Steering Linkage (Non-Rack & Pinion) - Hummer H2

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Idler Arm to Frame Nut	120 N.m	89 lb ft
Idler Arm to Relay Rod Nut	60 N.m	44 lb ft
Inner Tie Rod to Relay Rod	100 N.m	74 lb ft
Pitman Arm to Relay Rod Nut	60 N.m	44 lb ft
Pitman Arm to Steering Gear Nut	250 N.m	184 lb ft
Steering Dampener to Frame Bracket Nut	40 N.m	30 lb ft
Steering Dampener to Relay Rod Nut	40 N.m	30 lb ft
Outer Tie Rod Jam Nut	68 N.m	50 lb ft
Tie Rod to Steering Knuckle Nut	60 N.m	44 lb ft

REPAIR INSTRUCTIONS

STEERING LINKAGE INSPECTION

1. Raise and suitably support the vehicle on safety stands. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Turn the ignition switch to the ON position.
3. With the aid of an assistant, move the tire back and forth.
4. Inspect for excessive vertical or lateral movement and/or looseness in the pivot joints.
    - Tie rod ends
    - Idler arm
    - Pitman arm
5. Inspect for bent, damaged, or loose components.
6. Replace any worn or damaged pivot joints.

TIE ROD REPLACEMENT - OUTER

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools and Equipment** .
- **J 29193** Steering Linkage Installer (12 mm). See **Special Tools and Equipment** .

Removal Procedure

IMPORTANT: Use the J 24319-B in order to separate all the tie rods and ball joints. See Special Tools and Equipment .

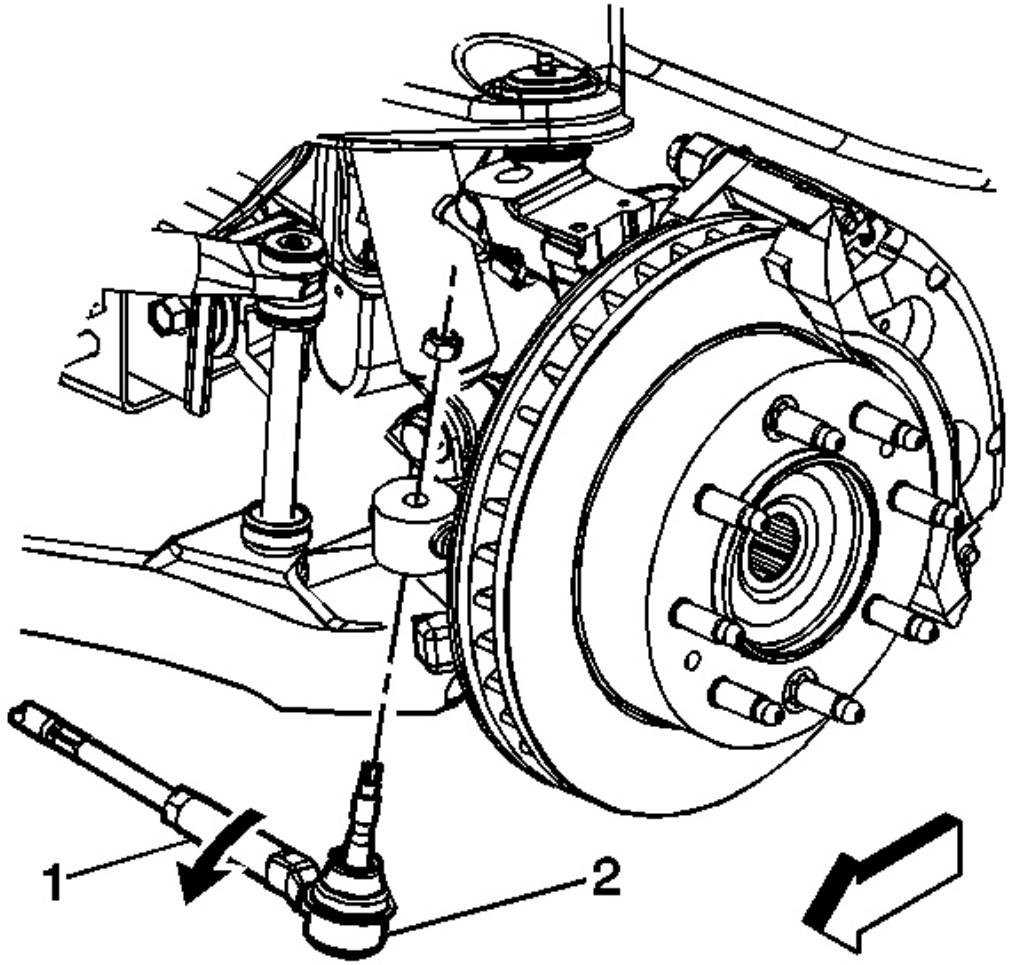


Fig. 1: Outer Tie Rod Ball Stud & Nut
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the nut from the outer tie rod ball stud (2).

   Do not reuse the nut.

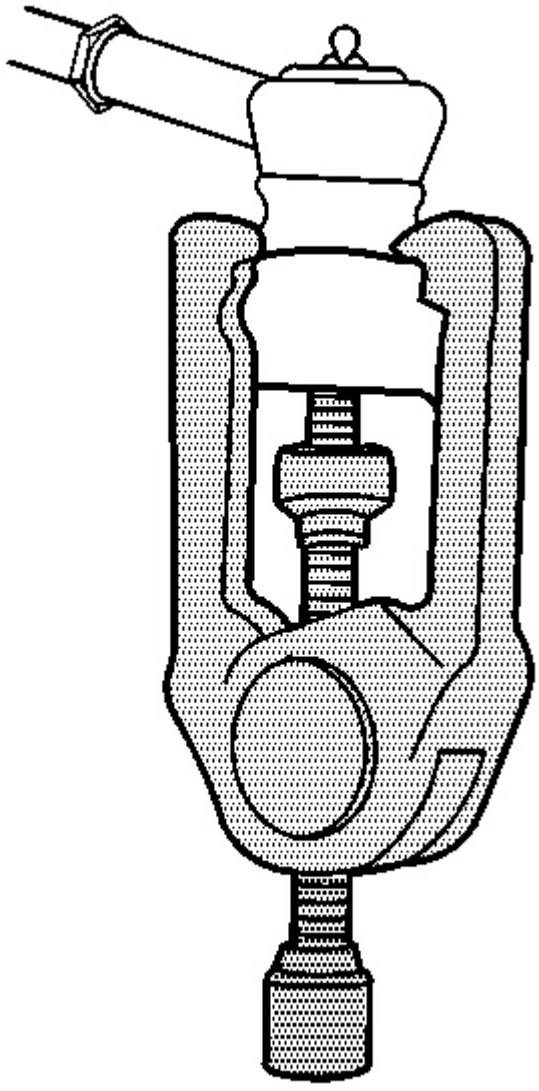


Fig. 2: Removing Outer Tie Rod Assembly From Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

3. Use the **J 24319-B** in order to remove the outer tie rod ball stud from the steering knuckle. See **Special Tools and Equipment** .

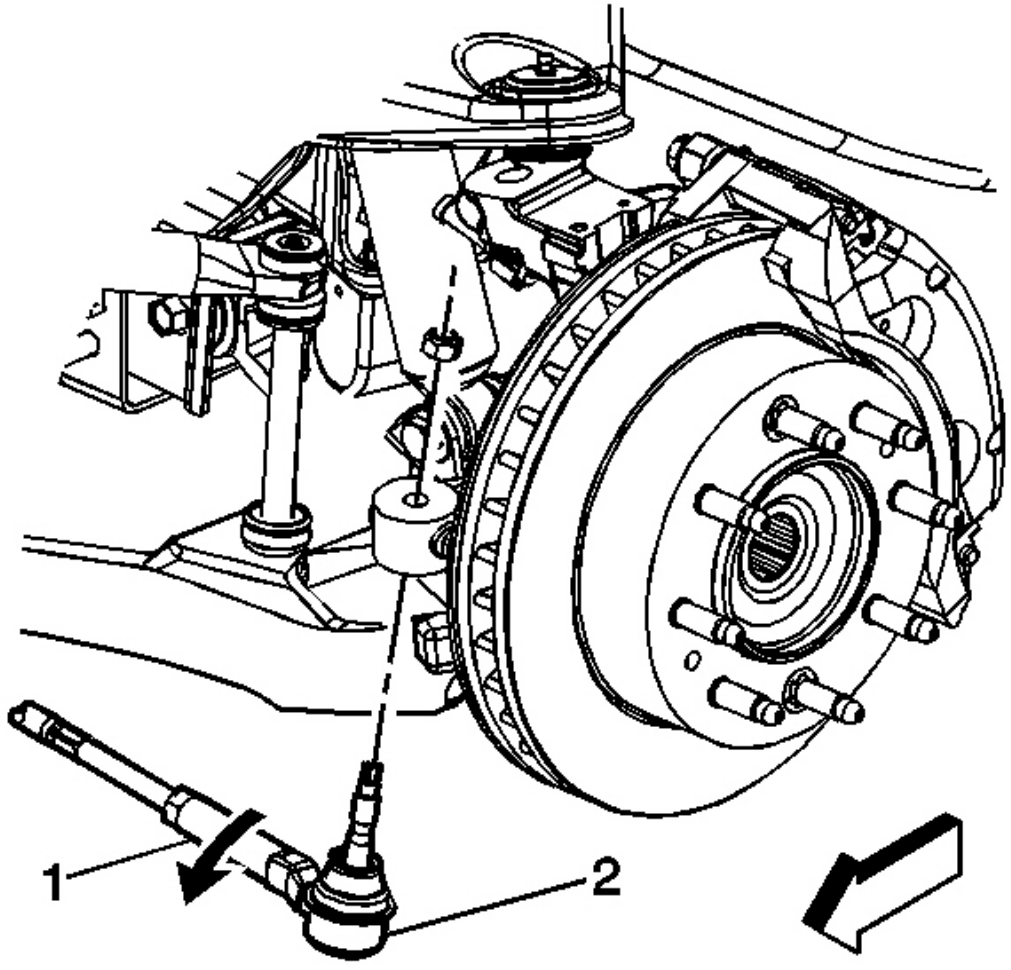


Fig. 3: Outer Tie Rod Ball Stud & Nut
Courtesy of GENERAL MOTORS CORP.

4. Loosen the jam nut (1).
5. Separate the outer tie rod end from the inner tie rod.
6. Inspect the shaft for bent or damaged threads.
7. Clean the tapered surface of the steering knuckle.

