

2017 SUSPENSION
Front Suspension - Impala

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Threaded Fastener/Component Tightening Specifications

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	Specification
	Metric (English)
Front Lower Control Arm Front Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	90 - 105 degrees
Front Lower Control Arm Rear Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	75 - 90 degrees
Front Stabilizer Shaft Insulator Clamp Bolt	
• First Pass:	22 N.m (16 lb ft)
• Final Pass:	30 - 45 degrees
Front Wheel Bearing and Hub Assembly Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	60 - 75 degrees
Steering Knuckle Nut @ Front Lower Control Arm	
• First Pass:	50 N.m (37 lb ft)
• Second Pass:	Loosen 120 degrees
• Third Pass:	50 N.m (37 lb ft)
• Final Pass:	30 - 45 degrees
Steering Knuckle Nut @ Steering Knuckle	

NOTE:

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

Application	Specification
	Metric (English)
• First Pass:	85 N.m (63 lb ft)
• Final Pass:	60 - 75 degrees
Wheel Stud	

Reusable Threaded Fastener Tightening Specifications**NOTE:**

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

Application	Specification
	Metric (English)
Front Stabilizer Shaft Link Nut	65 N.m (48 lb ft)
Front Suspension Strut Mount Nut	55 N.m (41 lb ft)
Front Suspension Strut Nut	75 N.m (55 lb ft)

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Steering Knuckle Bearing Pilot Bore	Grease	12345996	10953501

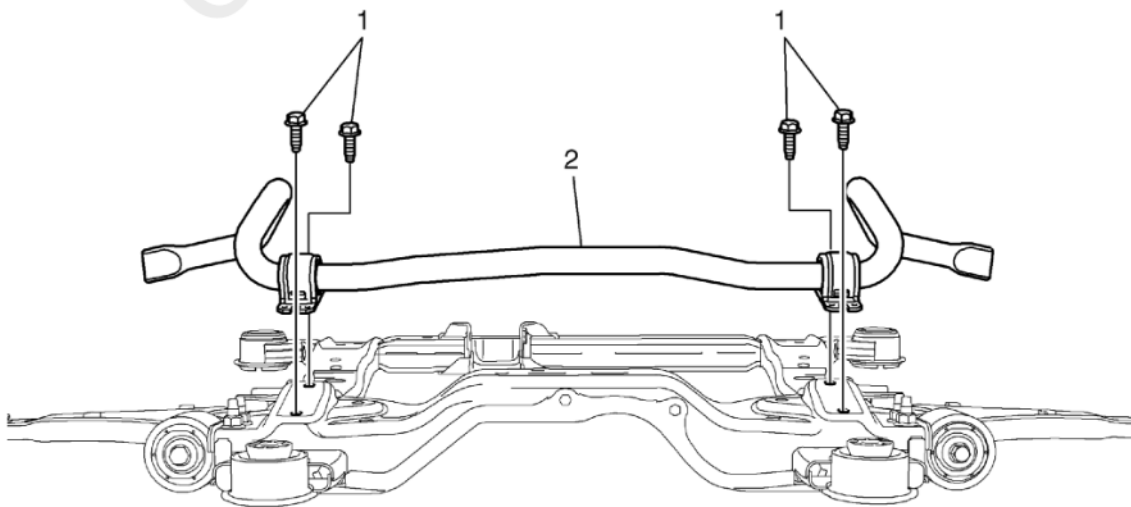
REPAIR INSTRUCTIONS**STABILIZER SHAFT REPLACEMENT**

Fig. 1: Stabilizer Shaft & Clamp Bolts
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Separate Front Stabilizer Shaft Link (Qty: 2) @ Front Stabilizer Shaft. Refer to Stabilizer Shaft Link Replacement 2. Lower the rear of the drivetrain and front suspension frame to gain enough clearance to remove the front stabilizer shaft. Refer to Drivetrain and Front Suspension Frame Replacement	
1	Front Stabilizer Shaft Insulator Clamp Bolt (Qty: 4) CAUTION: Refer to Fastener Caution . 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. Procedure 1. Remove the front stabilizer shaft insulator clamp bolts. DISCARD the bolts. 2. Install NEW front stabilizer shaft insulator clamp bolts. Tighten First Pass: 22 N.m (16 lb ft) Final Pass: (30 - 45 degrees)
2	Front Stabilizer Shaft

STABILIZER SHAFT LINK REPLACEMENT

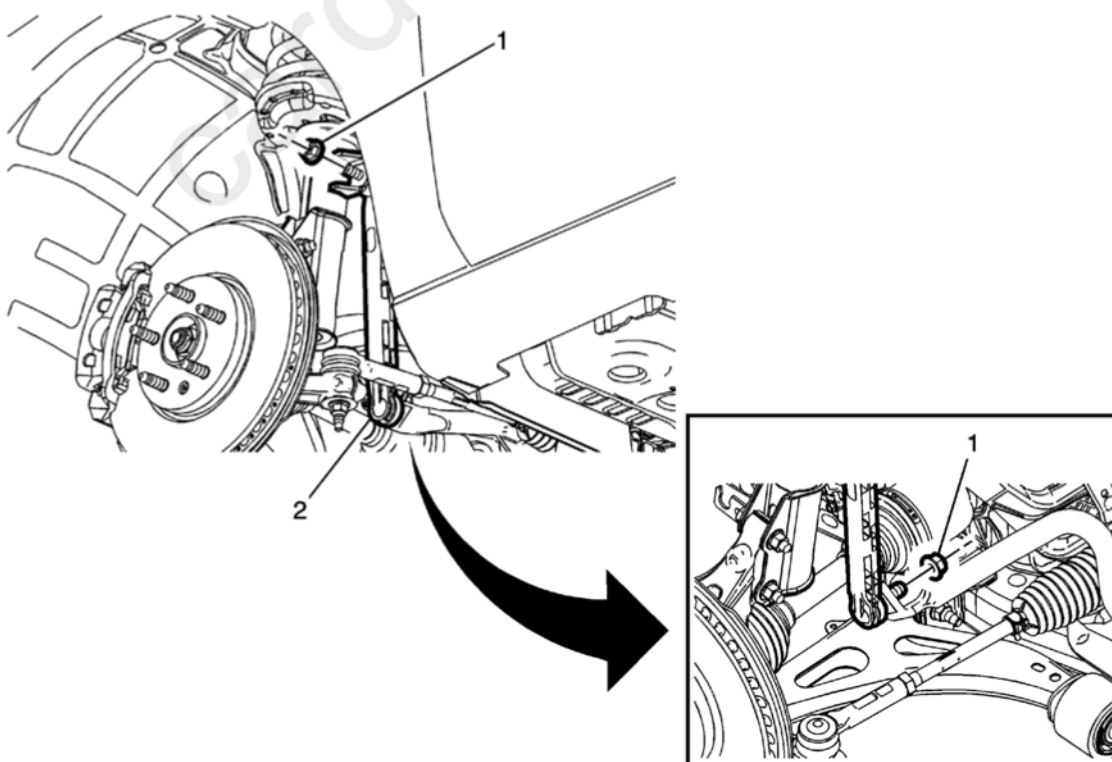


Fig. 2: Stabilizer Shaft Link

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
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Callout	Component Name
Preliminary Procedures 1. Remove the front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation 2. Remove and set aside any harnesses or retainers secured to the front stabilizer shaft link.	
1	Front Stabilizer Shaft Link Nut (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 65 N.m (48 lb ft)
2	Front Stabilizer Shaft Link

STABILIZER SHAFT INSULATOR REPLACEMENT

The stabilizer shaft insulator is not serviced separately, but with the stabilizer shaft. For the stabilizer shaft replacement, refer to [Stabilizer Shaft Replacement](#).

FRONT WHEEL BEARING AND HUB REPLACEMENT

Removal Procedure

1. Remove the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
2. Separate Front Wheel Drive Shaft @ Front Wheel Bearing and Hub Assembly. Refer to [Front Wheel Drive Shaft Replacement - Left Side](#) , or [Front Wheel Drive Shaft Replacement - Right Side](#)
3. Remove Front Brake Rotor. Refer to [Front Brake Rotor Replacement](#)
4. Remove Front Wheel Speed Sensor @ Steering Knuckle. Refer to [Front Wheel Speed Sensor Replacement](#)

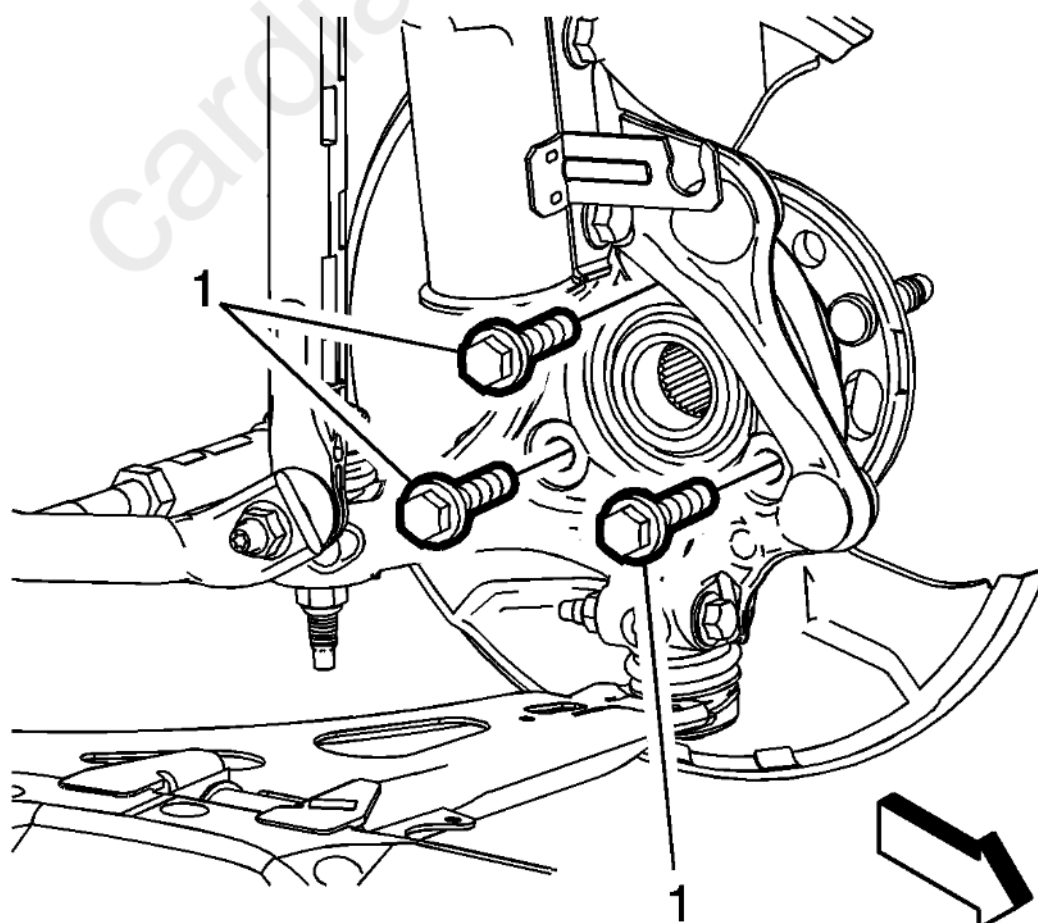


Fig. 3: Front Wheel Bearing And Hub Assembly Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove Front Wheel Bearing and Hub Assembly Bolts (1) (Qty: 3)

DISCARD the bolts.

