SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application
Front Upper Control Arm Adjust Cam Insert

Single Use Threaded Fastener/Component Tightening Specifications

NOTE:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application	Specification Metric (English)
Front Lower Control Arm Front Bolt (Heavy Duty)	
Front Lower Control Arm Rear Bolt (Heavy Duty)	
Front Shock Absorber Stud Nut (Light Duty, With Z85/Z95)	75 N.m (55 lb ft)
Front Shock Absorber Stud Nut (Light Duty, Without Z85/Z95)	50 N.m (37 lb ft)
Wheel Stud	

Reusable Threaded Fastener Tightening Specifications

NOTE:
All fasteners listed in this table can be reused after removal.

Application	Specification Metric (English)

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NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification Metric (English)
Front Lower Control Arm Ball Stud Nut (Heavy Duty)	
• First Pass:	50 N.m (37 lb ft)
• Final Pass:	90-100 degrees
Front Lower Control Arm Ball Stud Nut (Light Duty)	
• First Pass:	50 N.m (37 lb ft)
• Final Pass:	125-135 degrees
Front Lower Control Arm Front Nut (Heavy Duty)	
• First Pass:	180 N.m (133 lb ft)
• Final Pass:	45-75 degrees
Front Lower Control Arm Rear Nut (Heavy Duty)	
• First Pass:	180 N.m (133 lb ft)
• Final Pass:	45-75 degrees
Front Lower Control Arm Nut (Light Duty)	175 N.m (129 lb ft)
Front Shock Absorber Bolt (Heavy Duty, Lower Bolt)	120 N.m (89 lb ft)
Front Shock Absorber Bolt (Light Duty, Lower Bolt)	50 N.m (37 lb ft)
Front Shock Absorber Nut (Heavy Duty, Upper Nut)	65 N.m (48 lb ft)
Front Shock Absorber Nut (Light Duty, Upper Nut)	50 N.m (37 lb ft)
Front Stabilizer Shaft Clamp Bolt	50 N.m (37 lb ft)
Front Stabilizer Shaft Link Nut	23 N.m (17 lb ft)
Front Upper Control Arm Ball Stud Nut (Heavy Duty)	50 N.m (37 lb ft)
Front Upper Control Arm Ball Stud Nut (Light Duty)	
• First Pass:	50 N.m (37 lb ft)
• Final Pass:	90-110 degrees
Front Upper Control Arm Nut (Heavy Duty)	260 N.m (192 lb ft)
Front Upper Control Arm Nut (Light Duty, New Design)	105 N.m (77 lb ft)
Front Upper Control Arm Nut (Light Duty, Old Design)	190 N.m (140 lb ft)
Front Wheel Hub and Bearing Assembly Bolt	180 N.m (133 lb ft)

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NOTE:
All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Torsion Bar Support Assembly Bolt	125 N.m (92 lb ft)

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Front Stabilizer Shaft Link Bolt	Thread Locking Adhesive	12345382	10953489
Steering Knuckle Bearing Pilot Bore	Grease	12345996	10953501

REPAIR INSTRUCTIONS

STABILIZER SHAFT REPLACEMENT (HEAVY DUTY)

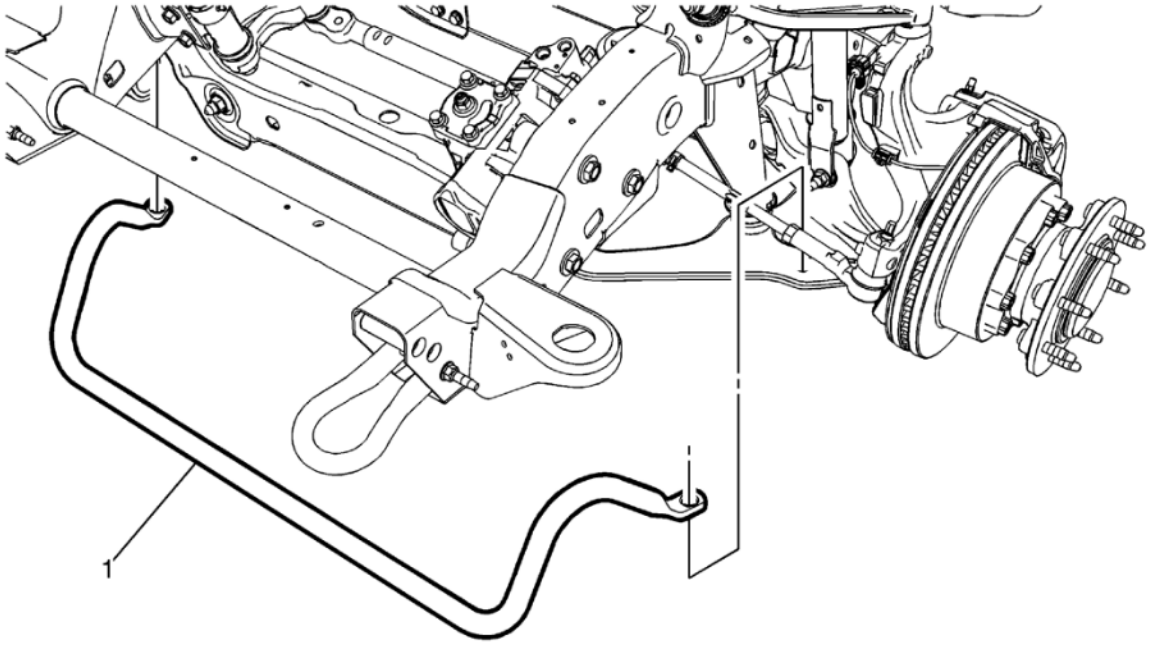


Fig. 1: View Of Stabilizer Shaft (2500, 3500)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	

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Callout	Component Name
1. Underbody Splash Shield Replacement 2. Stabilizer Shaft Link Replacement (Heavy Duty) 3. Stabilizer Shaft Insulator Replacement (Heavy Duty)	
1	Front Stabilizer Shaft

STABILIZER SHAFT REPLACEMENT (LIGHT DUTY)

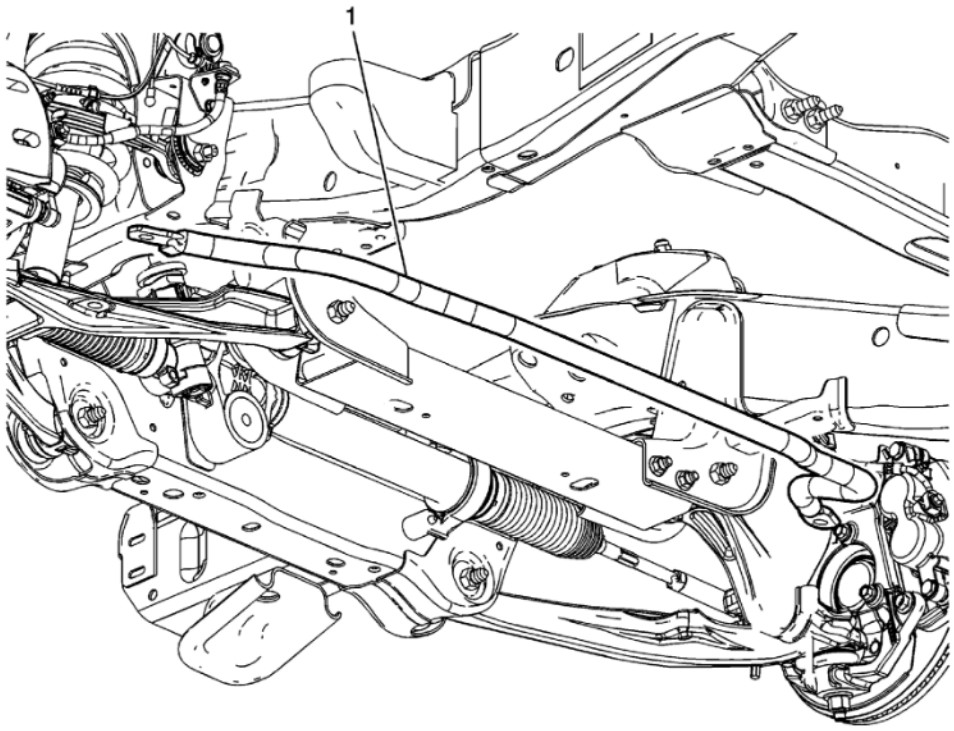


Fig. 2: View Of Stabilizer Shaft (1500)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Steering Gear Skid Shield Replacement 2. Stabilizer Shaft Link Replacement (Light Duty) 3. Stabilizer Shaft Insulator Replacement (Light Duty)	
1	Front Stabilizer Shaft

STABILIZER SHAFT LINK REPLACEMENT (LIGHT DUTY)

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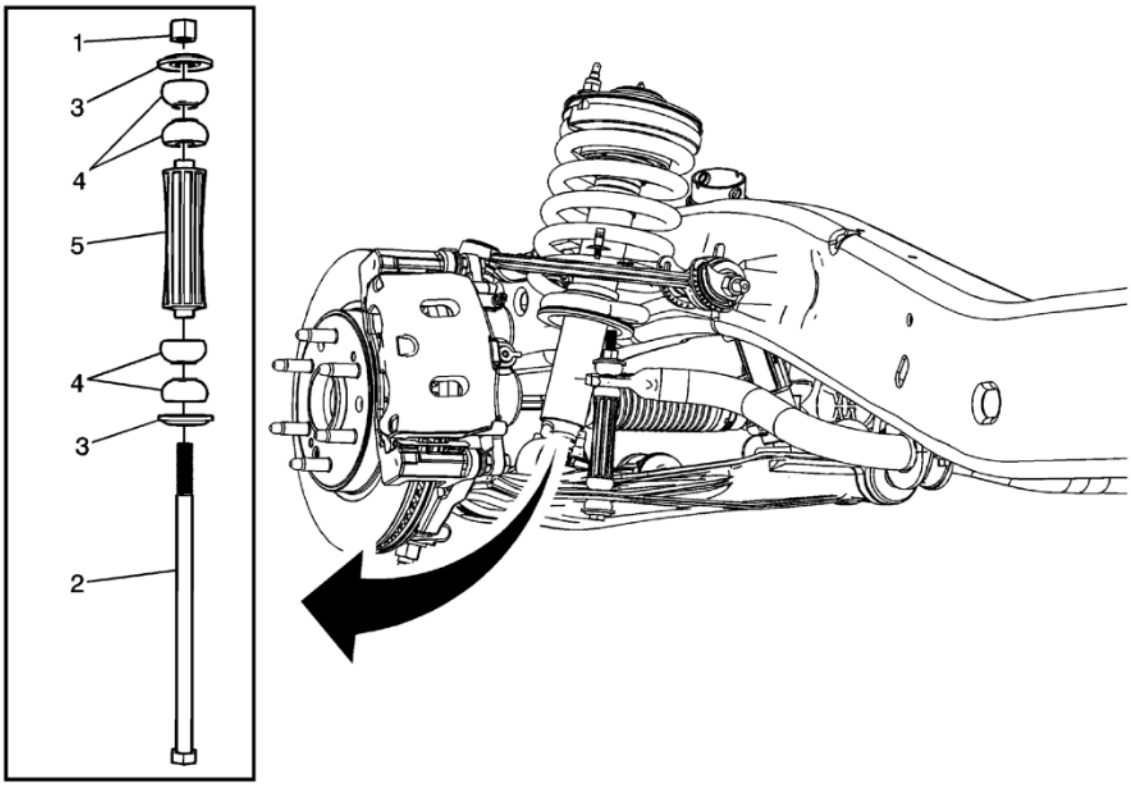


Fig. 3: View Of Stabilizer Shaft Link (1500)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**	
1	Front Stabilizer Shaft Link Nut **CAUTION:** **Refer to** **Fastener Caution** . **Procedure** Remove all traces of the original adhesive patch. **Tighten** 23 N.m (17 lb ft)
2	Front Stabilizer Shaft Link Bolt **Procedure** 1. Remove all traces of the original adhesive patch. 2. Apply thread locking adhesive to the bolt. **Adhesives, Fluids, Lubricants, and Sealers**

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Callout	Component Name
3	Front Stabilizer Shaft Link Washer
4	Front Stabilizer Shaft Link Insulator
5	Front Stabilizer Shaft Link Spacer

STABILIZER SHAFT LINK REPLACEMENT (HEAVY DUTY)

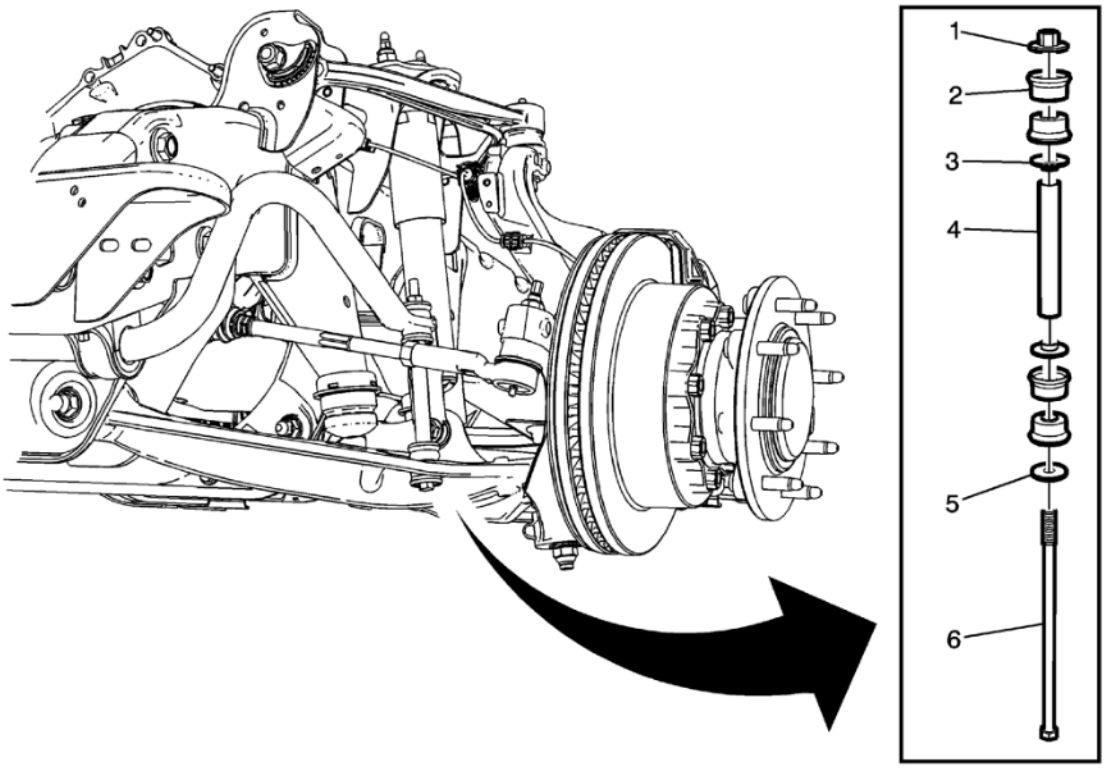


Fig. 4: View Of Stabilizer Shaft Link (2500, 3500)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Lifting and Jacking the Vehicle	
1	Front Stabilizer Shaft Link Nut **CAUTION:** **Refer to** **Fastener Caution** . **Procedure** Remove all traces of the original adhesive patch. **Tighten** 23 N.m (17 lb ft)
2	Front Stabilizer Shaft Link Insulator
3	Front Stabilizer Shaft Link Washer

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Callout	Component Name
4	Front Stabilizer Shaft Link
5	Front Stabilizer Shaft Link Washer
6	Front Stabilizer Shaft Link Bolt **Procedure** 1. Remove all traces of the original adhesive patch. 2. Apply thread locking adhesive to the bolt. **Adhesives, Fluids, Lubricants, and Sealers**

STABILIZER SHAFT INSULATOR REPLACEMENT (LIGHT DUTY)

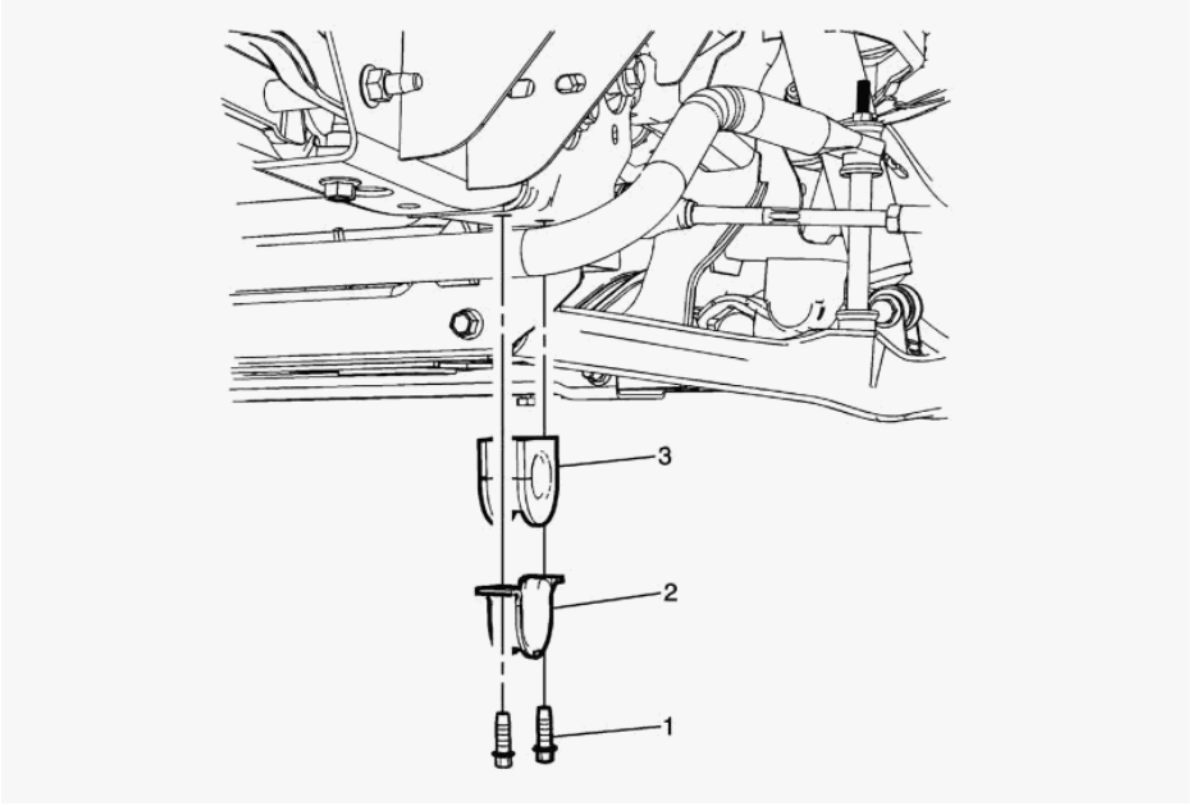


Fig. 5: Stabilizer Shaft Insulator
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Steering Gear Skid Shield Replacement**	
1	Front Stabilizer Shaft Clamp Bolt **CAUTION:** **Refer to** **Fastener Caution** .

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Callout	Component Name
	Tighten 50 N.m (37 lb ft)
2	Front Stabilizer Shaft Clamp
3	Front Stabilizer Shaft Insulator **NOTE:** **Ensure the slit in the front stabilizer shaft insulator is facing toward the front of the vehicle when installed.**

STABILIZER SHAFT INSULATOR REPLACEMENT (HEAVY DUTY)

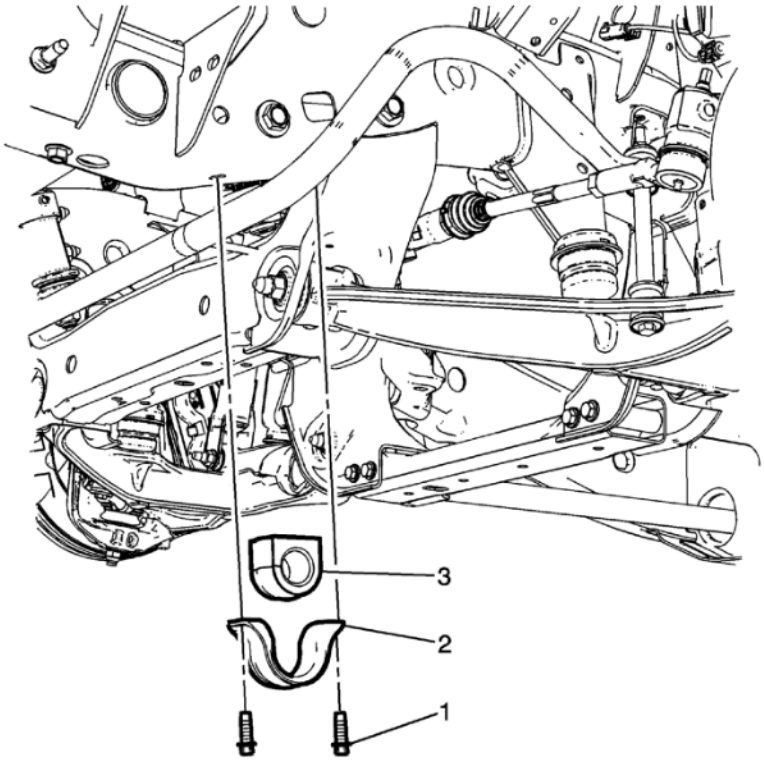


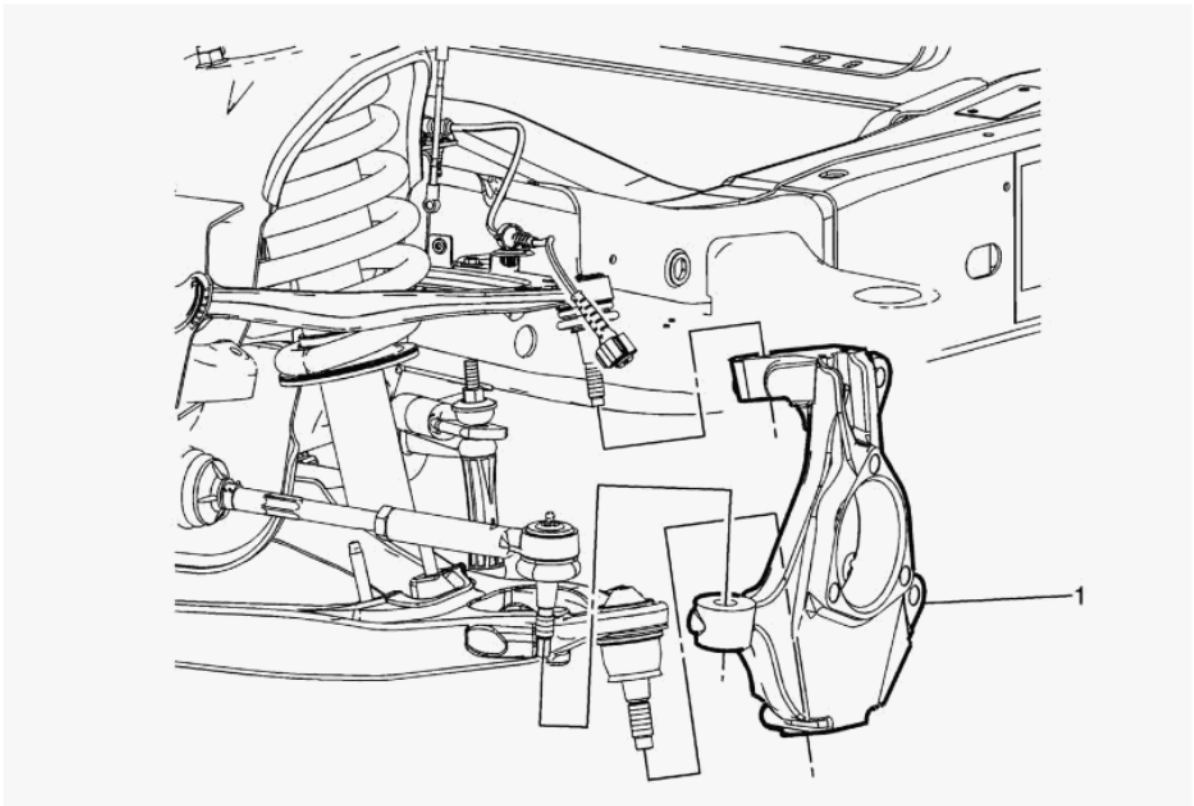
Fig. 6: Stabilizer Shaft Insulator (Heavy Duty)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Underbody Splash Shield Replacement**	

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Callout	Component Name
1	Front Stabilizer Shaft Clamp Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten** 50 N.m (37 lb ft)
2	Front Stabilizer Shaft Clamp
3	Front Stabilizer Shaft Insulator **NOTE:** **Ensure the slit in the front stabilizer shaft insulator is facing toward the front of the vehicle when installed.**

STEERING KNUCKLE REPLACEMENT (LIGHT DUTY)



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Fig. 7: Steering Knuckle (Light Duty)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)** 2. **Front Wheel Hub, Bearing, and Seal Replacement (Light Duty)**	
1	Steering Knuckle **Procedure** 1. Steering Linkage Outer Tie Rod@Steering Knuckle - Separate - **Steering Linkage Outer Tie Rod Replacement (Light Duty)** 2. Front Upper Control Arm@Steering Knuckle - Separate - **Upper Control Arm Replacement (Light Duty)** 3. Front Lower Control Arm@Steering Knuckle - Separate - **Lower Control Arm Replacement (Light Duty)** 4. Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

STEERING KNUCKLE REPLACEMENT (HEAVY DUTY)

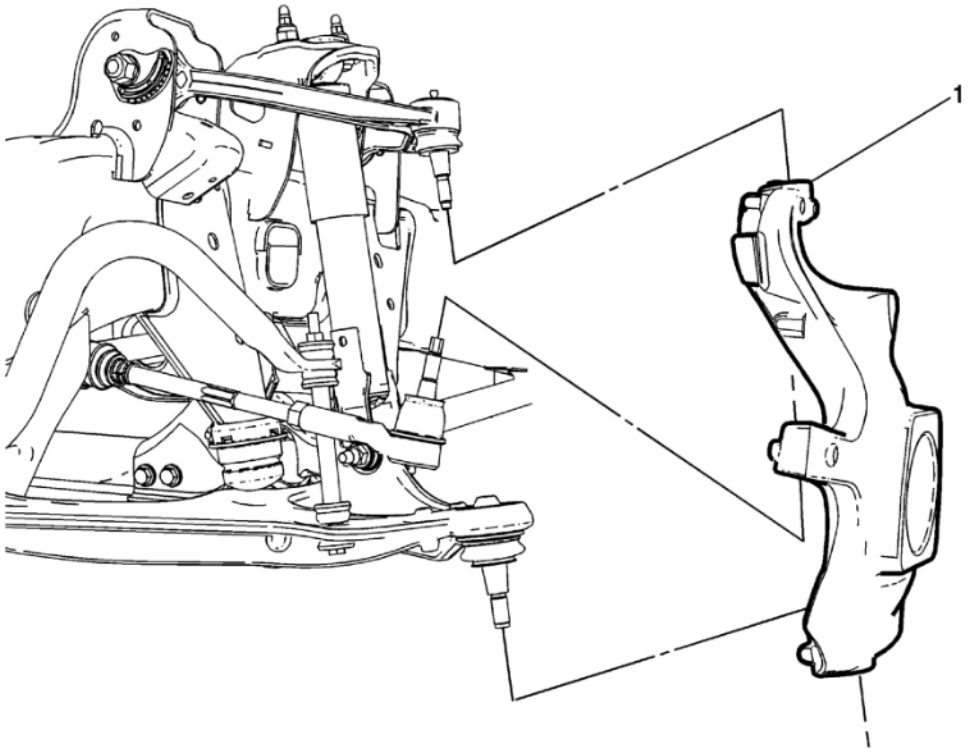


Fig. 8: Steering Knuckle (Heavy Duty)
Courtesy of GENERAL MOTORS COMPANY

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Callout	Component Name
Preliminary Procedures 1. **Front Wheel Hub, Bearing, and Seal Replacement (Heavy Duty)** 2. Front Brake Hose Bracket @Steering Knuckle - Separate - **Front Brake Hose Replacement (J95, J96)** **Front Brake Hose Replacement (JD9)** 3. Steering Linkage Outer Tie Rod@Steering Knuckle - Separate 4. Front Upper Control Arm@Steering Knuckle - Separate - **Upper Control Arm Replacement (Heavy Duty)** 5. Front Lower Control Arm@Steering Knuckle - Separate - **Lower Control Arm Replacement (Heavy Duty)**	
1	Steering Knuckle **Procedure** Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

UPPER CONTROL ARM REPLACEMENT (LIGHT DUTY)

Special Tools

CH-42188-B Ball Joint Separator

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Remove the front wheel speed sensor wiring harness from the steering knuckle. **Front Wheel Speed Sensor Replacement**
2. Remove the front shock absorber nuts. **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
3. Support the front lower control arm with a suitable stand.

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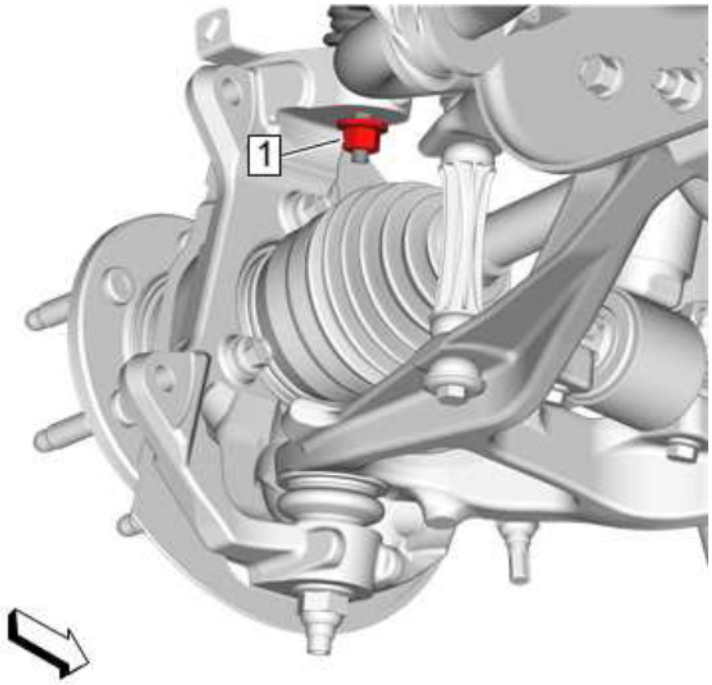


Fig. 9: Front Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

4. Front Upper Control Arm Ball Stud Nut 1 - Loosen

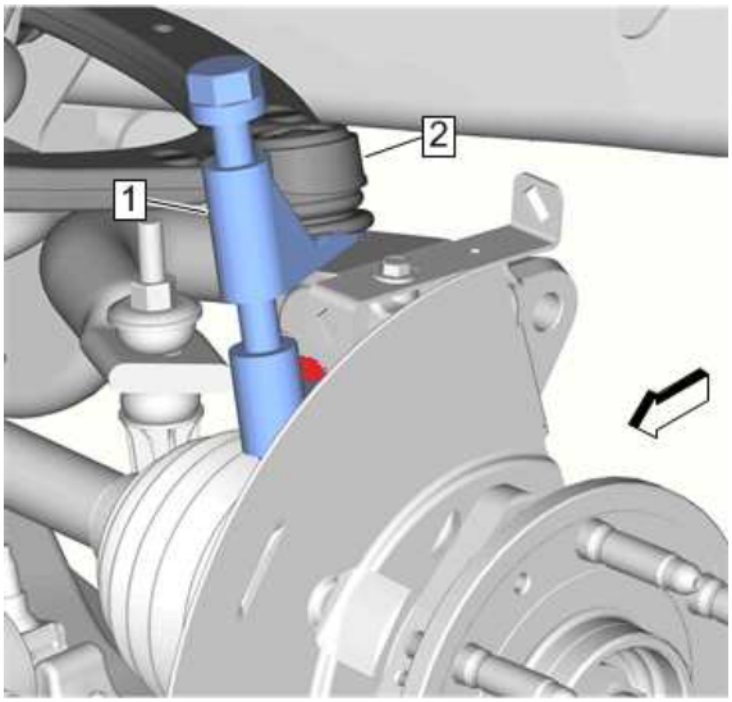


Fig. 10: Front Upper Control Arm And Steering Knuckle
Courtesy of GENERAL MOTORS COMPANY

5. Use the **CH-42188-B** separator (1) to separate the front upper control arm (2) from the steering knuckle.

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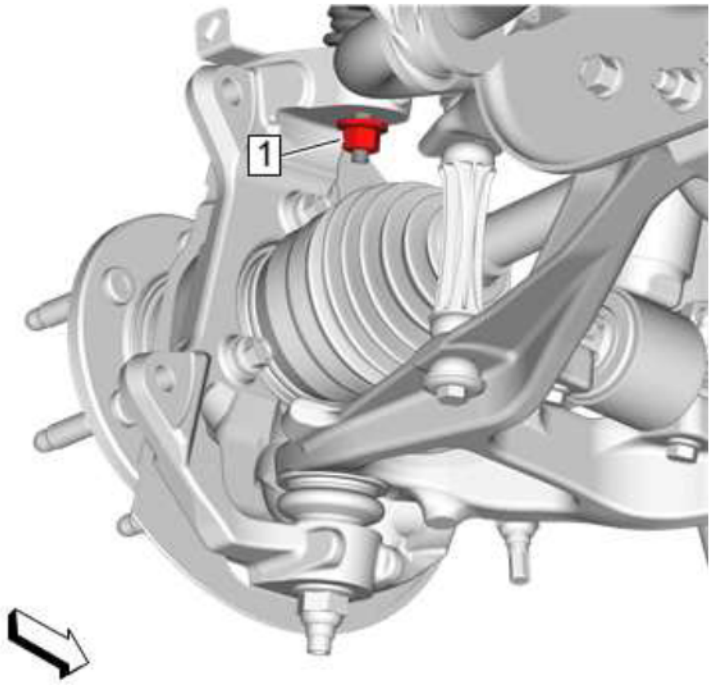


Fig. 11: Front Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Upper Control Arm Ball Stud Nut 1 - Remove

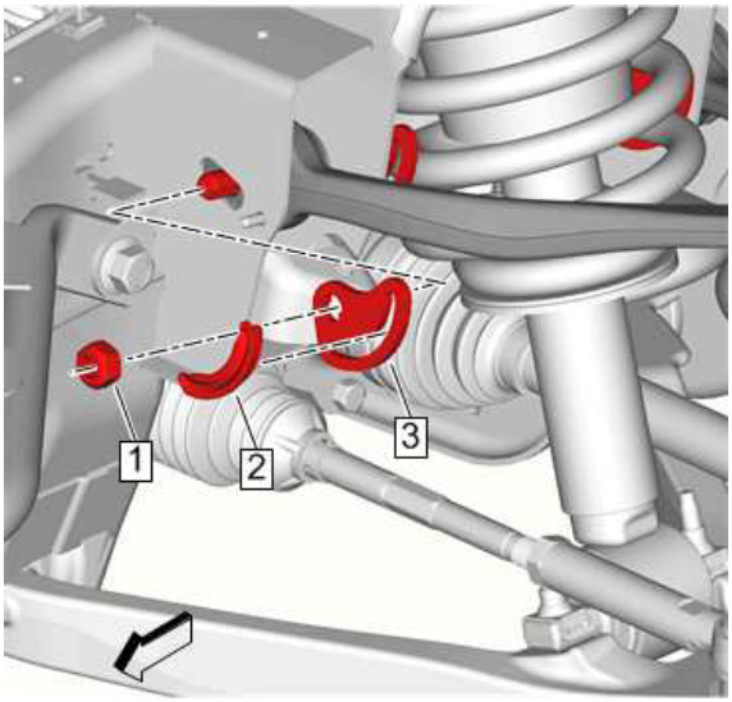


Fig. 12: Front Upper Control Arm Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Mark the position of the front upper control arm adjust cams to aid in installation and vehicle alignment.**
- **The front lower control arm adjust cam insert is installed in the factory to aid in alignment. Once removed, the insert should NOT be reused.**

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7. Remove the front upper control arm nut (1), front upper control arm adjust cam insert (2), and front upper control arm adjust cam (3).

   DISCARD the insert.

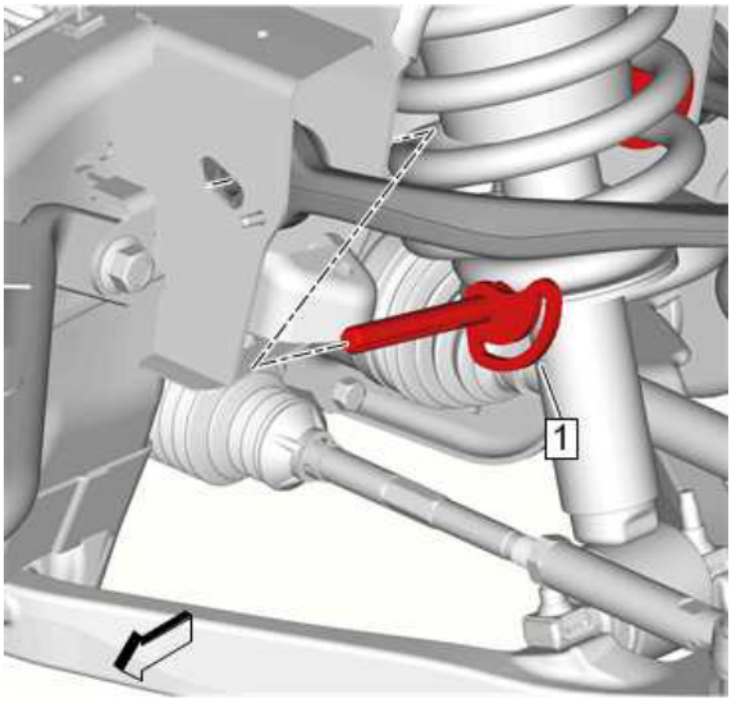


Fig. 13: Front Upper Control Arm Bolt/Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Two different front upper control arm bolt designs are available. The OLDER design has a removable front upper control arm adjust cam bolt while the NEWER design does NOT have a removable adjust cam bolt.**

8. Position the front shock absorber and spring assembly aside and remove the front upper control arm bolt/adjust cam (1).

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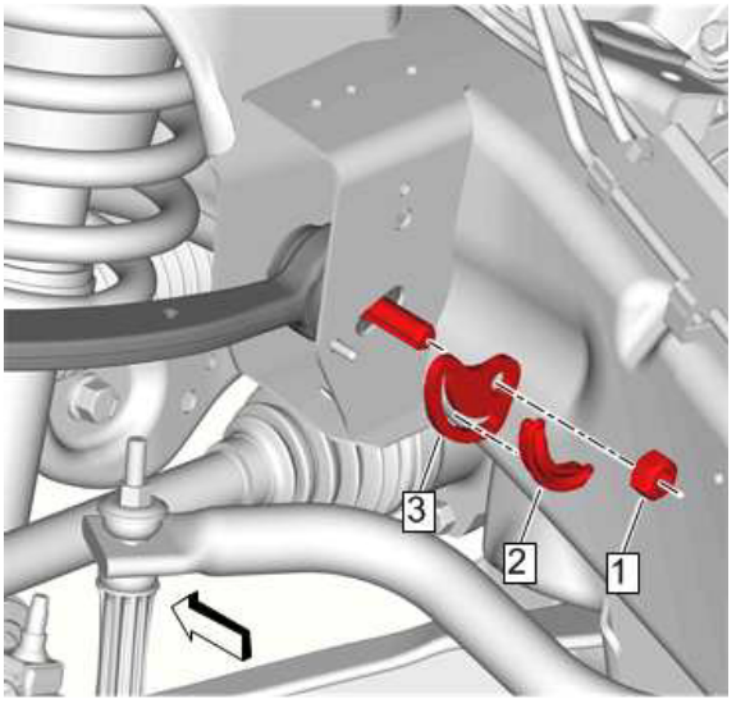


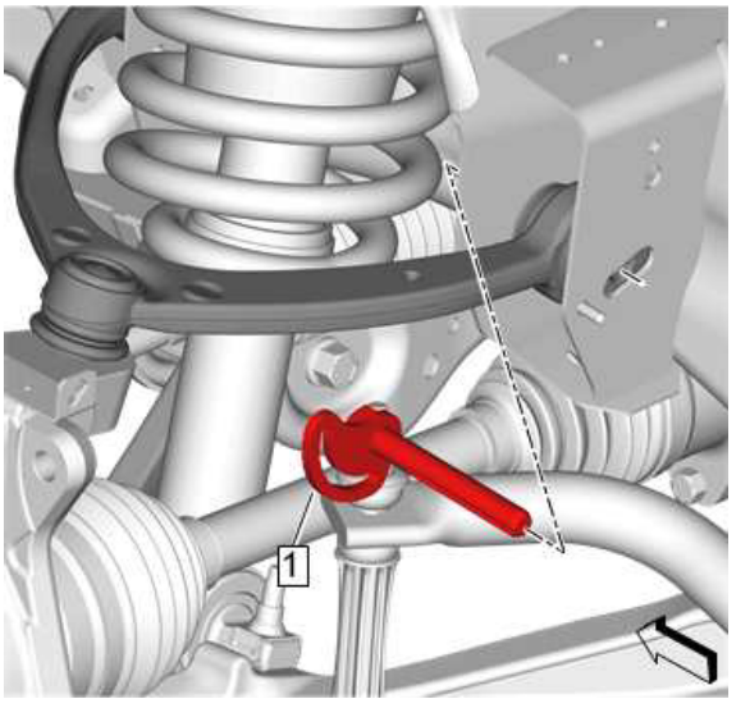
Fig. 14: Front Lower Control Arm Adjust Cam And Insert
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Mark the position of the front upper control arm adjust cams to aid in installation and vehicle alignment.**
- **The front lower control arm adjust cam insert is installed in the factory to aid in alignment. Once removed, the insert should NOT be reused.**

9. Remove the front upper control arm nut (1), front upper control arm adjust cam insert (2), and front upper control arm adjust cam (3).

   DISCARD the insert.



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Fig. 15: Front Upper Control Arm Bolt/Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Two different front upper control arm bolt designs are available. The OLDER design has a removable front upper control arm adjust cam bolt while the NEWER design does NOT have a removable adjust cam bolt.**

10. Position the front shock absorber and spring assembly aside and remove the front upper control arm bolt/adjust cam (1).

