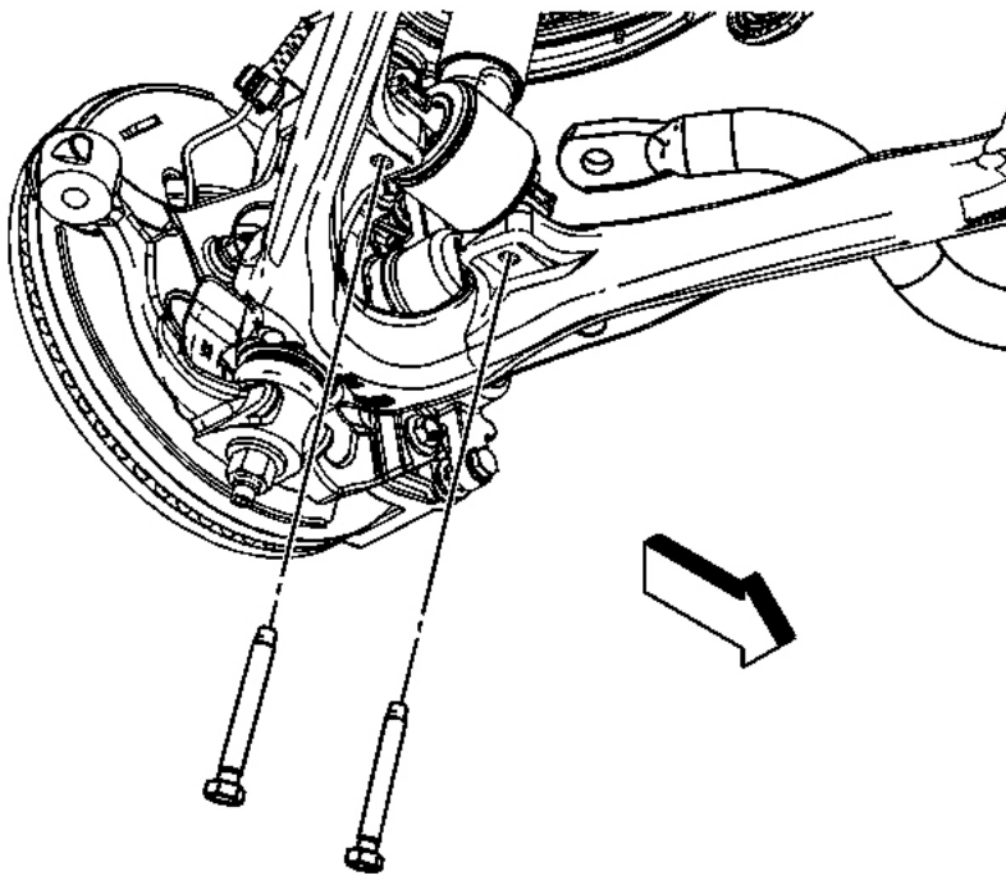


Fig. 23: View Of Lower Shock Absorber Module Mount Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the 2 lower shock absorber module mount bolts.
6. If equipped, remove the wheel drive shaft nut.

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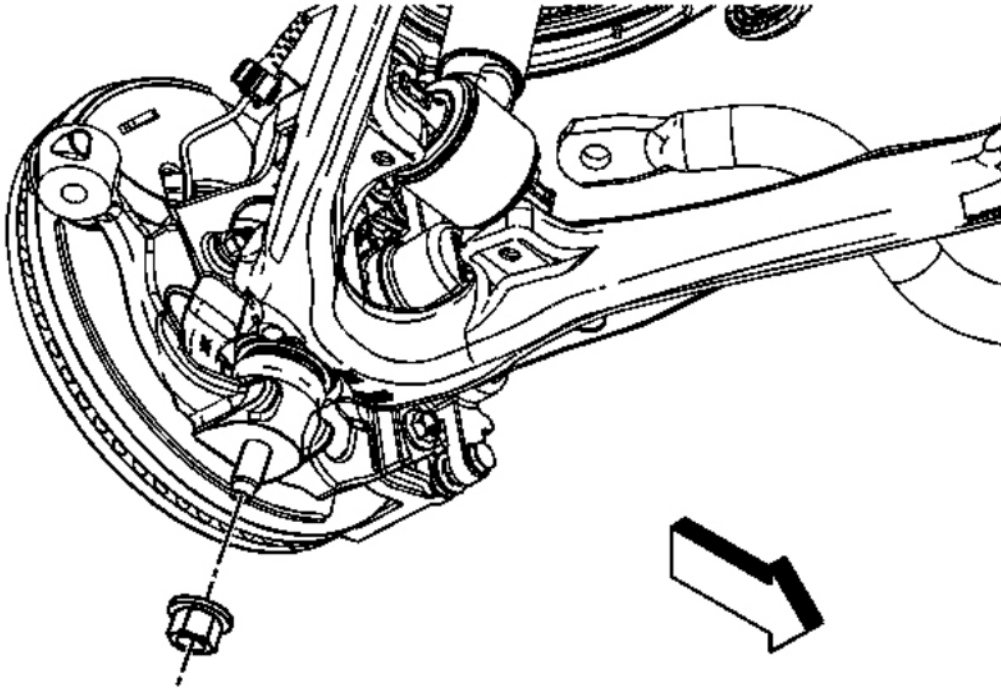


Fig. 24: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS CORP.

7. Remove the lower ball joint retaining nut.

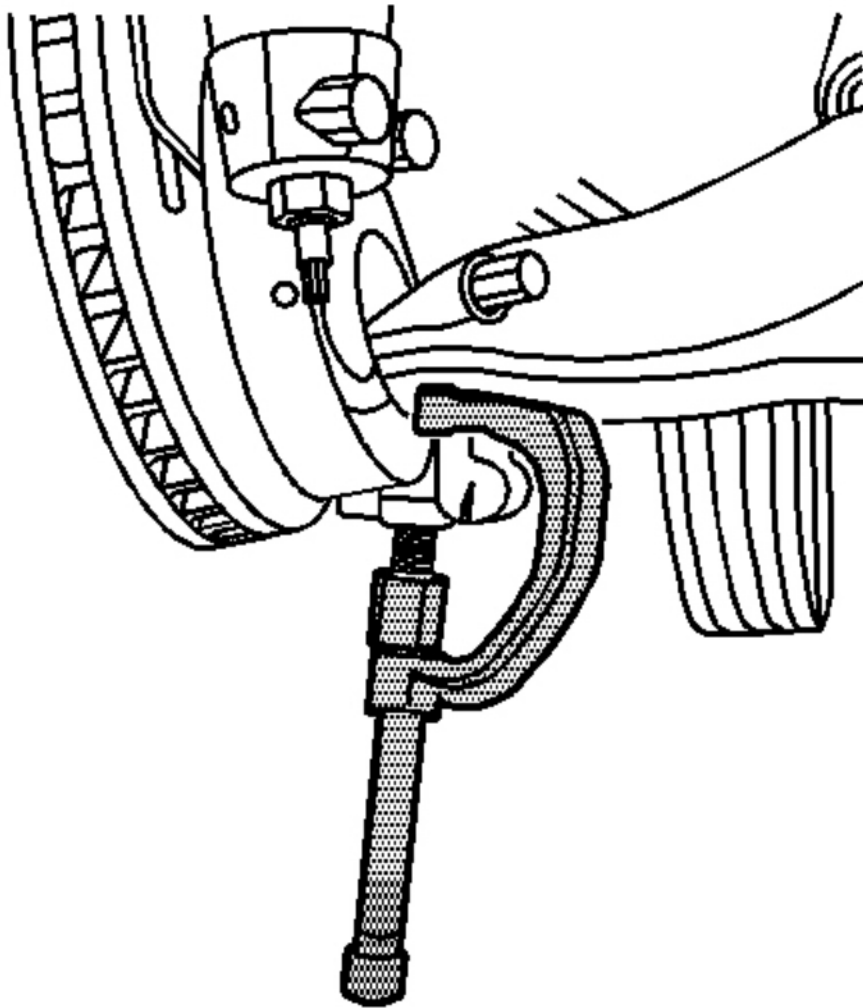


Fig. 25: Separating The Lower Ball Joint From The Steering Knuckle (RWD)
Courtesy of GENERAL MOTORS CORP.

8. Using the **J 43631** and the **J 45851** , remove the lower ball joint from the steering knuckle. See **Special Tools**.
9. Remove the lower control arm nuts and washers.
10. Remove the control arm bolts.
11. Remove the control arm.

1. Install the lower control arm.
2. Install the lower control arm bolts.
3. Install the washers.

NOTE: Refer to Fastener Notice .

4. Install the lower control arm retaining nuts.

Tighten: Tighten nuts to 175 N.m (129 lb ft).

5. Install the lower ball joint in the steering knuckle.
6. If equipped, install the wheel drive shaft. Refer to Wheel Drive Shaft Replacement (1500 Series) or Wheel Drive Shaft Replacement (2500 Series) .

Tighten: Tighten nut to 240 N.m (177 lb ft).

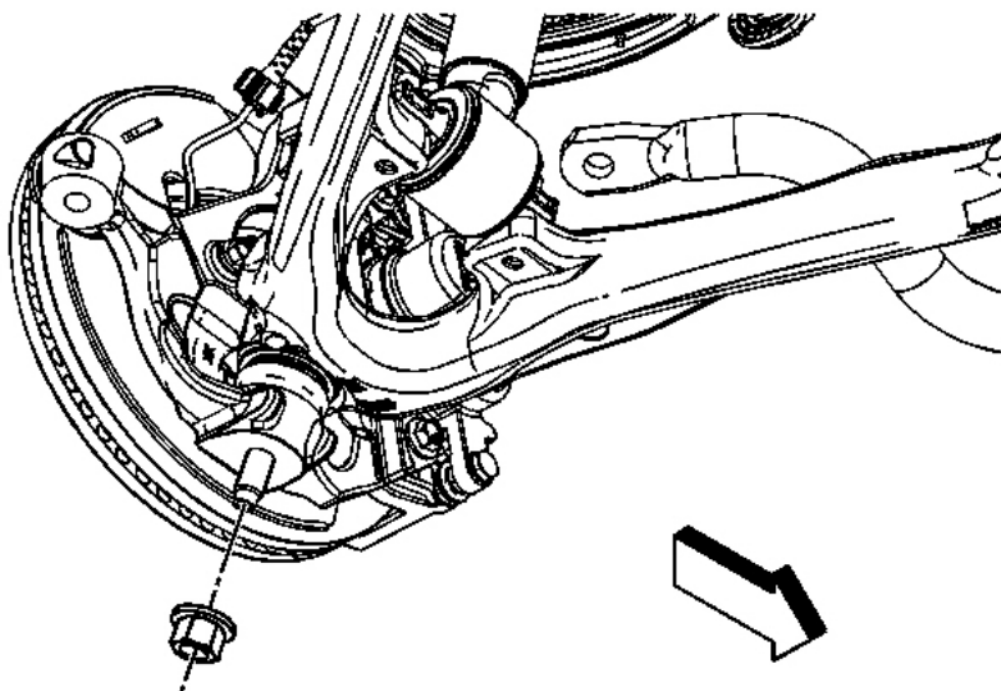


Fig. 26: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS CORP.

7. Install the lower ball joint retaining nut.

Tighten: Tighten nuts to 100 N.m (74 lb ft).

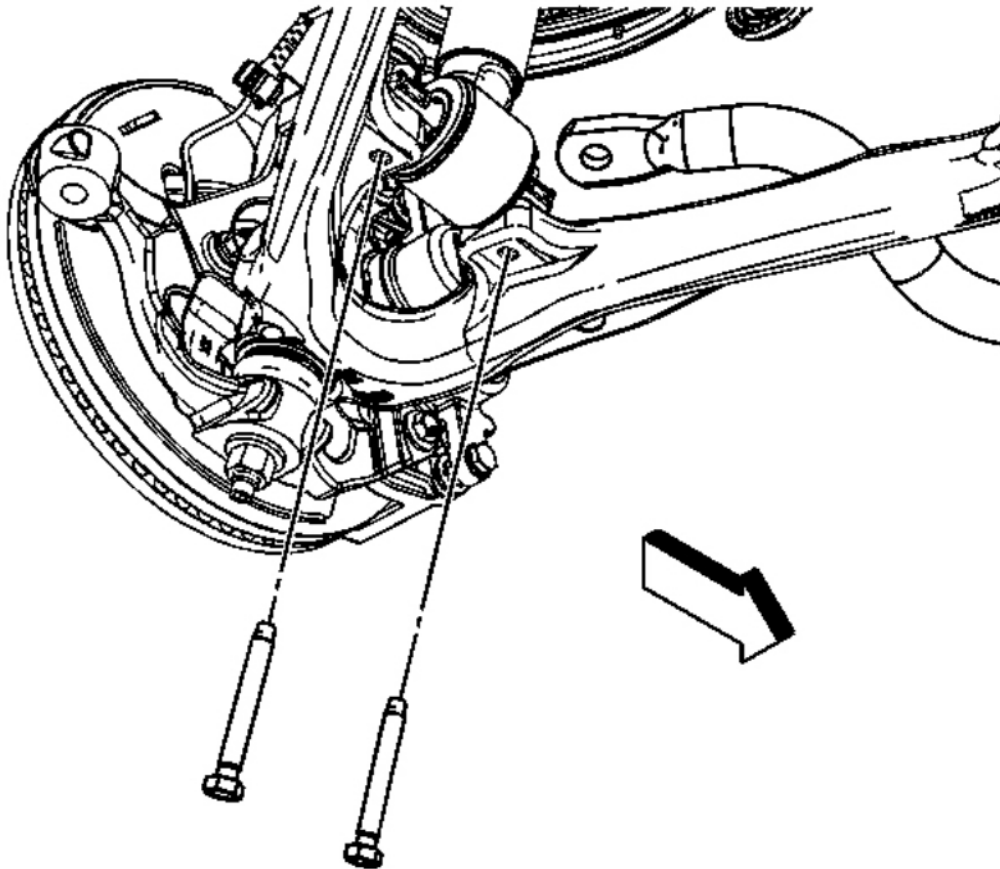


Fig. 27: View Of Lower Shock Absorber Module Mount Bolts
Courtesy of GENERAL MOTORS CORP.

8. Install the 2 lower shock absorber module mount bolts.

Tighten: Tighten bolts to 50 N.m (37 lb ft).

9. Install the stabilizer shaft links to the lower control arm. Refer to **Stabilizer Shaft Link Replacement (1500 Series)** or **Stabilizer Shaft Link Replacement (2500 Series)**.
10. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation**.
11. Remove the safety stands.

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12. Lower the vehicle.
13. Align the front end. Refer to **Measuring Wheel Alignment** .

