

2004 DRIVELINE/AXLE

Propeller Shaft - Vue

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Center Bearing-to-Vehicle Underbody Bolts	25 N.m	18 lb ft
Propeller Shaft-to-Rear Differential Flange Bolts	50 N.m	37 lb ft
Propeller Shaft-to-Transfer Case Flange Bolts	25 N.m	19 lb ft

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

Application	Type of Material	Saturn Part Number
Propeller Shaft Bolts	Threadlocker	21005994
Center Bearing to Vehicle Bolts	Threadlocker	21005994

COMPONENT LOCATOR

DRIVELINE DISASSEMBLED VIEWS

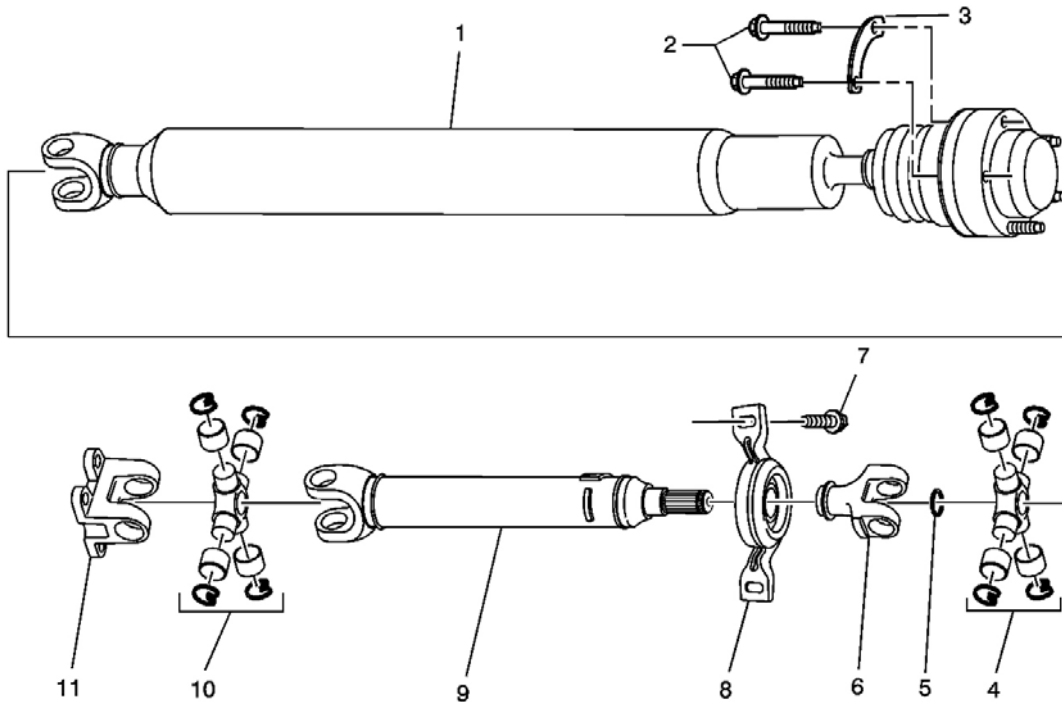


Fig. 1: Driveline Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Front Shaft
2	Front Mounting Bolt
3	Washer
4	Universal Joint
5	Snap Ring
6	Yoke
7	Center Support Bearing Bolt
8	Center Support Bearing
9	Rear Shaft
10	Universal Joint
11	Rear Flange

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - PROPELLER SHAFT

Begin the system diagnosis by reviewing or **Propeller Shaft Description and Operation** or **Transfer Case**

Description and Operation in Transfer Case NVG900, and Differential Carrier Assembly General Description in this service manual. Reviewing the description and operation information will help you to determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the description and operation information will also help you to determine if the condition described by the customer is normal operation. Refer to **Symptoms - Propeller Shaft** in this service manual to diagnose the system and locate the procedure.