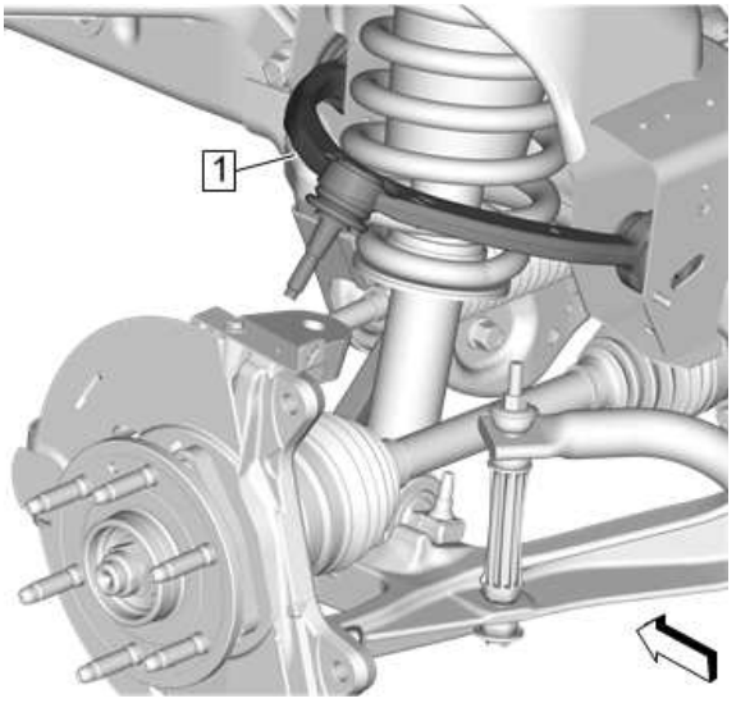


Fig. 16: Front Upper Control Arm
Courtesy of GENERAL MOTORS COMPANY

11. Remove the front upper control arm (1) from the vehicle.

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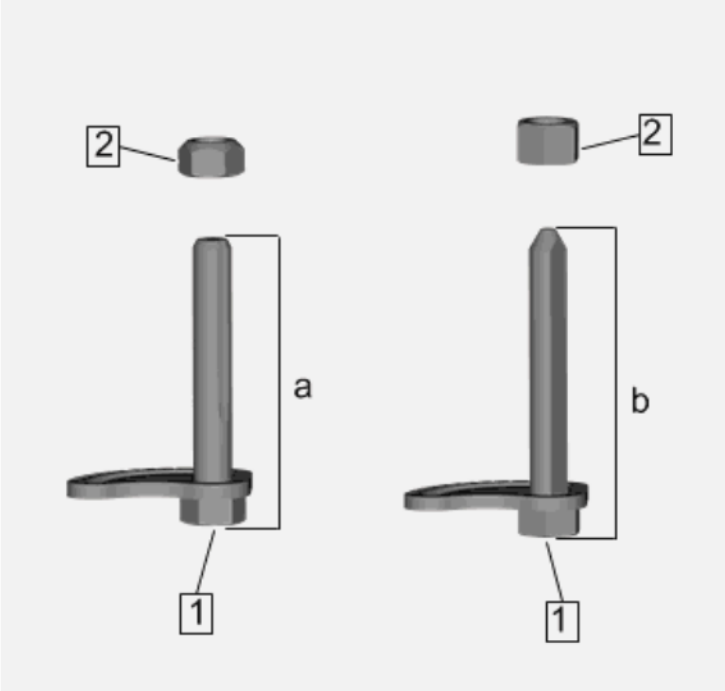


Fig. 17: Identifying NEW And OLD Design Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **BEFORE continuing with the installation procedure, the design of the front upper control arm nuts and bolts MUST be verified.**
- **Do NOT mix the different bolt designs on a single vehicle. The fastener tightening specifications for each design are different.**
- **If replacing the fasteners, refer to the General Motors Parts Catalog for the correct, matching nut and bolt part numbers.**
- **The visible differences between the front upper control arm nut designs are clearly observable.**

12. Observe each front upper control arm bolt (1) and nut (2) to verify which design is present on the vehicle.
    1. The NEW design bolt (a) is slotted, does NOT have a removable adjust cam, and measures 102 mm (4 in).
    2. The OLD design bolt (b) is flat down the entire length of one side, has a removable adjust cam, and measures 110 mm (4.3 in).

Installation Procedure

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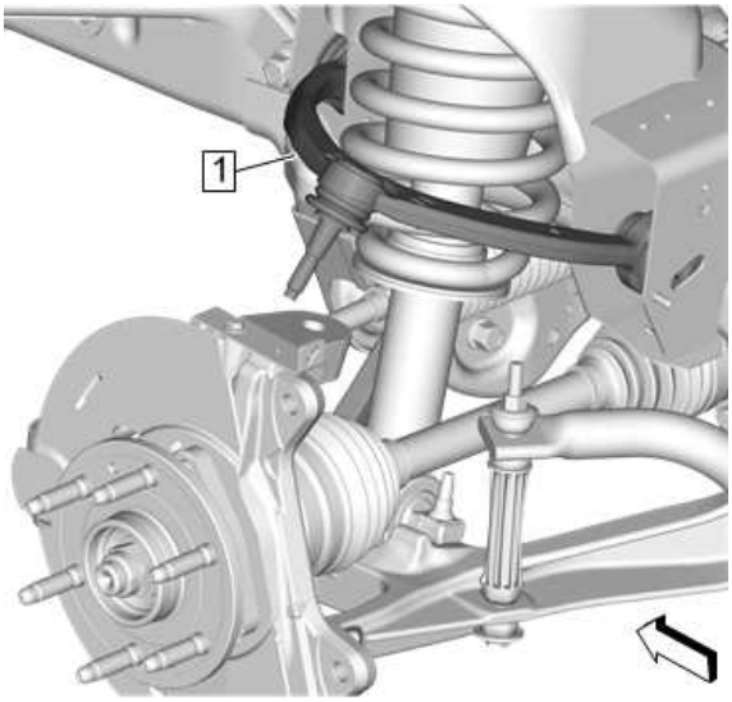


Fig. 18: Front Upper Control Arm
Courtesy of GENERAL MOTORS COMPANY

1. Position the front upper control arm (1) on the vehicle.

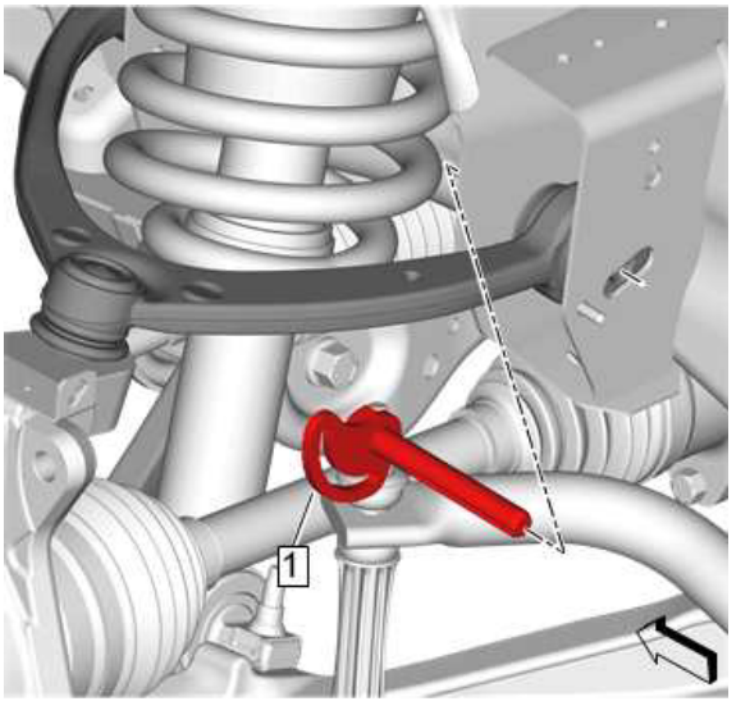


Fig. 19: Front Upper Control Arm Bolt/Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

2. Position the front shock absorber and spring assembly aside and install the front upper control arm bolt/adjust cam (1).

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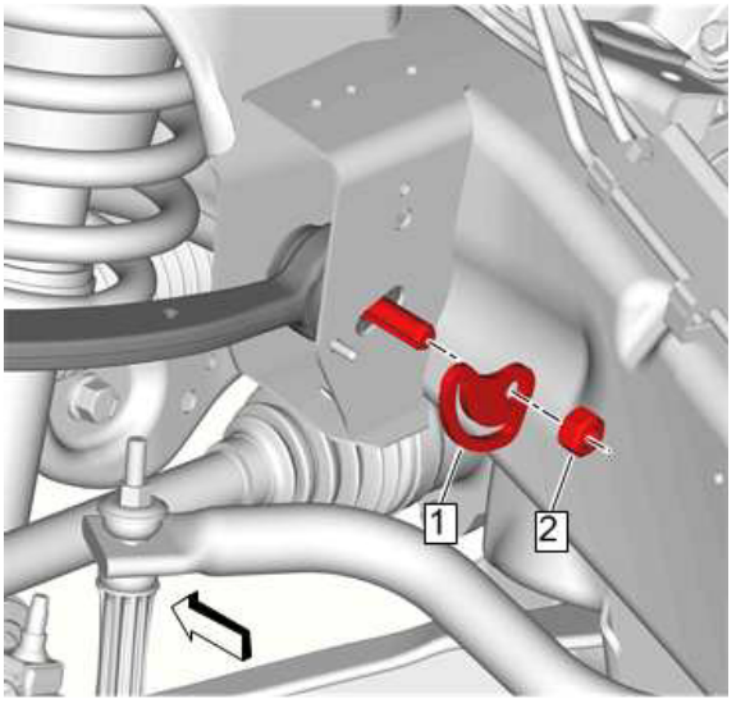


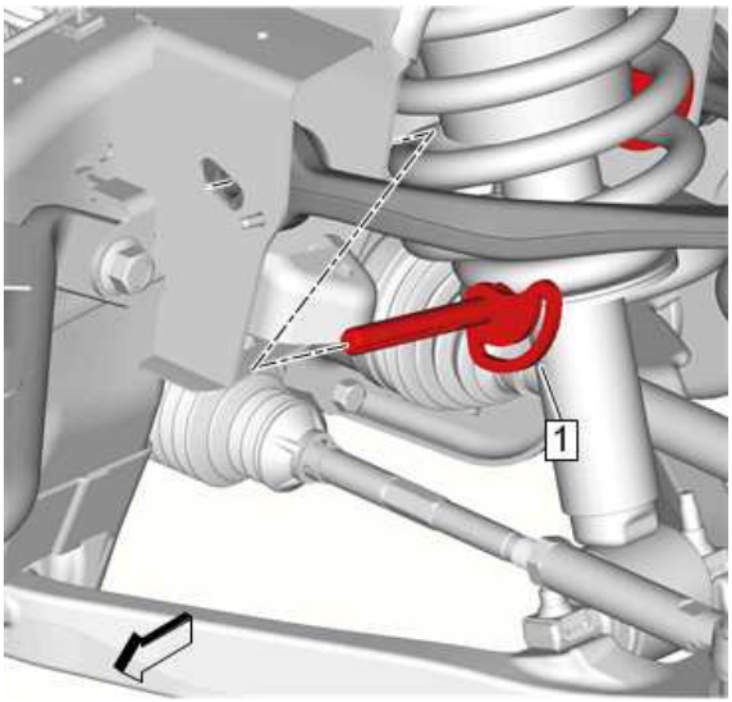
Fig. 20: Front Upper Control Arm Adjust Cam And Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the front upper control arm adjust cam (1) and front upper control arm nut (2) and tighten to:

Tighten

1. For the NEWER design bolt, tighten the NEWER style nut to 105 N.m (77 lb ft).
2. For the OLDER design bolt, tighten the OLDER style nut to 190 N.m (140 lb ft).



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Fig. 21: Front Upper Control Arm Bolt/Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

4. Position the front shock absorber and spring assembly aside and install the front upper control arm bolt/adjust cam (1).

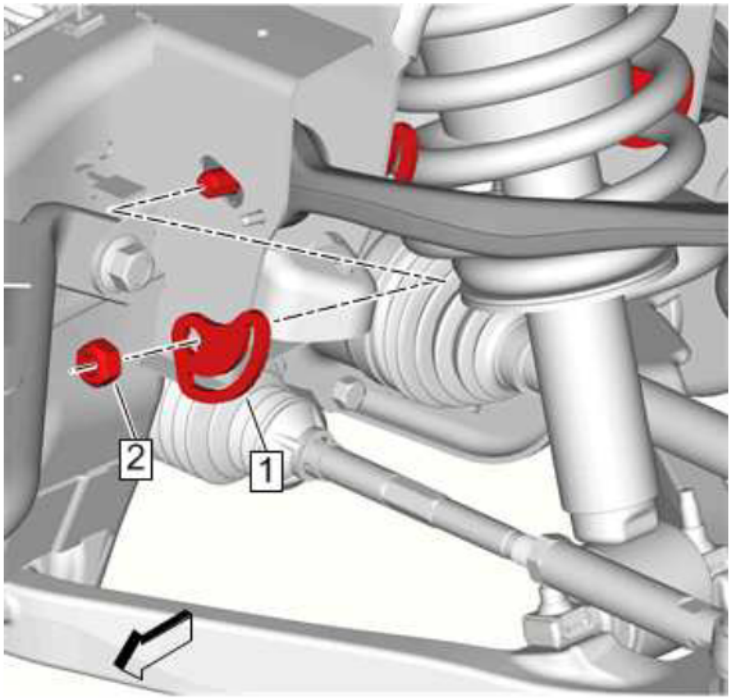


Fig. 22: Front Upper Control Arm Adjust Cam And Nut
Courtesy of GENERAL MOTORS COMPANY

5. Install the front upper control arm adjust cam (1) and front upper control arm nut (2) and tighten to:

Tighten

1. For the NEWER design bolt, tighten the NEWER style nut to 105 N.m (77 lb ft).
2. For the OLDER design bolt, tighten the OLDER style nut to 190 N.m (140 lb ft).

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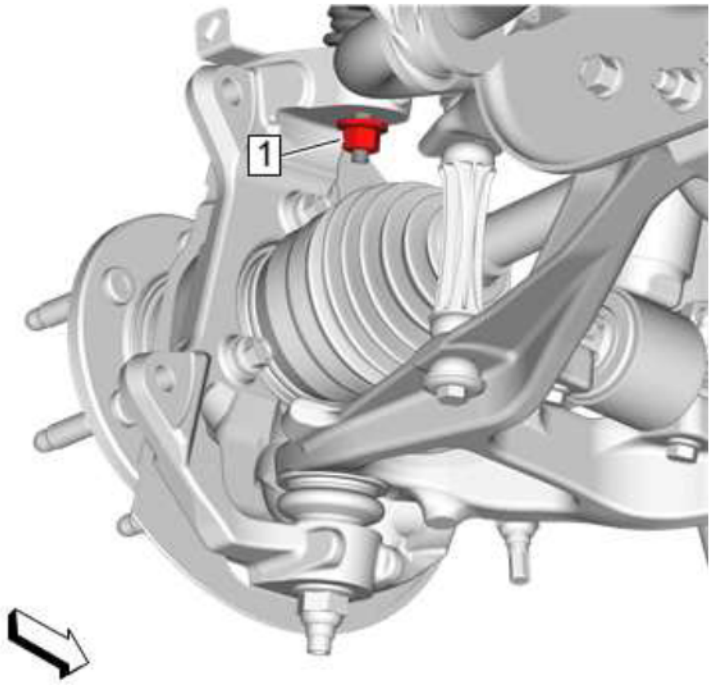


Fig. 23: Front Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Upper Control Arm Ball Stud Nut 1 - Install and tighten

   Tighten

   1. First Pass: 50 N.m (37 lb ft)
   2. Final Pass: (90-110 degrees)
7. Remove the support from underneath the front lower control arm.
8. Completely install the front shock absorber and spring assembly. **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
9. Completely install the front wheel speed sensor wiring harness. **Front Wheel Speed Sensor Replacement**
10. Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

UPPER CONTROL ARM REPLACEMENT (HEAVY DUTY)

Special Tools

CH-42188-B Ball Joint Separator

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) Tire and Wheel Removal and Installation (Dual Rear Wheels)**
2. Shock Absorber - Remove - **Shock Absorber Replacement (Heavy Duty)**

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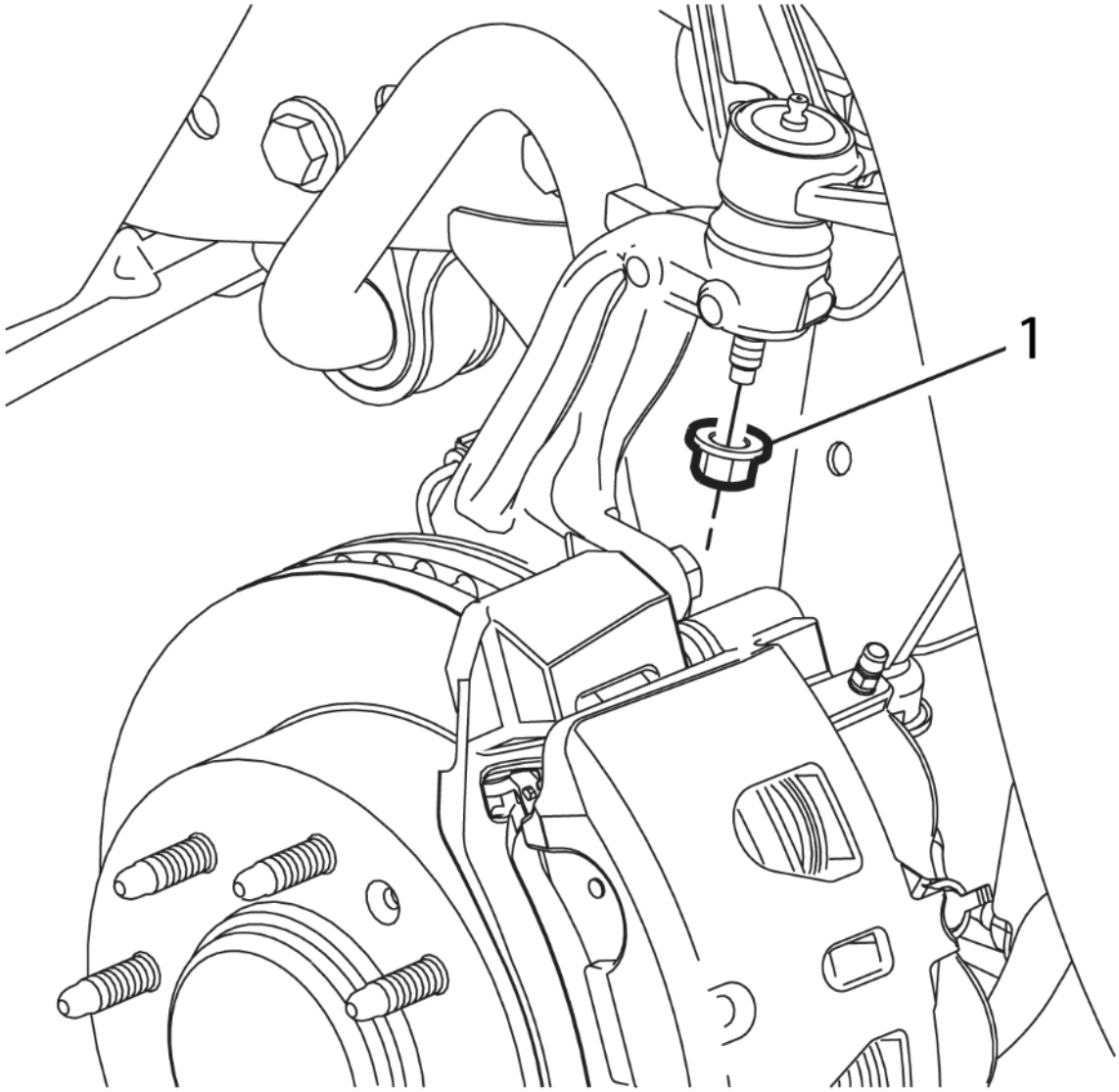


Fig. 24: Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

3. Front Upper Control Arm Ball Stud Nut 1 - Loosen
4. Use a suitable jack stand to support the front lower control arm.

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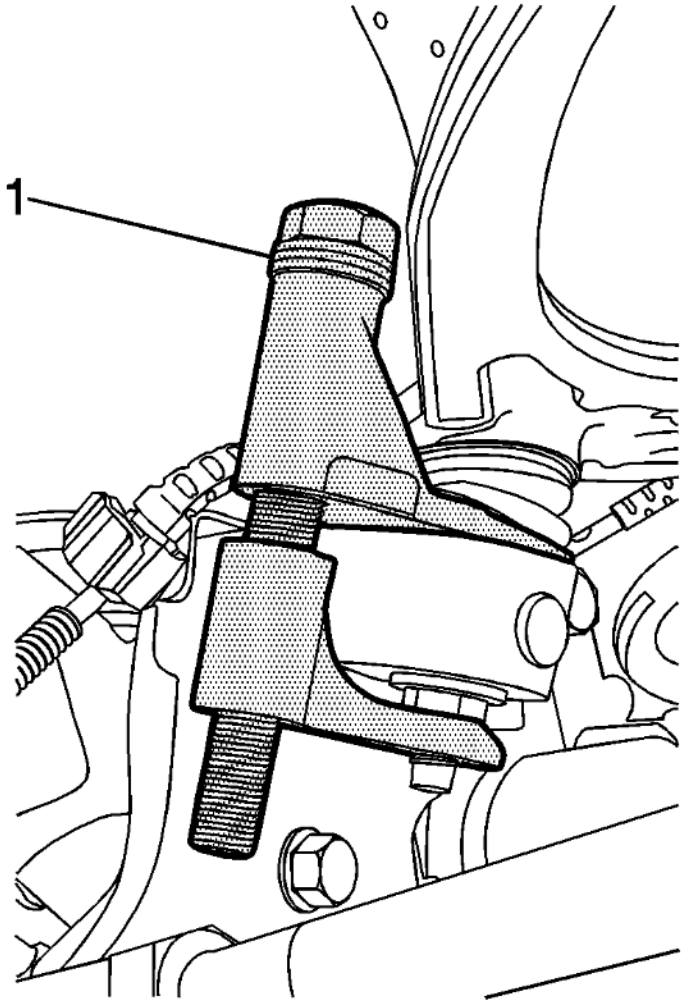


Fig. 25: Separating Front Upper Control Arm From Steering Knuckle
Courtesy of GENERAL MOTORS COMPANY

5. Use the **CH-42188-B** separator to separate the front upper control arm from the steering knuckle.

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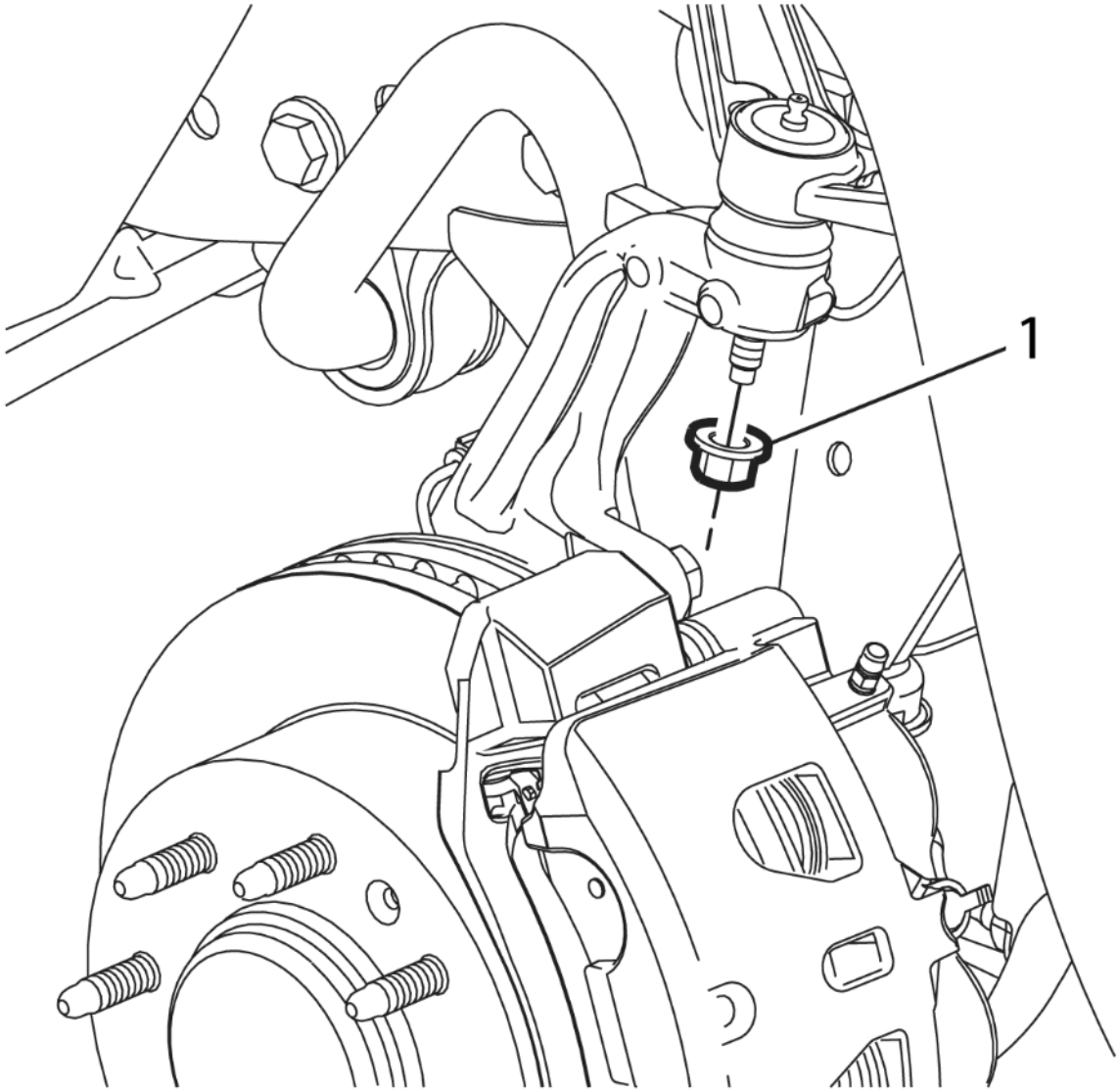


Fig. 26: Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Upper Control Arm Ball Stud Nut 1 - Remove
7. Front Upper Control Arm@Steering Knuckle - Separate

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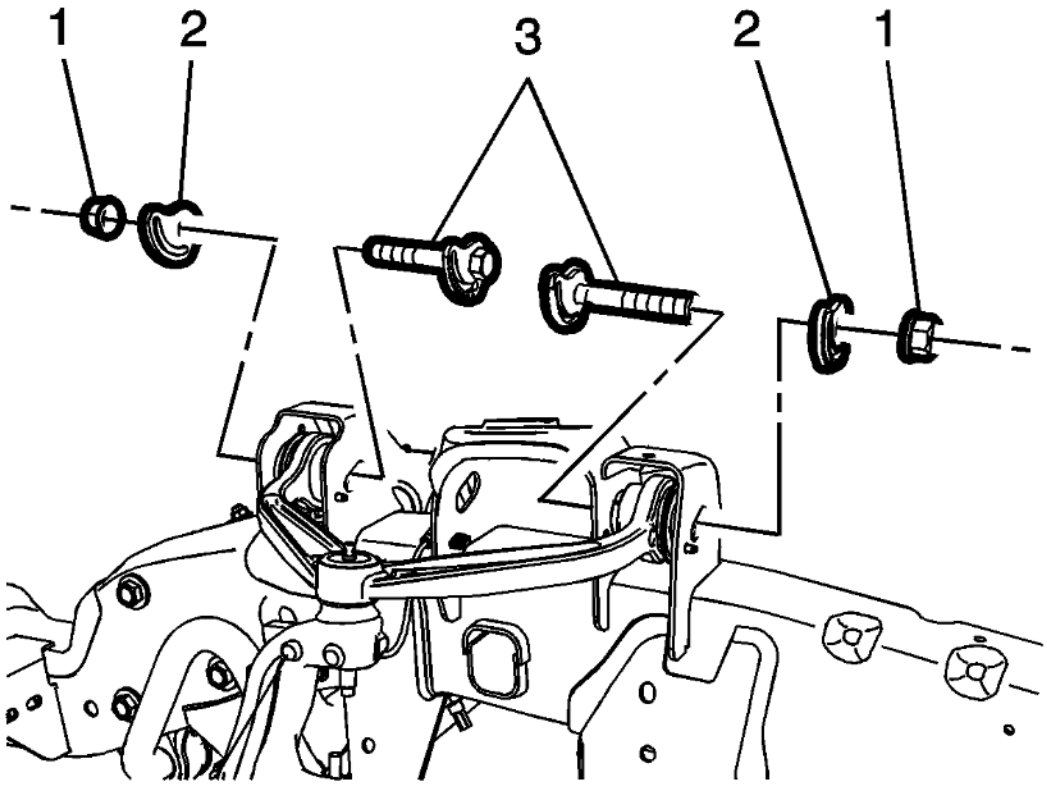


Fig. 27: Front Upper Control Arm Nut
Courtesy of GENERAL MOTORS COMPANY

8. Front Upper Control Arm Nut 1 - Remove
9. Front Upper Control Arm Adjust Cam 2 - Remove
10. Front Upper Control Arm Bolt 3 - Remove

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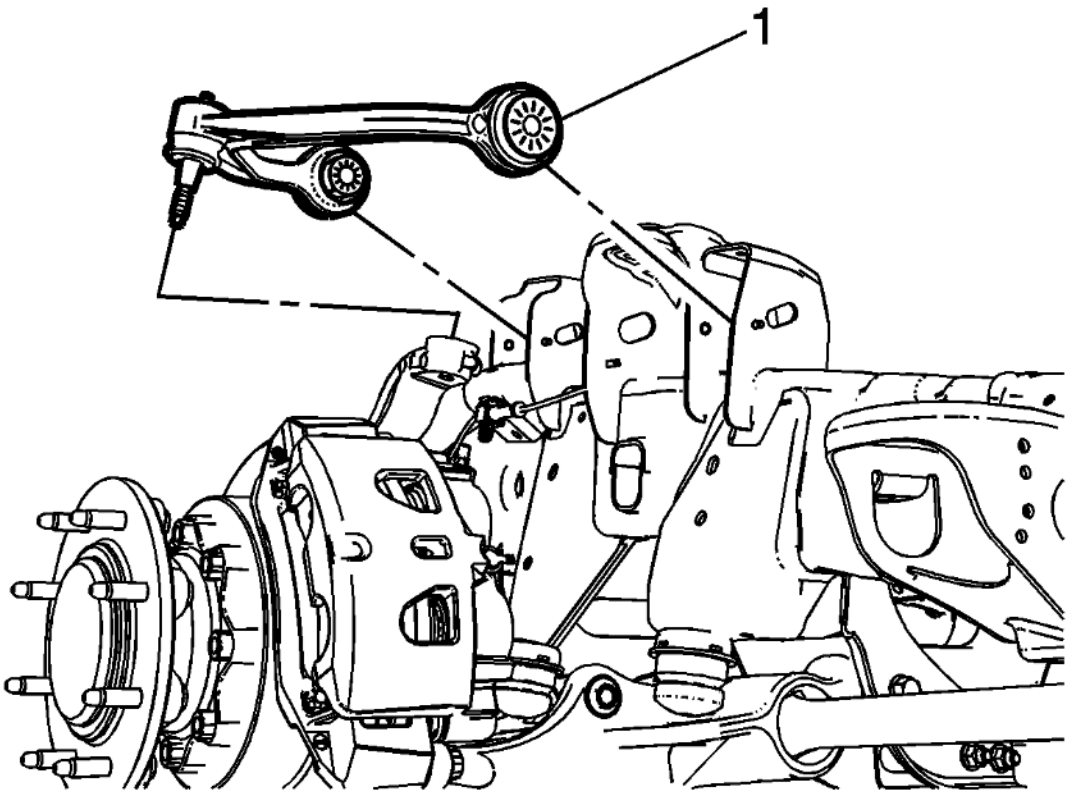


Fig. 28: Upper Control Arm
Courtesy of GENERAL MOTORS COMPANY

11. Front Upper Control Arm 1 - Remove

Installation Procedure

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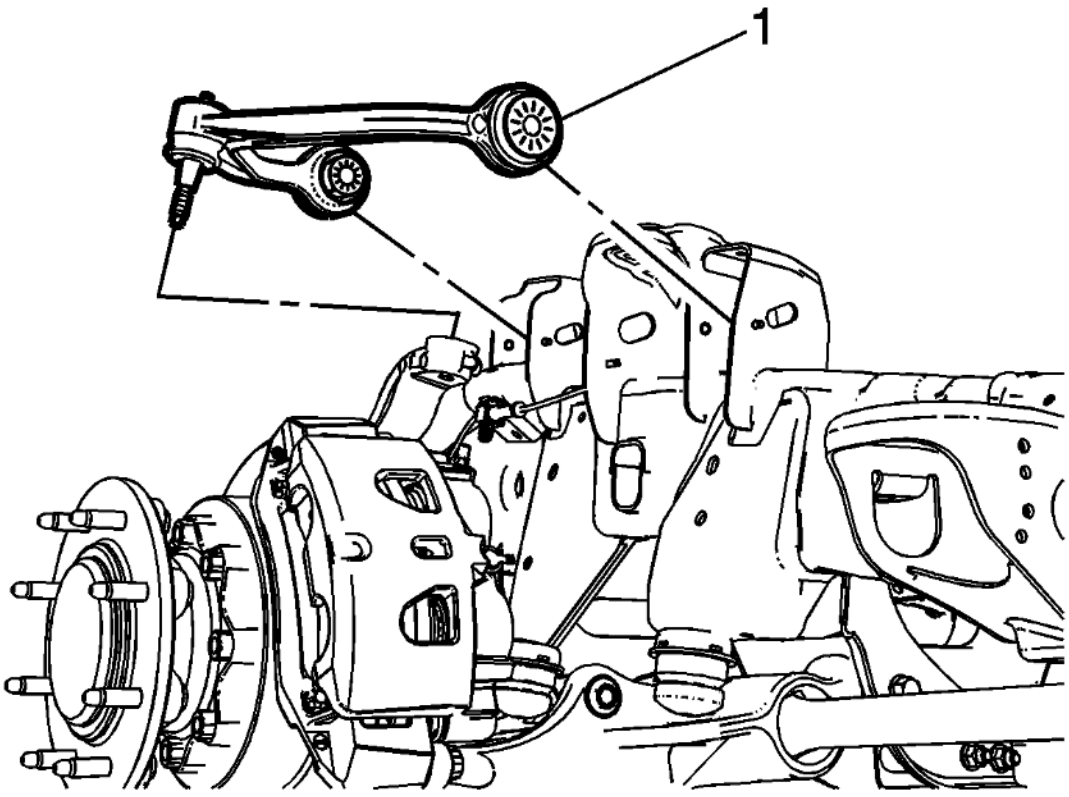


Fig. 29: Upper Control Arm
Courtesy of GENERAL MOTORS COMPANY

1. Front Upper Control Arm 1 - Install

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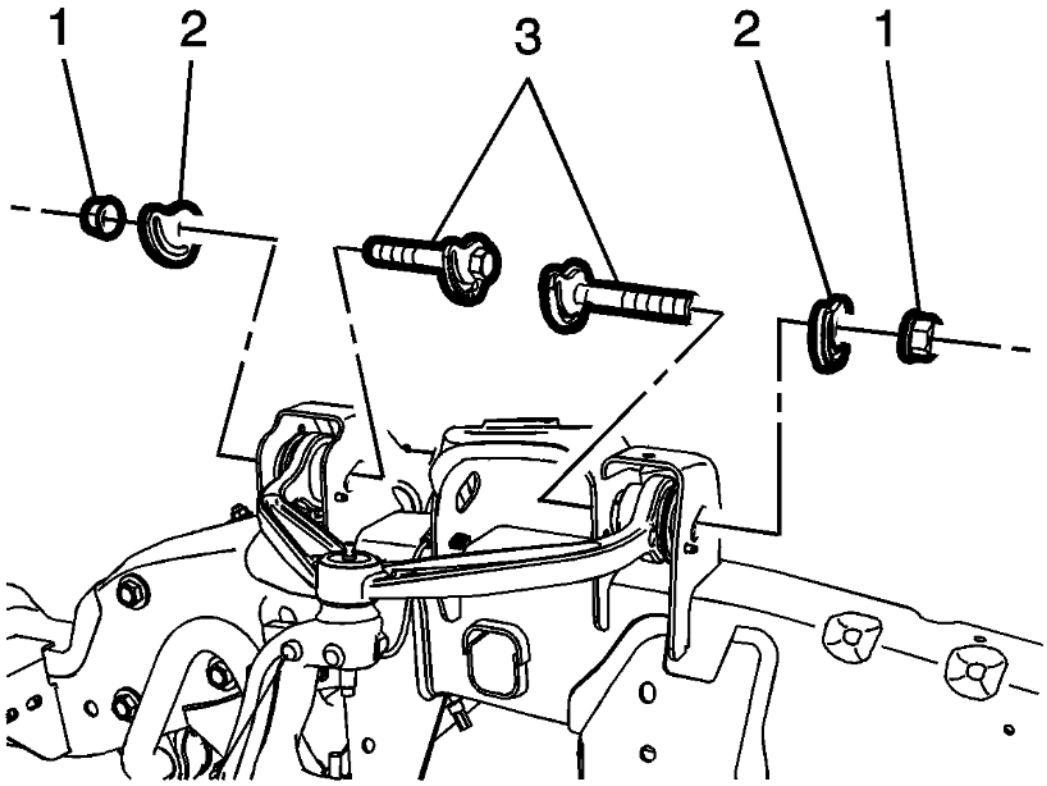


Fig. 30: Front Upper Control Arm Nut
Courtesy of GENERAL MOTORS COMPANY

2. Front Upper Control Arm Bolt 3 - Install
3. Front Upper Control Arm Adjust Cam 2 - Install

CAUTION: Refer to Fastener Caution .

4. Front Upper Control Arm Nut 1 - Install and tighten 260 N.m (192 lb ft)
5. Front Upper Control Arm@Steering Knuckle - Install

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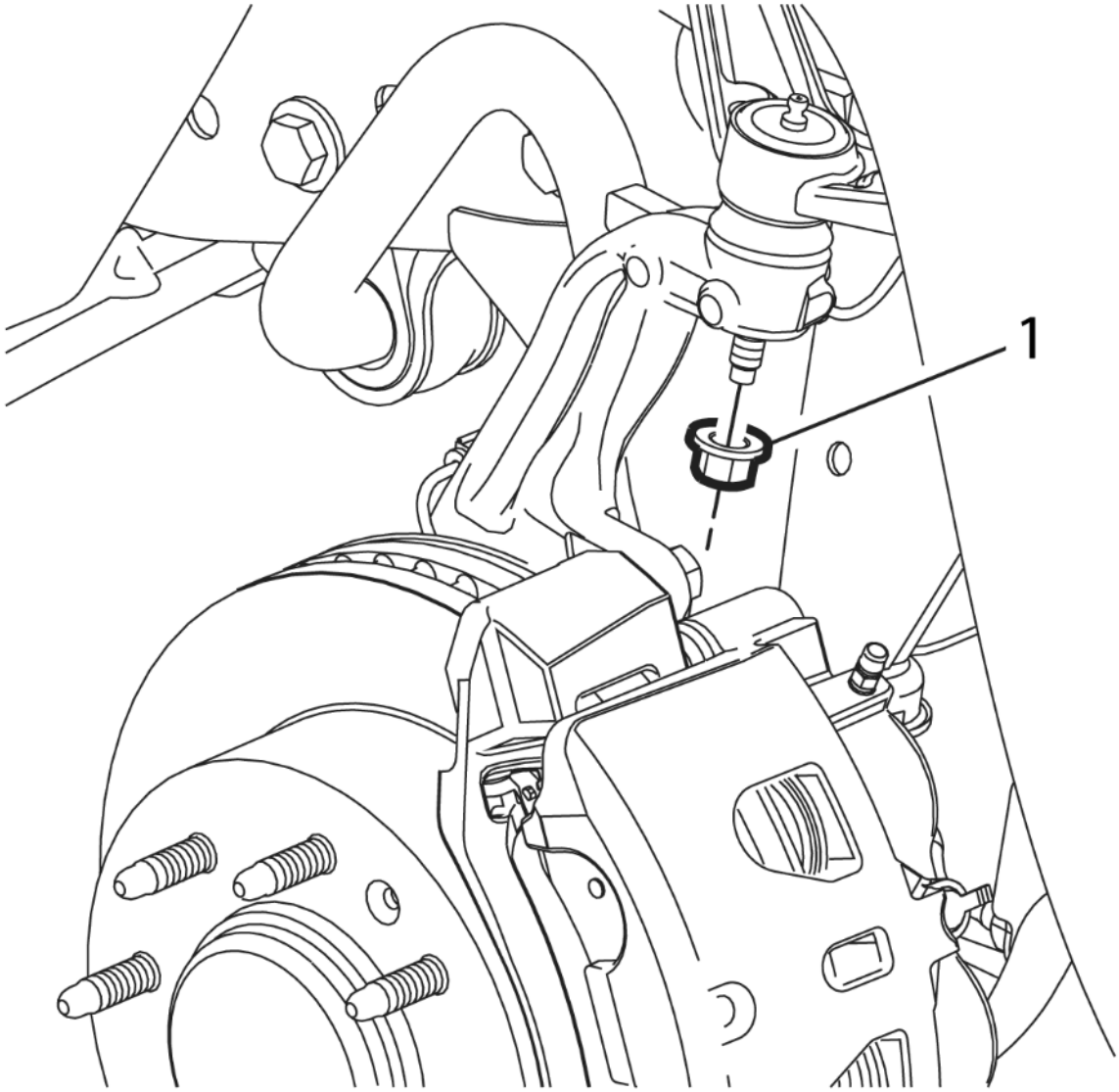


Fig. 31: Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Upper Control Arm Ball Stud Nut 1 - Install and tighten 50 N.m (37 lb ft)
7. Shock Absorber - Install - **Shock Absorber Replacement (Heavy Duty)**
8. Install the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**
9. Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

LOWER CONTROL ARM REPLACEMENT (LIGHT DUTY)

Special Tools

- **CH-43631** Ball Joint Separator
- **J-45851** Ball Joint Separator Protector Adapter(s)

Equivalent regional tools:**Special Tools**

Removal Procedure

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1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) Tire and Wheel Removal and Installation (Dual Rear Wheels)**
2. Front Stabilizer Shaft Link - Remove - **Stabilizer Shaft Link Replacement (Light Duty)**
3. Front Shock Absorber@Front Lower Control Arm - Separate - **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
4. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Separate - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side**
5. Use mechanic's wire or equivalent to support the steering knuckle and front upper control arm.