Installation Procedure

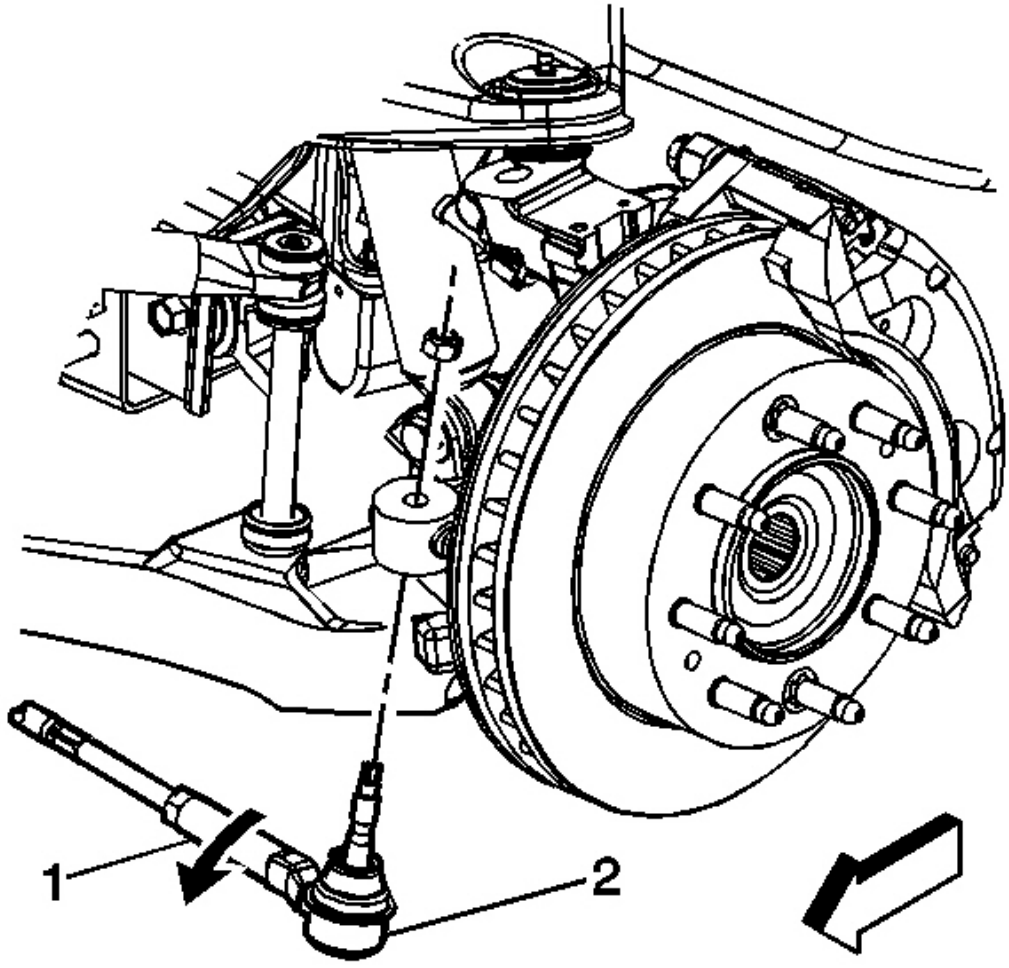


Fig. 4: Outer Tie Rod Ball Stud & Nut
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the tie rod threads with chassis lubricant. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
2. Install the outer tie rod end to the inner tie rod.
3. Install the outer tie rod ball stud to the steering knuckle.

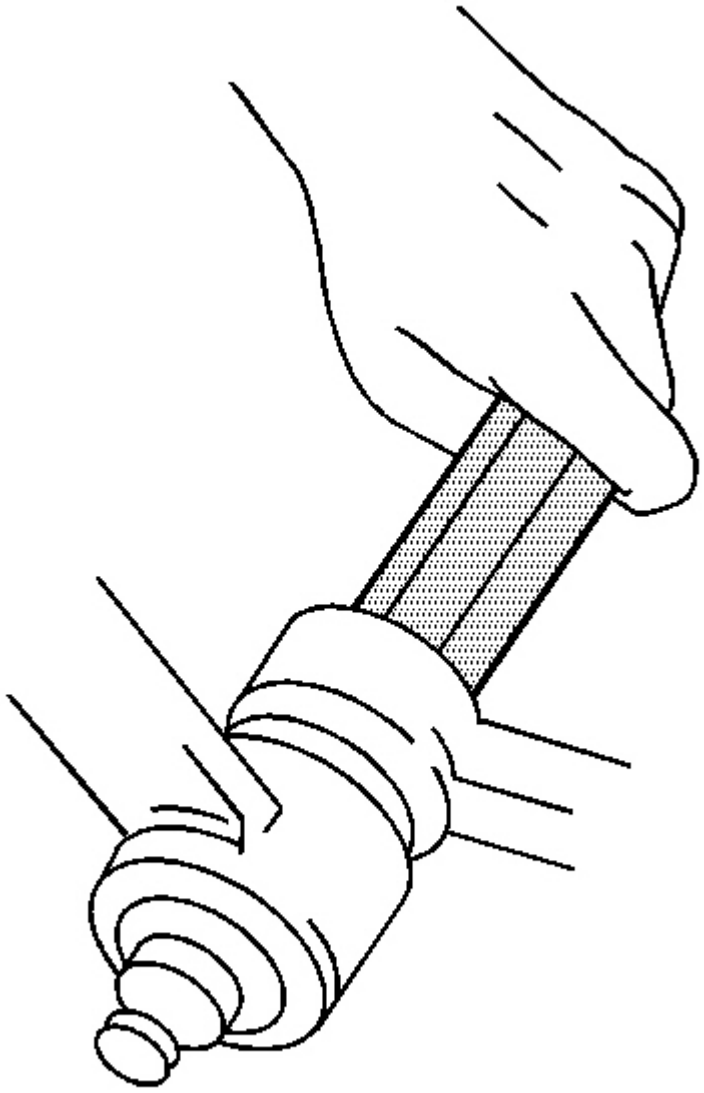


Fig. 5: Seating Relay Rod Tapers
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Use the **J 29193** in order to install the outer tie rod ball stud. See **Special Tools and Equipment** .

   Tighten: Tighten the **J 29193** to 54 N.m (40 lb ft) in order to seat the tapers. See **Special Tools and**

Equipment .

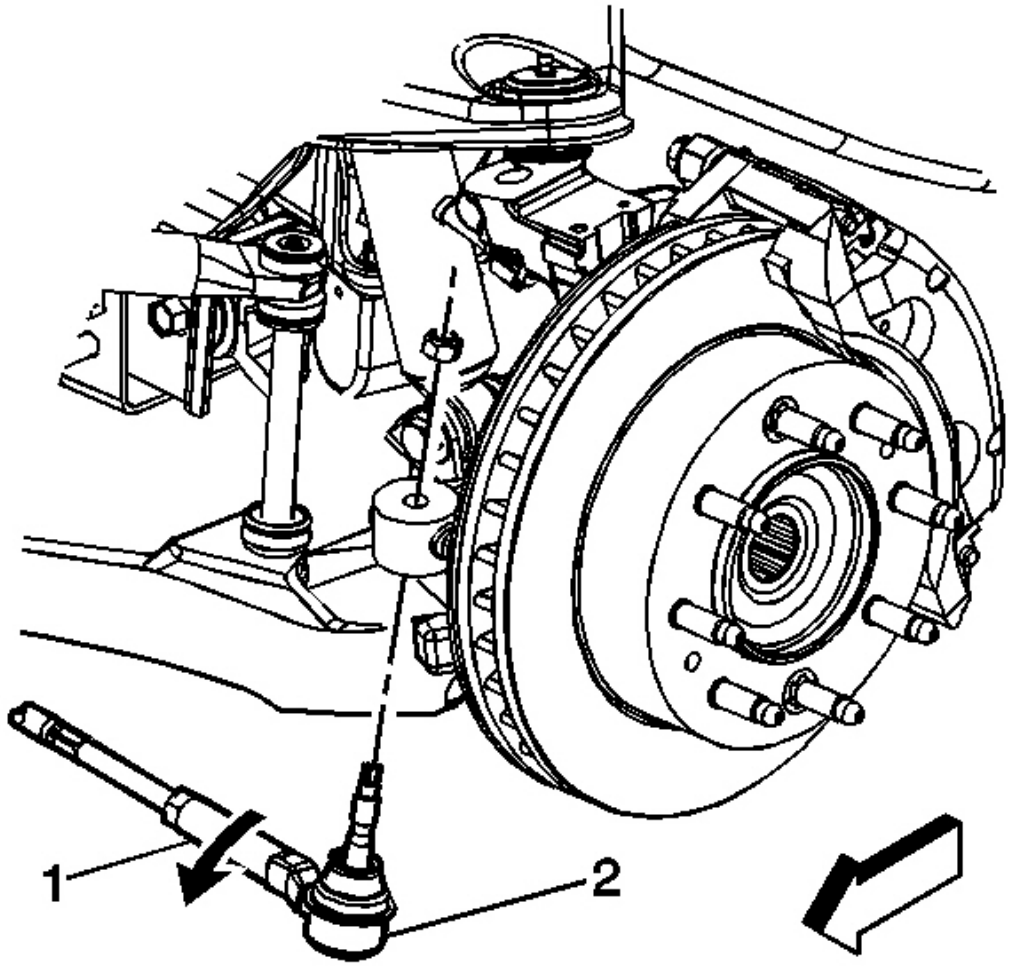


Fig. 6: Outer Tie Rod Ball Stud & Nut
Courtesy of GENERAL MOTORS CORP.

5. Install the new prevailing torque nut to the outer rod ball stud (2).

   Tighten: Tighten the new prevailing torque nut to 60 N.m (44 lb ft).

6. Verify the front toe setting. Refer to **Wheel Alignment Specifications** in Wheel Alignment.
7. Tighten the jam nut.

Tighten: Tighten the jam nut to 68 N.m (50 lb ft).

TIE ROD REPLACEMENT - INNER

Tools Required

J 34028 Inner Tie Rod Wrench. See **Special Tools and Equipment** .

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
3. Remove the outer tie rod ends. Refer to **Tie Rod Replacement - Outer** .

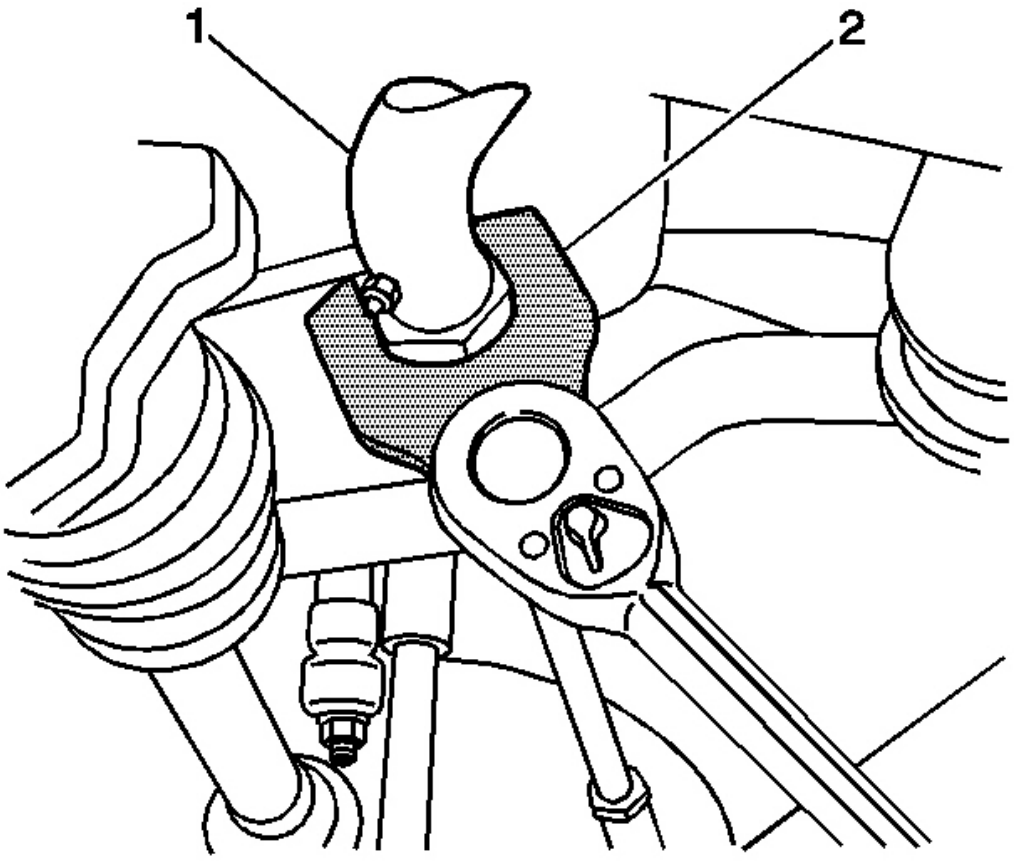


Fig. 7: Inner Tie Rods Ends

Courtesy of GENERAL MOTORS CORP.