LOWER CONTROL ARM REPLACEMENT (2500 SERIES)

Tools Required

- **J 43631** Ball Joint Separator. See **Special Tools**.
- **J 45851** Ball Joint Separator Protector Adapters. See **Special Tools**.

Removal Procedure

IMPORTANT: The lower ball joint and control arm are serviced as an assembly and are not serviced separately.

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

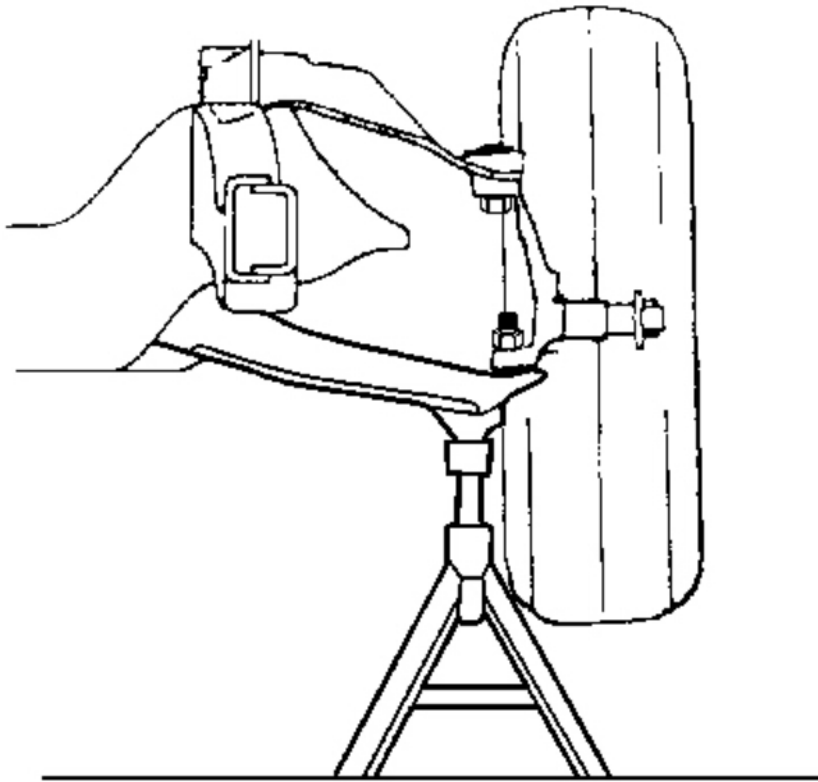


Fig. 28: Supporting Lower Control Arm With Jack Stand
Courtesy of GENERAL MOTORS CORP.

2. Support the lower control arm with a safety stand.
3. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
4. Remove the stabilizer shaft links from the lower control arm. Refer to **Stabilizer Shaft Replacement (1500 Series)** or **Stabilizer Shaft Replacement (2500 Series)**.
5. Remove the shock absorber module. Refer to **Shock Absorber Replacement (2500 Series)**.
6. Remove the torsion bars. Refer to **Torsion Bar Replacement (2500 Series)**.
7. Remove the wheel drive shafts. Refer to **Wheel Drive Shaft Replacement (1500 Series)** or **Wheel Drive Shaft Replacement (2500 Series)** .

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Fig. 29: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS CORP.

8. Remove the lower ball joint retaining nut.

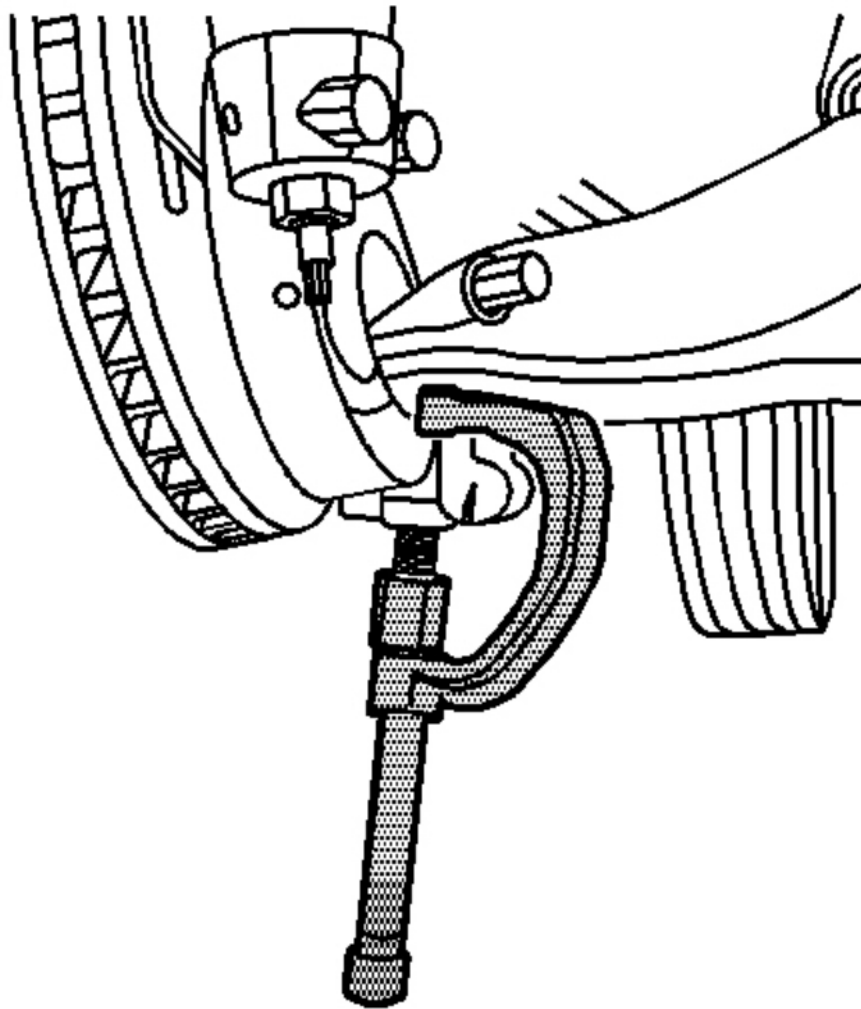


Fig. 30: Separating The Lower Ball Joint From The Steering Knuckle (RWD)
Courtesy of GENERAL MOTORS CORP.

9. Using the **J 43631** and the **J 45851** , remove the lower ball joint from the steering knuckle. See **Special Tools**.

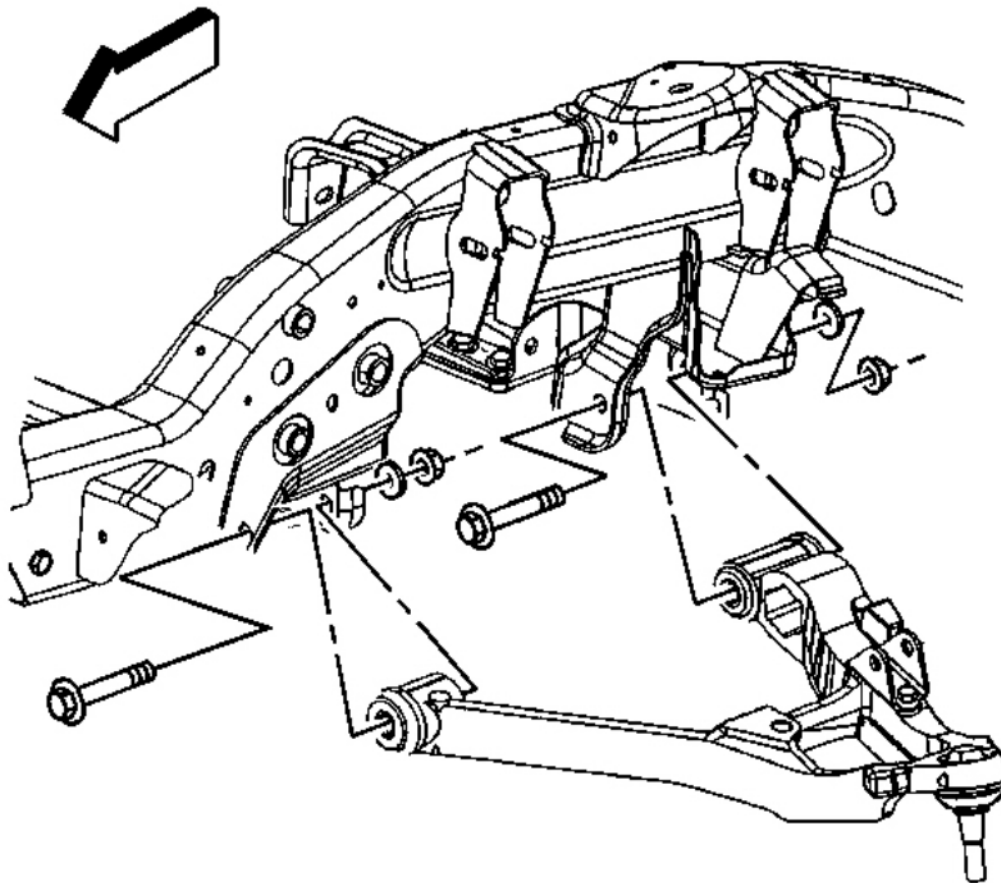


Fig. 31: Lower Control Arm, Nuts, Bolts & Washers (25/35 Series)
Courtesy of GENERAL MOTORS CORP.

10. Remove the lower control arm nuts and washers.
11. Remove the control arm bolts.
12. Remove the control arm.

Installation Procedure

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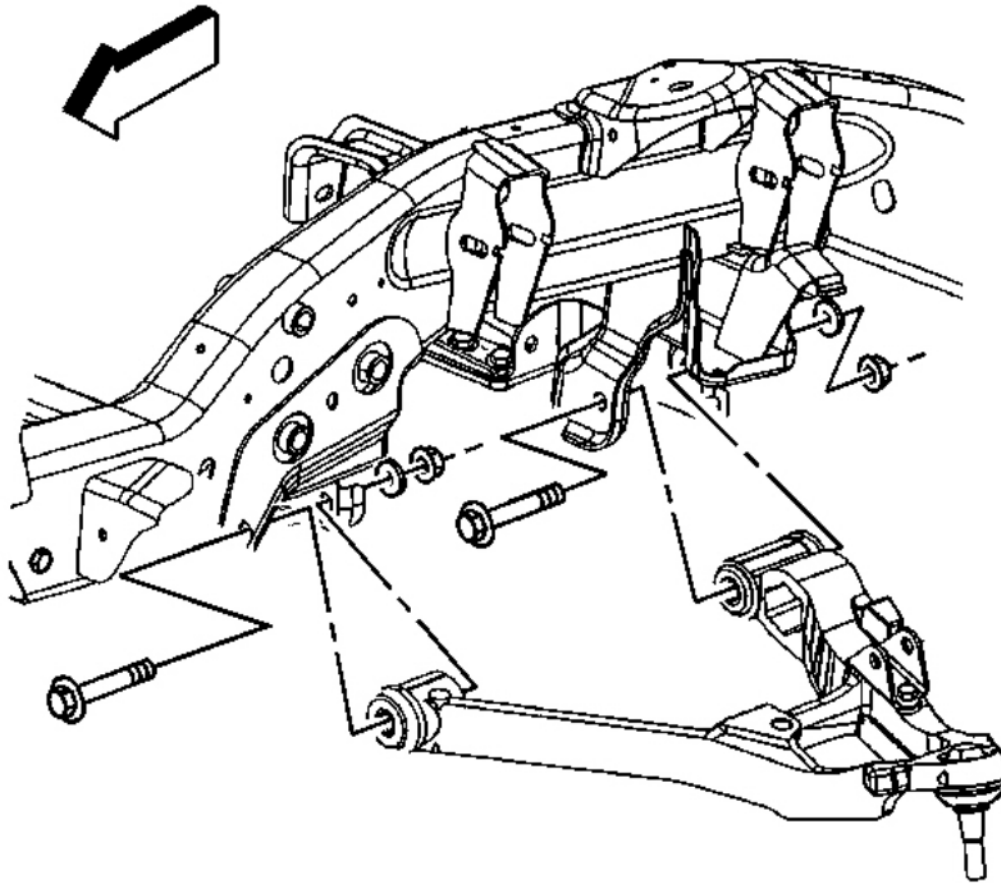


Fig. 32: Lower Control Arm, Nuts, Bolts & Washers (25/35 Series)
Courtesy of GENERAL MOTORS CORP.

1. Install the lower control arm.
2. Install the lower control arm bolts.
3. Install the washers.

NOTE: Refer to Fastener Notice .

4. Install the lower control arm retaining nuts.

Tighten: Tighten nuts to 175 N.m (129 lb ft).

5. Install the torsion bars. Refer to Torsion Bar Replacement (2500 Series).

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6. Install the lower ball joint in the steering knuckle.
7. Install the wheel drive shaft. Refer to **Wheel Drive Shaft Replacement (1500 Series)** or **Wheel Drive Shaft Replacement (2500 Series)**.

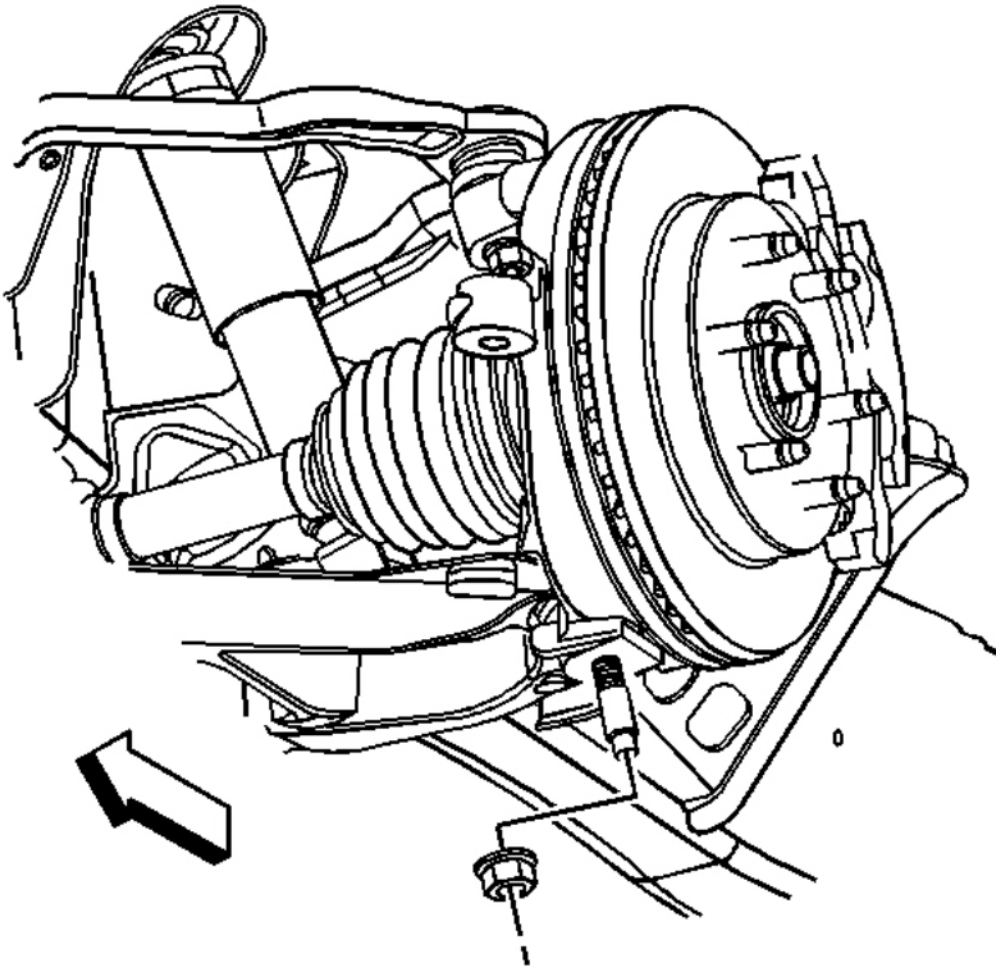


Fig. 33: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS CORP.

