

2017 DRIVELINE/AXLE

Wheel Drive Shafts - Bolt EV

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

Application
NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>
Front Wheel Drive Shaft Retaining Ring
Front Wheel Drive Shaft Seal

Single Use Threaded Fastener/Component Tightening Specifications

Application	Specification
	Metric (English)
NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Front Wheel Drive Shaft Nut	
• First Pass:	150 N.m (111 lb ft)
• Second Pass:	Loosen 45 Degrees
• Final Pass:	250 N.m (184 lb ft)

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - WHEEL DRIVE SHAFTS

IMPORTANT: Complete the following steps prior to beginning the wheel drive shaft diagnosis.

1. Review the [Vibration Diagnosis, Starting Point, and Correction](#).
2. Perform the [Vibration Analysis - Road Testing \(EL-38792-A Electronic Vibration Analyzer\)](#) [Vibration Analysis - Road Testing \(CH-51450-NVH Oscilloscope\)](#) in order to effectively diagnose the concern.
3. Review the system operation in order to become familiar with the system function. Refer to [Wheel Drive Shafts Description and Operation](#)

Visual/Physical Inspection

- Inspect for aftermarket equipment and modifications which could affect the operation of the wheel drive shafts or other rotating components.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Thoroughly inspect the entire wheel drive shaft for visible damage, leaking joint seals, and missing seal clamps.

- Inspect the wheel drive shaft seals for cuts, tears, or other damage which may allow the loss of lubricant and the entry of contaminants.

Symptom List

After performing the Visual/Physical Inspection and no visual signs of damage or other interference impairing the wheel drive shaft function is apparent, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the joints manually. Any binding or otherwise impeded movement of the joints may indicate damage which could contribute to the concern. Refer to the following:

- [Click Noise In Turns](#)
- [Clunk When Accelerating from Coast](#)
- [Clunk Noise When Accelerating During Turns](#)
- [Shudder or Vibration During Acceleration](#)

CLICK NOISE IN TURNS

A click noise occurring during turns may be caused by a worn or damaged wheel drive shaft outer joint. This may be more apparent while simultaneously turning and accelerating. This click is caused by wear and/or damage to the constant velocity joint bearings and/or races. Commonly, this damage or wear is caused by the loss of lubricating grease from the constant velocity joint and the entry of foreign material or contaminants.

Carefully inspect the wheel drive shaft seals for cuts, tears or other damage which may allow the lubricating grease to escape. The loss of this grease will cause damage to the wheel drive shaft constant velocity joint in a very short period of time.

If inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the inner joint manually. Any binding or impeded movement of the joint may indicate damage which could contribute to the concern.

CLUNK WHEN ACCELERATING FROM COAST

A clunk noise occurring when accelerating from coast or a standing start may be caused by a worn or damaged wheel drive shaft inner joint. The common cause of wheel drive shaft inner joint damage is the loss of lubricating grease and/or the presence of foreign material and contaminants in the joint. This usually occurs as a result of a torn or damaged inner joint seal.

Carefully inspect the wheel drive shaft seal for cuts, tears or other damage that may allow the loss of the lubricating grease and/or the entry of contaminants.

If inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the inner joint manually. Do not allow the outer joint to separate from the wheel drive shaft bar. Any binding or impeded movement of the joint may indicate damage which could contribute to the concern.

CLUNK NOISE WHEN ACCELERATING DURING TURNS

A clunk noise that occurs while accelerating during turns may be caused by wear and/or damage to the inboard and the outboard joints in combination. The loss of lubricant and/or the presence of contaminants can cause damage to the internal components of the joints.

Carefully inspect the joint seals for cuts, tears or other damage. Joint seals that are damaged may allow lubricant leakage and the entry of contaminants.

If inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the inner joint manually. Do not allow the outer joint to separate from the wheel drive shaft bar. Any binding or impeded movement of the joints may indicate damage which could contribute to the concern.

SHUDDER OR VIBRATION DURING ACCELERATION

In order to diagnose a shudder or vibration during acceleration, refer to [Vibration Diagnosis, Starting Point, and Correction](#) .

REPAIR INSTRUCTIONS

FRONT WHEEL DRIVE SHAFT REPLACEMENT

Special Tools

- CH-49376 Wheel Hub Holding Tool
- CH-49400 Hub Spindle Remover
- EN-956-1 Extension

Equivalent regional tools: [Special Tools](#)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
3. Remove Front Compartment Air Deflector. Refer to [Front Compartment Air Deflector Replacement](#)

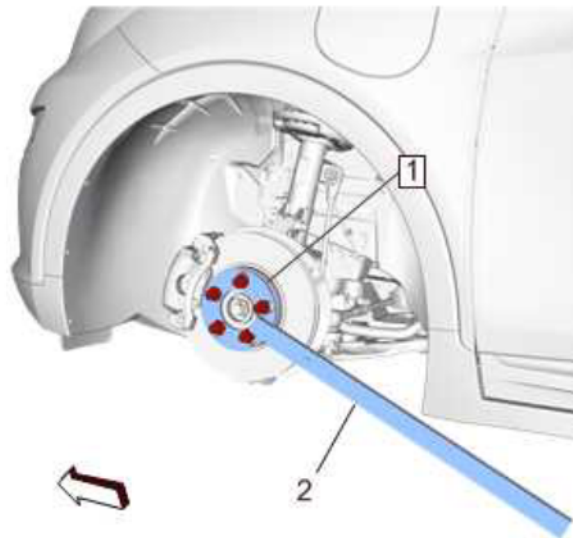


Fig. 1: Wheel Hub Holding Tool And Extension
Courtesy of GENERAL MOTORS COMPANY

4. Install the CH-49376 wheel hub holding tool (1) with the EN-956-1 extension (2) to the wheel hub with the wheel nuts and support the wheel hub holding tool outer end on a safety stand.



Fig. 2: Front Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: The wheel drive shaft nut must be discarded after removal.

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5. Remove and DISCARD Front Wheel Drive Shaft Nut (1) @ Front Wheel Drive Shaft