4. Remove the inner tie rod ends using the**J 34028** . See **Special Tools and Equipment** .

Installation Procedure

IMPORTANT: Perform the following procedure before installing the new tie rod ends.

- Remove all traces of the oil, grease, or other contaminants.
- Clean the threads of the tie rod with denatured alcohol or the equivalent and allow to dry.
- Apply Threadlocker GM P/N 12345493 or Canadian P/N 10953488 to the threads of the tie rod.

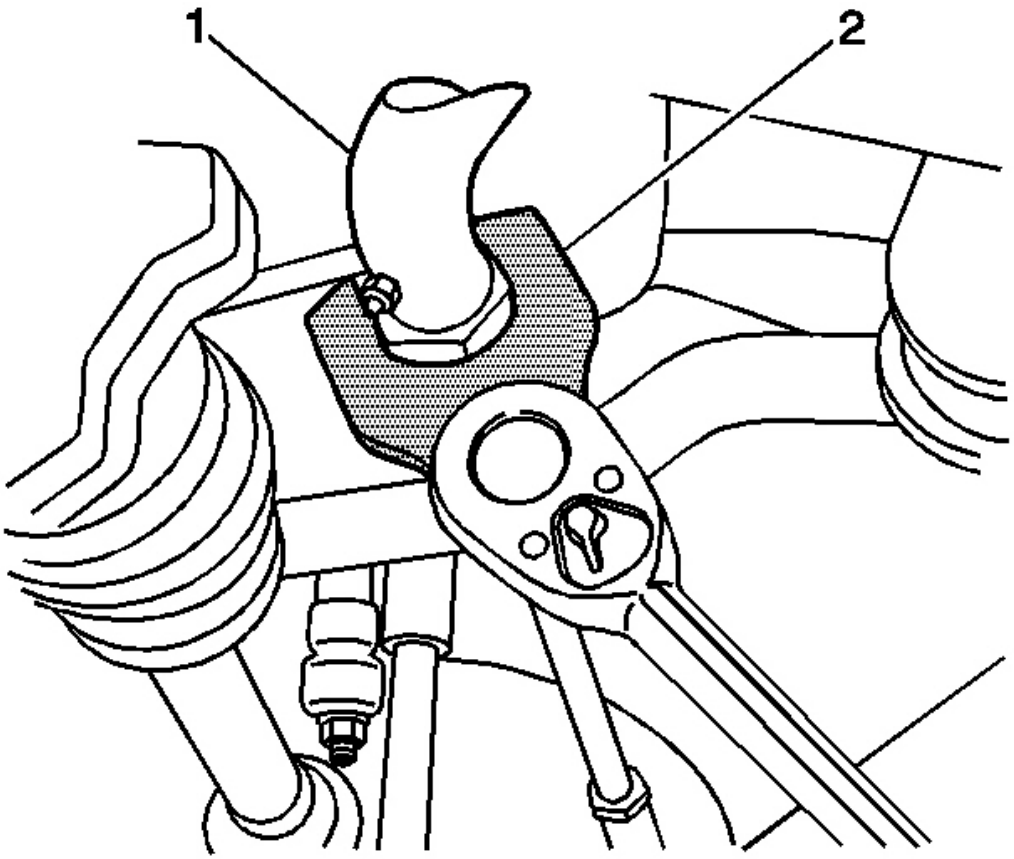


Fig. 8: Inner Tie Rods Ends
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the inner tie rod to the relay rod.

   Tighten: Using the**J 34028** tighten the tie rod to 100 N.m (74 lb ft). See **Special Tools and Equipment** .

2. Install the outer tie rod assemblies. Refer to **Tie Rod Replacement - Outer** .
3. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
4. Lower the vehicle.
5. Verify the wheel alignment. Refer to **Wheel Alignment Specifications** in Wheel Alignment.

IDLER ARM REPLACEMENT

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools and Equipment** .
- **J 29193** Steering Linkage Installer (12 mm). See **Special Tools and Equipment** .
- **J 29194** Steering Linkage Installer (14 mm). See **Special Tools and Equipment** .

Removal Procedure

NOTE: Do not attempt to free the ball stud by using a pickle fork or wedge type tool, because seal or bushing damage could result. Use the proper tool to separate all ball joints.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
3. Remove the idler arm ball stud nut.

   Do not reuse the idler arm ball stud nut.

4. Remove the idler arm from the relay rod using the **J 24319-B** . See **Special Tools and Equipment** .

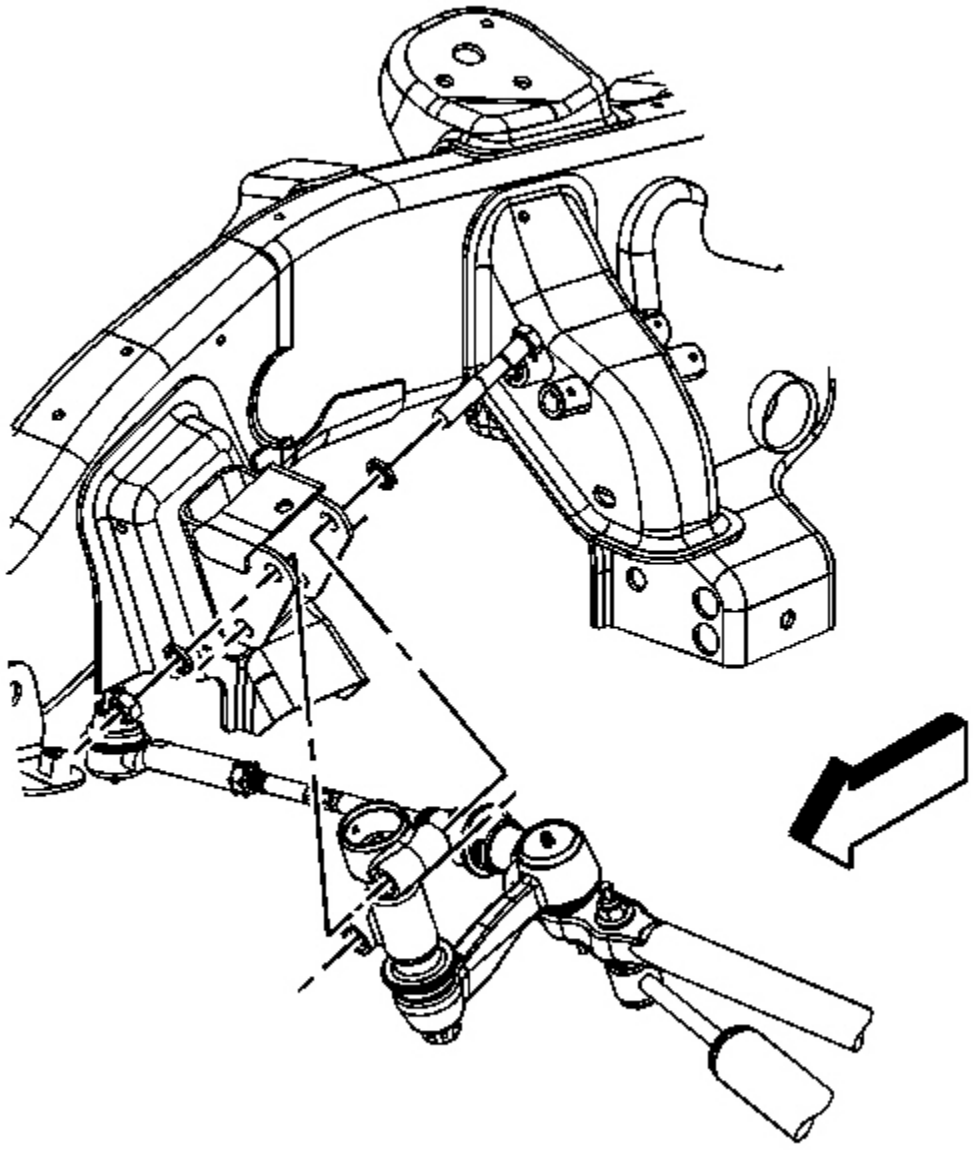


Fig. 9: View Of Idler Arm
Courtesy of GENERAL MOTORS CORP.

5. Remove the idler arm frame bolts and the nuts.
6. Remove the idler arm from the vehicle.

Installation Procedure

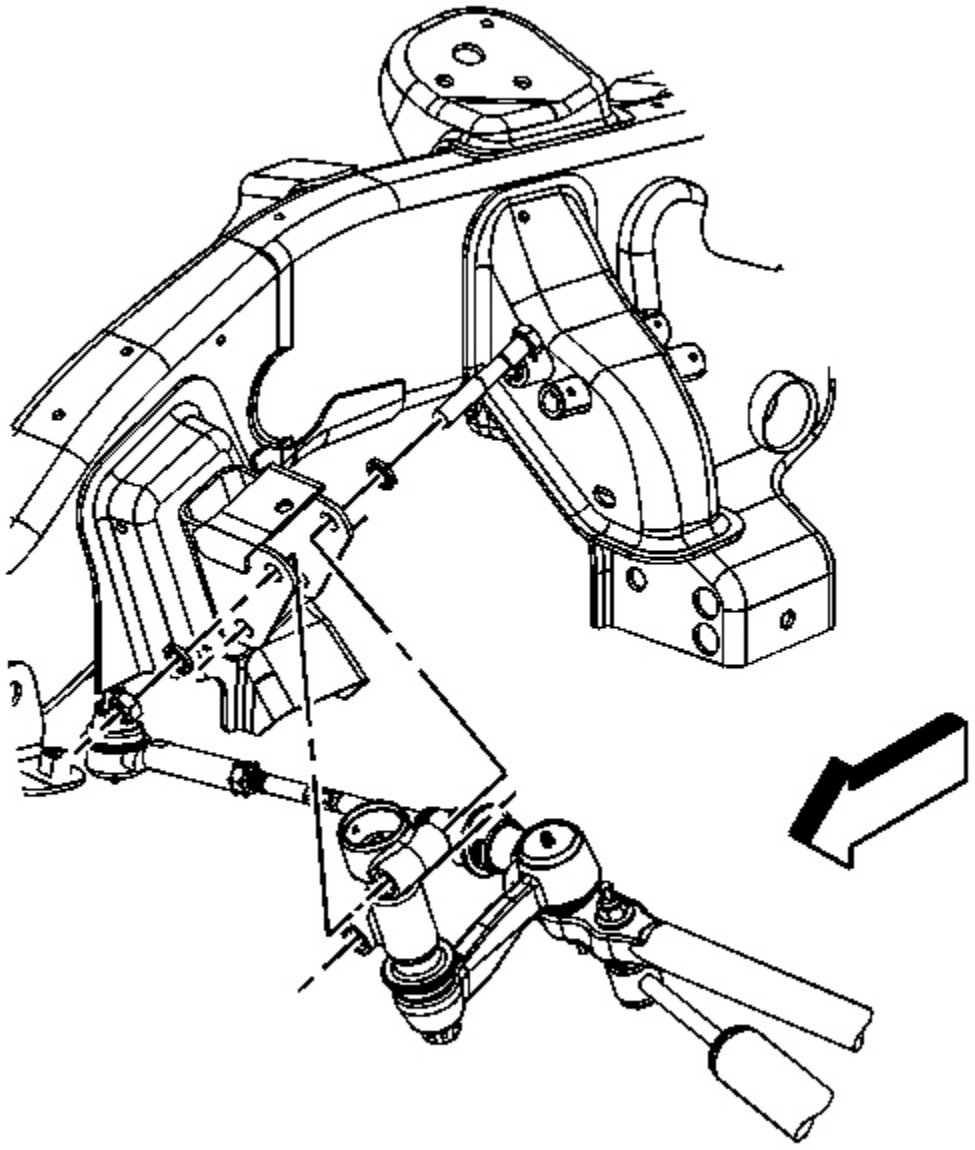


Fig. 10: View Of Idler Arm
Courtesy of GENERAL MOTORS CORP.