8. Install the lower ball joint retaining nut.

Tighten: Tighten nuts to 100 N.m (74 lb ft).

9. Install the shock module. Refer to **Shock Absorber Replacement (2500 Series)**.

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10. Install the stabilizer shaft links to the lower control arm. Refer to **Stabilizer Shaft Replacement (1500 Series)** or **Stabilizer Shaft Replacement (2500 Series)**.
11. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
12. Remove the safety stands.
13. Lower the vehicle.
14. Align the front end. Refer to **Measuring Wheel Alignment** .

SPRING JOUNCE BUMPER REPLACEMENT (2500 SERIES)

Removal Procedure

IMPORTANT: The following service procedure is for 2500 series vehicles.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

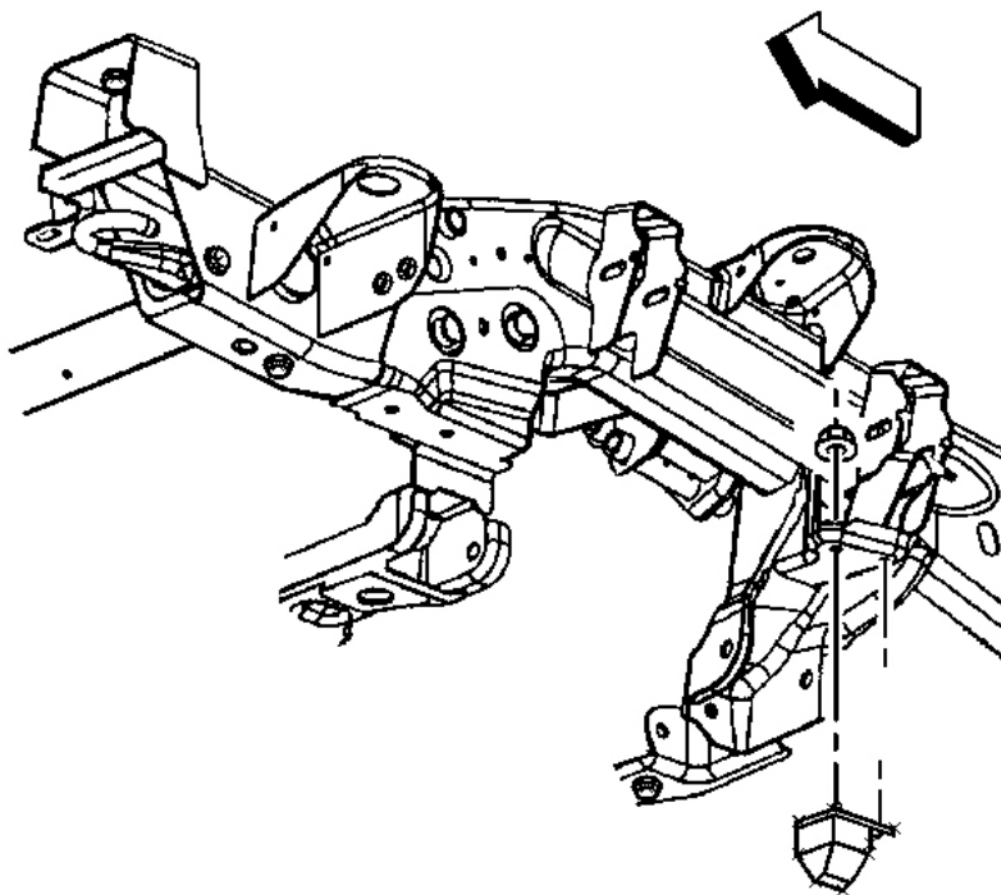


Fig. 34: View Of Jounce Bumper Stud & Nut
Courtesy of GENERAL MOTORS CORP.

3. Remove the nut from the jounce bumper stud.
4. Remove the jounce bumper.

Installation Procedure

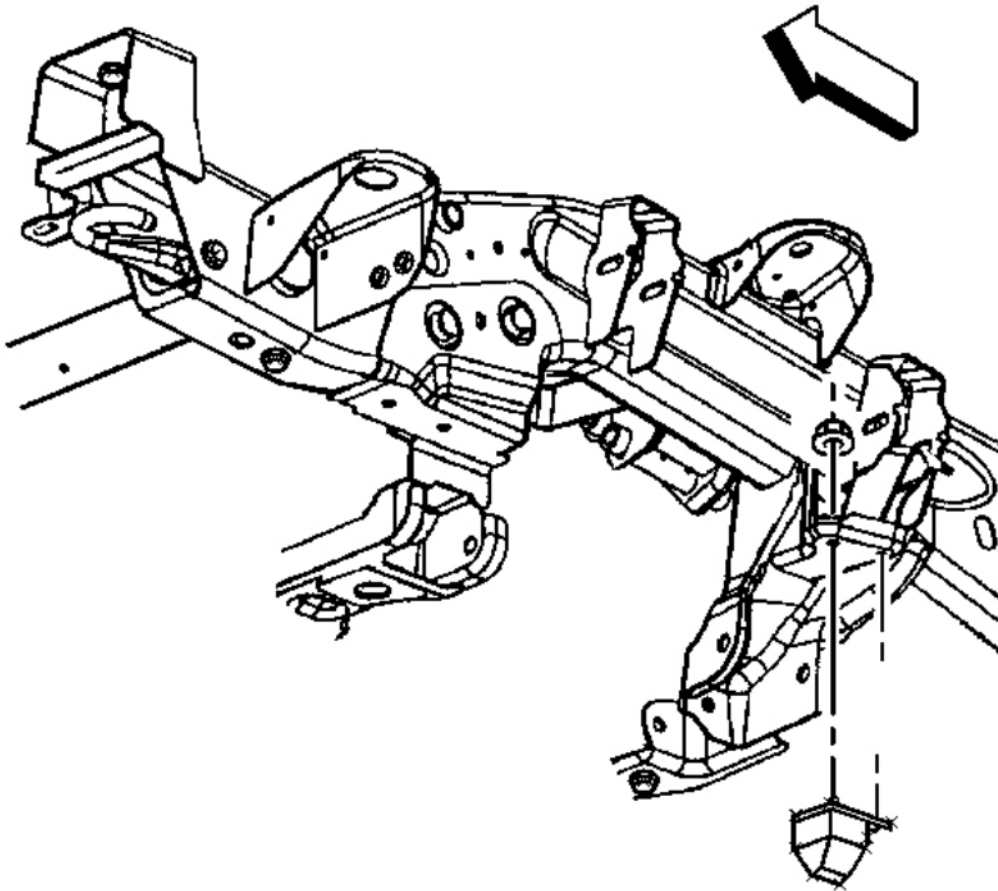


Fig. 35: View Of Jounce Bumper Stud & Nut
Courtesy of GENERAL MOTORS CORP.

1. Install the jounce bumper.

NOTE: Refer to Fastener Notice .

2. Install the nut to the jounce bumper stud.

Tighten: Tighten the nut to 30 N.m (22 lb ft).

3. Install the tire and wheel. Refer to Tire and Wheel Removal and Installation .
4. Lower the vehicle.

WHEEL STUD REPLACEMENT

Tools Required

J 43631 Ball Joint Remover. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the brake rotor. Refer to **Front Brake Rotor Replacement (1500 Series)** or **Front Brake Rotor Replacement (2500 Series)** .

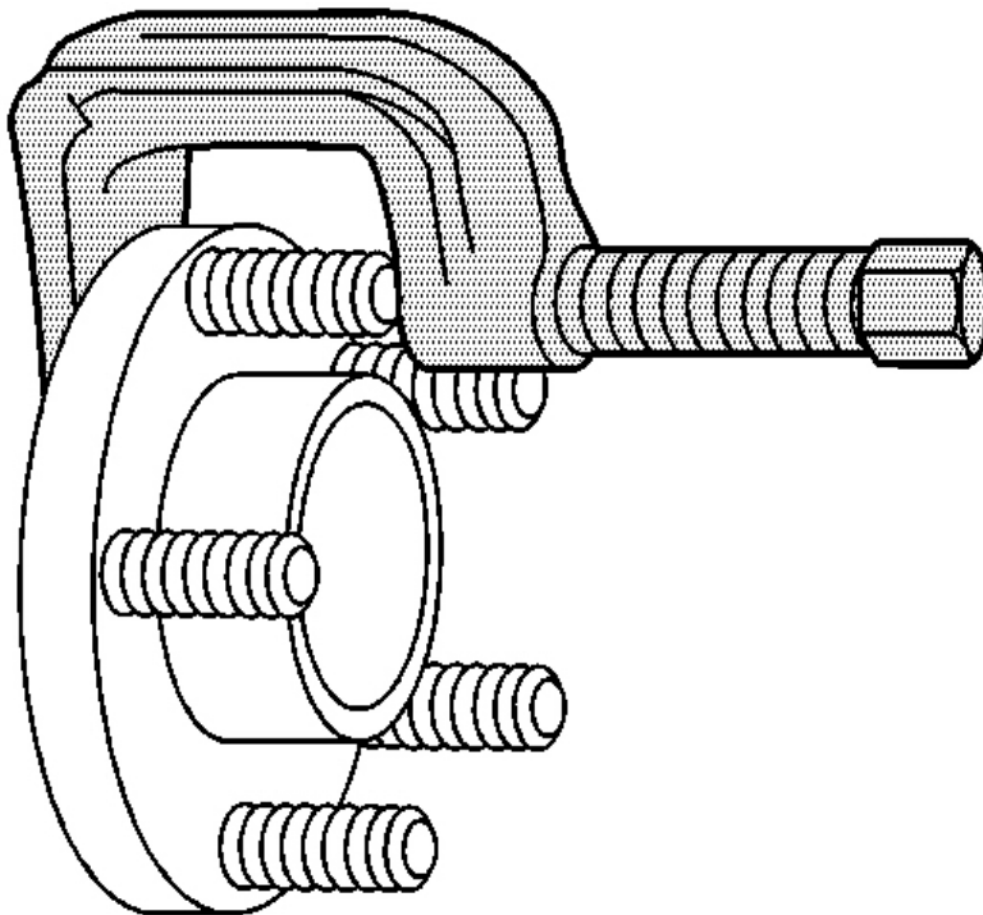


Fig. 36: Using J 43631 To Remove Wheel Stud From Wheel Bearing
Courtesy of GENERAL MOTORS CORP.

4. Use the **J 43631** to press the stud from the wheel bearing/hub. See **Special Tools**.

Installation Procedure

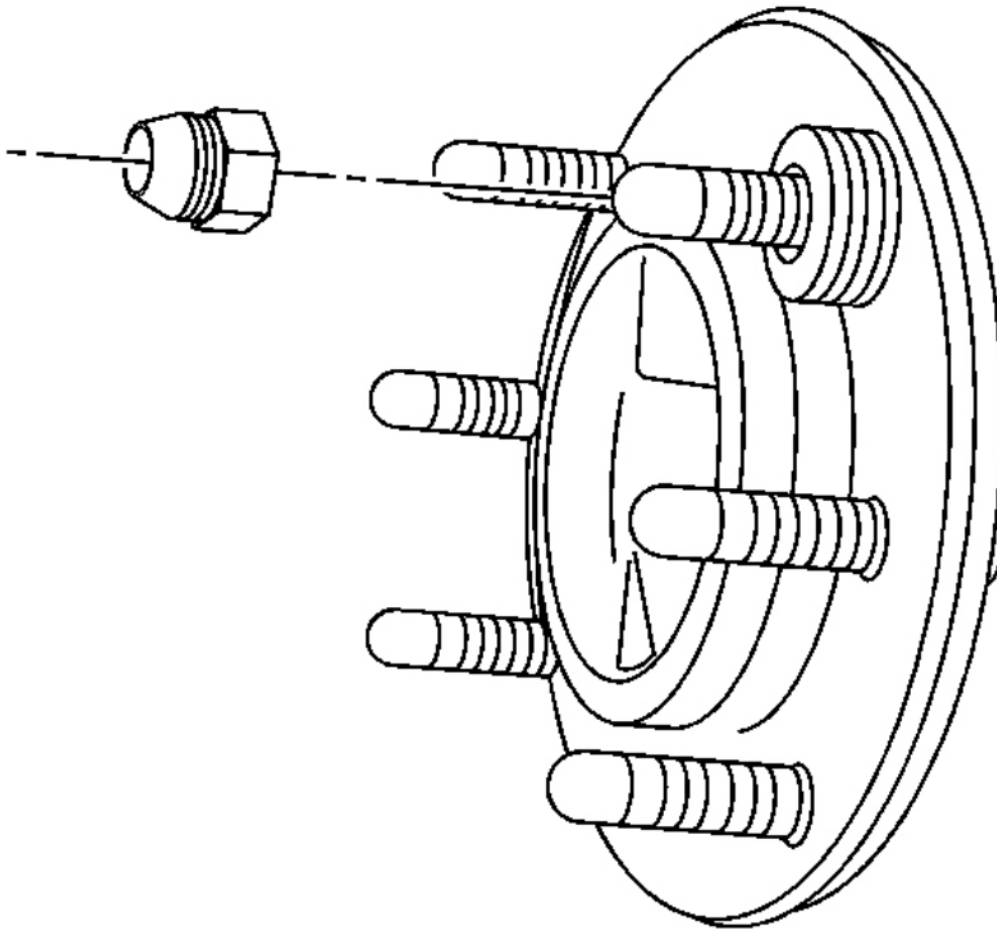


Fig. 37: View Of Wheel Nut & Studs
Courtesy of GENERAL MOTORS CORP.