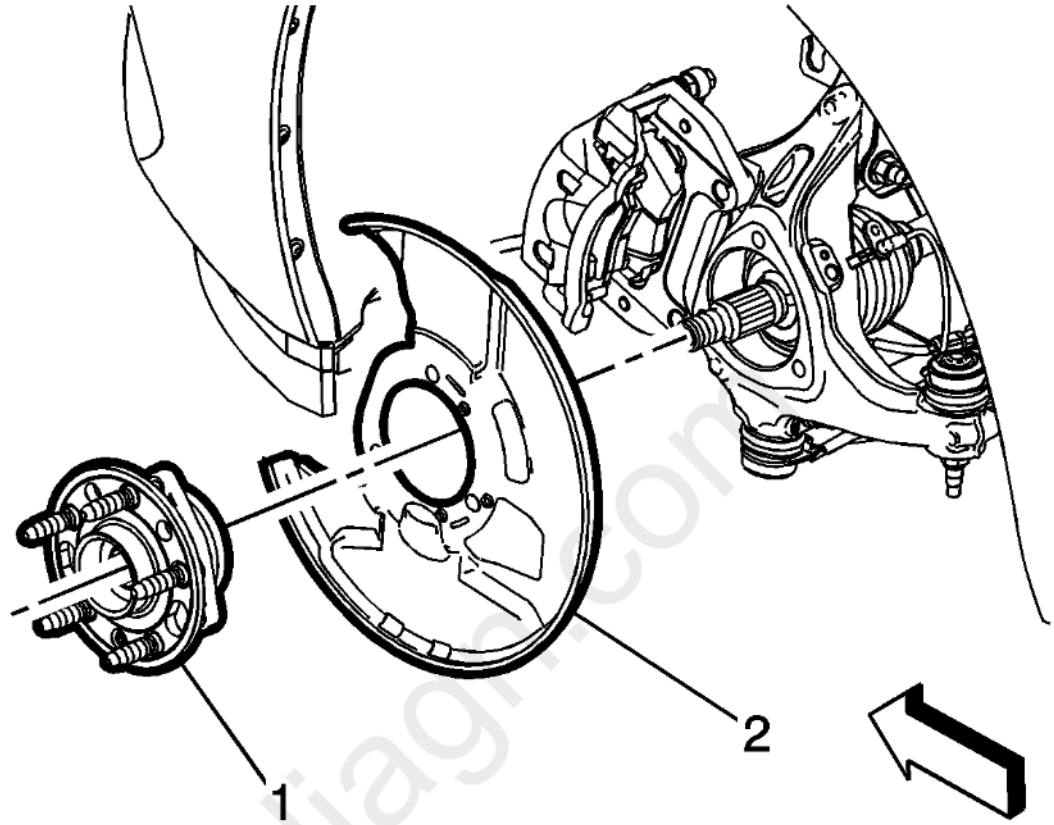


Fig. 4: Front Wheel Bearing And Hub Assembly With Front Brake Shield
Courtesy of GENERAL MOTORS COMPANY

6. Remove Front Wheel Bearing and Hub Assembly (1)
7. Remove Front Brake Shield (2)

Installation Procedure

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.

1. Apply grease evenly and ensure complete coverage to the steering knuckle bearing pilot bore only. Refer to **Adhesives, Fluids, Lubricants, and Sealers**

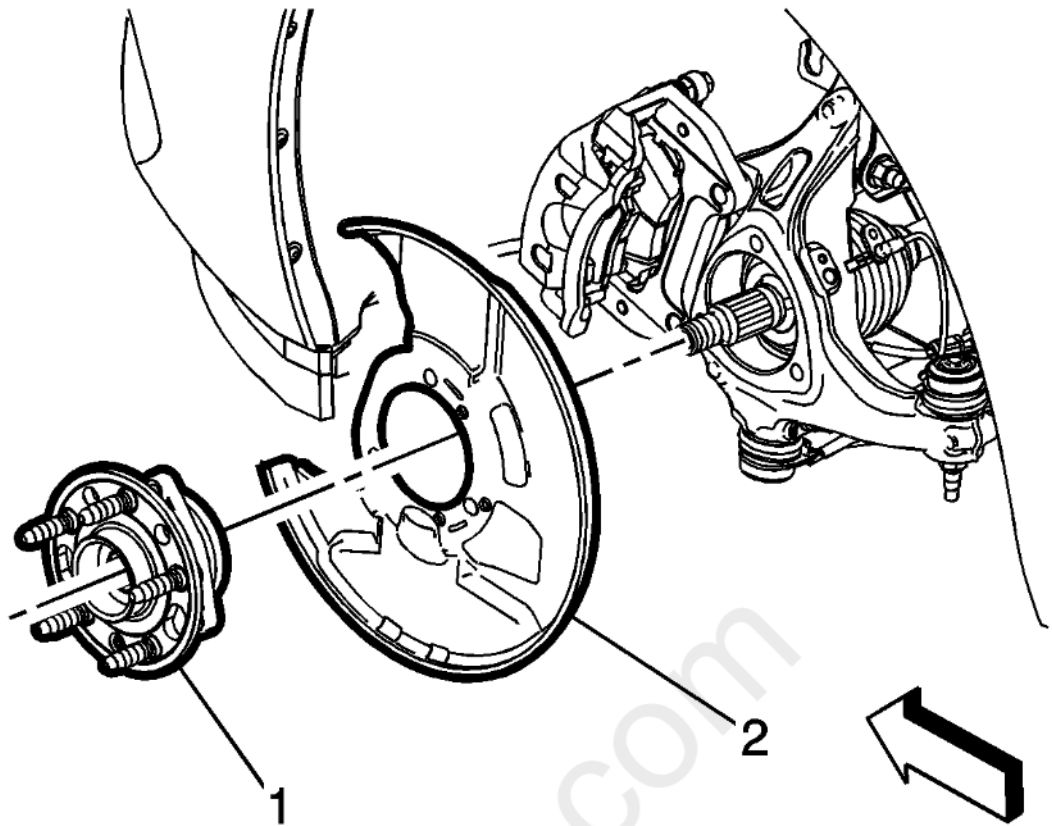


Fig. 5: Front Wheel Bearing And Hub Assembly With Front Brake Shield
Courtesy of GENERAL MOTORS COMPANY

2. Install Front Brake Shield (2)
3. Install Front Wheel Bearing and Hub Assembly (1)

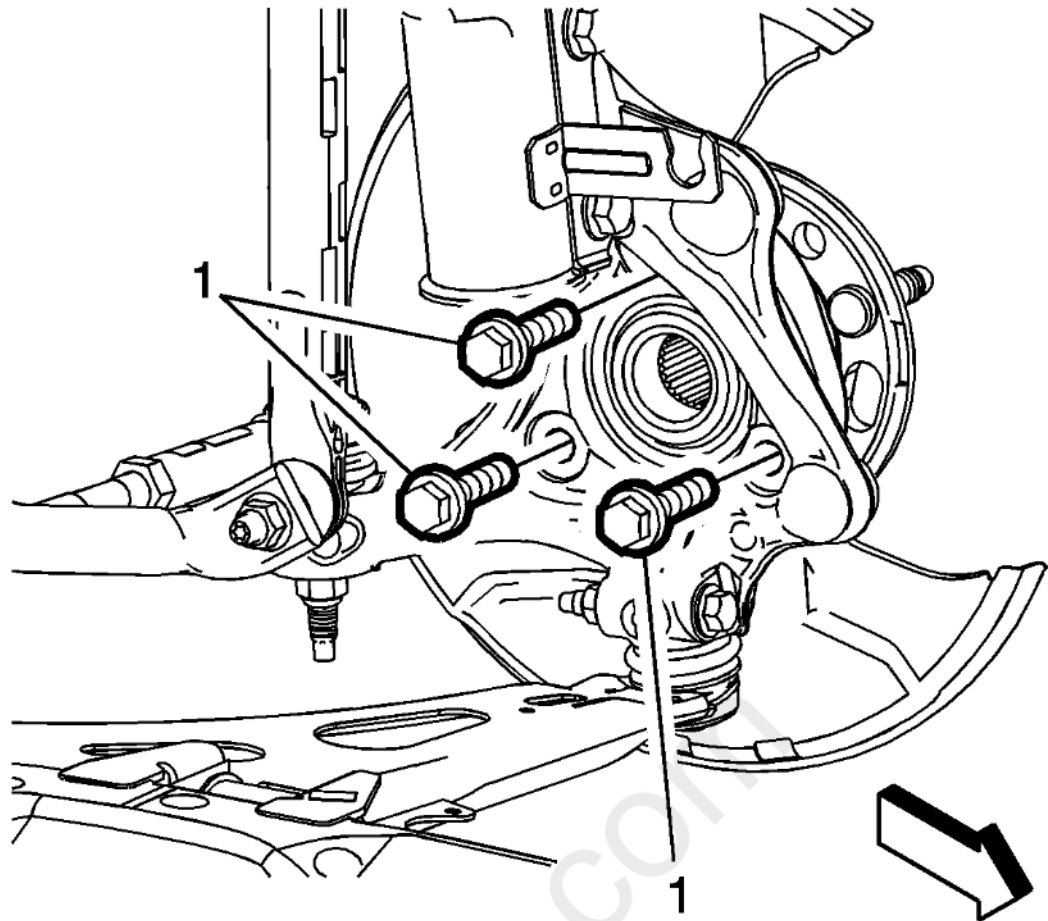


Fig. 6: Front Wheel Bearing And Hub Assembly Bolts
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

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.

4. Install and tighten Front Wheel Bearing and Hub Assembly Bolts (1) (Qty: 3)

Install NEW bolts.