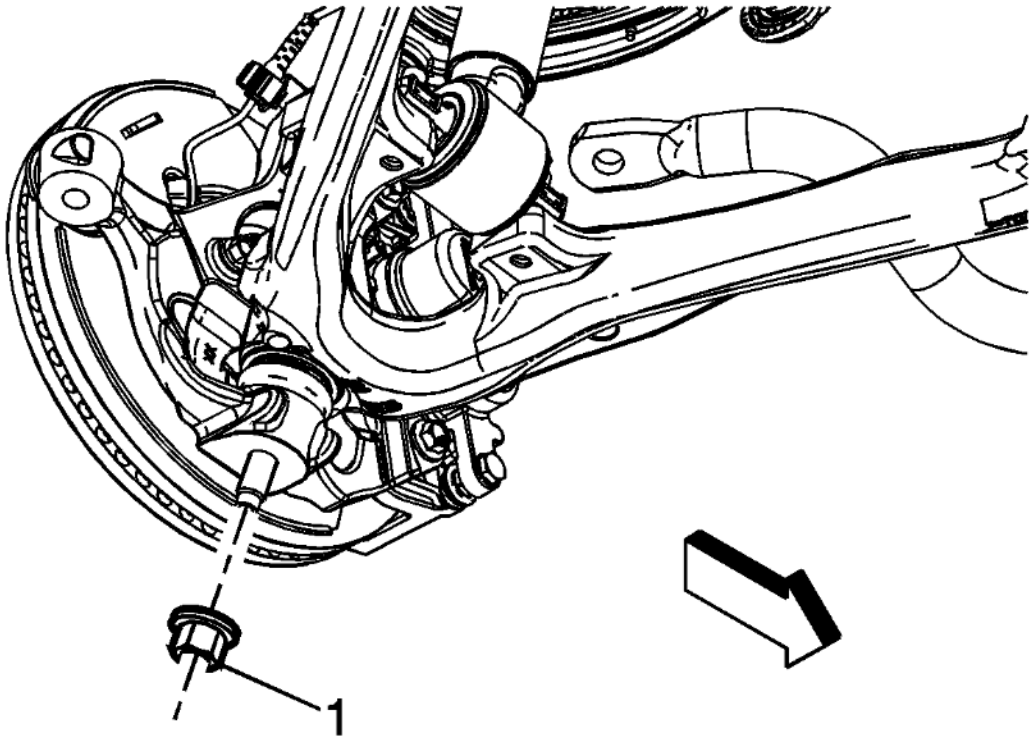


Fig. 32: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Lower Control Arm Ball Stud Nut 1 - Remove

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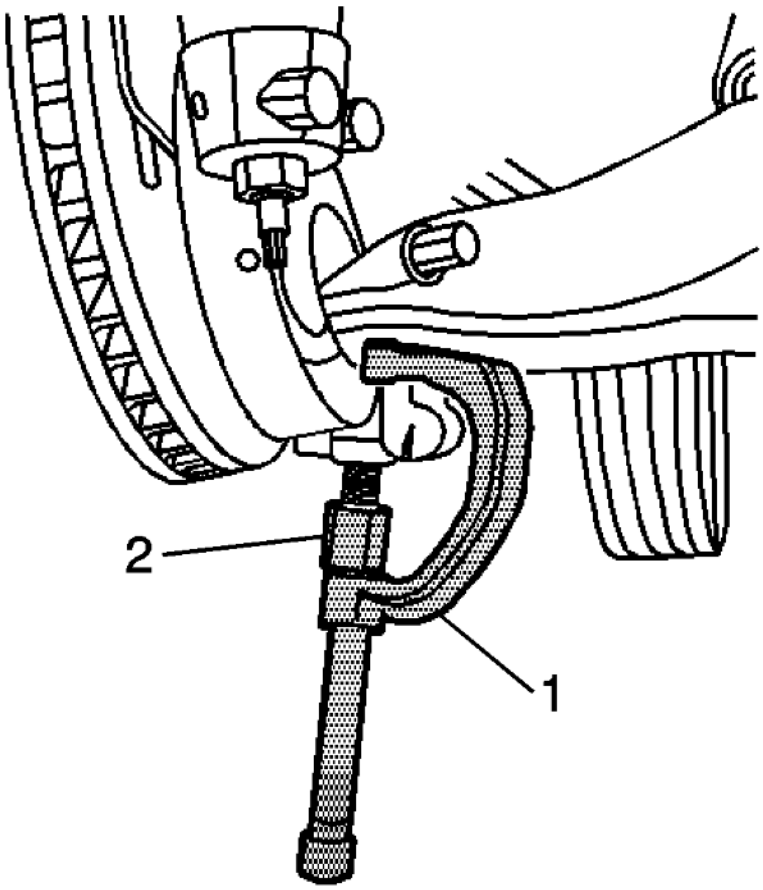


Fig. 33: Separator And Adapters
Courtesy of GENERAL MOTORS COMPANY

7. Use the **CH-43631** separator (1) and the **J-45851** adapter(s) (2) to separate the front lower control arm from the steering knuckle.

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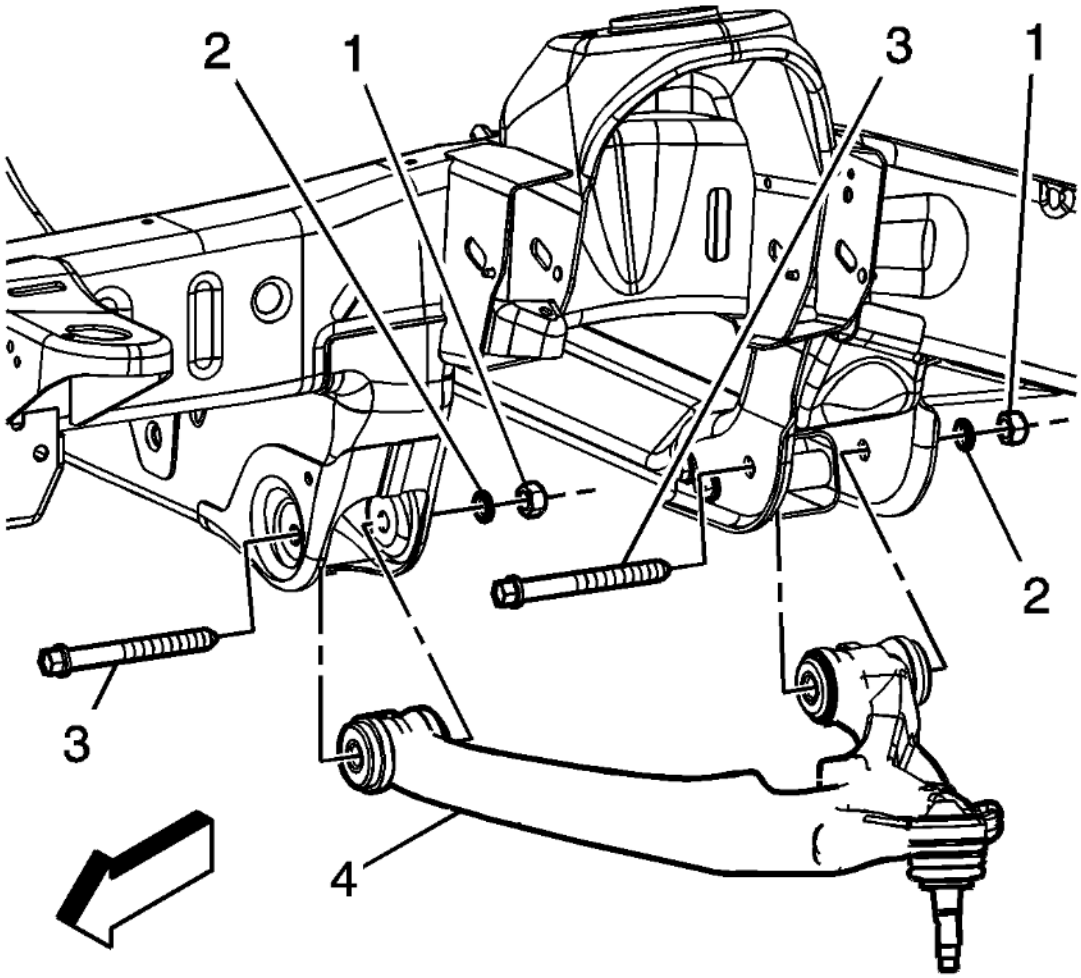


Fig. 34: Lower Control Arm
Courtesy of GENERAL MOTORS COMPANY

8. Front Lower Control Arm Nut 1 - Remove

NOTE:

- **The front lower control arm washers are directional washers and MUST be installed in the same direction as when they were removed.**
- **Note the direction of the front lower control arm washers during removal to assist in installation.**

9. Front Lower Control Arm Washer 2 - Remove
10. Front Lower Control Arm Bolt 3 - Remove
11. Front Lower Control Arm 4 - Remove

Installation Procedure

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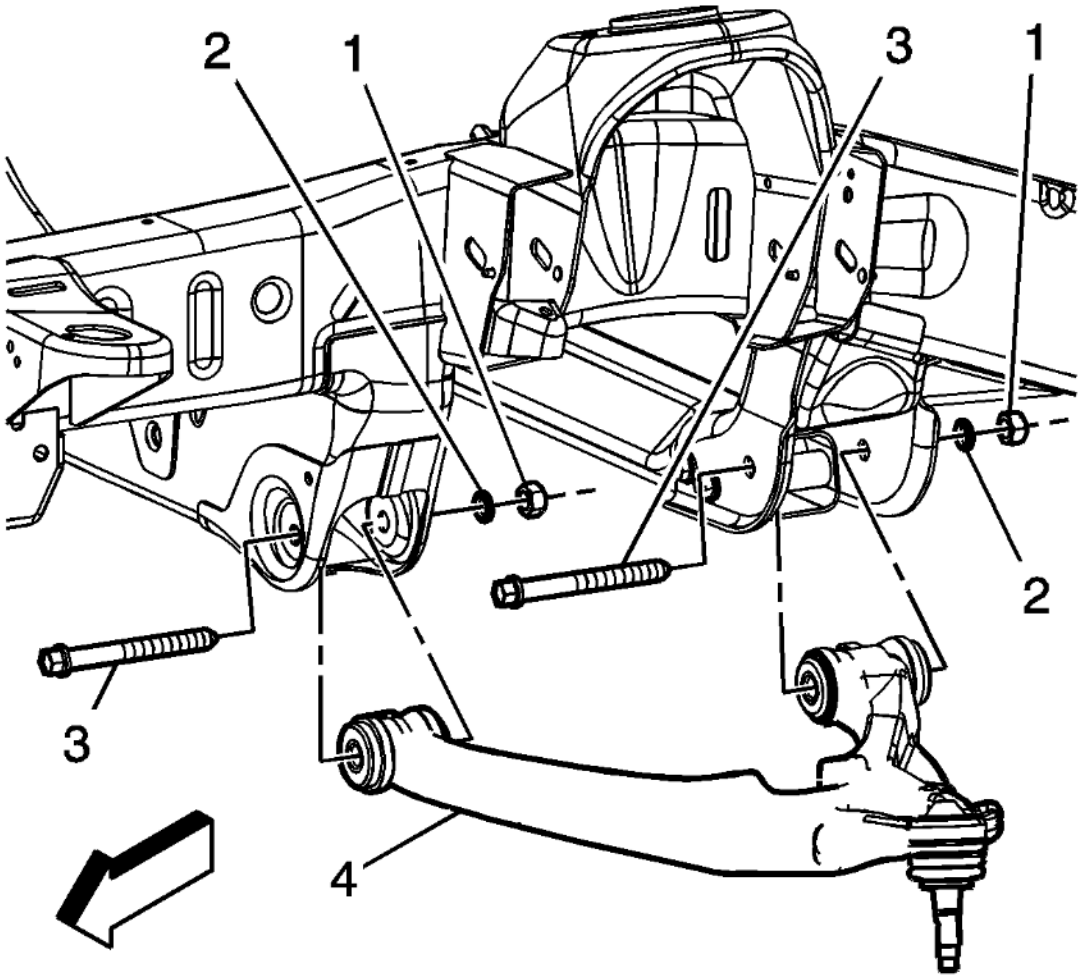


Fig. 35: Lower Control Arm
Courtesy of GENERAL MOTORS COMPANY

1. Front Lower Control Arm 4 - Install
2. Front Lower Control Arm Bolt 3 - Install

NOTE: **The front lower control arm washers are directional washers and MUST be installed in the same direction as when they were removed.**

3. Front Lower Control Arm Washer 2 - Install

CAUTION: **Refer to Fastener Caution .**

4. Front Lower Control Arm Nut 1 - Install and tighten 175 N.m (129 lb ft)
5. Front Lower Control Arm@Steering Knuckle - Install

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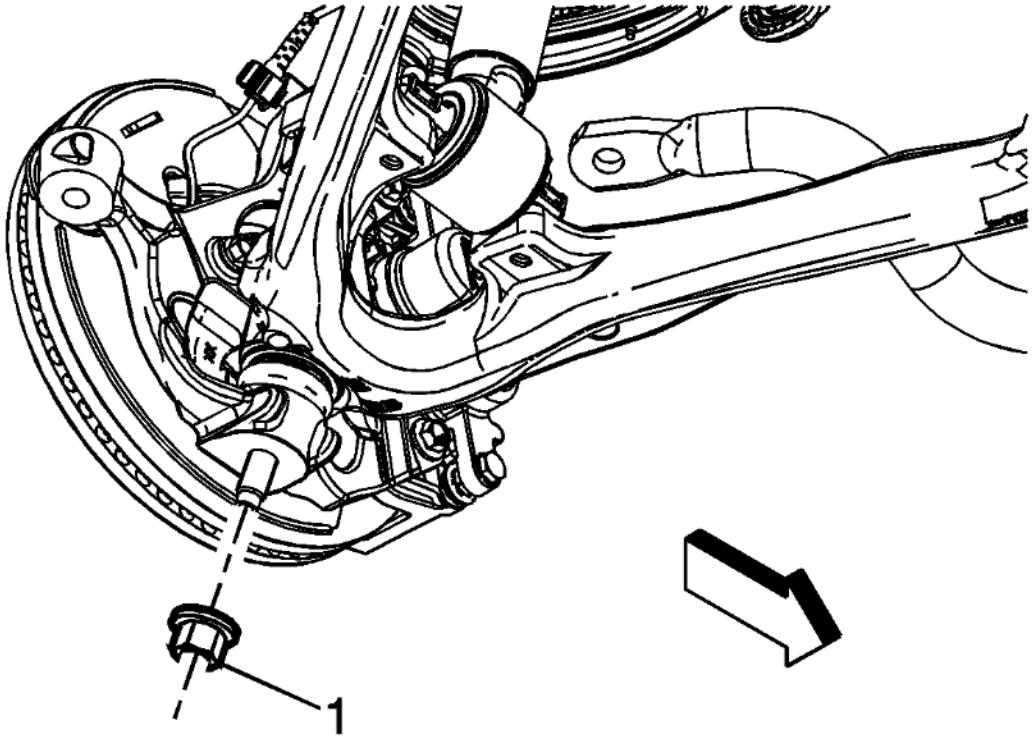


Fig. 36: View Of Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

6. Front Lower Control Arm Ball Stud Nut 1 - Install

   Tighten

   1. First Pass: 50 N.m (37 lb ft)
   2. Final Pass: (125-135 degrees)
7. Remove the mechanic's wire or equivalent used to support the steering knuckle and front upper control arm.
8. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Install - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side**
9. Front Shock Absorber@Front Lower Control Arm - Install - **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
10. Front Stabilizer Shaft Link - Install - **Stabilizer Shaft Link Replacement (Light Duty)**
11. Install the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) Tire and Wheel Removal and Installation (Dual Rear Wheels)**

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12. Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

LOWER CONTROL ARM REPLACEMENT (HEAVY DUTY)

Special Tools

- **CH-43631** Ball Joint Separator
- **J-45851** Ball Joint Separator Protector Adapter(s)

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**
2. Front Torsion Bar - Remove - **Torsion Bar and Support Assembly Replacement (Heavy Duty)**
3. Front Stabilizer Shaft Link - Remove - **Stabilizer Shaft Link Replacement (Heavy Duty)**
4. Front Shock Absorber@Front Lower Control Arm - Separate - **Shock Absorber Replacement (Heavy Duty)**
5. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Separate - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side**
6. Use mechanic's wire or equivalent to support the steering knuckle and front upper control arm.

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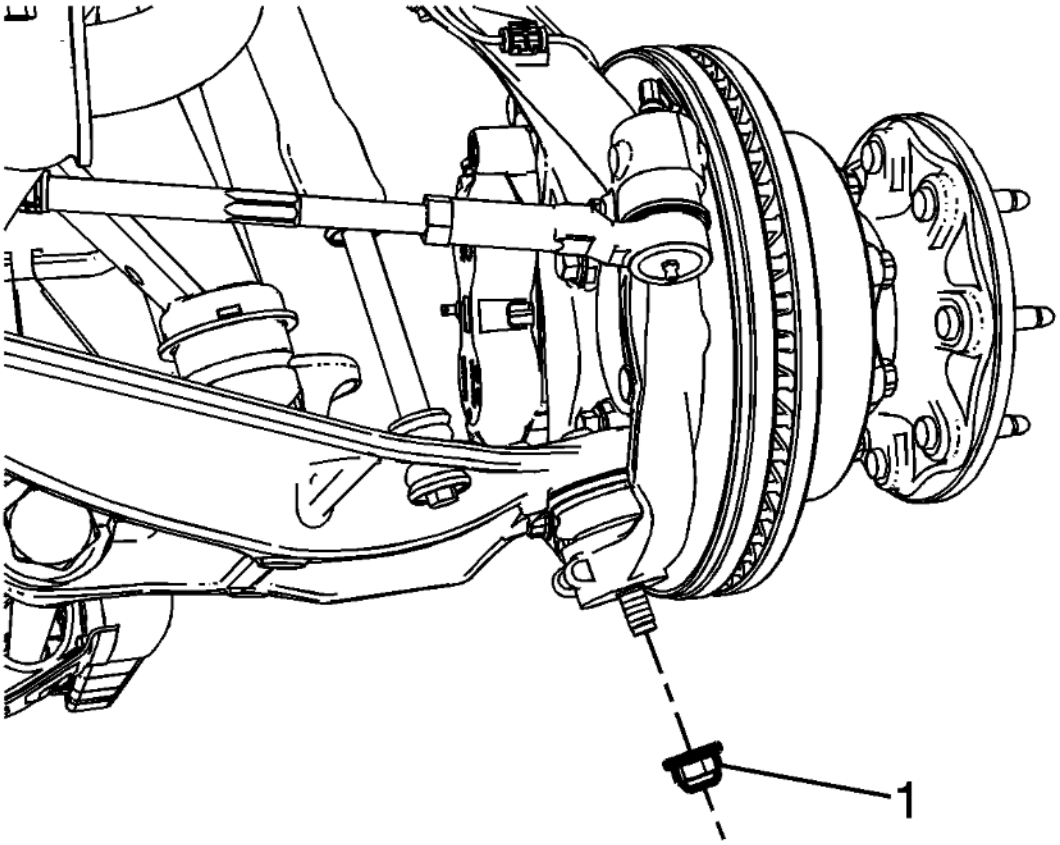


Fig. 37: Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

7. Front Lower Control Arm Ball Stud Nut 1 - Remove

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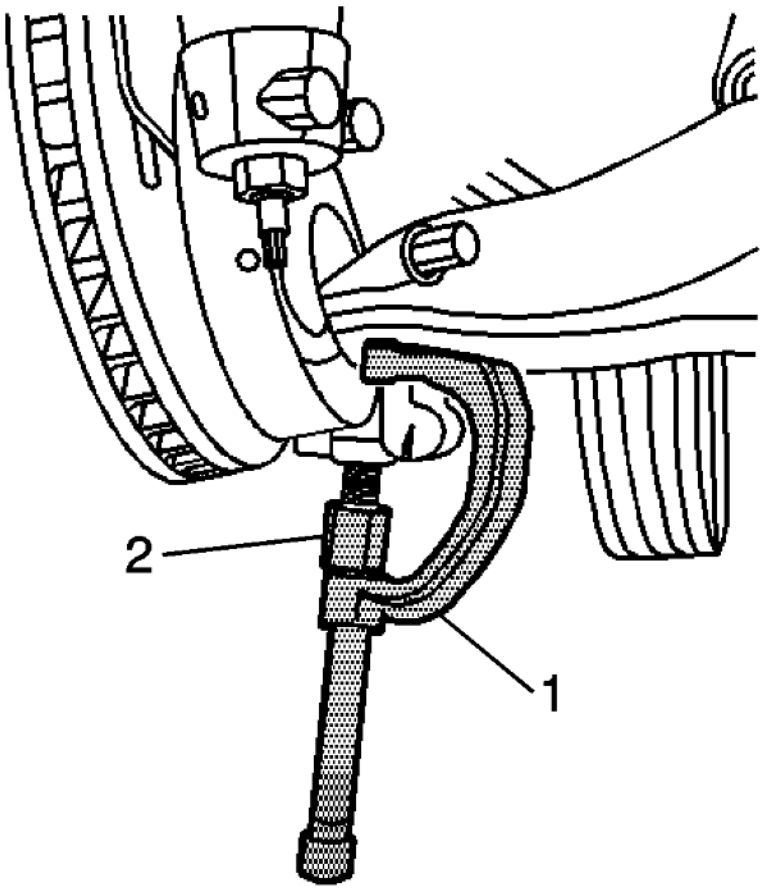


Fig. 38: View Of CH 43631 Separator And J 45851 Adapters
Courtesy of GENERAL MOTORS COMPANY

8. Use the **CH-43631** separator (1) and the **J-45851** adapter(s) (2) to separate the front lower control arm from the steering knuckle.

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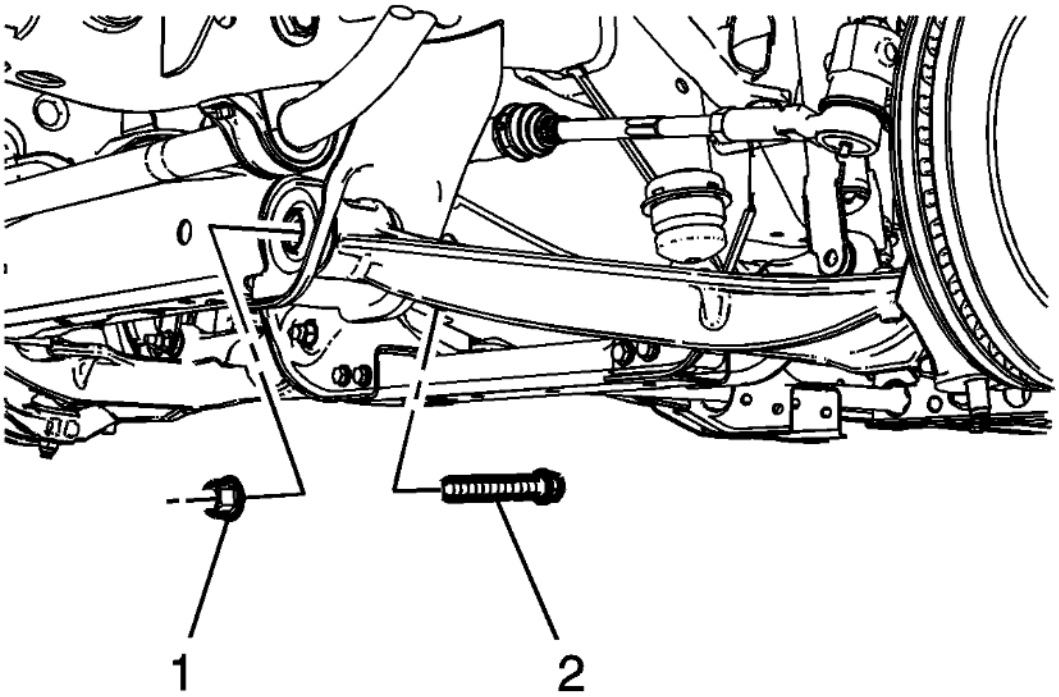


Fig. 39: Identifying Front Lower Control Arm Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Front Lower Control Arm Front Nut 1 - Remove
10. Front Lower Control Arm Front Bolt 2 - Remove

DISCARD the bolt.

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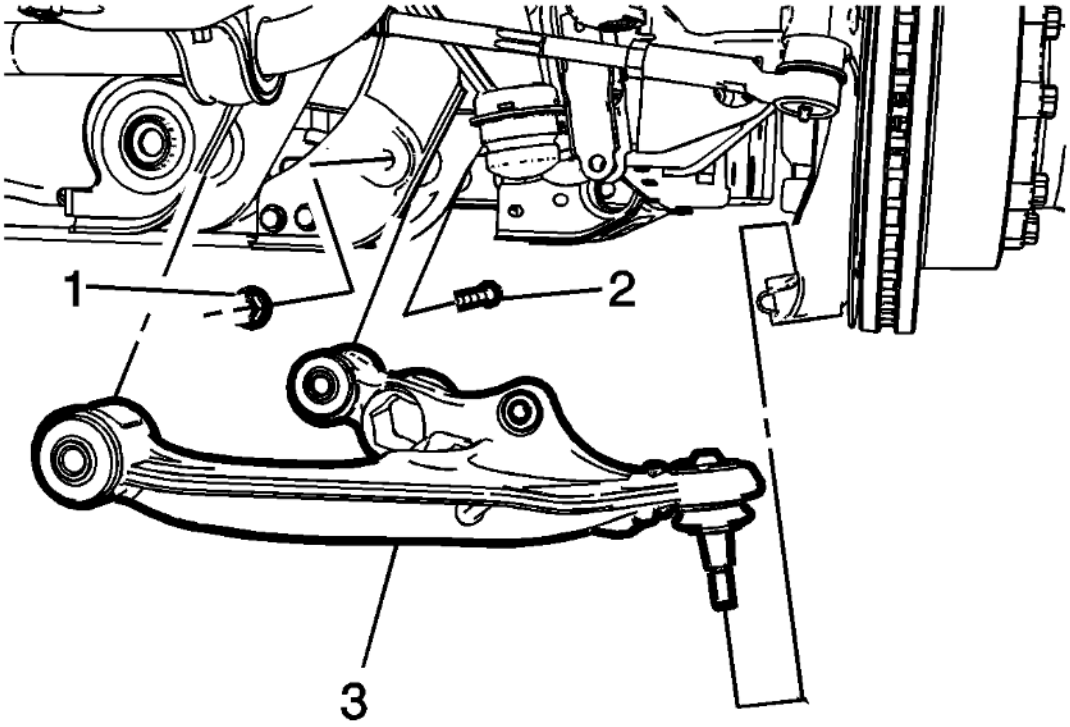


Fig. 40: Lower Control Rear Nut, Control Arm And Bolt
Courtesy of GENERAL MOTORS COMPANY

11. Front Lower Control Arm Rear Nut 1 - Remove
12. Front Lower Control Arm Rear Bolt 2 - Remove

    DISCARD the bolt.

13. Front Lower Control Arm 3 - Remove

Installation Procedure

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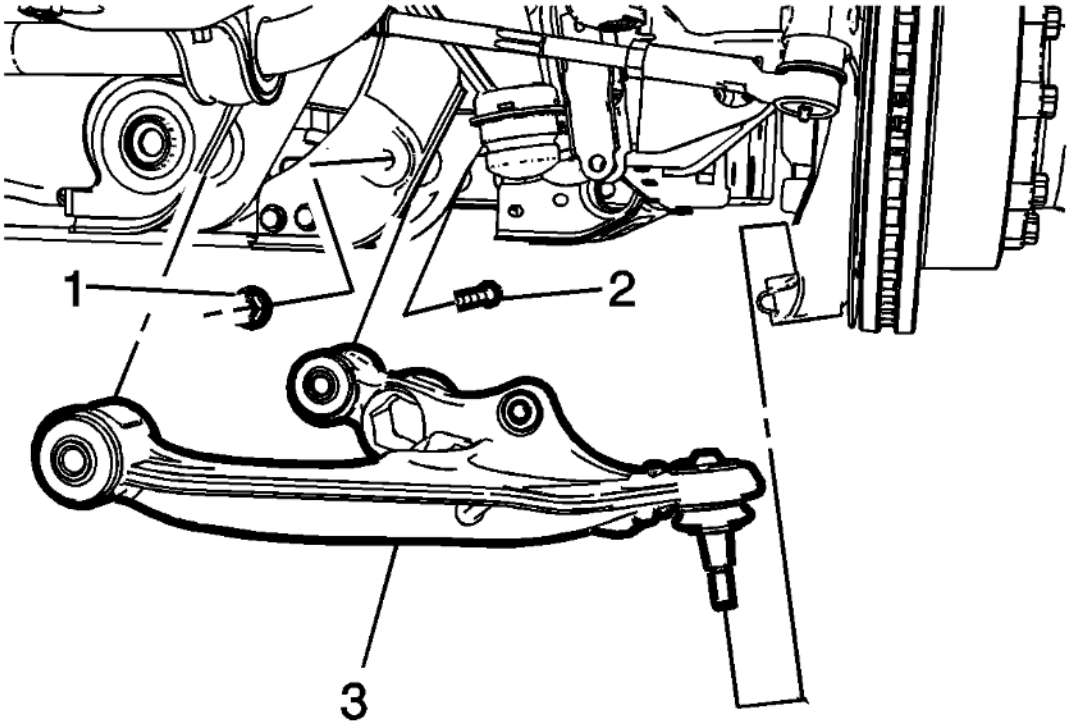


Fig. 41: Lower Control Rear Nut, Control Arm And Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Front Lower Control Arm 3 - Install

CAUTION: This vehicle is equipped with torque-to-yield or single use fasteners. Install a NEW torque-to-yield or single use fastener when installing this component. Failure to replace the torque-to-yield or single use fastener could cause damage to the vehicle or component.

2. Front Lower Control Arm Rear Bolt 2 - Install

   Install a NEW bolt.

3. Front Lower Control Arm Rear Nut 3 - Install, but do NOT tighten

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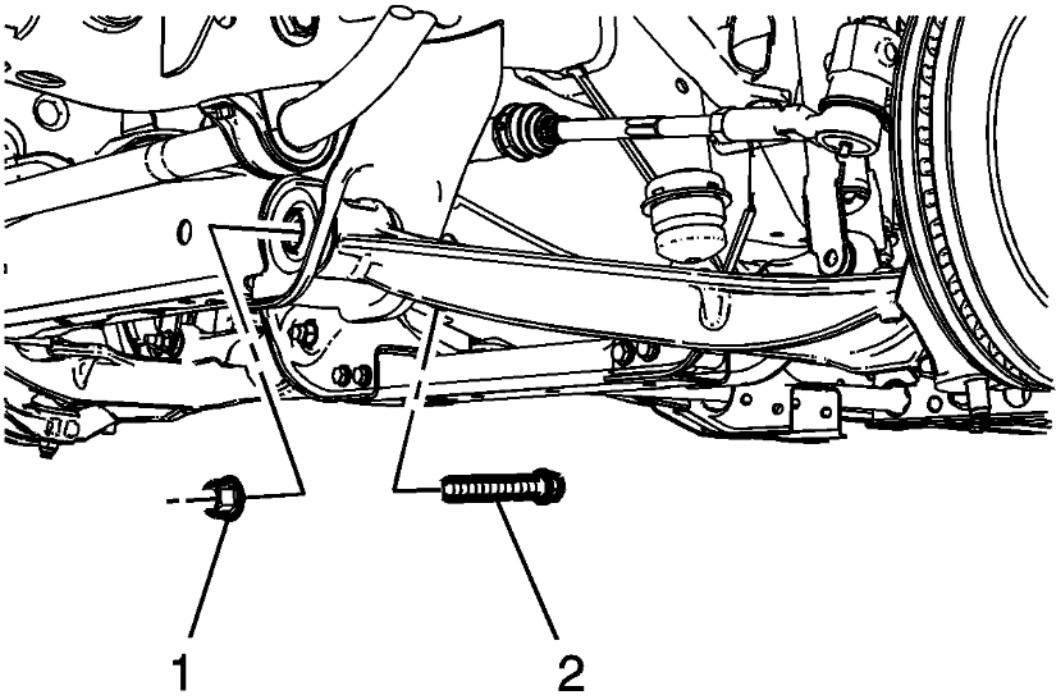


Fig. 42: Identifying Front Lower Control Arm Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Front Lower Control Arm Front Bolt 2 - Install

   Install a NEW bolt.

5. Front Lower Control Arm Front Nut 1 - Install, but do NOT tighten
6. Use an adjustable jack to raise the front lower control arm until it barely contacts both front lower control arm bumpers.

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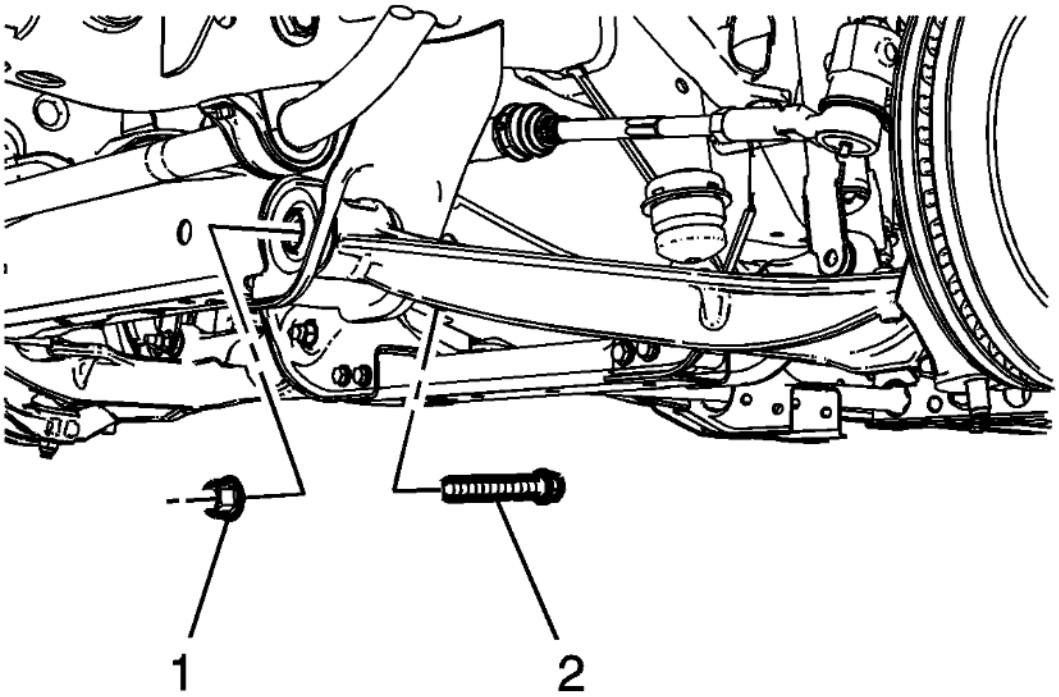


Fig. 43: Identifying Front Lower Control Arm Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

7. Front Lower Control Arm Front Nut 1 - Install and tighten 175 N.m (129 lb ft)

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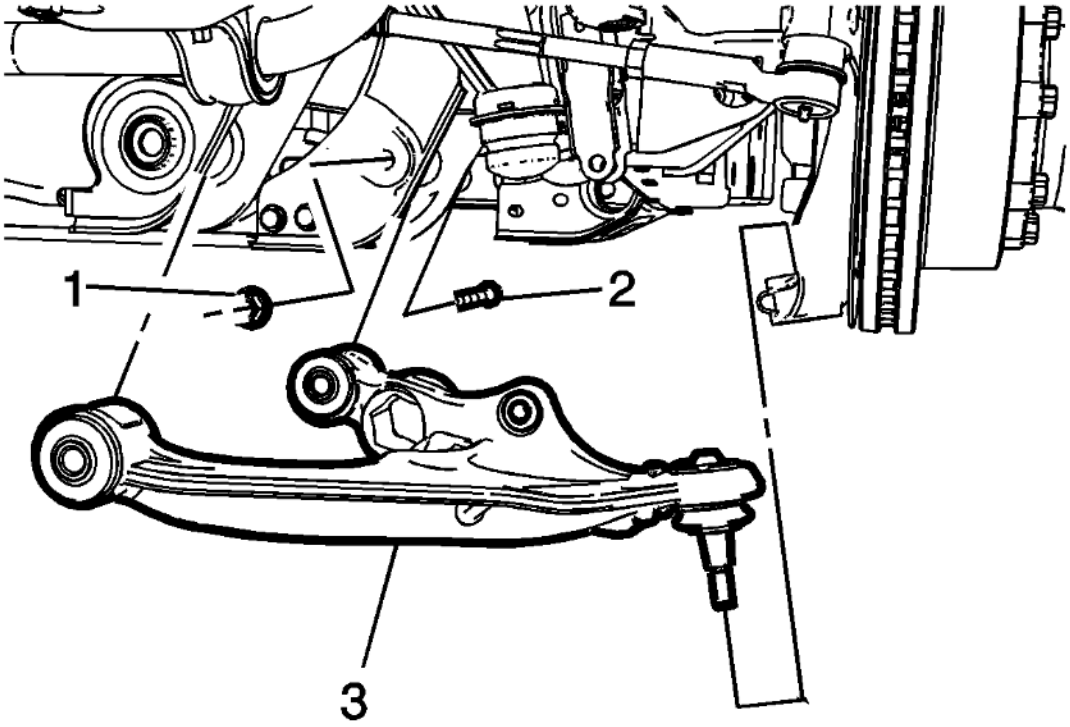


Fig. 44: Lower Control Rear Nut, Control Arm And Bolt
Courtesy of GENERAL MOTORS COMPANY

8. Front Lower Control Arm Rear Nut 1 - Install and tighten 175 N.m (129 lb ft)

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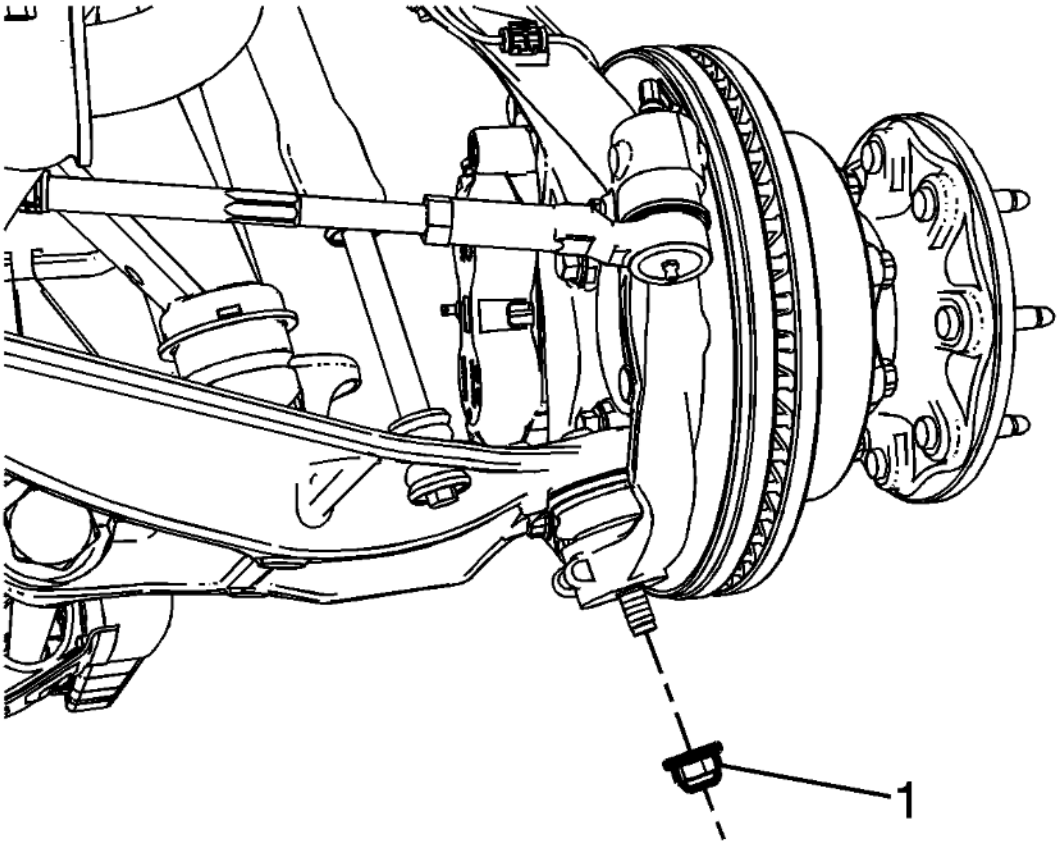


Fig. 45: Lower Ball Joint Retaining Nut
Courtesy of GENERAL MOTORS COMPANY

9. Front Lower Control Arm Ball Stud Nut 1 - Install

   Tighten

   1. First Pass: 50 N.m (37 lb ft)
   2. Final Pass: (90-100 degrees)
10. Remove the mechanic's wire or equivalent used to support the steering knuckle and front upper control arm.
11. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Install - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side**
12. Front Shock Absorber@Front Lower Control Arm - Install - **Shock Absorber Replacement (Heavy Duty)**
13. Front Stabilizer Shaft Link - Install - **Stabilizer Shaft Link Replacement (Heavy Duty)**
14. Front Torsion Bar - Install - **Torsion Bar and Support Assembly Replacement (Heavy Duty)**
15. Install the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**

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16. Measure and adjust the wheel alignment. **Wheel Alignment Measurement**

FRONT LOWER CONTROL ARM BALL STUD REPLACEMENT (HEAVY DUTY)

Special Tools

- **CH-41805** Ball Joint Replacer
- **CH-49240** Ball Joint Installer

Equivalent regional tools:**Special Tools**

Removal Procedure

NOTE: **When removing the steering knuckle, Do NOT remove any of the brake or electrical components from the knuckle. Secure the knuckle assembly to the side.**

1. Steering Knuckle - Remove - **Steering Knuckle Replacement (Heavy Duty)**

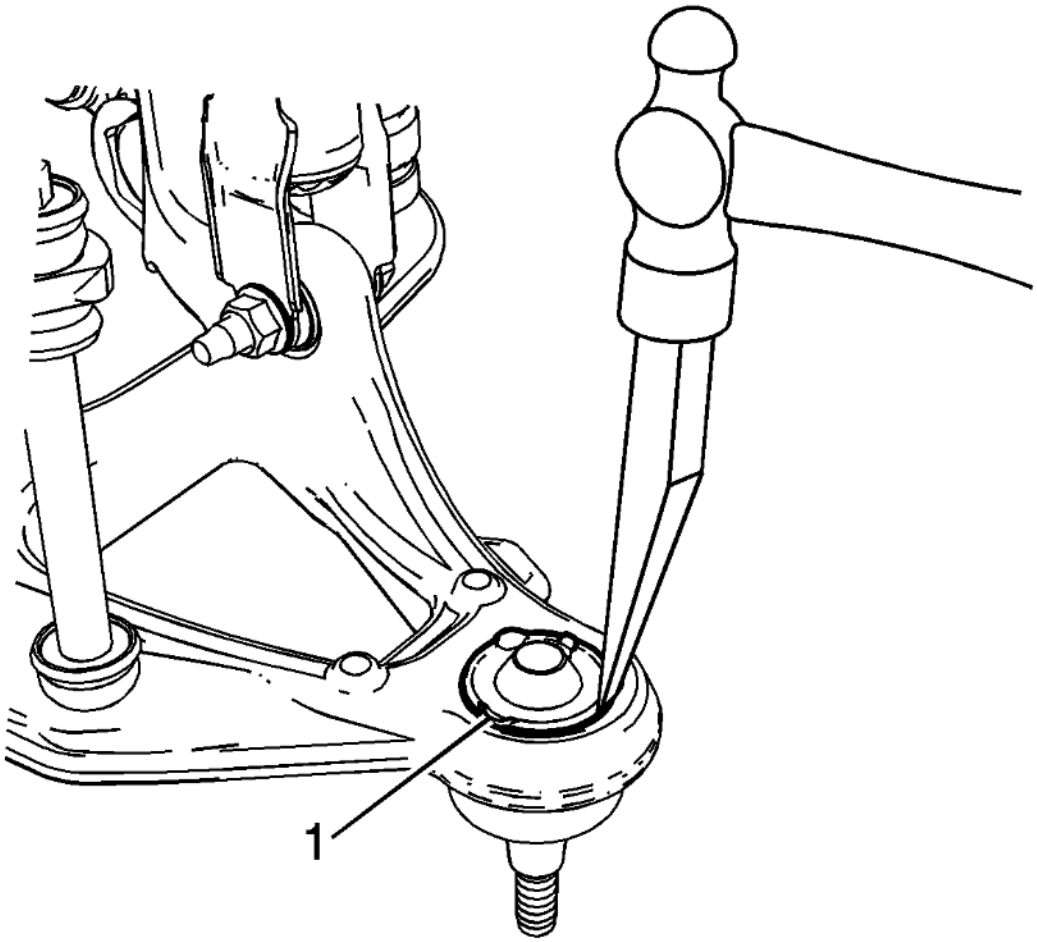


Fig. 46: View Of Hammer And Chisel At Lower Ball Joint
Courtesy of GENERAL MOTORS COMPANY

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2. Use the appropriate tools to remove the locking tabs (1) from the front lower control arm ball stud body.