1. Position the idler arm on the frame.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the frame bolts and the nuts to the idler arm.

   Tighten: Tighten the frame bolts to 120 N.m (89 lb ft).

3. Install the relay rod to the idler arm ball stud.

   Ensure the seal is on the stud.

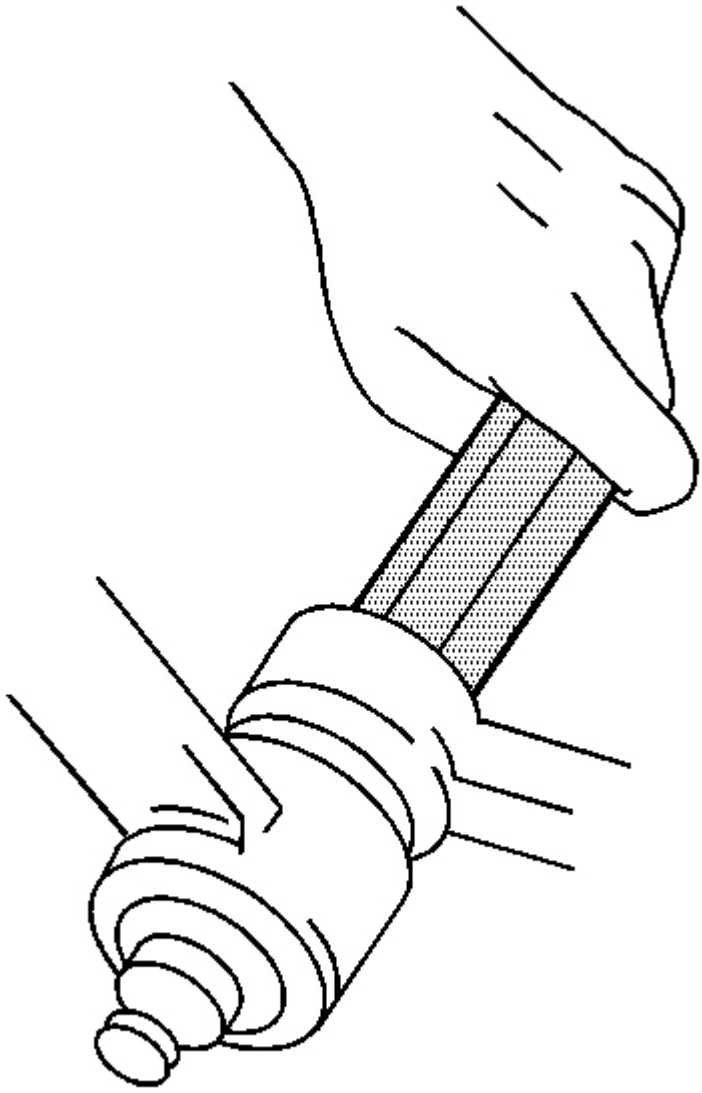


Fig. 11: Seating Relay Rod Tapers
Courtesy of GENERAL MOTORS CORP.

4. Use the **J 29193** or the **J 29194** in order to seat the tapers. See **Special Tools and Equipment** .

   Tighten: Tighten the **J 29193** or the **J 29194** to 54 N.m (40 lb ft) in order to seat the tapers. See **Special Tools and Equipment** .

5. Install the new idler arm ball stud prevailing torque nut to the idler arm ball stud.

   Tighten: Tighten the nut to 60 N.m (44 lb ft).

6. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
7. Lower the vehicle.
8. Check the wheel alignment. Refer to **Wheel Alignment Specifications** in Wheel Alignment.

RELAY ROD REPLACEMENT

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools and Equipment** .
- **J 29193** Steering Linkage Installer (12 mm). See **Special Tools and Equipment** .
- **J 29194** Steering Linkage Installer (14 mm). See **Special Tools and Equipment** .

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
3. Remove the steering damper from the relay rod. Refer to **Steering Damper Replacement** .
4. Remove the outer tie rod ends. Refer to **Tie Rod Replacement - Outer** .

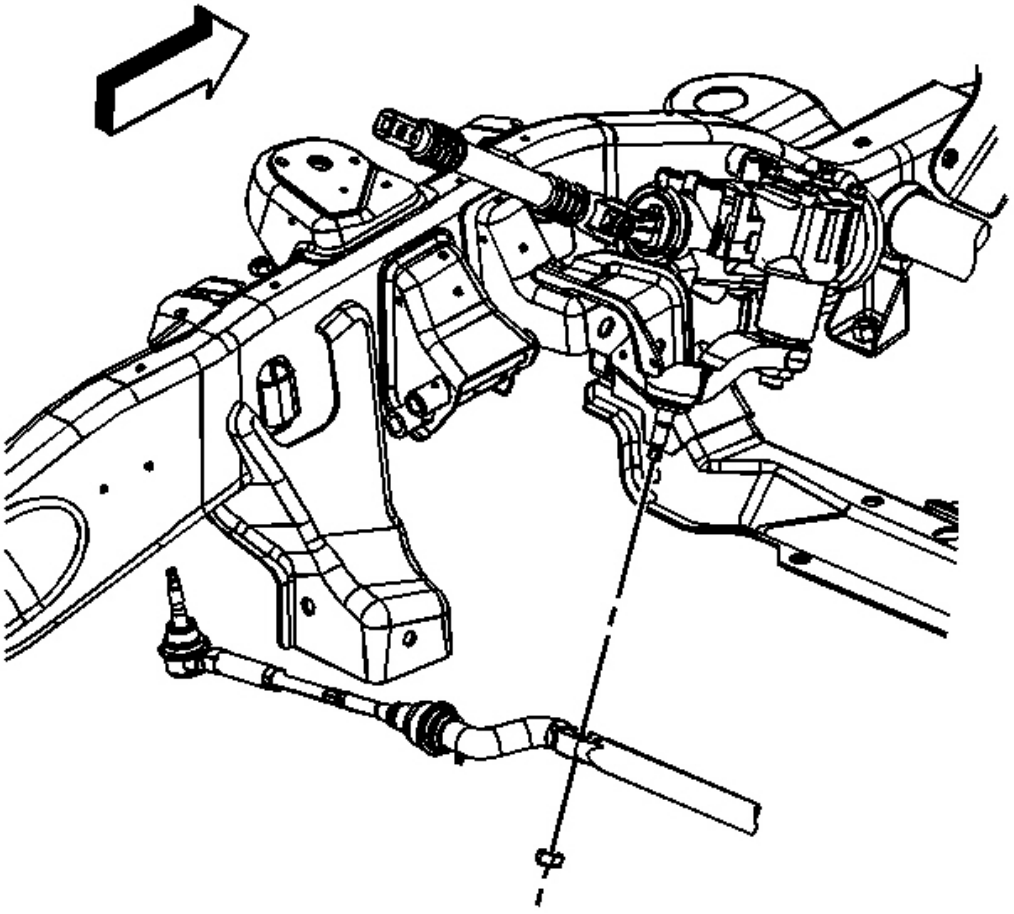


Fig. 12: Idler Arm Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

5. Remove the idler arm ball stud nut. Do not reuse the nut.

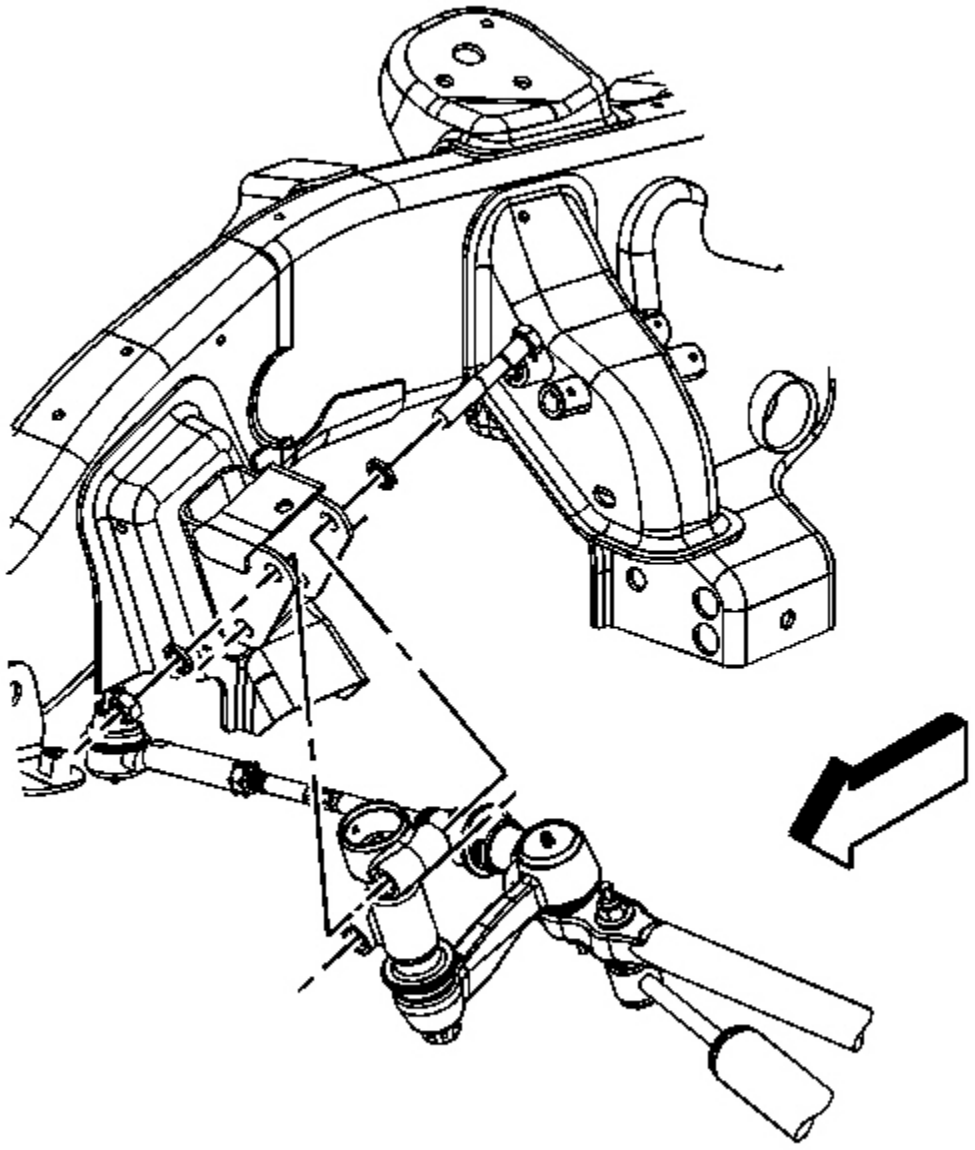


Fig. 13: View Of Idler Arm
Courtesy of GENERAL MOTORS CORP.