6. Remove the CH-49376 wheel hub holding tool from the wheel hub.

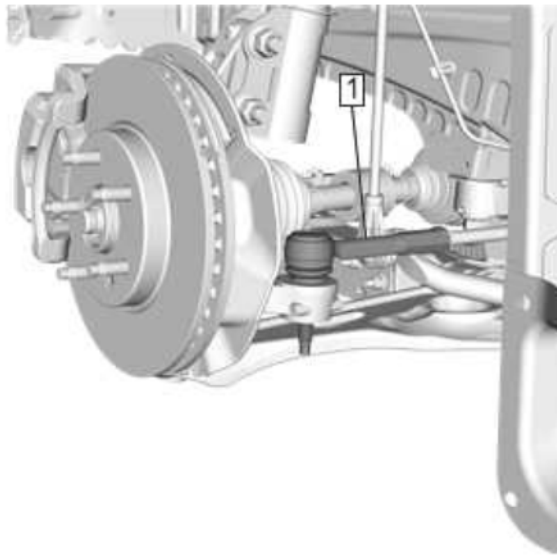


Fig. 3: Steering Linkage Outer Tie Rod

Courtesy of GENERAL MOTORS COMPANY

7. Separate Steering Linkage Outer Tie Rod (1) @ Steering Knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#)

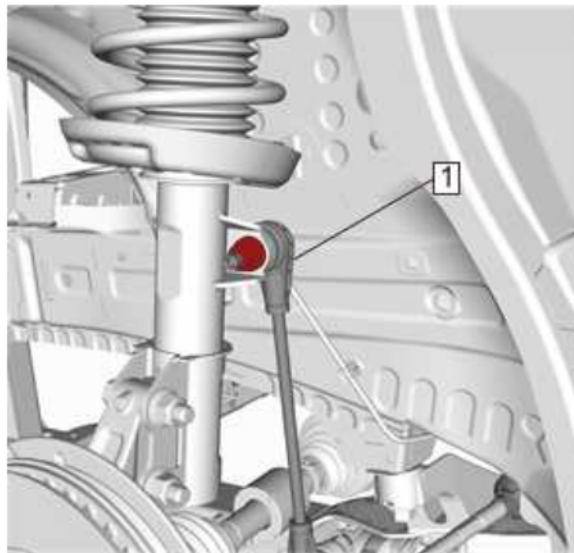


Fig. 4: Front Stabilizer Shaft Link

Courtesy of GENERAL MOTORS COMPANY

8. Separate Front Stabilizer Shaft Link (1) @ Front Suspension Strut. Refer to [Stabilizer Shaft Link Replacement](#)

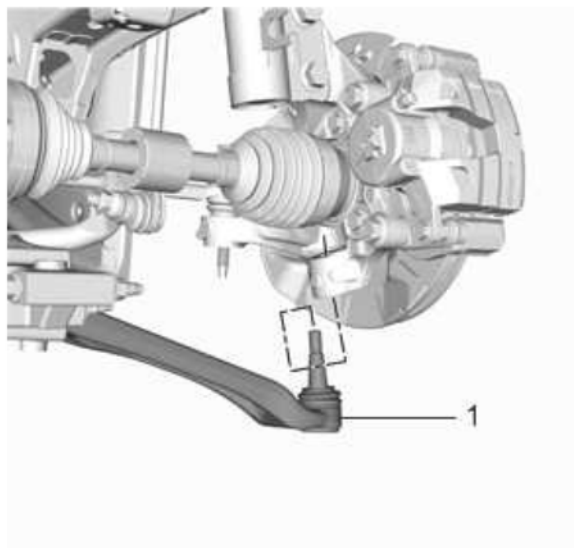


Fig. 5: Front Lower Control Arm Ball Joint
Courtesy of GENERAL MOTORS COMPANY

9. Separate Front Lower Control Arm Ball Joint (1) @ Steering Knuckle. Refer to [Lower Control Arm Replacement](#)

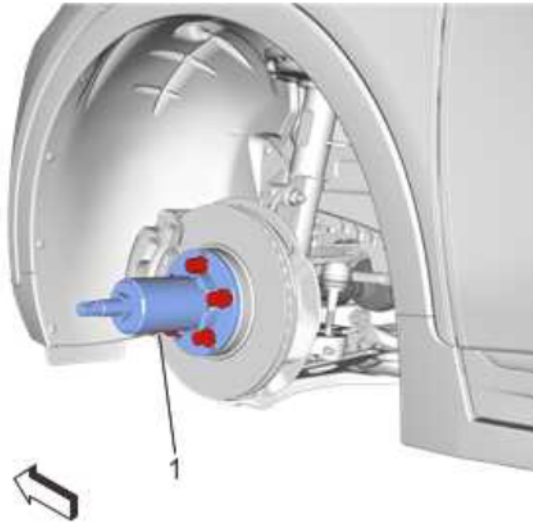


Fig. 6: Hub Spindle Remover
Courtesy of GENERAL MOTORS COMPANY

10. Using the CH-49400 hub spindle remover (1), disconnect the wheel drive shaft from the steering knuckle.

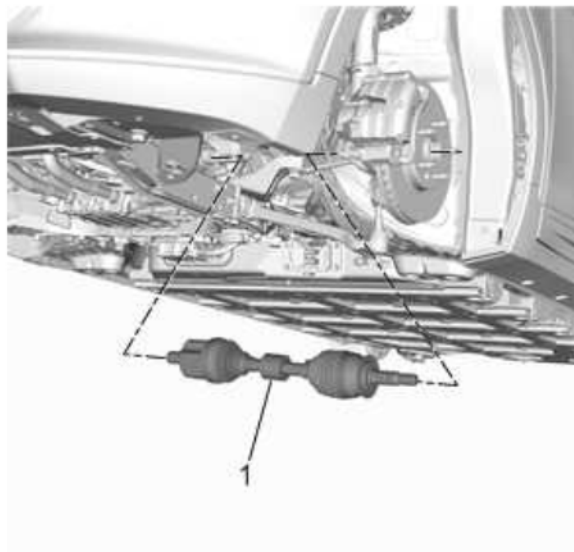


Fig. 7: Front Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

11. Remove Front Wheel Drive Shaft (1) @ Vehicle



Fig. 8: Front Wheel Drive Shaft Retaining Ring And Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE: The wheel drive shaft retaining ring and seal must be discarded after removal.

12. Remove and DISCARD Front Wheel Drive Shaft Retaining Ring (1) @ Front Wheel Drive Shaft
13. Remove and DISCARD Front Wheel Drive Shaft Seal (2) @ Front Wheel Drive Shaft

Installation Procedure



Fig. 9: Front Wheel Drive Shaft Retaining Ring And Seal

Courtesy of GENERAL MOTORS COMPANY

1. Install NEW Front Wheel Drive Shaft Seal (2) @ Front Wheel Drive Shaft
2. Install NEW Front Wheel Drive Shaft Retaining Ring (1) @ Front Wheel Drive Shaft