1. Install a new stud. Use washers and a wheel nut and pull the new stud into the hub.
2. Install the brake rotor. Refer to **Front Brake Rotor Replacement (1500 Series)** or **Front Brake Rotor Replacement (2500 Series)**.

3. Install the tire and wheel. Refer to [Tire and Wheel Removal and Installation](#) .
4. Lower the vehicle.

WHEEL HUB, BEARING, AND SEAL REPLACEMENT (1500 SERIES)

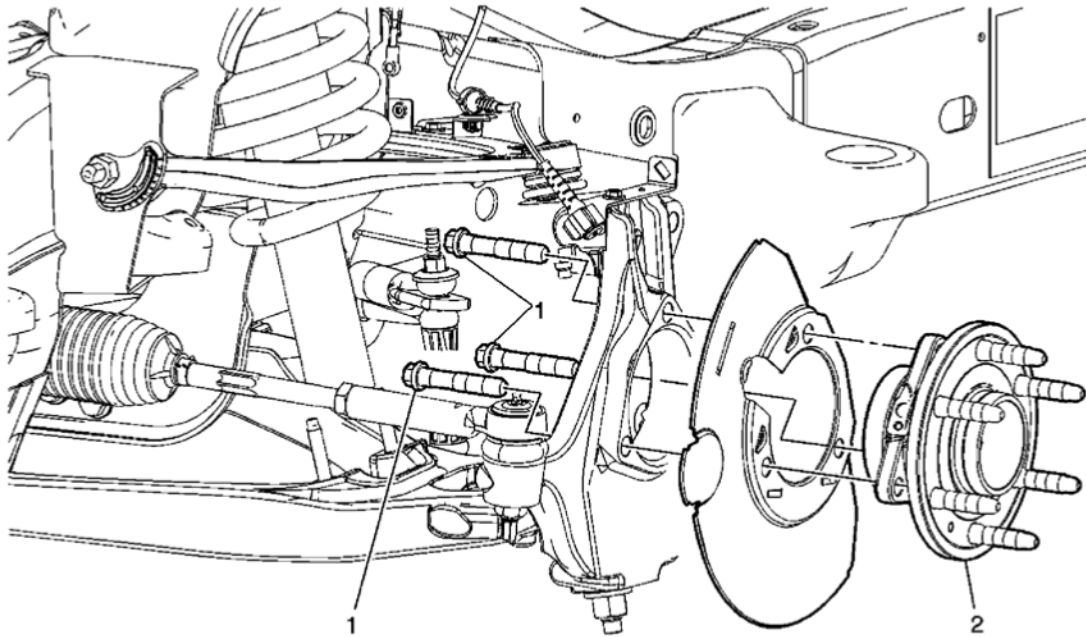


Fig. 38: View Of Wheel/Bearing Hub Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Wheel Hub, Bearing, and Seal Replacement (1500 Series)

Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the front tire and wheel assembly. Refer to <u>Tire and Wheel Removal and Installation</u> . 3. Remove the front brake rotor. Refer to <u>Front Brake Rotor Replacement (1500 Series)</u> or <u>Front Brake Rotor Replacement (2500 Series)</u> . 4. Remove the wheel speed sensor from the wheel bearing/hub assembly. Refer to <u>Front Wheel Speed Sensor Replacement</u> .	
1	Front Wheel Bearing/Hub Bolt (Qty: 3) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 180 N.m (133 lb ft)

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	Tip: Remove the bolts from the wheel bearing/hub assembly.
2	Wheel Bearing/Hub Assembly Tighten: 240 N.m (177 lb ft) Tip: • Remove the wheel bearing/hub assembly from the steering knuckle. • Install the wheel drive shaft to front hub nut. • The J 45859 Axle Remover, can be used to separate the bearing from the axle shaft.

WHEEL HUB, BEARING, AND SEAL REPLACEMENT (2500 SERIES)

Removal Procedure

NOTE: Never place vehicle on the ground with the halfshaft removed or the halfshaft nut torqued improperly. Otherwise, bearing seals may become dislodged causing premature wear and/or damage to the hub and bearing assembly.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rotor. Refer to **Front Brake Rotor Replacement (1500 Series)** or **Front Brake Rotor Replacement (2500 Series)** .
4. Remove the wheel speed sensor and brake hose mounting bracket bolt from the steering knuckle.
5. Disconnect the electrical connection for the wheel speed sensor.
6. Remove the wheel driveshaft nut retaining cover.
7. Remove the wheel driveshaft assembly retaining nut and washer from the wheel driveshaft assembly.

Disengage the wheel driveshaft from the wheel hub and bearing.

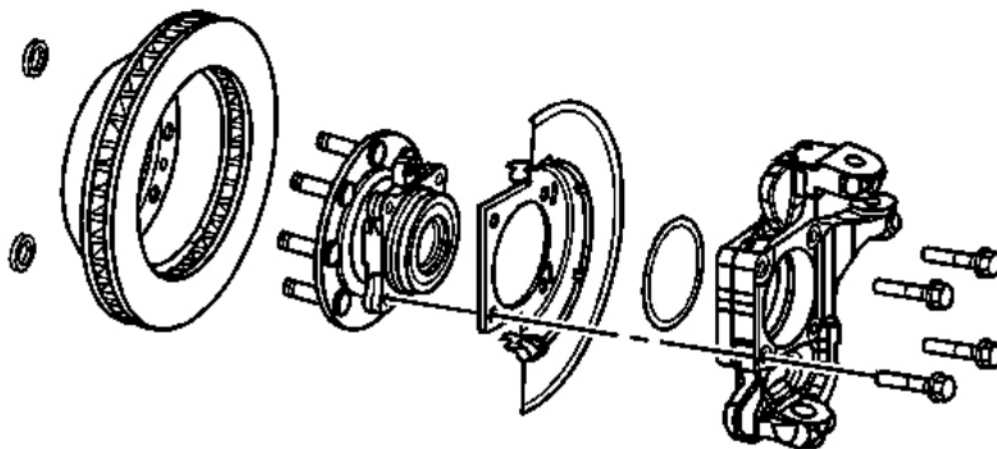


Fig. 39: Front Disc Brake Splash Shield Components
Courtesy of GENERAL MOTORS CORP.

8. Remove the wheel hub and bearing mounting bolts.
9. Remove the wheel hub and bearing and splash shield from the vehicle.
10. Remove the O-ring seal from the steering knuckle bore.
11. Remove the wheel speed sensor from the wheel hub and bearing.
12. Clean and inspect the O-ring seal.
13. Replace the seal if the following conditions exist:
 - Nicks
 - Cuts
 - Dry or brittle
 - Compression set

Installation Procedure

1. Clean all corrosion or contaminants from the steering knuckle bore and the hub and bearing assembly.
2. Lubricate the steering knuckle bore with wheel bearing grease or the equivalent.

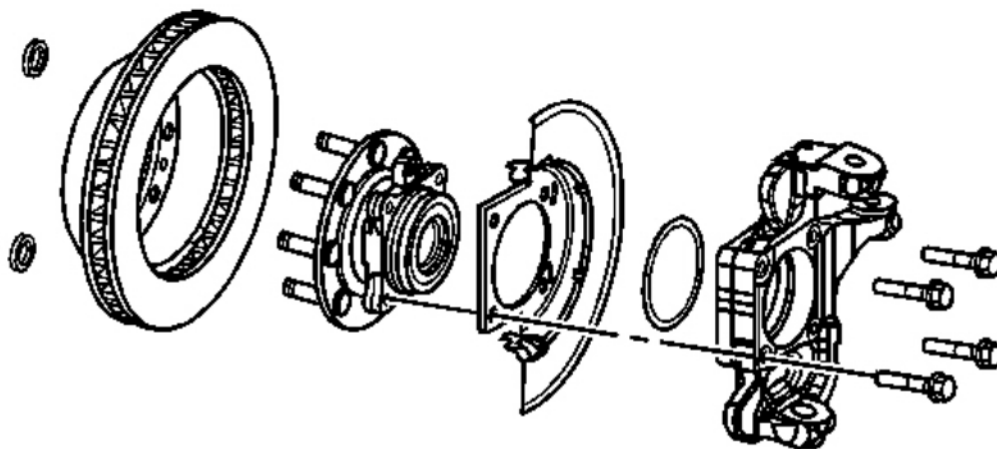


Fig. 40: Front Disc Brake Splash Shield Components
Courtesy of GENERAL MOTORS CORP.

3. Install the O-ring to the steering knuckle.

NOTE: Refer to Fastener Notice .

4. Install the wheel speed sensor to the wheel hub and bearing.

Tighten: Tighten the sensor mounting bolt to 18 N.m (13 lb ft).

5. Install the wheel hub and bearing and splash shield to the vehicle.
6. Install the wheel hub and bearing mounting bolts.

Tighten: Tighten the wheel hub to knuckle bolts to 180 N.m (133 lb ft).

7. Install the nut and washer retaining the wheel drive shaft assembly to the wheel hub and bearing.

Tighten: Tighten the nut to 240 N.m (177 lb ft).

8. Connect the electrical connection for the wheel speed sensor.
9. Install the wheel speed sensor and brake hose mounting bracket bolt to the steering knuckle.

Tighten: Tighten the bolt to 12 N.m (106 lb in).

10. Install the rotor. Refer to Front Brake Rotor Replacement (1500 Series) or Front Brake Rotor

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Replacement (2500 Series) .

11. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
12. Lower the vehicle.

TORSION BAR REPLACEMENT (2500 SERIES)

Tools Required

J 36202 Torsion Bar Unloading/Loading Tool. See **Special Tools**.

Removal Procedure

NOTE: Use care when handling the torsion bars in order to avoid chipping or scratching the coating. Damage to the coating will result in premature failure of the torsion bars.

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

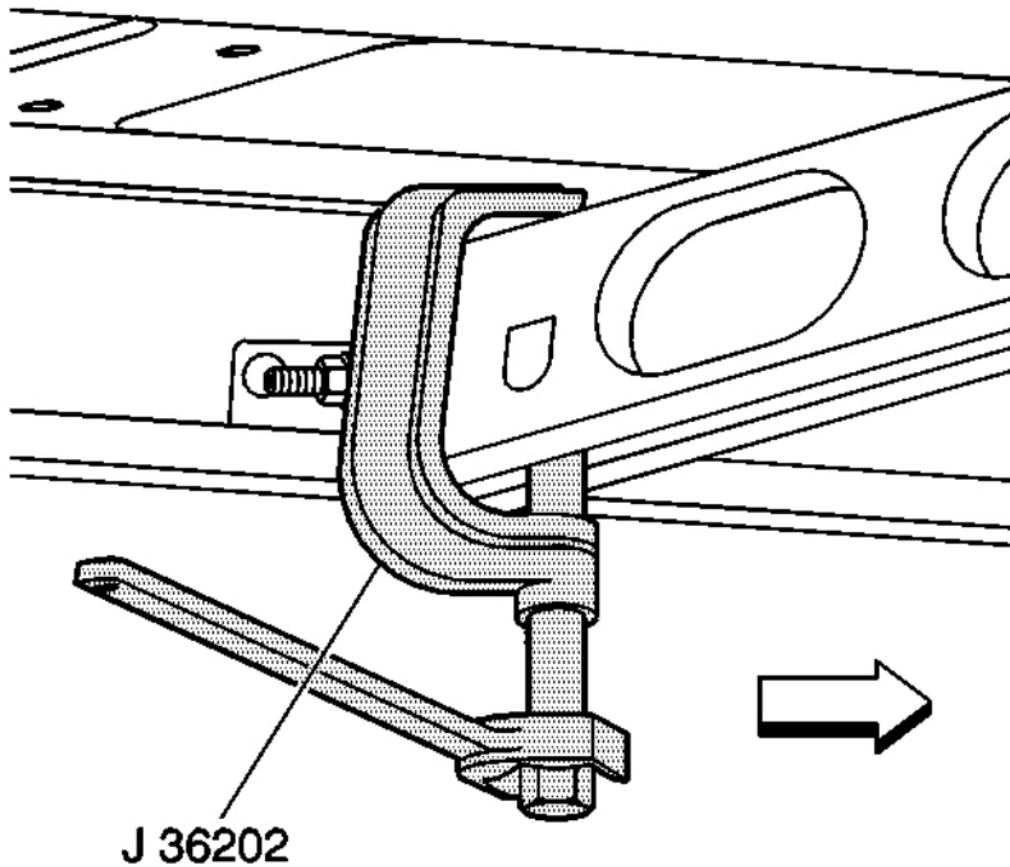


Fig. 41: J 36202, Adjustment Arm & Crossmember
Courtesy of GENERAL MOTORS CORP.

2. Install the **J 36202** to the adjustment arm and the crossmember. See **Special Tools**.
3. Increase the tension on the adjustment arm until the load is removed from the adjustment bolt and the adjuster nut.

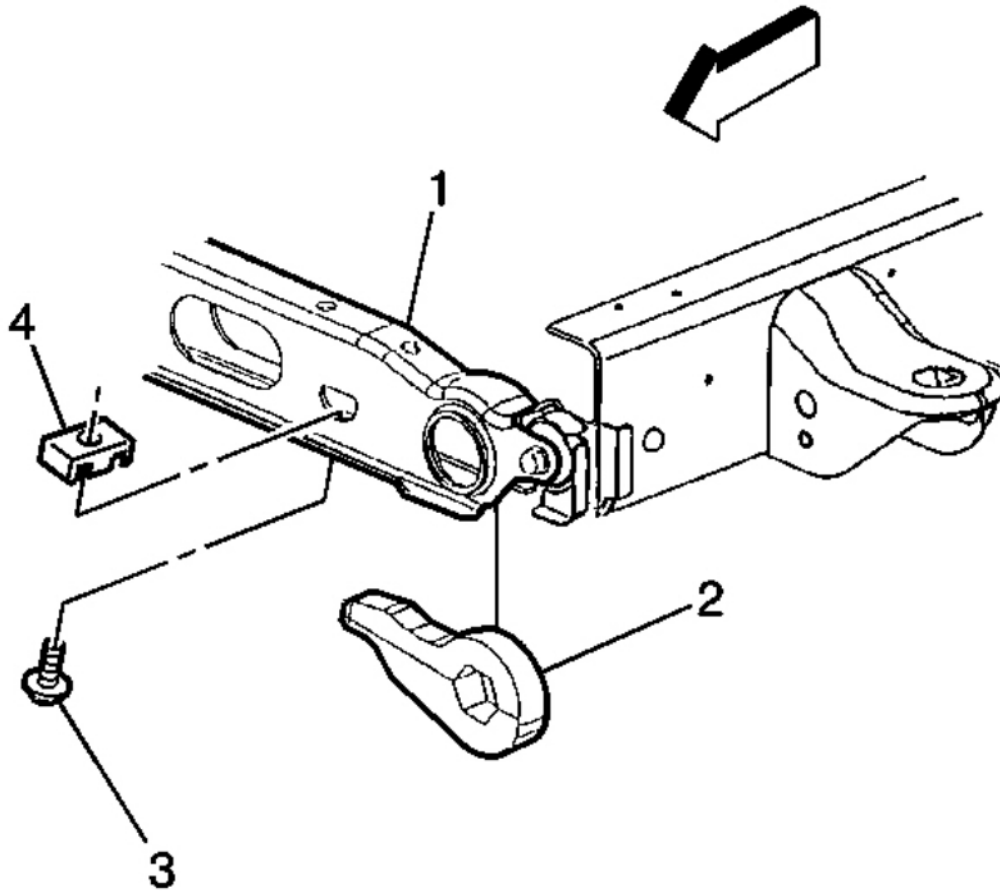


Fig. 42: Torsion Bar, Adjustment Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Mark the adjustment bolt and count the number of times that is required to remove the adjustment bolt.