6. Remove the pitman arm nut. Do not reuse the nut.
7. Remove the relay rod from the idler arm ball stud using the **J 24319-B** . See **Special Tools and Equipment** .

8. Remove the relay rod from the pitman arm ball stud using the**J 24319-B** . See **Special Tools and Equipment** .
9. Remove the relay rod from the vehicle.
10. Inspect the threads on the tie rod ends for damage.
11. Inspect the ball stud threads for damage.
12. Inspect the ball stud seals for excessive damage.
13. Clean the threads on the ball studs.

Installation Procedure

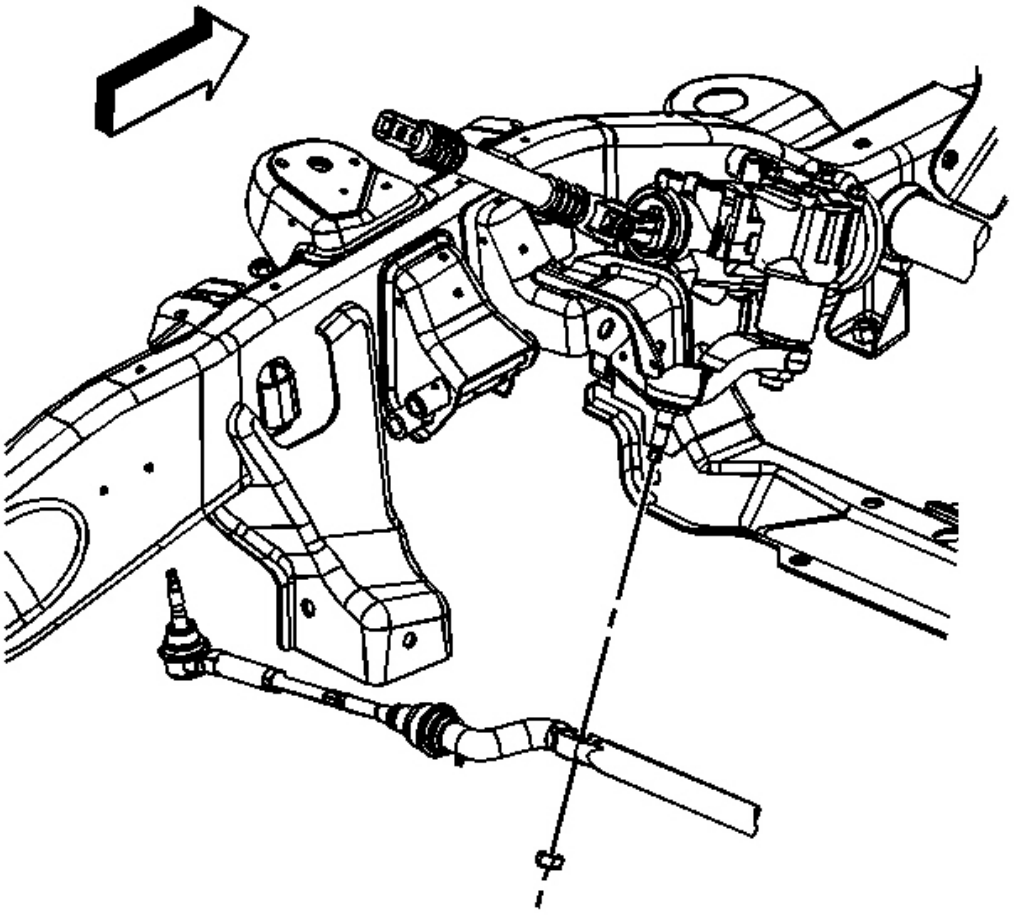


Fig. 14: Idler Arm Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

1. Install the relay rod to the vehicle.
2. Install the relay rod to the pitman arm ball stud.

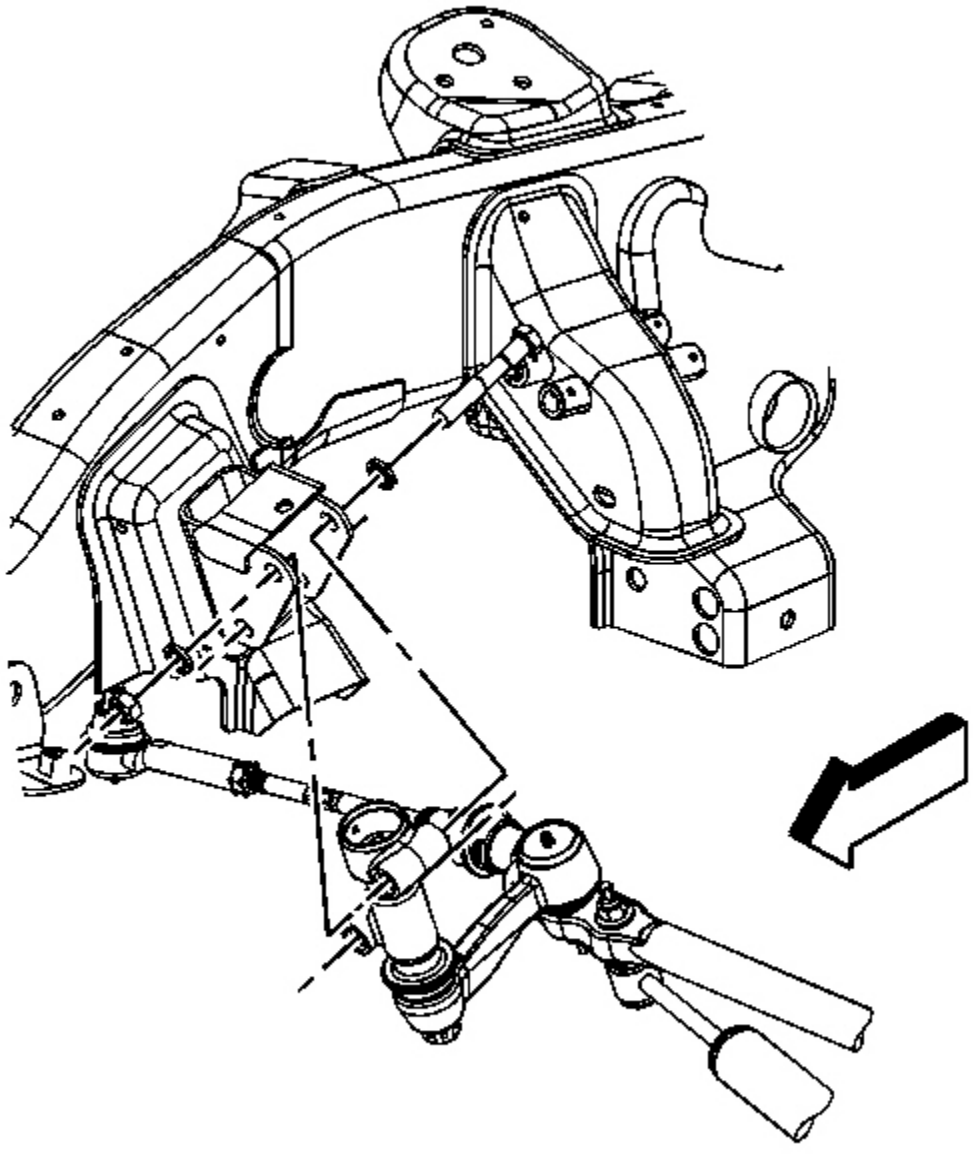


Fig. 15: View Of Idler Arm
Courtesy of GENERAL MOTORS CORP.

3. Install the relay rod to the idler arm ball stud. Verify that the seal is seated on the stud

NOTE: Refer to Fastener Notice in Cautions and Notices.

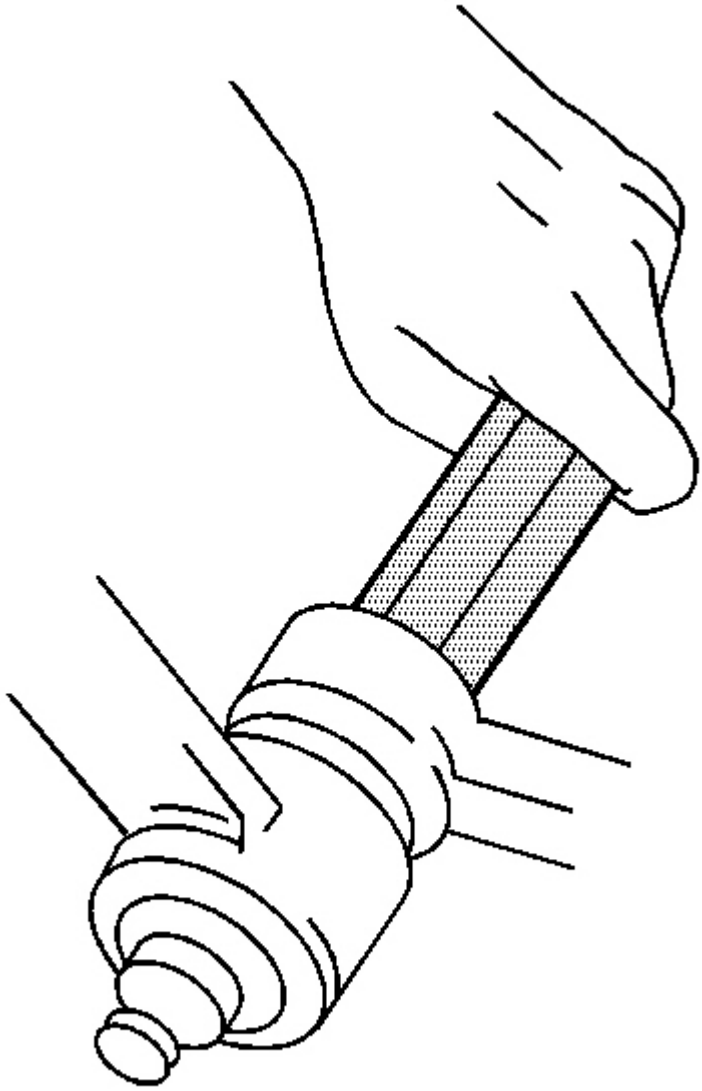


Fig. 16: Seating Relay Rod Tapers
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 29193** or the **J 29194** . See **Special Tools and Equipment** .

5. Tighten the steering linkage installer in order to seat the tapers.

   Tighten: Tighten the steering linkage installer to 54 N.m (40 lb ft).

6. Remove the **J 29193** or the **J 29194** . See **Special Tools and Equipment** .
7. Install the new pitman arm prevailing torque nut.
8. Install the new idler arm prevailing torque nut.

   Tighten: Tighten the nuts to 60 N.m (44 lb ft).

9. Install the outer tie rod assemblies. Refer to **Tie Rod Replacement - Outer** .
10. Install the steering dampener to the relay rod. Refer to **Steering Damper Replacement** .
11. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
12. Lower the vehicle.
13. Verify the wheel alignment. Refer to **Wheel Alignment Specifications** in Wheel Alignment.