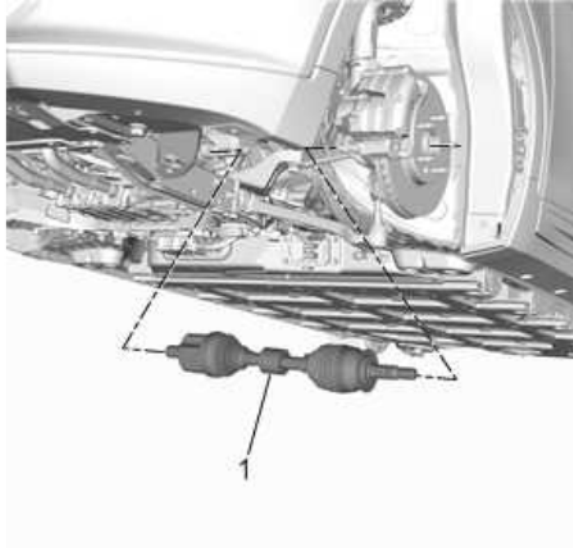


Fig. 10: Front Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

3. Install Front Wheel Drive Shaft (1) @ Vehicle

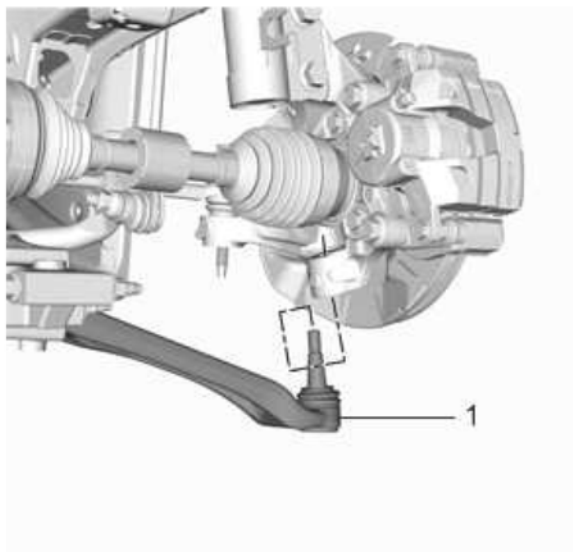


Fig. 11: Front Lower Control Arm Ball Joint

Courtesy of GENERAL MOTORS COMPANY

4. Install Front Lower Control Arm Ball Joint (1) @ Steering Knuckle. Refer to [Lower Control Arm Replacement](#)

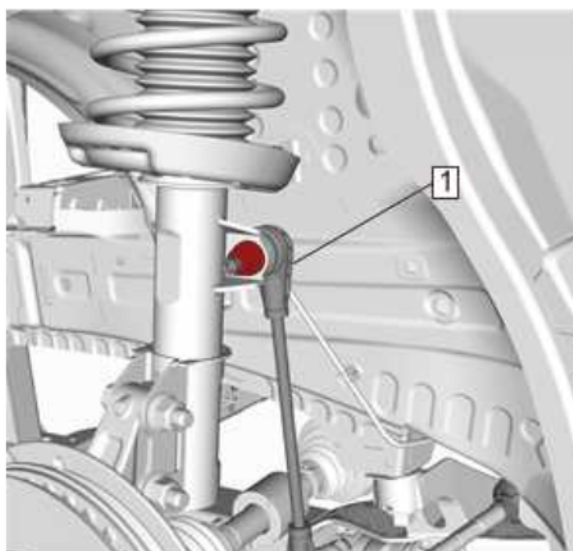


Fig. 12: Front Stabilizer Shaft Link

Courtesy of GENERAL MOTORS COMPANY

5. Install Front Stabilizer Shaft Link (1) @ Front Suspension Strut. Refer to [Stabilizer Shaft Link Replacement](#)

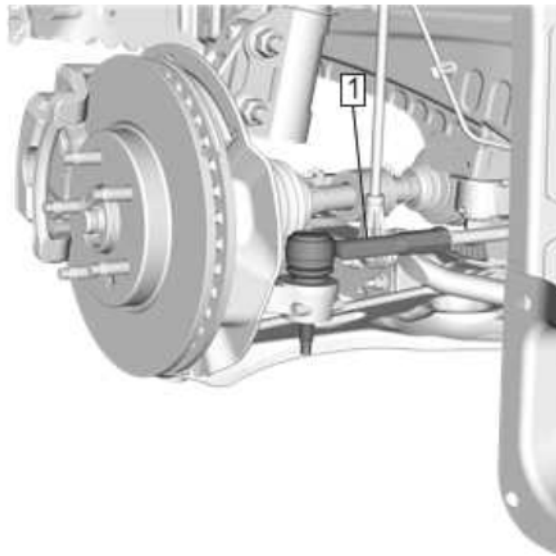


Fig. 13: Steering Linkage Outer Tie Rod

Courtesy of GENERAL MOTORS COMPANY

6. Install Steering Linkage Outer Tie Rod (1) @ Steering Knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#)



Fig. 14: Front Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

7. Install NEW Front Wheel Drive Shaft Nut (1) @ Front Wheel Drive Shaft

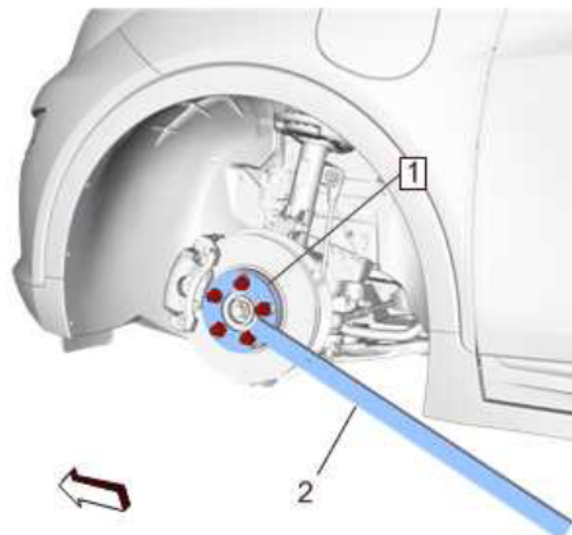


Fig. 15: Wheel Hub Holding Tool And Extension
Courtesy of GENERAL MOTORS COMPANY

8. Install the CH-49376 wheel hub holding tool (1) with the EN-956-1 extension (2) to the wheel hub with the wheel nuts and support the wheel hub holding tool outer end on a safety stand.

CAUTION: Refer to [Fastener Caution](#)

9. Tighten Front Wheel Drive Shaft Nut @ Front Wheel Drive Shaft
 1. First Pass: 150 N.m (111 lb ft)
 2. Second Pass: Loosen 45 Degrees
 3. Final Pass: 250 N.m (185 lb ft)
10. Remove the CH-49376 wheel hub holding tool from the wheel hub.
11. Install Front Compartment Air Deflector. Refer to [Front Compartment Air Deflector Replacement](#)
12. Install the front tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
13. Lower the vehicle.