Tighten

1. First Pass: 100 N.m (74 lb ft)
2. Final Pass: (60 - 75 degrees)
5. Install Front Wheel Speed Sensor @ Steering Knuckle. Refer to [Front Wheel Speed Sensor Replacement](#)
6. Install Front Brake Rotor. Refer to [Front Brake Rotor Replacement](#)
7. Install Front Wheel Drive Shaft @ Front Wheel Bearing and Hub Assembly. Refer to [Front Wheel Drive Shaft Replacement - Left Side](#) , or [Front Wheel Drive Shaft Replacement - Right Side](#)
8. Install the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)

STEERING KNUCKLE REPLACEMENT

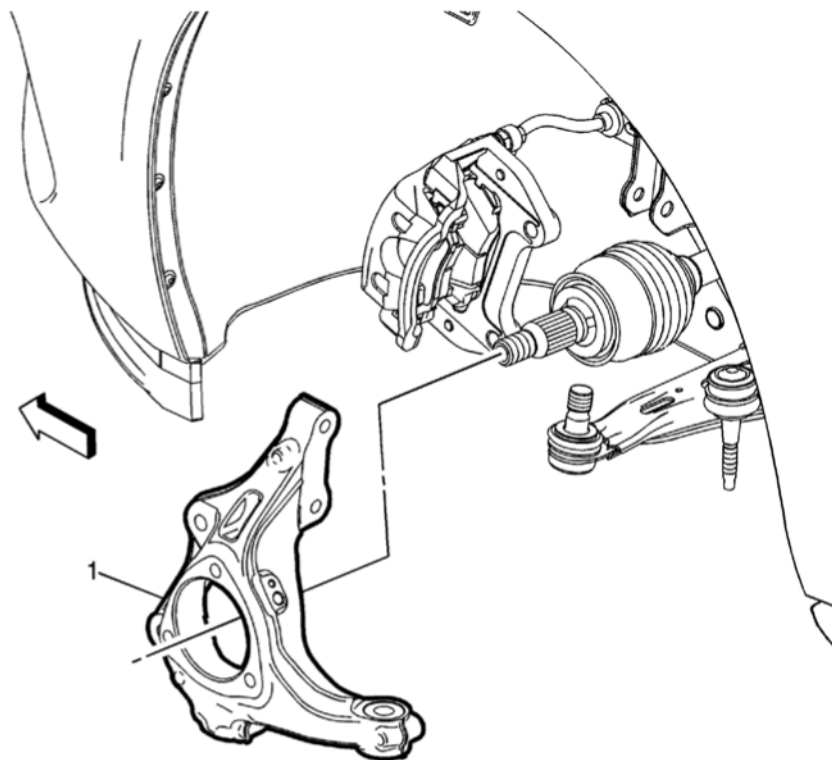


Fig. 7: Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
CAUTION: Do not pry in such a way that the ball joint seal is contacted. Damage to the seal may result.	
Preliminary Procedures 1. Remove Front Wheel Bearing and Hub. Refer to Front Wheel Bearing and Hub Replacement 2. Separate Steering Linkage Outer Tie Rod @ Steering Knuckle. Refer to Steering Linkage Outer Tie Rod Replacement 3. Separate Front Lower Control Arm @ Steering Knuckle. Refer to Lower Control Arm Replacement 4. Separate Strut Assembly @ Steering Knuckle. Refer to Strut Assembly Removal and Installation 5.	
1	Steering Knuckle Procedure Measure and adjust the wheel alignment. Refer to Wheel Alignment Measurement

LOWER CONTROL ARM REPLACEMENT

Removal Procedure

1. Remove the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
2. Remove Front Compartment Splash Shield. Refer to [Front Compartment Splash Shield Replacement](#)
3. Disconnect any harnesses or retainers secured to the front lower control arm.

Note any attaching points to aid in installation.

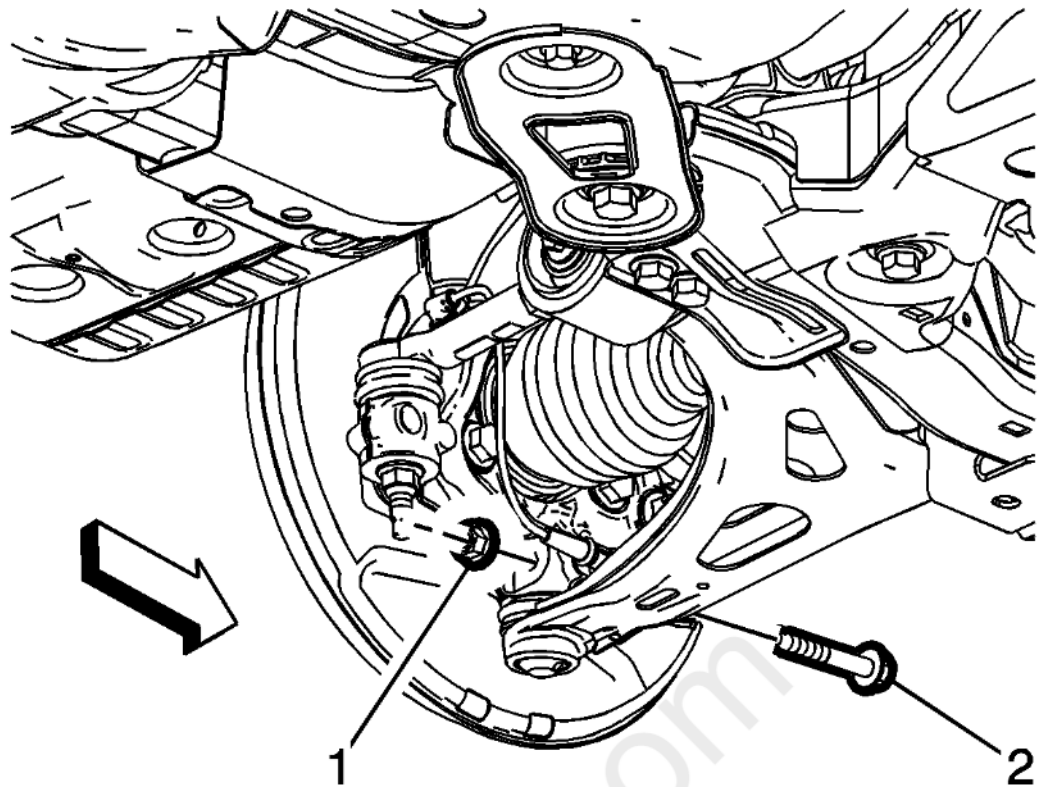


Fig. 8: Steering Knuckle, Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove Steering Knuckle Nut (1)
5. Remove Steering Knuckle Bolt (2)

DISCARD the bolt.

CAUTION: Do not pry against the ball joint boot when separating the ball joint from the steering knuckle. The integrated washer in the boot protects both the boot and joint and prying against the ball joint boot may damage the washer and impair the boot.

6. Separate the pinch joint at the front lower control arm ball joint and the steering knuckle.

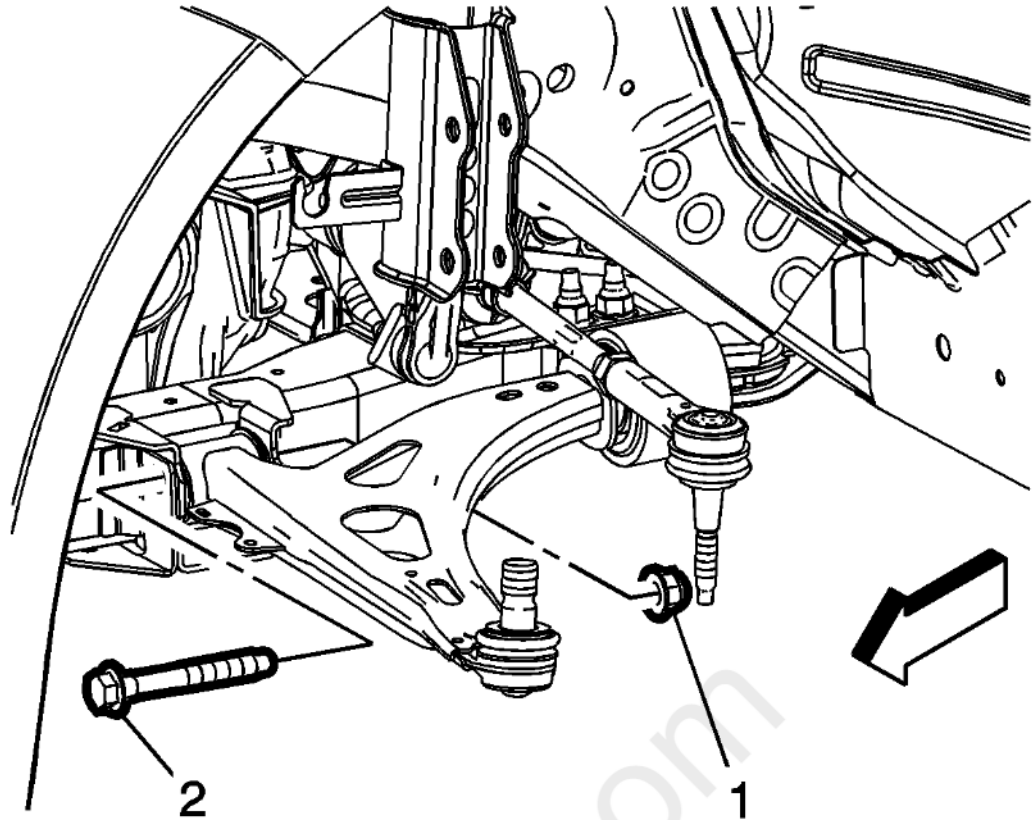


Fig. 9: Front Lower Control Arm, Front Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: The steering knuckle is NOT shown for clarity only. It is NOT necessary to remove the steering knuckle to service the front lower control arm.

7. Remove Front Lower Control Arm Front Nut (1)
8. Remove Front Lower Control Arm Front Bolt (2)

DISCARD the bolt.

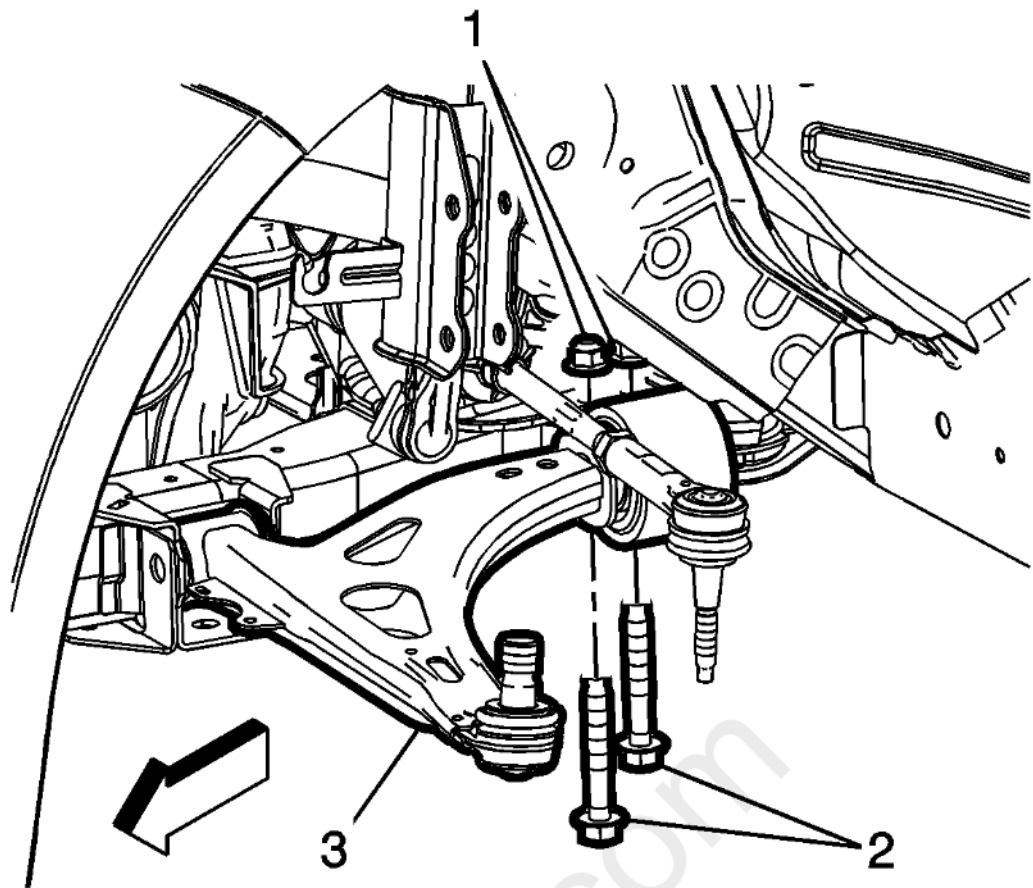


Fig. 10: Front Lower Control Arm, Rear Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: The steering knuckle is NOT shown for clarity only. It is NOT necessary to remove the steering knuckle to service the front lower control arm.