4. Remove the adjustment bolt (3) and the adjuster nut (4).

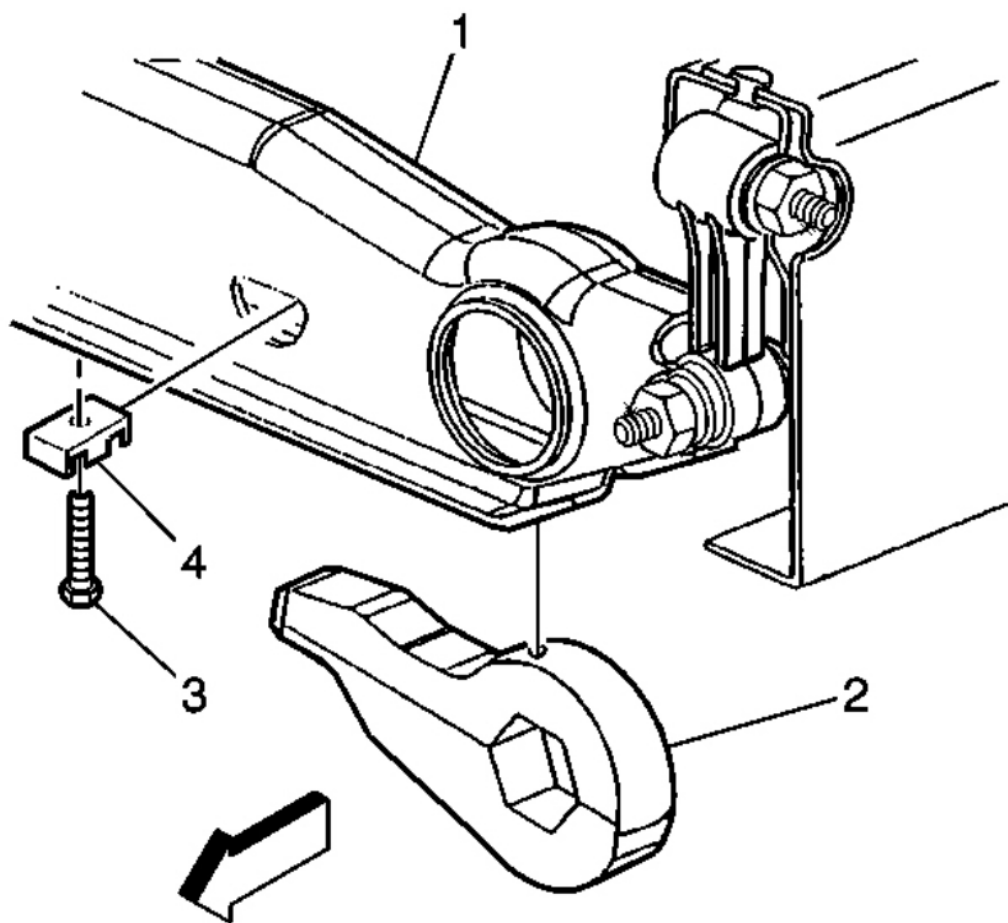


Fig. 43: Torsion Bar, Adjustment Bolt & Nut (MN8, MT1 And MW3)
Courtesy of GENERAL MOTORS CORP.

5. Remove the adjustment bolt (3) and the adjuster nut (4).
6. Remove the **J 36202** , allowing the torsion bar to unload. See **Special Tools**.

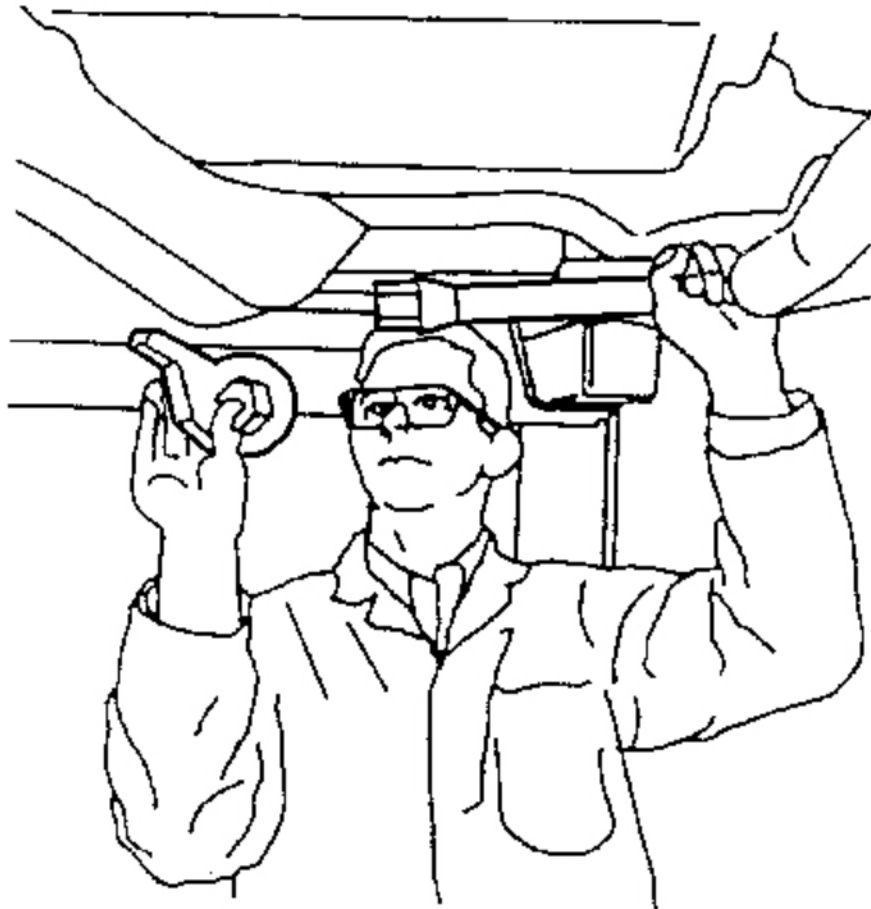


Fig. 44: Removing J 36202, Allowing The Torsion Bar To Unload
Courtesy of GENERAL MOTORS CORP.

7. Remove the adjustment arm by sliding the torsion bar forward until the torsion bar clears the adjustment arm. Use your hand to support the adjustment arm as the adjustment arm releases from the torsion bar.

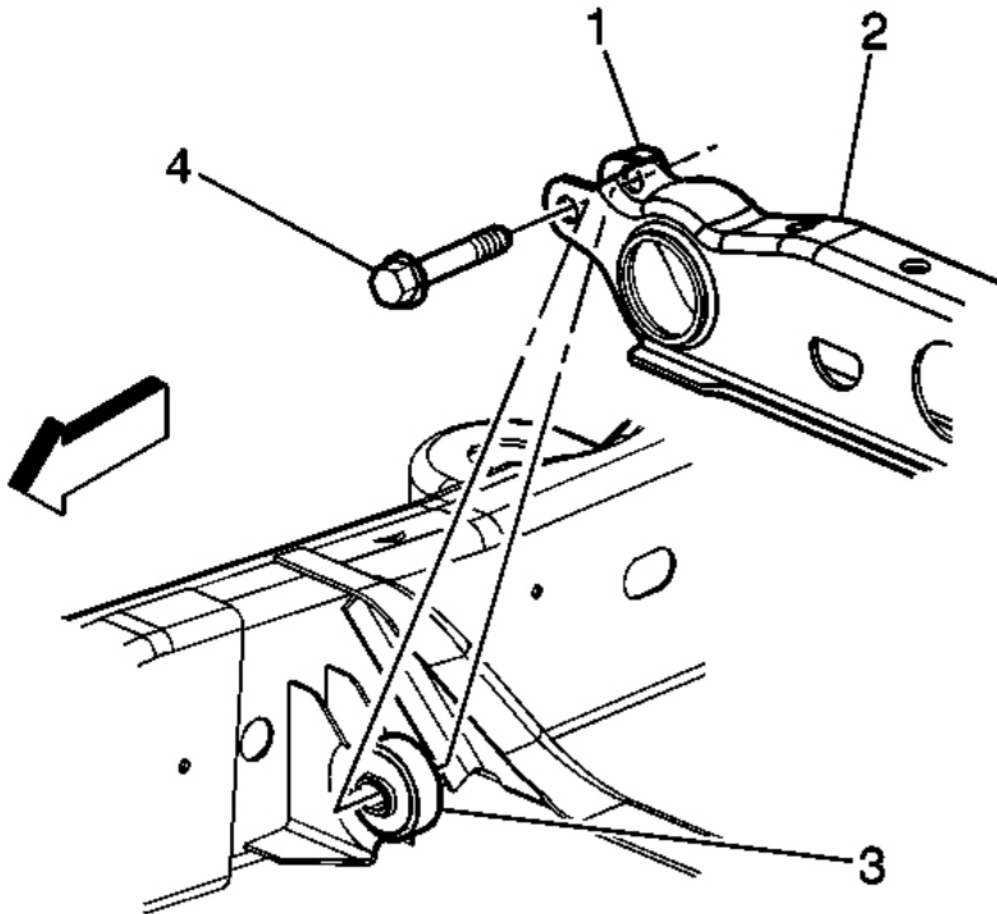


Fig. 45: Torsion Bar Crossmember, Bolts & Weld Nuts
Courtesy of GENERAL MOTORS CORP.

8. Remove the torsion bar crossmember bolts (4) from the weld nuts (1).

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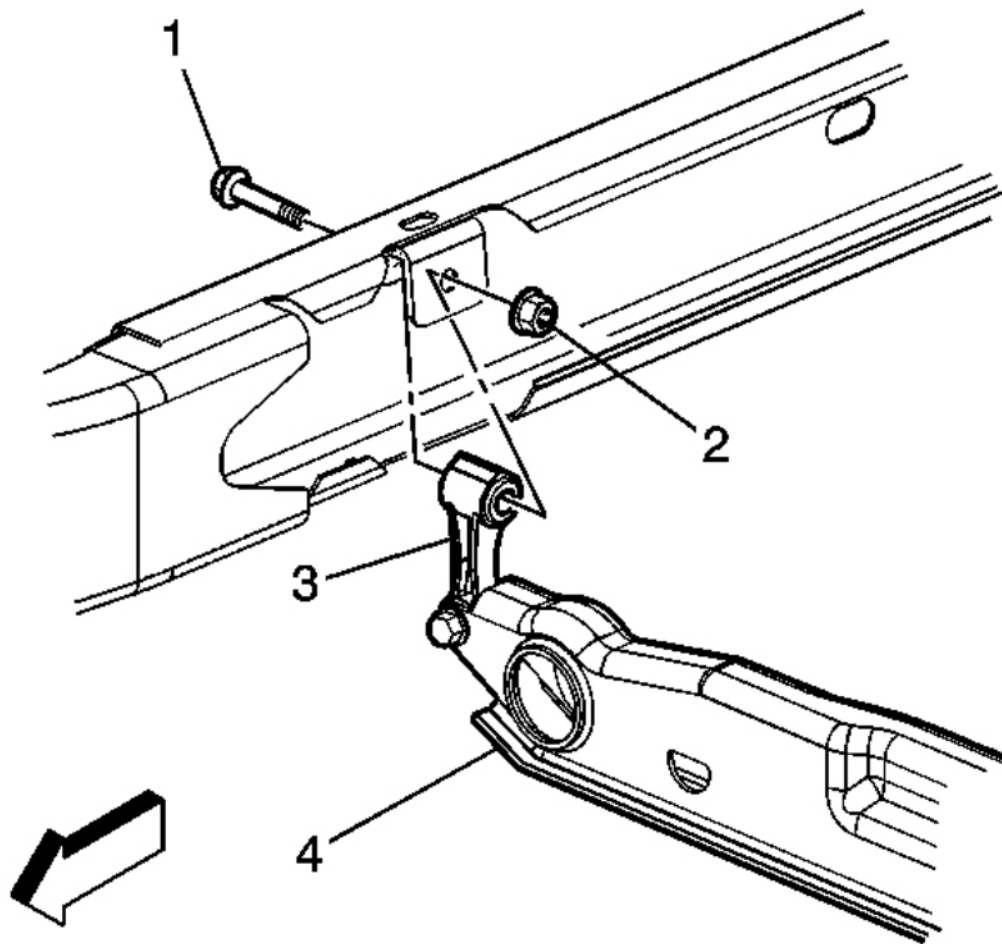


Fig. 46: Upper Link, Mounting Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the upper link mounting nuts (1) and the bolts (2).
10. Remove the torsion bar crossmember.