FRONT WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Removal Procedure

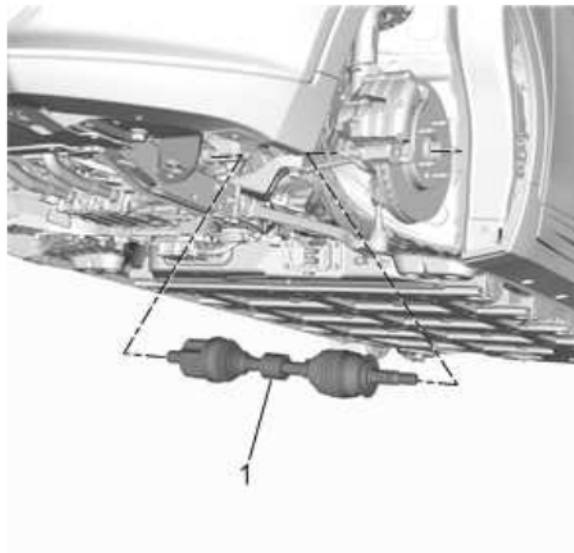


Fig. 16: Front Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

1. Remove Front Wheel Drive Shaft (1) @ Vehicle. Refer to [Front Wheel Drive Shaft Replacement](#)

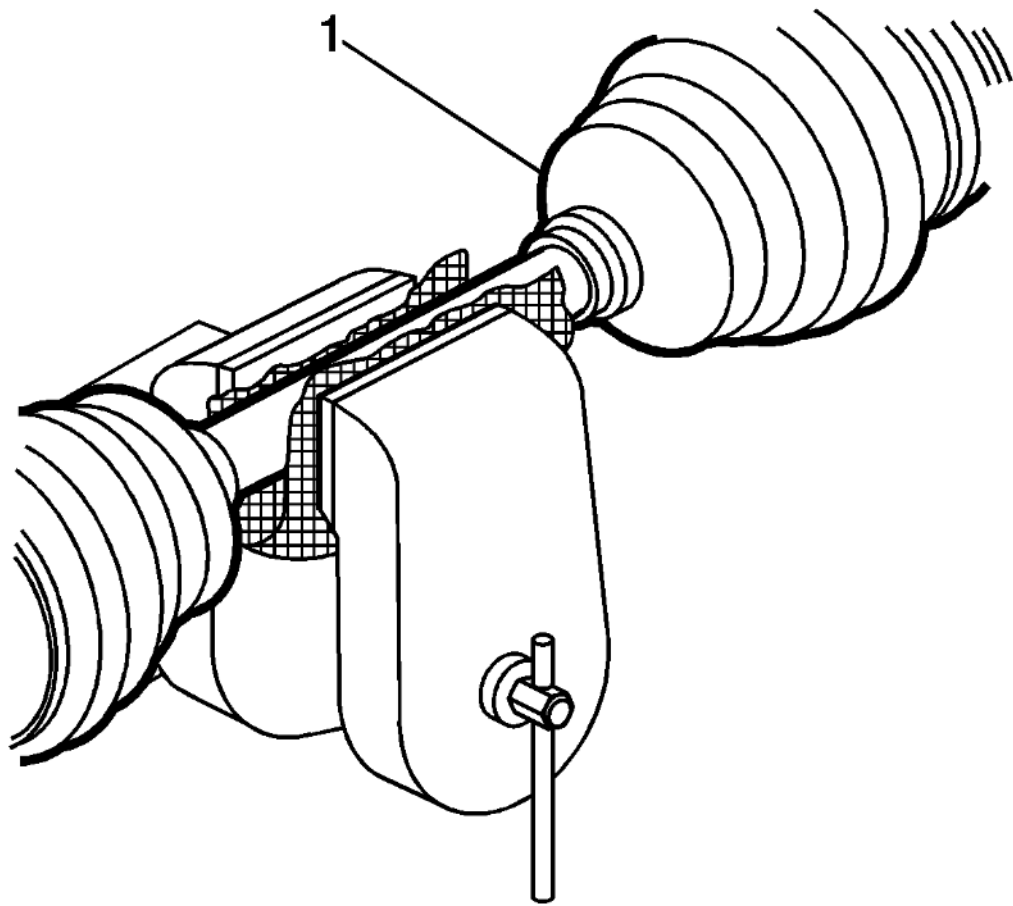


Fig. 17: Wheel Drive Shaft In Vise

Courtesy of GENERAL MOTORS COMPANY

2. Position the wheel drive shaft (1) in a soft jawed vise and clamp securely.

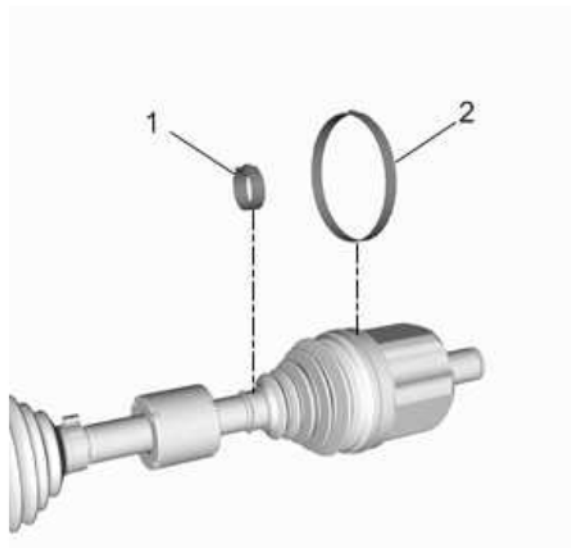


Fig. 18: Inboard Boot Inner Clamp And Outer Clamp

Courtesy of GENERAL MOTORS COMPANY

3. Using a flat-bladed tool, remove and DISCARD the inboard boot inner clamp (1) and outer clamp (2).

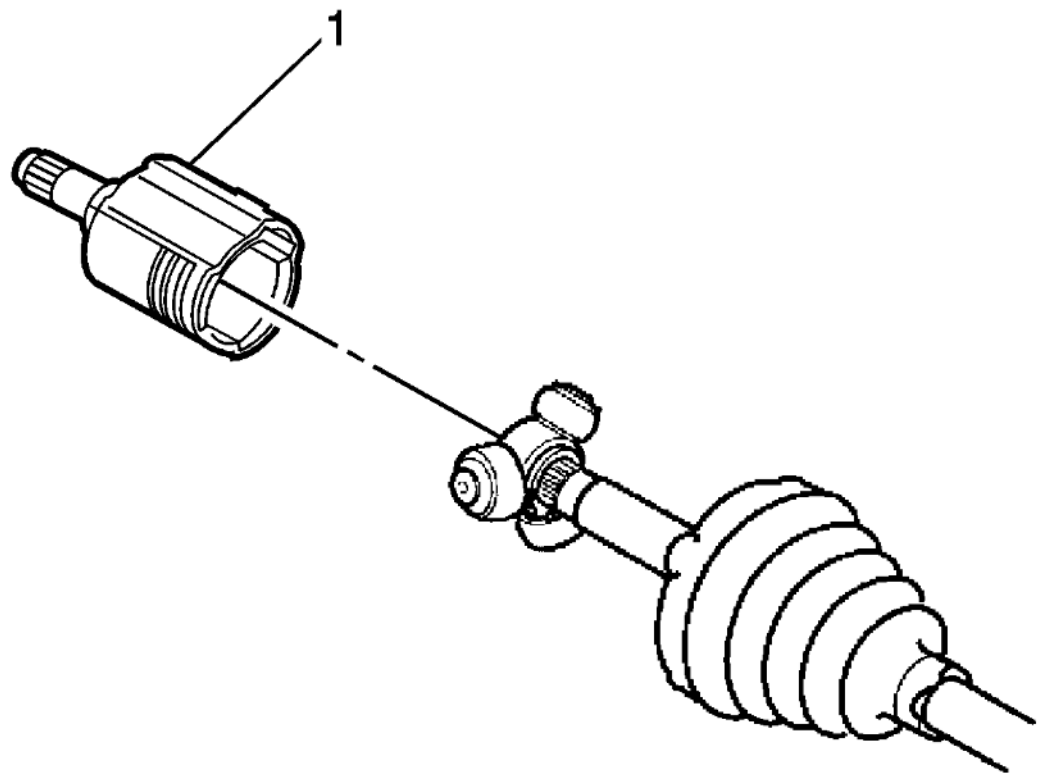


Fig. 19: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

4. Remove the tripot housing (1) from the wheel drive shaft.

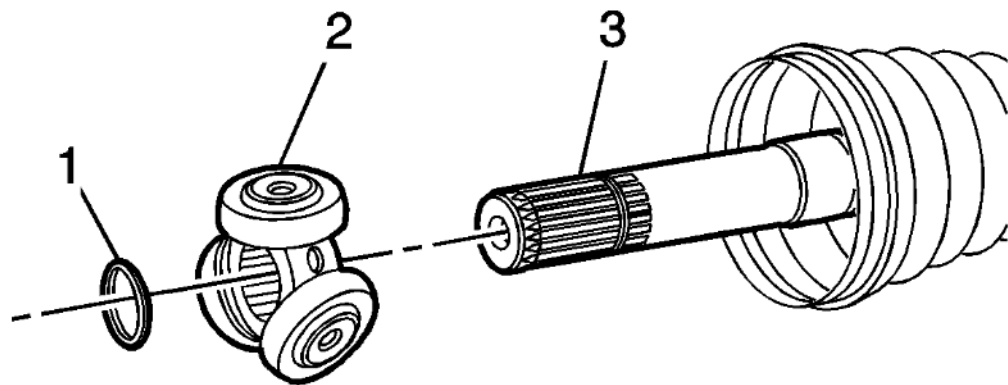


Fig. 20: Wheel Drive Shaft, Tripot Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

5. Remove the retaining clip (1) and the tripod spider (2) from the wheel drive shaft (3).

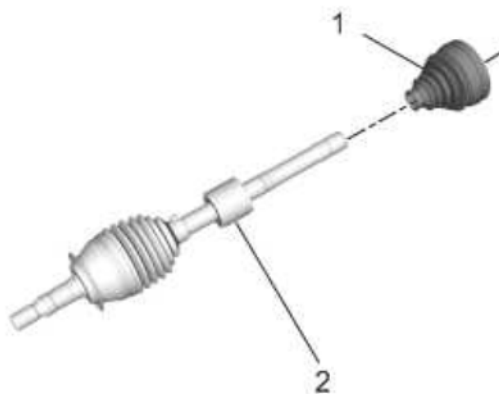


Fig. 21: Wheel Drive Shaft And Boot
Courtesy of GENERAL MOTORS COMPANY

6. Remove the boot (1) from the wheel drive shaft (2).

Installation Procedure

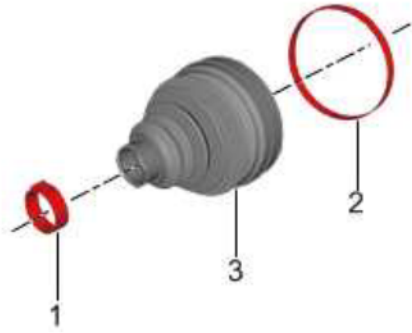


Fig. 22: Inboard Boot, Inner Clamp And Outer Clamp
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW inboard boot inner clamp (1) and a NEW outer clamp (2) on the boot (3).