9. Remove Front Lower Control Arm Rear Nuts (1) (Qty: 2)
10. Remove Front Lower Control Arm Rear Bolts (2) (Qty: 2)

DISCARD the bolts.

11. Remove the front lower control arm (3) from the vehicle.
12. Transfer components as necessary.

Installation Procedure

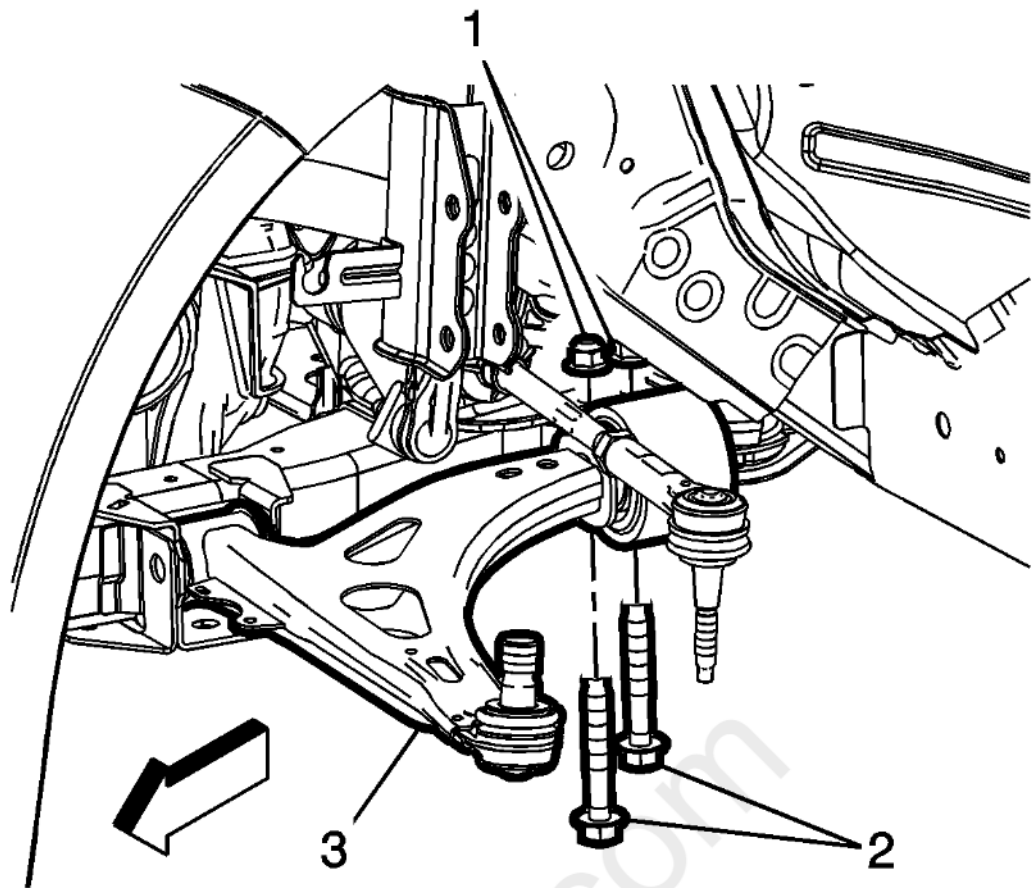


Fig. 11: Front Lower Control Arm, Rear Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Position the front lower control arm (3) on the vehicle.

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. Install Front Lower Control Arm Rear Bolts (2) (Qty: 2)

Install NEW bolts.

3. Install, but do NOT tighten Front Lower Control Arm Rear Nuts (1) (Qty: 2)

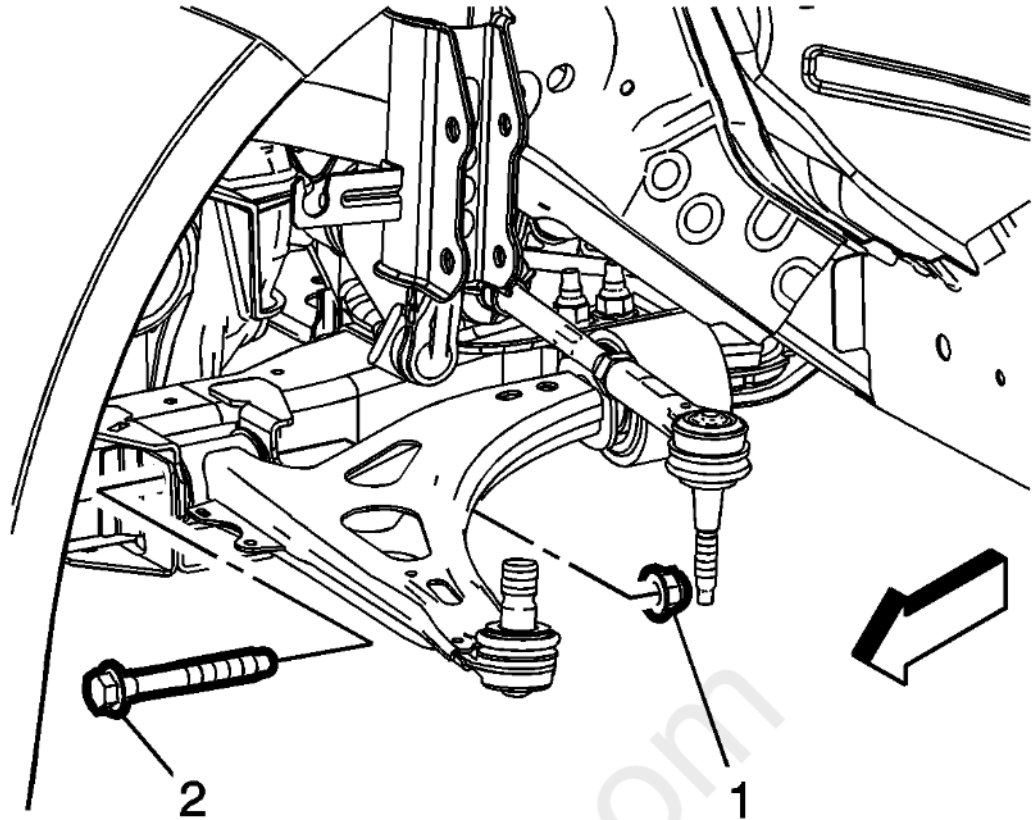


Fig. 12: Front Lower Control Arm, Front Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Install Front Lower Control Arm Front Bolt (2)

Install a NEW bolt.

CAUTION: Refer to **Fastener Caution** .

5. Install and tighten Front Lower Control Arm Front Nut (1)

Tighten

1. First Pass: 100 N.m (74 lb ft)
2. Final Pass: (90 - 105 degrees)

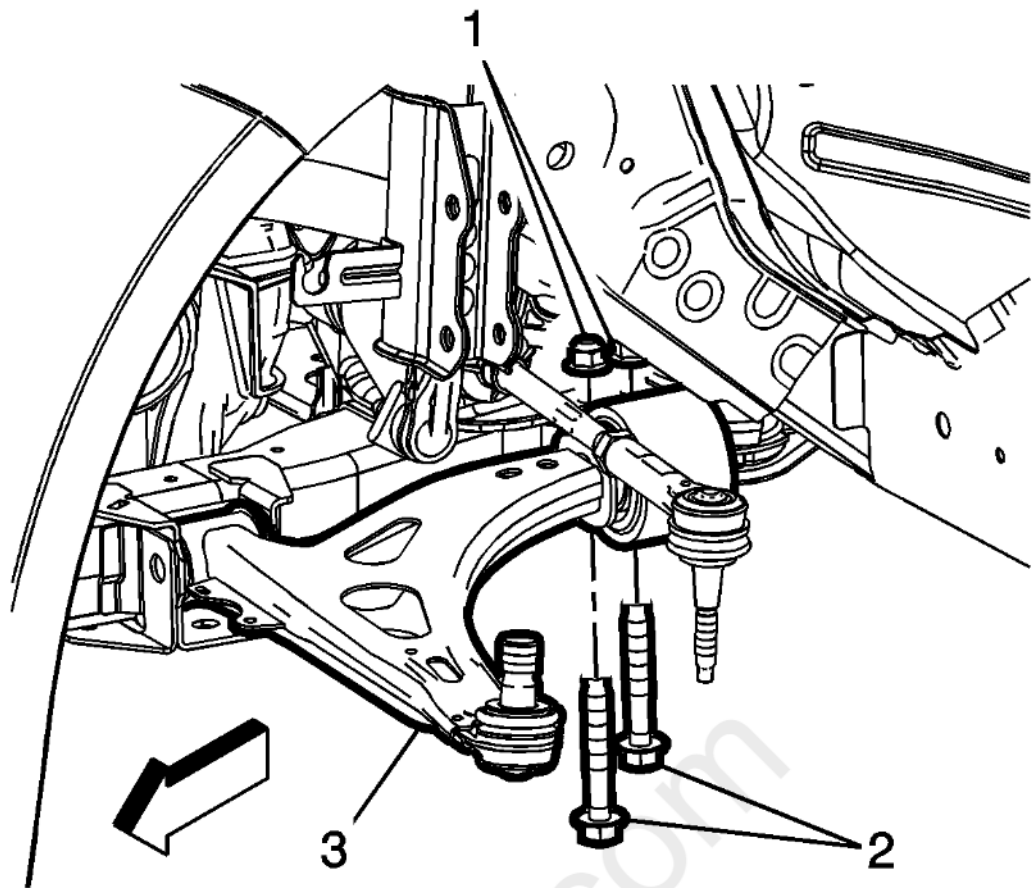


Fig. 13: Front Lower Control Arm, Rear Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Tighten Front Lower Control Arm Rear Bolts (2) (Qty: 2)

