

SUSPENSION

Front Suspension - Canyon, Colorado

SPECIFICATIONS

FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Front Lower Control Arm Ball Stud Nut		
• First Pass:	65 N.m	48 lb ft
• Final Pass:	60-75 degrees	
Front Lower Control Arm Nut	260 N.m	192 lb ft
Front Shock Absorber Lower Bracket Bolt		
• First Pass:	100 N.m	74 lb ft
• Final Pass:	25-35 degrees	
Front Shock Absorber Nut (Upper Assembly to Frame)	58 N.m	43 lb ft
Front Shock Absorber Nut (Upper Mount to Spring)	38 N.m	28 lb ft
Front Stabilizer Shaft Bushing Clamp Bolt	50 N.m	37 lb ft
Front Stabilizer Shaft Link Bolt	30 N.m	22 lb ft
Front Upper Control Arm Ball Stud Nut		
• First Pass:	50 N.m	37 lb ft
• Final Pass:	90-110 degrees	
Front Upper Control Arm Nut	160 N.m	118 lb ft
Front Wheel Bearing and Hub Assembly Bolt	130 N.m	96 lb ft

REPAIR INSTRUCTIONS

STABILIZER SHAFT REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Support the center of the front stabilizer shaft with an appropriate jack or stand.

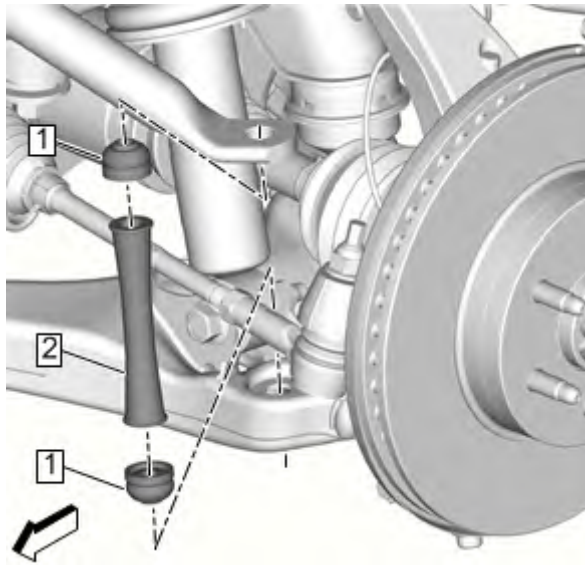


Fig. 1: Front Stabilizer Shaft Link Insulators
 Courtesy of GENERAL MOTORS COMPANY

3. Remove Front Stabilizer Shaft Link (2) **Stabilizer Shaft Link Replacement**

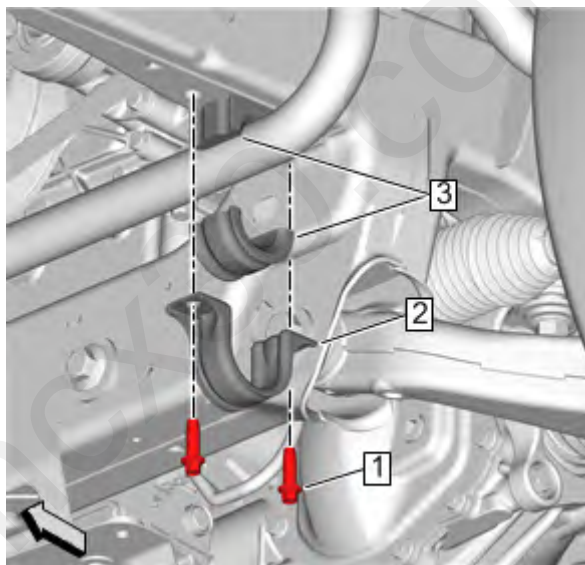


Fig. 2: Front Stabilizer Shaft Bushing
 Courtesy of GENERAL MOTORS COMPANY

4. Remove Front Stabilizer Shaft Bushing (3) **Front Stabilizer Shaft Bushing Replacement**

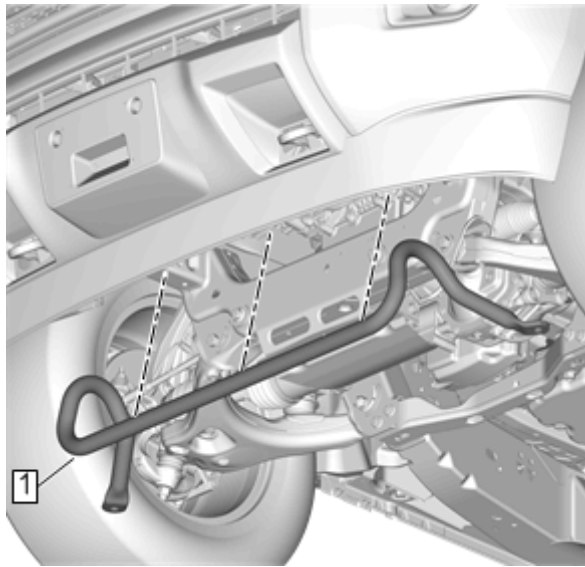


Fig. 3: Front Stabilizer Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Remove the front stabilizer shaft (1) from the vehicle.

Installation Procedure

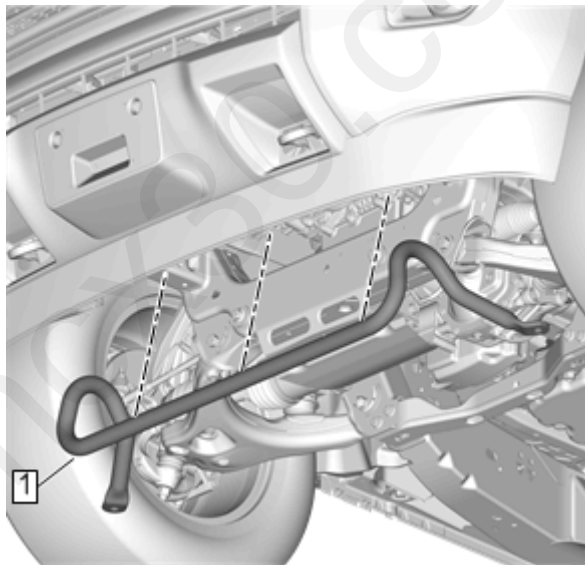


Fig. 4: Front Stabilizer Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Position the front stabilizer shaft (1) on the vehicle.
2. Support the center of the front stabilizer shaft with an appropriate jack or stand.

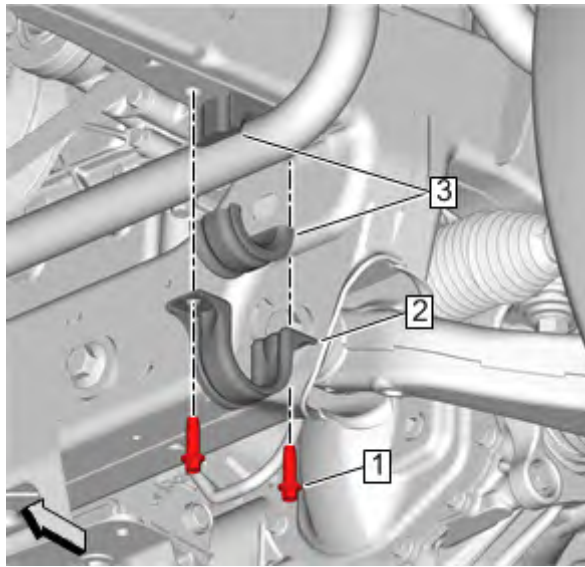


Fig. 5: Front Stabilizer Shaft Bushing

Courtesy of GENERAL MOTORS COMPANY

3. Install Front Stabilizer Shaft Bushing (3) **Front Stabilizer Shaft Bushing Replacement**

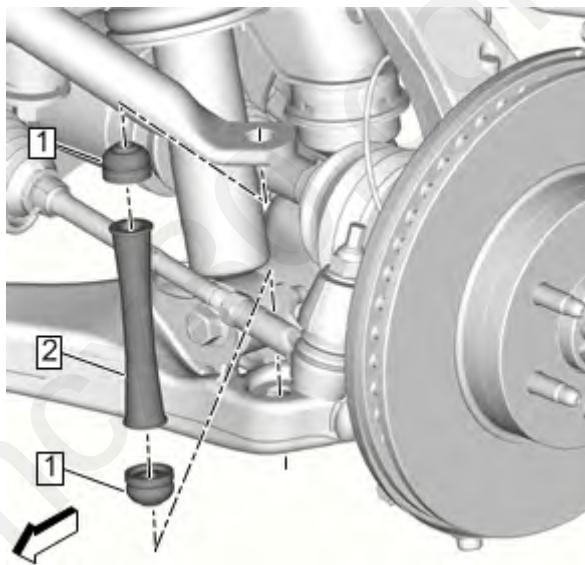


Fig. 6: Front Stabilizer Shaft Link Insulators

Courtesy of GENERAL MOTORS COMPANY

4. Install Front Stabilizer Shaft Link (2) **Stabilizer Shaft Link Replacement**
5. Remove any jacks or stands used.

STABILIZER SHAFT LINK REPLACEMENT

Removal Procedure

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

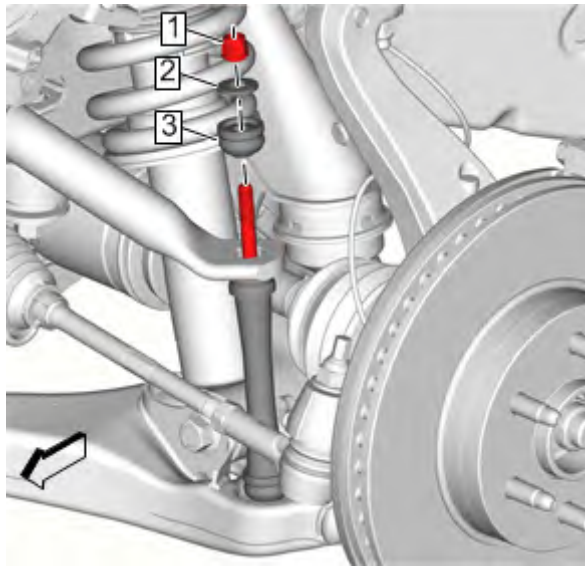


Fig. 7: Front Stabilizer Shaft Link Nut

Courtesy of GENERAL MOTORS COMPANY

NOTE: Rest the front stabilizer shaft on a suitable support to relieve the tension on the front stabilizer shaft link.

2. Remove the front stabilizer shaft link nut (1) and front stabilizer shaft link insulator (2).

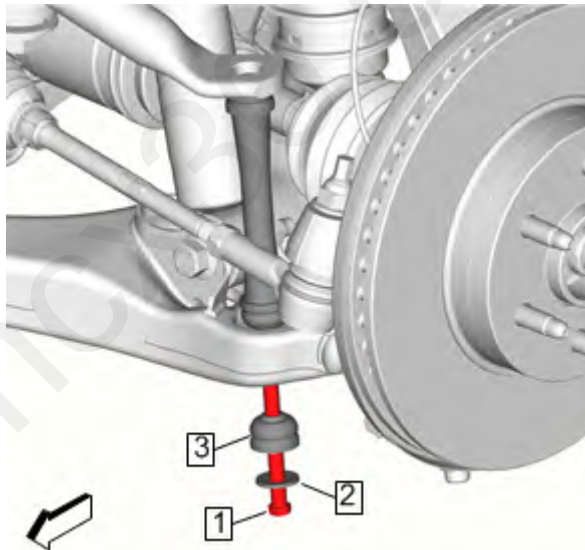


Fig. 8: Front Stabilizer Shaft Link Bolt

Courtesy of GENERAL MOTORS COMPANY

3. Remove the front stabilizer shaft link bolt (1) and front stabilizer shaft link insulator (2).

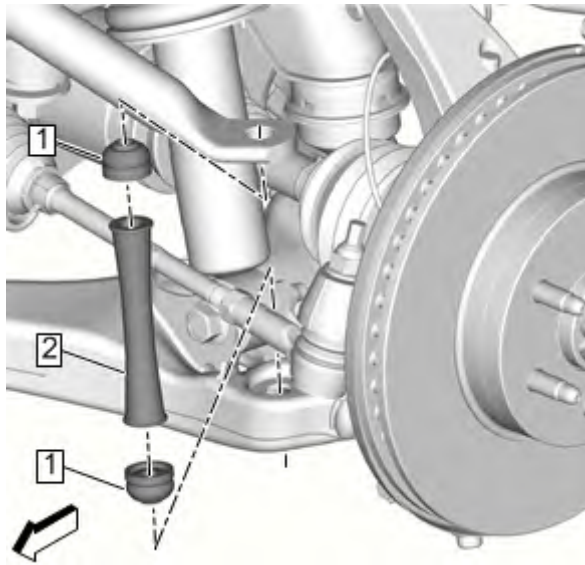


Fig. 9: Front Stabilizer Shaft Link Insulators
 Courtesy of GENERAL MOTORS COMPANY

4. Remove the front stabilizer shaft link insulators (1) and front stabilizer shaft link (2).

Installation Procedure

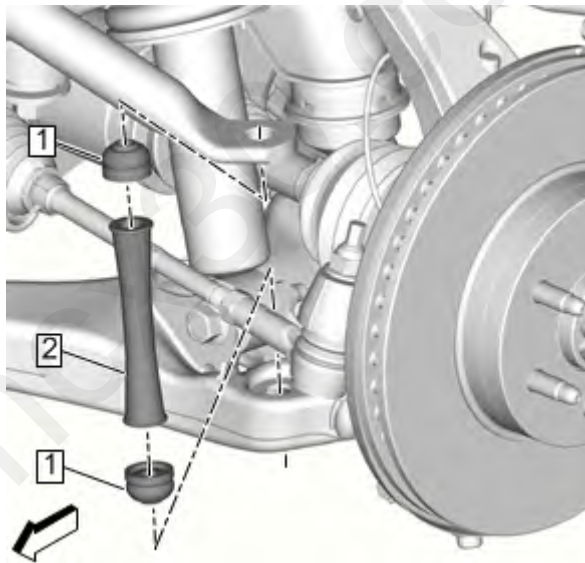


Fig. 10: Front Stabilizer Shaft Link Insulators
 Courtesy of GENERAL MOTORS COMPANY

1. Install the front stabilizer shaft link (2) and front stabilizer shaft link insulators (1).

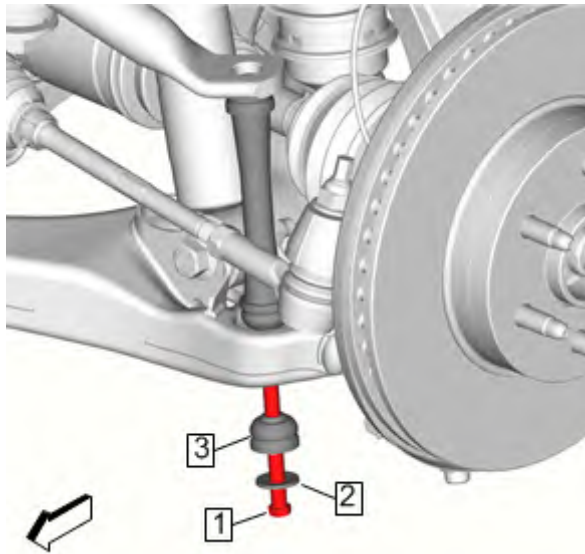


Fig. 11: Front Stabilizer Shaft Link Bolt

Courtesy of GENERAL MOTORS COMPANY

2. Install the front stabilizer shaft link insulator (2) and front stabilizer shaft link bolt (1).

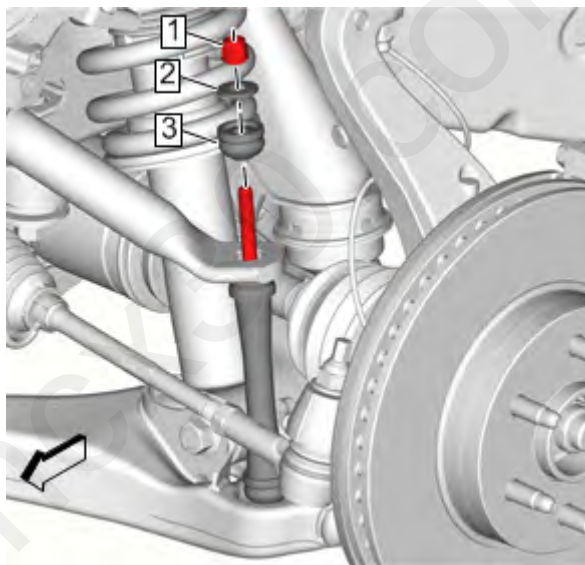


Fig. 12: Front Stabilizer Shaft Link Nut

Courtesy of GENERAL MOTORS COMPANY

3. Install the front stabilizer shaft link insulator (2) and front stabilizer shaft link nut (1).

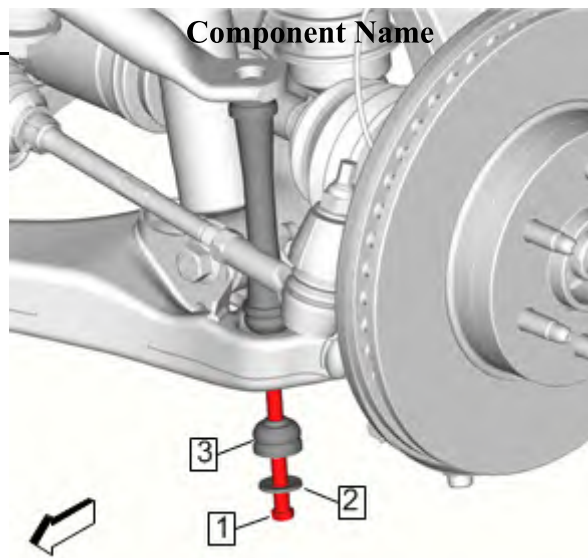


Fig. 13: Front Stabilizer Shaft Link Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

4. Tighten the front stabilizer shaft link bolt (1) to 30 N.m (22 lb ft).

FRONT STABILIZER SHAFT BUSHING REPLACEMENT

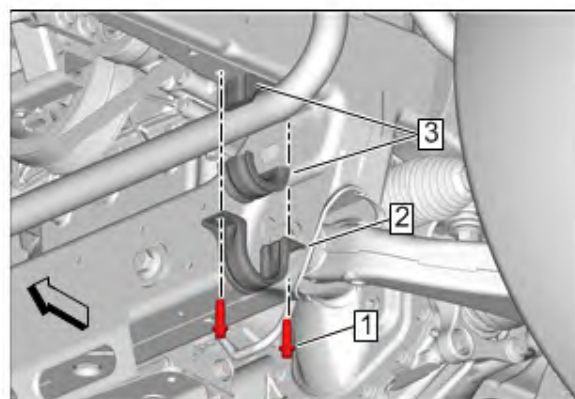


Fig. 14: Front Stabilizer Shaft Bushing

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

	Component Name
Preliminary Procedure	
Raise and support the vehicle. <u>Lifting and Jacking the Vehicle</u>	
1	Front Stabilizer Shaft Bushing Clamp Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 50 N.m (37 lb ft)
2	Front Stabilizer Shaft Bushing Clamp
3	Front Stabilizer Shaft Bushing

FRONT WHEEL BEARING AND HUB REPLACEMENT (4WD)