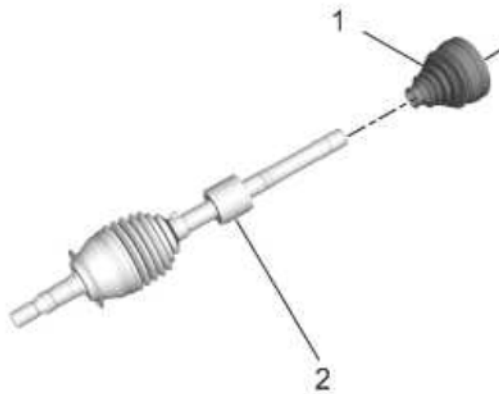


Fig. 23: Wheel Drive Shaft And Boot
Courtesy of GENERAL MOTORS COMPANY

2. Position the boot (1) on the wheel drive shaft (2).

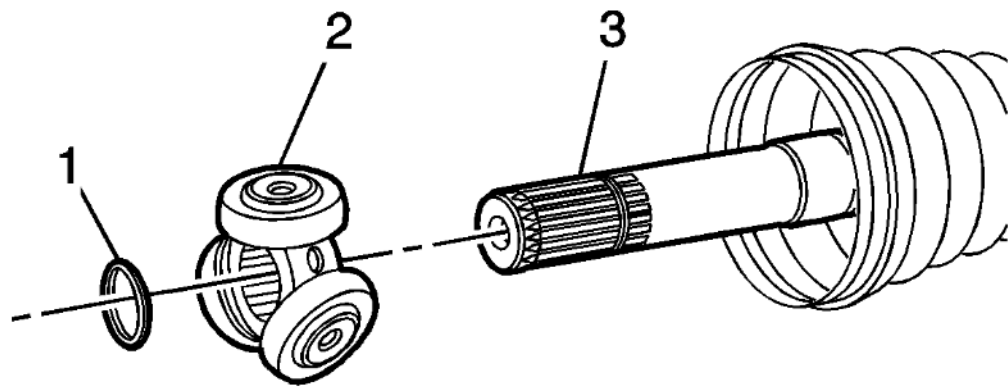


Fig. 24: Wheel Drive Shaft, Tripot Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

3. Install the tripot spider assembly (2) to the wheel drive shaft (3), until seated against the shoulder.
4. Install the retaining ring (1) in the wheel drive shaft (3).
5. Place approximately half of the grease in the kit into the boot and place the remainder in the tripot housing.

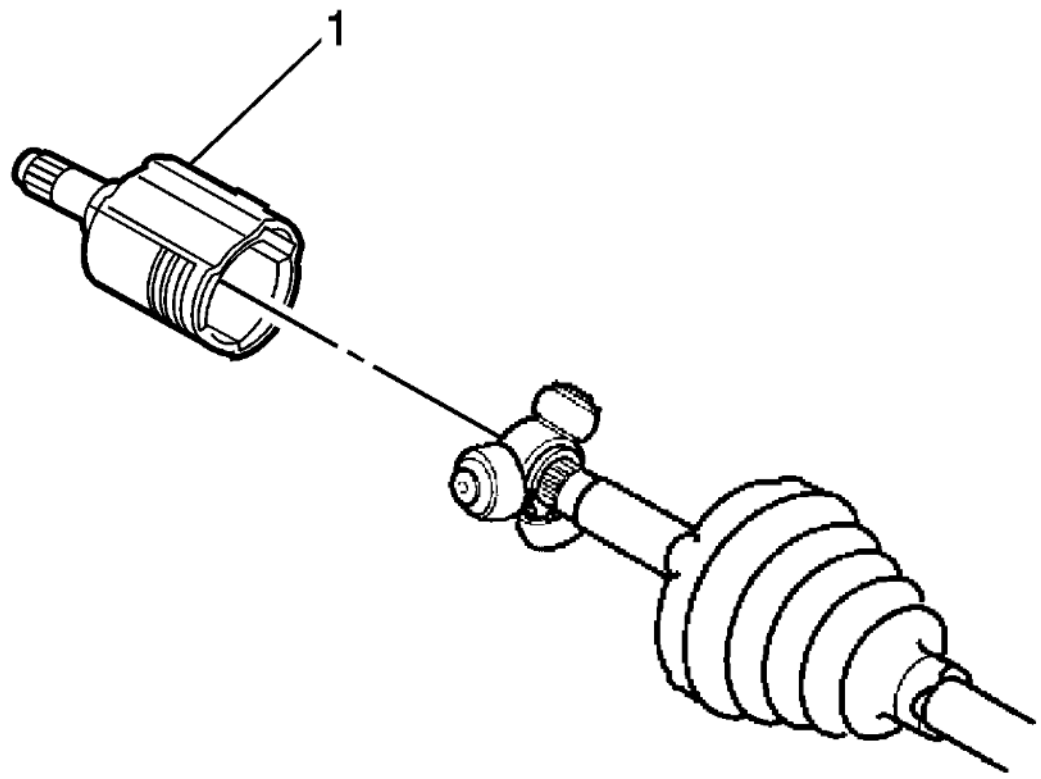


Fig. 25: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

6. Install the tripot housing (1) on the wheel drive shaft.

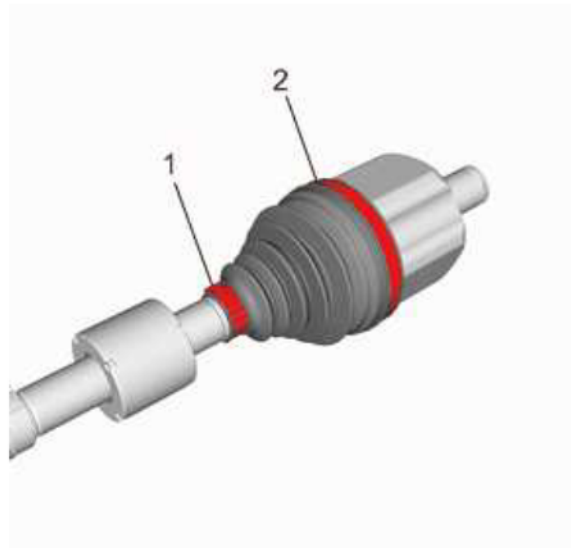


Fig. 26: Inboard Boot Inner Clamp And Outer Clamp

Courtesy of GENERAL MOTORS COMPANY

7. Compress and lock the inboard boot inner clamp (1) and outer clamp (2) using an appropriate earless seal clamp tool.

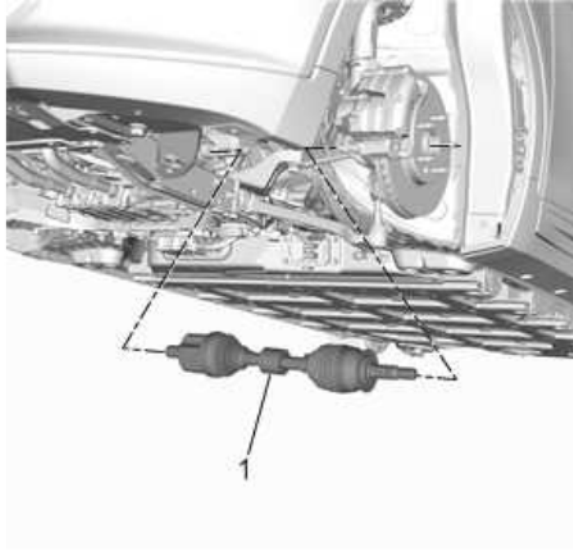


Fig. 27: Front Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Install Front Wheel Drive Shaft (1) @ Vehicle. Refer to [Front Wheel Drive Shaft Replacement](#)

FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

NOTE: The front wheel drive shaft outer joint and boot should be replaced with the half shaft as a subassembly.

Removal Procedure

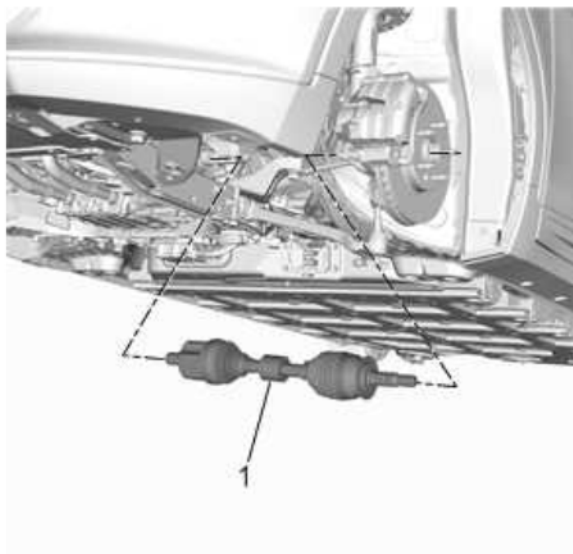


Fig. 28: Front Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Remove Front Wheel Drive Shaft (1) @ Vehicle. Refer to [Front Wheel Drive Shaft Replacement](#)