STEERING DAMPER REPLACEMENT

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools and Equipment** .
- **J 29193** Steering Linkage Installer (12 mm). See **Special Tools and Equipment** .

Removal Procedure

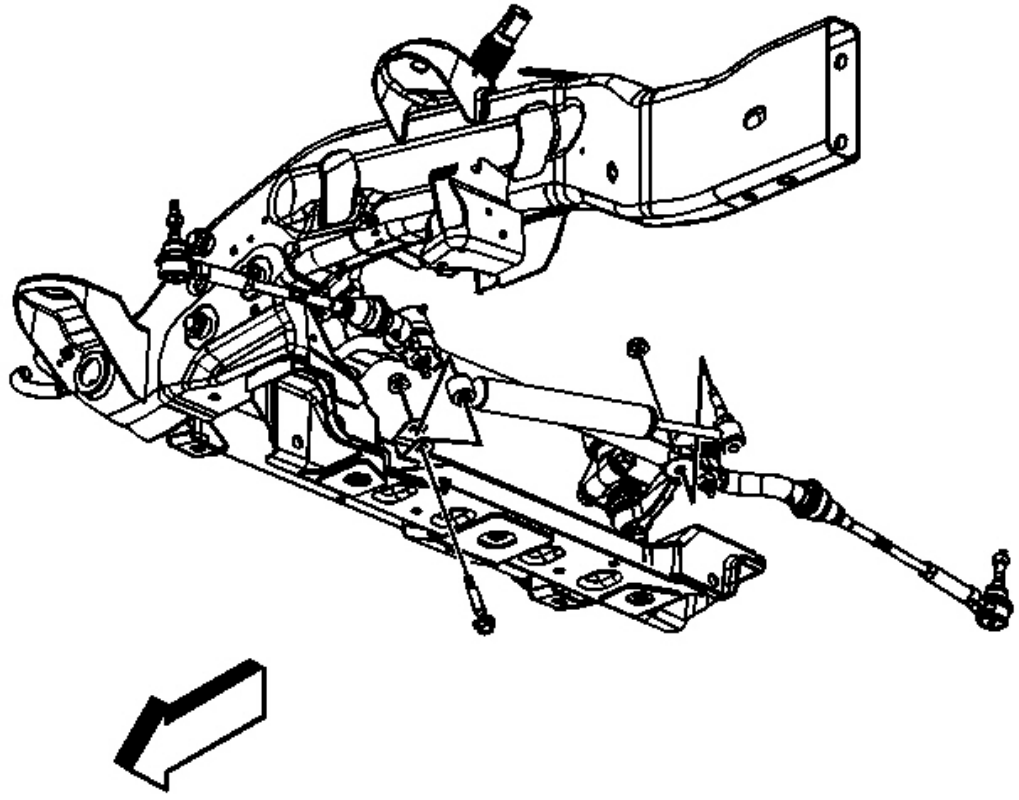


Fig. 17: Steering Damper Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Support the vehicle with safety stands. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
3. Remove the steering damper ball stud nut.

   Do not reuse the nut.

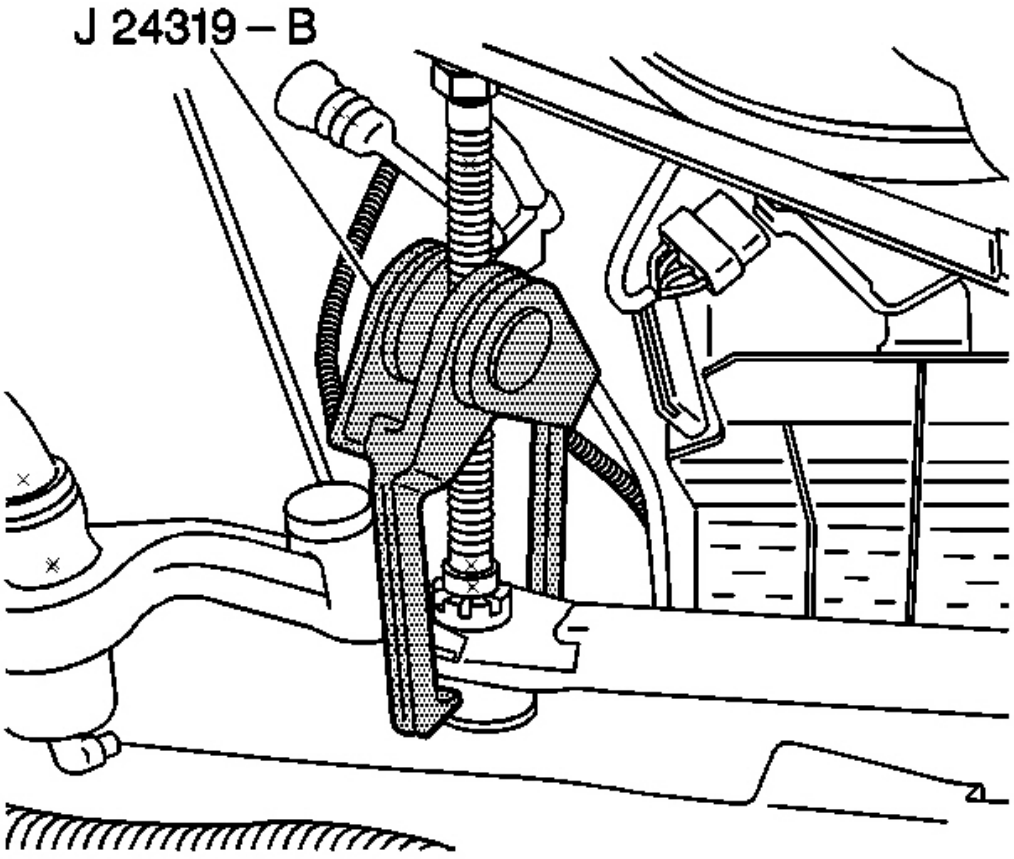


Fig. 18: Removing Steering Damper Ball Stud From Relay Rod Using J 24319-B
Courtesy of GENERAL MOTORS CORP.

4. Remove the steering damper ball stud from the relay rod using the **J 24319-B** . See **Special Tools and Equipment** .

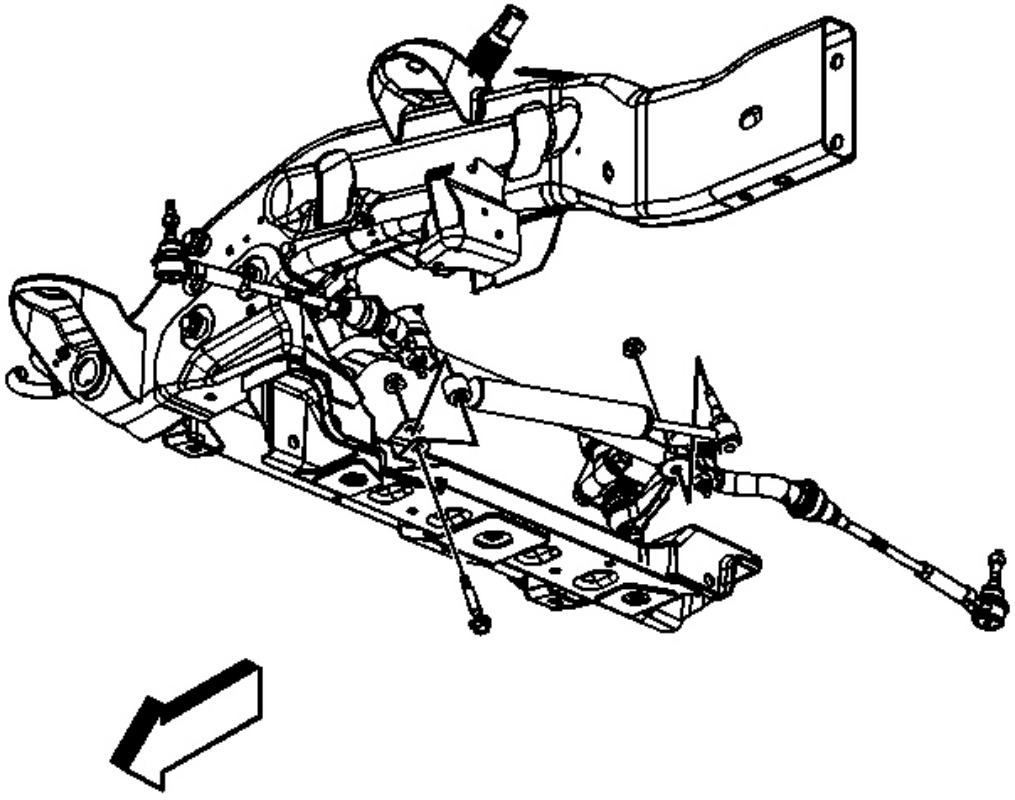


Fig. 19: Steering Damper Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

5. Remove the steering damper mounting bolt and the nut.

   Do not reuse the bolt or nut.

6. Remove the steering damper from the vehicle.
7. Inspect the steering damper for leaks and damage.

Installation Procedure

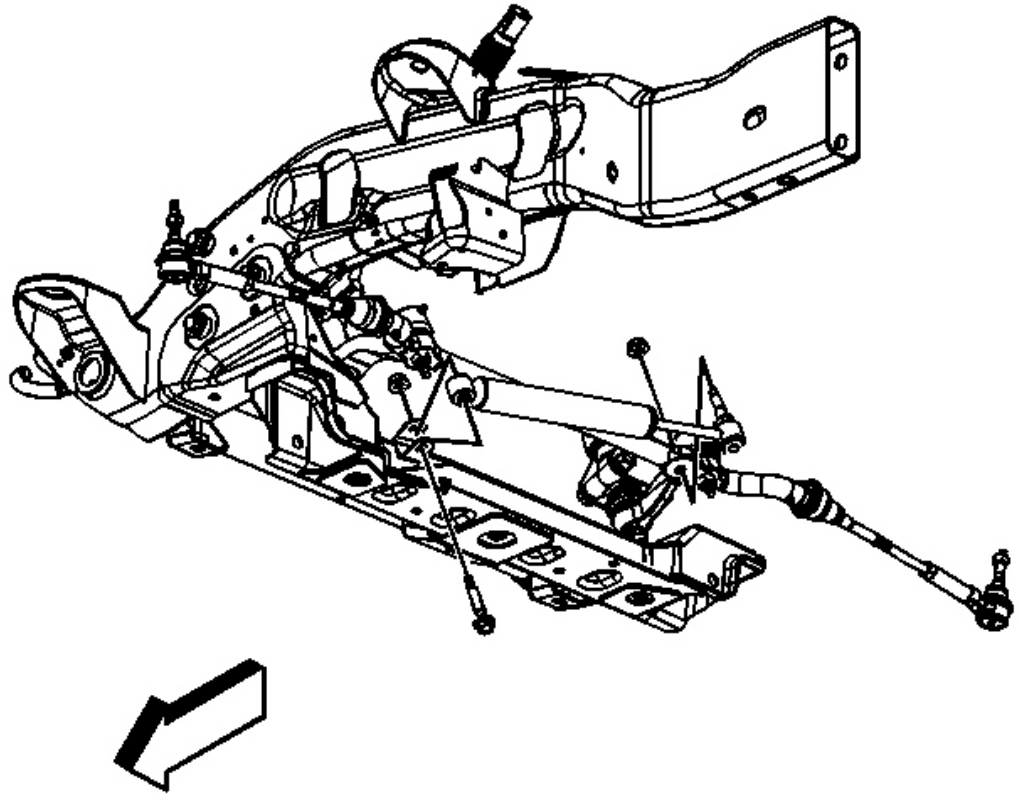


Fig. 20: Steering Damper Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

1. Install the steering damper.
2. Install the new mounting bolt and a new prevailing torque nut.
3. Install the steering damper ball stud to the relay rod.