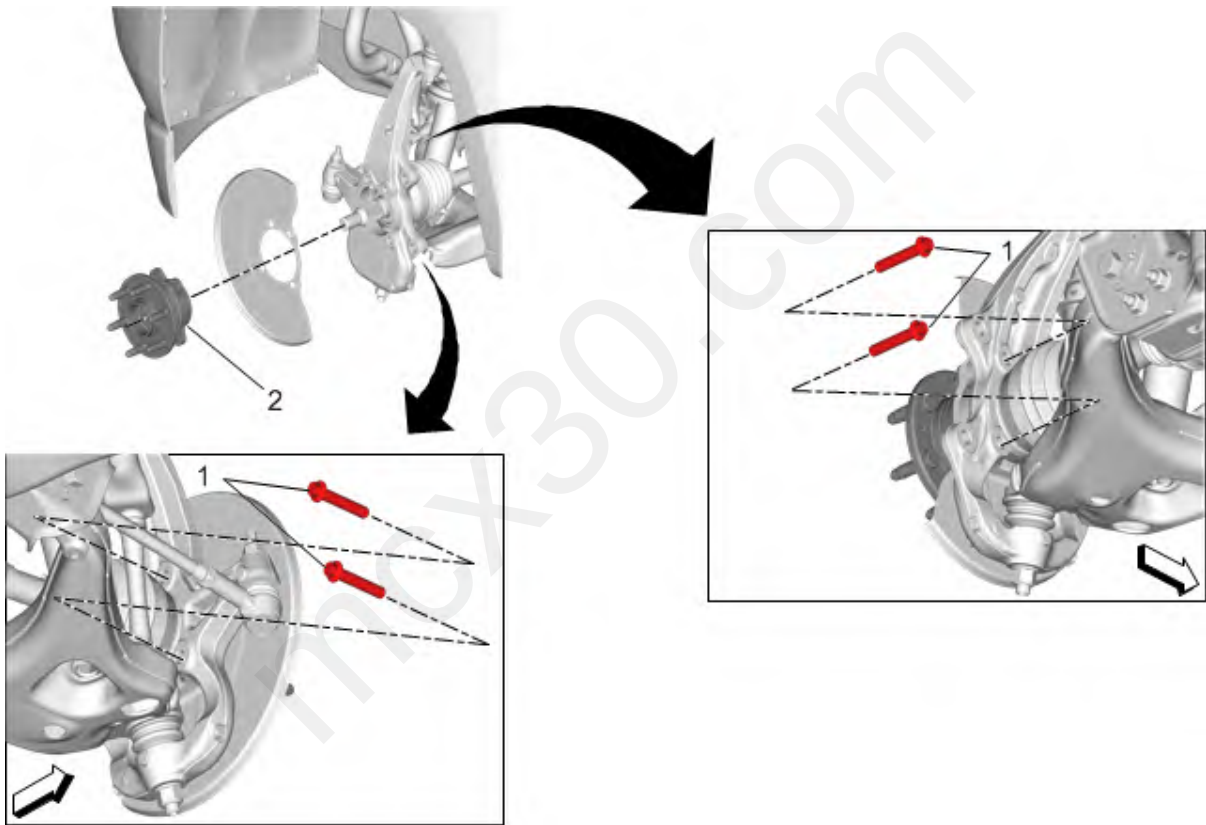


Fig. 15: Front Wheel Bearing and Hub
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Component Name	
Preliminary Procedures 1. Remove the front tire and wheel assembly. Tire and Wheel Removal and Installation 2. Remove the front wheel speed sensor from the steering knuckle and set aside. Front Wheel Speed Sensor Replacement 3. Separate Front Wheel Drive Shaft@Front Wheel Bearing and Hub Assembly Front Wheel Drive Shaft Replacement - Left Side , or Front Wheel Drive Shaft Replacement - Right Side 4. Front Brake Rotor Replacement	
1	Front Wheel Bearing and Hub Assembly Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 130 N.m (96 lb ft)
2	Front Wheel Bearing and Hub Assembly

FRONT WHEEL BEARING AND HUB REPLACEMENT (2WD)

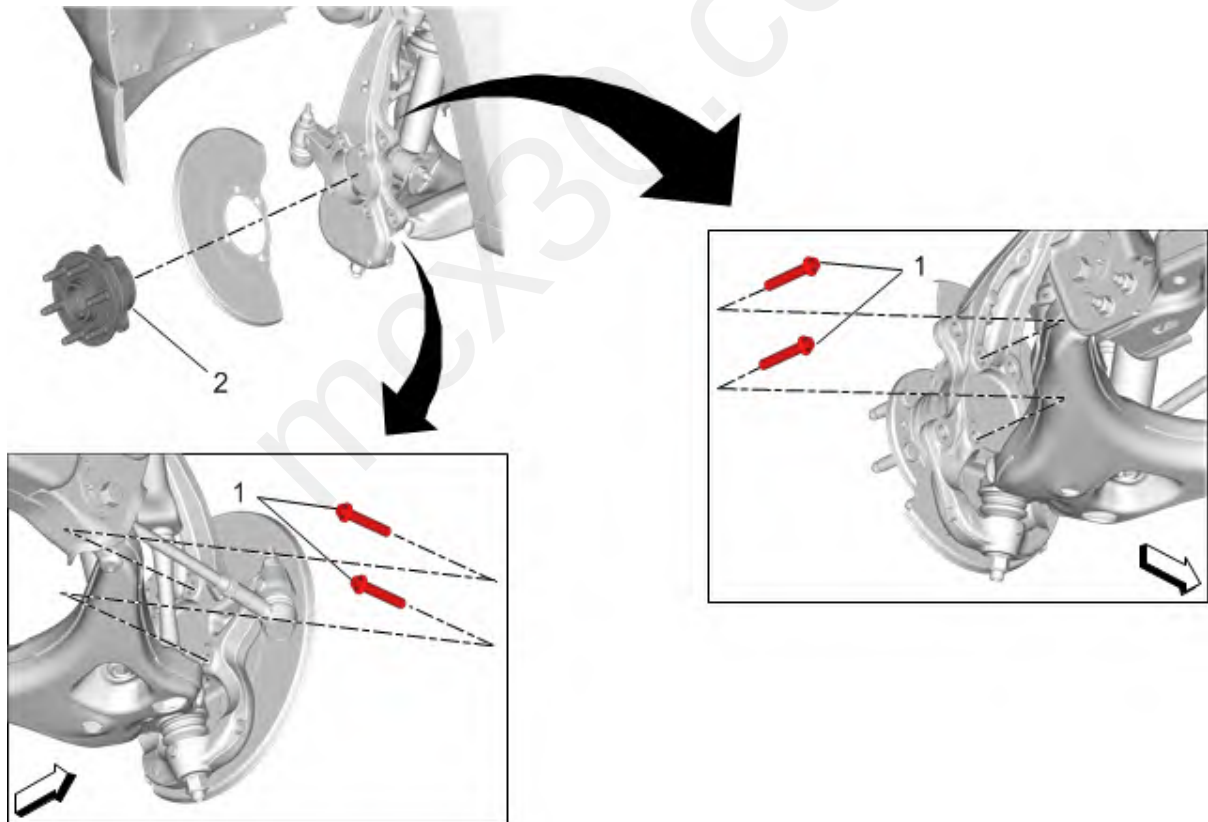


Fig. 16: Front Wheel Bearing and Hub
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Component Name

Preliminary Procedures

1. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
2. Remove the front wheel speed sensor from the steering knuckle and set aside. [Front Wheel Speed Sensor Replacement](#)
3. [Front Brake Rotor Replacement](#)

1	Front Wheel Bearing and Hub Assembly Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 130 N.m (96 lb ft)
2	Front Wheel Bearing and Hub Assembly

STEERING KNUCKLE REPLACEMENT (4WD)

Removal Procedure

1. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

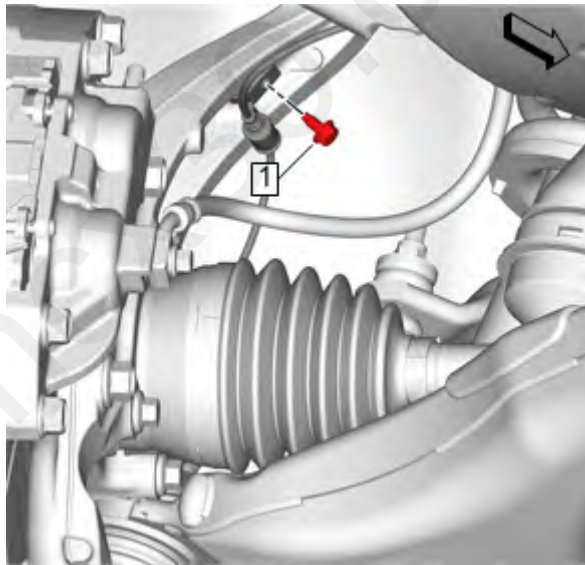


Fig. 17: Front Wheel Speed Sensor Harness Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front wheel speed sensor harness bracket bolt (1). [Front Wheel Speed Sensor Replacement](#)

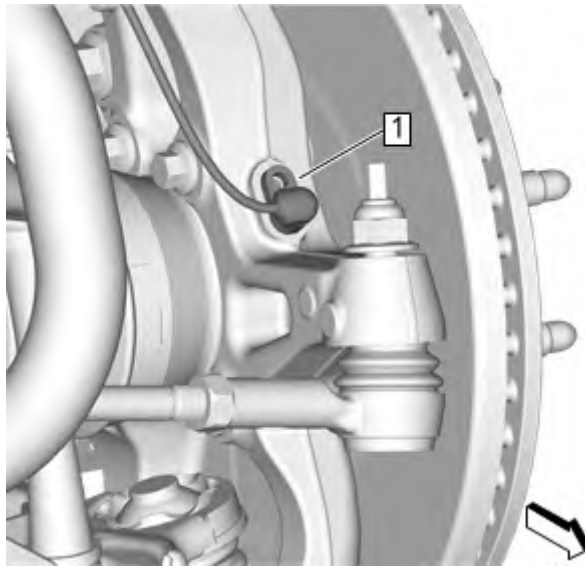


Fig. 18: Front Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

3. Remove the front wheel speed sensor (1) from the steering knuckle and set aside. **Front Wheel Speed Sensor Replacement**