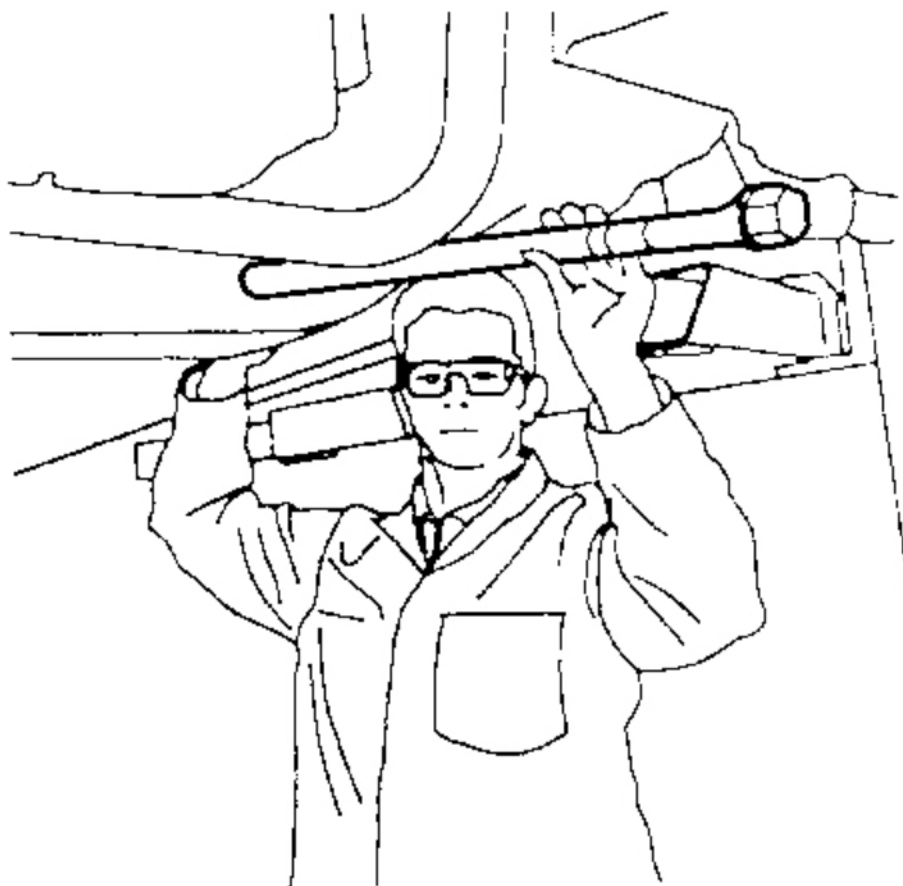


Fig. 47: Removing The Torsion Bars From The Vehicle
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Note the position of the torsion bars as the left and right bars are different.

11. Remove the torsion bars from the vehicle.

Installation Procedure

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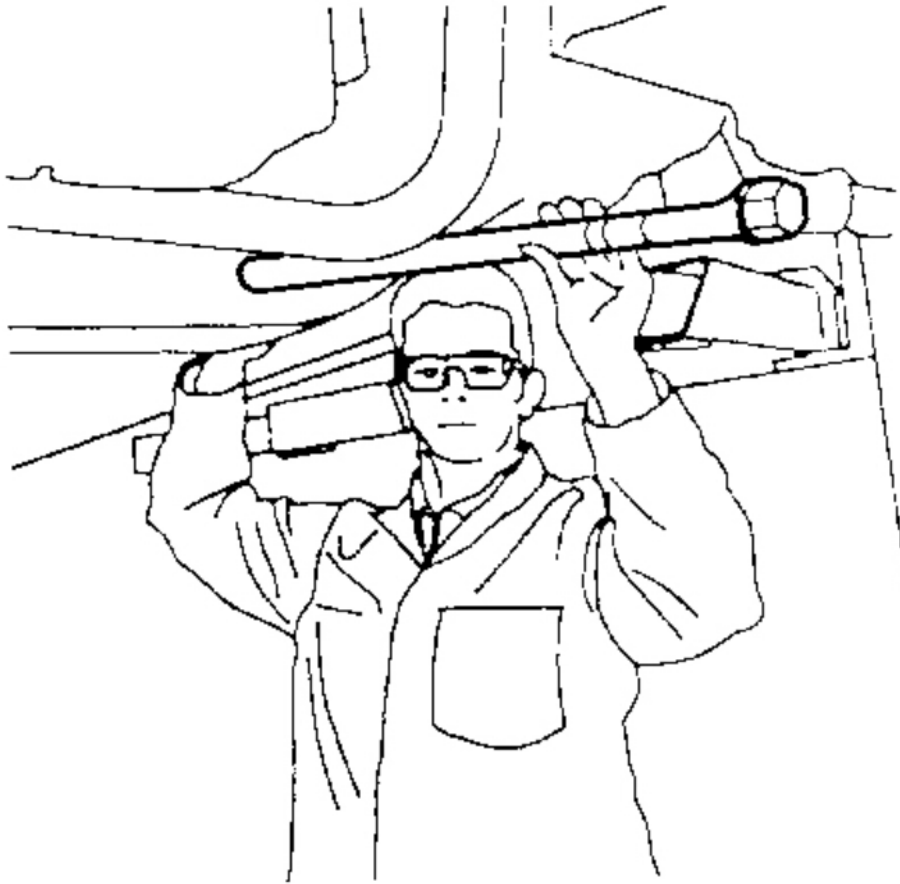


Fig. 48: Removing The Torsion Bars From The Vehicle
Courtesy of GENERAL MOTORS CORP.

1. Install the torsion bars to the lower control arm.
2. Install the torsion bar crossmember.

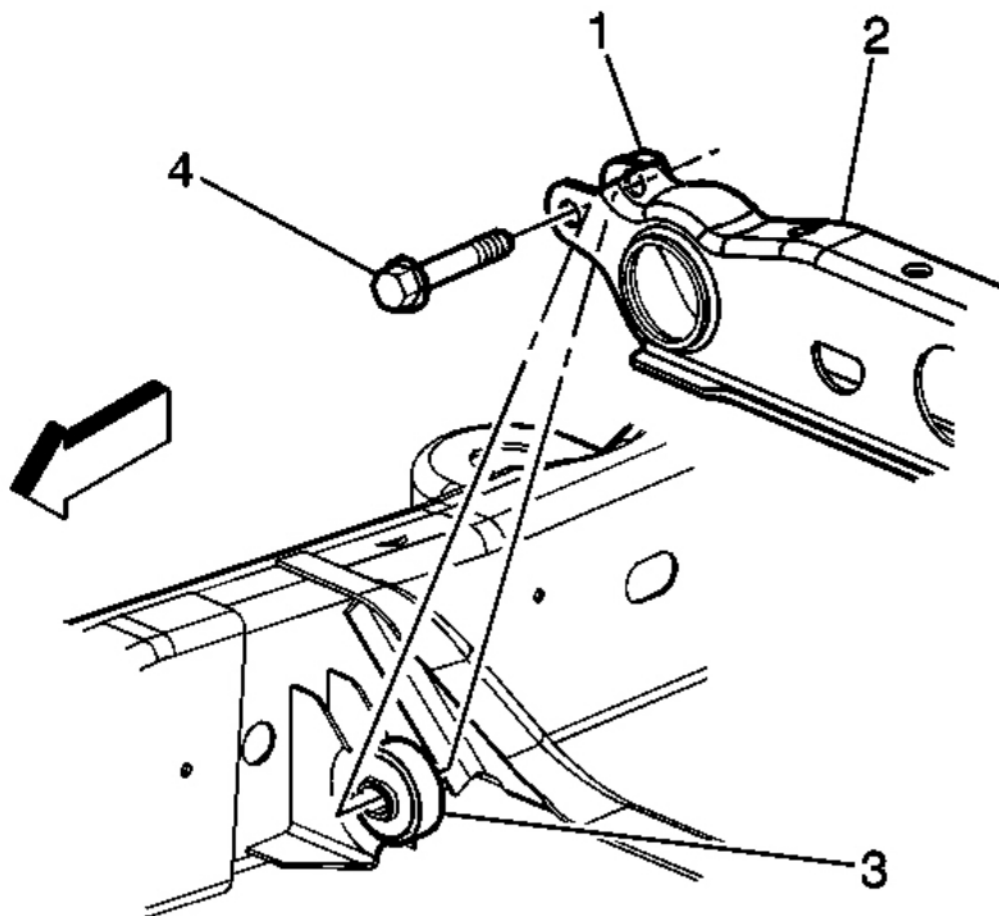


Fig. 49: Torsion Bar Crossmember, Bolts & Weld Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

3. Install the torsion bar crossmember bolts (1) to the weld nuts (4).

Tighten: Tighten the bolt to 95 N.m (70 lb ft).

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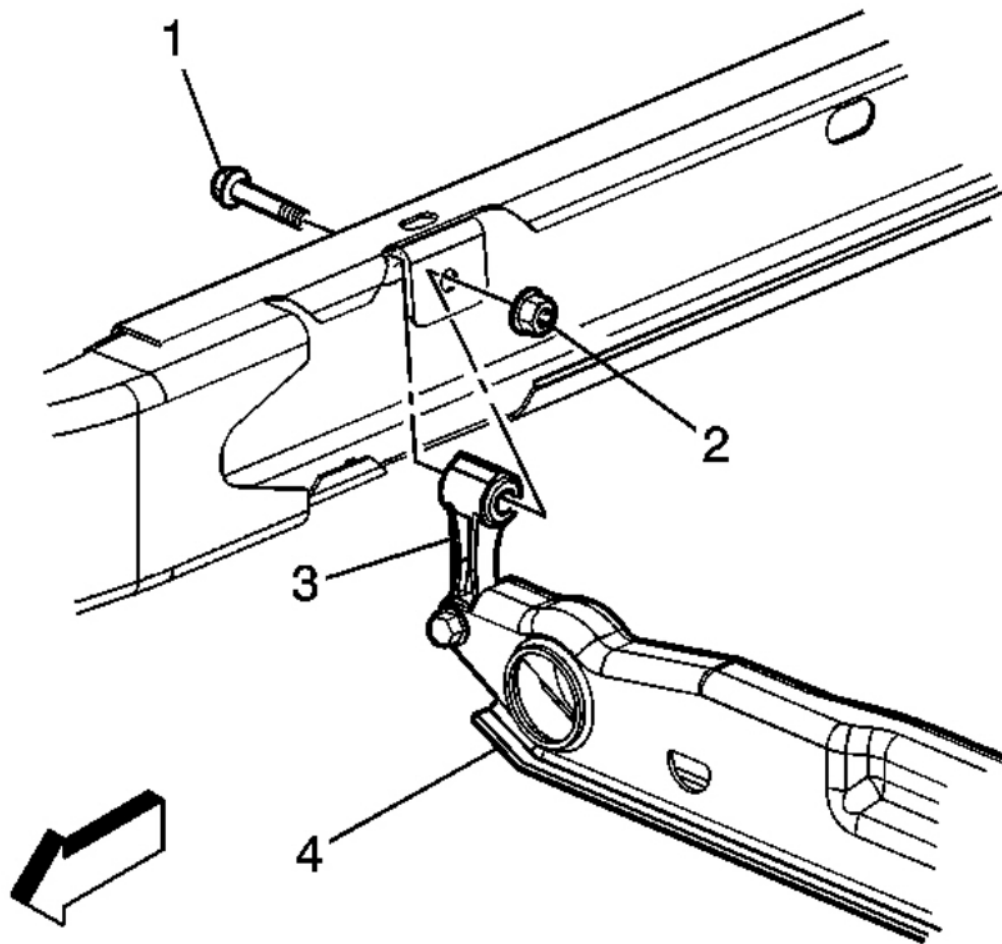


Fig. 50: Upper Link, Mounting Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Install the upper link mounting nuts and the bolts (3).

Tighten: Tighten the nut to 95 N.m (70 lb ft).

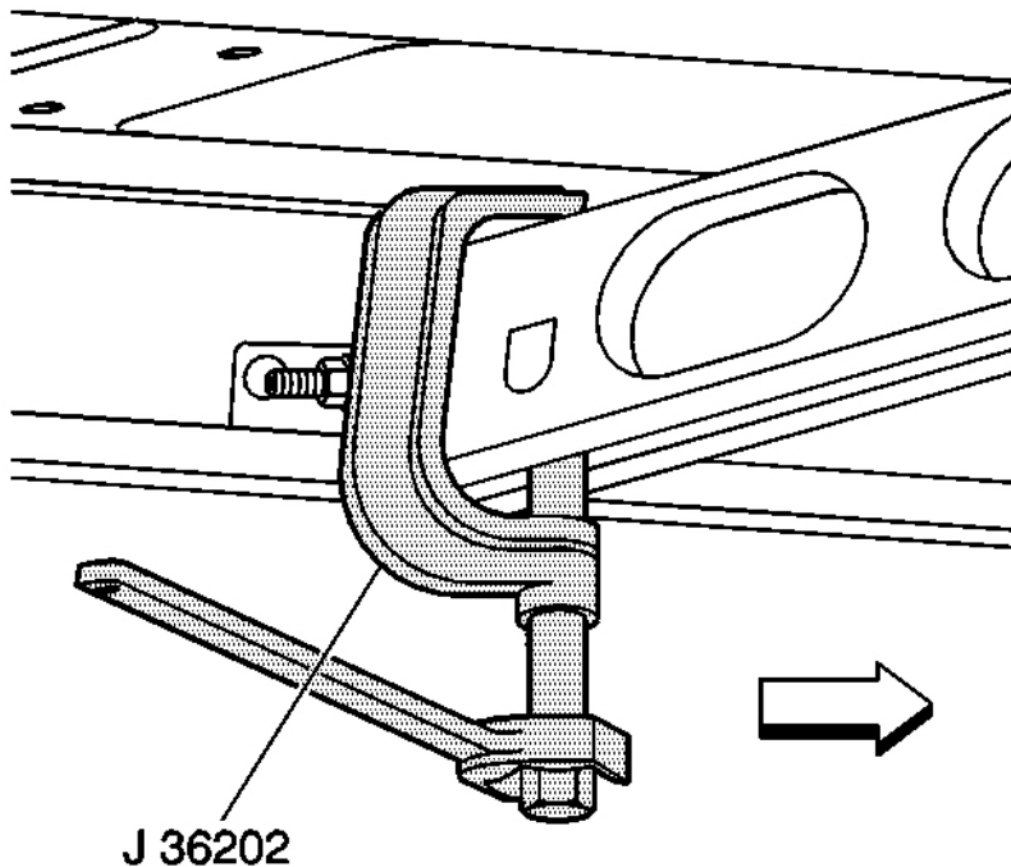


Fig. 51: J 36202, Adjustment Arm & Crossmember
Courtesy of GENERAL MOTORS CORP.

5. While supporting the adjustment arm, slide the torsion bar rearward until the torsion bar fully engages the adjustment arm.
6. Install the **J 36202** to the adjustment arm and the crossmember. See **Special Tools**.
7. Increase the tension on the adjustment arm in order to load the torsion bar.