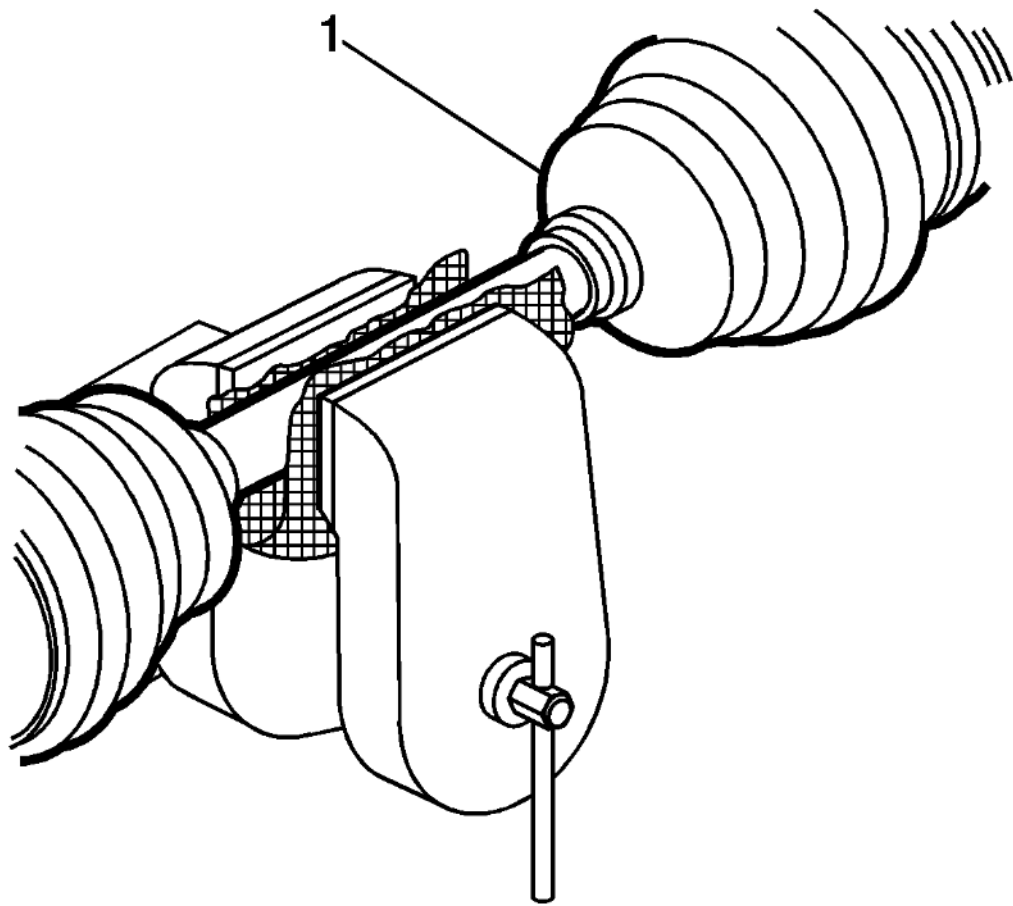


Fig. 29: Wheel Drive Shaft In Vise

Courtesy of GENERAL MOTORS COMPANY

2. Position the wheel drive shaft (1) in a soft jawed vise and clamp securely.

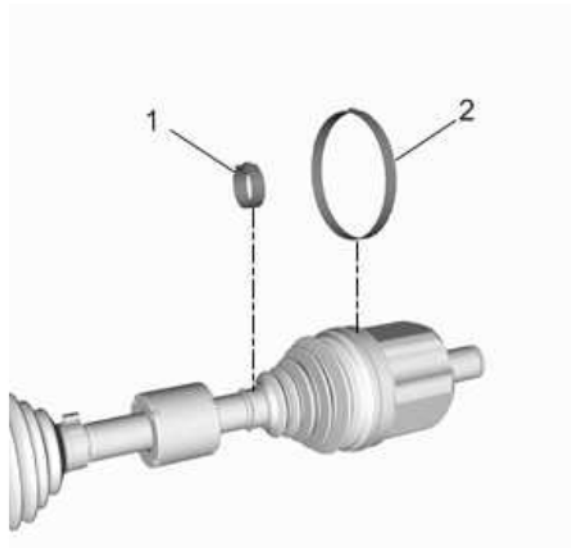


Fig. 30: Inboard Boot Inner Clamp And Outer Clamp

Courtesy of GENERAL MOTORS COMPANY

3. Using a flat-bladed tool, remove and DISCARD the inboard boot inner clamp (1) and outer clamp (2).

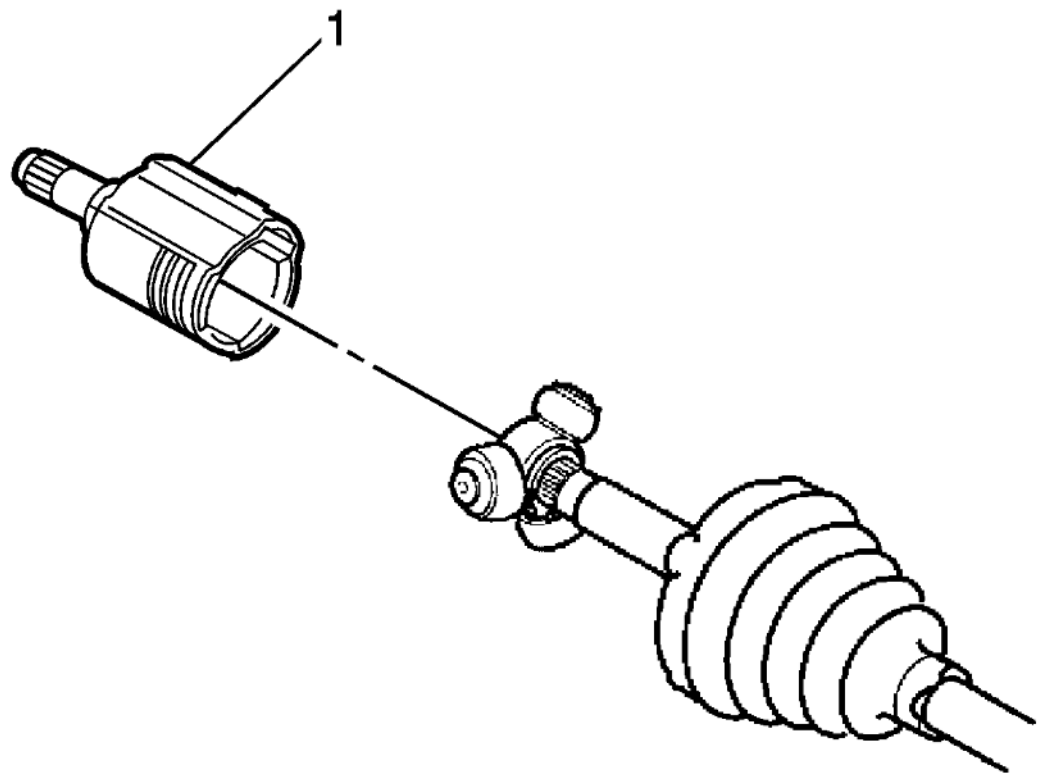


Fig. 31: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

4. Remove the tripot housing (1) from the wheel drive shaft.

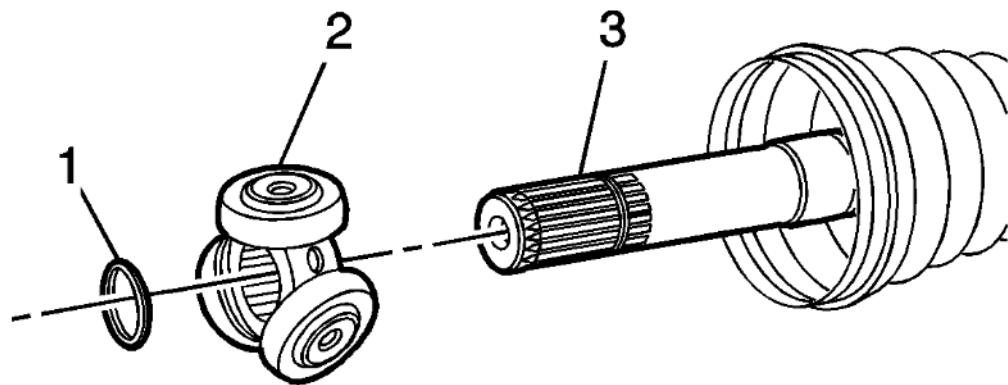


Fig. 32: Wheel Drive Shaft, Tripot Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