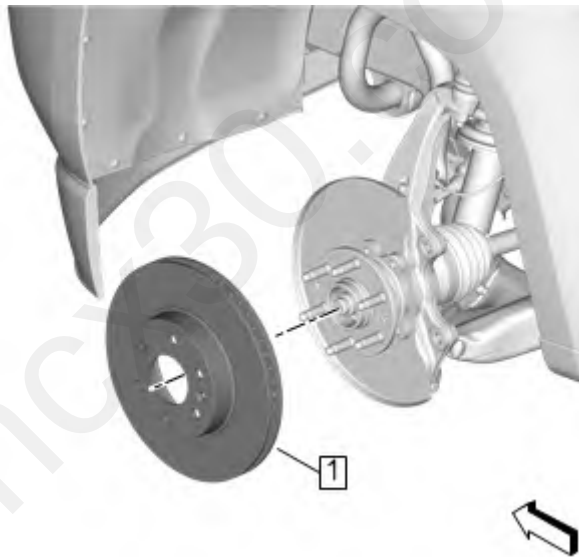


Fig. 19: Front Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

4. Remove Front Brake Rotor (1) **Front Brake Rotor Replacement**

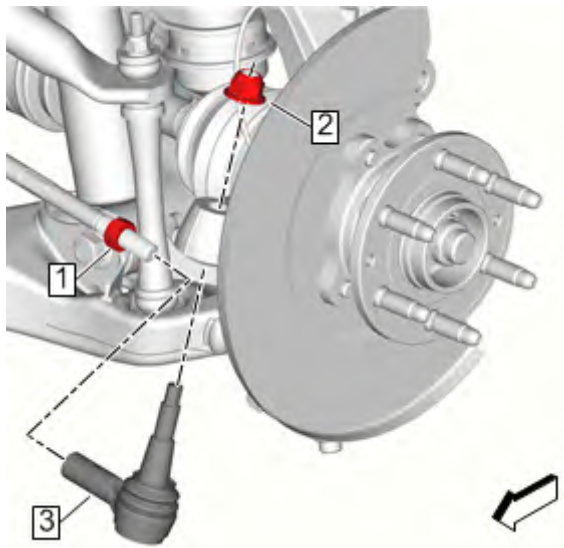


Fig. 20: Steering Linkage Outer Tie Rod

Courtesy of GENERAL MOTORS COMPANY

5. Separate Steering Linkage Outer Tie Rod (3) @Steering Knuckle **Steering Linkage Outer Tie Rod Replacement**

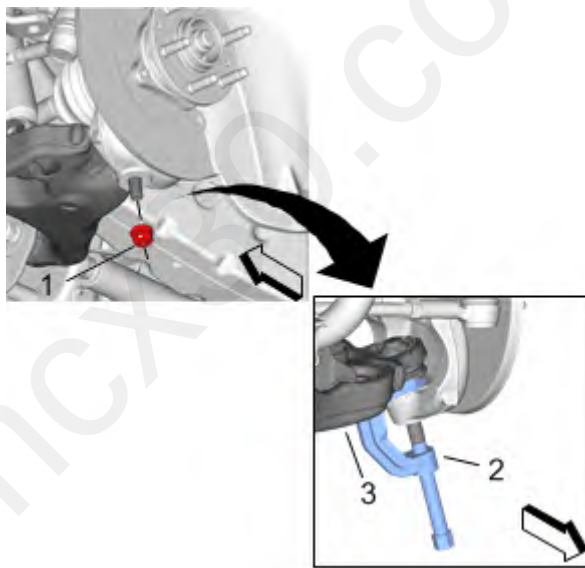


Fig. 21: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

6. Separate Front Lower Control Arm (3) @Steering Knuckle **Lower Control Arm Replacement (4WD)**

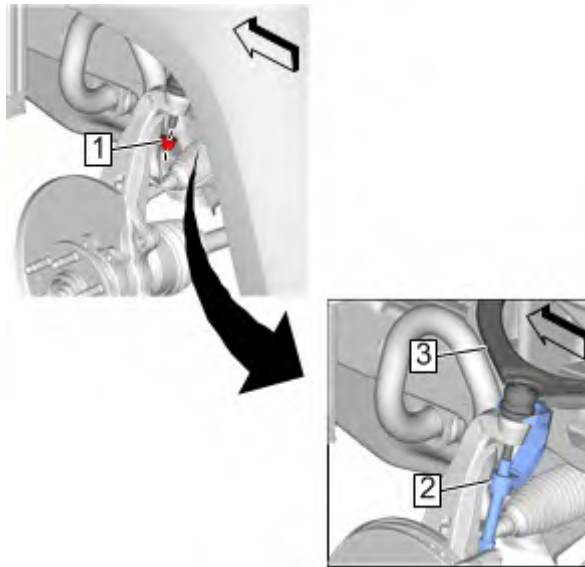


Fig. 22: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

7. Separate Front Upper Control Arm (3) @Steering Knuckle **Upper Control Arm Replacement**

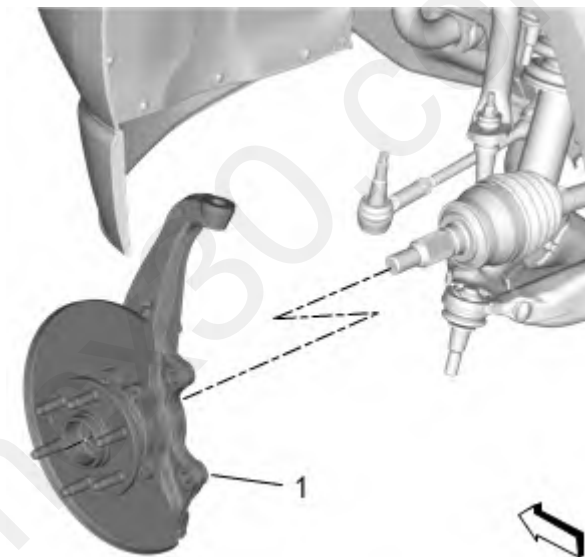


Fig. 23: Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

8. Remove the steering knuckle (1) from the vehicle.
9. Transfer components as necessary.

Installation Procedure

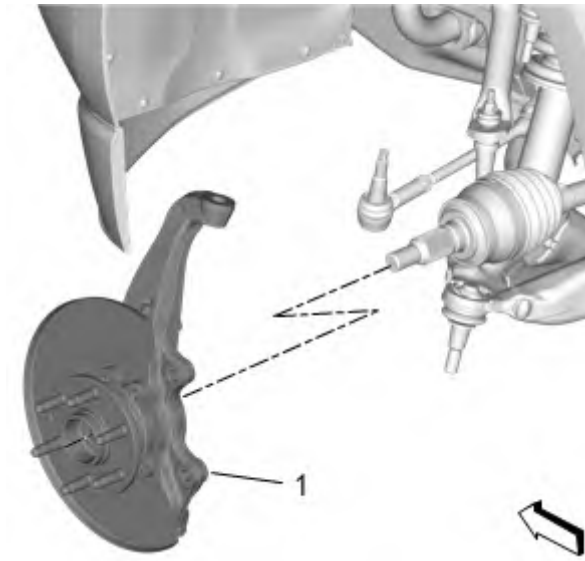


Fig. 24: Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

1. Position the steering knuckle (1) on the vehicle.

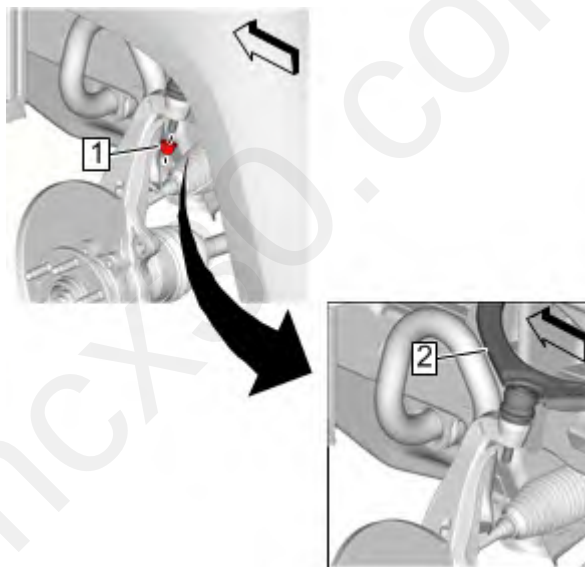


Fig. 25: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

2. Install Front Upper Control Arm (3) @Steering Knuckle [Upper Control Arm Replacement](#)

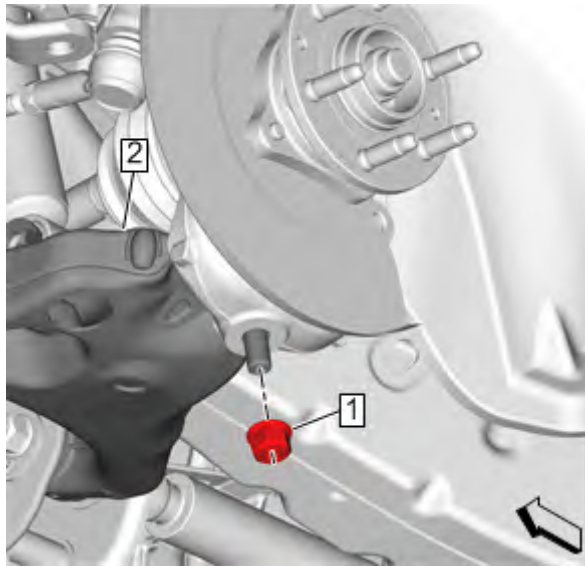


Fig. 26: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

3. Install Front Lower Control Arm (3) @Steering Knuckle **Lower Control Arm Replacement (4WD)**

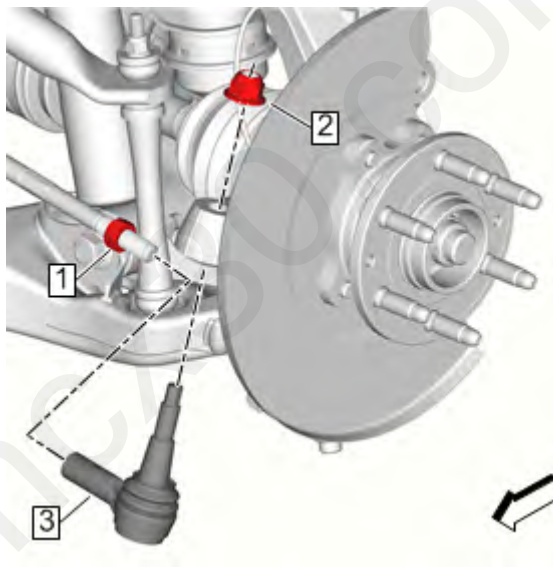


Fig. 27: Steering Linkage Outer Tie Rod

Courtesy of GENERAL MOTORS COMPANY

4. Install Steering Linkage Outer Tie Rod (3) @Steering Knuckle **Steering Linkage Outer Tie Rod Replacement**

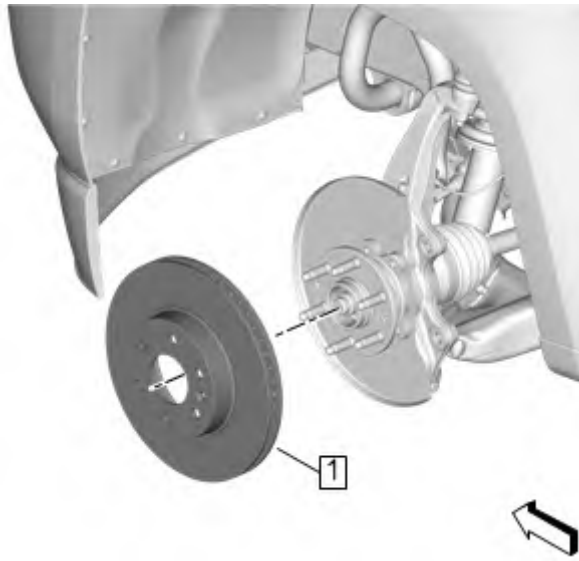


Fig. 28: Front Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

5. Install Front Brake Rotor (1) [Front Brake Rotor Replacement](#)

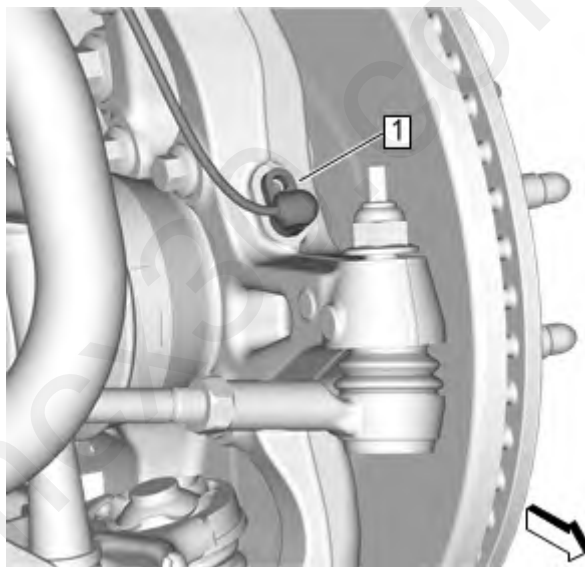


Fig. 29: Front Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

6. Install Front Wheel Speed Sensor (1) [Front Wheel Speed Sensor Replacement](#)

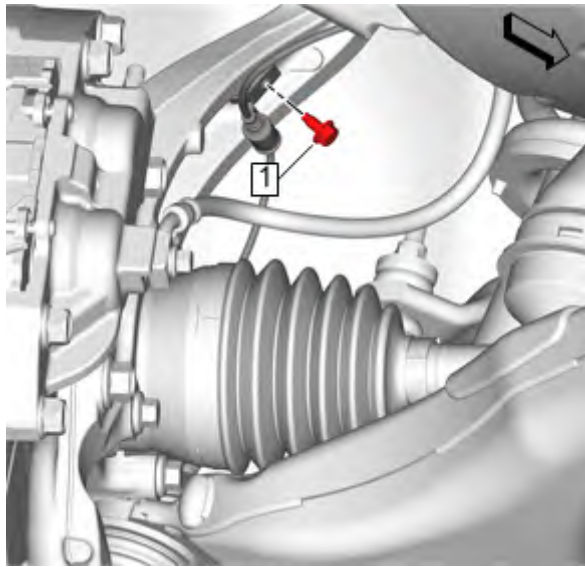


Fig. 30: Front Wheel Speed Sensor Harness Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

7. Install the front wheel speed sensor harness bracket bolt (1). [Front Wheel Speed Sensor Replacement](#)
8. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
9. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

STEERING KNUCKLE REPLACEMENT (2WD)

Removal Procedure

1. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

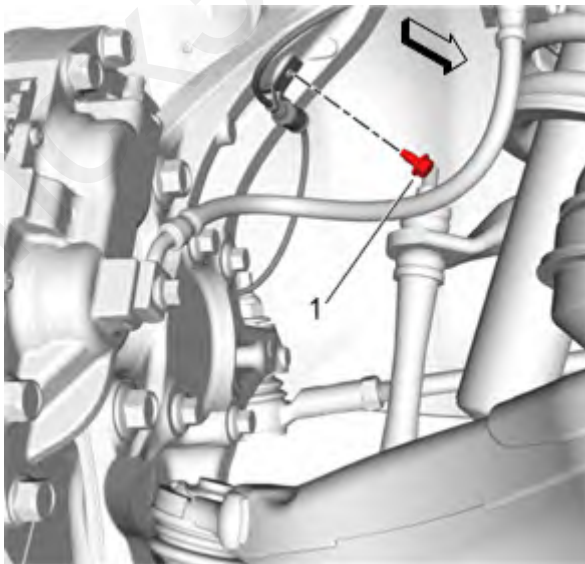


Fig. 31: Front Wheel Speed Sensor Harness Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front wheel speed sensor harness bracket bolt (1). [Front Wheel Speed Sensor Replacement](#)

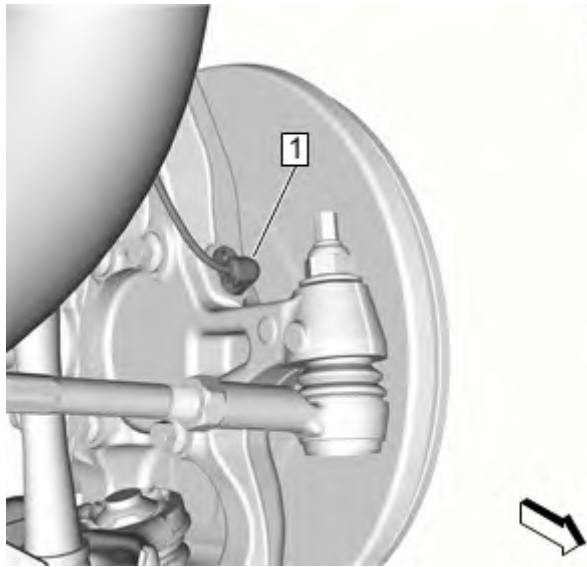


Fig. 32: Front Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

3. Remove the front wheel speed sensor (1) from the steering knuckle and set aside. **Front Wheel Speed Sensor Replacement**

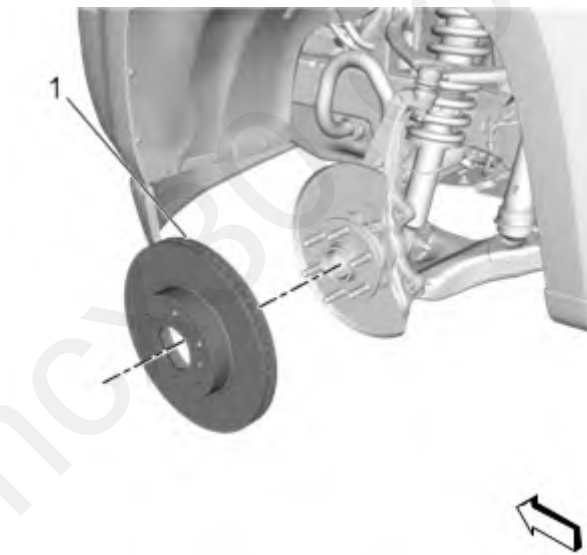


Fig. 33: Front Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

4. Remove Front Brake Rotor (1) **Front Brake Rotor Replacement**

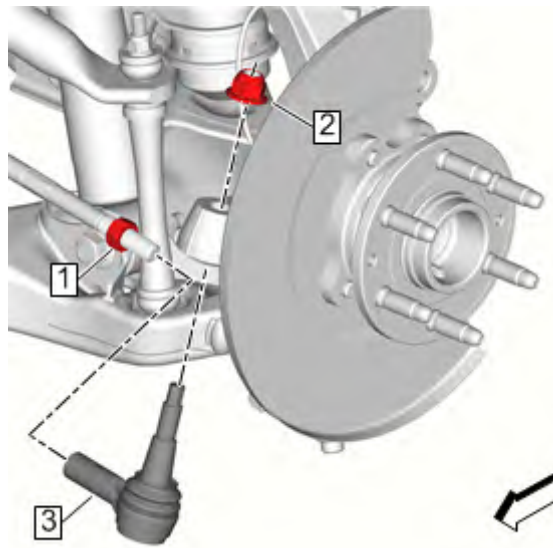


Fig. 34: Steering Linkage Outer Tie Rod

Courtesy of GENERAL MOTORS COMPANY

5. Separate Steering Linkage Outer Tie Rod (3) @Steering Knuckle **Steering Linkage Outer Tie Rod Replacement**

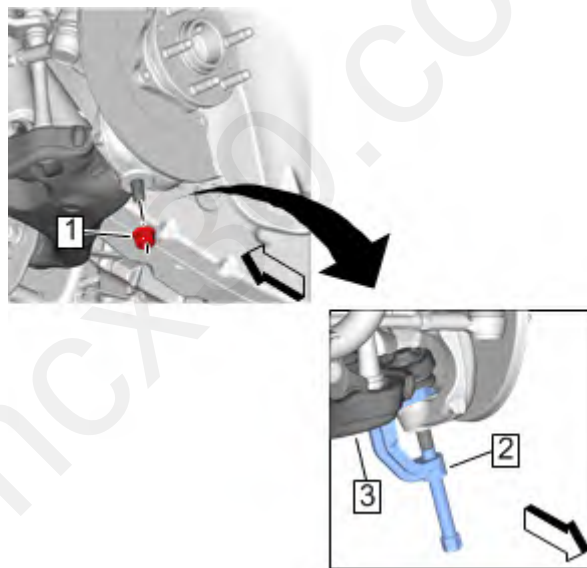


Fig. 35: Front Lower Control Arm Ball Stud Nut

Courtesy of GENERAL MOTORS COMPANY

6. Separate Front Lower Control Arm (3) @Steering Knuckle **Lower Control Arm Replacement (2WD)**

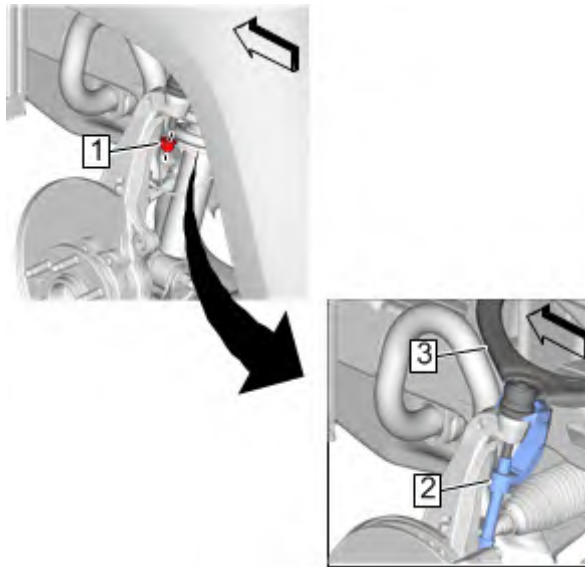


Fig. 36: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

7. Separate Front Upper Control Arm (3) @Steering Knuckle **Upper Control Arm Replacement**

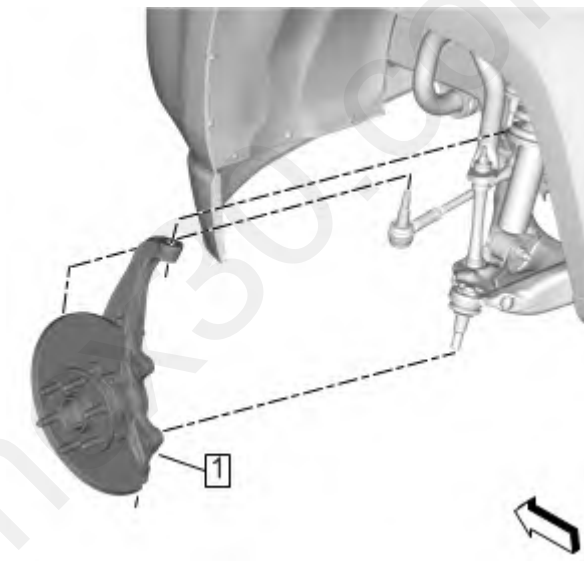


Fig. 37: Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

8. Remove the steering knuckle (1) from the vehicle.
9. Transfer components as necessary.

Installation Procedure

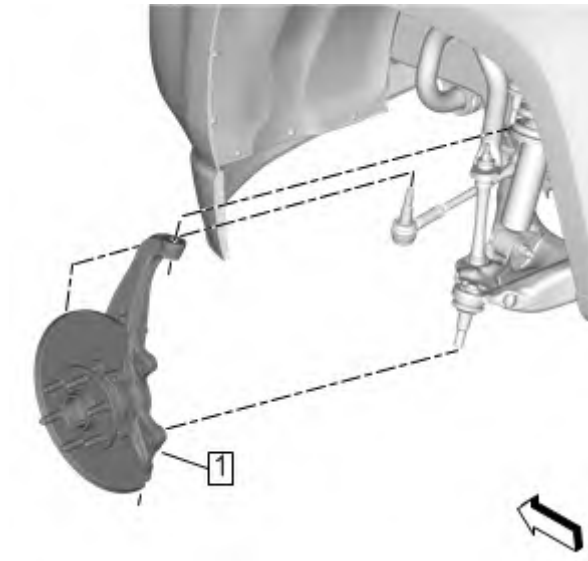


Fig. 38: Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

1. Position the steering knuckle (1) on the vehicle.

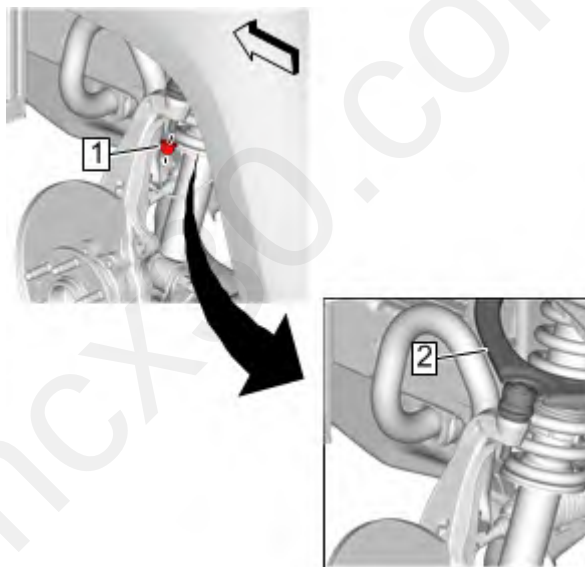


Fig. 39: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

2. Install Front Upper Control Arm (2) @Steering Knuckle [Upper Control Arm Replacement](#)

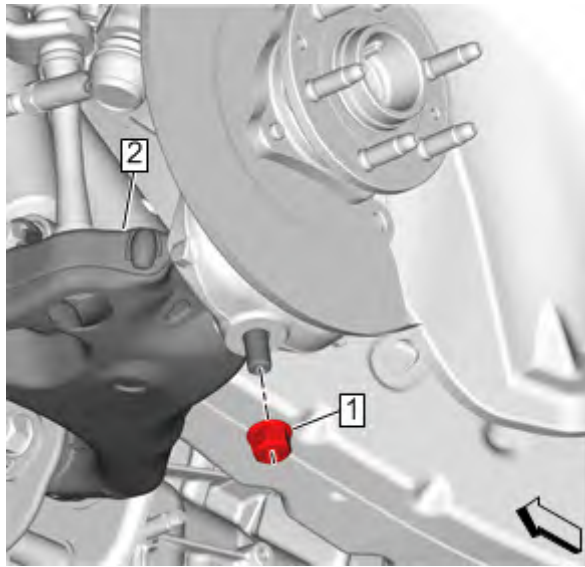


Fig. 40: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

3. Install Front Lower Control Arm (2) @Steering Knuckle **Lower Control Arm Replacement (2WD)**

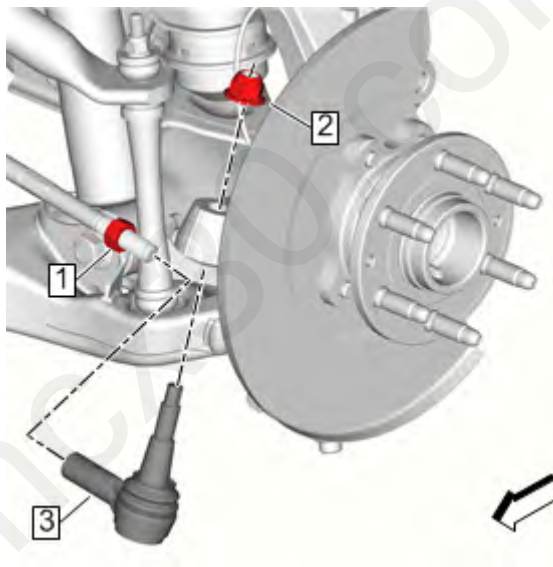


Fig. 41: Steering Linkage Outer Tie Rod
 Courtesy of GENERAL MOTORS COMPANY

4. Install Steering Linkage Outer Tie Rod (3) @Steering Knuckle **Steering Linkage Outer Tie Rod Replacement**

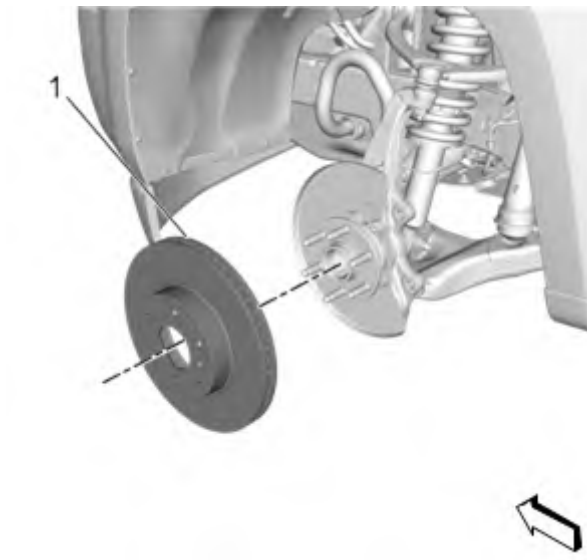


Fig. 42: Front Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

5. Install Front Brake Rotor (1) **Front Brake Rotor Replacement**

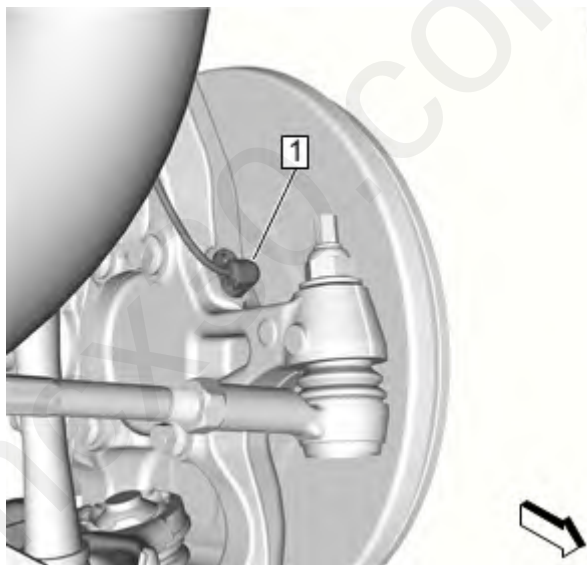


Fig. 43: Front Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

6. Install Front Wheel Speed Sensor (1) **Front Wheel Speed Sensor Replacement**

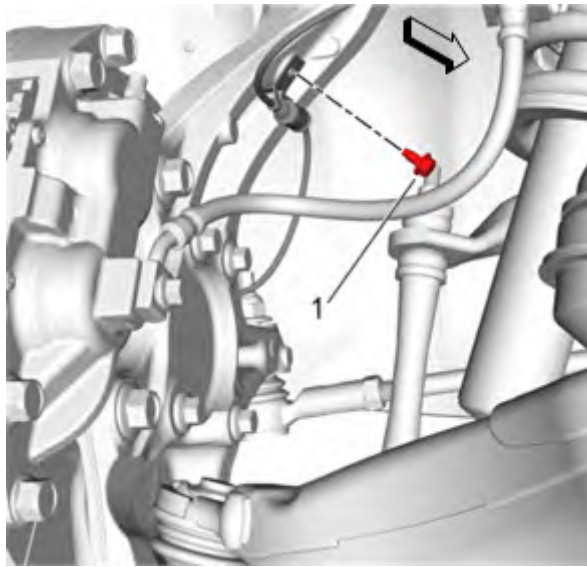


Fig. 44: Front Wheel Speed Sensor Harness Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