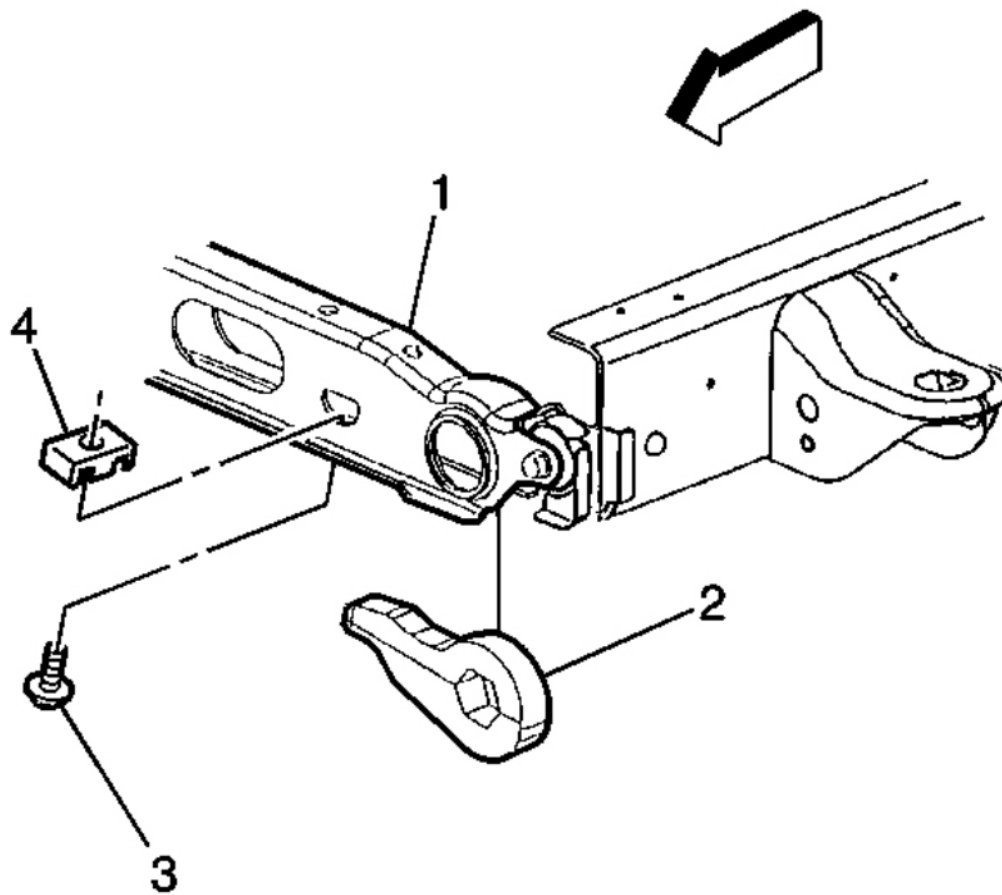


Fig. 52: Torsion Bar, Adjustment Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Install the adjustment bolt the same amount of turns that were required to remove the bolt during removal.

8. Install the adjustment bolt (3) and the adjuster nut (4).

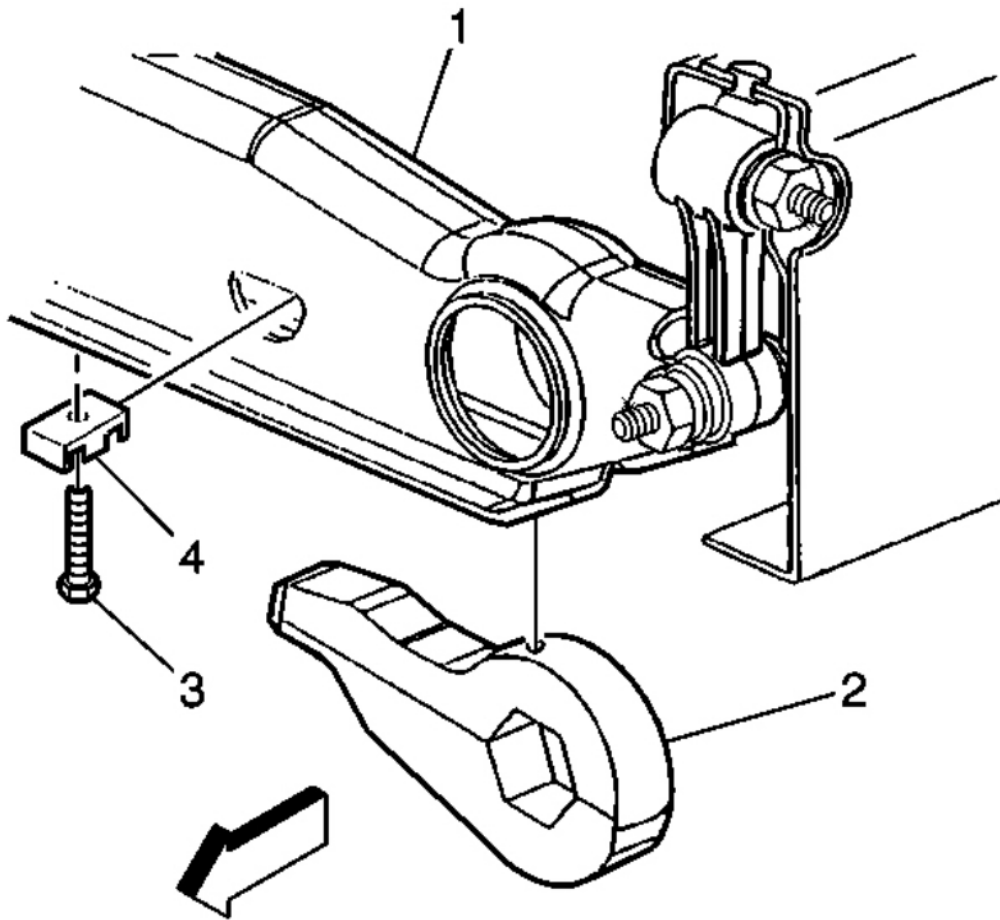


Fig. 53: Torsion Bar, Adjustment Bolt & Nut (MN8, MT1 And MW3)
Courtesy of GENERAL MOTORS CORP.

9. Install the adjustment bolt (3) and the adjuster nut (4).
10. Remove the **J 36202** releasing the tension on the torsion bar until the load is taken up by the adjustment bolt. See **Special Tools**.
11. Remove the safety stands.
12. Lower the vehicle.
13. Measure the Z height. Refer to **Trim Height Inspection**.

SHOCK MODULE REPLACEMENT

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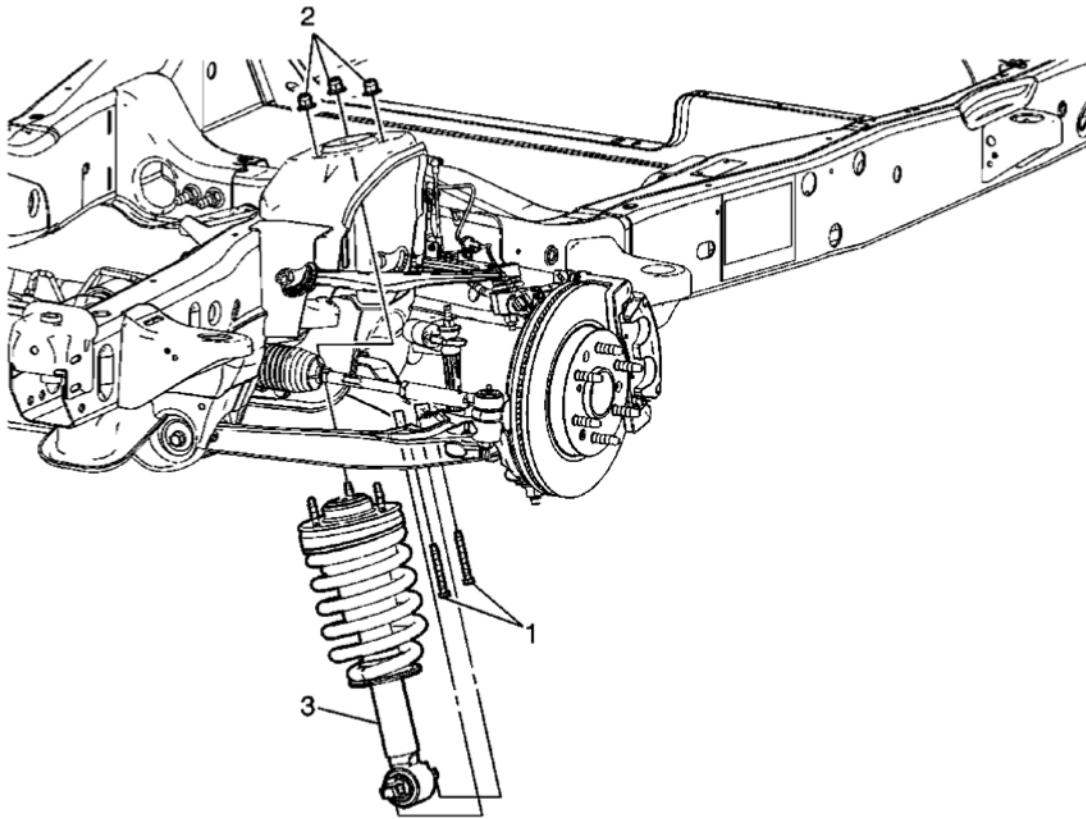


Fig. 54: View Of Shock Absorber Module & Components
Courtesy of GENERAL MOTORS CORP.

Shock Module Replacement

Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the front tire and wheel assembly. Refer to <u>Tire and Wheel Removal and Installation</u> . 3. Disconnect the outer tie rod from the steering knuckle. Refer to <u>Rack and Pinion Outer Tie Rod End Replacement</u> .	
1	Shock Absorber Module Bolt (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft) Tip: Support the lower control arm using a pole jack.

2	Shock Absorber Module Nut (Qty: 3) Tighten: 50 N.m (37 lb ft) Tip: Disconnect the electronic suspension control (ESC) electrical connector, if equipped.
3	Shock Absorber Module Tip: • If removing the shock module to service of its components, refer to <u>Shock, Shock Component, and/or Spring Replacement (ESC)</u> or <u>Shock, Shock Component, and/or Spring Replacement (Non ESC)</u>. • For the proper disposal procedure of the shock absorber, refer to <u>Shock Absorber Disposal</u>.

SHOCK, SHOCK COMPONENT, AND/OR SPRING REPLACEMENT (ESC)

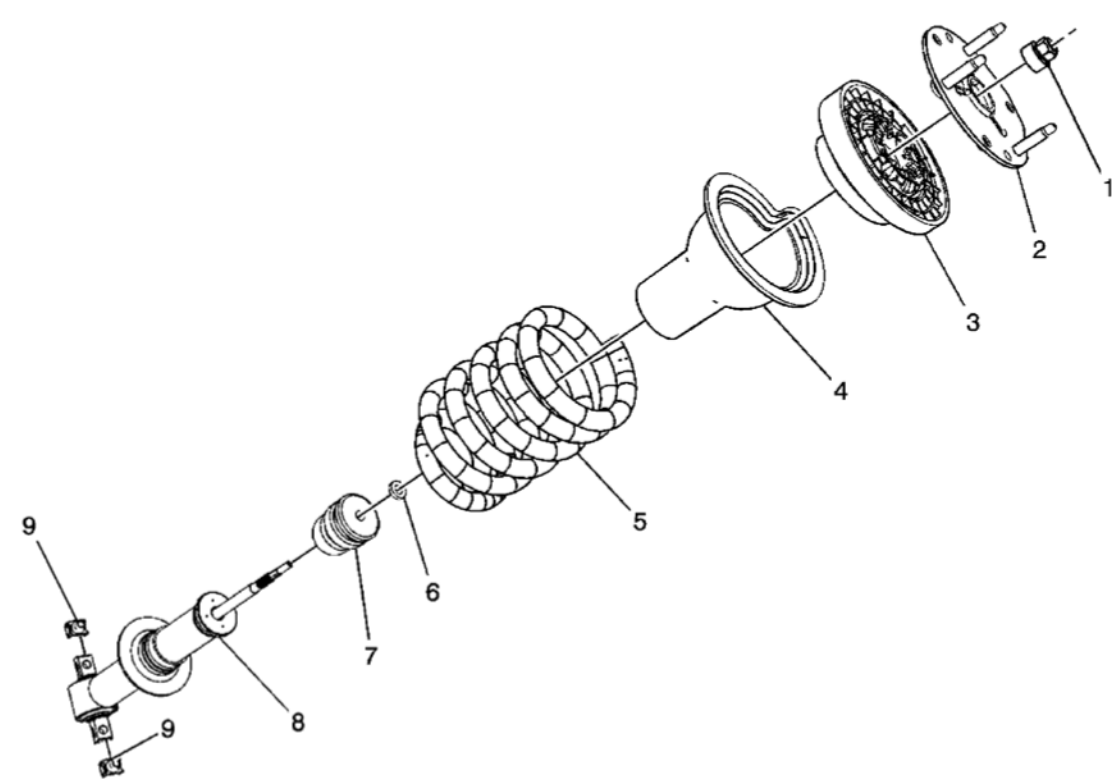


Fig. 55: View Of Shock Absorber Components
 Courtesy of GENERAL MOTORS CORP.

Shock, Shock Component, and/or Spring Replacement (ESC)

Callout	Component Name

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Preliminary Procedure:

Remove the shock module. Refer to **Shock Module Replacement**.

1	Tenon Nut NOTE: Do not allow the absorber rod to rotate during disassembly/reassembly. Use hand tools to keep the absorber rod from rotating. If air tools are used, and the rod is allowed to rotate, damage to the absorber may occur. NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft). Tip: • Use Snap On® tool 18 mm offset crow foot wrench P/N ANM18, or equivalent. • Hold the tenon shaft end with a wrench while removing the nut.
2	Mount Tip: For proper alignment during assembly, make sure one of the mount studs is aligned with the centerline of the shock absorber dog bone.
3	Seat
4	Insulator
5	Spring Tip: The use of J 45400 Strut Spring Compressor or equivalent, is required. See <u>Special Tools</u>.
6	Reinforcement
7	Jounce Bumper
8	Absorber
9	Clip Nut (Qty: 2) Tip: The use of air tools on the clip nuts during installation is not recommended.