SYMPTOMS - PROPELLER SHAFT

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Driveline Disassembled Views** or **Propeller Shaft Description and Operation** or **Transfer Case Description and Operation** in Transfer Case NVG900, Differential Case General Description, and Differential Carrier Assembly Description in this service manual. All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system problem. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to **Strategy Based Diagnosis** in General Information.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the vehicle. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Verify the exact operating conditions under which the concern exists. Note factors such as speed, road conditions, ambient temperature, and other specifics.
- Compare the driving characteristics or sounds, if applicable, to a known good vehicle and make sure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Roughness or Vibration**
- **Ping, Snap, or Click Noise**
- **Knock or Clunk Noise**
- **Scraping Noise**
- **Squeak Noise**
- **Shudder on Acceleration at Low Speed**

ROUGHNESS OR VIBRATION

Roughness or Vibration

Cause	Correction
The roughness or vibration occurs while driving the vehicle at various speeds.	
A bent or dented propeller shaft	Replace the propeller shaft. Refer to <u>Propeller Shaft Replacement</u> .
Undercoating is on the propeller shaft	Clean the propeller shaft.
The tires are unbalanced at 48-80 km/h (30-50 mph)	Balance or replace tires.
The universal joints are worn	Replace worn universal joints.
Burrs or gouges are on the companion flange	<ul style="list-style-type: none">• Inspect snap ring locating surfaces on flange yoke.• Deburr or replace companion flange.
Excessive looseness at the slippage spine	Replace necessary parts.
Distorted or damaged yokes or flanges	Install new yokes or flanges.
The yokes are out of phase on two-piece propeller shaft system	Re-index propeller shaft.
The driveline vibration is at 80 km/h (50 mph)	Inspect propeller shaft for runout and missing balance weights.

PING, SNAP, OR CLICK NOISE

Ping, Snap, or Click Noise

Cause	Correction
A ping, snap, or click is usually heard on initial load after the transmission is in gear, either forward or reverse.	
Upper and lower control arms have loose bushing bolts.	Tighten bolts to specified torque. Refer to <u>Fastener Tightening Specifications</u> .
A loose fixed yoke or companion flange	Tighten bolts and pinion nut to specified torque. Refer to <u>Fastener Tightening Specifications</u> .
Worn or damaged universal joints	Replace universal joints. Refer to <u>Universal Joint Replacement - External Snap Ring</u> .

KNOCK OR CLUNK NOISE

Knock or Clunk Noise

Cause	Correction
Knocking or clinking noise occurs when operating the vehicle in high gear or coasting in neutral at 16 km/h (10 mph).	
A worn or damaged universal joint	Replace the worn or damaged universal joint. Refer to <u>Universal Joint Replacement - External Snap Ring</u> .
The side hub counterbore in the	Replace the differential case and/or side gears.

differential is worn oversize

SCRAPING NOISE

Scraping Noise

Cause	Correction
A scraping noise occurs when driving the vehicle at various speeds.	
The pinion flange or center bearing is rubbing	Correct the interference.

SQUEAK NOISE

Squeak Noise

Cause	Correction
When driving the vehicle at various speeds a squeaking sound occurs.	
Lack of lubricant	Replace the universal joints as required. Refer to <u>Universal Joint Replacement - External Snap Ring</u> .

SHUDDER ON ACCELERATION AT LOW SPEED

Shudder on Acceleration at Low Speed

Cause	Correction
When accelerating the vehicle at low speed a shudder occurs.	
Bolts are loose or missing at the flanges	Replace and/or tighten bolts to specified torque. Refer to <u>Fastener Tightening Specifications</u> .
The universal joint is worn	Replace the universal joint. Refer to <u>Universal Joint Replacement - External Snap Ring</u> .