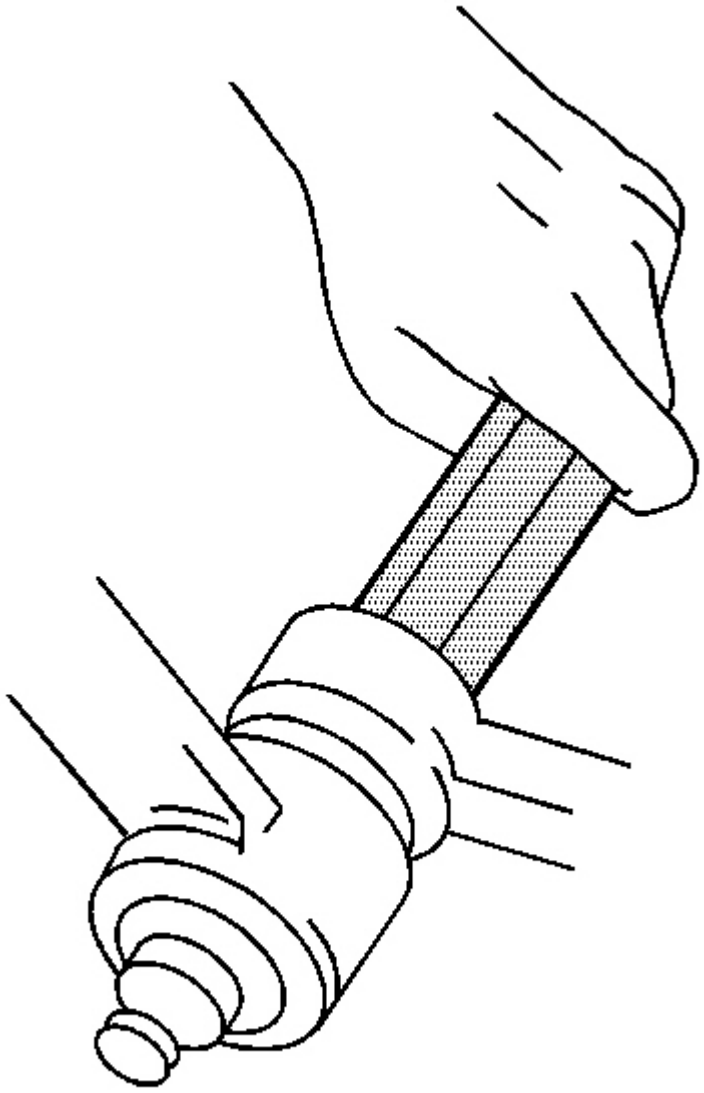


Fig. 21: Seating Relay Rod Tapers
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the **J 29193** . See **Special Tools and Equipment** .

   Tighten the steering linkage installer in order to seat the ball stud in the relay rod.

Tighten: Tighten the steering linkage installer to 32 N.m (24 lb ft).

5. Remove the **J 29193** . See **Special Tools and Equipment** .
6. Install the prevailing torque nuts.

   Tighten:
   - Tighten the mounting nut to 40 N.m (30 lb ft).
   - Tighten the ball stud nut to 40 N.m (30 lb ft).

7. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
8. Lower the vehicle.

PITMAN ARM REPLACEMENT

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools and Equipment** .
- **J 29107-A** Universal Pitman Arm Puller. See **Special Tools and Equipment** .
- **J 29193** Steering Linkage Installer (12 mm). See **Special Tools and Equipment** .
- **J 29194** Steering Linkage Installer (14 mm). See **Special Tools and Equipment** .
- **J 6632-01** Pitman Arm Puller. See **Special Tools and Equipment** .

Removal Procedure

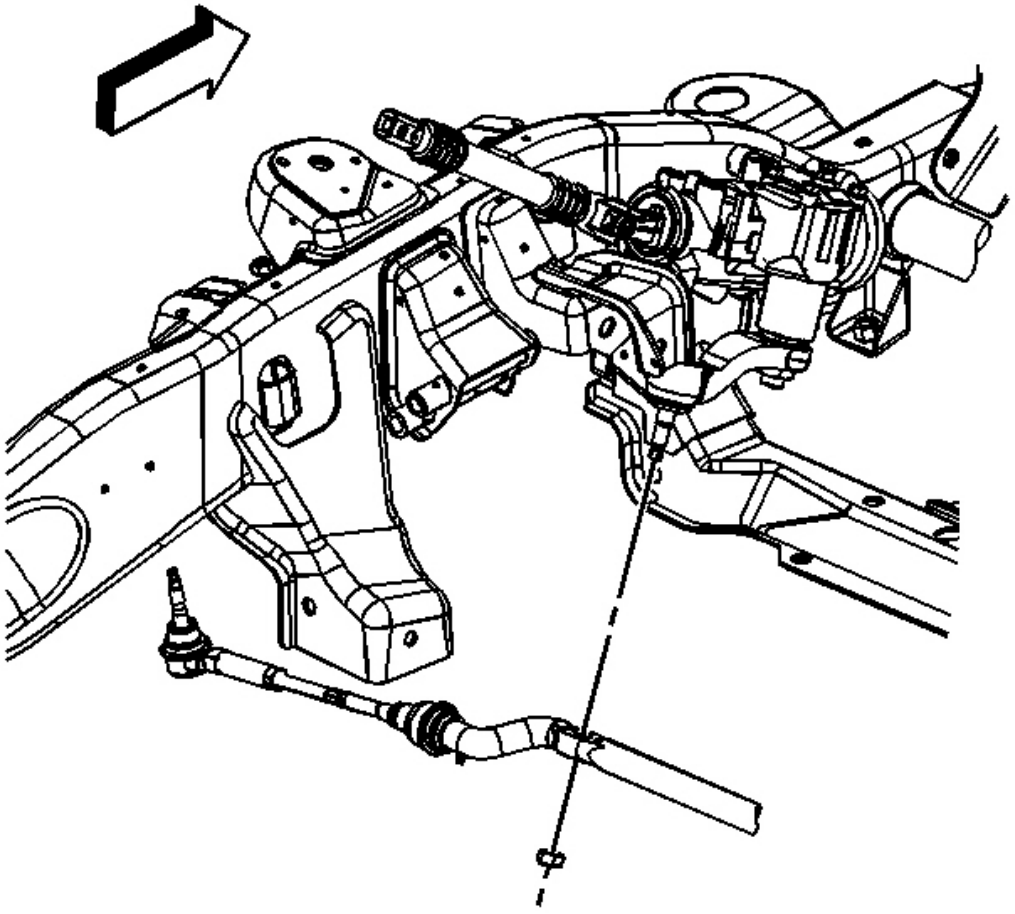


Fig. 22: Idler Arm Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
3. Remove the relay rod nut from the pitman arm ball stud.

   Do not reuse the nut.

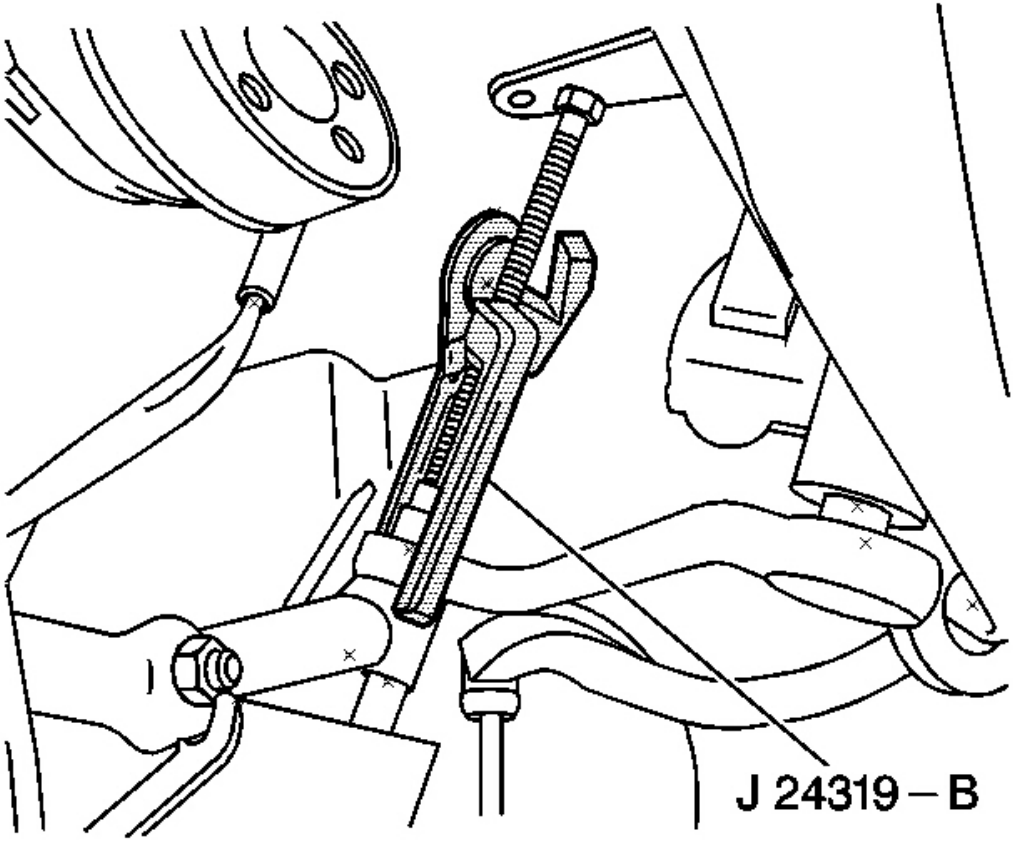


Fig. 23: Using J 24319-B To Remove Relay Rod From Pitman Arm Ball Stud
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not hammer on the pitman arm, pitman arm shaft or puller. Damage to the pitman arm or steering gear may result.

4. Use the **J 24319-B** in order to remove the relay rod from the pitman arm ball stud. See **Special Tools and Equipment** .