SHOCK, SHOCK COMPONENT, AND/OR SPRING REPLACEMENT (NON ESC)

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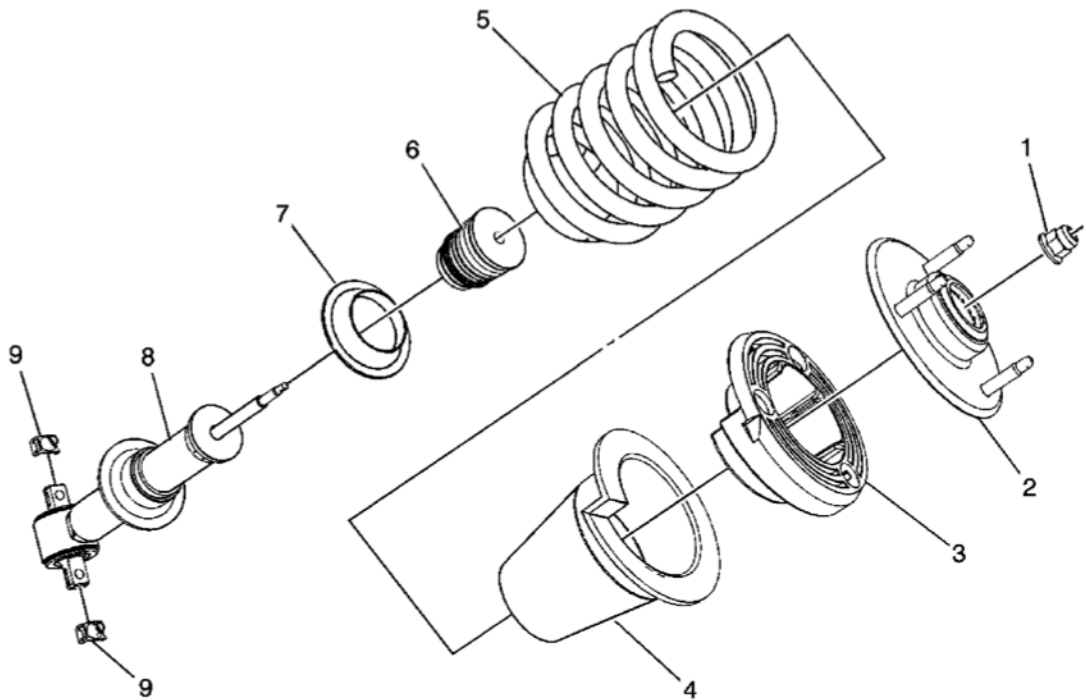


Fig. 56: View Of Shock Absorber Components
Courtesy of GENERAL MOTORS CORP.

Shock, Shock Component, and/or Spring Replacement (Non ESC)

Callout	Component Name
Preliminary Procedure: Remove the shock module. Refer to <u>Shock Module Replacement</u> .	
1	Tenon Nut NOTE: Do not allow the absorber rod to rotate during disassembly/reassembly. Use hand tools to keep the absorber rod from rotating. If air tools are used, and the rod is allowed to rotate, damage to the absorber may occur. NOTE: Refer to <u>Fastener Notice</u> . Tighten: 50 N.m (37 lb ft). Tip: • Use Snap On® tools P/N A139 and P/N LIL20470, or equivalent. • Hold the tenon shaft end with a wrench while removing the nut.

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2	Mount Tip: For proper alignment during assembly, make sure one of the mount studs is aligned with the centerline of the shock absorber dog bone.
3	Seat
4	Insulator
5	Spring Tip: The use of J 45400 Strut Spring Compressor or equivalent, is required. See Special Tools .
6	Jounce Bumper
7	Lower Insulator
8	Absorber
9	Clip Nut (Qty: 2) Tip: The use of air tools on the clip nuts during installation is not recommended.

SHOCK ABSORBER REPLACEMENT (2500 SERIES)

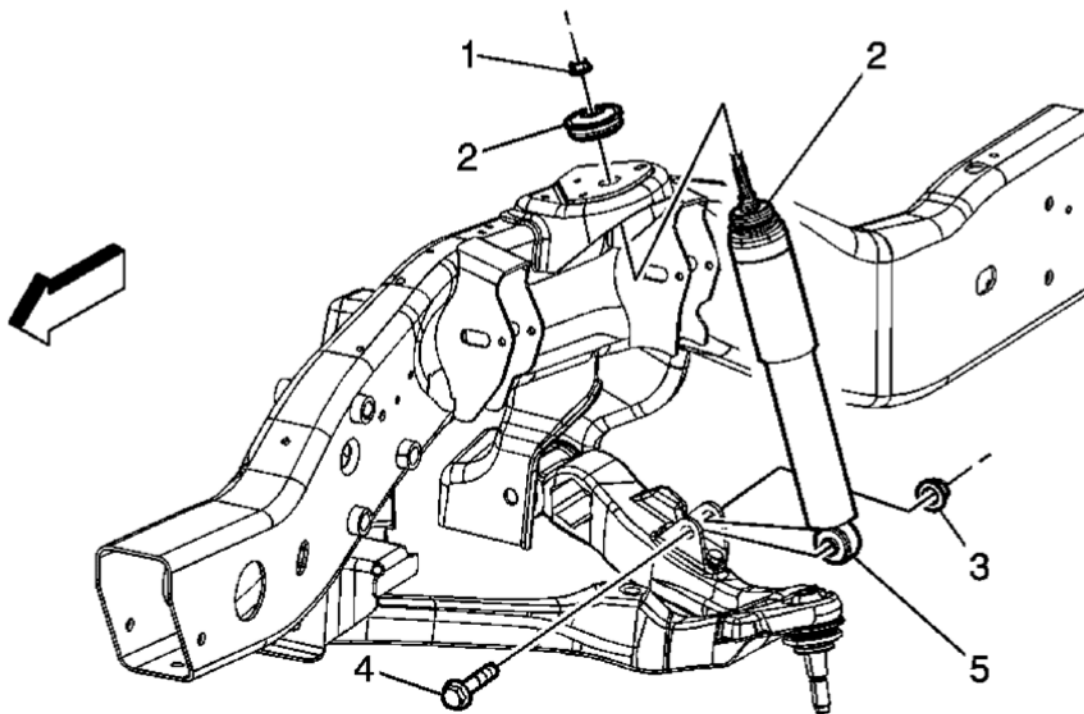


Fig. 57: View Of Shock Absorber Components
Courtesy of GENERAL MOTORS CORP.

Shock Absorber Replacement (2500 Series)

Callout	Component Name
Preliminary Procedure:	
Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation .	

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1	Shock Absorber Retaining Nut NOTE: Refer to <u>Fastener Notice</u> . Tighten: 24 N.m (17 lb ft) Tip: Support the lower control arm with a safety stand.
2	Insulators (Qty: 2) Tip: 1. Install the lower insulator, which is smaller than the upper insulator and plastic pilot ring. 2. Install the upper insulator, which is the larger of the 2 insulators.
3	Retaining Nut Tighten: 80 N.m (59 lb ft)
4	Mounting Bolt
5	Shock Absorber Tip: If replacing the shock absorber, refer <u>Shock Absorber Disposal</u> for the proper disposal procedure.

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.

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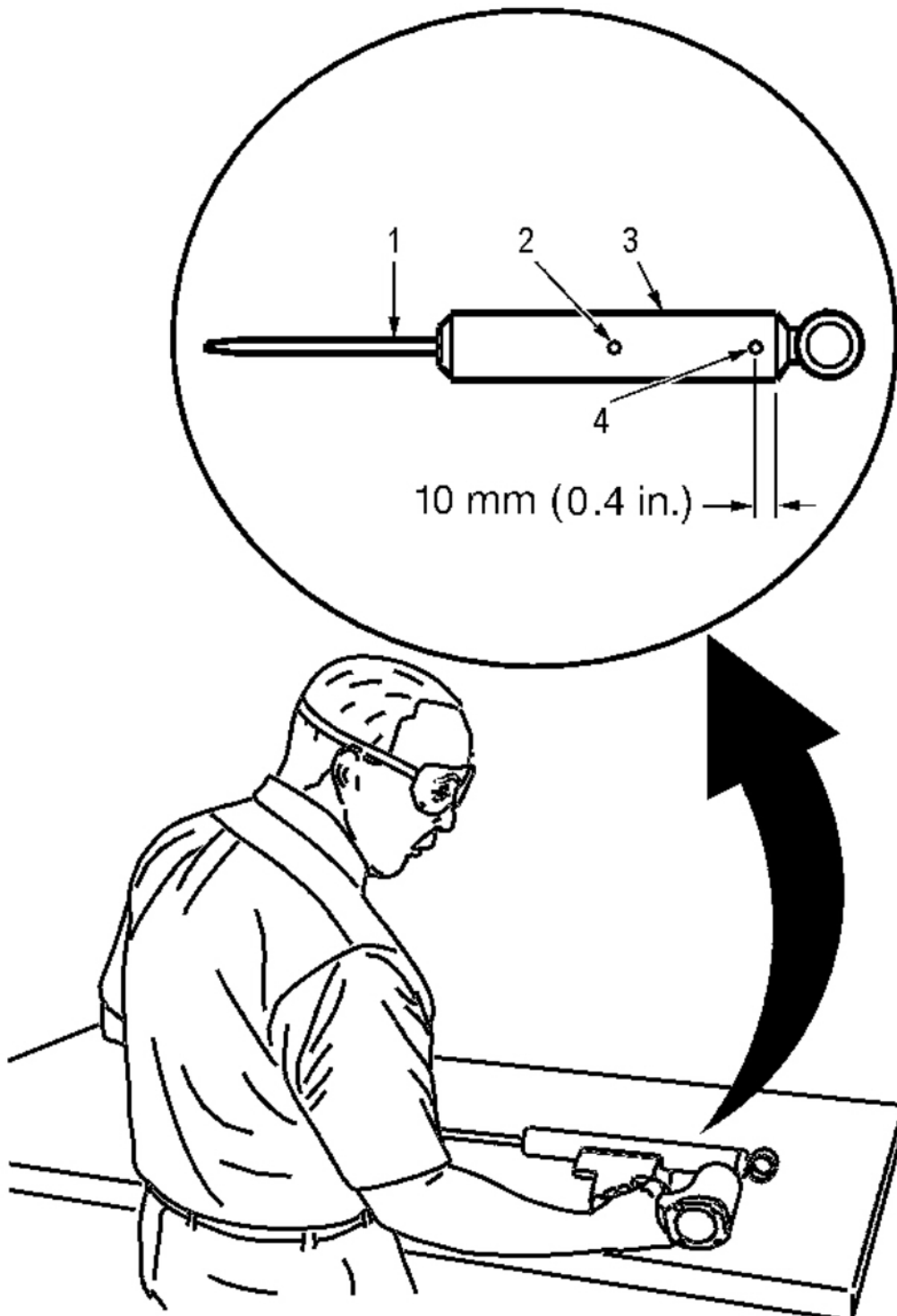


Fig. 58: Drilling Hole In Shock Absorber At Centerpunched Locations
Courtesy of GENERAL MOTORS CORP.

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.

DESCRIPTION AND OPERATION

GENERAL DESCRIPTION

The front suspension allows each wheel to compensate for changes in the road surface without affecting the opposite wheel. Each wheel independently connects to the frame with a steering knuckle, ball joint assemblies, and upper and lower control arms.

Two tie rods connect to the steering arms on the knuckles and to a steering gear.

Rear wheel drive models have a front suspension that consists of the following components:

- Control arms
- Stabilizer shaft
- Shock/Coil spring modules

The upper part of each Shock/Coil spring module bolts to the frame. Three insulators, a mounting plate and a nut secure the coil spring to the shock housing. Two bolts secure the lower part of the shock module to the lower control arm.

A spring steel stabilizer shaft controls the side roll of the front suspension. This shaft is mounted in rubber insulators that are held by clamps to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link assemblies.

The upper ball joint assembly is integrated into the upper control arm. The assembly attaches to the steering knuckle with a prevailing torque nut.

The lower ball joint assembly is integrated into the control arm. The assembly attaches to the steering knuckle with a prevailing torque nut.

The upper and the lower control arms have pressed-in bushings. The bolts pass through the bushings and join the arms to the frame.

Ball joint assemblies have rubber grease seals. These seals prevent the entry of moisture and dirt. This prevents damage to the bearing surfaces.

Four-wheel drive models have a front suspension that consists of the following components:

- Control arms
- Stabilizer shaft
- Shock module/Shock absorbers
- Coil Springs (1500 series)
- Torsion bars (2500, 3500 series)

The upper part of each shock absorber (2500, 3500 series) extends through a frame bracket. Two insulators and a nut secure the upper part of the shock to the frame. A through bolt secures the lower part of the shock to the lower control arm.

The upper part of each shock module (1500 series) attaches to the frame by 3 nuts. The lower part of the shock module attaches to the lower control arm by 2 bolts.

A spring steel stabilizer shaft controls the side roll of the front suspension. This shaft is mounted in rubber insulators that are held by clamps to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link assemblies.

The front end of the torsion bar attaches to the lower control arm. The rear of the torsion bar mounts into an adjustable arm at the torsion bar crossmember. This arm adjustment controls the vehicle trim height.

Both RWD and 4WD models have sealed front wheel bearings. These bearings are pre-adjusted and need no lubrication.

SPECIAL TOOLS AND EQUIPMENT

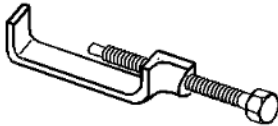
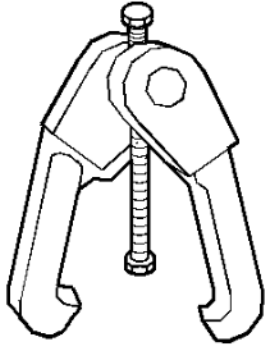
SPECIAL TOOLS

Special Tools

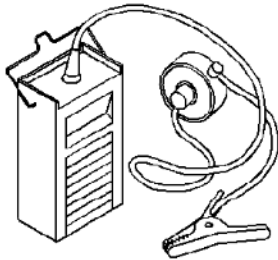
Illustration	Tool Number/ Description
	J-24319-B Steering Linkage and Tie Rod Puller

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J-36202
Torsion Loading/Unloading Tool

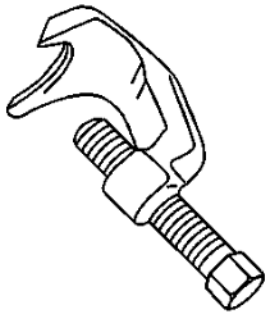
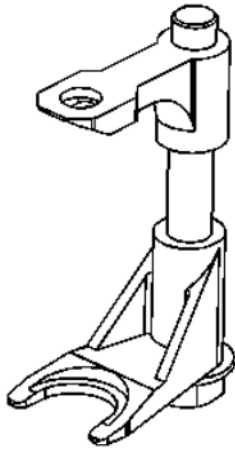


J-36660-A
Torque Angle Meter

J-42188-B
Ball Joint Separator

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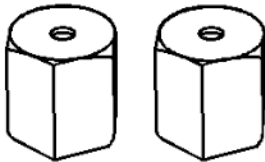
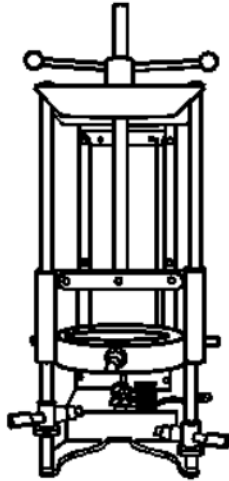


J-43631
Ball Joint Remover

J-45400
Strut Spring Compressor

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J-45851
Ball Joint Separator Protector Adapters