7. Install the front wheel speed sensor harness bracket bolt (1). [Front Wheel Speed Sensor Replacement](#)
8. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
9. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

UPPER CONTROL ARM REPLACEMENT

Special Tools

- CH-43631 Ball Joint Separator
- EN-45059 Torque Angle Meter

Equivalent regional tools: [Special Tools](#)

Removal Procedure

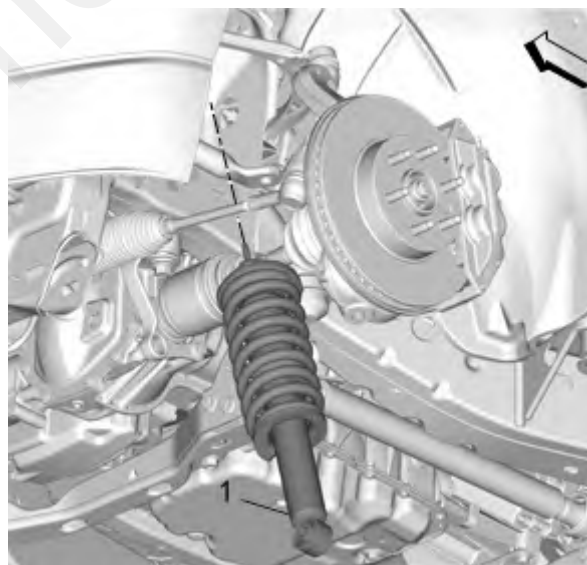


Fig. 45: Front Shock Absorber And Spring Assembly
 Courtesy of GENERAL MOTORS COMPANY

Front Shock Absorber and Spring Assembly (1) **Shock Absorber and Spring Removal and Installation**

2. Support the steering knuckle with a suitable support.

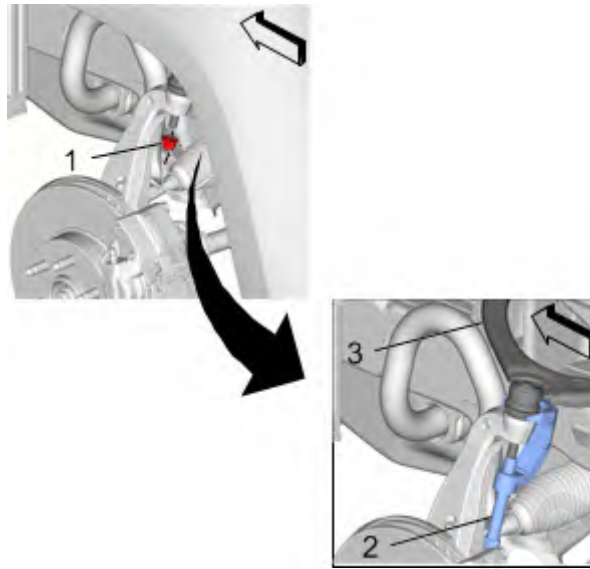


Fig. 46: Front Upper Control Arm Ball Stud Nut
Courtesy of GENERAL MOTORS COMPANY

3. Remove Front Upper Control Arm Ball Stud Nut (1)
4. Use the **CH-43631** separator (2) to separate the front upper control arm (3) from the steering knuckle.

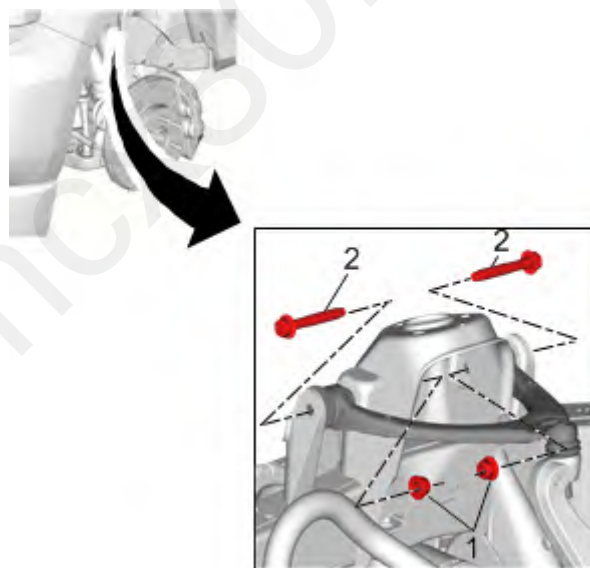


Fig. 47: Front Upper Control Arm Bolt
Courtesy of GENERAL MOTORS COMPANY

5. Remove Front Upper Control Arm Nut (1)
6. Remove Front Upper Control Arm Bolt (2)

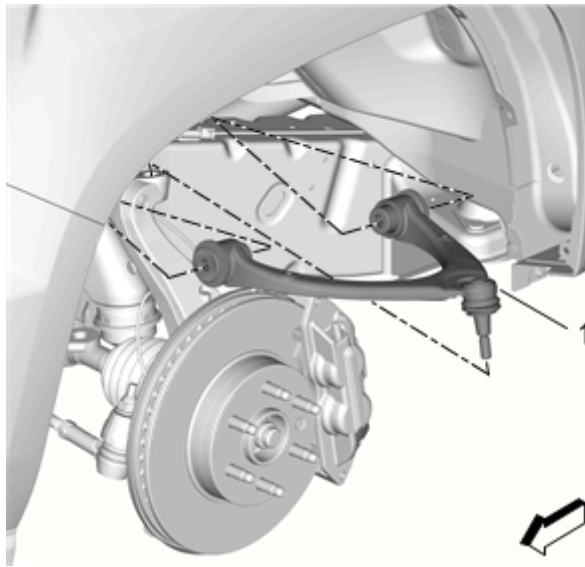


Fig. 48: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

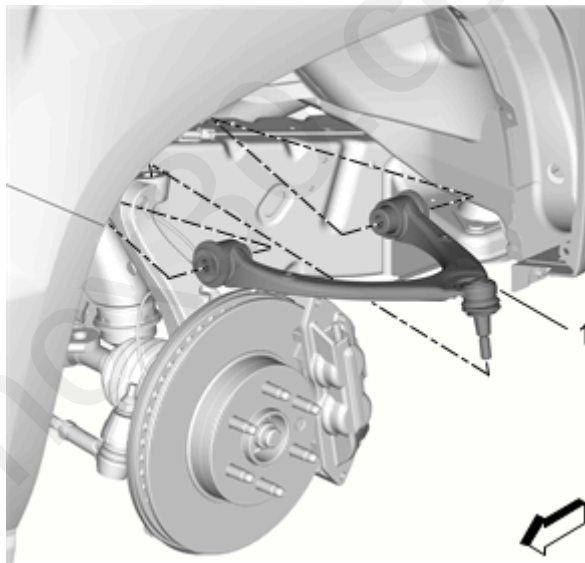


Fig. 49: Front Upper Control Arm

Courtesy of GENERAL MOTORS COMPANY

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

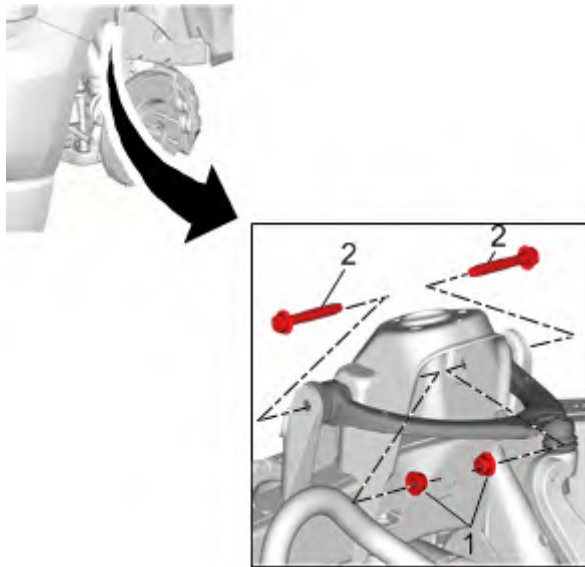


Fig. 50: Front Upper Control Arm Bolt
 Courtesy of GENERAL MOTORS COMPANY

2. Install Front Upper Control Arm Bolt (2)

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

3. Install Front Upper Control Arm Nut (1) and tighten 160 N.m (118 lb ft)

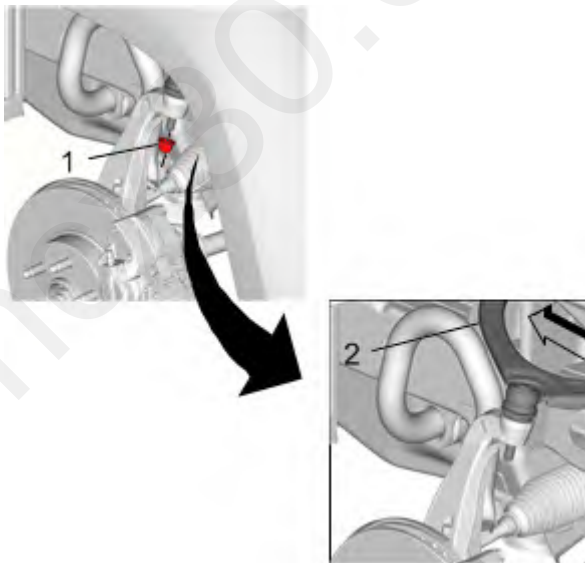


Fig. 51: Front Upper Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

4. Install Front Upper Control Arm Ball Stud Nut (1)
5. Use the **EN-45059** meter to tighten the front upper control arm ball stud nut (1).

Tighten

1. First Pass: 50 N.m (37 lb ft)
 2. Final Pass: (90-110 degrees)
6. Remove the support from the steering knuckle.

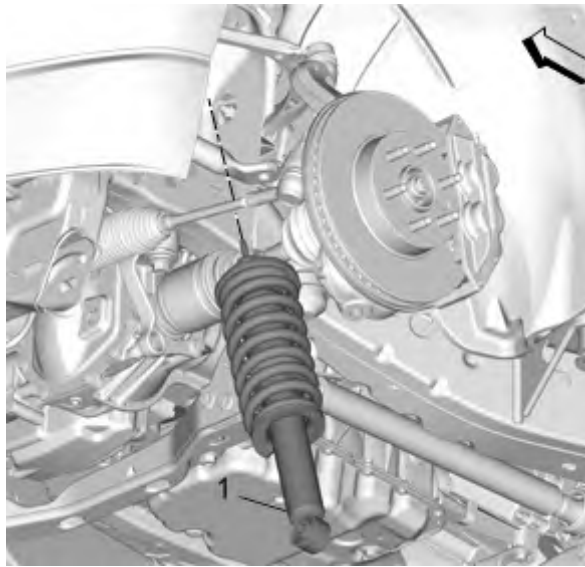


Fig. 52: Front Shock Absorber And Spring Assembly

Courtesy of GENERAL MOTORS COMPANY

7. Install Front Shock Absorber and Spring Assembly (1) [Shock Absorber and Spring Removal and Installation](#)
8. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

LOWER CONTROL ARM REPLACEMENT (2WD)

Special Tools

- CH-43631 Ball Joint Separator
- EN-45059 Torque Angle Meter

Equivalent regional tools: [Special Tools](#)

Removal Procedure

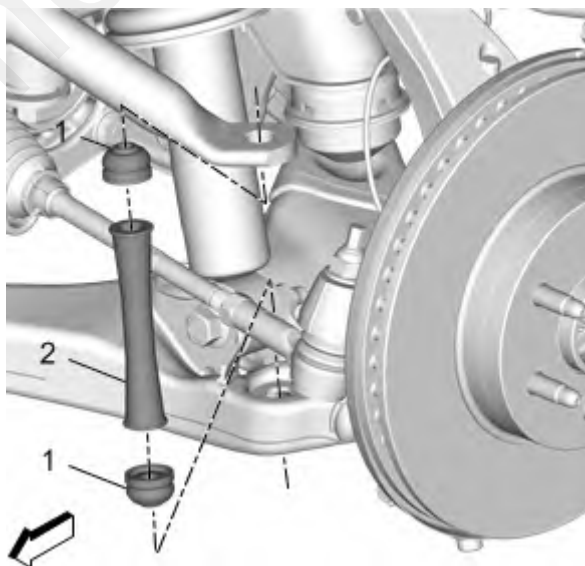


Fig. 53: Front Stabilizer Shaft Link

Courtesy of GENERAL MOTORS COMPANY

1. Remove Front Stabilizer Shaft Link (2) [Stabilizer Shaft Link Replacement](#)

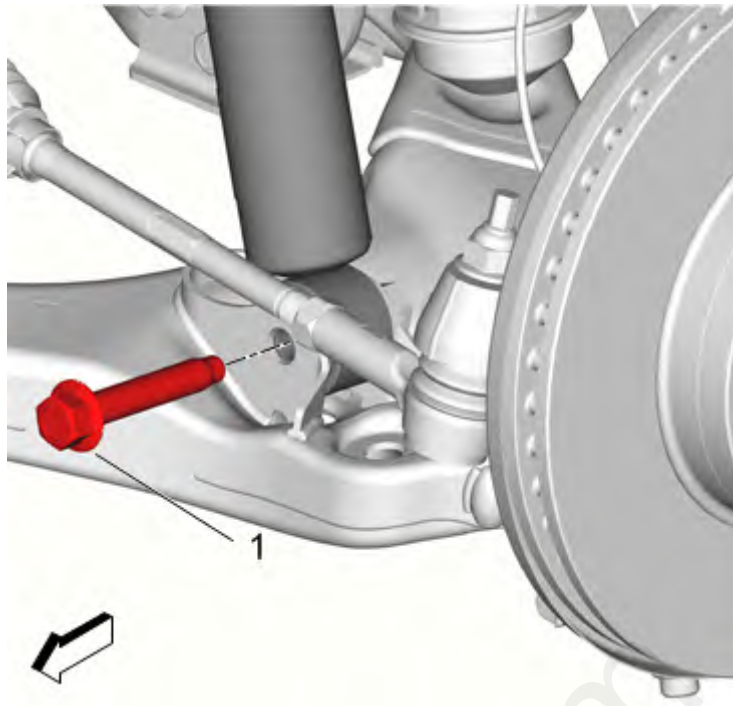


Fig. 54: Front Shock Absorber Lower Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

2. Remove the front shock absorber lower bracket bolt (1). **Shock Absorber and Spring Removal and Installation**

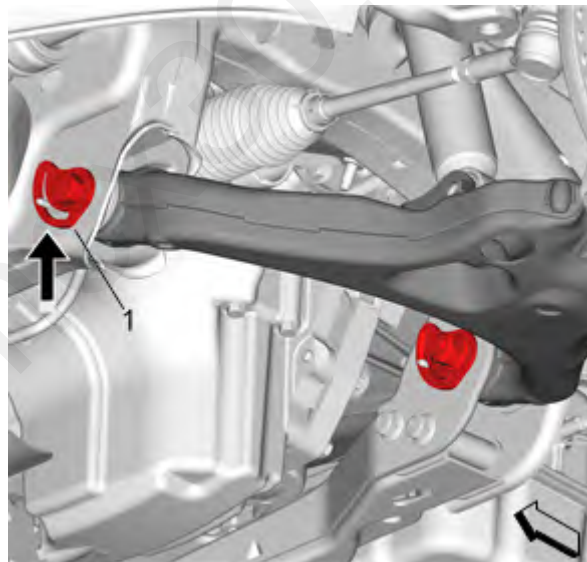


Fig. 55: Front Lower Control Arm Front Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

3. Mark the position of the front lower control arm front adjust cam (1).

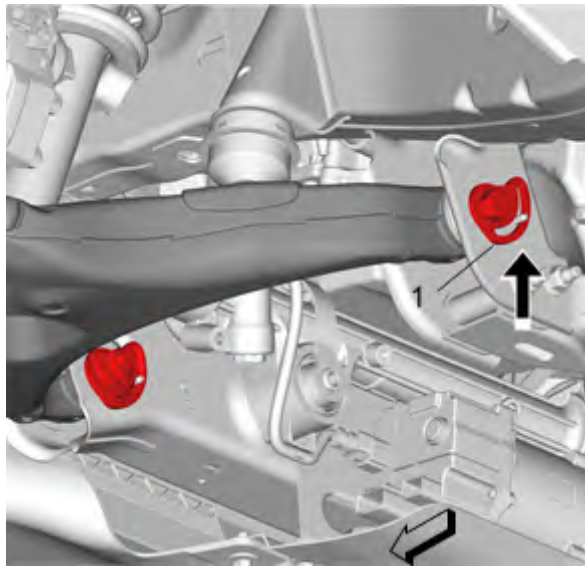


Fig. 56: Front Lower Control Arm Rear Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

4. Mark the position of the front lower control arm rear adjust cam (1).

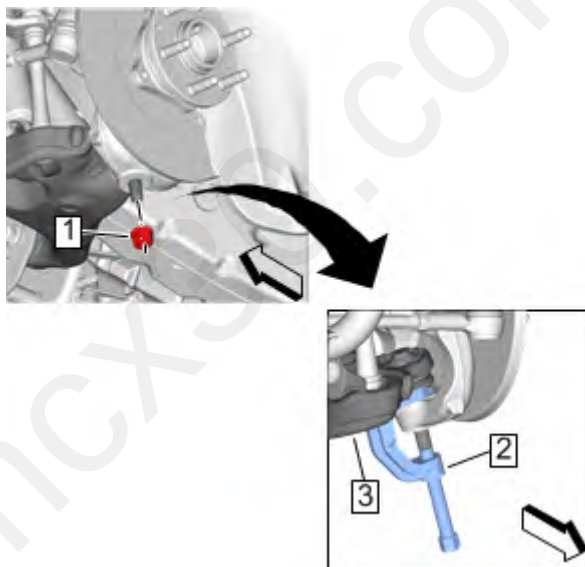


Fig. 57: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

5. Remove Front Lower Control Arm Ball Stud Nut (1)
6. Use the **CH-43631** separator (2) to separate the front lower control arm (3) from the steering knuckle.