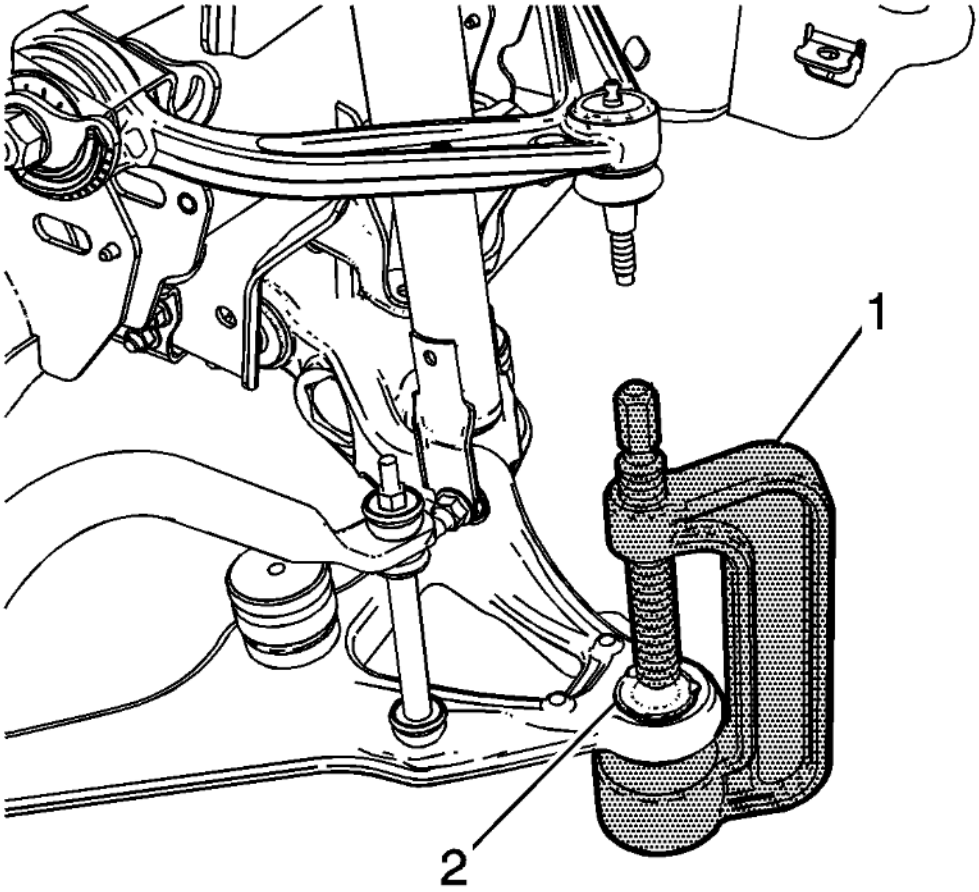


Fig. 47: View Of Remover/Installer And Lower Ball Joint
Courtesy of GENERAL MOTORS COMPANY

3. Use the **CH-41805** replacer (1) and the appropriate adapter to remove the front lower control arm ball stud (2) from the front lower control arm.

Installation Procedure

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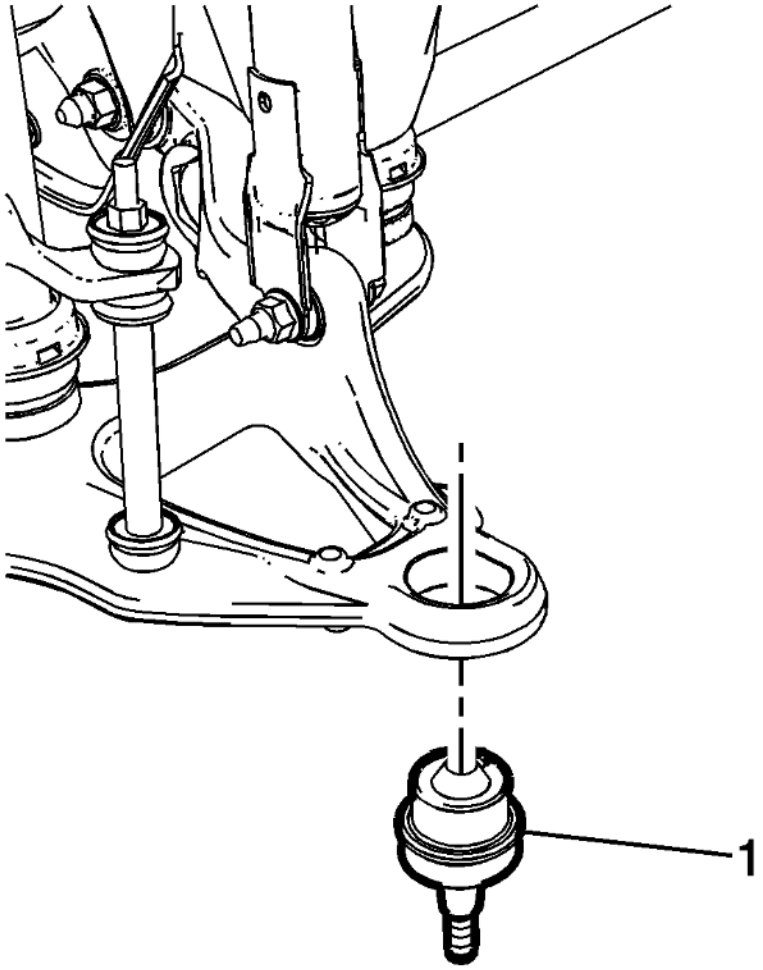


Fig. 48: View Of Lower Ball Joint At Lower Control Arm
Courtesy of GENERAL MOTORS COMPANY

1. Position the front lower control arm ball stud (1) in the front lower control arm.

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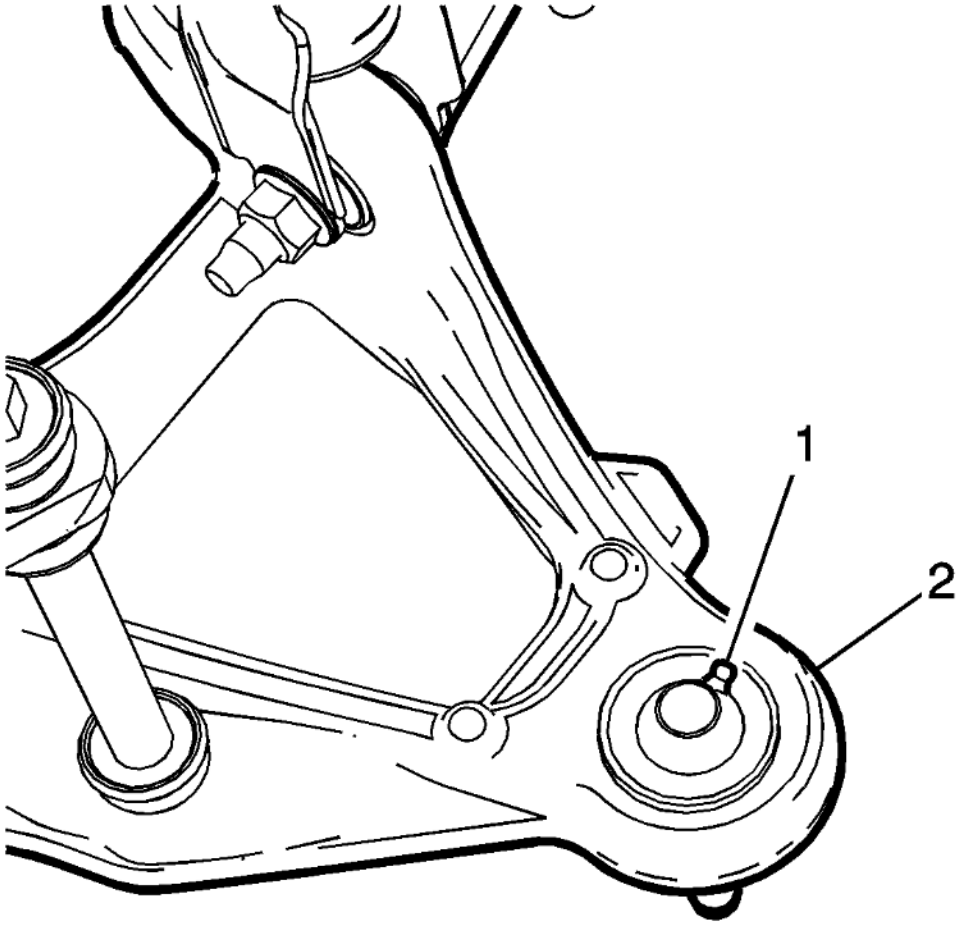


Fig. 49: Lower Ball Joint Grease Fitting And Channel
Courtesy of GENERAL MOTORS COMPANY

2. Align the front lower control arm ball stud grease fitting (1) with the channel (2) in the front lower control arm.

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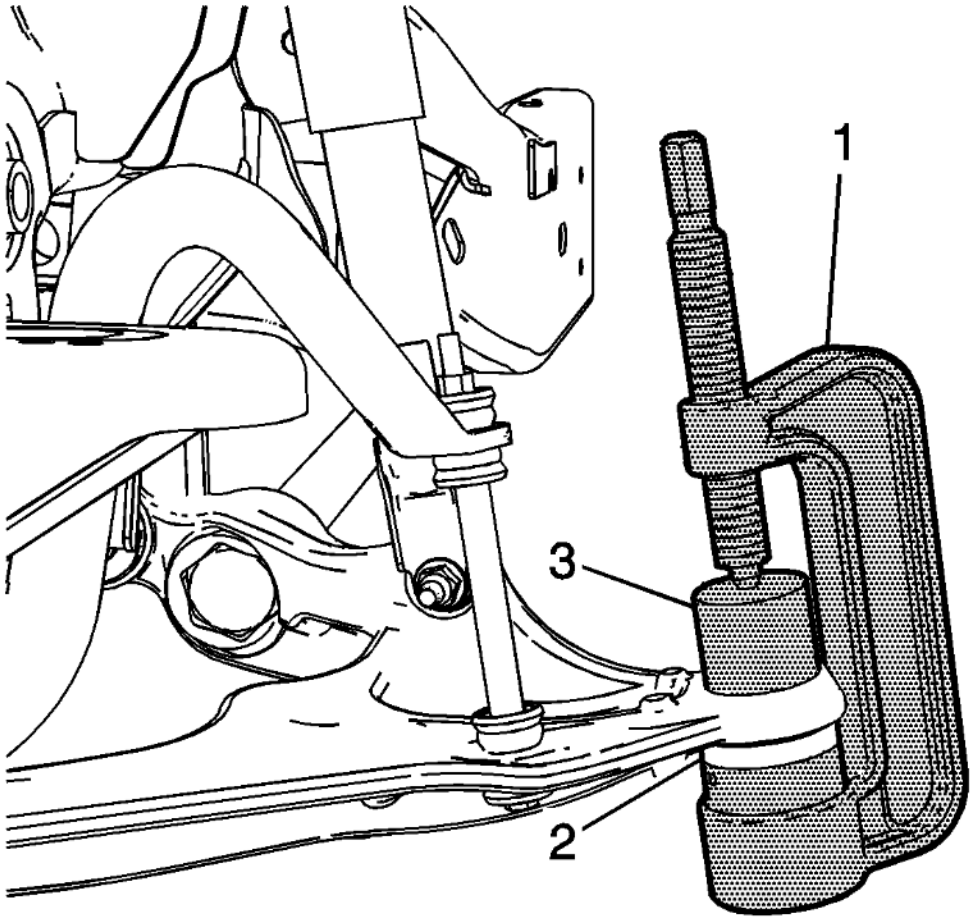


Fig. 50: Remover/Installer, Install Kit And Adapter
Courtesy of GENERAL MOTORS COMPANY

3. Use the **CH-41805** replacer (1) , appropriate adapter (3) and **CH-49240** installer (2) to install the front lower control arm ball stud in the front lower control arm.

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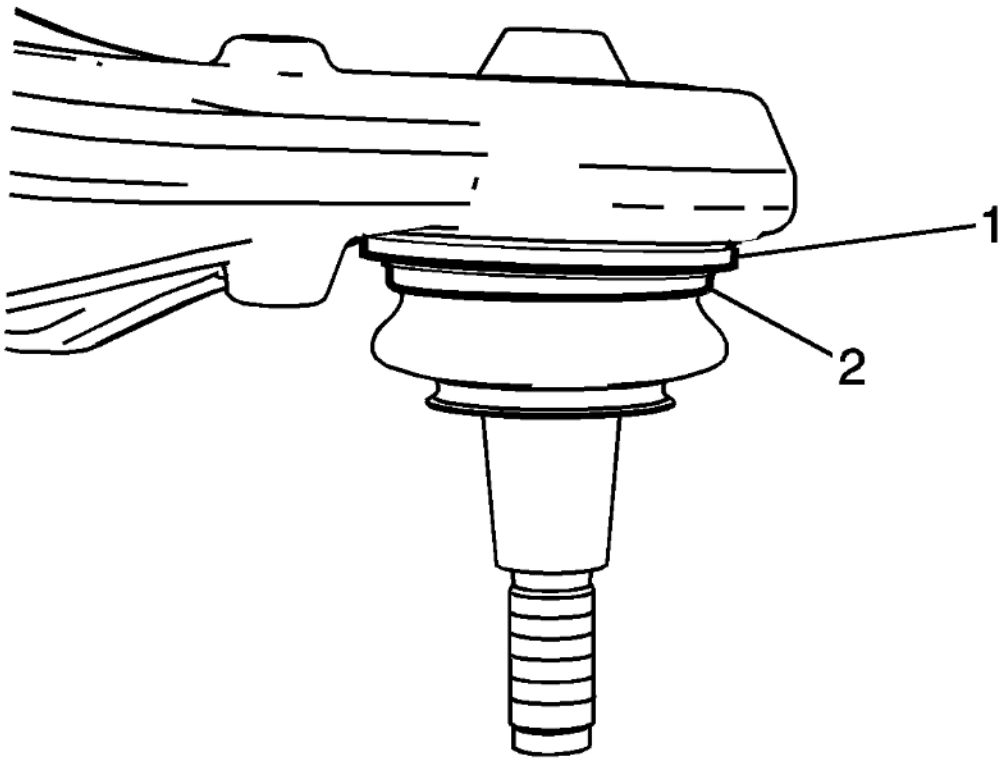


Fig. 51: Lower Control Arm And Ball Joint
Courtesy of GENERAL MOTORS COMPANY

4. Ensure the front lower control arm ball stud (2) is fully seated against the front lower control arm (1).

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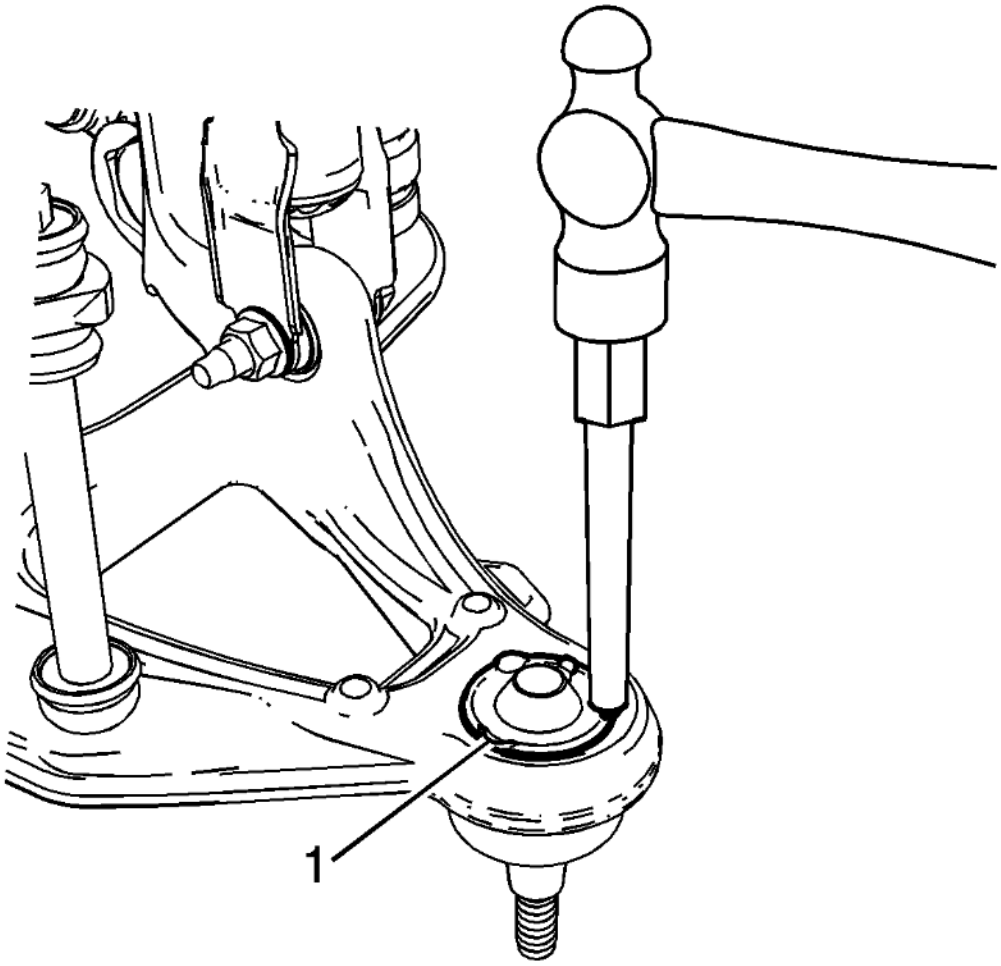
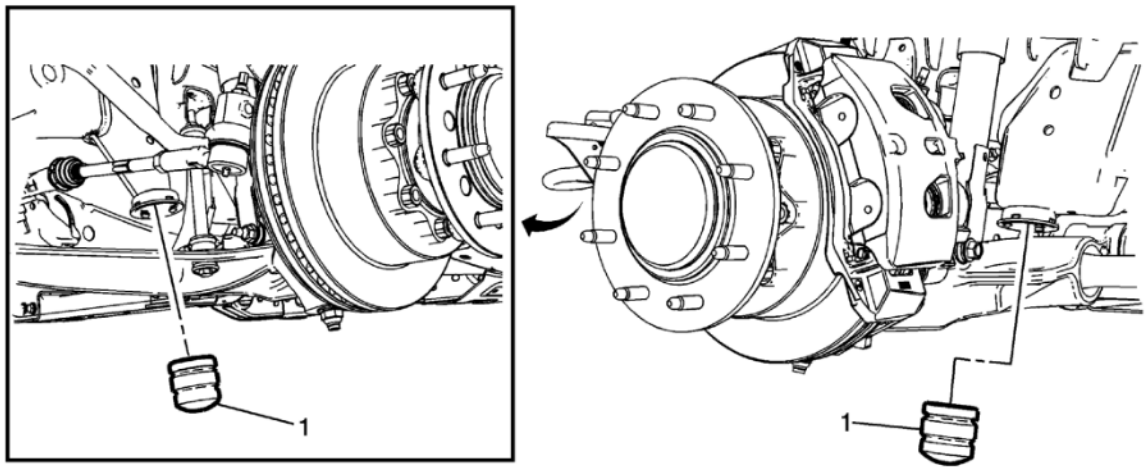


Fig. 52: View Of Lock Tab Creation Procedure
Courtesy of GENERAL MOTORS COMPANY

5. Use the appropriate tools to create new locking tabs (1) for the front lower control arm ball stud.
6. Steering Knuckle - Install - **Steering Knuckle Replacement (Heavy Duty)**

FRONT LOWER CONTROL ARM BUMPER REPLACEMENT (HEAVY DUTY)



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Fig. 53: Identifying Front Lower Control Arm Bumpers (Heavy Duty)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Lifting and Jacking the Vehicle	
1	Front Lower Control Arm Bumper

WHEEL STUD REPLACEMENT (LIGHT DUTY)

Special Tools

CH-43631 Ball Joint Separator

Equivalent regional tools:Special Tools

Removal Procedure

1. Front Brake Rotor - Remove - Front Brake Rotor Replacement (JD9) Front Brake Rotor Replacement (J95) Front Brake Rotor Replacement (J96)

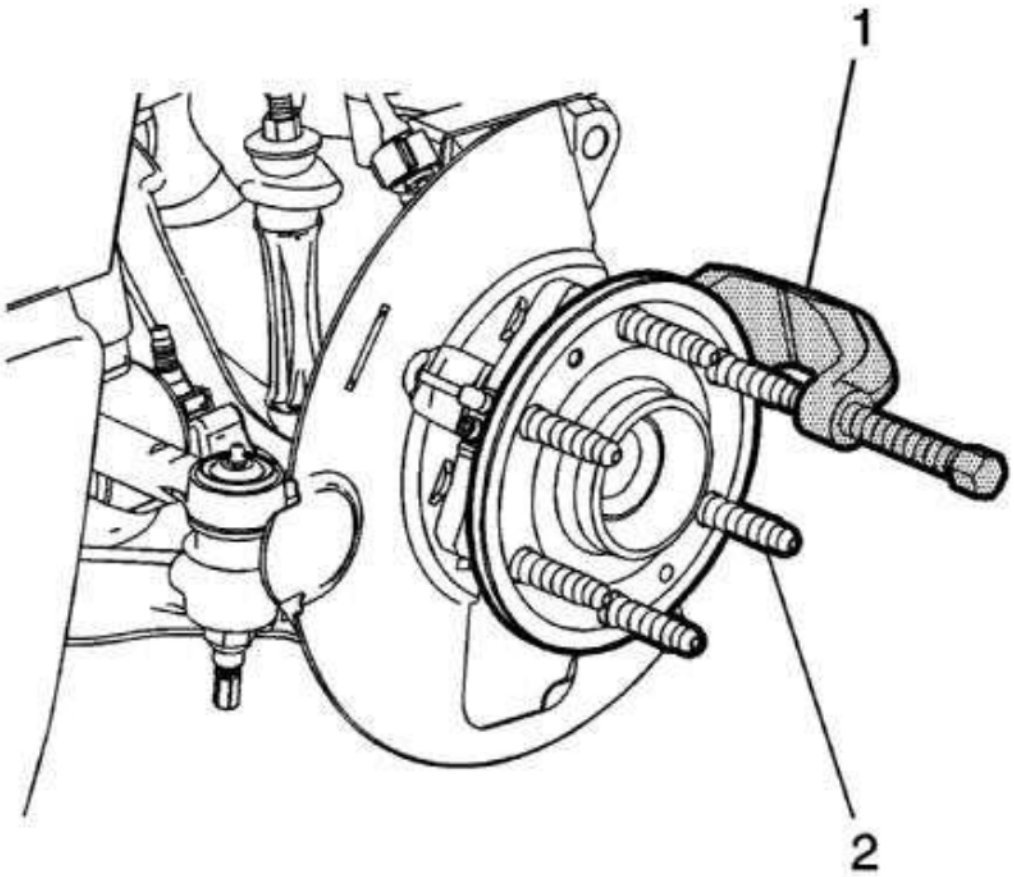


Fig. 54: Separator

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Courtesy of GENERAL MOTORS COMPANY

2. Use the **CH-43631** separator (1) to remove the wheel stud (2) from the flange on the hub assembly.

   DISCARD the stud.

Installation Procedure

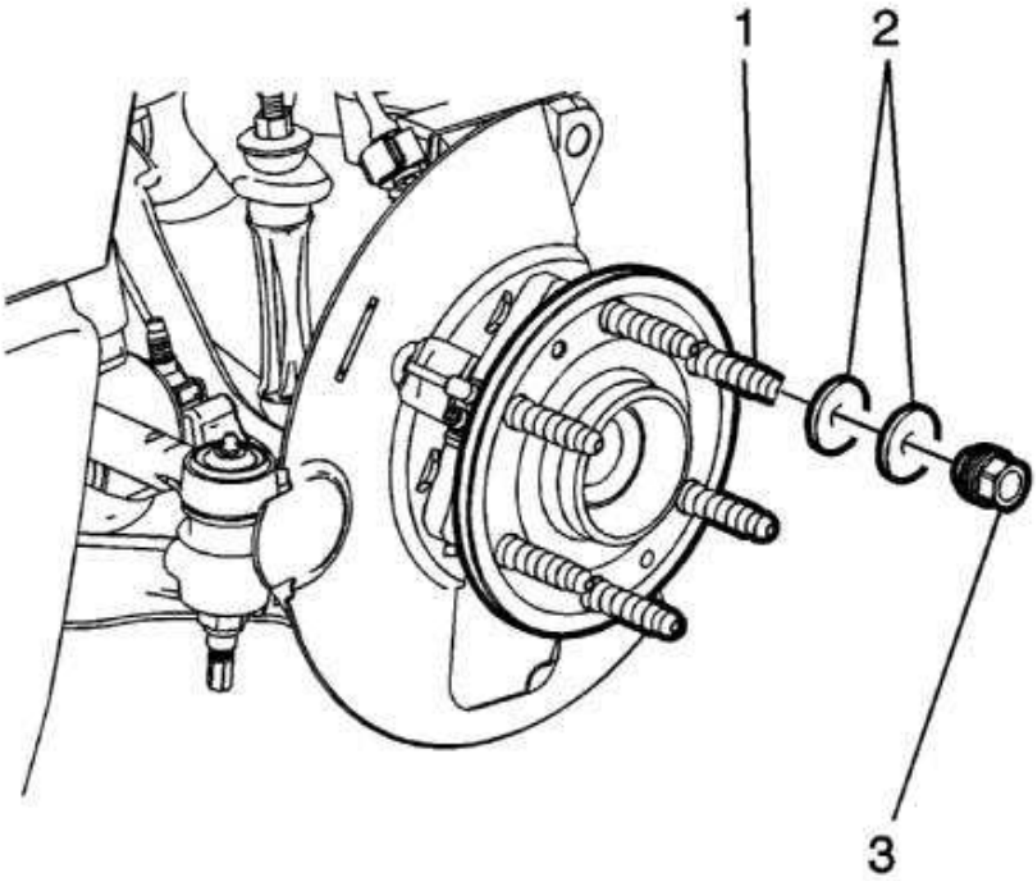


Fig. 55: NEW Wheel Stud
Courtesy of GENERAL MOTORS COMPANY

1. Position the NEW wheel stud (1) in the flange on the hub assembly.
2. Install flat washers (2) and an OLD wheel nut (3) on the wheel stud.
3. Use a suitable tool to prevent the flange on the hub assembly from rotating.
4. Tighten the wheel nut until the wheel stud is firmly seated.
5. Remove the wheel nut and flat washers.
6. Front Brake Rotor - Install - **Front Brake Rotor Replacement (JD9)** **Front Brake Rotor Replacement (J95)** **Front Brake Rotor Replacement (J96)**

WHEEL STUD REPLACEMENT (HEAVY DUTY)

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Special Tools

CH-43631 Ball Joint Separator

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Front Brake Rotor - Remove - **Front Brake Rotor Replacement (JD9)** **Front Brake Rotor Replacement (J95)** **Front Brake Rotor Replacement (J96)**

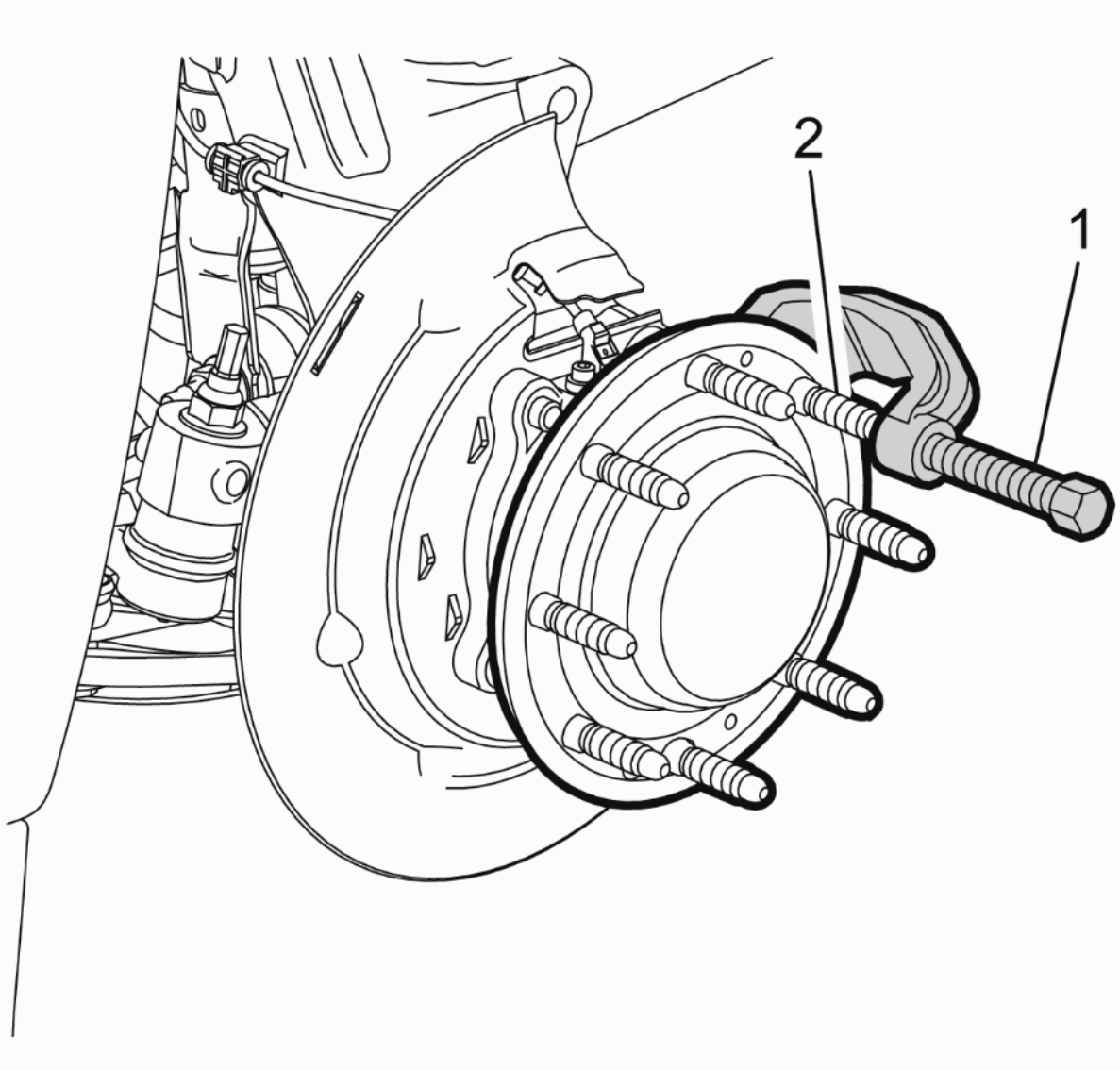


Fig. 56: Removing Wheel Stud From Flange On Hub Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Use the **CH-43631** separator (1) to remove the wheel stud (2) from the flange on the hub assembly.

   DISCARD the stud.

Installation Procedure

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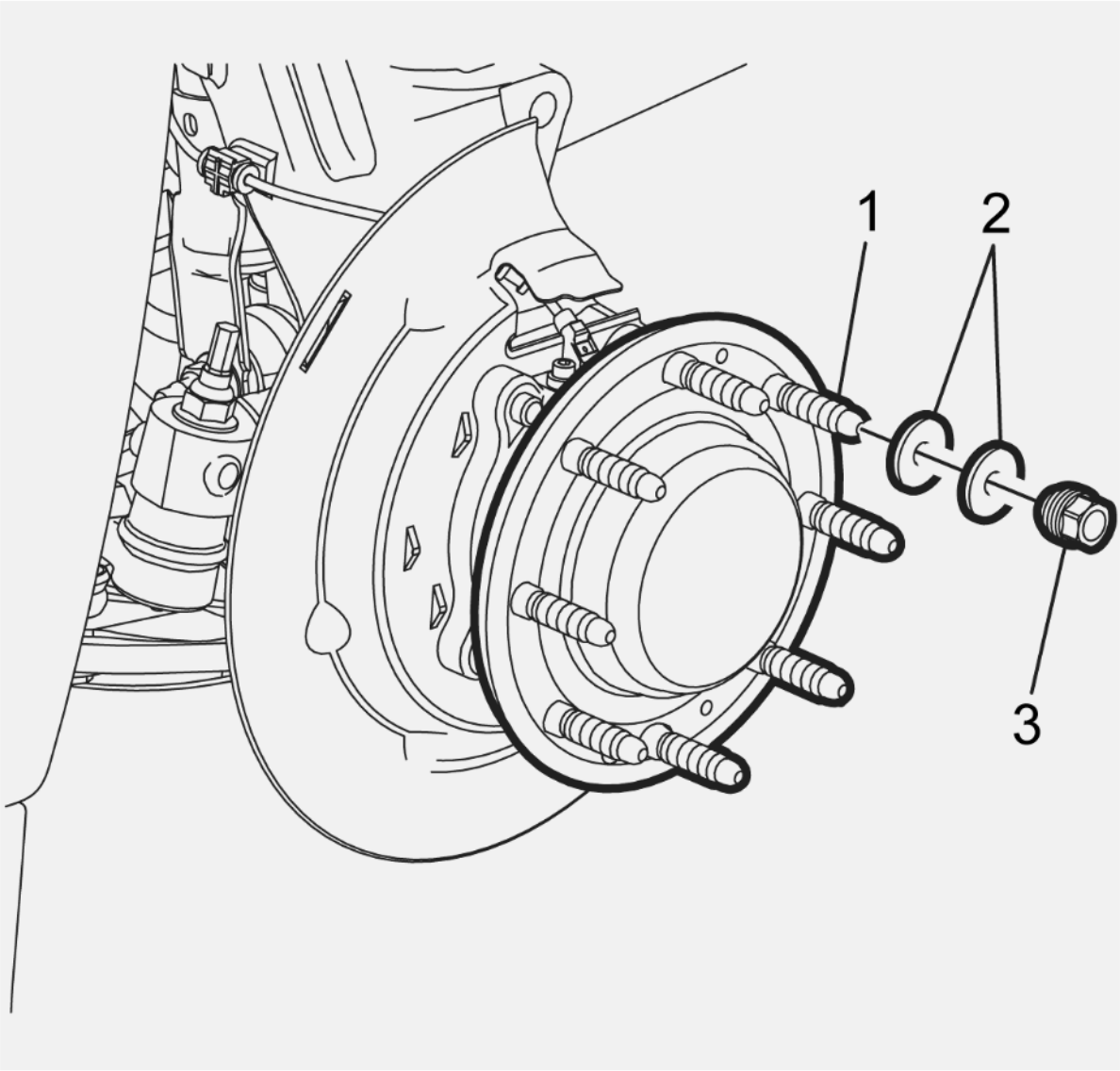


Fig. 57: Wheel Stud
Courtesy of GENERAL MOTORS COMPANY

1. Position the NEW wheel stud (1) in the flange on the hub assembly.
2. Install flat washers (2) and an OLD wheel nut (3) on the wheel stud.
3. Use a suitable tool to prevent the flange on the hub assembly from rotating.
4. Tighten the wheel nut until the wheel stud is firmly seated.
5. Remove the wheel nut and flat washers.
6. Front Brake Rotor - Install - **Front Brake Rotor Replacement (JD9)** **Front Brake Rotor Replacement (J95)** **Front Brake Rotor Replacement (J96)**

FRONT WHEEL HUB, BEARING, AND SEAL REPLACEMENT (LIGHT DUTY)

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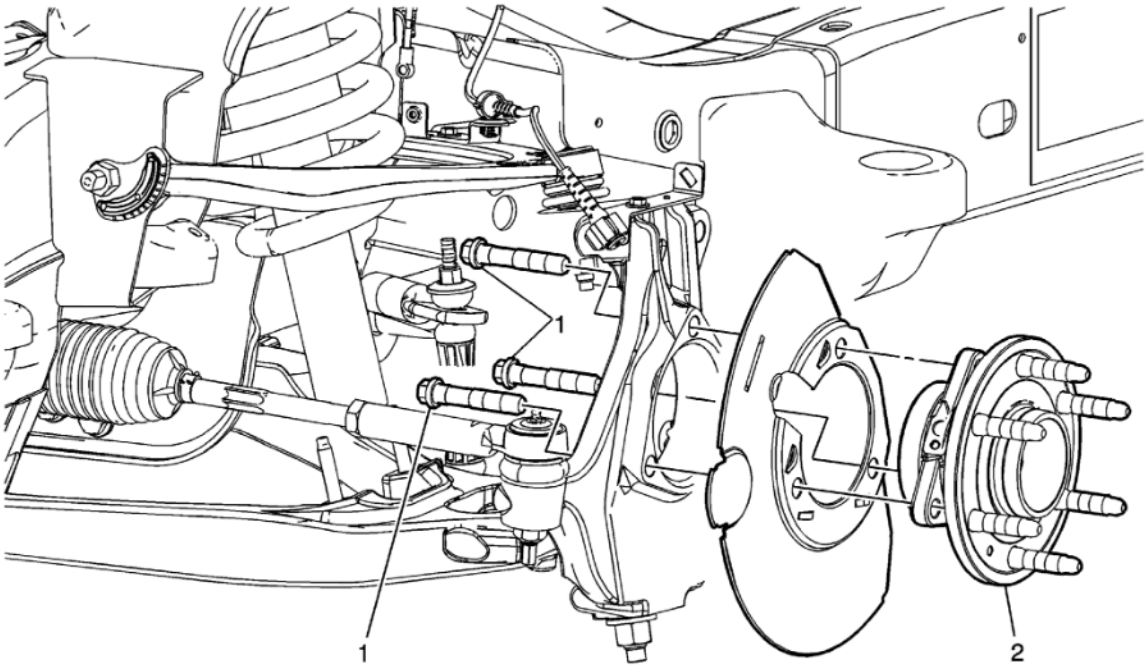


Fig. 58: Front Wheel Hub, Bearing And Seal (Light Duty)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Separate - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side** 2. **Front Brake Rotor Replacement (JD9)** **Front Brake Rotor Replacement (J95)** **Front Brake Rotor Replacement (J96)** 3. Disconnect the front wheel speed sensor electrical connector and detach the sensor retainers from the steering knuckle. **Front Wheel Speed Sensor Replacement**	
1	Front Wheel Hub and Bearing Assembly Bolt **CAUTION:** **Refer to Fastener Caution .** **NOTE:** • **Vehicles equipped with aluminum steering knuckles**

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Callout	Component Name
	come equipped with hardened steel washers located between the steering knuckle and the front wheel hub and bearing assembly bolts. • The hardened steel washers MUST be reinstalled or the fastener tightening measurement may be inaccurate. **Tighten** 180 N.m (133 lb ft)
2	Front Wheel Hub and Bearing Assembly **Procedure** Apply grease evenly and ensure complete coverage to the steering knuckle bearing pilot bore only. **Adhesives, Fluids, Lubricants, and Sealers** **NOTE:** • Avoid applying grease to any other machined surfaces, holes, or threads. Ensure the drain channel at the

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Callout	Component Name
	bottom of the bore is not blocked with grease or debris. • The NEW front wheel hub and bearing assembly comes with a NEW front wheel speed sensor already installed.