REPAIR INSTRUCTIONS

PROPELLER SHAFT REPLACEMENT

Removal Procedure

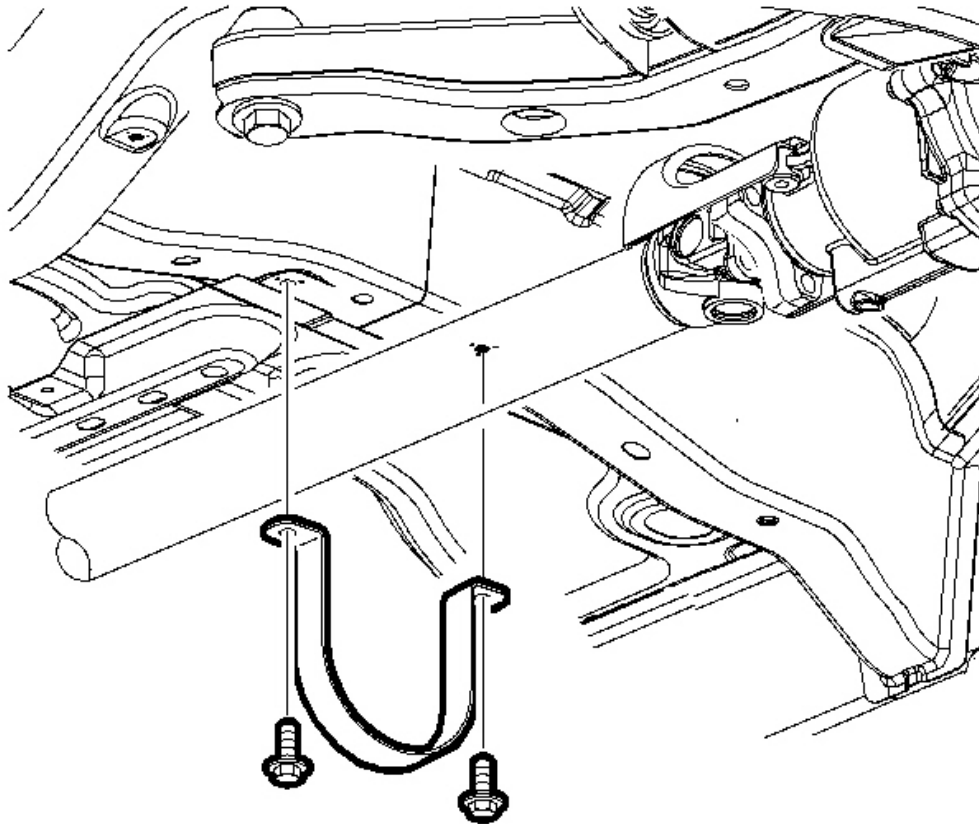


Fig. 2: View Of Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

1. Place the transmission in neutral.
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
3. Index mark the relationship of the propeller shaft to the rear drive module flange.
4. Remove the bolts securing the underbody guard loop.
5. Remove the underbody guard loop.