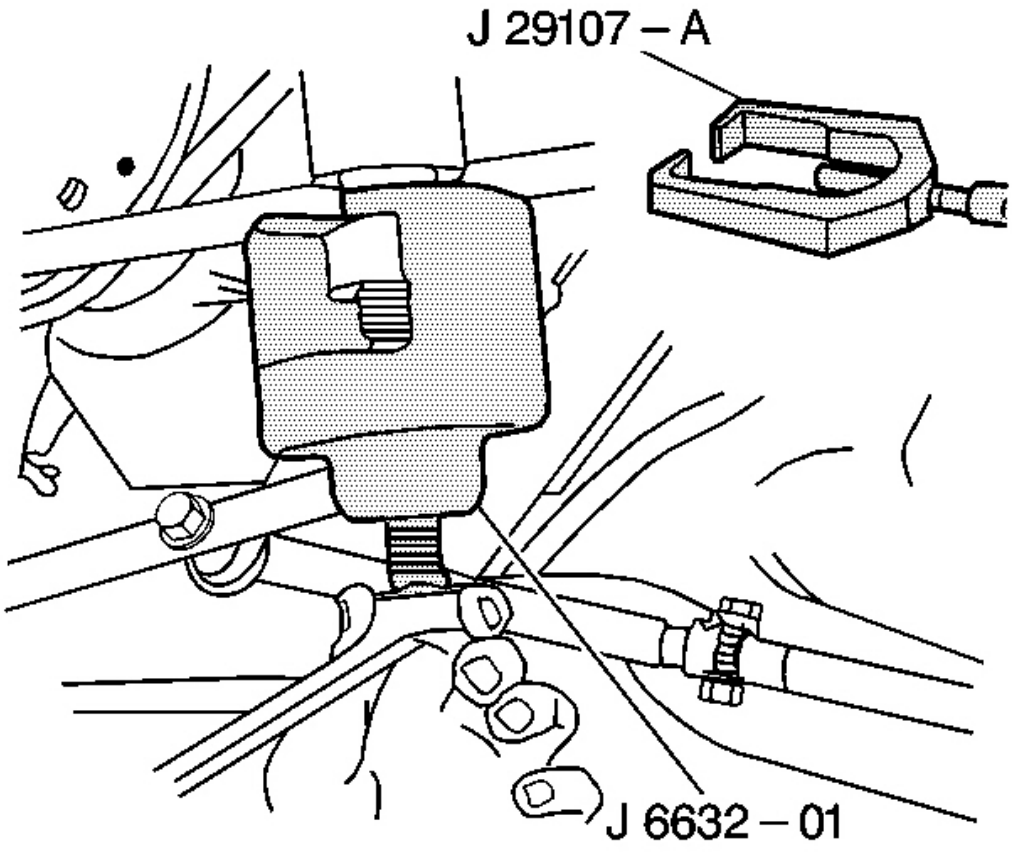


Fig. 24: Using J 29107-A Or J 6632-01 To Remove Pitman Arm From Steering Gear Pitman Shaft
Courtesy of GENERAL MOTORS CORP.

5. Remove the power steering gear. Refer to **Power Steering Gear Replacement** in Power Steering System.
6. Mark the pitman arm and the pitman shaft in order to ensure the proper alignment at assembly.
7. Remove the pitman arm nut.
8. Use the **J 29107-A** or **J 6632-01** in order to remove the pitman arm from the steering gear pitman shaft. See **Special Tools and Equipment** .
9. Inspect the ball stud threads for damage.
10. Inspect the ball stud seals for excessive wear.
11. Clean the threads on the ball stud.

Installation Procedure

1. Install the pitman arm on the pitman shaft.
2. Align the marks made at the removal on the pitman arm and the pitman arm shaft.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install a new pitman arm nut.

   Tighten: Tighten the pitman arm nut to 250 N.m (184 lb ft).

4. Install the power steering gear. Refer to **Power Steering Gear Replacement** in Power Steering System.

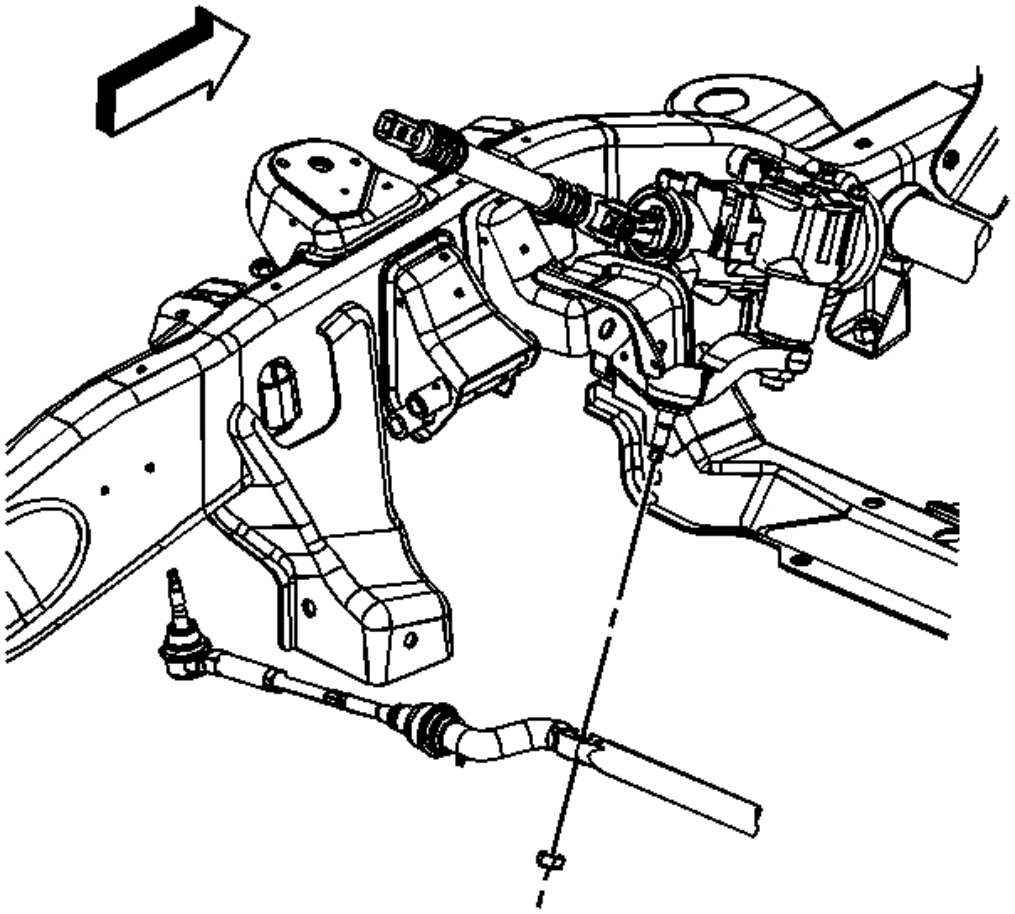


Fig. 25: Idler Arm Ball Stud Nut
Courtesy of GENERAL MOTORS CORP.

5. Install the relay rod to the pitman arm ball stud.
6. Ensure the seal is on the stud.

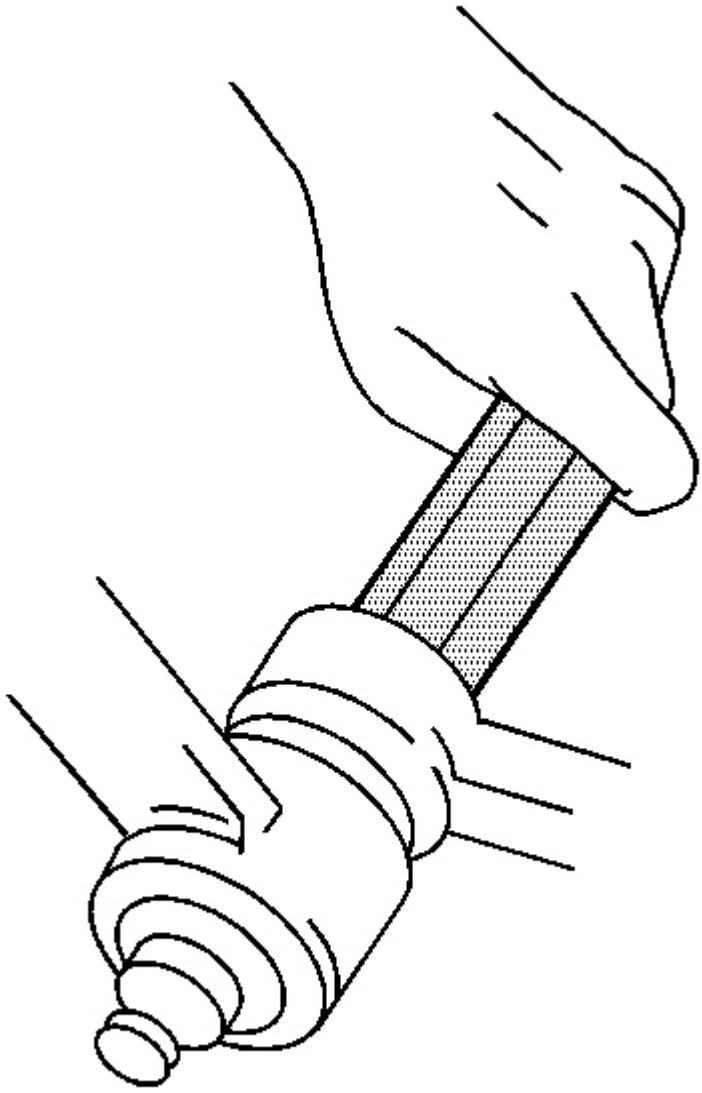


Fig. 26: Seating Relay Rod Tapers
Courtesy of GENERAL MOTORS CORP.

7. Install the **J 29193** or the **J 29194** . See **Special Tools and Equipment** .

Tighten: Tighten the **J 29193** or the **J 29194** to 54 N.m (40 lb ft) in order to seat the tapers. See **Special Tools and Equipment** .

8. Remove the **J 29193** or the **J 29194** . See **Special Tools and Equipment** .
9. Install the new relay rod prevailing torque nut.

   Tighten: Tighten the new prevailing torque nut to 60 N.m (44 lb ft).

10. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.
11. Lower the vehicle.
12. Check the wheel alignment. Refer to **Wheel Alignment Specifications** in Wheel Alignment.

DESCRIPTION AND OPERATION

STEERING LINKAGE DESCRIPTION AND OPERATION

The steering linkage consists of the following components:

- A pitman arm
- An idler arm
- A relay rod
- Inner and outer tie rods

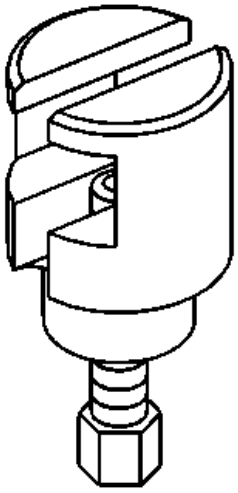
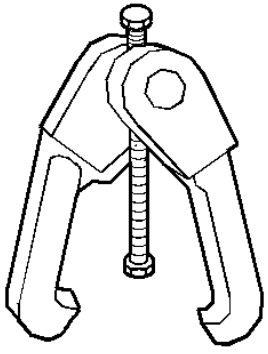
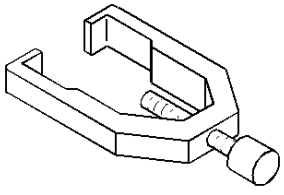
When you turn the steering wheel the steering gear rotates the pitman arm which forces the relay rod to one side. The tie rods connect to the relay rod at the ball studs. The tie rods transfer the steering force to the wheels. The tie rods are used when making toe adjustments. The idler arm pivots on a support attached to the frame rail and the ball stud attaches to the relay rod.

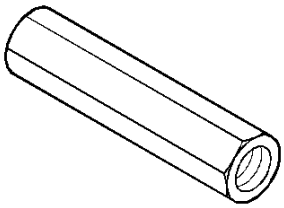
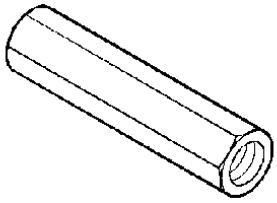
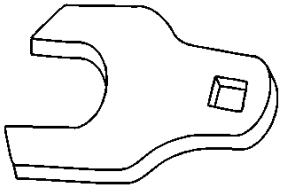
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description

	J 6632-01 Pitman Arm Puller
	J 24319-B Universal Steering Linkage Puller
	J 29107-A Pitman Arm Puller

	J 29193 Steering Linkage Installer (12mm)
	J 29194 Steering Linkage Installer (14mm)
	J 34028 Inner Tie Rod wrench)