FRONT WHEEL HUB, BEARING, AND SEAL REPLACEMENT (HEAVY DUTY)

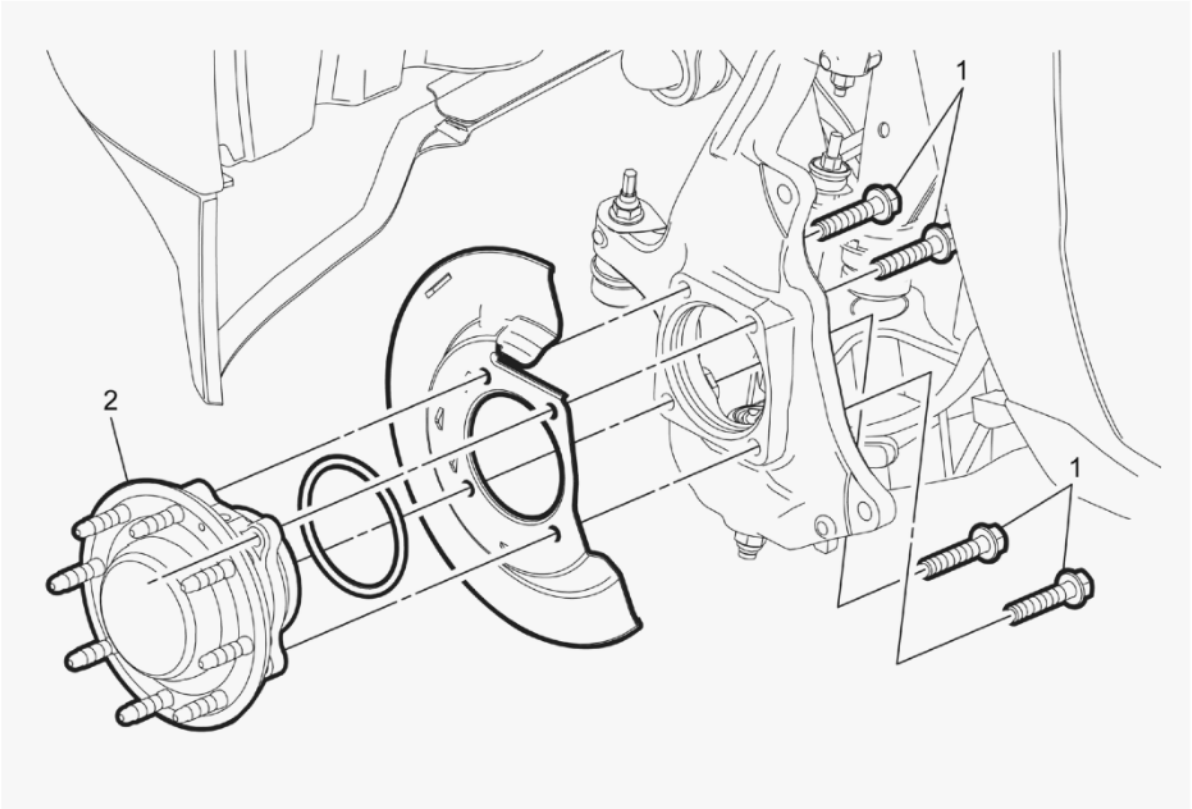


Fig. 59: Front Wheel Hub, Bearing, And Seal (Heavy Duty)

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Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. { If equipped }Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly - Separate - **Front Wheel Drive Shaft Replacement - Left Side** , or **Front Wheel Drive Shaft Replacement - Right Side** 2. **Front Brake Rotor Replacement (JD9)** **Front Brake Rotor Replacement (J95)** **Front Brake Rotor Replacement (J96)** 3. Disconnect the front wheel speed sensor electrical connector and detach the sensor retainers from the steering knuckle. **Front Wheel Speed Sensor Replacement**	
1	Front Wheel Hub and Bearing Assembly Bolt **CAUTION:** **Refer to Fastener Caution .** **NOTE:** • **Vehicles equipped with aluminum steering knuckles come equipped with hardened steel washers located between the steering knuckle and the front wheel hub and bearing assembly bolts.** • **The hardened steel washers MUST be reinstalled or the fastener**

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Callout	Component Name
	tightening measurement may be inaccurate. **Tighten** 180 N.m (133 lb ft)
2	Front Wheel Hub and Bearing Assembly **Procedure** 1. Remove the O-ring seal from the steering knuckle bore. 2. Clean and inspect the O-ring seal and replace the seal if the following conditions exist: nicks, cuts, dry or brittle, compression set. 3. Apply grease evenly and ensure complete coverage to the steering knuckle bearing pilot bore only. **Adhesives, Fluids, Lubricants, and Sealers** **NOTE:** • **Avoid applying grease to any other machined surfaces, holes, or threads. Ensure the drain channel at the bottom of the bore is not blocked with grease or debris.** • **The NEW front wheel hub and bearing assembly comes with a NEW front**

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Callout	Component Name
	wheel speed sensor already installed.

TORSION BAR SUPPORT INSULATOR REPLACEMENT (HEAVY DUTY)

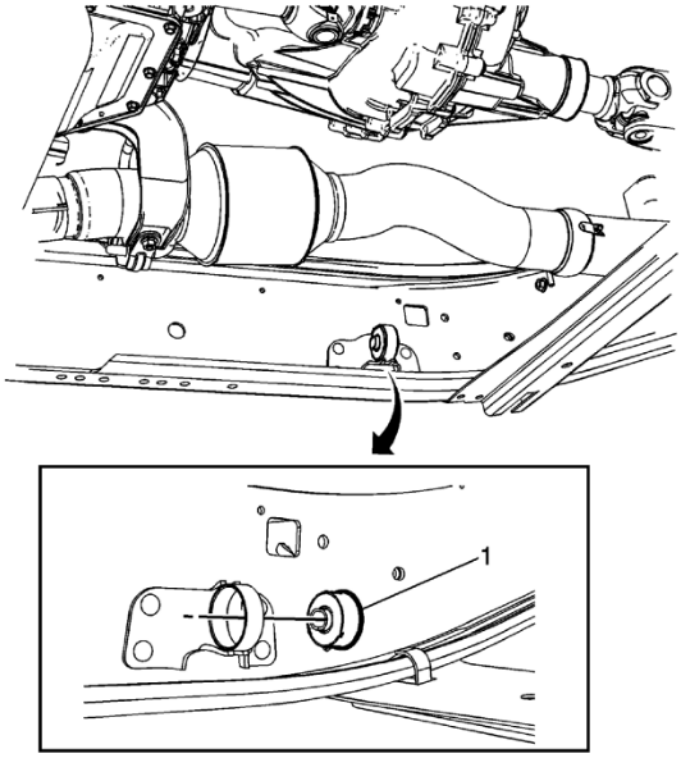


Fig. 60: Torsion Bar Support Insulator (Heavy Duty)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Torsion Bar and Support Assembly Replacement (Heavy Duty)	
1	Torsion Bar Support Insulator **Procedure** 1. When installing the torsion bar support insulator, ensure the inner slot is horizontal. 2. After installing the torsion bar support insulator, peen the insulator in three places 120 degrees apart from each other. 3. Measure and adjust the trim height. Trim Height Inspection **NOTE:**

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Callout	Component Name
	Note the orientation of the OLD torsion bar support insulator before removing to aid in the installation of the NEW insulator.

TORSION BAR AND SUPPORT ASSEMBLY REPLACEMENT (HEAVY DUTY)

Special Tools

CH-48809 Torsion Bar Unloader

Equivalent regional tools:**Special Tools**

Removal Procedure

CAUTION: **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.**

NOTE:

- **When lifting the vehicle to service the torsion bars or related components, Do NOT lift the vehicle by the front suspension.**
- **Use the appropriate hoist to lift the vehicle by the frame.**

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

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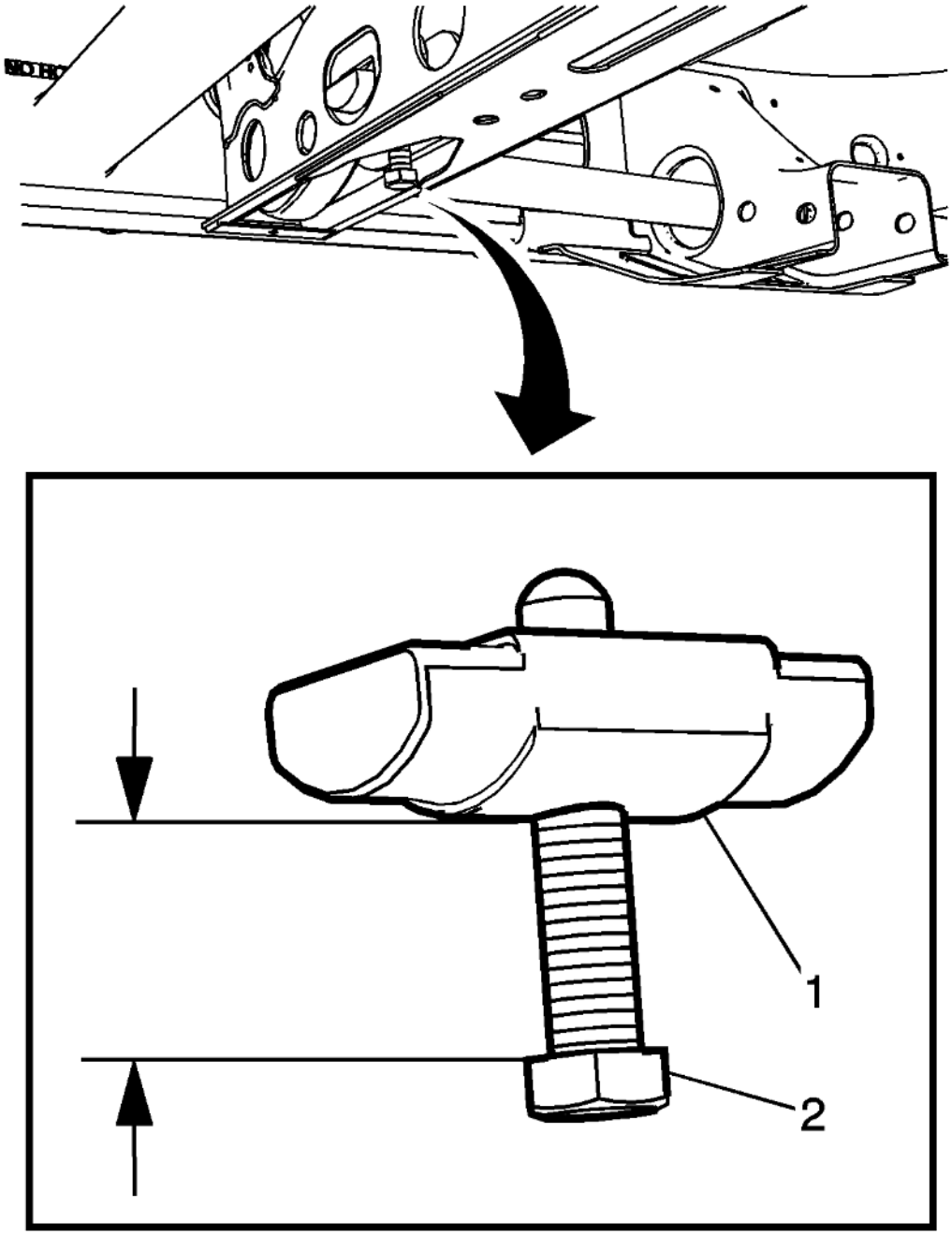


Fig. 61: Measuring Distance From Adjuster Nut To Adjuster Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: **This measurement step MUST be performed before removing or loosening any components or the measurement(s) will be inaccurate.**

2. Measure and record the distance between the torsion bar adjuster nut (1) and the head of the torsion bar adjuster bolt (2) at both ends of the torsion bar support assembly.

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3. Remove the torsion bar adjuster bolt (2) from the torsion bar adjuster nut (1) and allow the torsion bar adjuster arm to rest in the torsion bar support assembly.

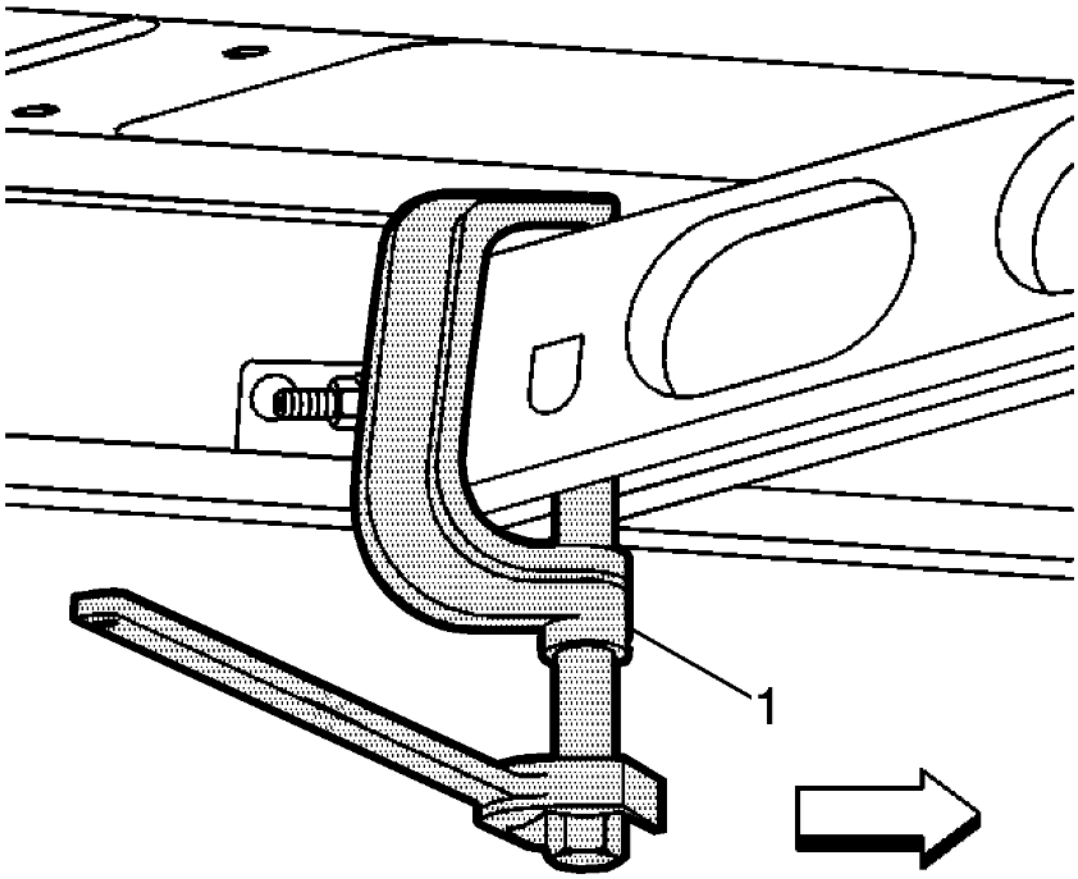


Fig. 62: Torsion Bar Tension Remover
Courtesy of GENERAL MOTORS COMPANY

4. Use the **CH-48809** unloader (1) to increase the tension on the torsion bar adjustment arm until the load is removed from the torsion bar adjuster nut.

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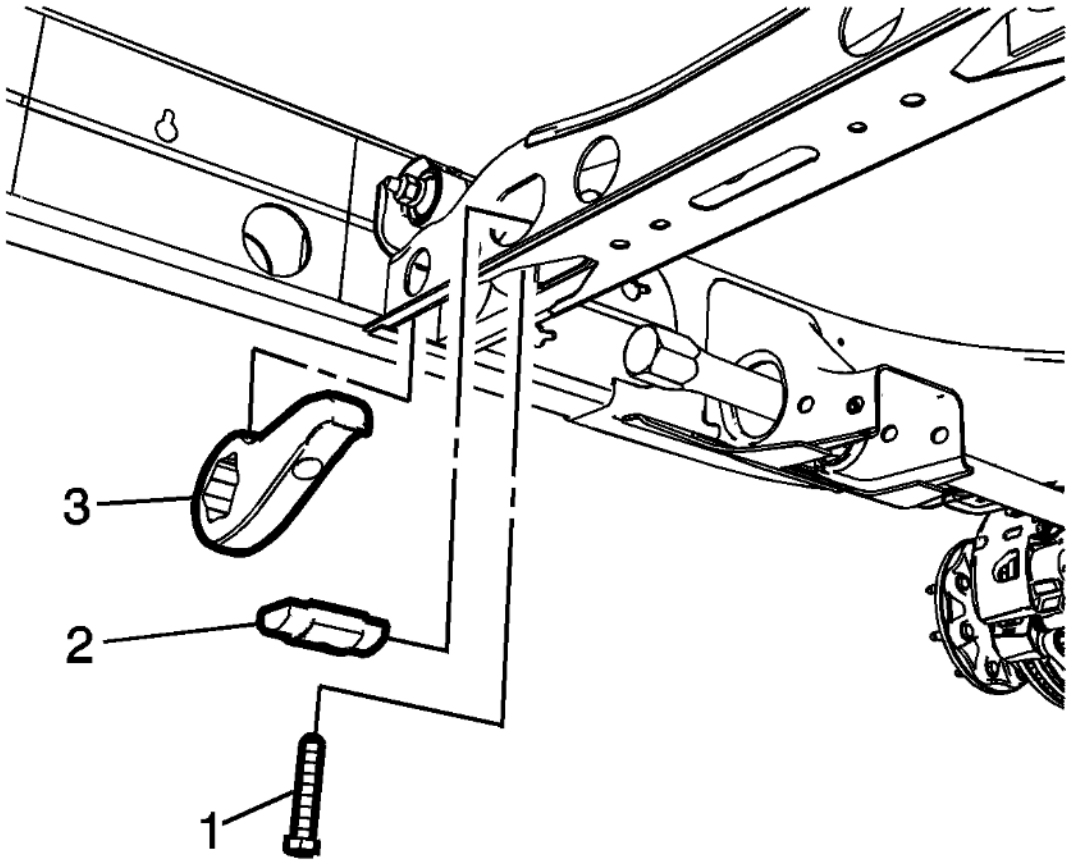


Fig. 63: Identifying Adjustment Arm, Bolt And Nut
Courtesy of GENERAL MOTORS COMPANY

5. Remove the torsion bar adjuster nut (2) from the torsion bar support assembly.
6. Remove the **CH-48809** unloader to unload the front torsion bar.
7. Slide the front torsion bar forward and remove the torsion bar adjustment arm (3) from the torsion bar support assembly.
8. Repeat the process for the other torsion bar adjustment arm.

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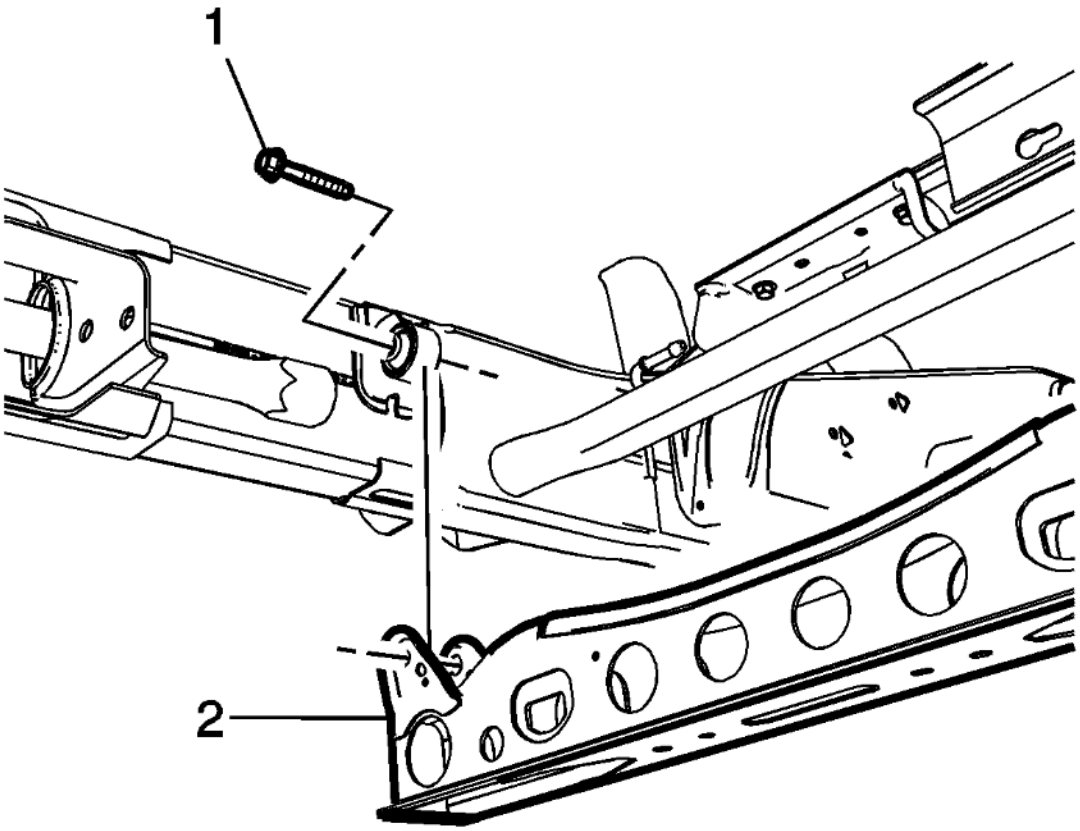


Fig. 64: View Of Torsion Bar And Crossmember Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove the torsion bar support assembly bolts (1).

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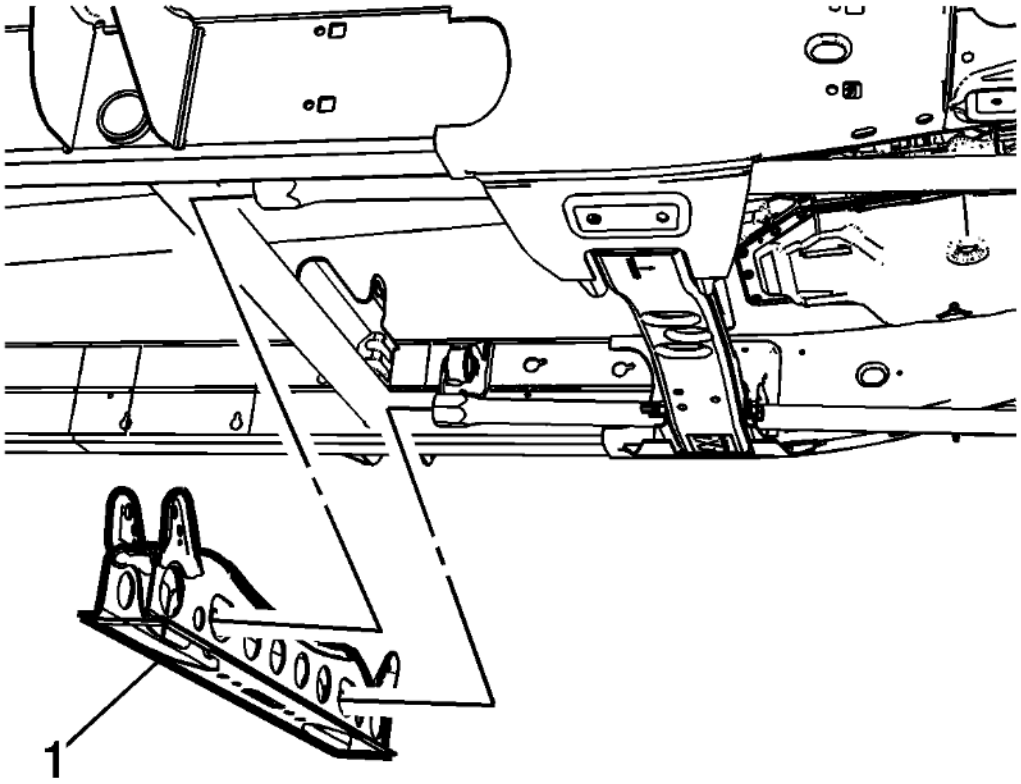


Fig. 65: View Of Torsion Bar Support
Courtesy of GENERAL MOTORS COMPANY

10. Remove the torsion bar support assembly (1) from the frame.

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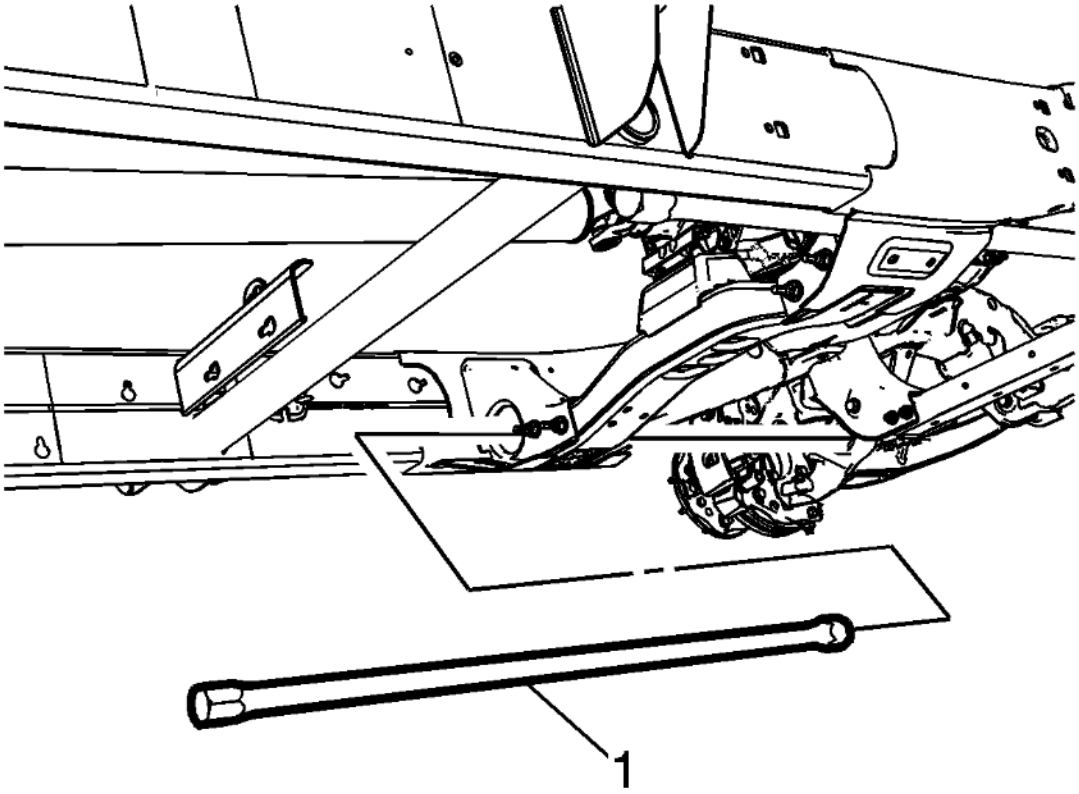


Fig. 66: Torsion Bar
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **The left and right torsion bars are NOT interchangeable.**
- **Ensure a NEW torsion bar is installed in the same direction as the OLD torsion bar.**
- **The torsion bars are only designed to be torqued in one direction.**
- **The correct direction for each torsion bar is marked on the bar.**

11. Remove the front torsion bars (1) from the front lower control arms.

Installation Procedure

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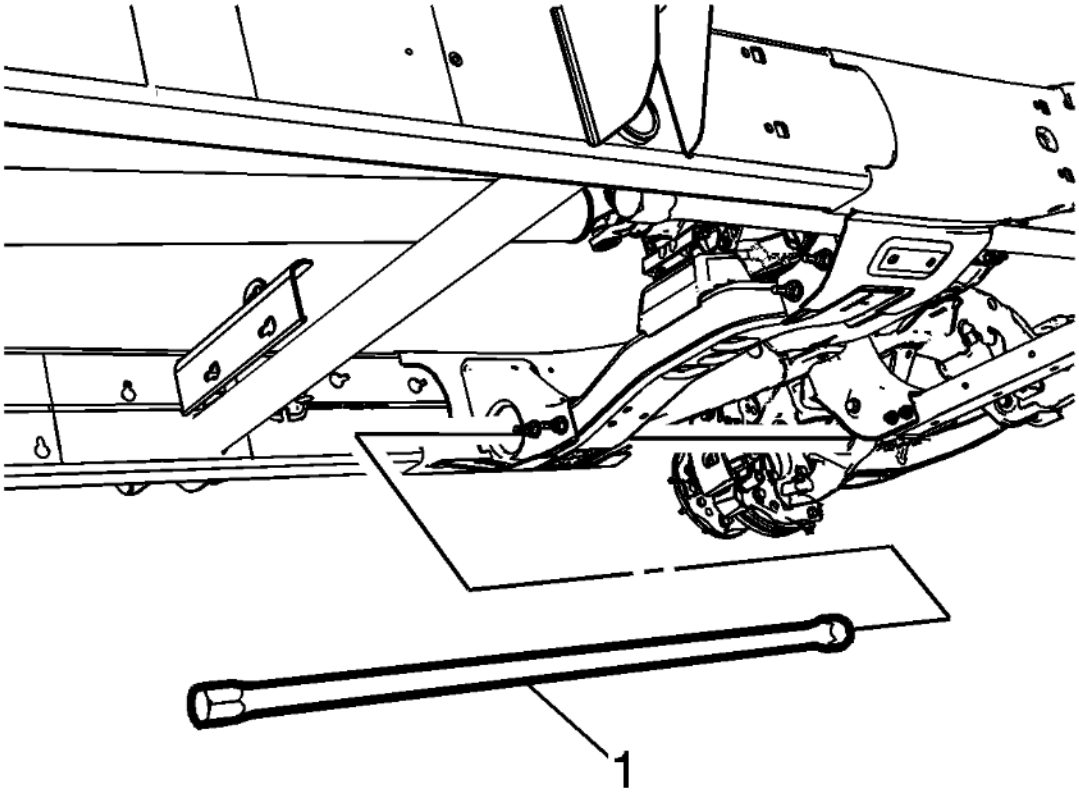


Fig. 67: Torsion Bar
Courtesy of GENERAL MOTORS COMPANY

1. Position the front torsion bars (1) in the front lower control arms.

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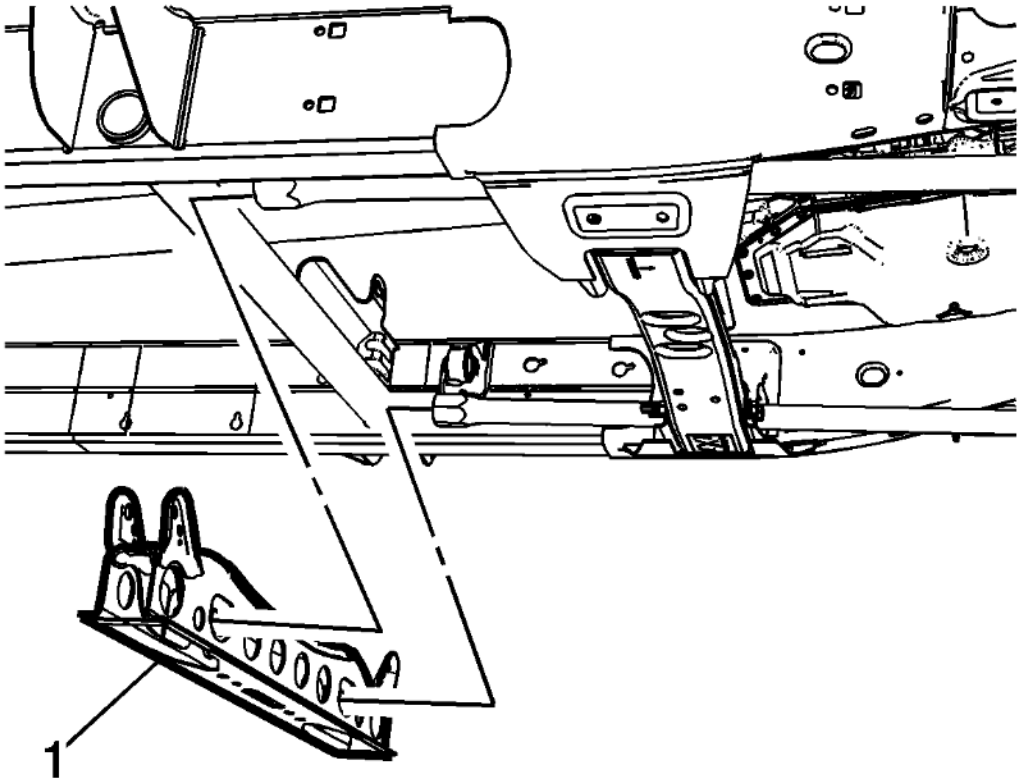


Fig. 68: View Of Torsion Bar Support
Courtesy of GENERAL MOTORS COMPANY

2. Position the torsion bar support assembly (1) on the frame.

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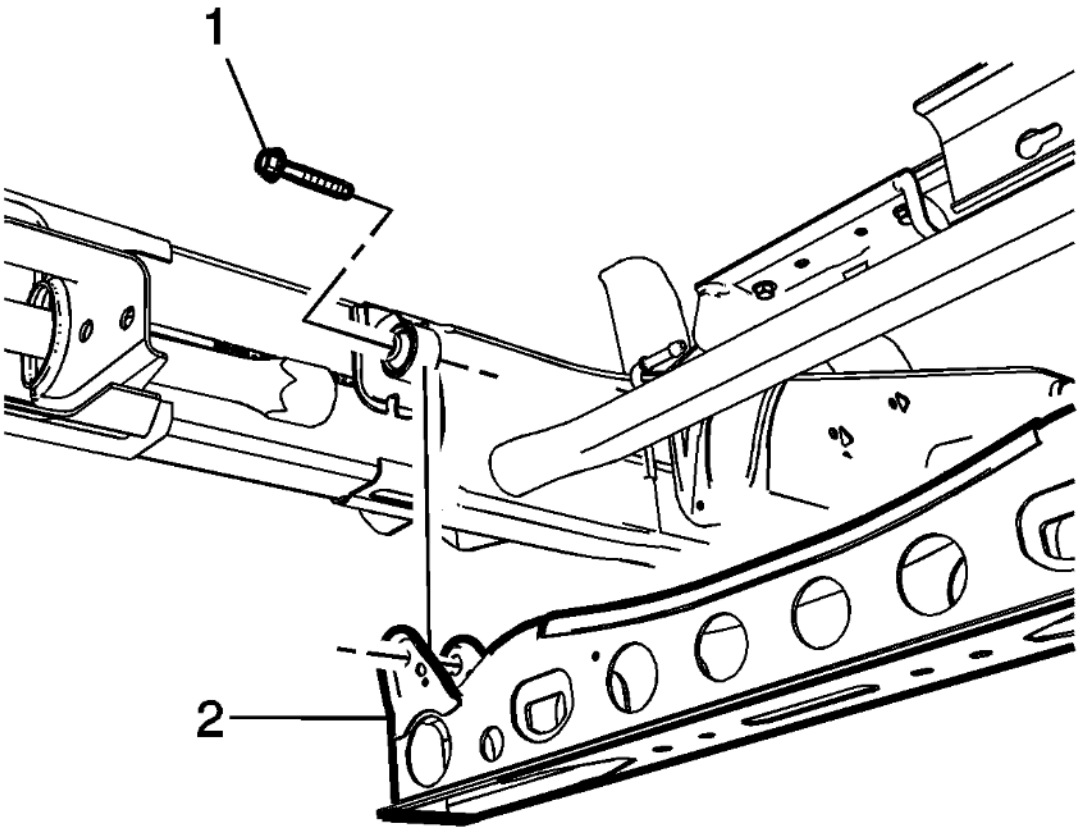


Fig. 69: View Of Torsion Bar And Crossmember Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

3. Install the torsion bar support assembly bolts (1) and tighten to 125 N.m (92 lb ft).

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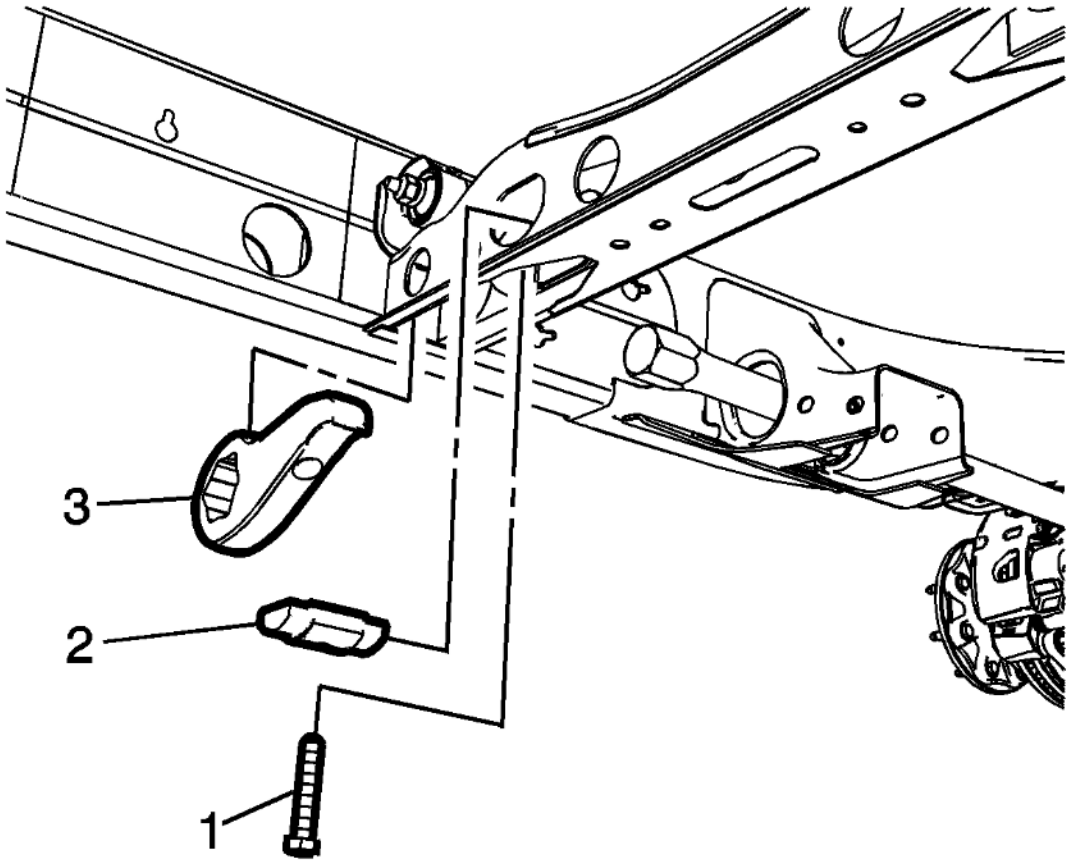


Fig. 70: Identifying Adjustment Arm, Bolt And Nut
Courtesy of GENERAL MOTORS COMPANY

4. Install the torsion bar adjustment arm (3) in the torsion bar support assembly.
5. Slide the front torsion bar rearward into the torsion bar adjustment arm until the bar is fully seated.

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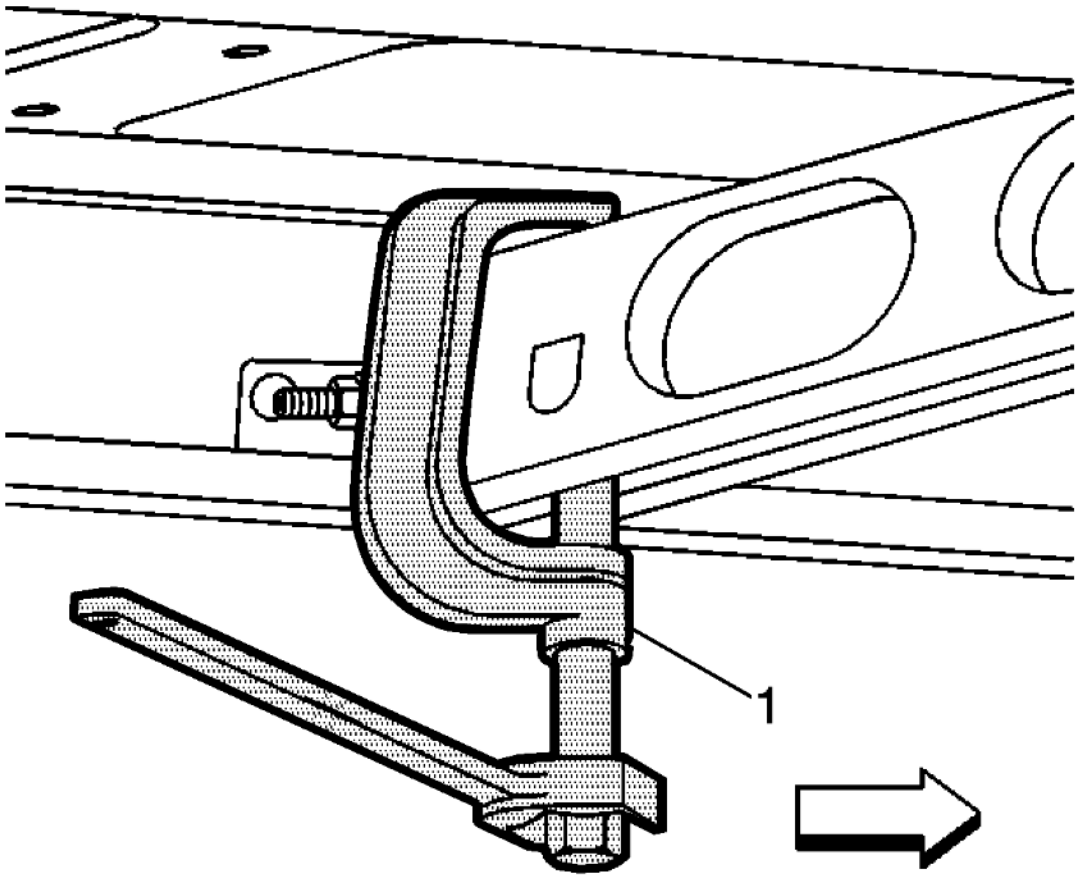


Fig. 71: Torsion Bar Tension Remover
Courtesy of GENERAL MOTORS COMPANY

6. Use the **CH-48809** unloader (1) to increase the load on the torsion bar adjustment arm.
7. Install the torsion bar adjuster nut in the torsion bar support assembly.
8. Remove the **CH-48809** unloader and allow the torsion bar adjuster arm to rest on the torsion bar adjuster nut.