Tighten

1. First Pass: 100 N.m (74 lb ft)
2. Final Pass: (75 - 90 degrees)

7. Connect the front lower control arm ball joint to the steering knuckle.

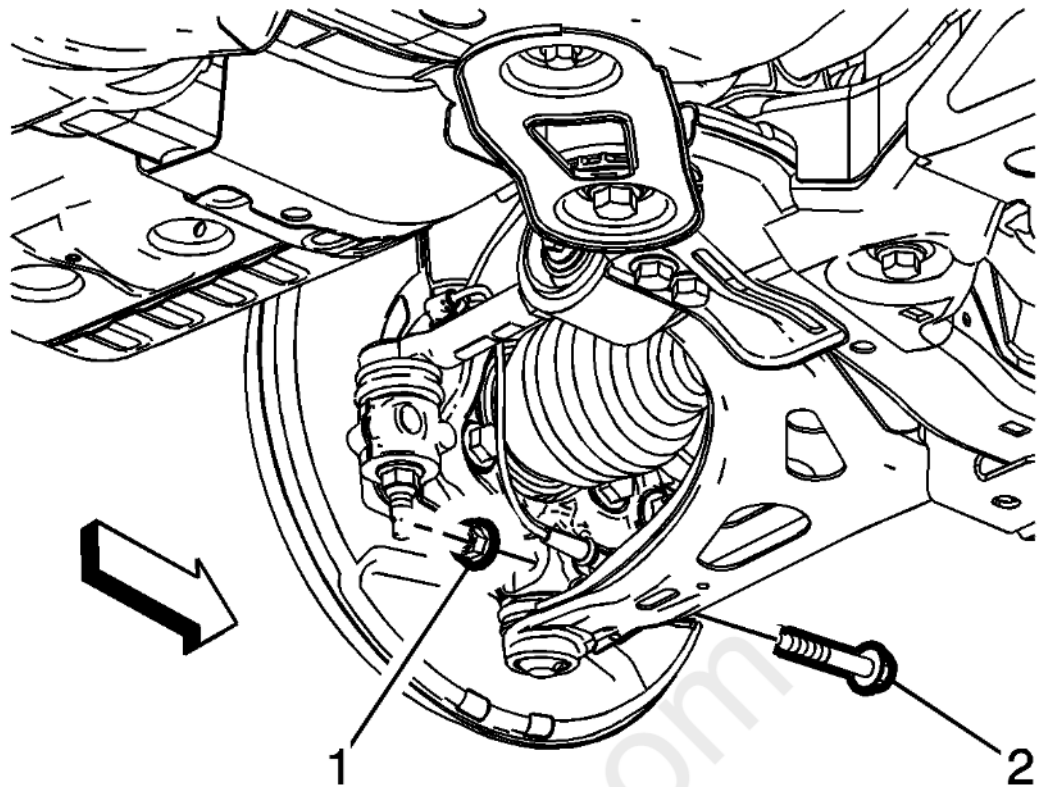


Fig. 14: Steering Knuckle, Nut And Bolt
Courtesy of GENERAL MOTORS COMPANY

8. Install Steering Knuckle Bolt (2)

Install a NEW bolt.

9. Install and tighten Steering Knuckle Nut (1)

Tighten

1. First Pass: 50 N.m (37 lb ft)
2. Second Pass: Loosen 120 degrees
3. Third Pass: 50 N.m (37 lb ft)
4. Final Pass: (30 - 45 degrees)
10. Connect any harnesses or retainers previously disconnected from the front lower control arm.
11. Install Front Compartment Splash Shield. Refer to [Front Compartment Splash Shield Replacement](#)
12. Install the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
13. Measure and adjust the wheel alignment. Refer to [Wheel Alignment Measurement](#)

WHEEL STUD REPLACEMENT

Special Tools

CH-43631 Ball Joint Separator

Equivalent regional tools: [Special Tools](#)

Removal Procedure

1. Remove Front Wheel Bearing and Hub Assembly. Refer to [Front Wheel Bearing and Hub Replacement](#)

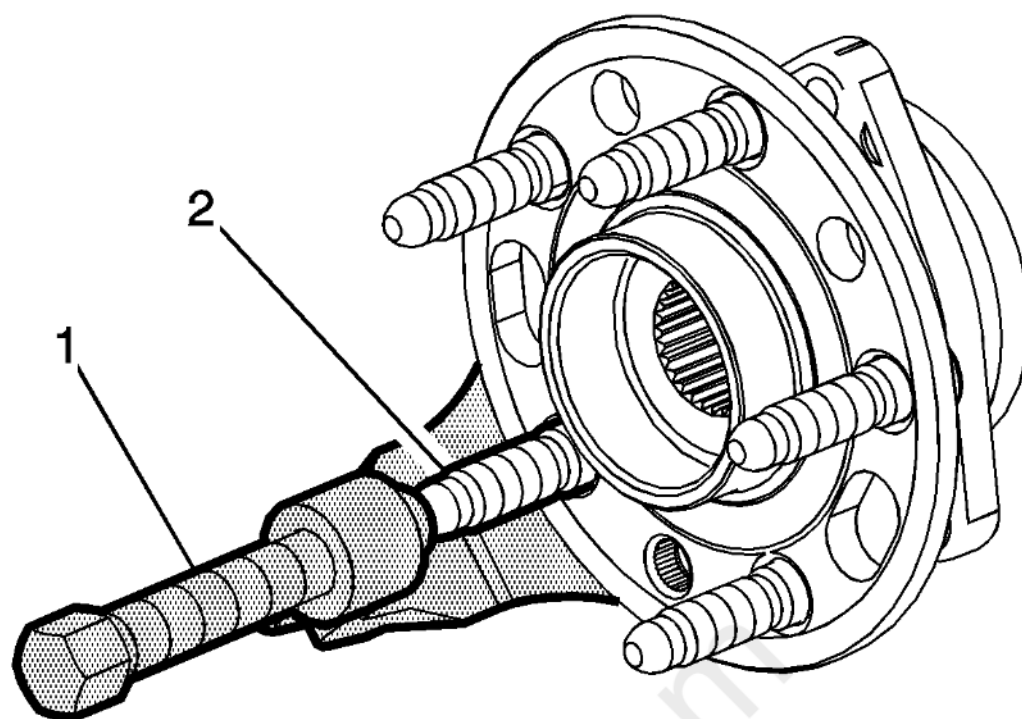


Fig. 15: Removing Wheel Stud

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

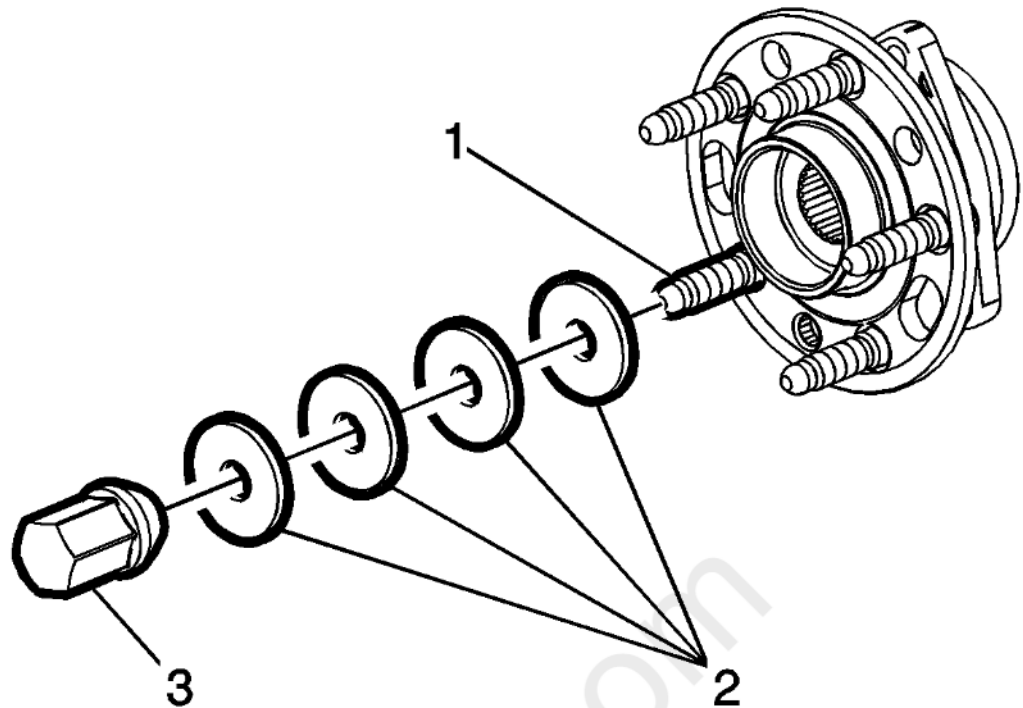


Fig. 16: Installing Wheel Stud

Courtesy of GENERAL MOTORS COMPANY

1. Position the NEW wheel stud (1) in the flange of 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. Install Front Wheel Bearing and Hub Assembly. Refer to [Front Wheel Bearing and Hub Replacement](#)

STRUT ASSEMBLY REMOVAL AND INSTALLATION

Special Tools

CH-49375 Strut Spring Wrench

Equivalent regional tools: [Special Tools](#)

Removal Procedure

1. Remove the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
2. Separate Front Wheel Speed Sensor Wiring Harness @ Steering Knuckle. Refer to [Front Wheel Speed Sensor Replacement](#)
3. Separate Front Brake Hose @ Strut Assembly. Refer to [Front Brake Hose Replacement](#)
4. Separate Front Stabilizer Shaft Link @ Strut Assembly. Refer to [Stabilizer Shaft Link Replacement](#)
5. Partially lower the vehicle.