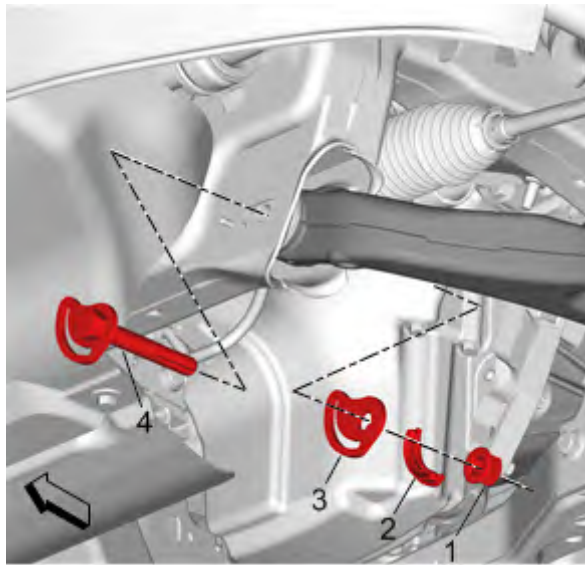


Fig. 58: Front Lower Control Arm Nut And Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

NOTE: 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.

7. Remove the front lower control arm nut (1), front lower control arm adjust cam insert (2), front lower control arm adjust cam (3), and front lower control arm adjust bolt (4).

DISCARD the insert.

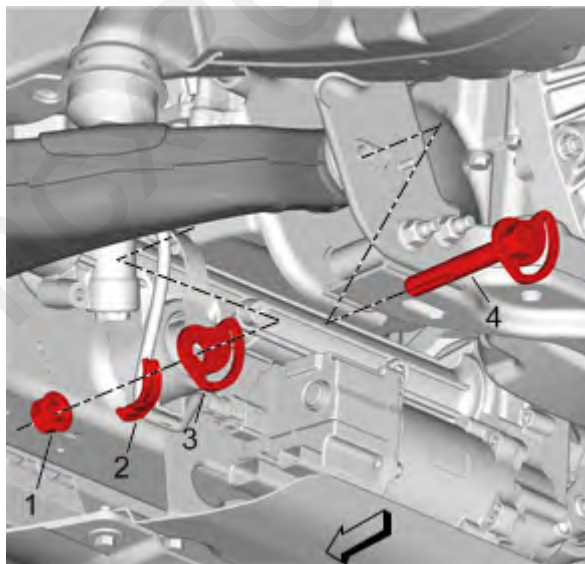


Fig. 59: Front Lower Control Arm Nut
 Courtesy of GENERAL MOTORS COMPANY

NOTE: 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.

8. Remove the front lower control arm nut (1), front lower control arm adjust cam insert (2), front lower control arm adjust cam (3), and front lower control arm adjust bolt (4).

DISCARD the insert.

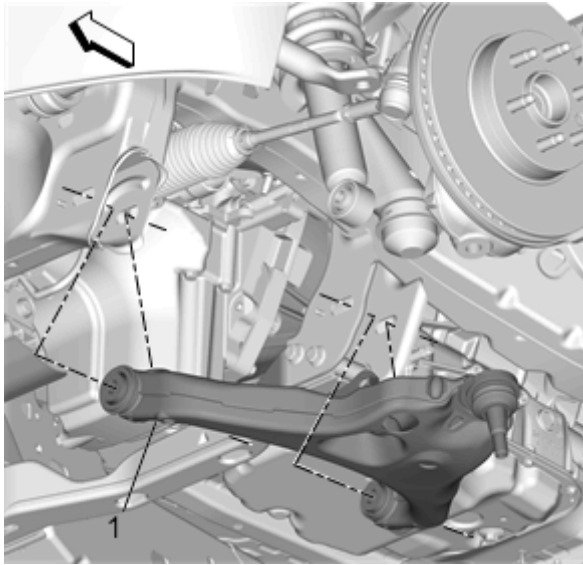


Fig. 60: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

9. Remove the front lower control arm (1) from the vehicle.

Installation Procedure

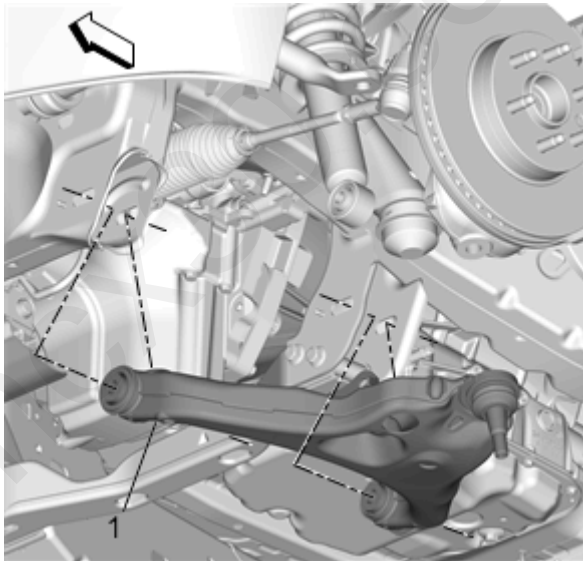


Fig. 61: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

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

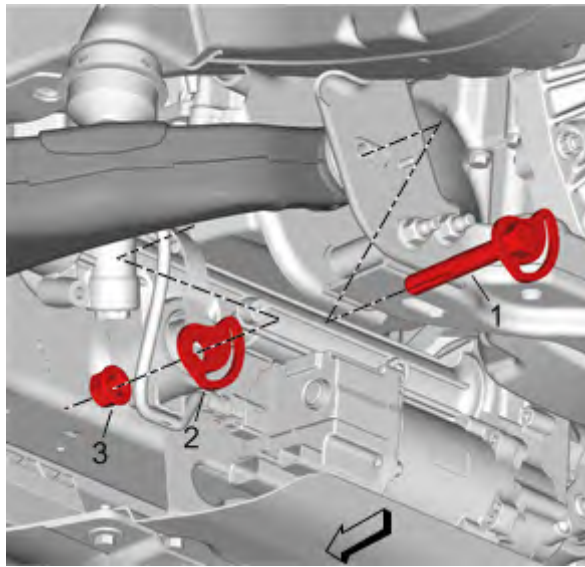


Fig. 62: Front Lower Control Arm Adjust Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Install the front lower control arm adjust bolt (1), front lower control arm adjust cam (2), and front lower control arm nut (3).

Lightly tighten the fastener but do NOT tighten to specification.

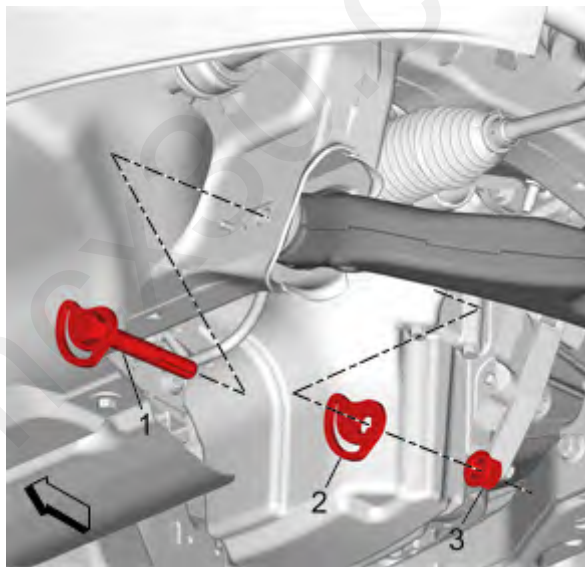


Fig. 63: Front Lower Control Arm Adjust Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install the front lower control arm adjust bolt (1), front lower control arm adjust cam (2), and front lower control arm nut (3).

Lightly tighten the fastener but do NOT tighten to specification.

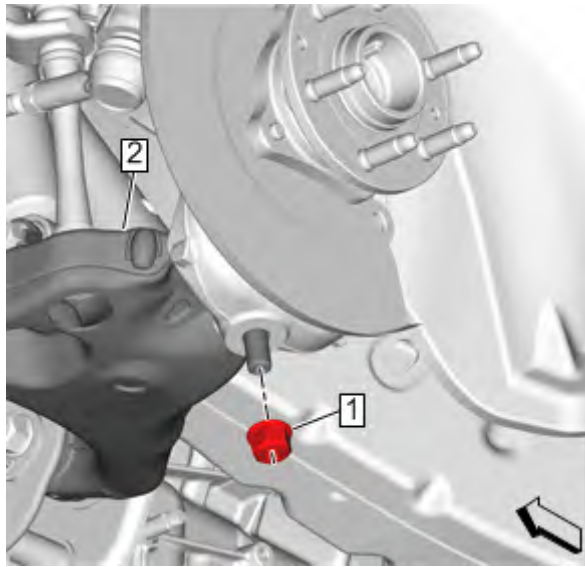


Fig. 64: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

4. Install Front Lower Control Arm Ball Stud Nut (1)

Lightly tighten the fastener but do NOT tighten to specification.

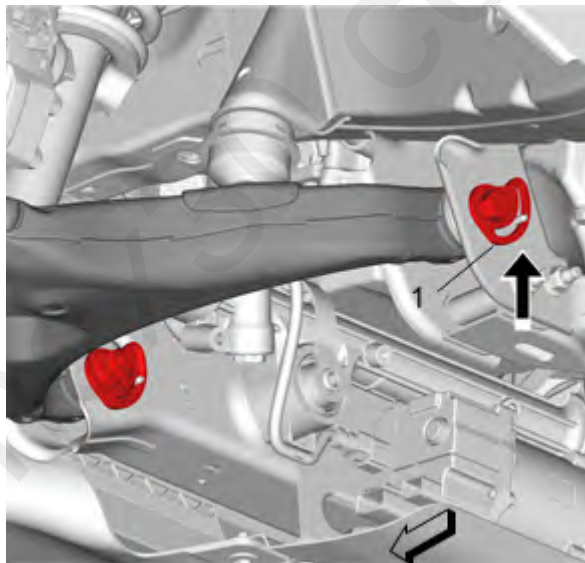


Fig. 65: Front Lower Control Arm Rear Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

5. Align the front lower control arm rear adjust cam (1) to the position previously marked.

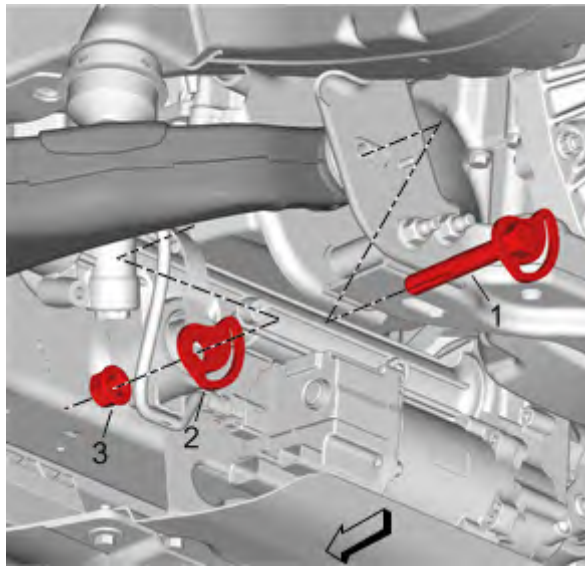


Fig. 66: Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

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

6. Tighten the front lower control arm nut (3) to 260 N.m (192 lb ft).

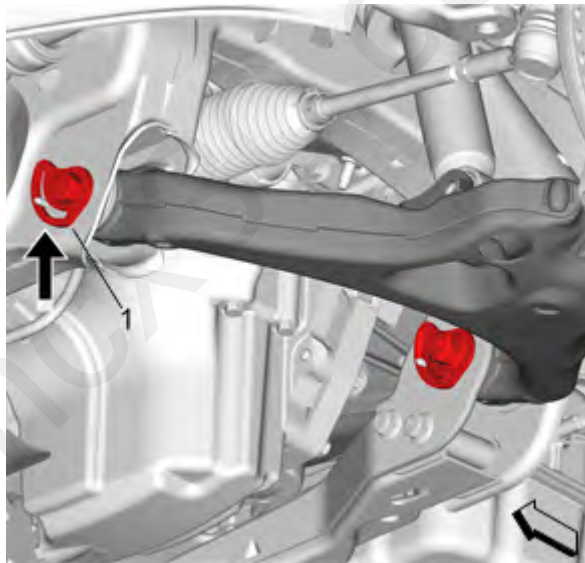


Fig. 67: Front Lower Control Arm Front Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

7. Align the front lower control arm front adjust cam (1) to the position previously marked.

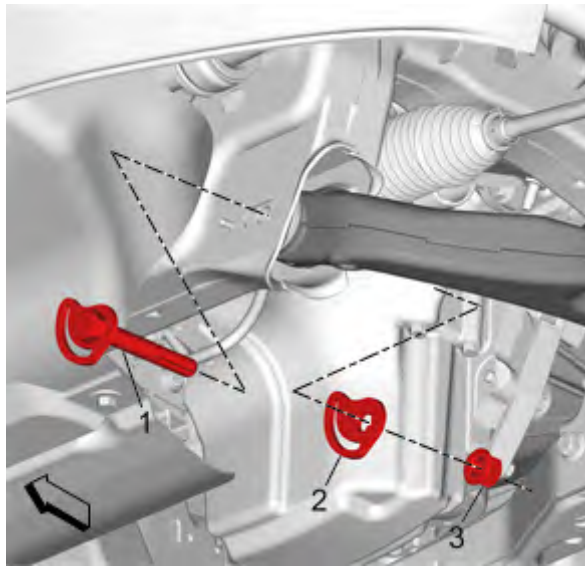


Fig. 68: Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

8. Tighten the front lower control arm nut (3) to 260 N.m (192 lb ft).

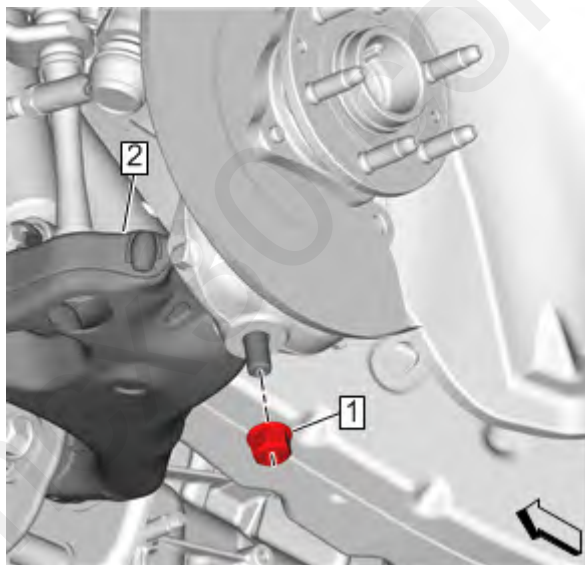


Fig. 69: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

9. Use the **EN-45059** meter to tighten the front lower control arm ball stud nut (1).

Tighten

1. First Pass: 65 N.m (48 lb ft)
2. Final Pass: (60-75 degrees)

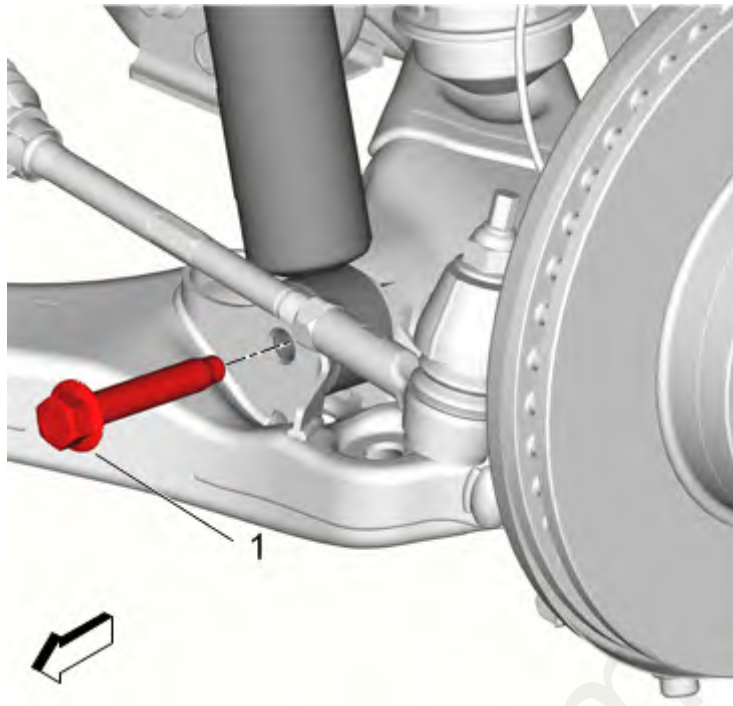


Fig. 70: Front Shock Absorber Lower Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

10. Install the front shock absorber lower bracket bolt (1). [Shock Absorber and Spring Removal and Installation](#)

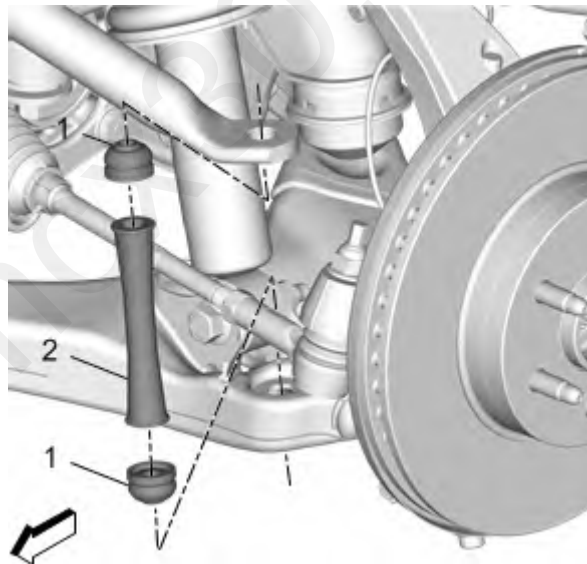


Fig. 71: Front Stabilizer Shaft Link
 Courtesy of GENERAL MOTORS COMPANY

11. Install Front Stabilizer Shaft Link (2) [Stabilizer Shaft Link Replacement](#)
12. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

LOWER CONTROL ARM REPLACEMENT (4WD)

Special Tools

- CH-43631 Ball Joint Separator

Equivalent regional tools: [Special Tools](#)

Removal Procedure

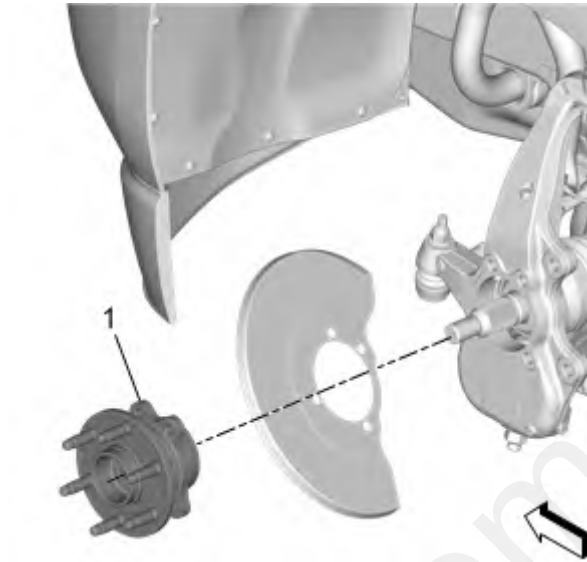


Fig. 72: Front Wheel Bearing and Hub Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Remove Front Wheel Bearing and Hub Assembly (1) [Front Wheel Bearing and Hub Replacement \(4WD\)](#)