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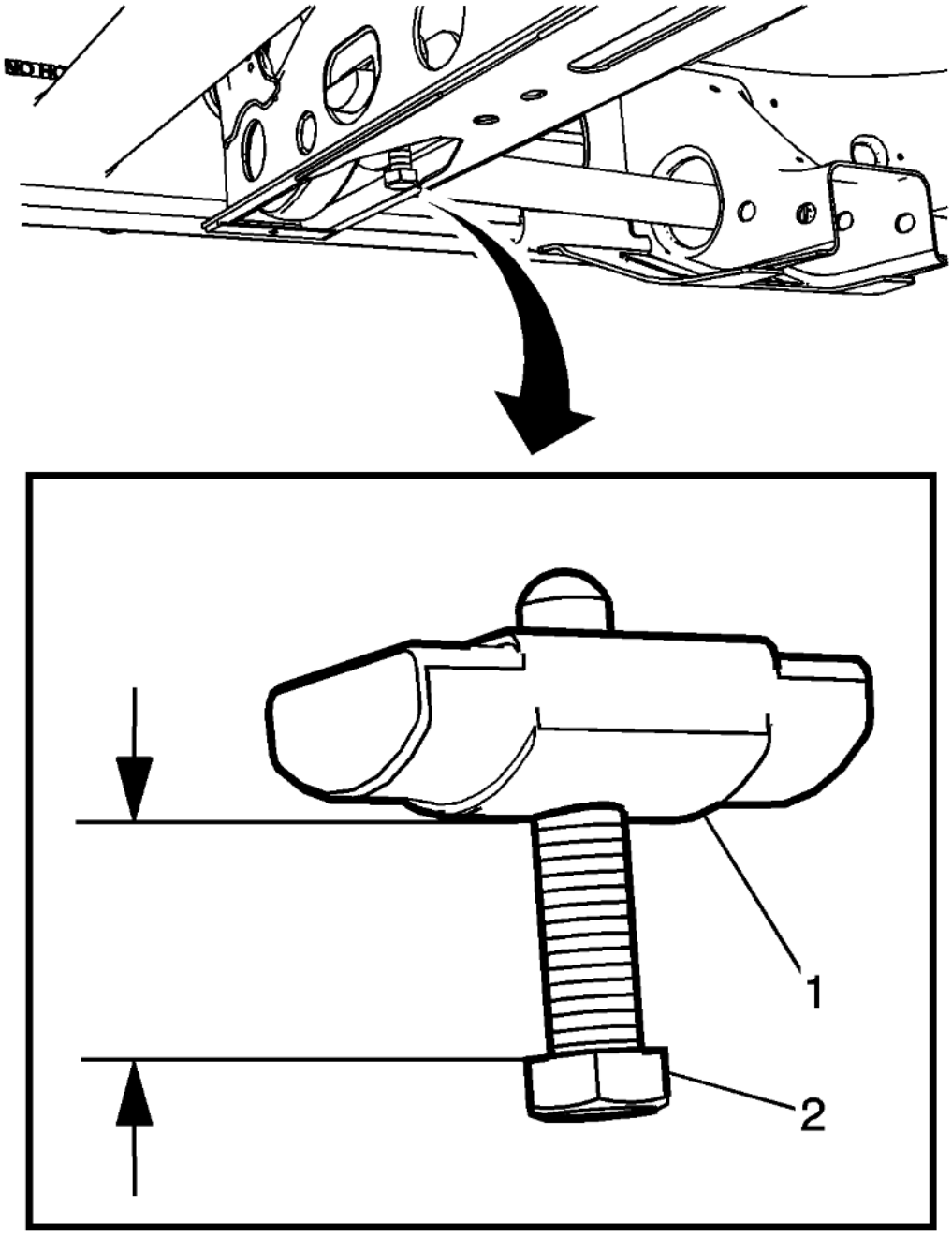


Fig. 72: Measuring Distance From Adjuster Nut To Adjuster Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Install the torsion bar adjuster bolt (2) in the torsion bar adjuster nut (1) and turn the bolt until it contacts the torsion bar adjuster arm.
10. Turn the torsion bar adjuster bolt until the previously recorded distance is achieved.
11. Repeat the process for the other torsion bar adjustment arm.

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12. Measure the Z height and adjust as necessary. **Trim Height Inspection**

STRUT AND SHOCK ABSORBER INSPECTION (HEAVY DUTY)

NOTE: **The shock absorber assembly DOES NOT have to be removed from the vehicle to perform the following inspection procedure.**

NOTE: **A light film of oil on the top portion of the lower shock absorber tube is normal. DO NOT replace the shock absorber for this condition.**

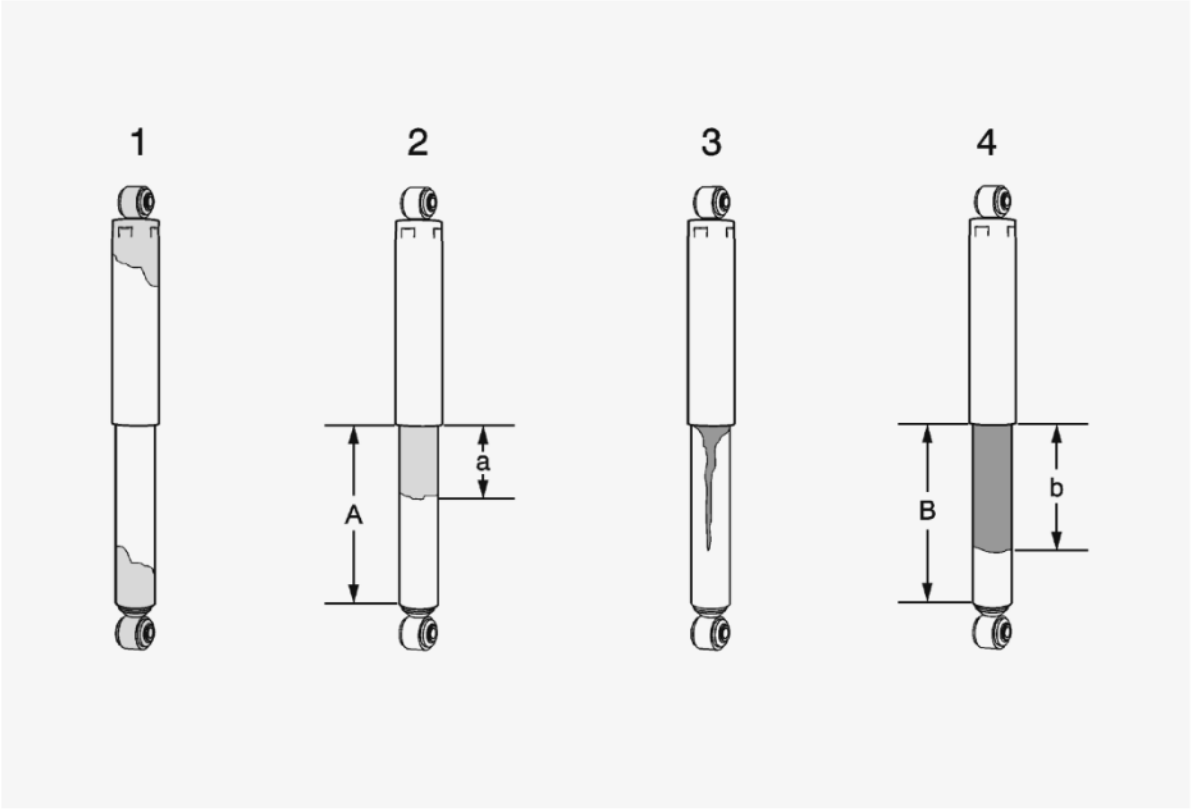


Fig. 73: Identifying Shock Absorber Conditions
Courtesy of GENERAL MOTORS COMPANY

Condition 1

Oil or fluid residue only on the bottom or top of the shock absorber and not originating from the shaft seal, is not a shock absorber related problem. DO NOT replace the shock absorber, look for other external leaks.

Condition 2

Light film/residue on approximately 1/3 (a) or less of the lower shock tube (A) and originating from the shaft seal, is a NORMAL condition. DO NOT replace the shock absorber.

Condition 3

Oil drip or trail down the lower shock tube and originating from the shaft seal, is an ABNORMAL condition. Replace the shock absorber.

Condition 4

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An extreme wet film of oil covering more than 1/3 (b) of the lower shock tube and originating from the shaft seal (B), is an ABNORMAL condition. Replace the shock absorber.

Inspection

1. Verify the customer's concern is present. If the concern is present, continue to the next step. If the concern is not present, then the vehicle is operating normally.

   NOTE: **The shock absorber assembly DOES NOT have to be removed from the vehicle to perform the following inspection procedure.**

2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Visually inspect each of the shock absorbers for external fluid leaks. Refer to the following conditions 1, 2 , 3 , and 4 for visual inspection.
   - If conditions 1 or 2 are found, continue to step 4.
   - If conditions 3 or 4 are found, replace shock absorber.
4. If equipped with electronic suspension control system, ensure that the system is working properly. Refer to Diagnostic Starting Point - Electronic Suspension Control.
5. Use your hands in order to lift up and push down on each corner of the vehicle 3 times. Remove your hands from the vehicle. If the corner motion exceeds 2 cycles, replace the shock absorber. If the shock absorber does not exceed 2 cycles, NO repair is necessary.

STRUT AND SHOCK ABSORBER INSPECTION (LIGHT DUTY)

NOTE: **The coil over shock assembly DOES NOT have to be removed from the vehicle to perform the following inspection procedure.**

NOTE: **A light film of oil on the top portion of the shock absorber tube is normal. DO NOT replace the shock absorber for this condition.**

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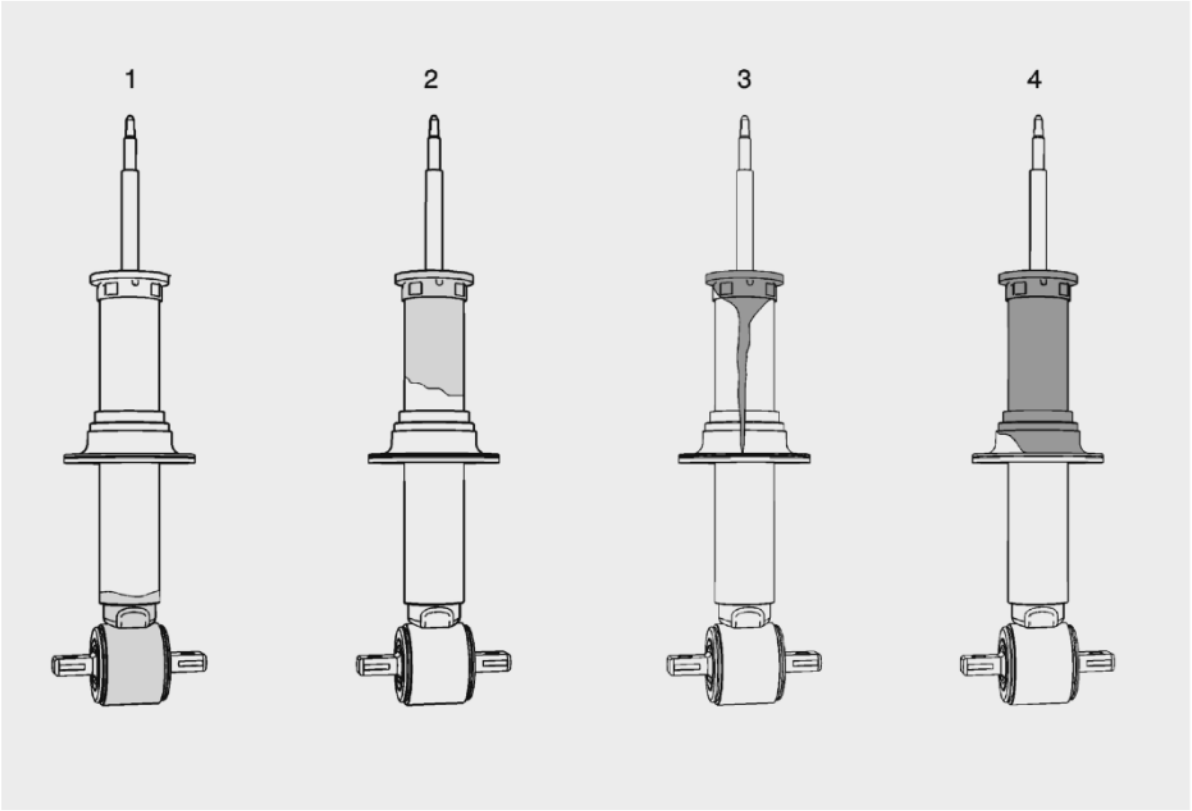


Fig. 74: Strut And Shock Absorber Inspection (Coil Over Shock)
Courtesy of GENERAL MOTORS COMPANY

Condition 1

Oil or fluid residue only on the bottom of the lower shock absorber tube or other coil over shock absorber and originating from the shaft seal, is not a shock absorber related problem. DO NOT replace the shock absorber, look for other external leaks.

Condition 2

Light film/residue on the shock absorber tube, but not on the spring seat and originating from the shaft seal, is a NORMAL condition. DO NOT replace the shock absorber.

Condition 3

Oil drip or trail down the shock absorber tube and originating from the shaft seal, is an ABNORMAL condition. Replace the shock absorber.

Condition 4

An extreme wet film of oil covering the shock absorber tube and pooling in the spring seat and originating from the shaft seal, is an ABNORMAL condition. Replace the shock absorber.

Inspection

1. Verify the customer's concern is present. If the concern is present, continue to the next step. If the concern is not present, then the vehicle is operating normally.

NOTE: **The shock assembly DOES NOT have to be removed from the vehicle to**

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perform the following inspection procedure.

2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Visually inspect each of the shock absorbers for external fluid leaks. Refer to the following conditions 1, 2, 3, and 4 for visual inspection.
   - If conditions 1 or 2 are found, continue to step 4.
   - If conditions 3 or 4 are found, replace shock absorber. Refer to Shock Absorber Replacement.
4. If equipped with electronic suspension control system, ensure that the system is working properly. Refer to Diagnostic Starting Point-Electronic Suspension Control.
5. Use your hands in order to lift up and push down on each corner of the vehicle 3 times. Remove your hands from the vehicle. If the corner motion exceeds 2 cycles, replace the shock absorber. If the shock absorber does not exceed 2 cycles, NO repair is necessary.

SHOCK ABSORBER AND SPRING REMOVAL AND INSTALLATION (LIGHT DUTY, WITHOUT Z85/Z95)

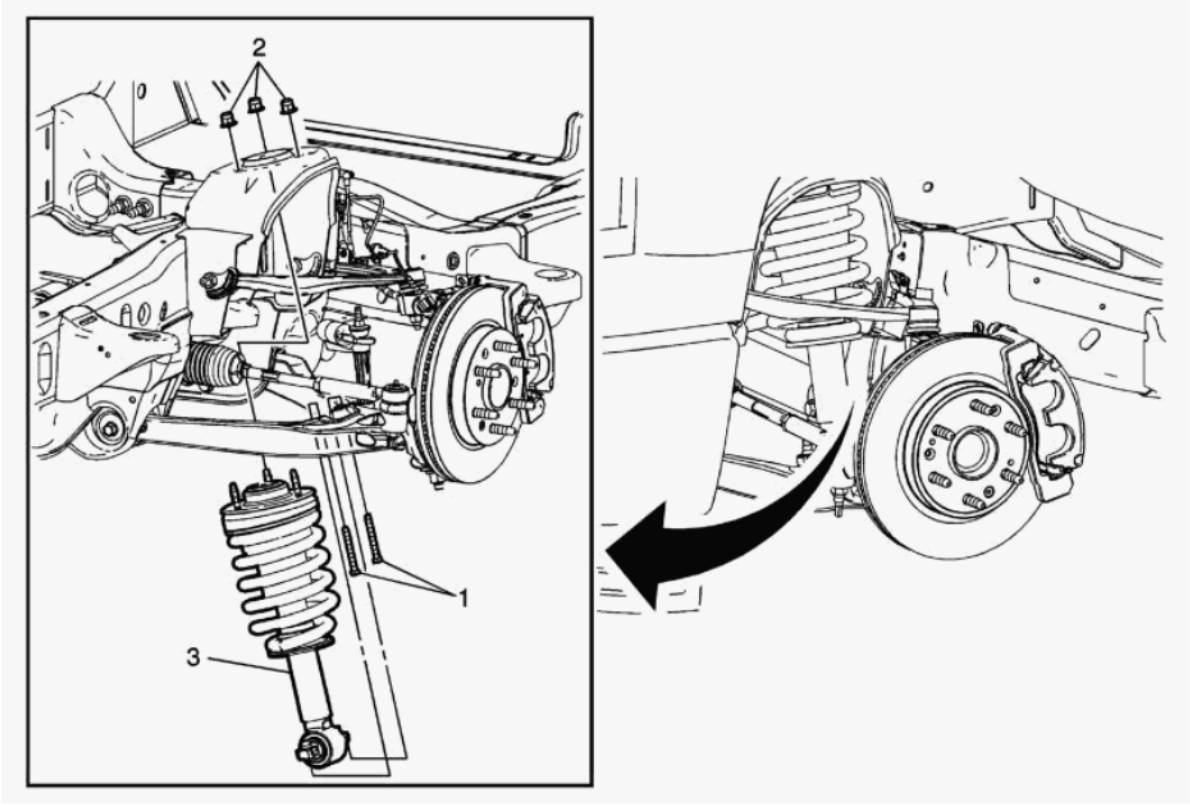


Fig. 75: Shock Absorber and Spring (Light Duty, Without Z85/Z95)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**	
2. Support the front lower control arm.	

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Callout	Component Name
1	Front Shock Absorber Bolt **CAUTION:** **Refer to Fastener Caution .** **CAUTION:** **Do not use air powered tools in order to disassemble or assemble any vehicle component. Bolt torques are vital to diagnosis. You can detect bolt torques only when using hand tools. Improper bolt torques can contribute to vehicle repair problems.** **Tighten** 50 N.m (37 lb ft)
2	Front Shock Absorber Nut **Tighten** 50 N.m (37 lb ft)
3	Front Shock Absorber Assembly **Procedure** If removing the front shock absorber assembly to service the components, refer to **Shock Absorber, Shock Absorber Component, or Spring Replacement (Light Duty, Without Z85/Z95)**. **NOTE:** • **On 2WD vehicles, the front**

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Callout	Component Name
	shock absorber assembly can be removed by bringing the assembly downwards through the opening in the front lower control arm. • On 4WD vehicles, the front shock absorber assembly can be removed by bringing the assembly downwards as far as possible into the opening in the front lower control arm and then tilting the assembly clear of the front upper control arm. After clearing the front upper control arm, the assembly

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Callout	Component Name
	can then be lifted back upwards and outwards to clear the front lower control arm and front wheel drive shaft.

SHOCK ABSORBER AND SPRING REMOVAL AND INSTALLATION (LIGHT DUTY, WITH Z85/Z95)

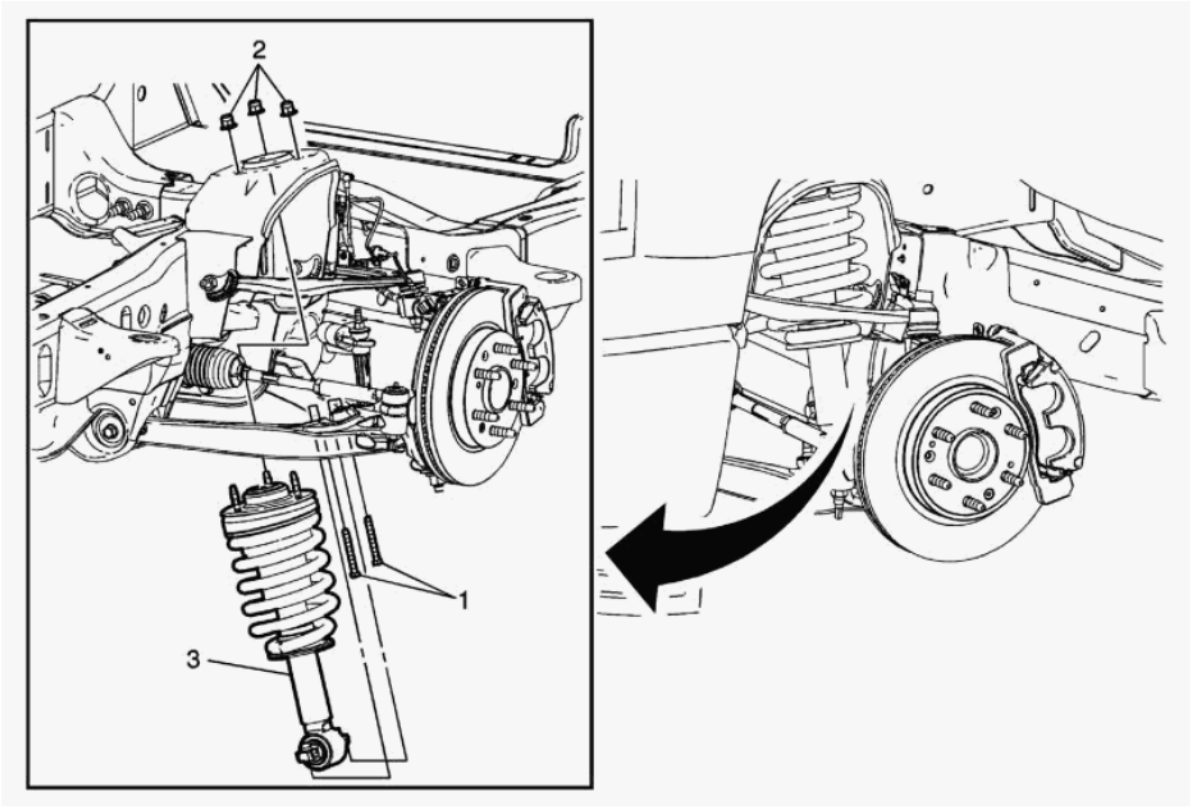


Fig. 76: Shock Absorber and Spring (Light Duty, With Z85/Z95)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1. Remove the front tire and wheel assembly. Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) Tire and Wheel Removal and Installation (Dual Rear Wheels)	
2. Support the front lower control arm.	

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Callout	Component Name
3. Disconnect the electrical connector from the front shock absorber assembly. 4. Disconnect the wiring harness from the front shock absorber studs and set aside.	
1	Front Shock Absorber Bolt **CAUTION:** **Refer to Fastener Caution .** **CAUTION:** **Do not use air powered tools in order to disassemble or assemble any vehicle component. Bolt torques are vital to diagnosis. You can detect bolt torques only when using hand tools. Improper bolt torques can contribute to vehicle repair problems.** **Tighten** 50 N.m (37 lb ft)
2	Front Shock Absorber Nut **Tighten** 50 N.m (37 lb ft)
3	Front Shock Absorber Assembly **Procedure** If removing the front shock absorber assembly to service the components, refer to **Shock Absorber, Shock Absorber Component, or Spring Replacement (Light Duty, With Z85/Z95)**. **NOTE:**

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Callout	Component Name
	• On 2WD vehicles, the front shock absorber assembly can be removed by bringing the assembly downwards through the opening in the front lower control arm. • On 4WD vehicles, the front shock absorber assembly can be removed by bringing the assembly downwards as far as possible into the opening in the front lower control arm and then tilting the assembly clear of the front upper control arm. After clearing the front upper

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Callout	Component Name
	control arm, the assembly can then be lifted back upwards and outwards to clear the front lower control arm and front wheel drive shaft.

SHOCK ABSORBER, SHOCK ABSORBER COMPONENT, OR SPRING REPLACEMENT (LIGHT DUTY, WITHOUT Z85/Z95)

Special Tools

CH-48845 Strut Spring Compressor

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Front Shock Absorber and Spring Assembly - Remove - **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)**

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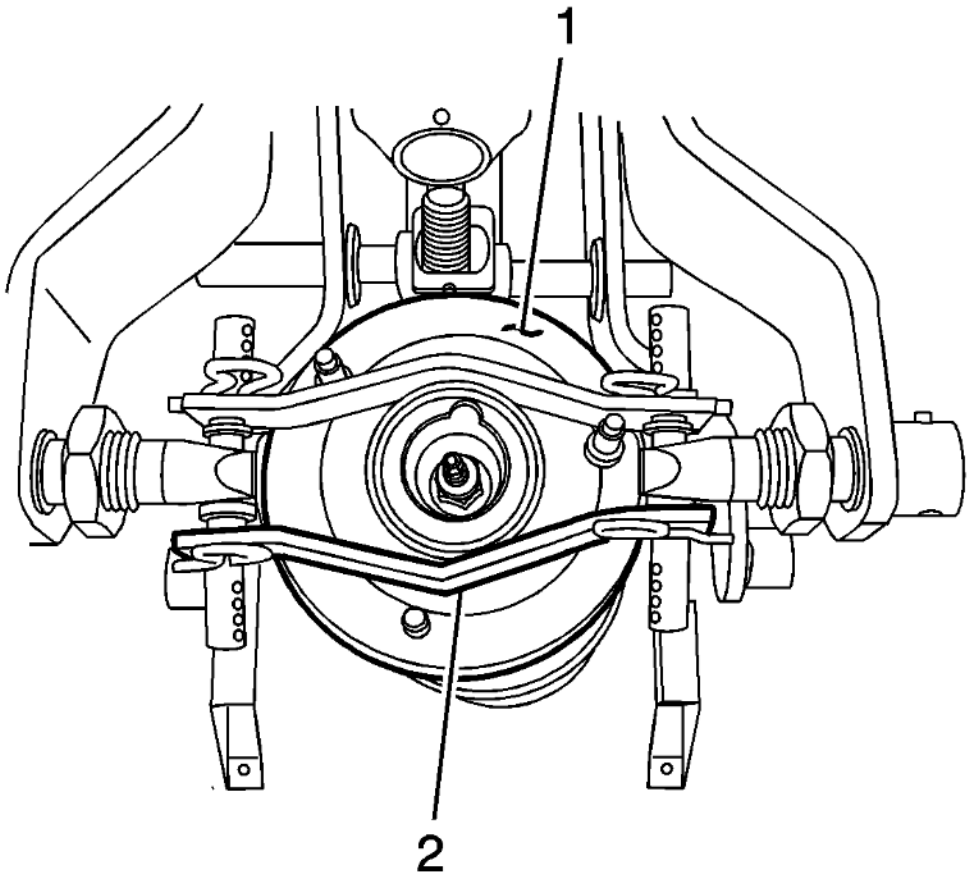


Fig. 77: Identifying Shock Absorber & Upper Retaining Bracket
Courtesy of GENERAL MOTORS COMPANY

WARNING: **Use only the CH-48845 Spring Compressor when servicing suspension components on this vehicle. Other tools may not be strong enough for the springs on this vehicle and you could be injured if you do not use Special Tool CH-48845. Failure to do so could result in serious personal injury.**

NOTE: **ONLY use hand tools to perform the following service procedure.**

2. Position the front shock absorber assembly (1) in the upper retaining bracket of the **CH-48845** compressor (2).

   Ensure the front shock absorber assembly is centered.

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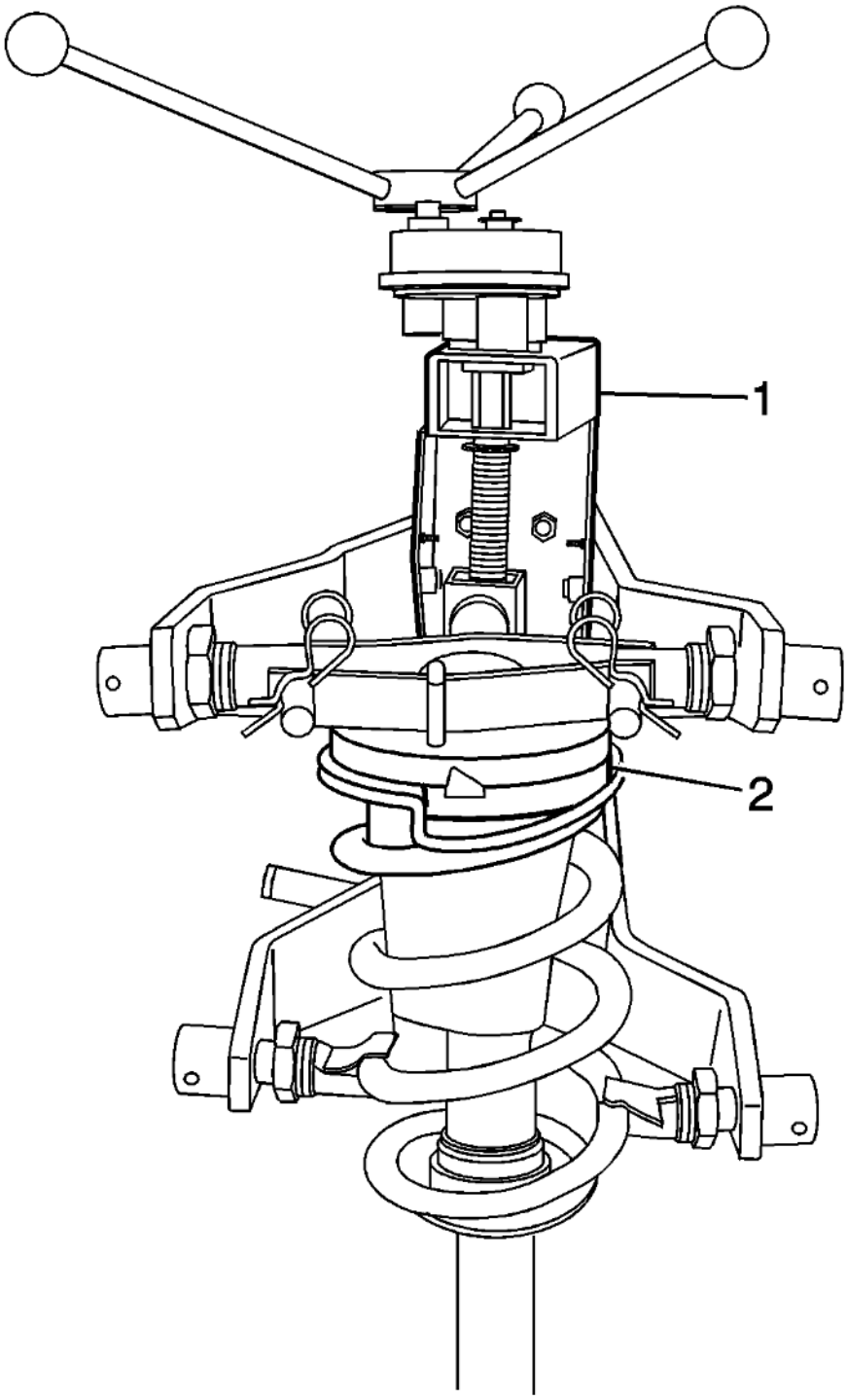


Fig. 78: Compressing Front Spring
Courtesy of GENERAL MOTORS COMPANY

3. Use the **CH-48845** compressor (1) to compress the front spring (2).
4. Use the appropriate size wrench to hold the front shock absorber shaft.

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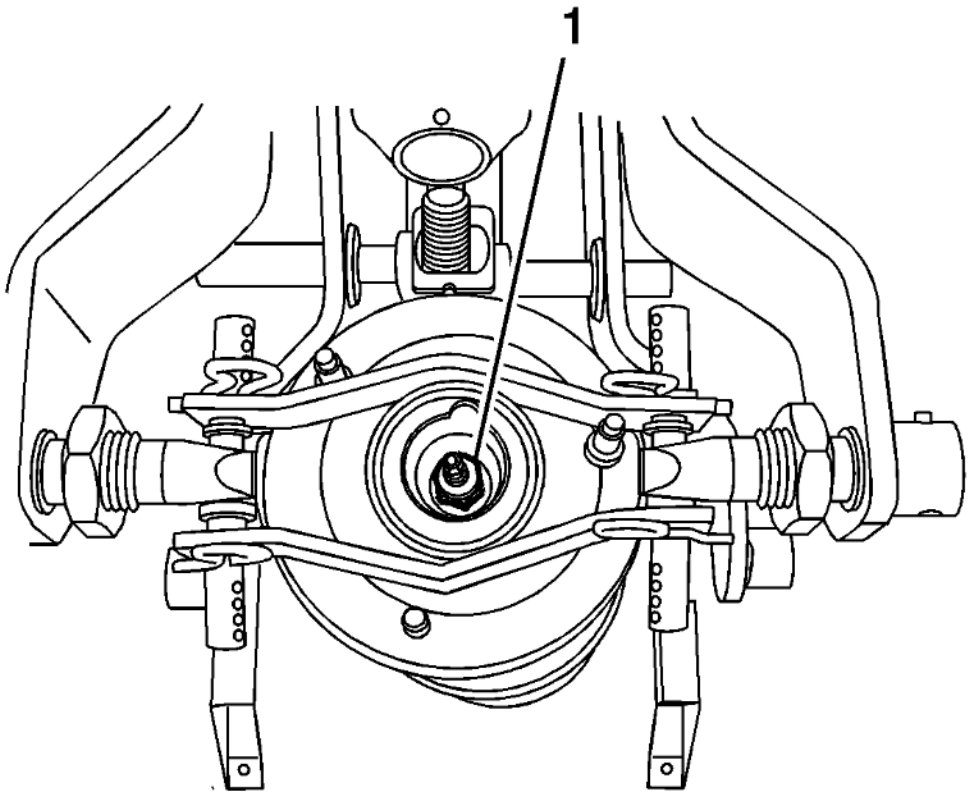


Fig. 79: Identifying Shock Absorber Nut
Courtesy of GENERAL MOTORS COMPANY

5. Use the appropriate tools to remove the front shock absorber stud nut (1).

   DISCARD the nut.

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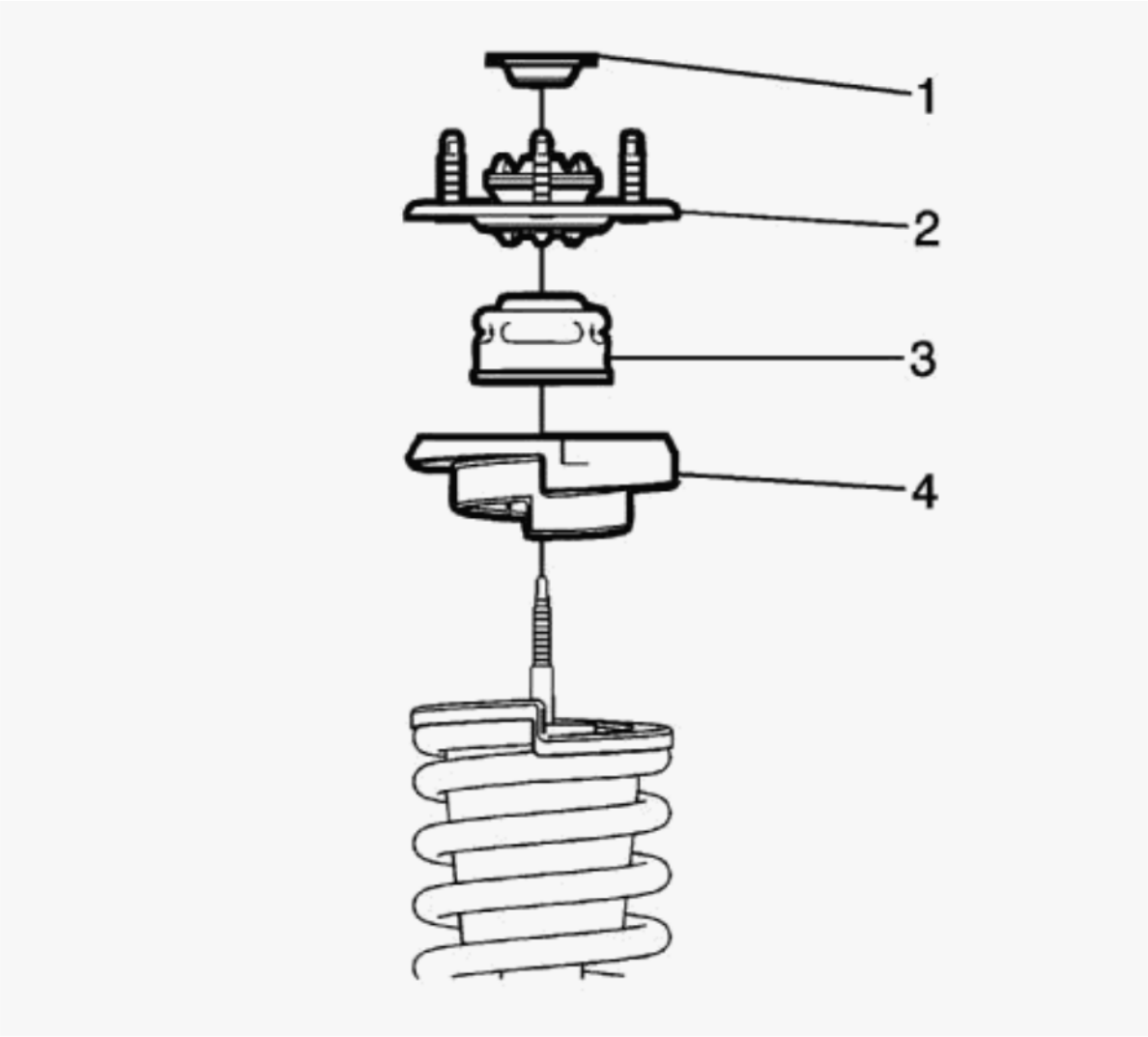


Fig. 80: Front Spring Upper Seat And Strut Bumper Upper Mount Cup
Courtesy of GENERAL MOTORS COMPANY

6. Remove the front shock absorber upper mount washer (1), front shock absorber upper mount (2), strut bumper upper mount cup (3) and front spring upper seat (4).