5. Remove the retaining clip (1) and the tripod spider (2) from the wheel drive shaft (3).

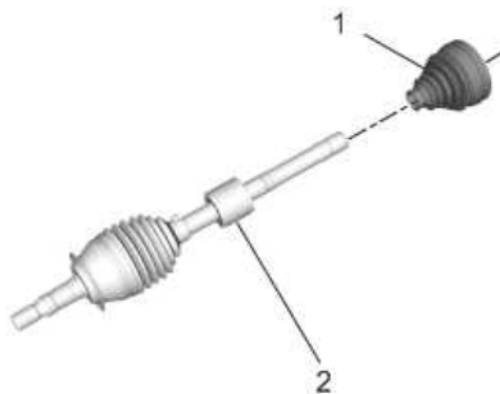


Fig. 33: Wheel Drive Shaft And Boot
Courtesy of GENERAL MOTORS COMPANY

6. Remove the boot (1) from the wheel drive shaft (2).

Installation Procedure

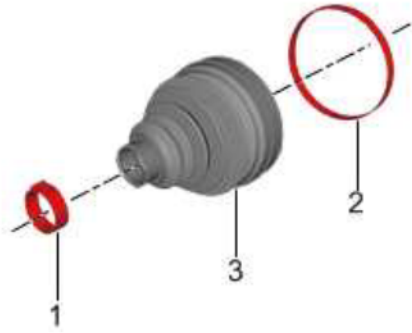


Fig. 34: Inboard Boot, Inner Clamp And Outer Clamp
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW inboard boot inner clamp (1) and a NEW outer clamp (2) on the boot (3).

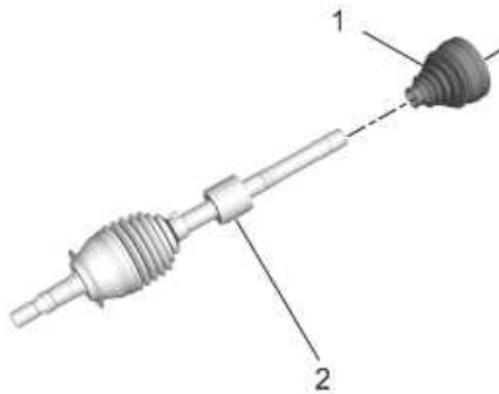


Fig. 35: Wheel Drive Shaft And Boot
Courtesy of GENERAL MOTORS COMPANY

2. Position the boot (1) on the wheel drive shaft (2).

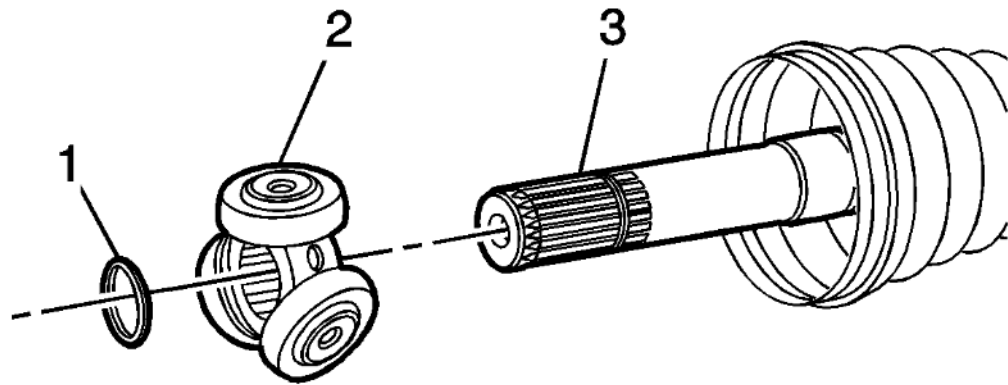


Fig. 36: Wheel Drive Shaft, Tripot Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

3. Install the tripot spider assembly (2) to the wheel drive shaft (3), until seated against the shoulder.
4. Install the retaining ring (1) in the wheel drive shaft (3).
5. Place approximately half of the grease in the kit into the boot and place the remainder in the tripot housing.