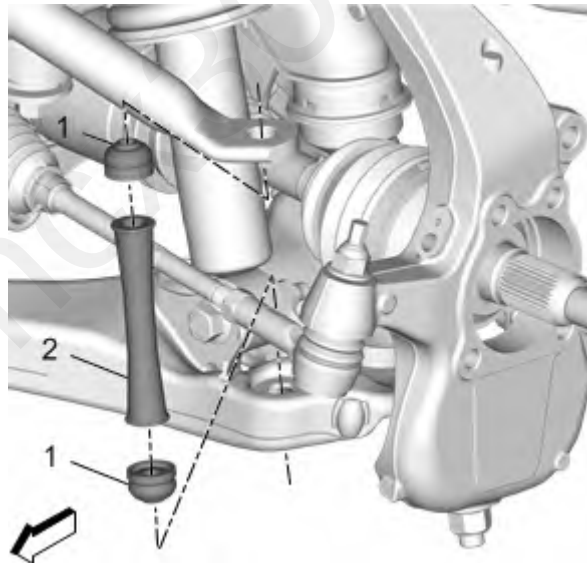


Fig. 73: Front Stabilizer Shaft Link
Courtesy of GENERAL MOTORS COMPANY

2. Remove Front Stabilizer Shaft Link (2) [Stabilizer Shaft Link Replacement](#)

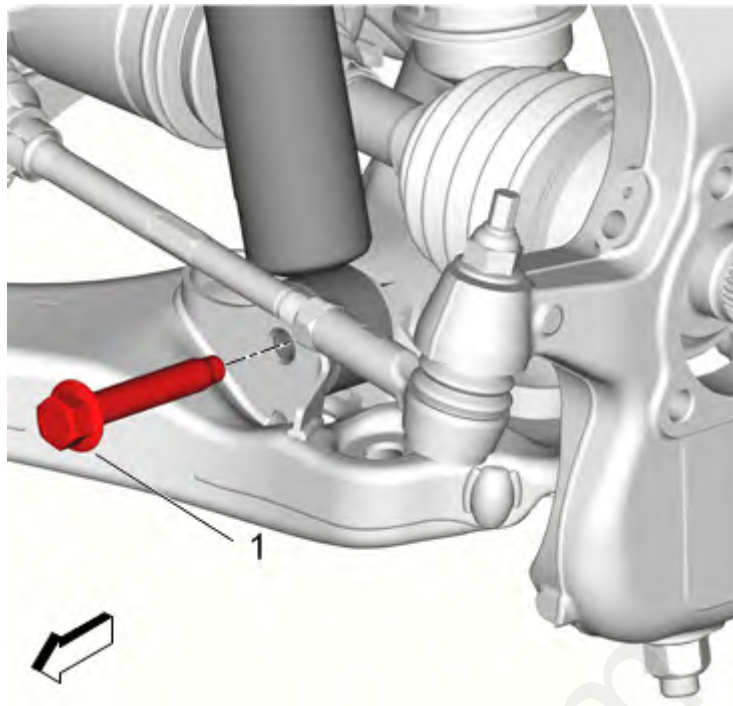


Fig. 74: Front Shock Absorber Lower Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front shock absorber lower bracket bolt (1). **Shock Absorber and Spring Removal and Installation**

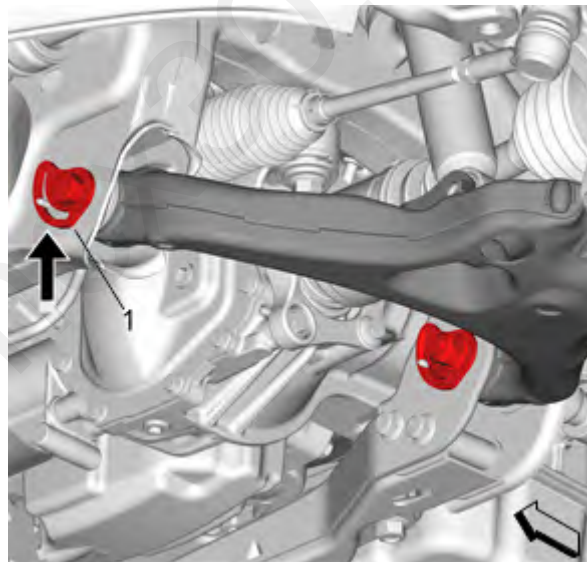


Fig. 75: Front Lower Control Arm Front Adjust Cam
Courtesy of GENERAL MOTORS COMPANY

4. Mark the position of the front lower control arm front adjust cam (1).

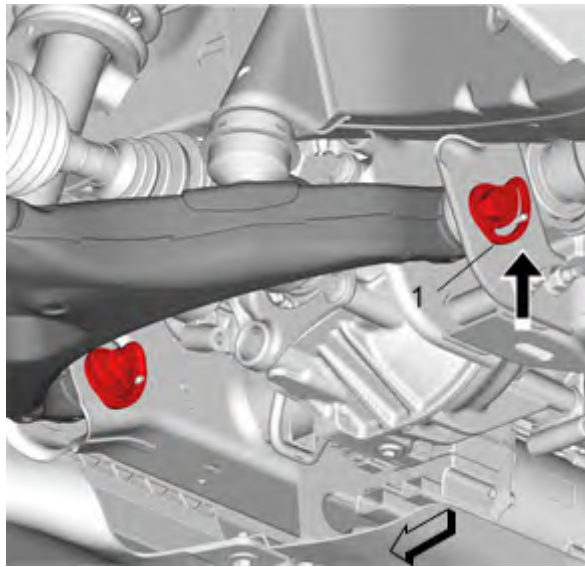


Fig. 76: Front Lower Control Arm Rear Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

5. Mark the position of the front lower control arm rear adjust cam (1).

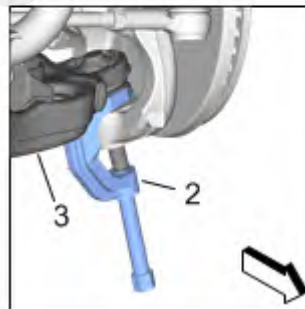
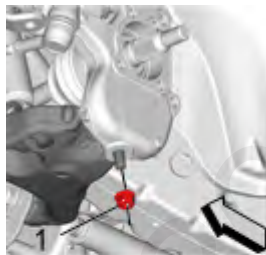


Fig. 77: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

6. Remove Front Lower Control Arm Ball Stud Nut (1)
7. Use the **CH-43631** separator (2) to separate the front lower control arm (3) from the steering knuckle.

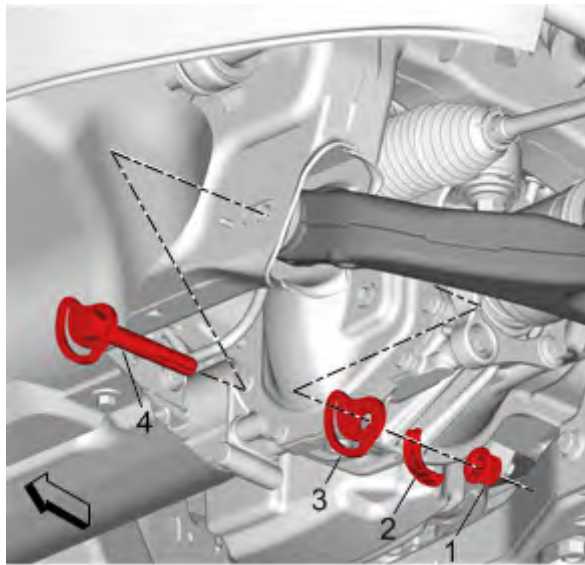


Fig. 78: Font Lower Control Arm Nut And Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

NOTE: 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.

8. Remove the front lower control arm nut (1), front lower control arm adjust cam insert (2), front lower control arm adjust cam (3), and front lower control arm adjust bolt (4).

DISCARD the insert.

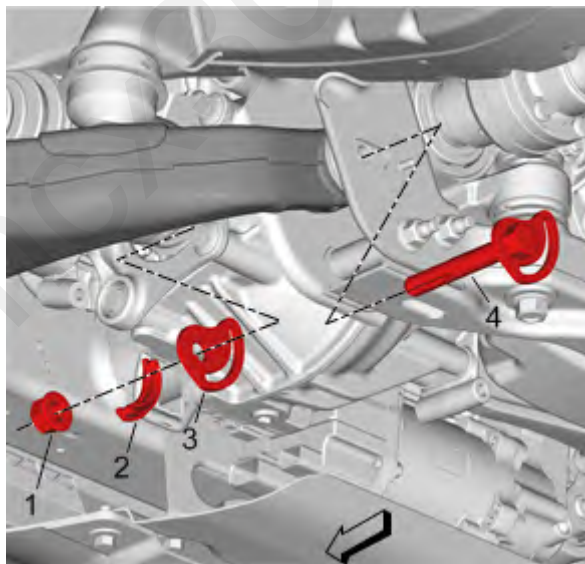


Fig. 79: Front Lower Control Arm Nut And Front Lower Control Arm Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

NOTE: 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 lower control arm nut (1), front lower control arm adjust cam insert (2), front lower control arm adjust cam (3), and front lower control arm adjust bolt (4).

DISCARD the insert.

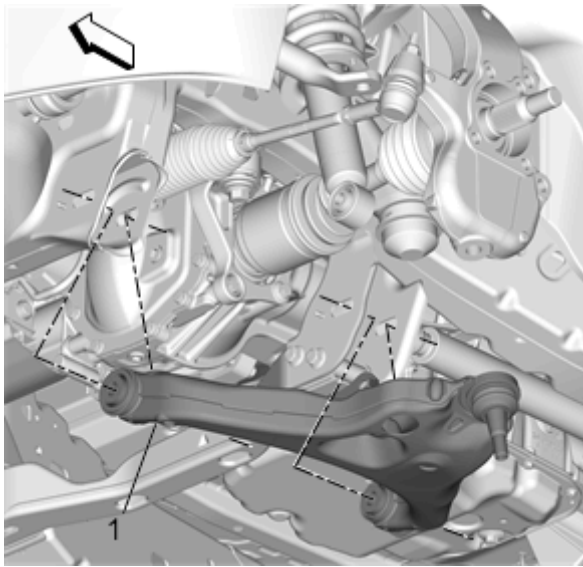


Fig. 80: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

10. Remove the front lower control arm (1) from the vehicle.

Installation Procedure

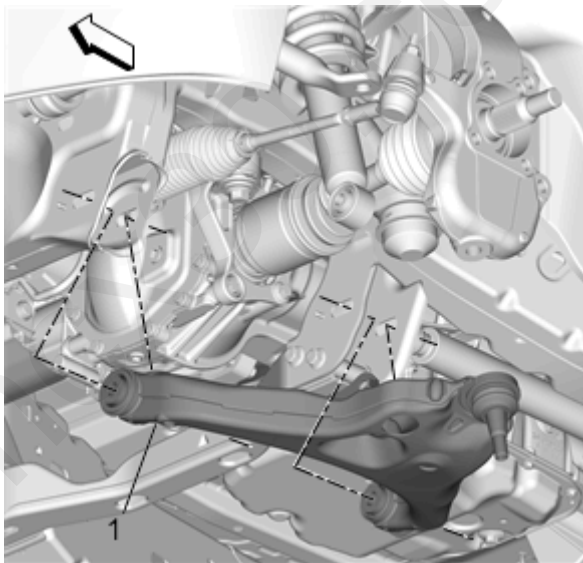


Fig. 81: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

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

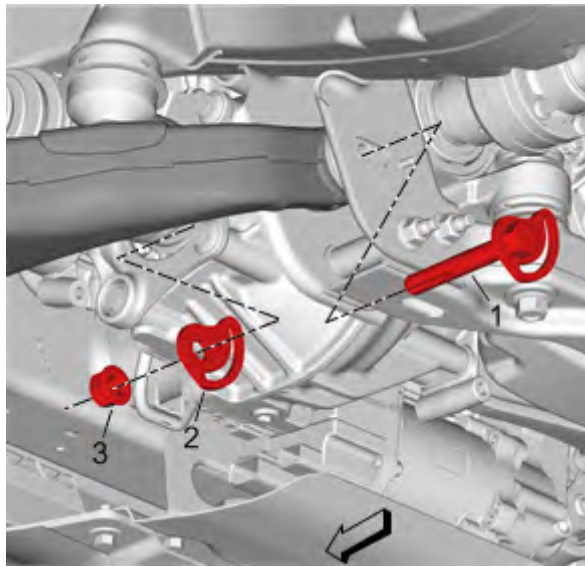


Fig. 82: Front Lower Control Arm Adjust Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Install the front lower control arm adjust bolt (1), front lower control arm adjust cam (2), and front lower control arm nut (3).

Lightly tighten the fastener but do NOT tighten to specification.

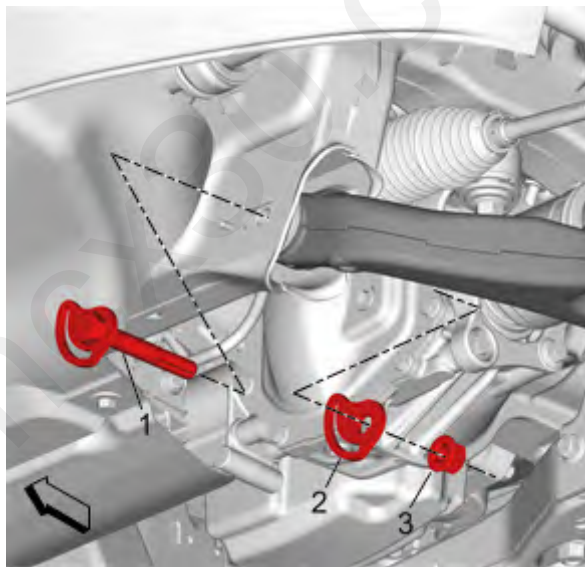


Fig. 83: Front Lower Control Arm Adjust Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install the front lower control arm adjust bolt (1), front lower control arm adjust cam (2), and front lower control arm nut (3).

Lightly tighten the fastener but do NOT tighten to specification.

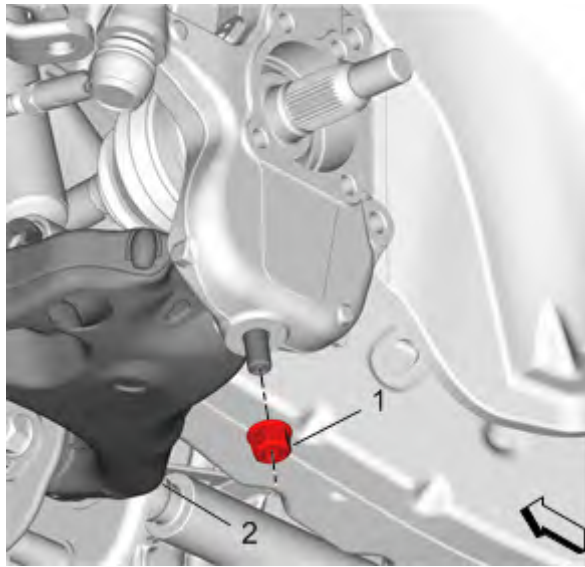


Fig. 84: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

4. Install Front Lower Control Arm Ball Stud Nut (1)

Lightly tighten the fastener but do NOT tighten to specification.

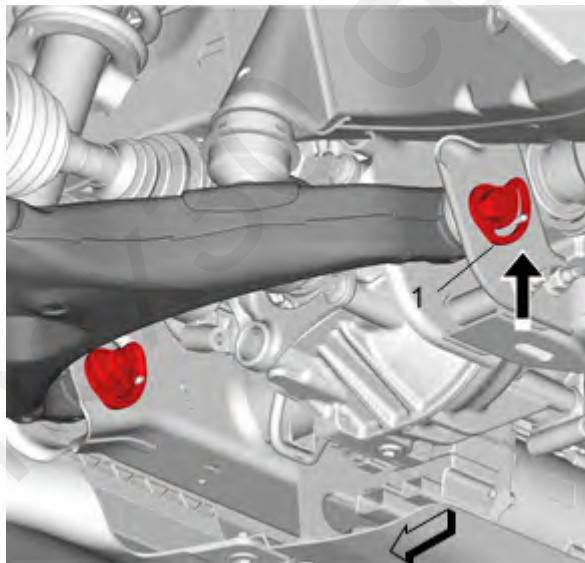


Fig. 85: Front Lower Control Arm Rear Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

5. Align the front lower control arm rear adjust cam (1) to the position previously marked.

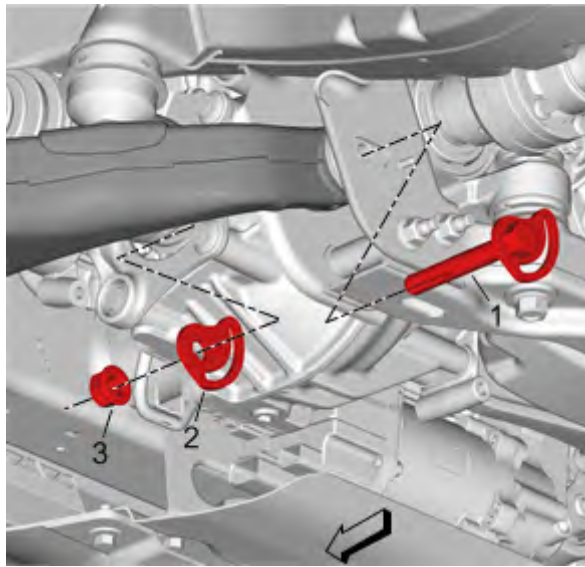


Fig. 86: Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

6. Tighten the front lower control arm nut (3) to 260 N.m (192 lb ft).

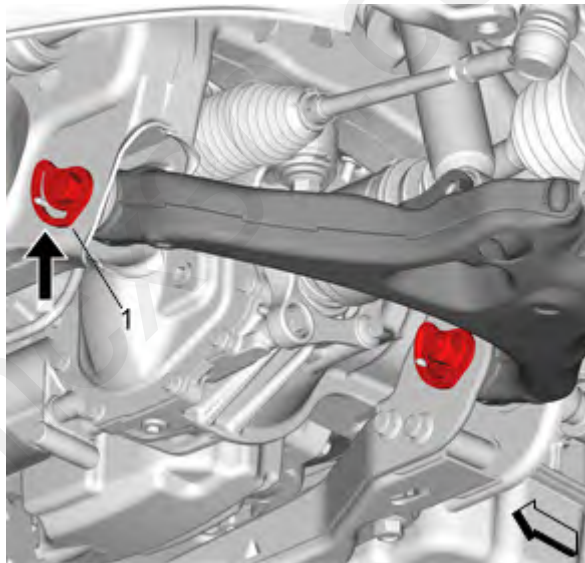


Fig. 87: Front Lower Control Arm Front Adjust Cam
 Courtesy of GENERAL MOTORS COMPANY