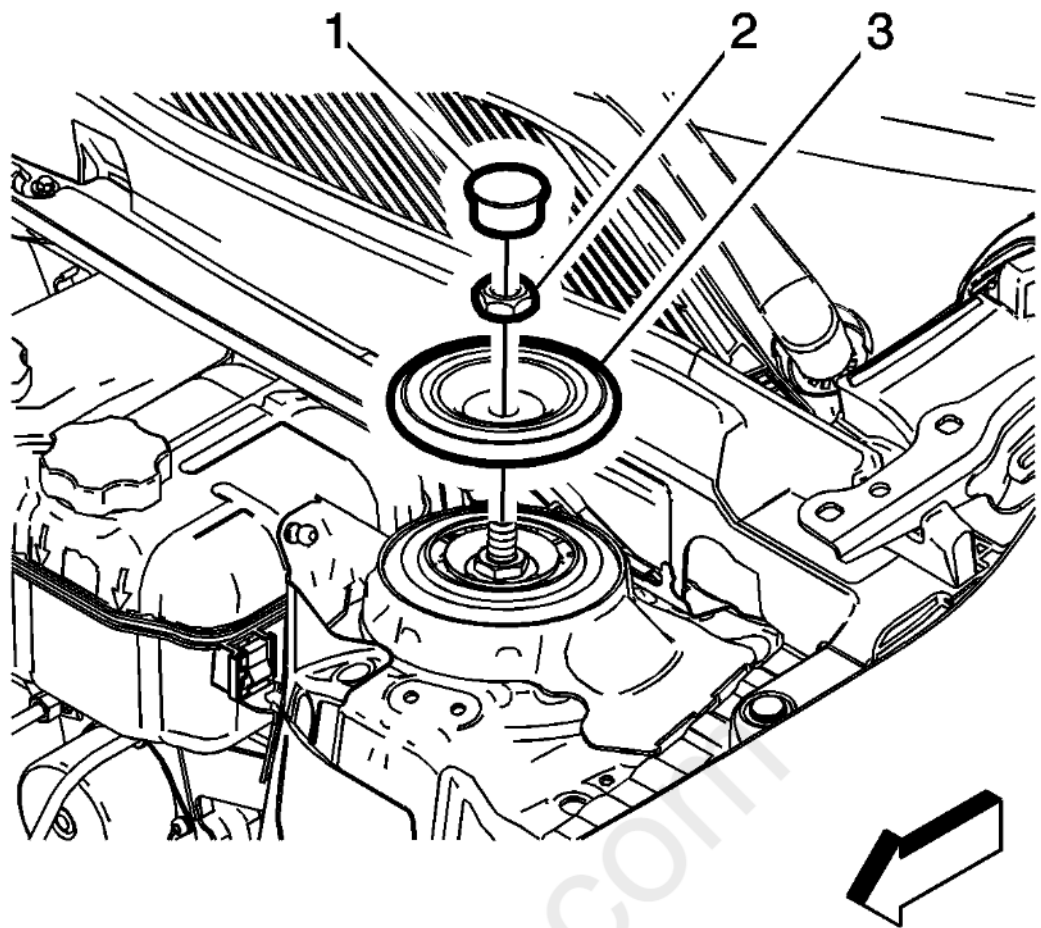


Fig. 17: Front Suspension Strut Mount Nut Cap, Nut And Bumper Stop
Courtesy of GENERAL MOTORS COMPANY

6. Remove Front Suspension Strut Mount Nut Cap (1)
7. Use the **CH-49375** wrench to remove the front suspension strut mount nut (2).
8. Remove Front Suspension Strut Bumper Stop (3)
9. Raise the vehicle.

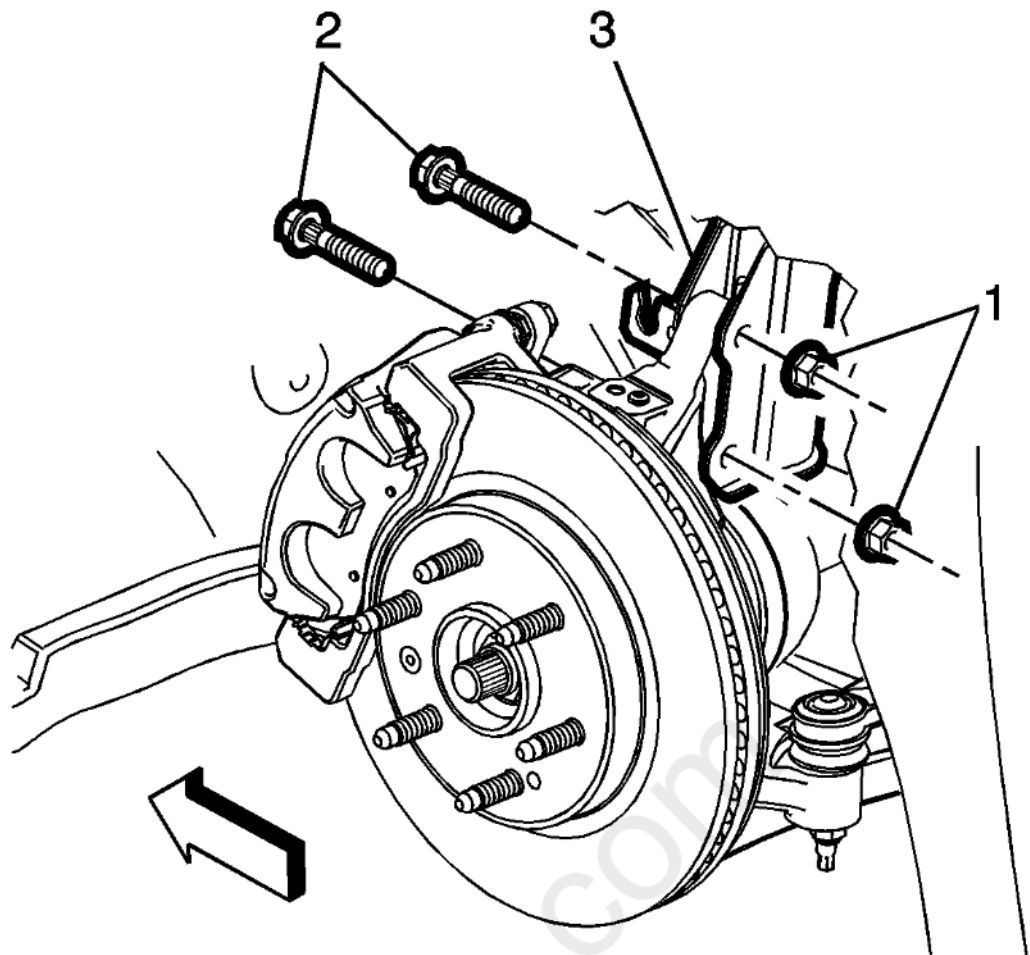


Fig. 18: Strut Assembly, Steering Knuckle Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Remove Steering Knuckle Nuts (1) (Qty: 2)
11. Remove Steering Knuckle Bolts (2) (Qty: 2)

DISCARD the bolts.

12. Remove the strut assembly (3) from the vehicle.

Installation Procedure

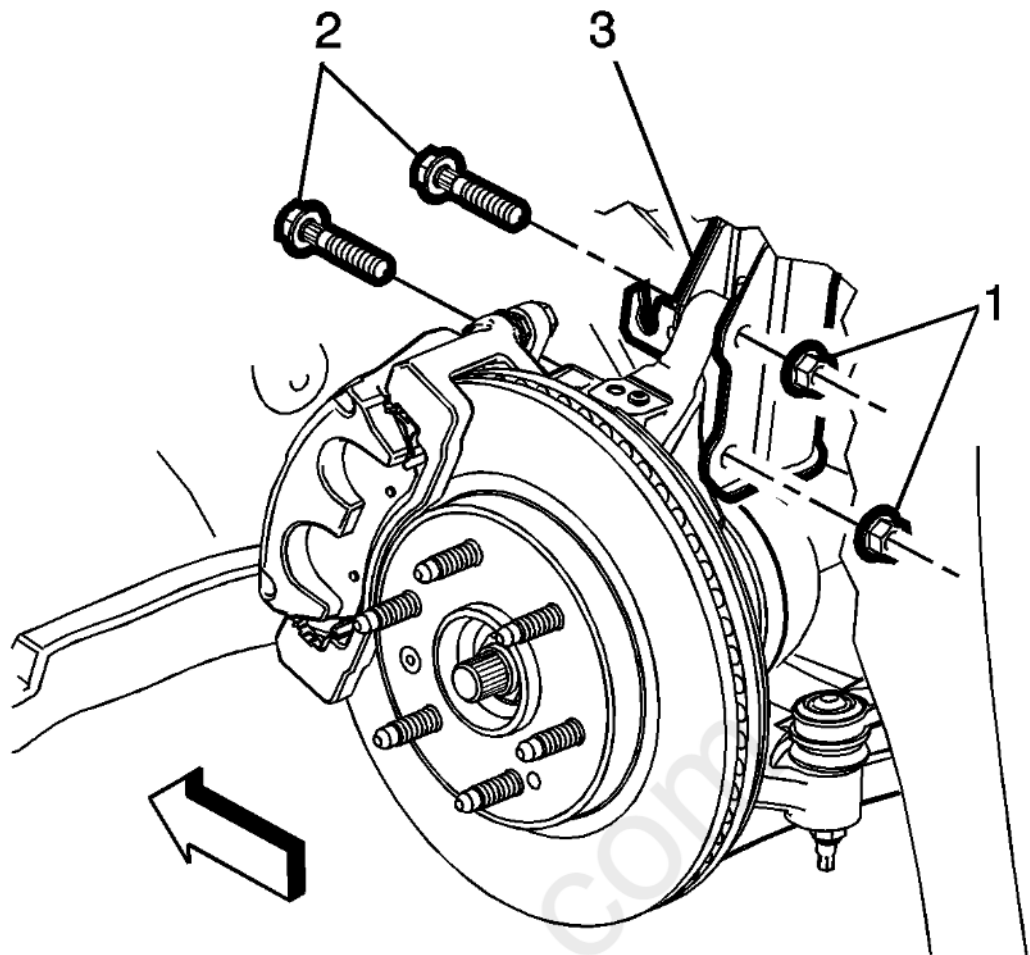


Fig. 19: Strut Assembly, Steering Knuckle Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Position the strut assembly (3) on the vehicle.

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. Install Steering Knuckle Bolts (2) (Qty: 2)

Install NEW bolts.