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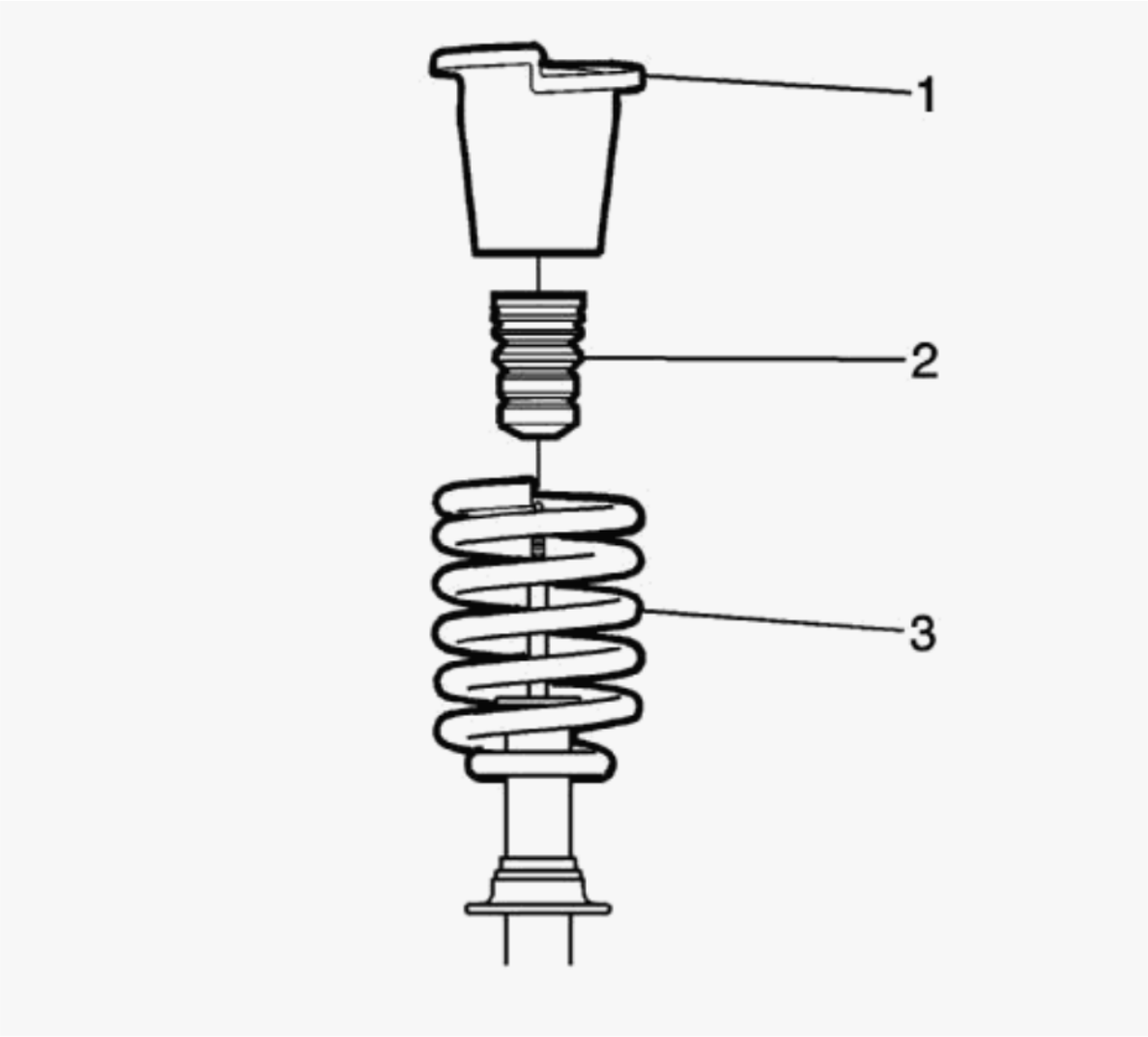


Fig. 81: Front Spring Upper Insulator And Front Suspension Strut Bumper
Courtesy of GENERAL MOTORS COMPANY

7. Remove the front spring upper insulator (1) and front spring (2).

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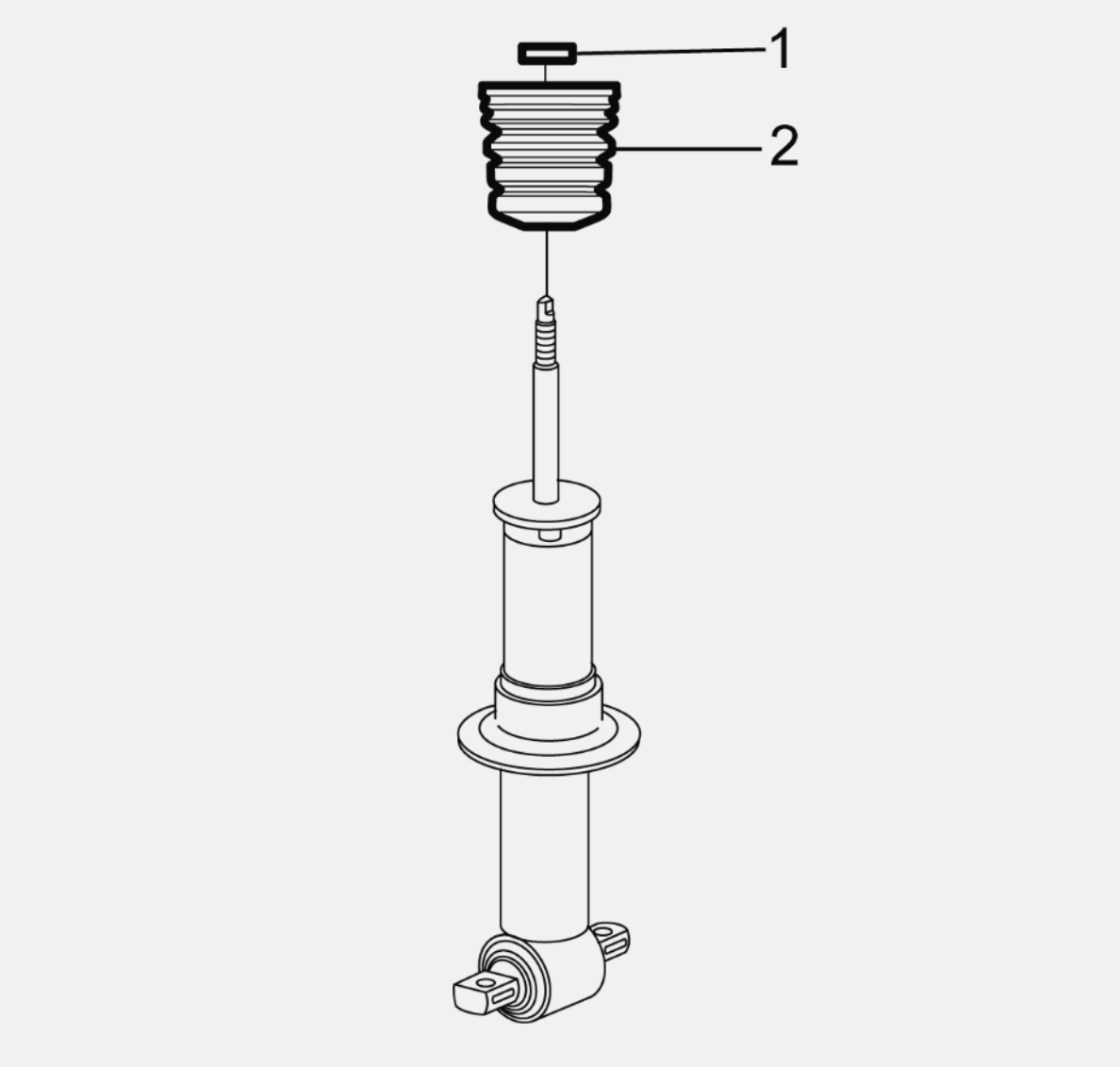


Fig. 82: Spacer And Front Suspension Strut Bumper
Courtesy of GENERAL MOTORS COMPANY

8. Remove the spacer (1) and front suspension strut bumper (2).

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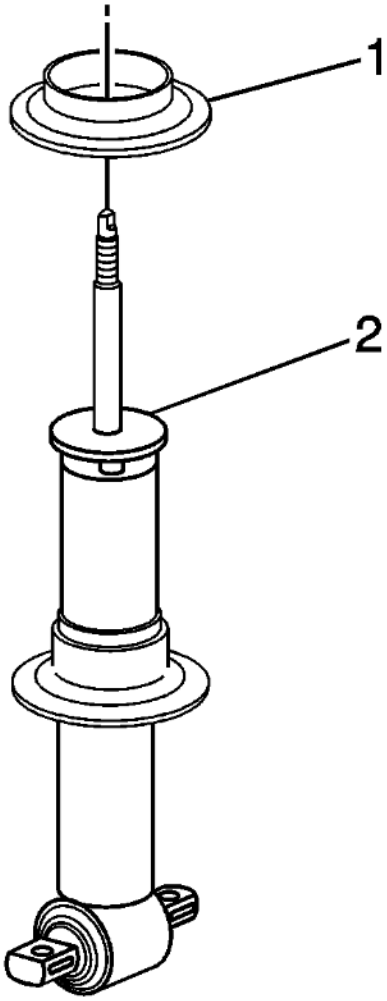


Fig. 83: Locating Front Suspension Shock Absorber And Front Spring Lower Insulator
Courtesy of GENERAL MOTORS COMPANY

9. Remove the front spring lower insulator (1) and front shock absorber (2) from the spring compressor.

Installation Procedure

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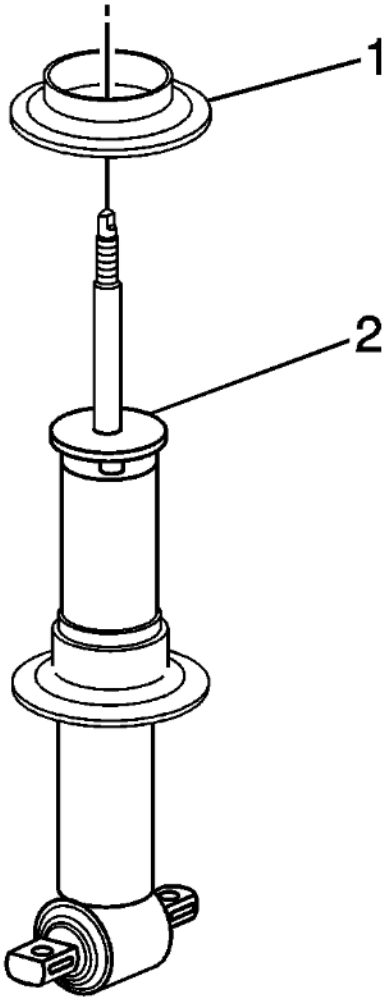


Fig. 84: Locating Front Suspension Shock Absorber And Front Spring Lower Insulator
Courtesy of GENERAL MOTORS COMPANY

1. Place the front shock absorber (2) and the front spring lower insulator (1) in the spring compressor.

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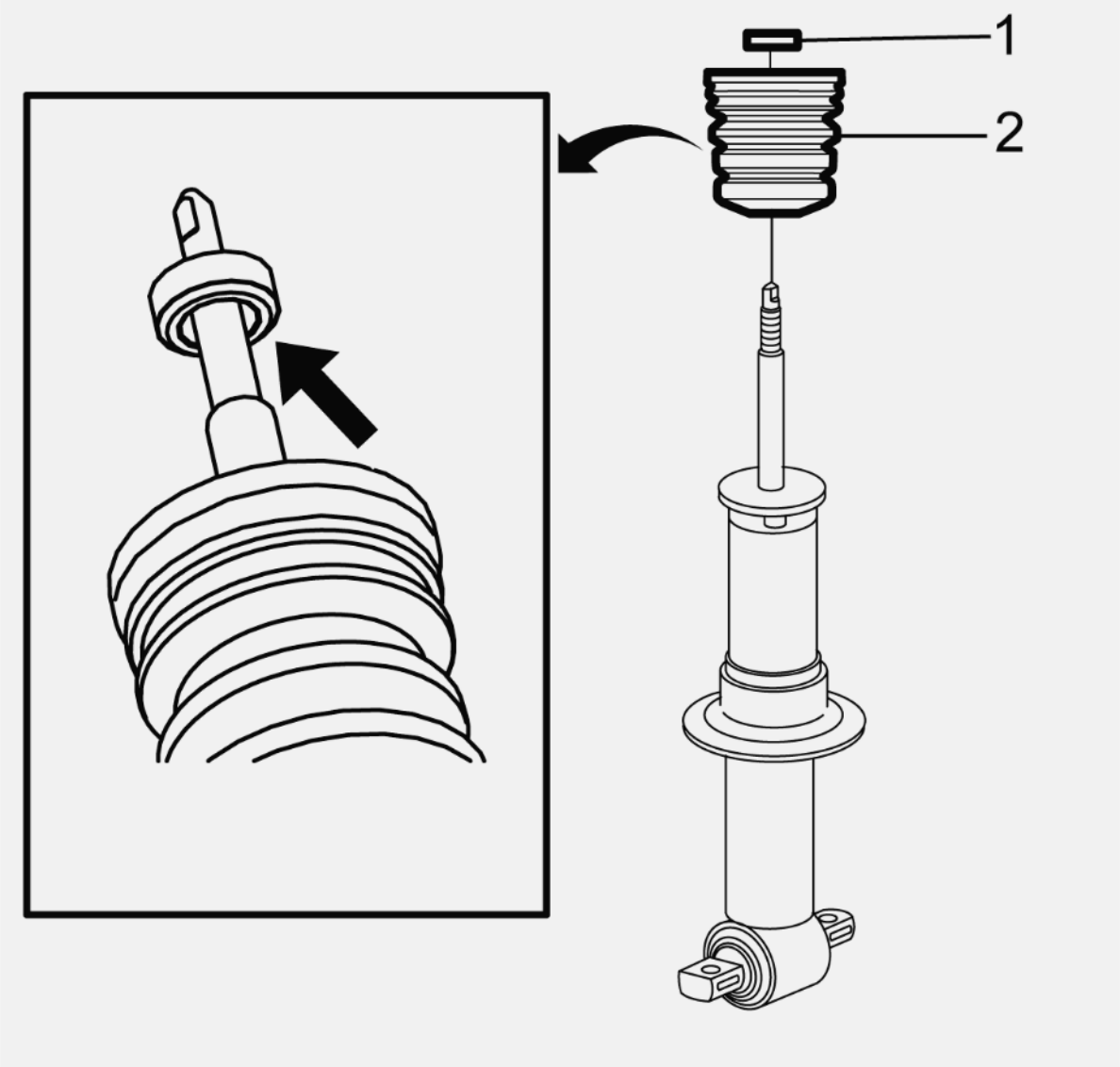


Fig. 85: Spacer And Front Suspension Strut Bumper
Courtesy of GENERAL MOTORS COMPANY

2. Install the front suspension strut bumper (2) and spacer (1).

   Ensure the spacer is installed with the beveled edge facing downwards or the spacer will catch on the bumper stop ring.

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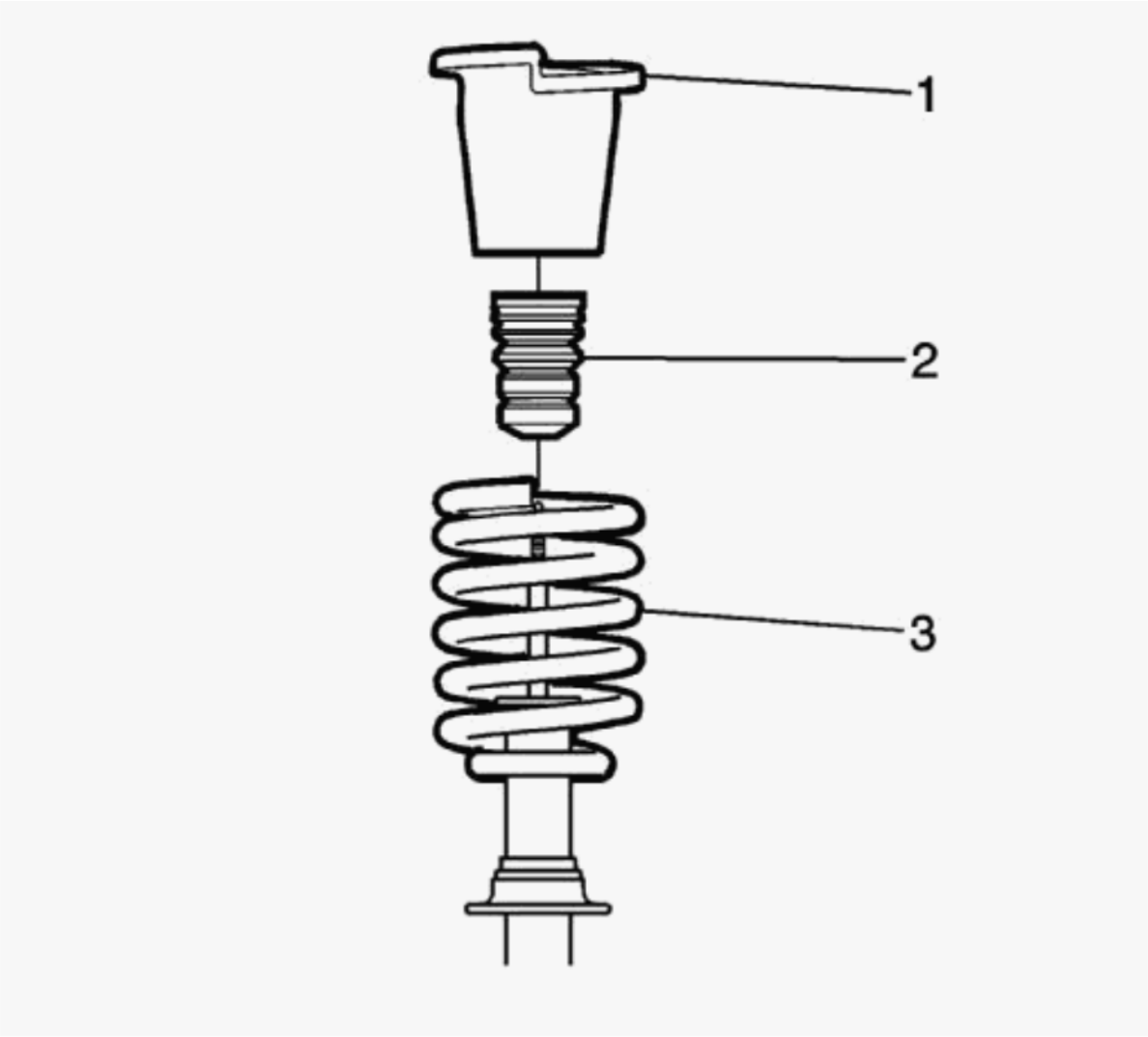


Fig. 86: Front Spring Upper Insulator And Front Suspension Strut Bumper
Courtesy of GENERAL MOTORS COMPANY

3. Install the front spring (2) and front spring upper insulator (1).

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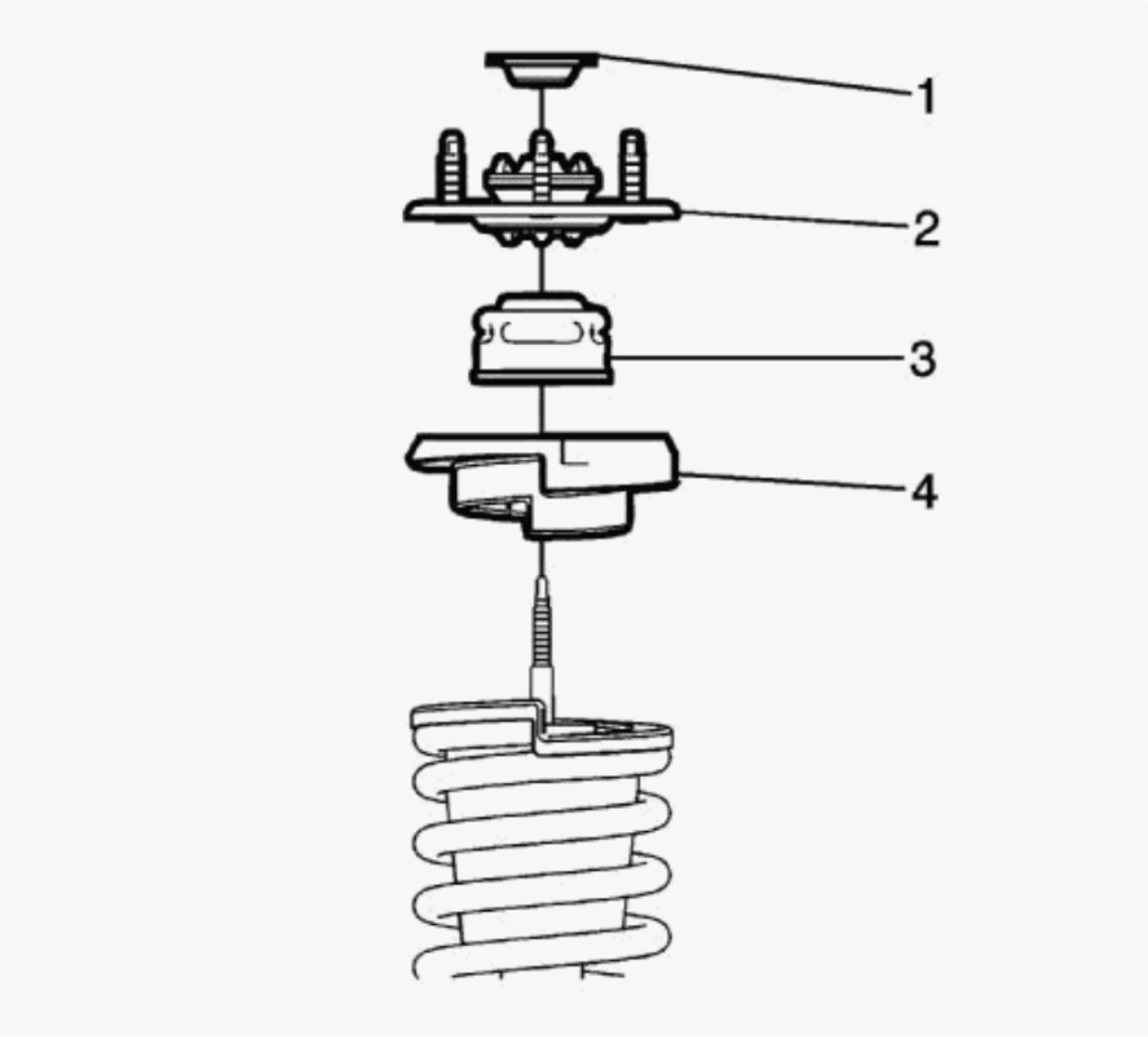


Fig. 87: Front Spring Upper Seat And Strut Bumper Upper Mount Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **The inboard strut mounting studs are spaced closer together than the outboard stud.**
- **The outboard stud should be facing toward the outside (closest to the technician) for proper alignment.**

4. Install the front spring upper seat (4), strut bumper upper mount cup (3), front shock absorber upper mount (2) and front shock absorber upper mount washer (1).

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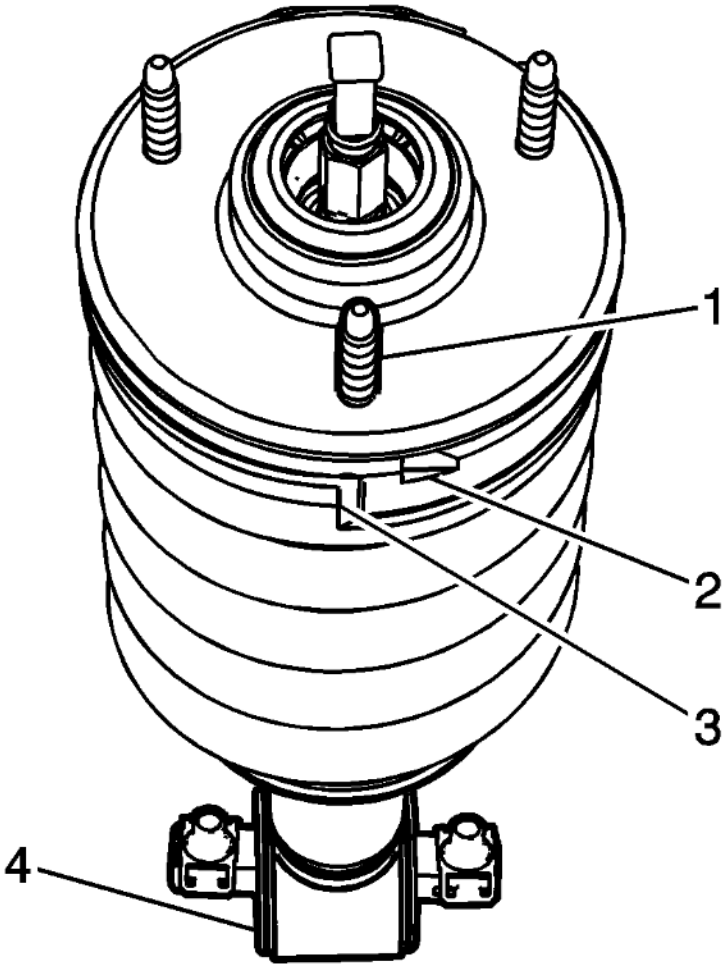


Fig. 88: Identifying Spring Seat Components
Courtesy of GENERAL MOTORS COMPANY

5. Align the spring seat stop (3), the outboard stud (1) and the center of the lower front shock absorber (4).

   The notch in the spring seat (2) should be just to the right of the outboard stud.

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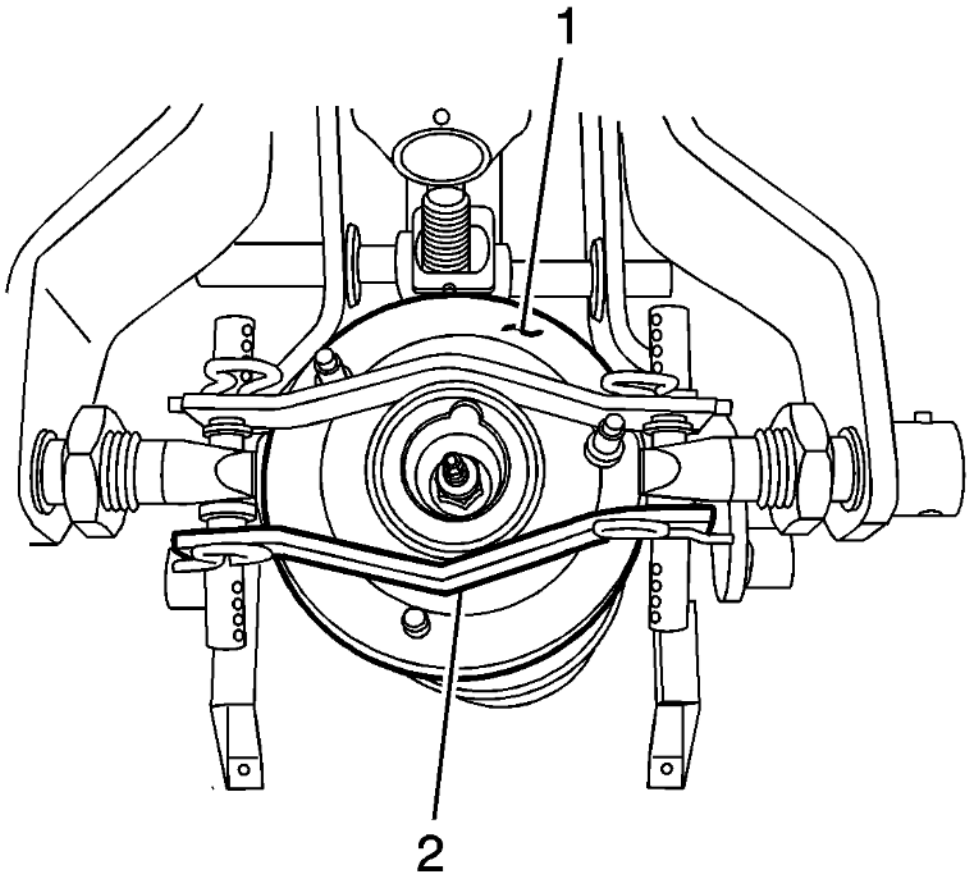


Fig. 89: Identifying Shock Absorber & Upper Retaining Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Position the front shock absorber (1) in the upper retaining bracket of the **CH-48845** compressor (2).

   Ensure the front shock absorber assembly is centered.

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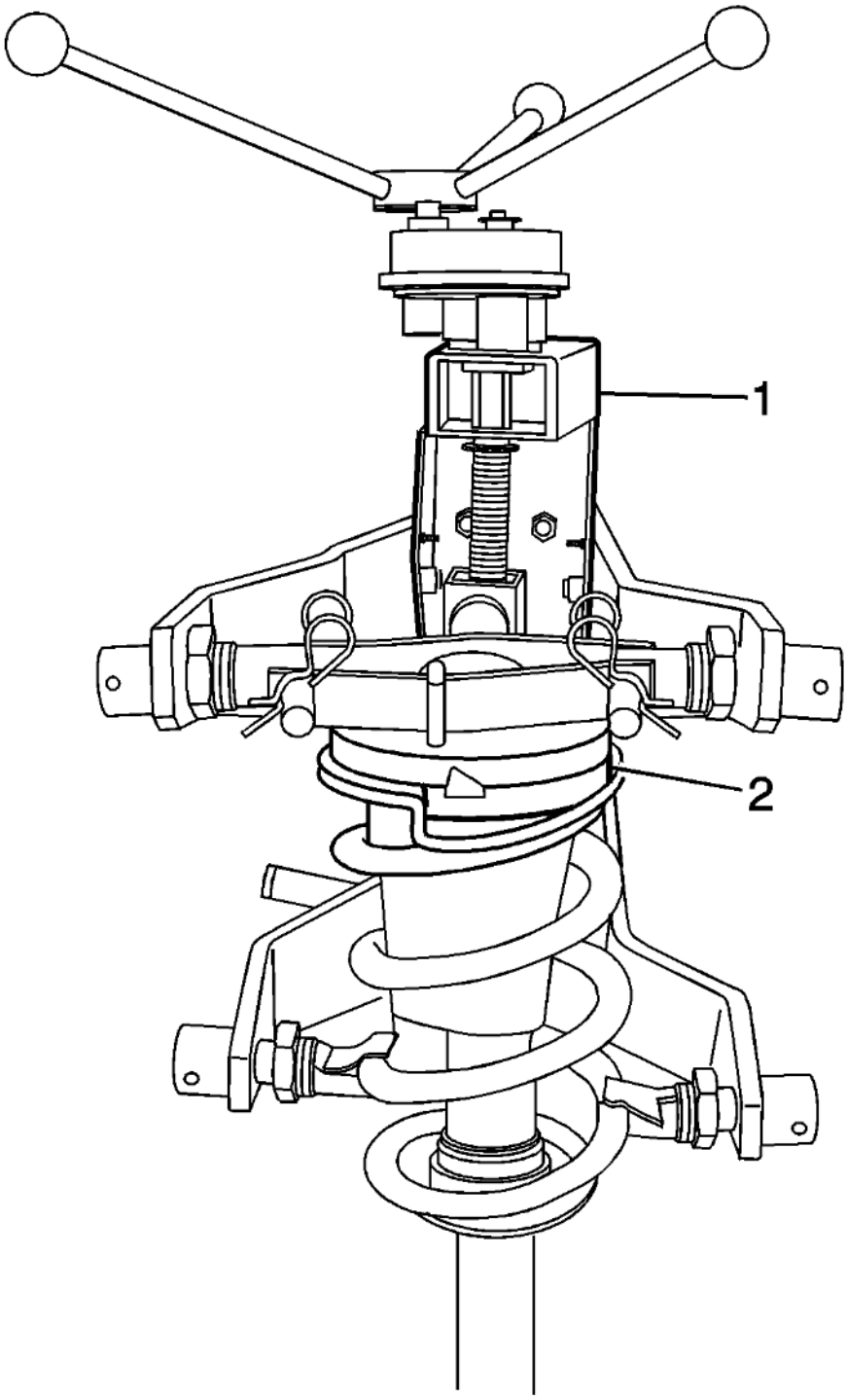


Fig. 90: Compressing Front Spring
Courtesy of GENERAL MOTORS COMPANY

7. Use the **CH-48845** compressor (1) to compress the front spring (2).
8. Use the appropriate size wrench to hold the front shock absorber shaft.

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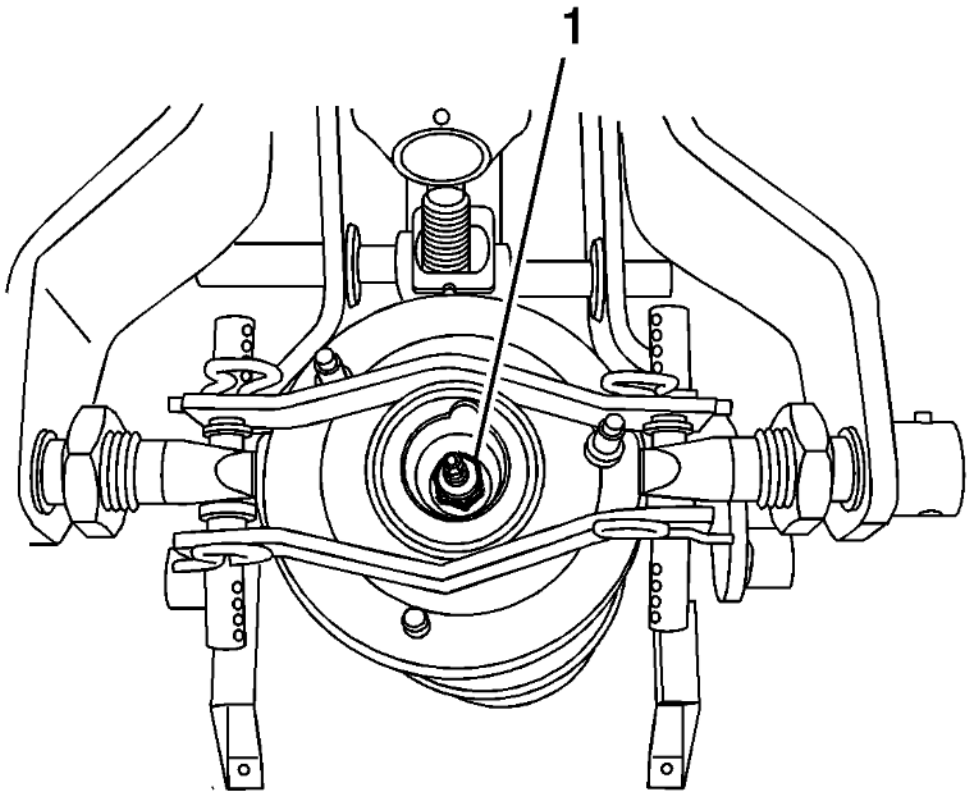


Fig. 91: Identifying Shock Absorber Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

9. Use the appropriate tools to install the NEW front shock absorber stud nut (1) and tighten to 50 N.m (37 lb ft).

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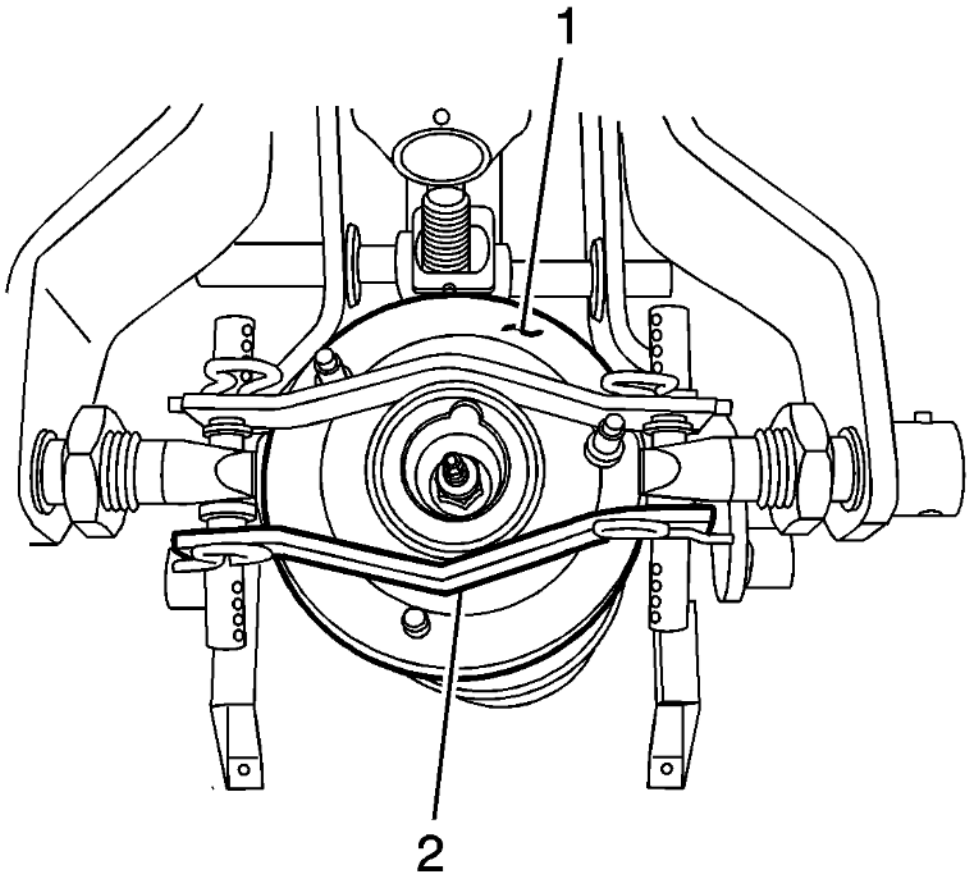


Fig. 92: Identifying Shock Absorber & Upper Retaining Bracket
Courtesy of GENERAL MOTORS COMPANY

10. Remove the front shock absorber assembly (1) from the **CH-48845** compressor (2).
11. Front Shock Absorber and Spring Assembly - Install - **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)**

SHOCK ABSORBER, SHOCK ABSORBER COMPONENT, OR SPRING REPLACEMENT (LIGHT DUTY, WITH Z85/Z95)

Special Tools

CH-48845 Strut Spring Compressor

Equivalent regional tools:**Special Tools**

Removal Procedure

1. Front Shock Absorber and Spring Assembly - Remove - **Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
2. Disassemble the front shock absorber electrical connector. **Terminal Removal**

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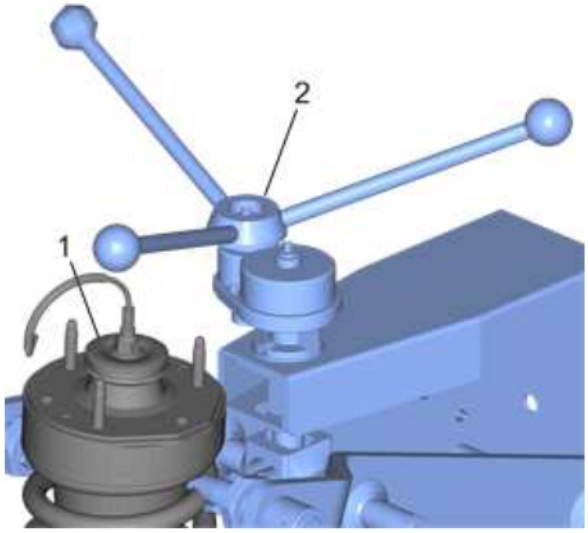


Fig. 93: Front Shock Absorber Assembly
Courtesy of GENERAL MOTORS COMPANY

WARNING: **Use only the CH-48845 Spring Compressor when servicing suspension components on this vehicle. Other tools may not be strong enough for the springs on this vehicle and you could be injured if you do not use Special Tool CH-48845. Failure to do so could result in serious personal injury.**

NOTE: **ONLY use hand tools to perform the following service procedure.**

3. Position the front shock absorber assembly (1) in the upper retaining bracket of the **CH-48845** compressor (2).

   Ensure the front shock absorber assembly is centered and compress the front spring.

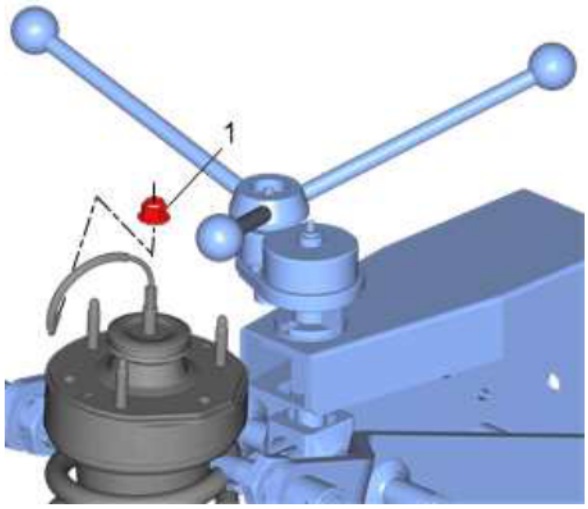


Fig. 94: Front Shock Absorber Stud Nut
Courtesy of GENERAL MOTORS COMPANY

4. Use the appropriate tools to remove the front shock absorber stud nut (1).

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DISCARD the nut.

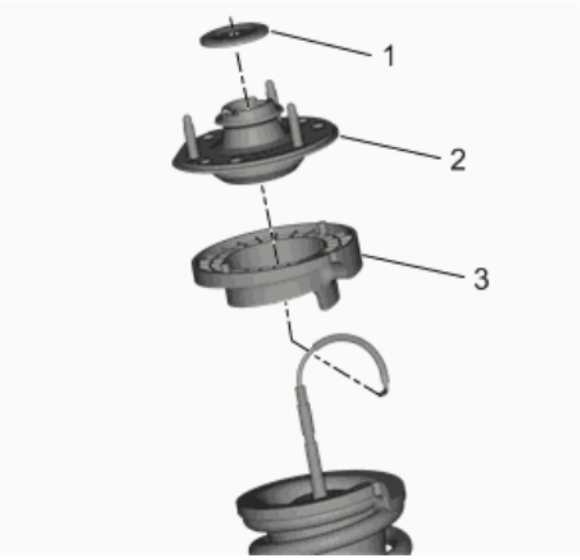


Fig. 95: Front Shock Absorber Upper Mount Washer And Mount
Courtesy of GENERAL MOTORS COMPANY

5. Remove the front shock absorber upper mount washer (1), front shock absorber mount (2) and front spring upper seat (3).



Fig. 96: Front Suspension Strut Bumper And Front Shock Absorber Boot
Courtesy of GENERAL MOTORS COMPANY

6. Remove the front suspension strut bumper (1) and front shock absorber boot (2).

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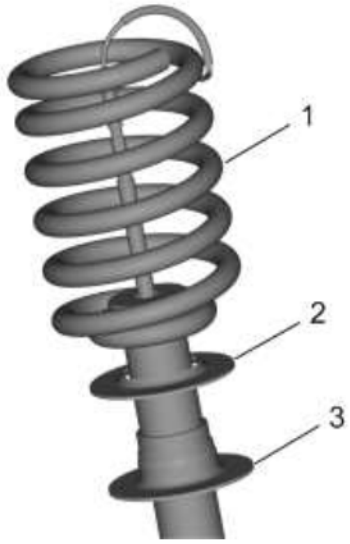


Fig. 97: Front Spring, Front Spring Lower Insulator And Front Shock Absorber
Courtesy of GENERAL MOTORS COMPANY

7. Remove the front spring (1), front spring lower insulator (2) and front shock absorber (3) from the spring compressor.

Installation Procedure

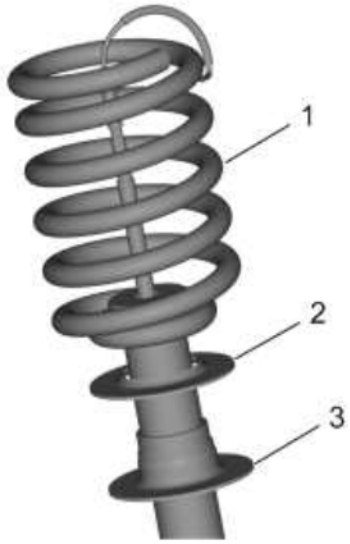


Fig. 98: Front Spring, Front Spring Lower Insulator And Front Shock Absorber
Courtesy of GENERAL MOTORS COMPANY

1. Place the front shock absorber (3), front spring lower insulator (2) and front spring (1) in the spring compressor.

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Fig. 99: Front Suspension Strut Bumper And Front Shock Absorber Boot
Courtesy of GENERAL MOTORS COMPANY

2. Install the front shock absorber boot (2) and front suspension strut bumper (1).

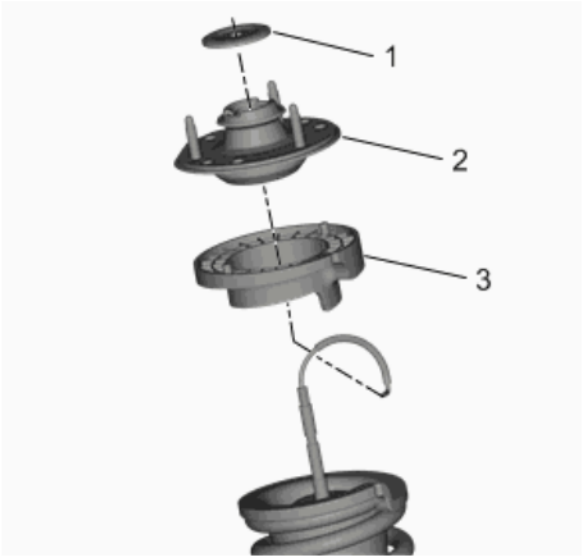


Fig. 100: Front Shock Absorber Upper Mount Washer And Mount
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **The inboard strut mounting studs are spaced closer together than the outboard stud.**
- **The outboard stud should be facing toward the outside (closest to the technician) for proper alignment.**

3. Install the front spring upper seat (3), front shock absorber mount (2) and front shock absorber upper mount washer (1).