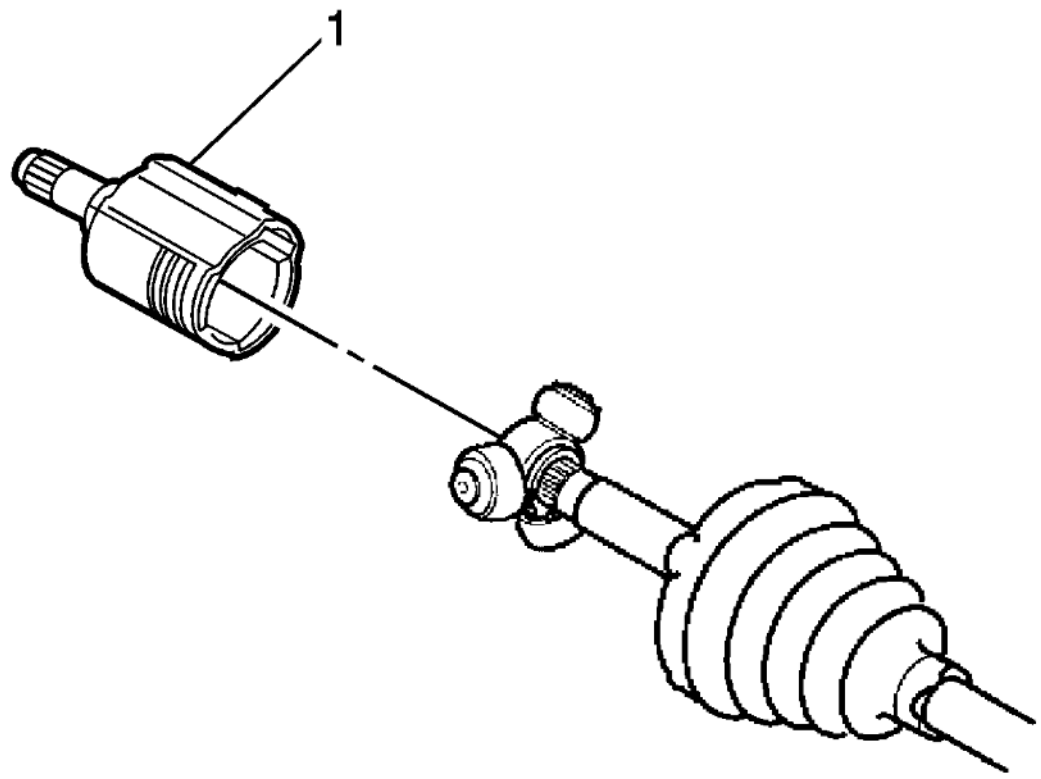


Fig. 37: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

6. Install the tripot housing (1) on the wheel drive shaft.

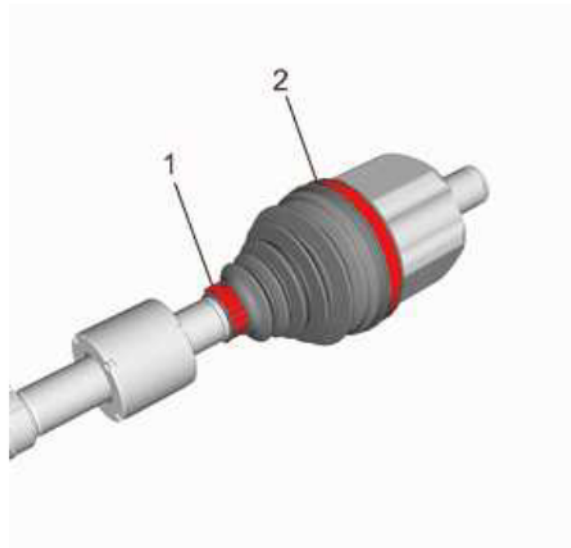


Fig. 38: Inboard Boot Inner Clamp And Outer Clamp

Courtesy of GENERAL MOTORS COMPANY

7. Compress and lock the inboard boot inner clamp (1) and outer clamp (2) using an appropriate earless seal clamp tool.

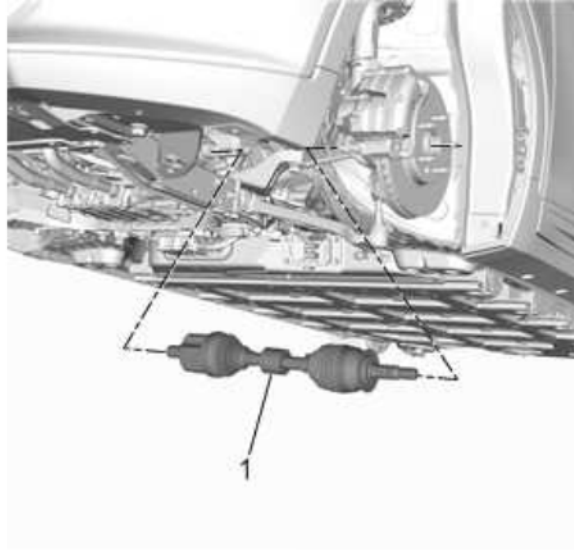


Fig. 39: Front Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Install Front Wheel Drive Shaft (1) @ Vehicle. Refer to [Front Wheel Drive Shaft Replacement](#)

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Front wheel drive axles are flexible assemblies.

Front wheel drive axles consist of the following components:

- A front wheel drive shaft tripot joint (inner joint)
- A front wheel drive shaft constant velocity joint (outer joint)
- A front wheel drive shaft

The front wheel drive shaft connects the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joint.

The front wheel drive shaft tripot joint is completely flexible. The front wheel drive shaft tripot joint can move in and out.

The front wheel drive shaft constant velocity joint is flexible, but the front wheel drive shaft constant velocity joint cannot move in and out.

Boots And Clamps

The front wheel drive shaft constant velocity joint and the front wheel drive shaft tripot joint boots in the front wheel drive axle are made of a thermoplastic material.

The clamps in the front wheel drive axle are made of stainless steel.

The boot provides the following functions:

- Protection of the internal parts of the front wheel drive shaft constant velocity joint and the front wheel drive shaft tripot joint

The boot protects the grease from the following sources of damage:

- Harmful atmospheric conditions, such as extreme temperatures or ozone gas
- Foreign material, such as dirt or water
- Allows angular movement and the axial movement of the front wheel drive shaft tripot joint
- Allows angular movement of the front wheel drive shaft constant velocity joint

NOTE:

Protect the boots from sharp tools and from the sharp edges of the surrounding components. Any damage to the boots or the clamps will result in leakage. Leakage

will allow water to leak into the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joints. Leakage will also allow grease to leak out of the front wheel drive shaft tripot joints and the front wheel drive shaft constant velocity joints. Leakage may cause noisy front wheel drive axle operation and eventual failure of the internal components.

The clamps provide a leak proof connection for the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joint at the following locations:

- The housing
- The front wheel drive shaft

The thermoplastic material performs well under normal conditions and normal operation. However, the material is not strong enough to withstand the following conditions:

- Abusive handling
- Damage from sharp objects, such as sharp tools or any sharp edges of the surrounding components in the vehicle

Front Wheel Drive Shaft Tripot Joint (Inner Joint)

The front wheel drive shaft tri-pot joint is made with the tripot design without an over-extension limitation retainer.

The joint is constructed as follows for vehicles that are equipped with an automatic transmission:

- The left front wheel drive axle has a female spline. The female spline installs over a stub shaft that protrudes from the transaxle.
- The right front wheel drive axle has a female spline. The right front wheel drive axle uses barrel type snap rings in order to interlock with the intermediate shaft.

Front Wheel Drive Shaft Constant Velocity Joint (Outer Joint)

The front wheel drive shaft constant velocity joint is made with the Rzeppa joint design.

The shaft end (which mates with the knuckle/hub) has a helical spline. The helical spline ensures a tight, press-type fit.

This design prevents end play between the hub bearing and the front wheel drive axle.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
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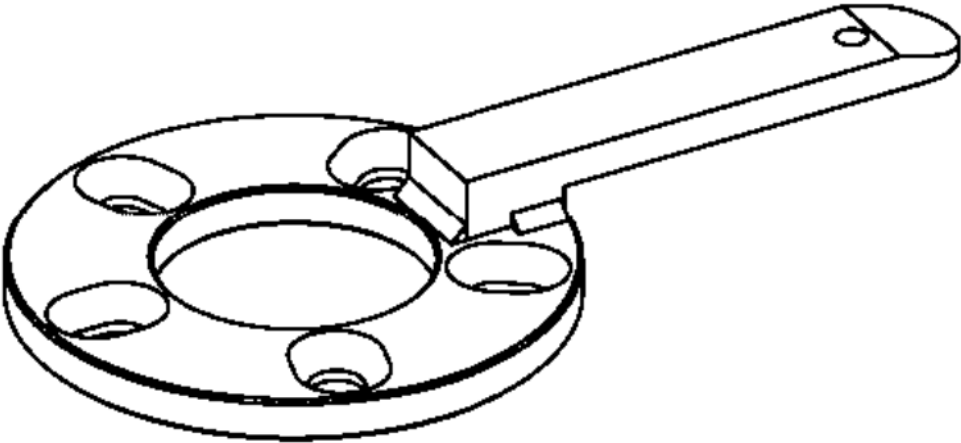
Illustration	Tool Number/Description
	CH 49376 Wheel Hub Holding Tool

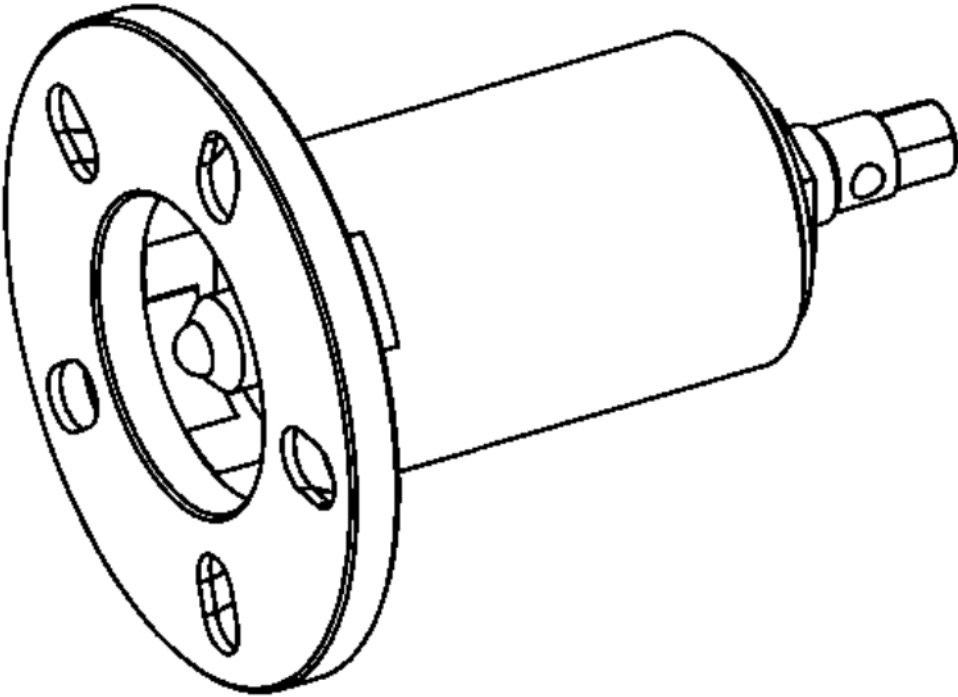
Illustration	Tool Number/Description
	CH 49400 Hub Spindle Remover

Illustration	Tool Number/Description
	EN 956-1 Extension