3. Install, but do NOT tighten Steering Knuckle Nuts (1) (Qty: 2)
4. Partially lower the vehicle.

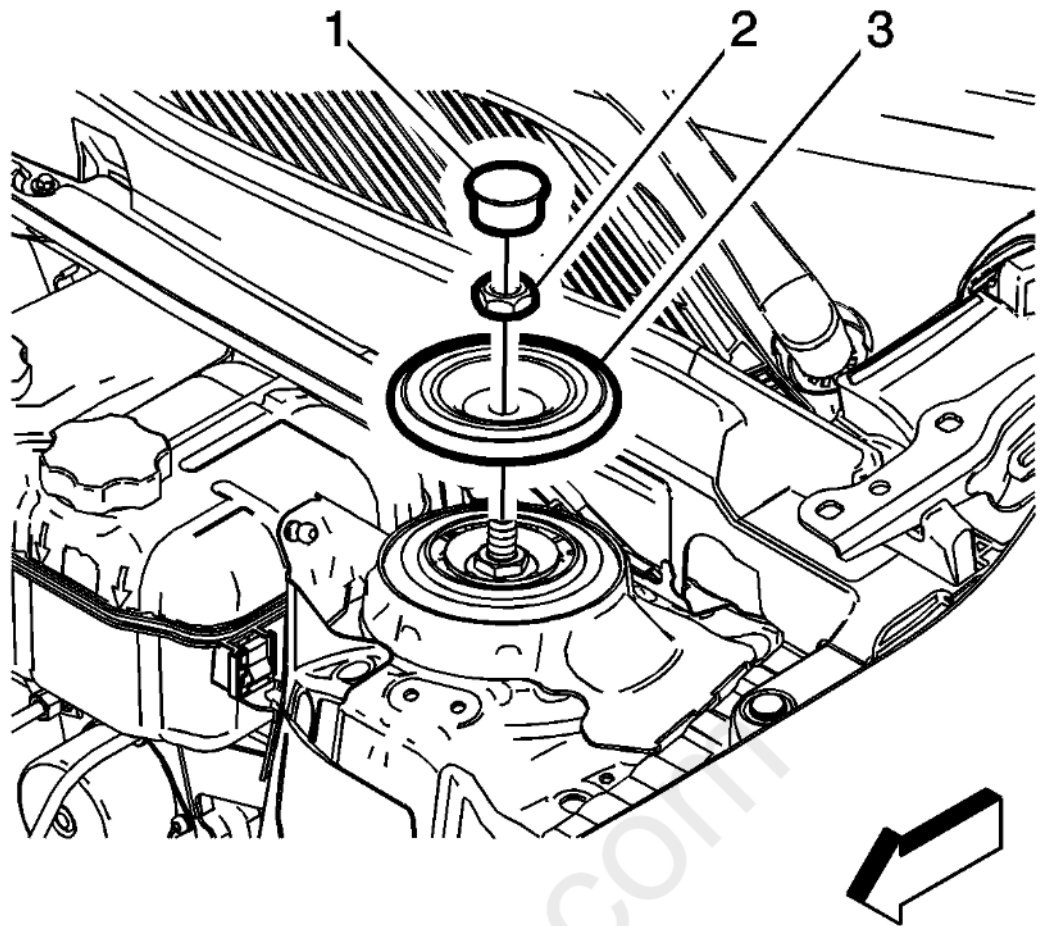


Fig. 20: Front Suspension Strut Mount Nut Cap, Nut And Bumper Stop
Courtesy of GENERAL MOTORS COMPANY

5. Install Front Suspension Strut Bumper Stop (3)

NOTE: Do NOT tighten the front suspension strut mount nut to specification until the vehicle is completely on the ground.

6. Install, but do NOT tighten Front Suspension Strut Mount Nut (2)
7. Raise the vehicle.

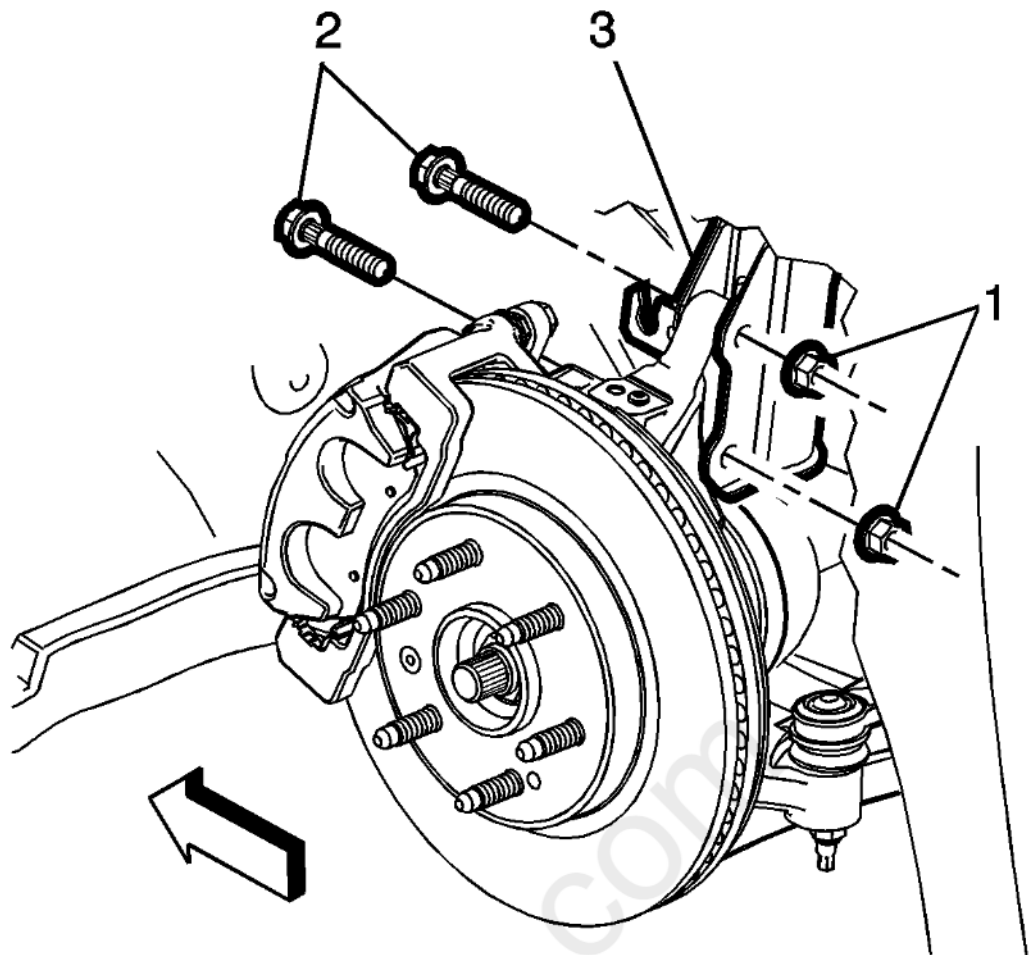


Fig. 21: Strut Assembly, Steering Knuckle Nuts And Bolts
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

8. Tighten Steering Knuckle Nuts (1) (Qty: 2)

Tighten

1. First Pass: 85 N.m (63 lb ft)
2. Final Pass: (60 - 75 degrees)
9. Install Front Stabilizer Shaft Link @ Strut Assembly. Refer to [Stabilizer Shaft Link Replacement](#)
10. Install Front Brake Hose @ Strut Assembly. Refer to [Front Brake Hose Replacement](#)
11. Install Front Wheel Speed Sensor Wiring Harness @ Steering Knuckle. Refer to [Front Wheel Speed Sensor Replacement](#)
12. Install the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
13. Lower the vehicle completely.

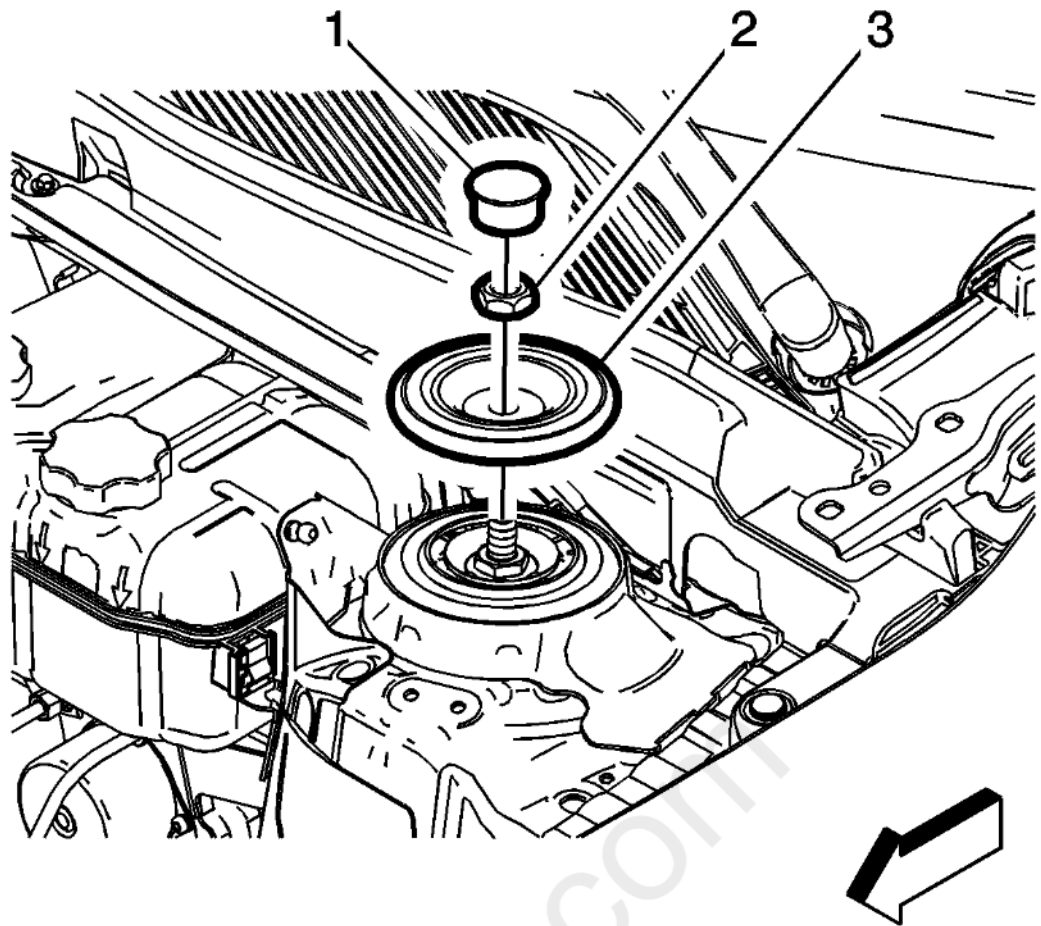


Fig. 22: Front Suspension Strut Mount Nut Cap, Nut And Bumper Stop
Courtesy of GENERAL MOTORS COMPANY

14. Use the **CH-49375** wrench to install the front suspension strut mount nut (2) and tighten to 55 N.m (41 lb ft).
15. Install Front Suspension Strut Mount Nut Cap (1)
16. Measure and adjust the wheel alignment. Refer to [Wheel Alignment Measurement](#)

SUSPENSION STRUT DISPOSAL

WARNING: Use the proper eye protection when drilling to prevent metal chips from causing physical injury.