7. Align the front lower control arm front adjust cam (1) to the position previously marked.

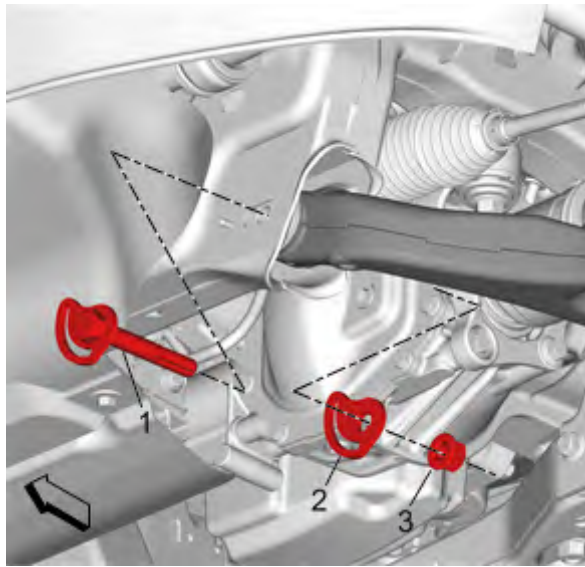


Fig. 88: Front Lower Control Arm Adjust Bolt
 Courtesy of GENERAL MOTORS COMPANY

8. Tighten the front lower control arm nut (3) to 260 N.m (192 lb ft).

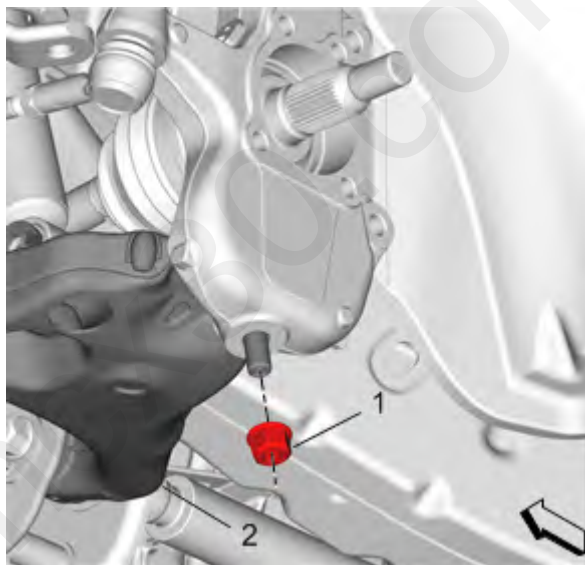


Fig. 89: Front Lower Control Arm Ball Stud Nut
 Courtesy of GENERAL MOTORS COMPANY

9. Use the **EN-45059** meter to tighten the front lower control arm ball stud nut (1).

Tighten

1. First Pass: 65 N.m (48 lb ft)
2. Final Pass: (60-75 degrees)

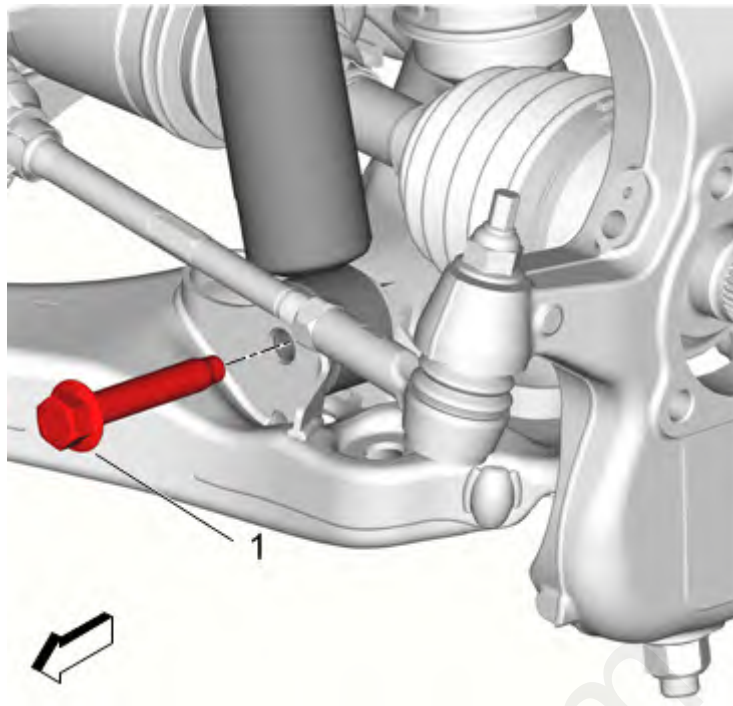


Fig. 90: Front Shock Absorber Lower Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

10. Install the front shock absorber lower bracket bolt (1). [Shock Absorber and Spring Removal and Installation](#)

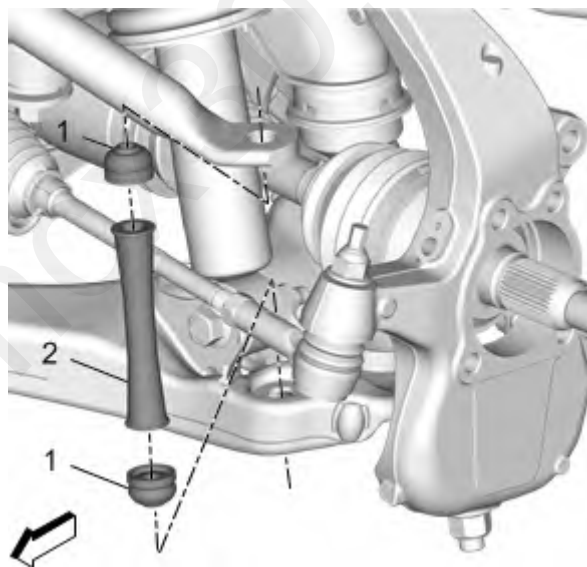
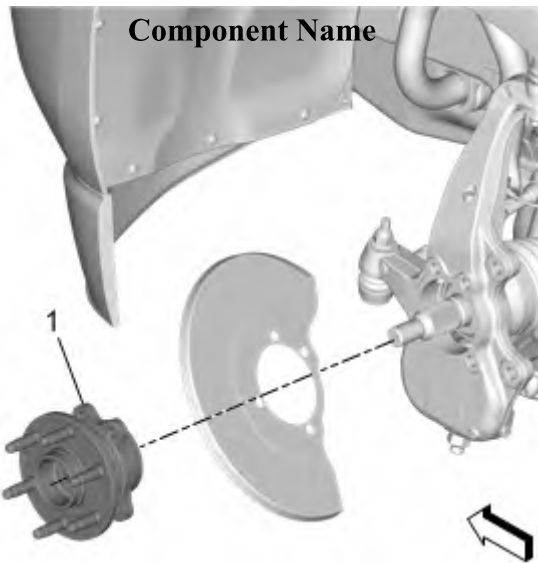


Fig. 91: Front Stabilizer Shaft Link
 Courtesy of GENERAL MOTORS COMPANY

11. Install Front Stabilizer Shaft Link (2) [Stabilizer Shaft Link Replacement](#)



Component Name

Fig. 92: Front Wheel Bearing and Hub Assembly
 Courtesy of GENERAL MOTORS COMPANY

- 12. Install Front Wheel Bearing and Hub Assembly (1)[Front Wheel Bearing and Hub Replacement \(4WD\)](#)
- 13. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

FRONT LOWER CONTROL ARM BUMPER REPLACEMENT

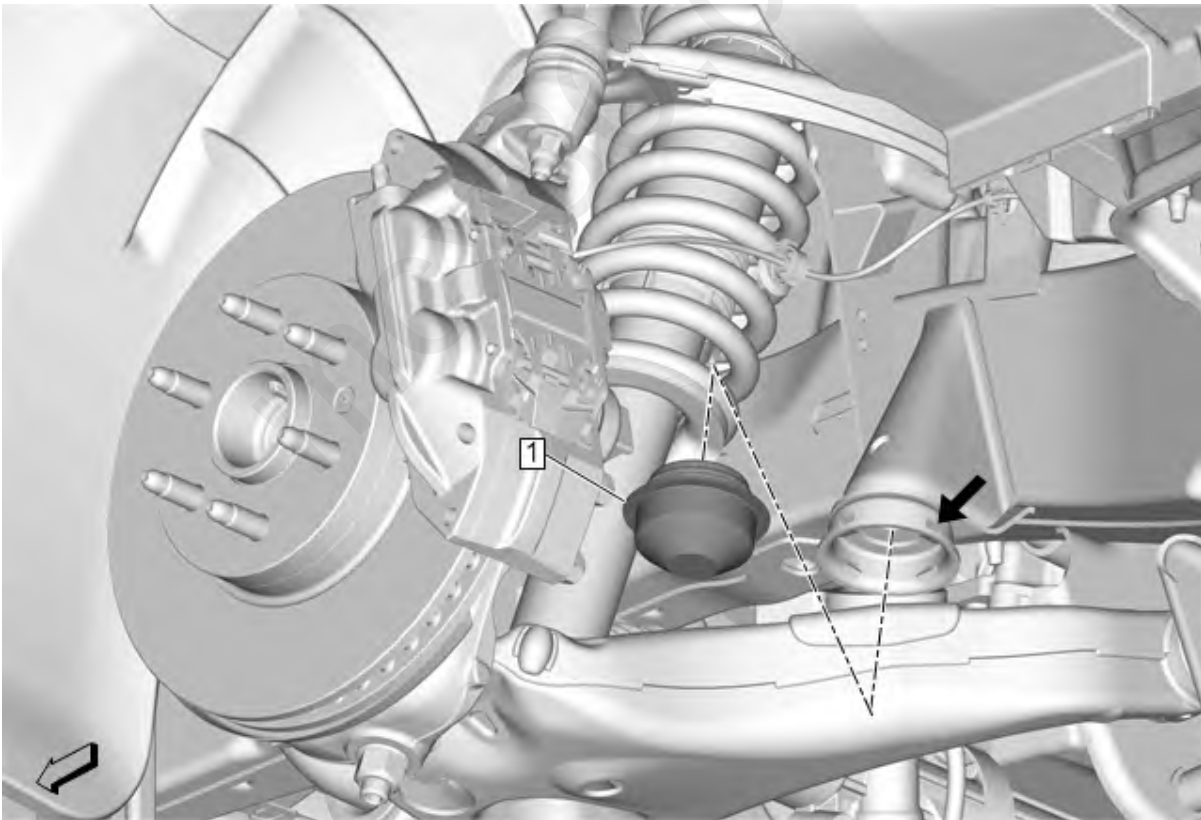


Fig. 93: Front Lower Control Arm Bumper
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove the front tire and wheel assembly. <u>Tire and Wheel Removal and Installation</u>	

Component Name

1	Front Lower Control Arm Bumper Procedure Use an appropriate tool to pry the front lower control arm bumper from the front frame mount cup. NOTE: Use a small amount of grease to help install the front lower control arm bumper in the front frame mount cup.
---	---

WHEEL STUD REPLACEMENT

Special Tools

CH-43631 Ball Joint Separator

Equivalent regional tools: Special Tools

Removal Procedure

1. Front Wheel Bearing and Hub Assembly » Remove — Front Wheel Bearing and Hub Replacement (4WD) Front Wheel Bearing and Hub Replacement (2WD)

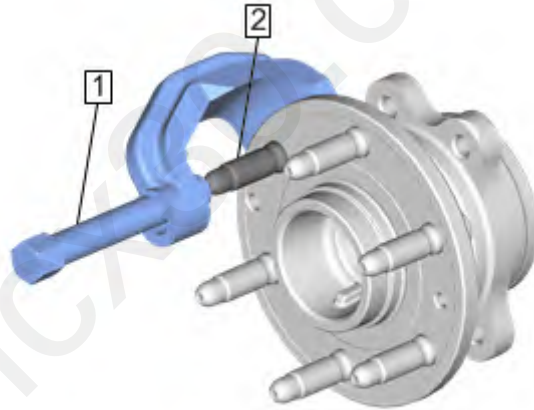


Fig. 94: Wheel Stud

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

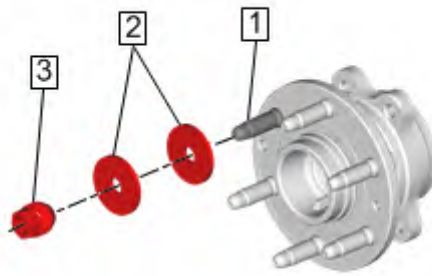


Fig. 95: NEW Wheel Stud, OLD Wheel Stud And Flat Washers

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 Wheel Bearing and Hub Assembly » Install — [Front Wheel Bearing and Hub Replacement \(4WD\)](#)[Front Wheel Bearing and Hub Replacement \(2WD\)](#)

STRUT AND SHOCK ABSORBER INSPECTION

- 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.

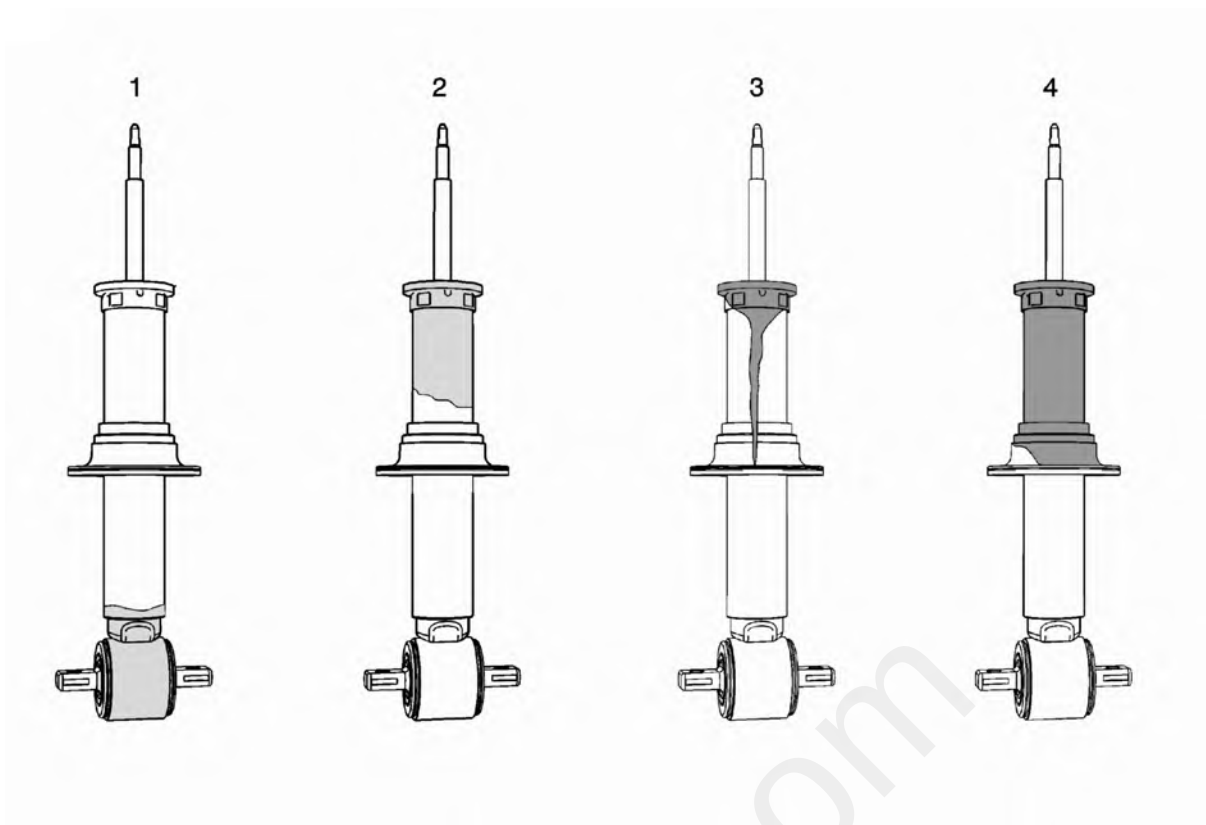


Fig. 96: Strut And Shock Absorber Inspection (Coil Over Shock)

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 perform the following inspection procedure.

id 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

Special Tools

EN-45059 Torque Angle Meter

Equivalent regional tools:[Special Tools](#)

Removal Procedure

1. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
2. Remove Front Wheelhouse Liner. [Front Wheelhouse Liner Replacement](#)

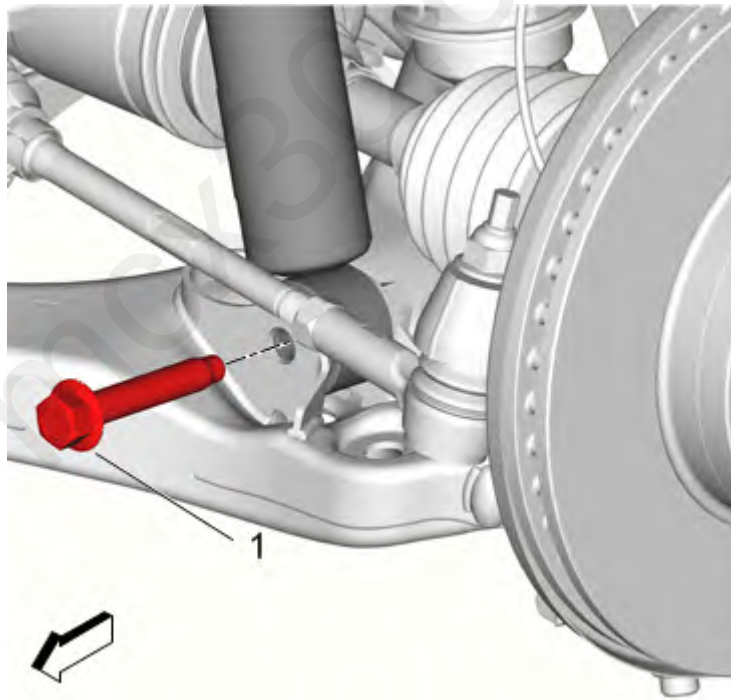


Fig. 97: Front Shock Absorber Lower Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front shock absorber lower bracket bolt (1).