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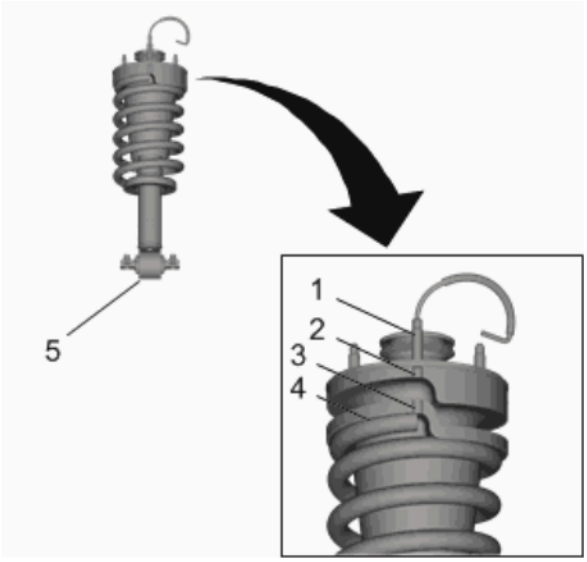


Fig. 101: Outboard Stud
Courtesy of GENERAL MOTORS COMPANY

4. Align the outboard stud (1), the notch in the front spring upper seat (2), the notch in the front shock absorber boot (3), the front spring (4) and the center of the lower front shock absorber (5).

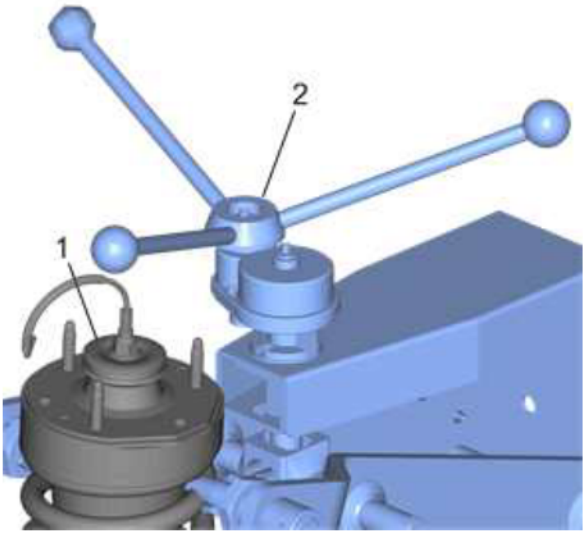


Fig. 102: Front Shock Absorber Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **For vehicles equipped with electronic suspension control, ensure the upper retaining bracket of the CH-48845 compressor is adjusted properly so that it does not damage the front shock absorber upper mount.**

5. Ensure the front shock absorber assembly (1) is centered in the **CH-48845** compressor (2) and compress the front spring.

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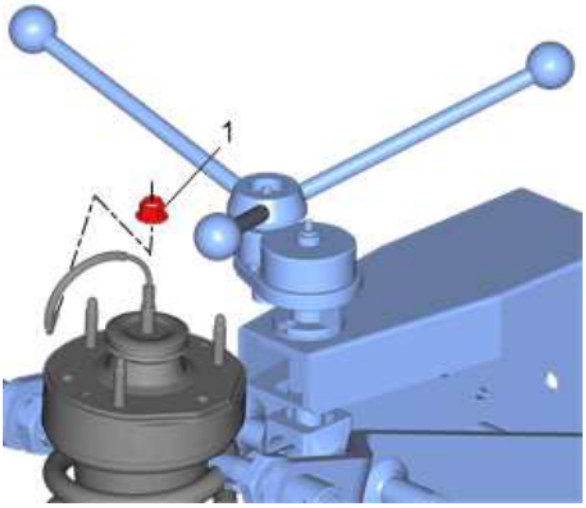


Fig. 103: Front Shock Absorber Stud Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

6. Use the appropriate tools to install the NEW front shock absorber stud nut (1) and tighten to 75 N.m (55 lb ft).
7. Assemble the front shock absorber electrical connector. **Terminal Removal**
8. Front Shock Absorber and Spring Assembly - Install - **Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**

SHOCK ABSORBER REPLACEMENT (HEAVY DUTY)

Removal Procedure

1. Remove the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**
2. Reposition the engine splash shield between the frame and the inner wheel house to access the upper front shock absorber nuts. **Front Wheelhouse Liner Replacement - Left Side** , or **Front Wheelhouse Liner Replacement - Right Side**

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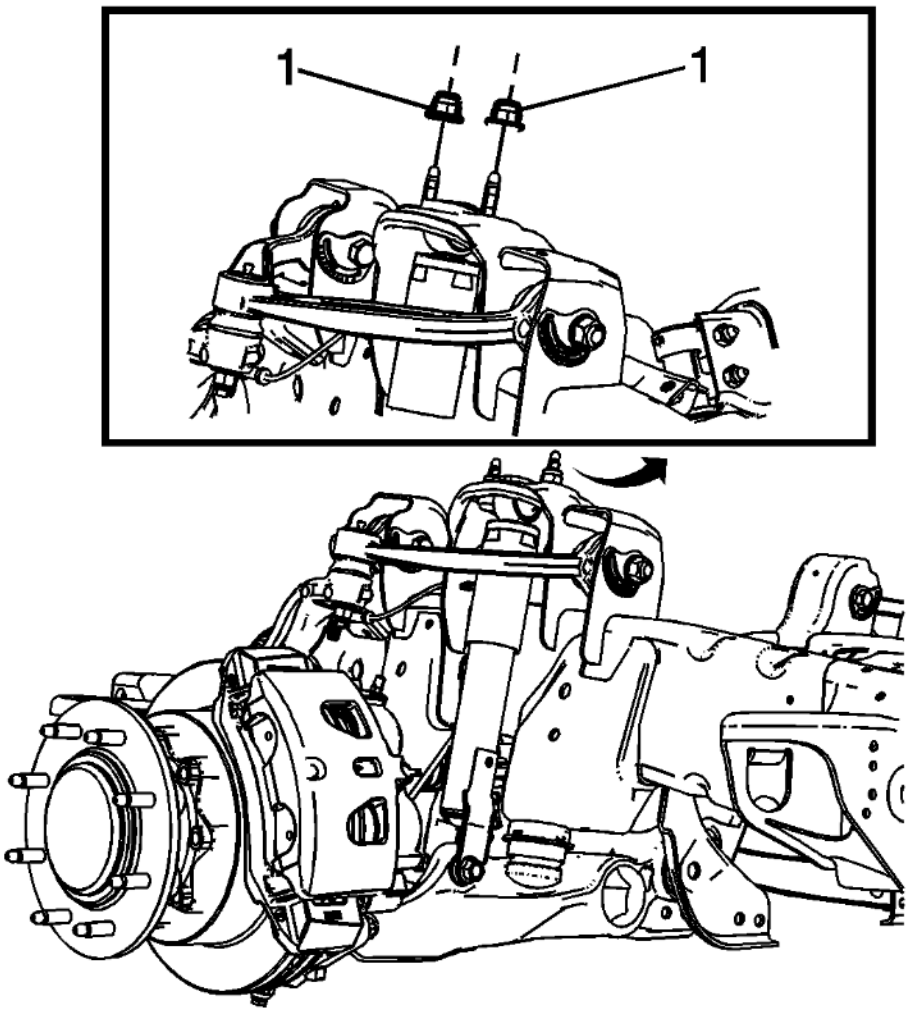


Fig. 104: Upper Front Shock Absorber Nuts
Courtesy of GENERAL MOTORS COMPANY

3. Remove the upper front shock absorber nuts (1).

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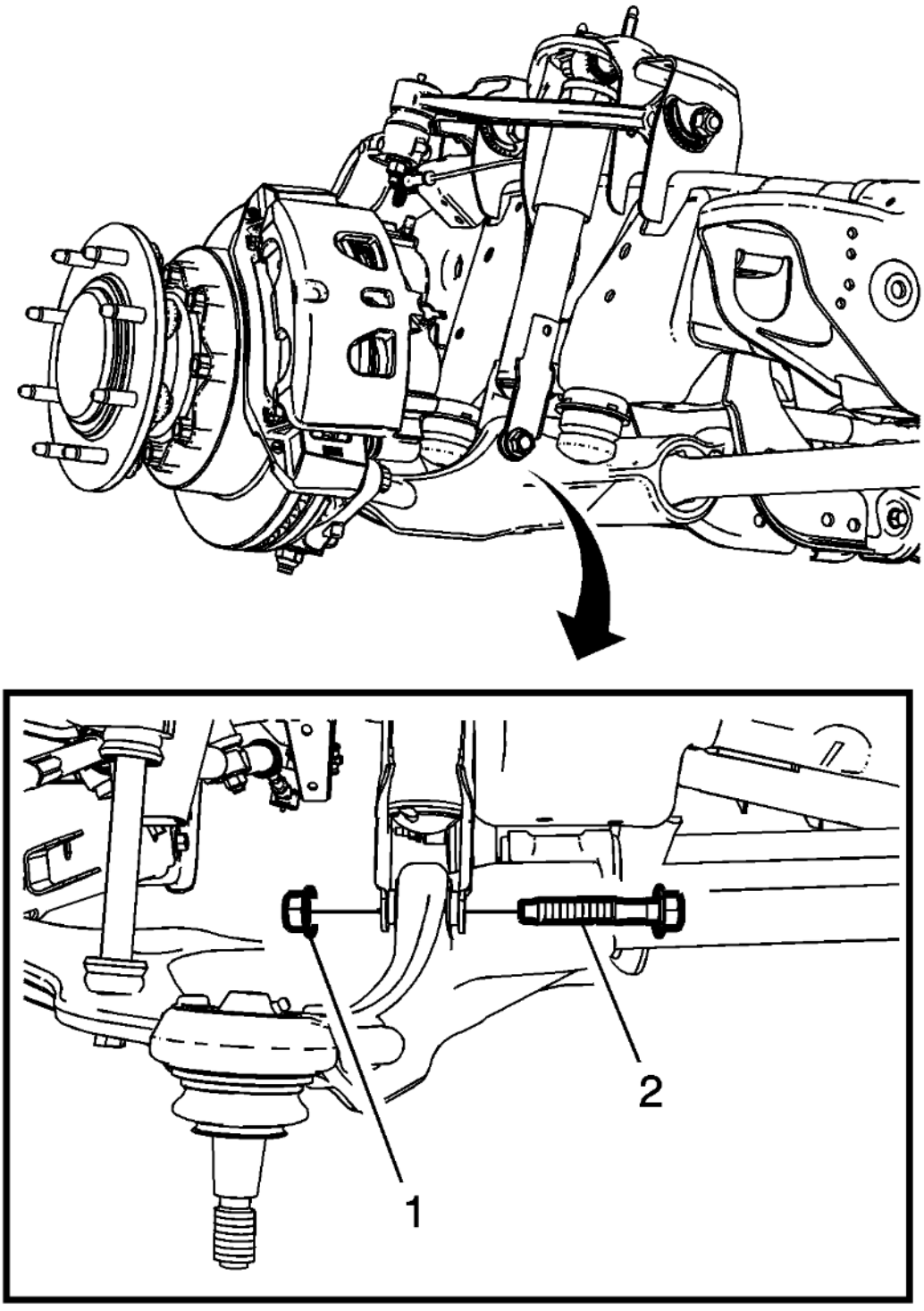


Fig. 105: Lower Front Shock Absorber Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove the lower front shock absorber nut (1) and bolt (2).

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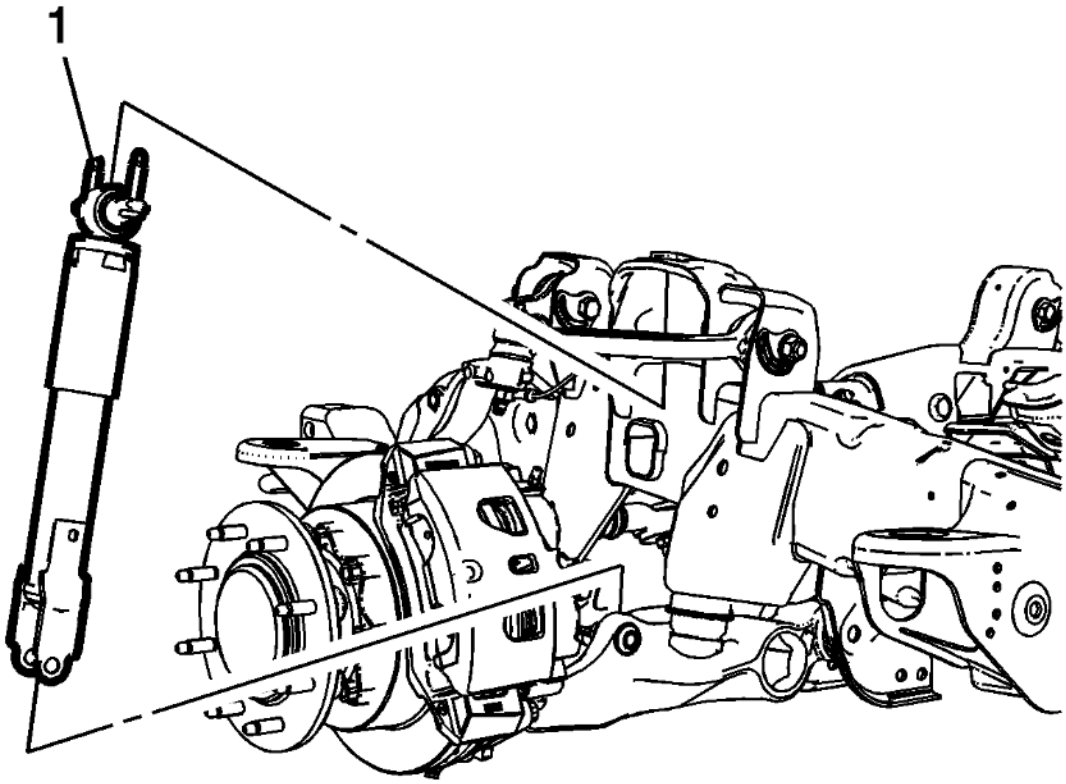


Fig. 106: Identifying Front Shock Absorber
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Turn the front tire and wheel assembly to gain enough clearance to remove the front shock absorber.**

5. Remove the front shock absorber (1) from the vehicle.

Installation Procedure

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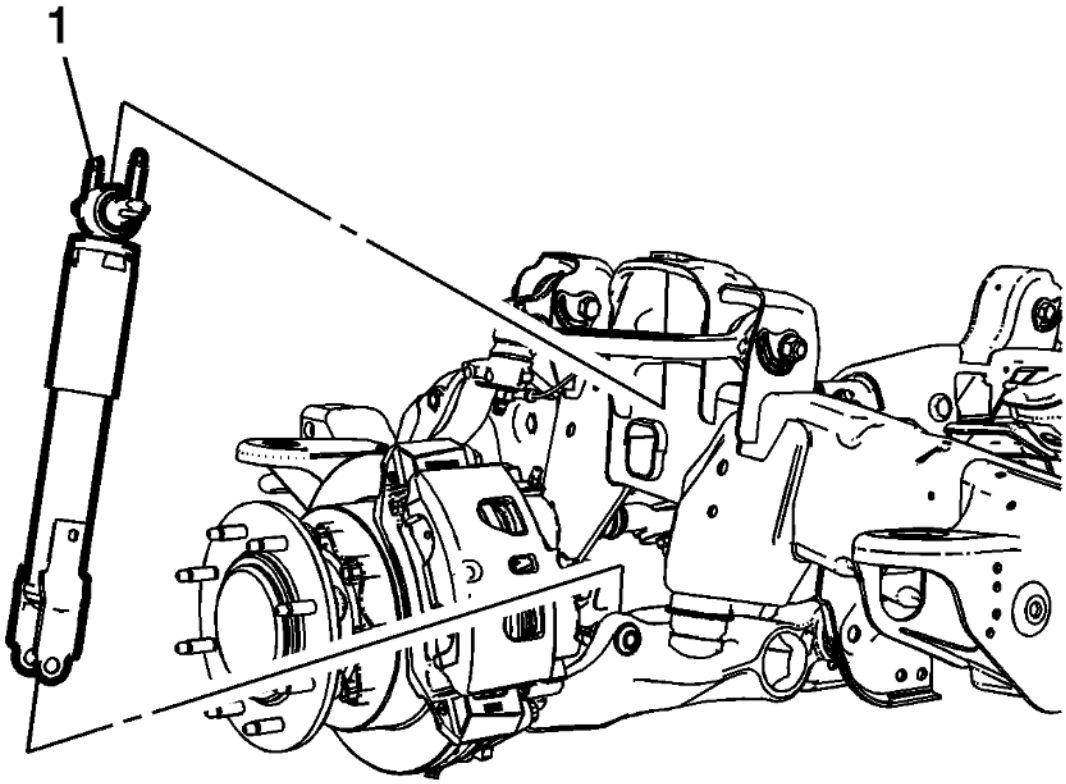


Fig. 107: Identifying Front Shock Absorber
Courtesy of GENERAL MOTORS COMPANY

1. Position the front shock absorber (1) on the vehicle.

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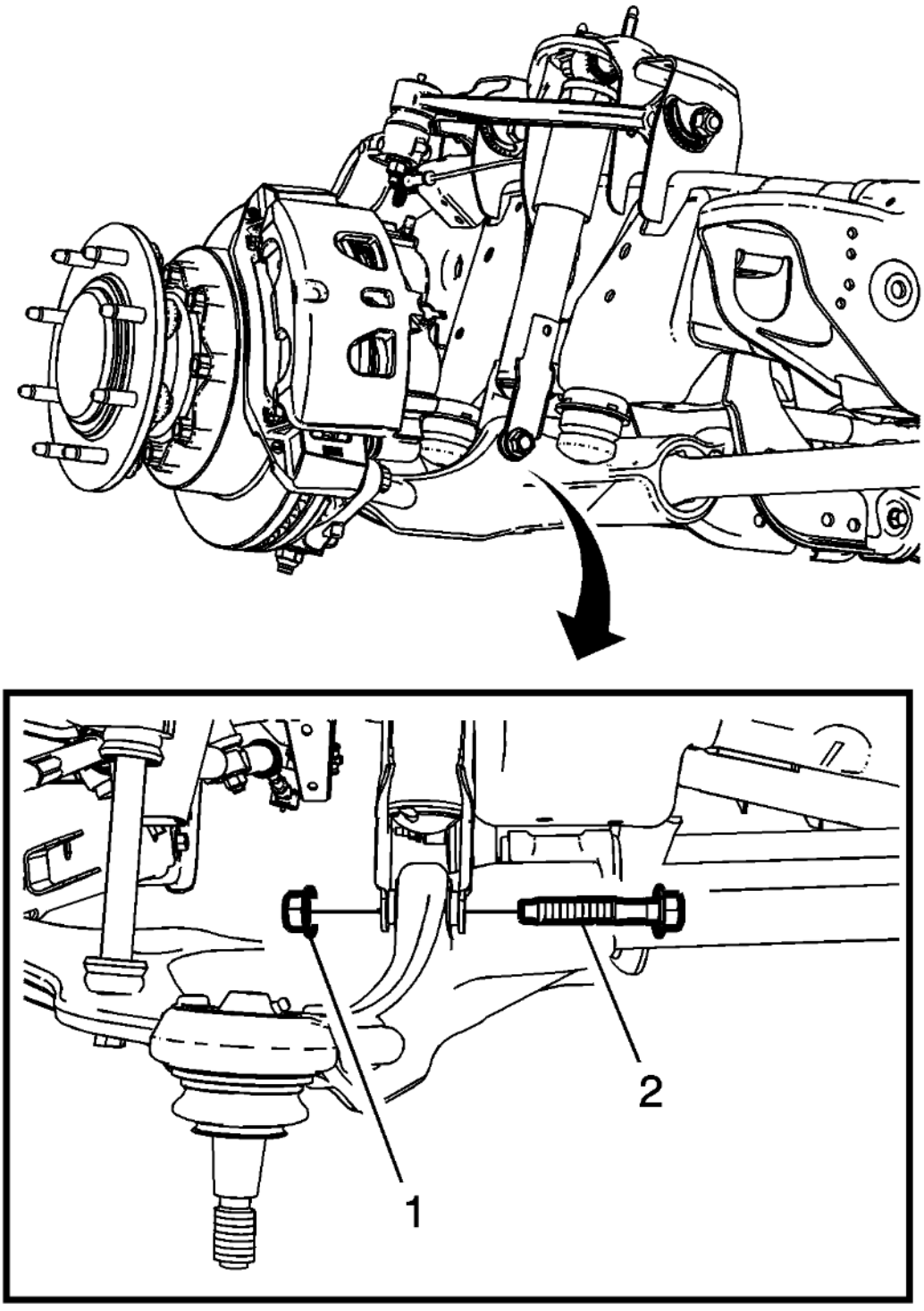


Fig. 108: Lower Front Shock Absorber Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the lower front shock absorber bolt (2) and nut (1) and tighten the bolt to 120 N.m (89 lb ft).

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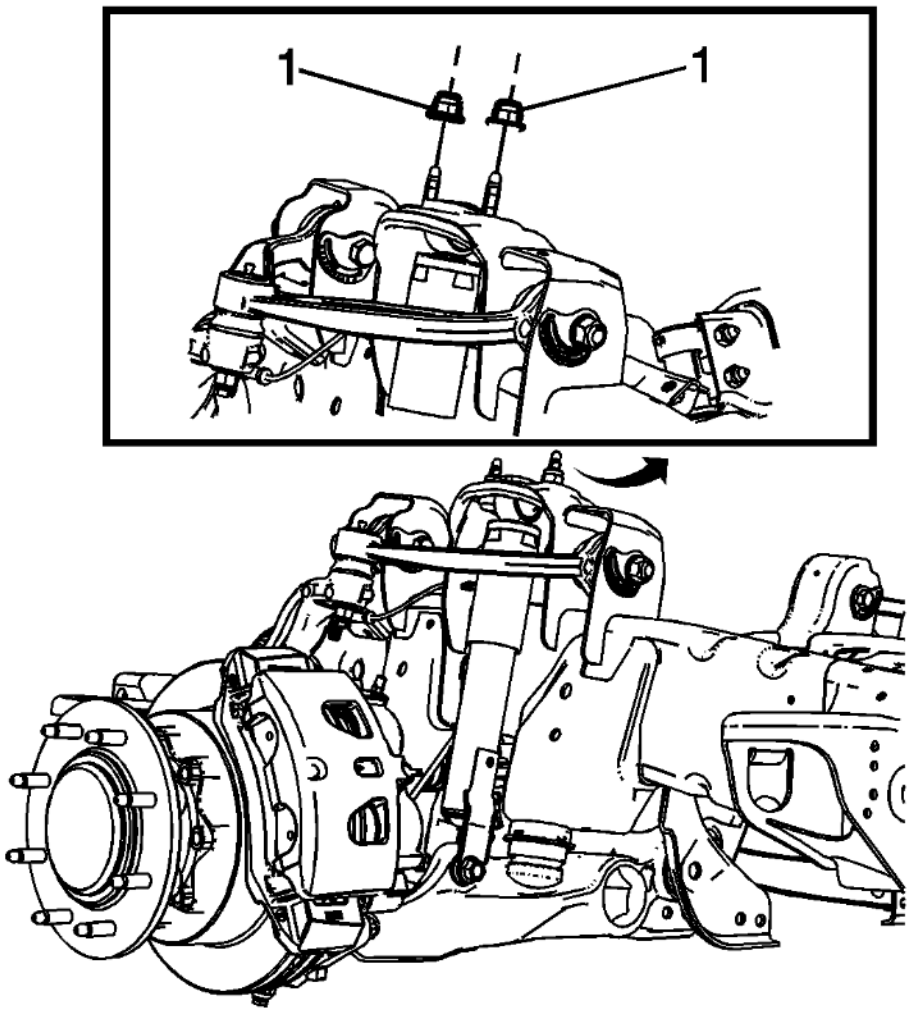


Fig. 109: Upper Front Shock Absorber Nuts
Courtesy of GENERAL MOTORS COMPANY

3. Install the upper front shock absorber nuts (1) and tighten to 65 N.m (48 lb ft).
4. Install the engine splash shield. **Front Wheelhouse Liner Replacement - Left Side** , or **Front Wheelhouse Liner Replacement - Right Side**
5. Install the front tire and wheel assembly. **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)**

SHOCK ABSORBER DISPOSAL

WARNING: **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.**

WARNING: **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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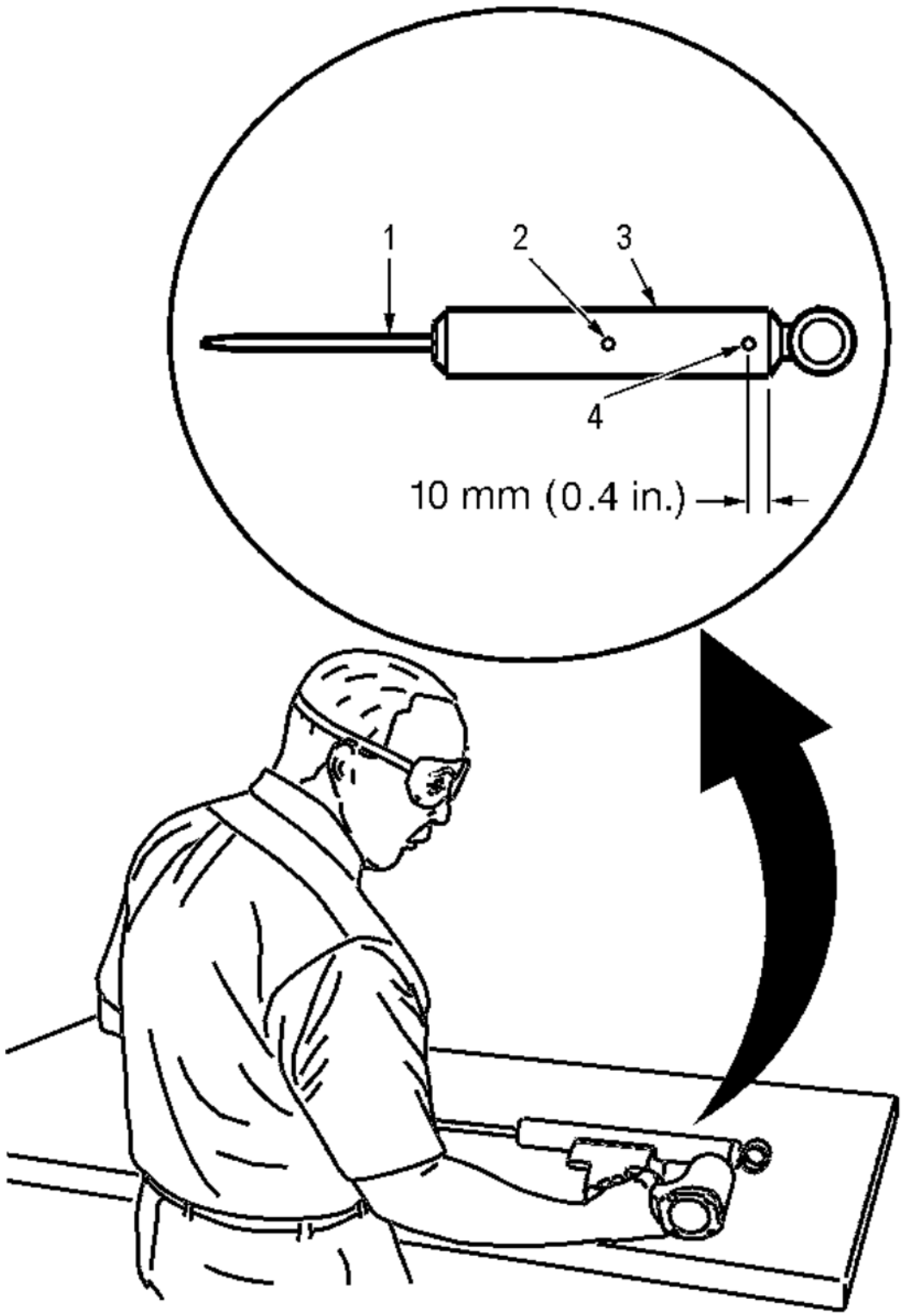


Fig. 110: Drilling Hole In Shock Absorber At Centerpunched Locations
Courtesy of GENERAL MOTORS COMPANY

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

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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

FRONT SUSPENSION DESCRIPTION AND OPERATION

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)

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- 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.

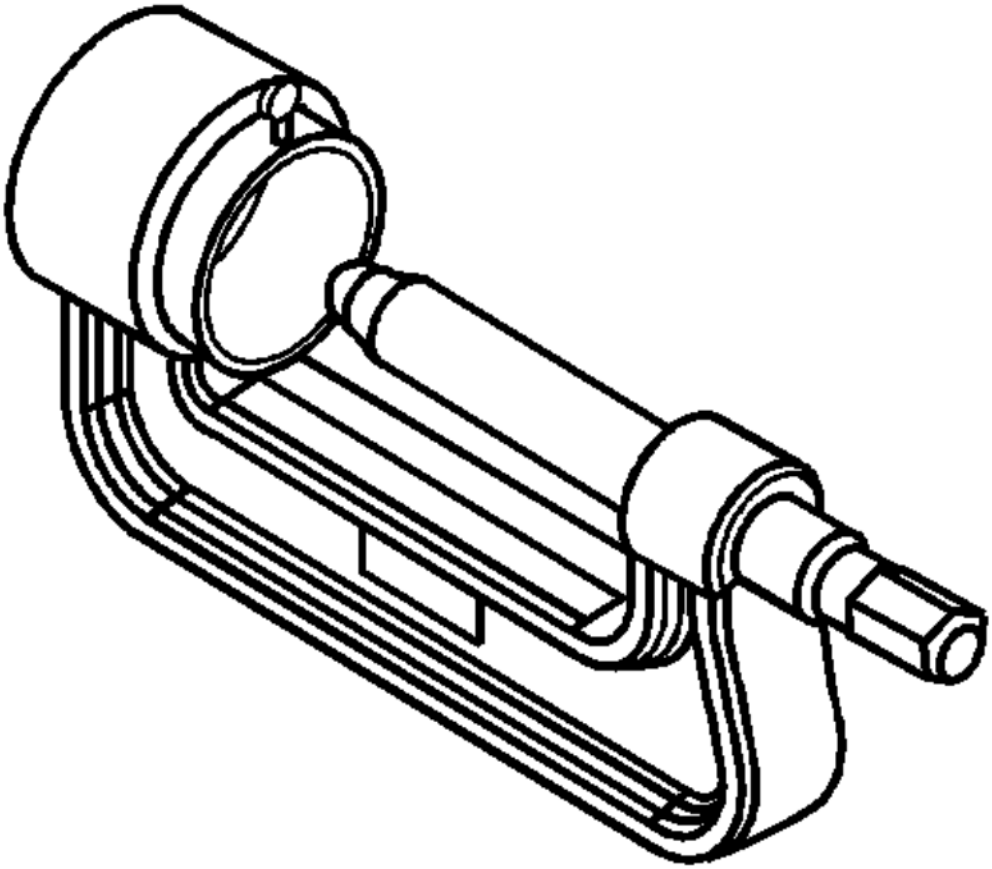
Both RWD and 4WD models have sealed front wheel bearings. These bearings are pre-adjusted and need no lubrication.

SPECIAL TOOLS AND EQUIPMENT

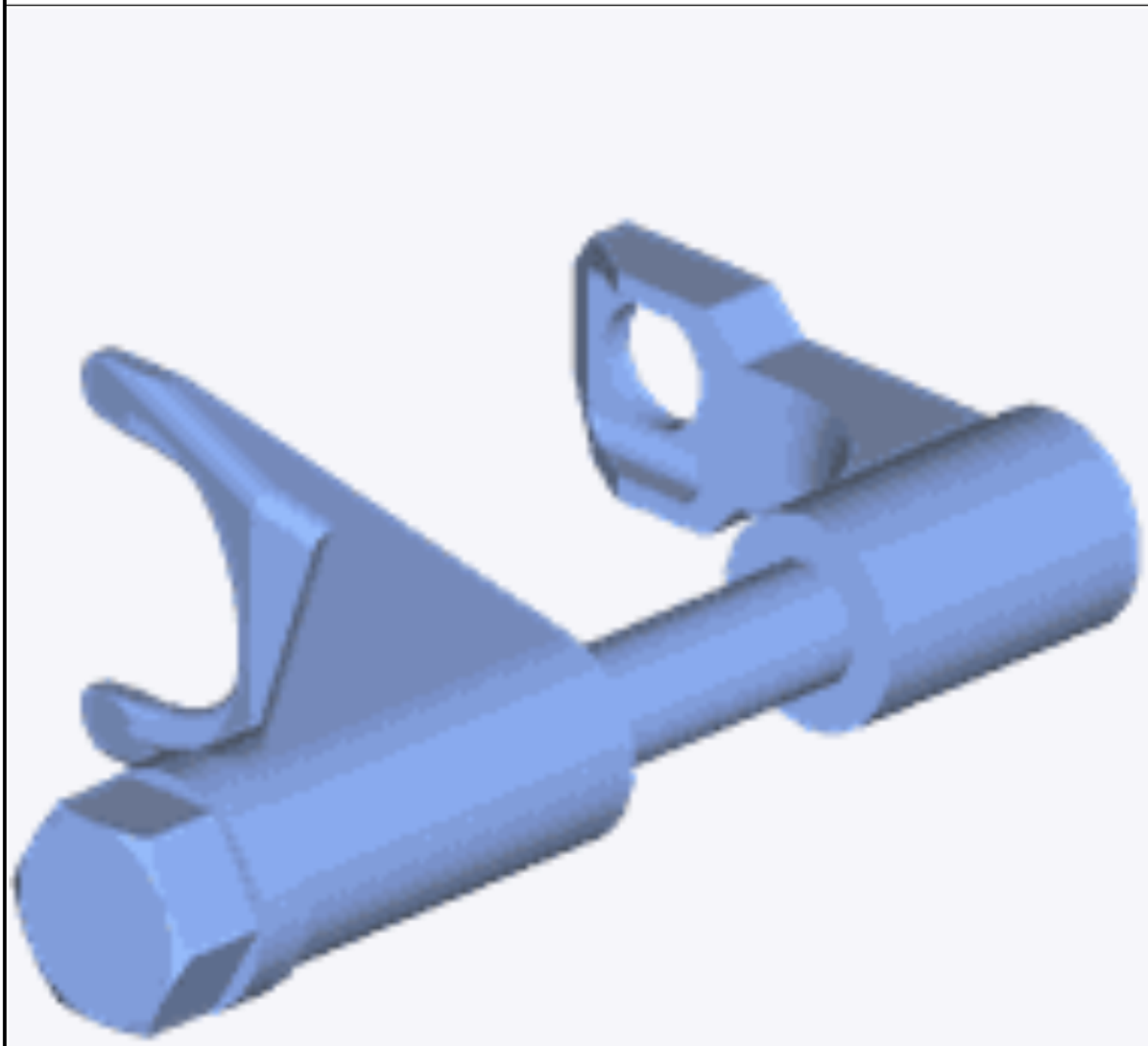
SPECIAL TOOLS

Illustration	Tool Number/ Description

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Illustration	Tool Number/ Description
	CH-41805 J-41805 Lower Ball Joint Remover/Installer

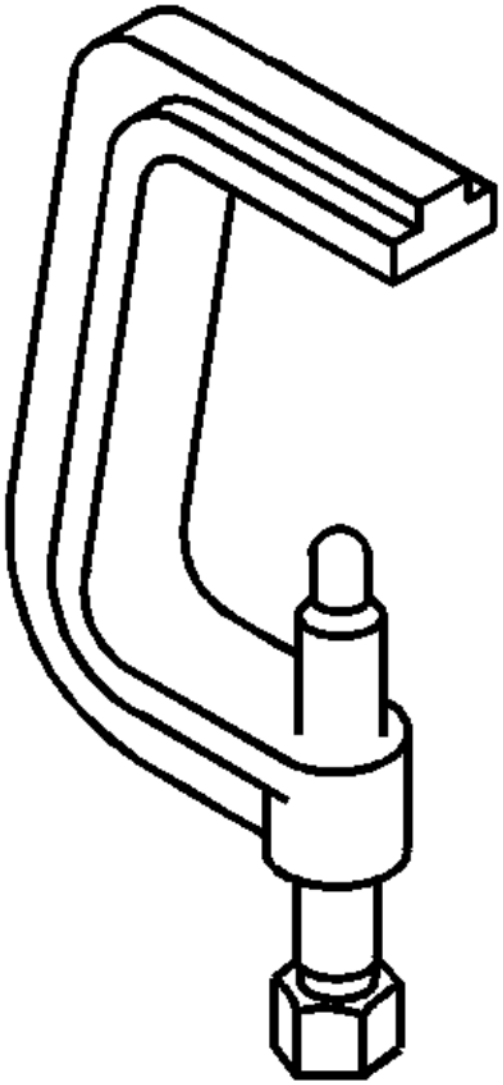
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Illustration	Tool Number/ Description
	CH-42188-B J-42188-B Ball Joint Separator

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Illustration	Tool Number/ Description
	CH-43631 CH-49455 J-43631 Ball Joint Separator

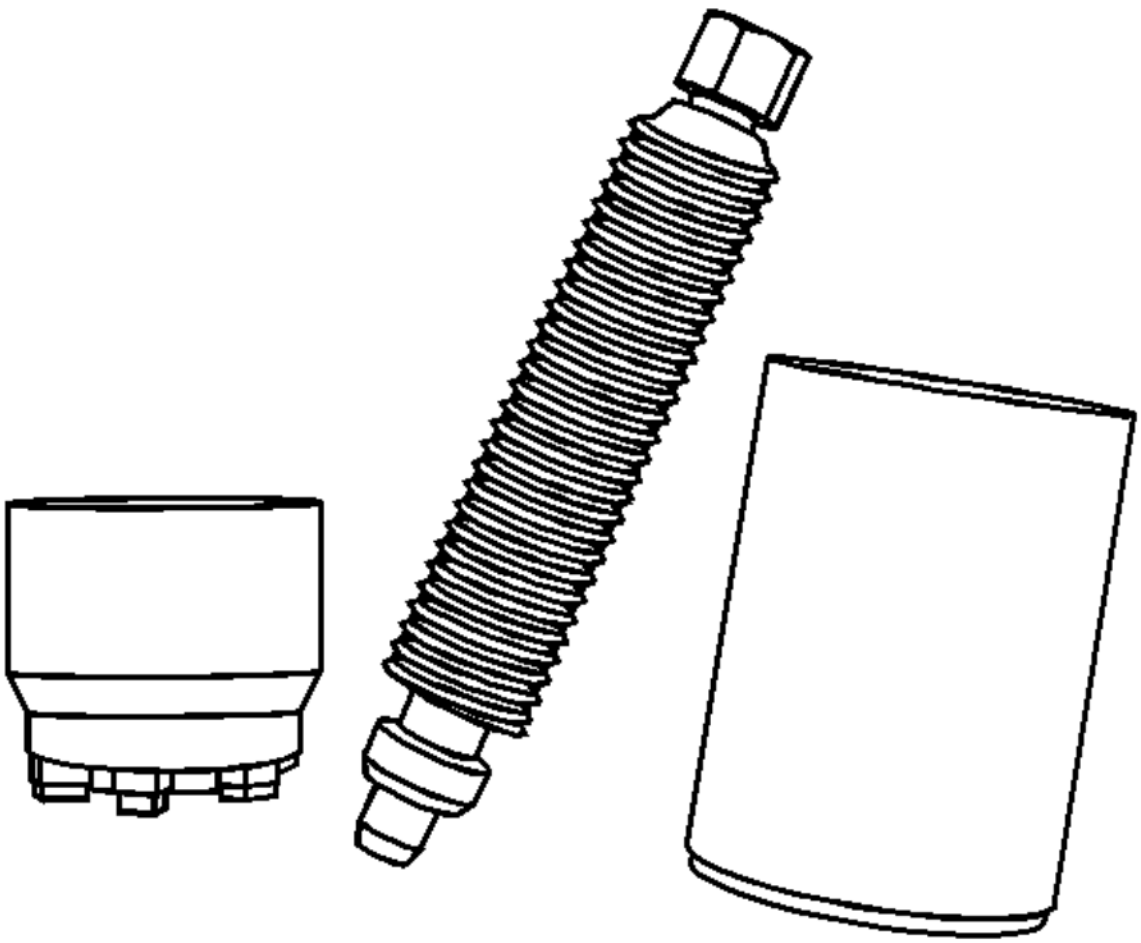
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Illustration	Tool Number/ Description
	CH-48809 Torsion Bar Unloader

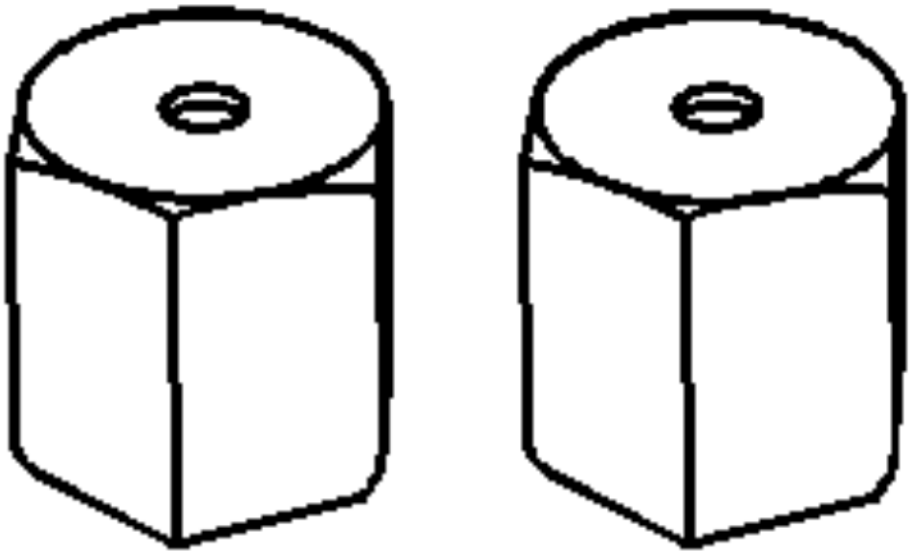
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Illustration	Tool Number/ Description
	CH-48845 Strut Spring Compressor

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Illustration	Tool Number/ Description
	CH-49240 Ball Joint Installer

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Illustration	Tool Number/ Description
	J-45851 Ball Joint Separator Protector Adapter(s)

Article GUID: A00854501

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