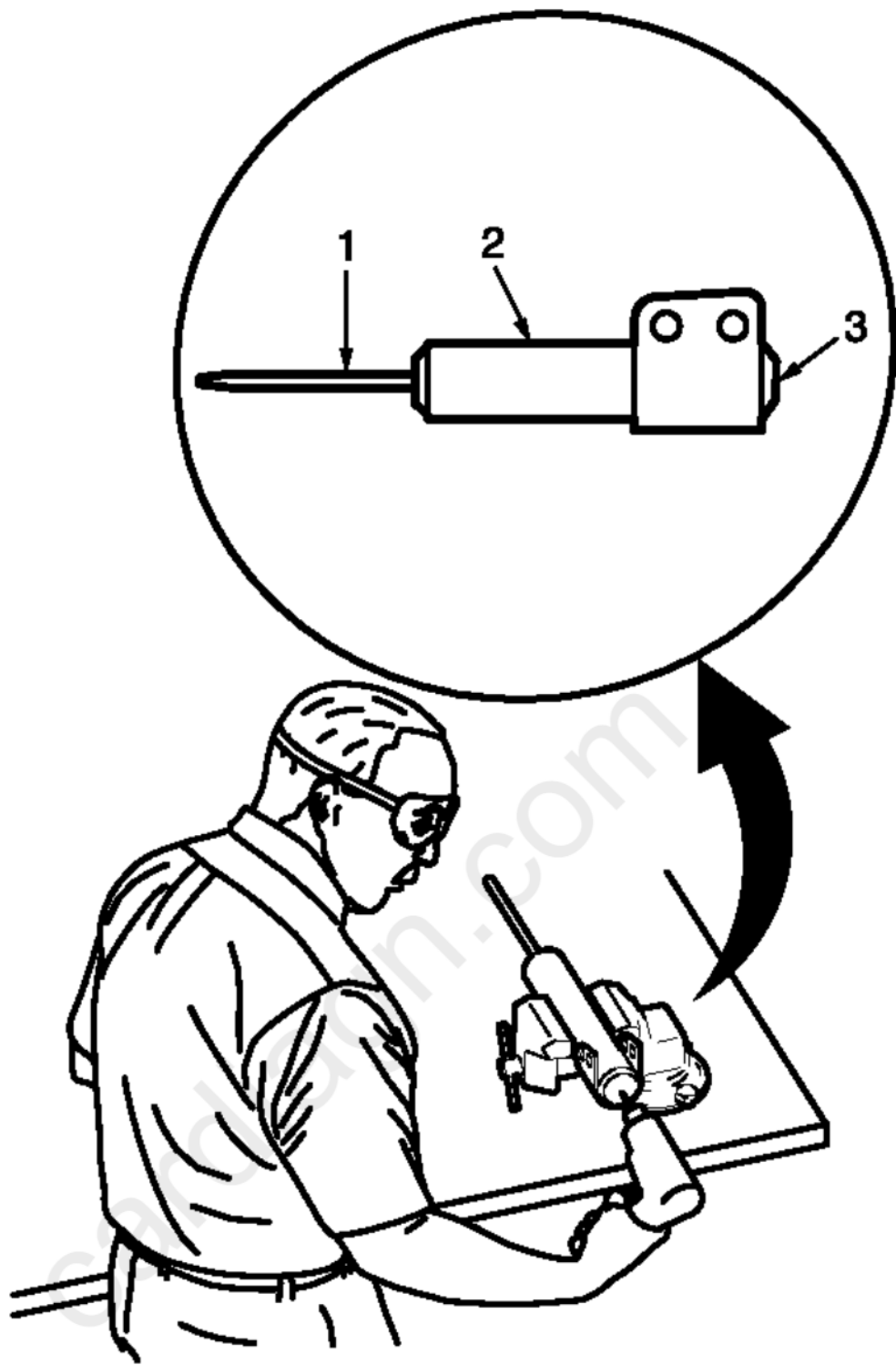


Fig. 23: Drilling Hole In Strut At Center Of End Cap
Courtesy of GENERAL MOTORS COMPANY

1. Clamp the strut in a vise horizontally with the rod (1) completely extended.
2. Drill a hole in the strut at the center of the end cap (3) using a 5 mm (3/16 in) drill bit. Gas or a gas/oil mixture will exhaust when the drill bit penetrates the strut. Use shop towels in order to contain the escaping oil.
3. Remove the strut from the vise.
4. Hold the strut over a drain pan vertically with the hole down.
5. Move the rod (1) in and out of the tube (2) to completely drain the oil from the strut.

STRUT, STRUT COMPONENT, OR SPRING REPLACEMENT

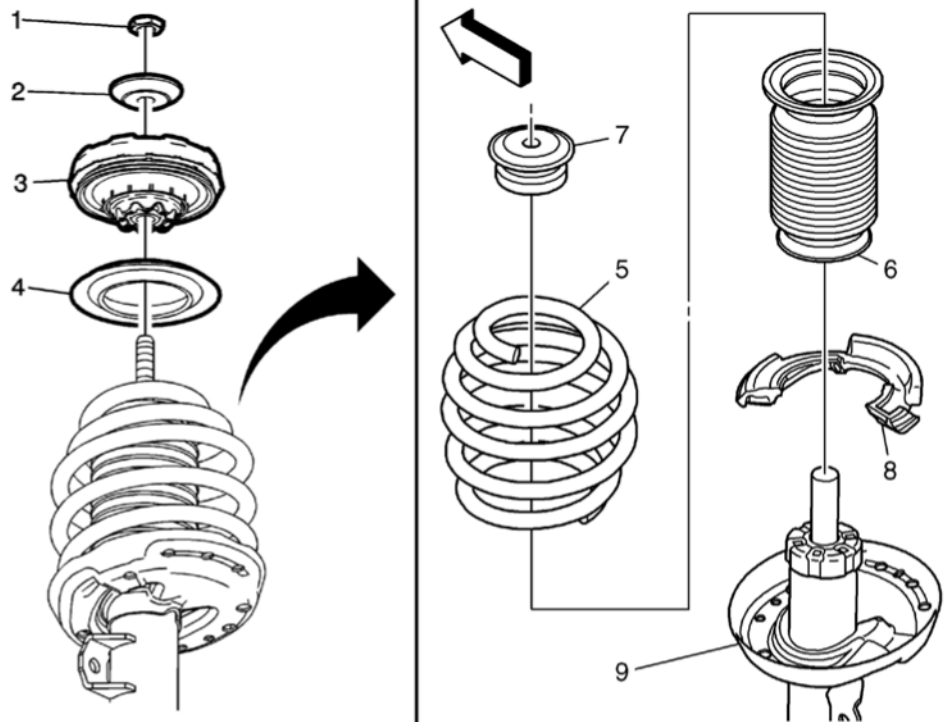


Fig. 24: Strut, Strut Component, or Spring
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: To prevent personal injury and/or component damage, use the proper tools to support and compress the coil spring prior to removal of the strut shaft nut when removing the coil spring. The coil spring is under extreme pressure and can become a projectile should the spring separate from the strut before all of the tension is relieved.	
Preliminary Procedure Remove Strut Assembly. Refer to Strut Assembly Removal and Installation	
1	Front Suspension Strut Nut CAUTION: Refer to Fastener Caution . Procedure 1. Use the CH-48845 compressor to compress the front coil spring. 2. Use the CH-49375 wrench to remove and install the front suspension strut nut. Tighten 70 N.m (52 lb ft) Special Tools • CH-48845 Strut Spring Compressor • CH-49375 Strut Spring Wrench Equivalent regional tools: Special Tools
2	Front Suspension Strut Mount Washer
3	Front Suspension Strut Mount
4	Front Coil Spring Upper Insulator
5	Front Coil Spring
6	Front Shock Absorber Boot

Callout	Component Name
7	Front Suspension Strut Bumper Inspect the front suspension strut bumper for the following: • Cracks or structural damage • Wetness from oil contamination • Loose fit to strut rod or excessive play from damage to the inner diameter retention fingers If any issues are noted, replace the front suspension strut bumper.
8	Front Coil Spring Lower Insulator
9	Front Suspension Strut

DESCRIPTION AND OPERATION

FRONT SUSPENSION DESCRIPTION AND OPERATION

The front suspension has 2 primary purposes:

- Isolate the driver from irregularities in the road surface.
- Define the ride and handling characteristics of the vehicle.

The front suspension absorbs the impact of the tires travelling over irregular road surfaces and dissipates this energy throughout the suspension system. This process isolates the vehicle occupants from the road surface. The rate at which the suspension dissipates the energy and the amount of energy that is absorbed is how the suspension defines the vehicles ride characteristics. Ride characteristics are designed into the suspension system and are not adjustable. The ride characteristics are mentioned in this description in order to aid in the understanding of the functions of the suspension system. The suspension system must allow for the vertical movement of the tire and wheel assembly as the vehicle travels over irregular road surfaces while maintaining the tire's horizontal relationship to the road.

This requires that the steering knuckle be suspended between a lower control arm and a strut assembly. The lower control arm attaches from the steering knuckle at the outermost point of the control arm. The attachment is through a ball and socket type joint. The innermost end of the control arm attached at 2 points to the vehicle frame through semi-rigid bushings. The upper portion of the steering knuckle is attached to a strut assembly. The strut assembly then connects to the vehicle body by way of an upper bearing. The steering knuckle is allowed to travel up and down independent of the vehicle body structure and frame.

This up and down motion of the steering knuckle as the vehicle travels over bumps is absorbed predominantly by the coil spring. This spring is retained under tension over the strut assembly. A strut is used in conjunction with this system in order to dampen out the oscillations of the coil spring. A strut is a basic hydraulic cylinder. The strut is filled with oil and has a moveable shaft that connects to a piston inside the strut. Valves inside the shock absorber offer resistance to oil flow and consequently inhibit rapid movement of the piston and shaft. Each end of the shock absorber is connected in such a fashion to utilize this recoil action of a spring alone. Each end of the strut is designed as the connection point of the suspension system to the vehicle and acts as the coil spring seat. This allows the strut to utilize the dampening action to reduce the recoil of a spring alone. The lower control arm is allowed to pivot at the vehicle frame in a vertical fashion. The ball joint allows the steering knuckle to maintain the perpendicular relationship to the road surface.

Front suspensions systems utilize a stabilizer shaft. The stabilizer bar connects between the left and right lower control arm assemblies through the stabilizer link and stabilizer shaft insulators. This bar controls the amount of independent movement of the suspension when the vehicle turns. Limiting the independent movement defines the vehicles handling characteristics on turns.

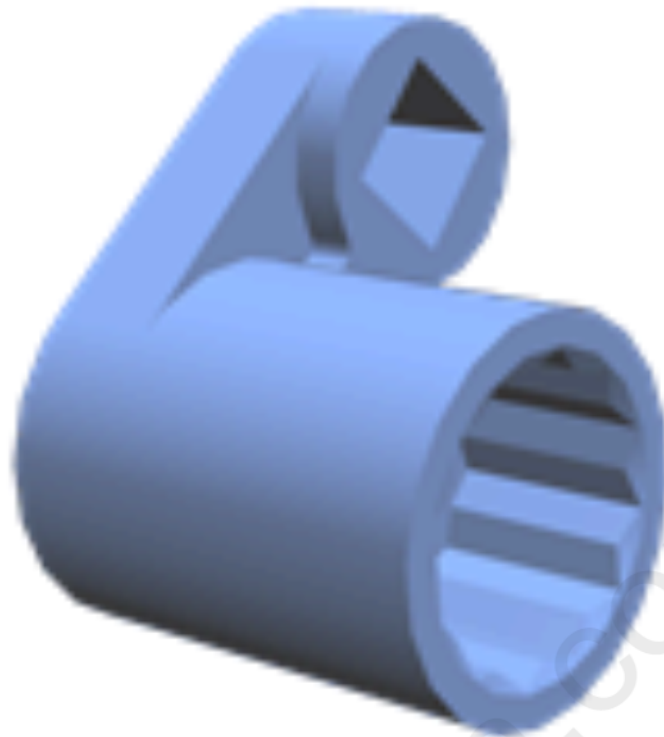
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description

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

Illustration	Tool Number/Description
	CH-48845 Strut Spring Compressor



CH-49375
Spanner (wrench)