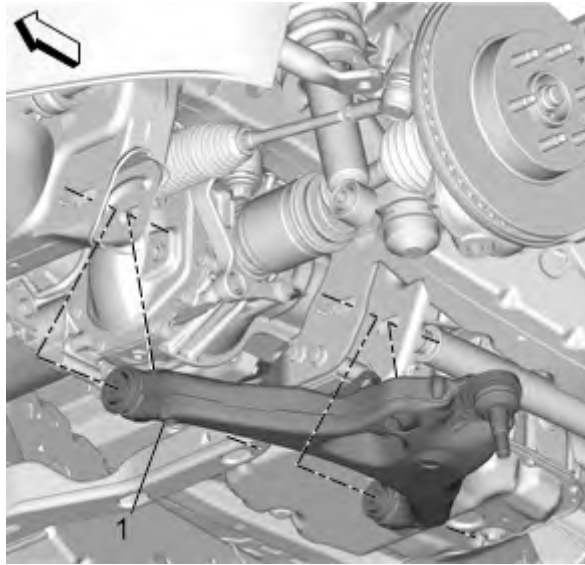


Fig. 98: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

4. Remove Front Lower Control Arm (1) **Lower Control Arm Replacement (2WD)****Lower Control Arm Replacement (4WD)**

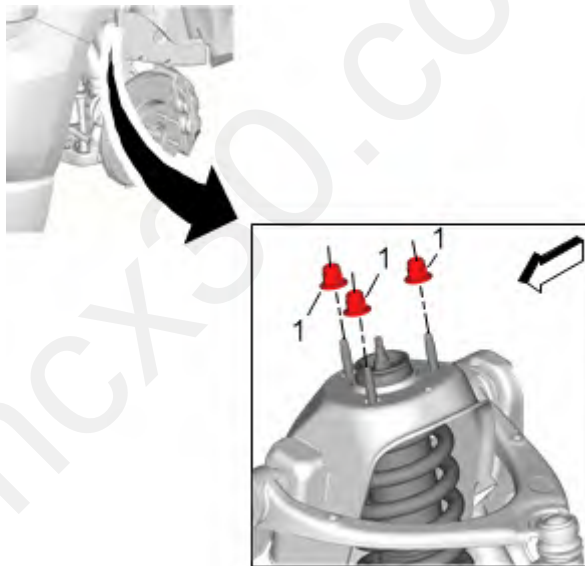


Fig. 99: Front Shock Absorber Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove Front Shock Absorber Nut (1)

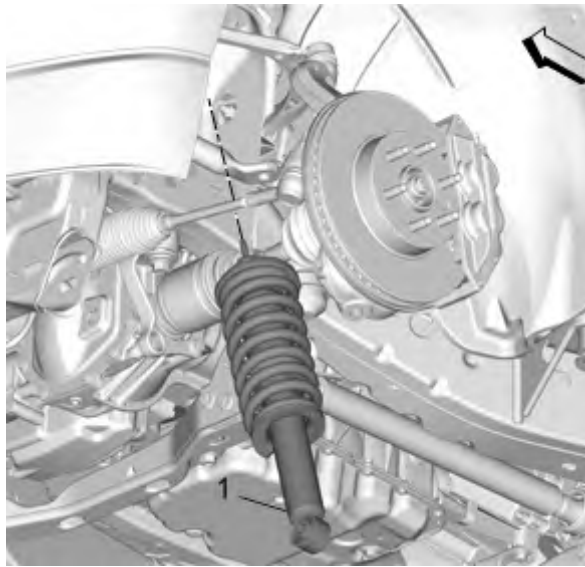


Fig. 100: Front Shock Absorber And Spring Assembly
Courtesy of GENERAL MOTORS COMPANY

6. Remove the front shock absorber and spring assembly (1) from the vehicle.

Installation Procedure

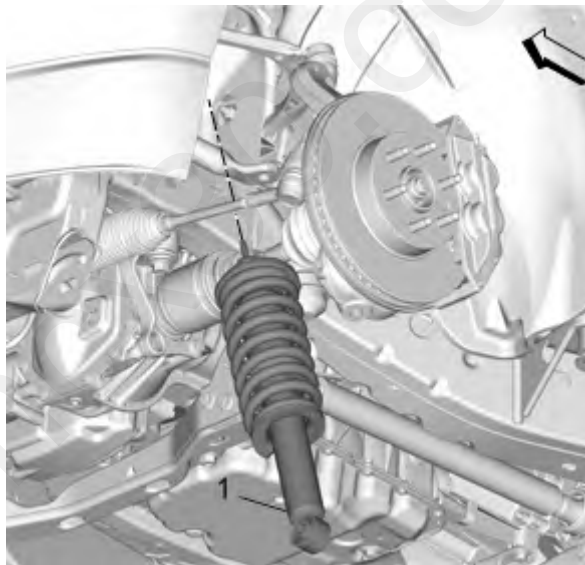


Fig. 101: Front Shock Absorber And Spring Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Position the front shock absorber and spring assembly (1) on the vehicle.

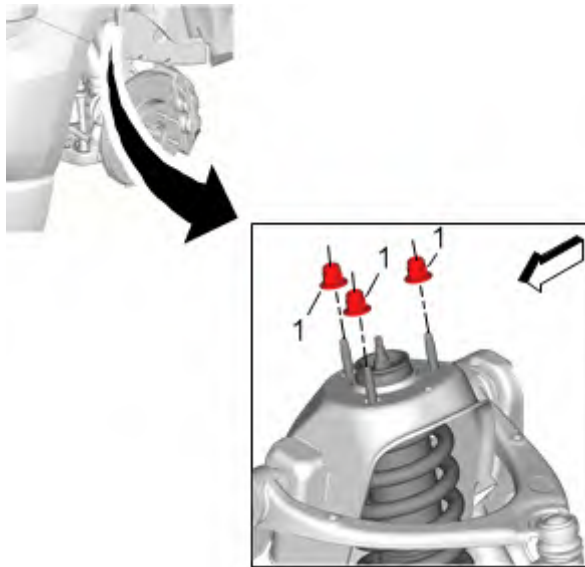


Fig. 102: Front Shock Absorber Nut

Courtesy of GENERAL MOTORS COMPANY

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

2. Install Front Shock Absorber Nut (1) and tighten 58 N.m (43 lb ft)

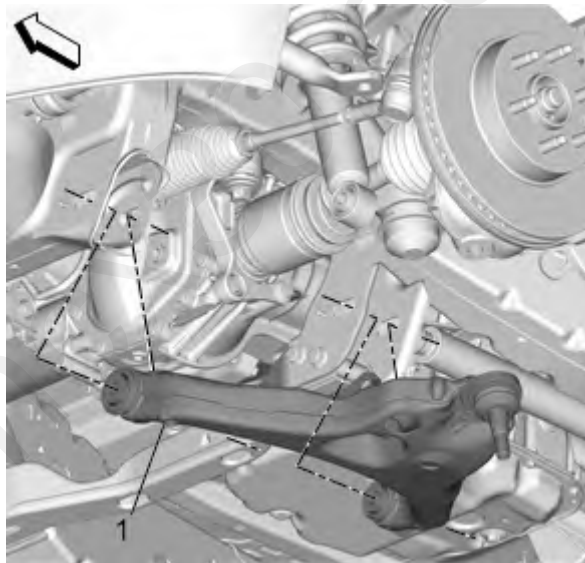


Fig. 103: Front Lower Control Arm

Courtesy of GENERAL MOTORS COMPANY

3. Install Front Lower Control Arm (1) [Lower Control Arm Replacement \(2WD\)](#)[Lower Control Arm Replacement \(4WD\)](#)

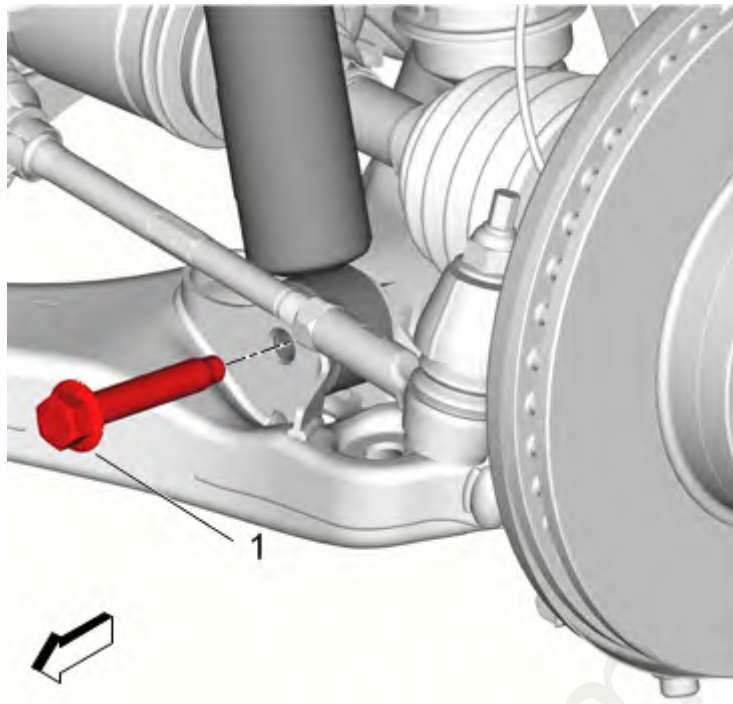


Fig. 104: Front Shock Absorber Lower Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Install the front shock absorber lower bracket bolt (1).
5. Use the **EN-45059** meter to tighten the front shock absorber lower bracket bolt (1).

Tighten

1. First Pass: 100 N.m (74 lb ft)
 2. Final Pass: (25-35 degrees)
6. Install Front Wheelhouse Liner [Front Wheelhouse Liner Replacement](#)
 7. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
 8. Measure and adjust the wheel alignment. [Wheel Alignment Measurement](#)

SHOCK ABSORBER, SHOCK ABSORBER COMPONENT, OR SPRING REPLACEMENT

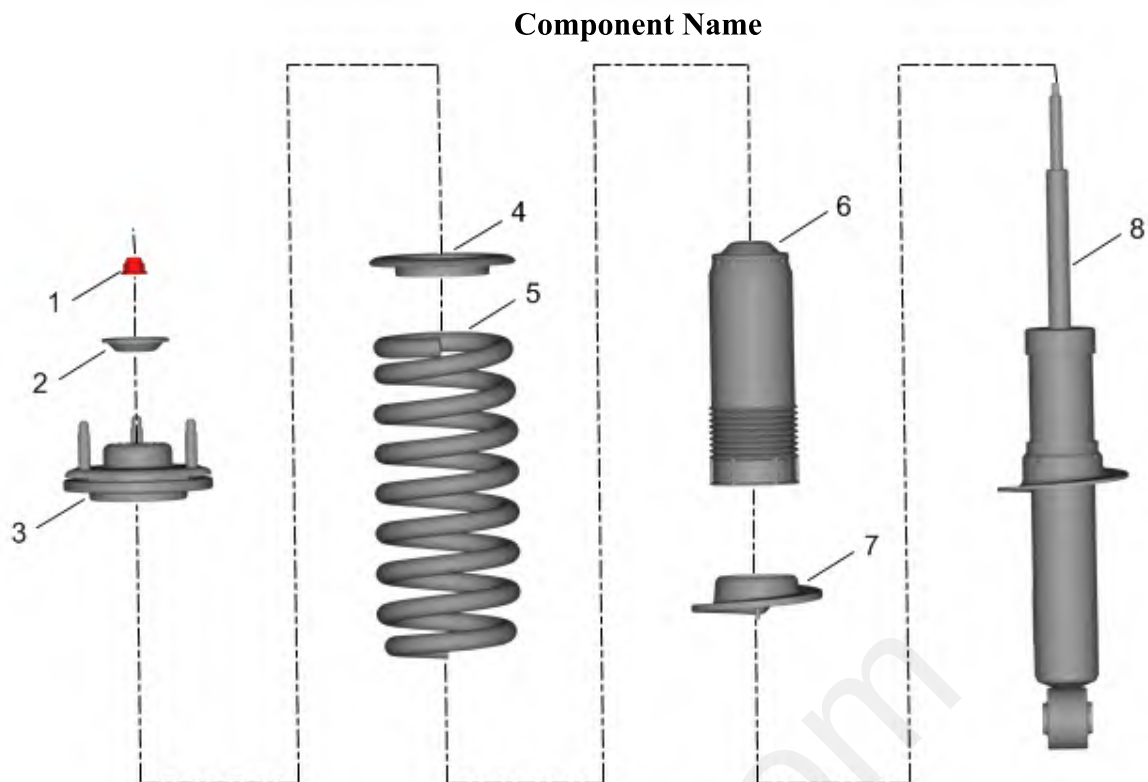


Fig. 105: Shock Absorber, Shock Absorber Component, or Spring

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 Shock Absorber and Spring Removal and Installation	
1	Front Shock Absorber Nut CAUTION: Refer to Fastener Caution . Procedure Use the CH-48845 compressor to compress the front shock absorber and spring assembly. Tighten 38 N.m (28 lb ft) Special Tools CH-48845 Strut Spring Compressor Equivalent regional tools: Special Tools
2	Front Shock Absorber Upper Washer
3	Front Shock Absorber Upper Mount
4	Front Shock Absorber Spring Upper Insulator
5	Front Shock Absorber Spring

	Component Name
6	Front Shock Absorber Dust Shield
7	Front Shock Absorber Spring Lower Insulator
8	Front 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.

The front suspension 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. A through bolt and nut secures 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 bolted to the upper control arm. The assembly attaches to the steering knuckle with a prevailing torque nut.

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

The upper 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

The upper part of each shock module attaches to the frame by 3 nuts. The lower part of the shock module attaches to the lower control arm by a through bolt and nut.

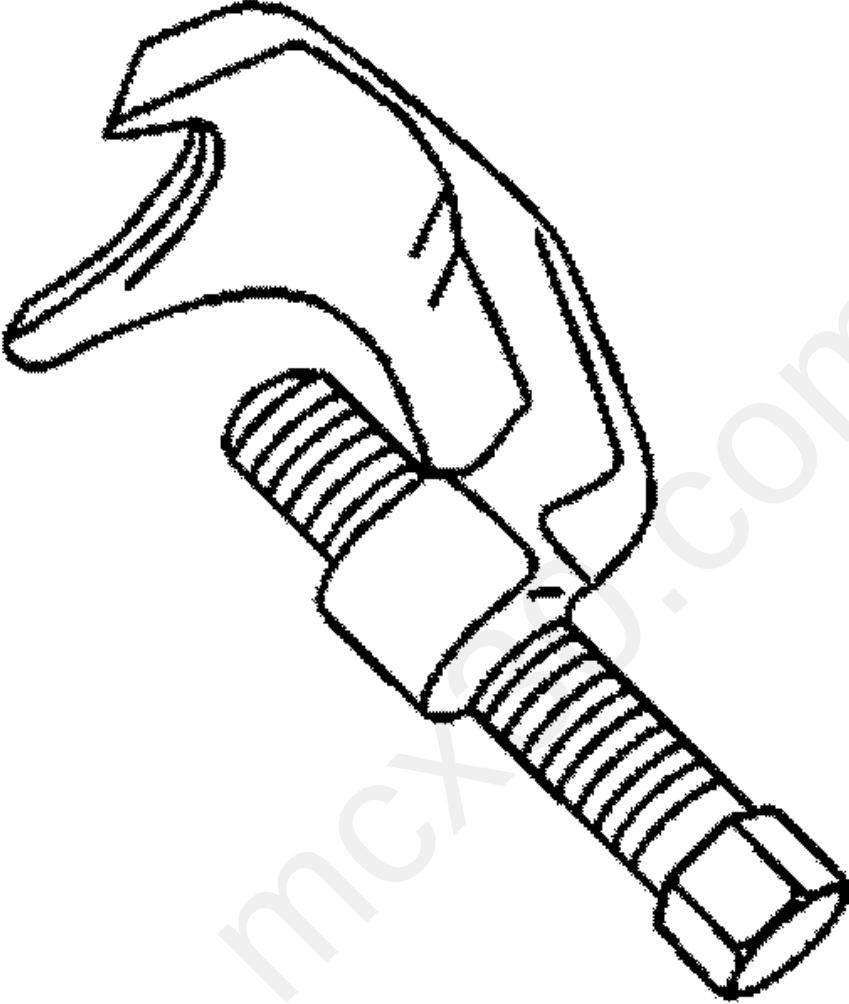
A spring steel stabilizer shaft controls the side roll of the front suspension. This shaft is mounted in rubber insulators that are held by clamps to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link assemblies.

----- **TOOLS AND EQUIPMENT**

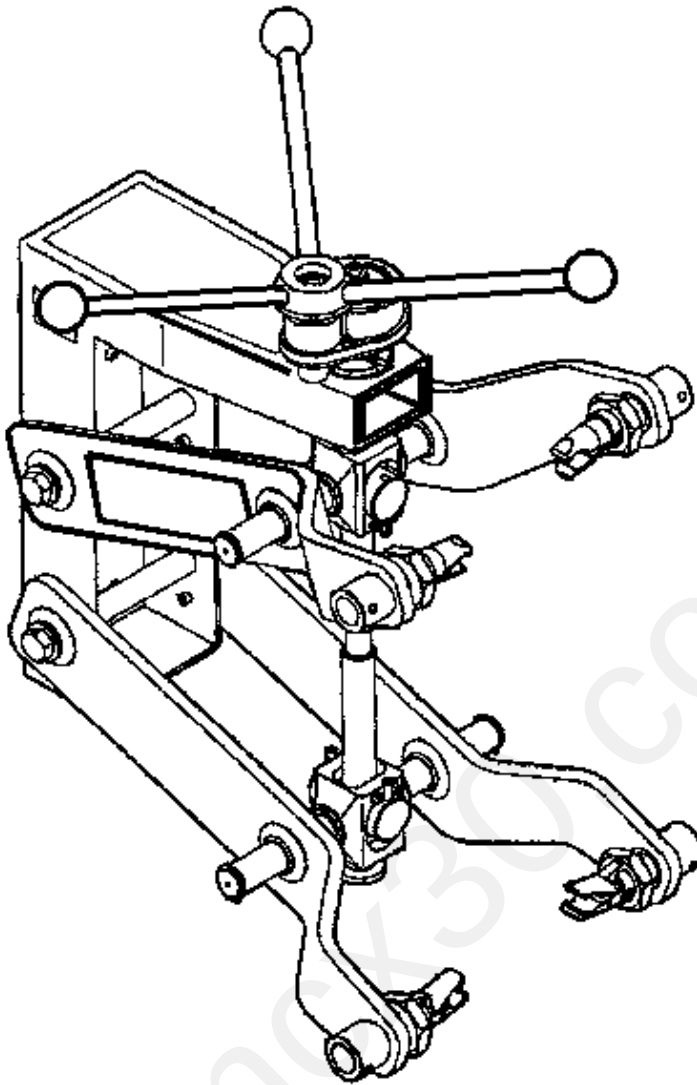
SPECIAL TOOLS

Illustration

**Tool
Number/
Description**

Illustration	Tool Number/ Description
	CH-43631 KM-507-C J-43631 Ball Joint Separator

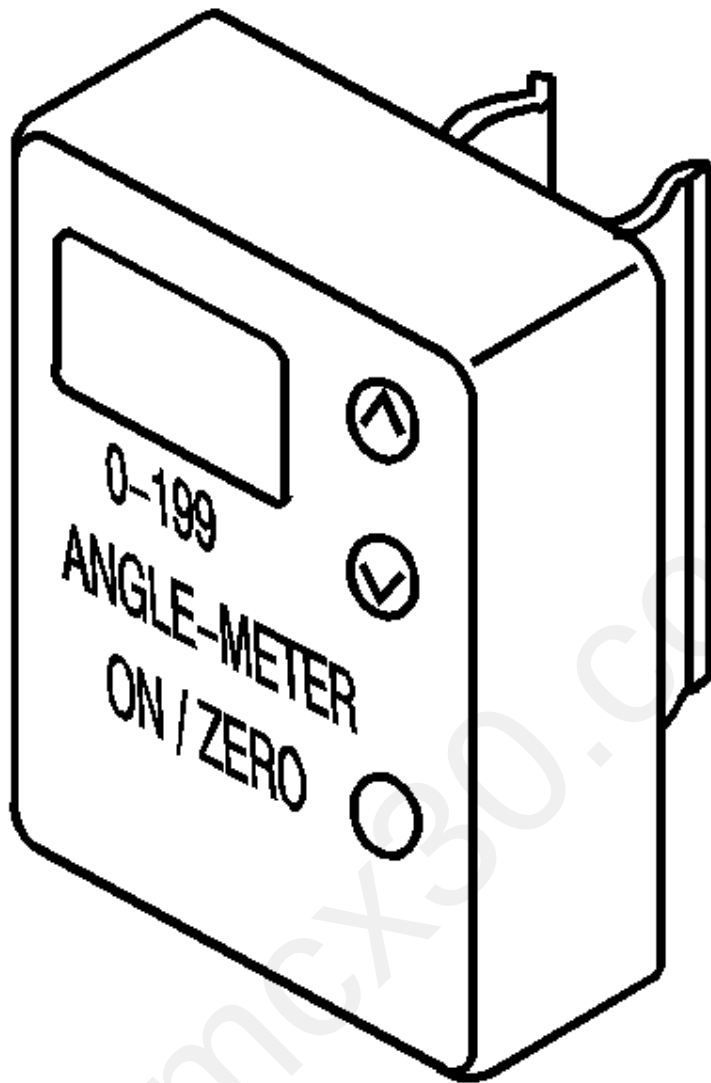
Illustration



Tool
Number/
Description

CH-48845
Strut Spring
Compressor

Illustration



Tool
Number/
Description

EN-45059
J-45059
Torque Angle
Meter