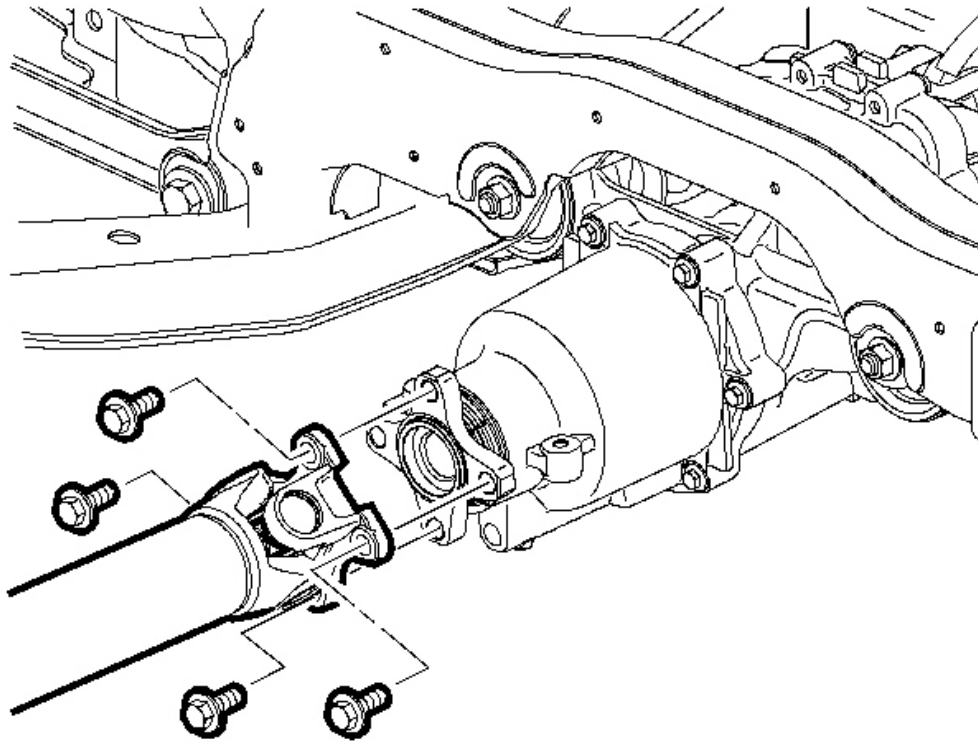


Fig. 3: Removing/Installing Bolts Securing The Propeller Shaft Yoke
Courtesy of GENERAL MOTORS CORP.

6. Place a support under the propeller shaft at the rear drive module.
7. Remove the bolts securing the propeller shaft yoke flange to the rear drive module flange.

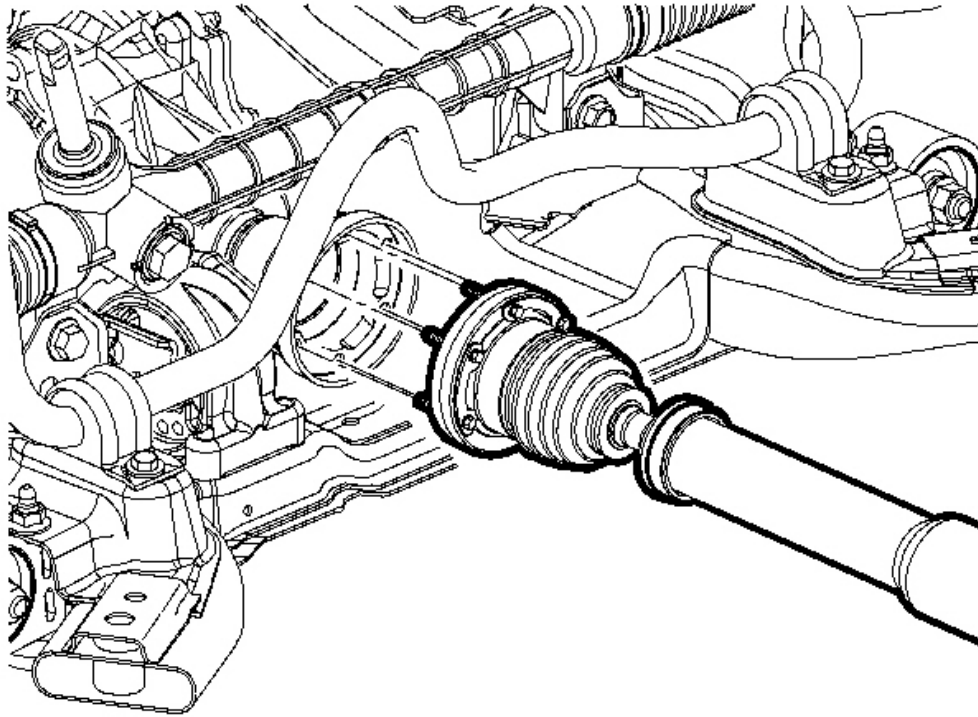


Fig. 4: Removing/Installing Propeller Shaft To The PTO Flange
Courtesy of GENERAL MOTORS CORP.

8. Index mark the relationship of the propeller shaft to the power take-off unit (PTO) flange.
9. Place a support under the propeller shaft at the PTO.
10. Remove the bolts securing the propeller shaft to the PTO flange.

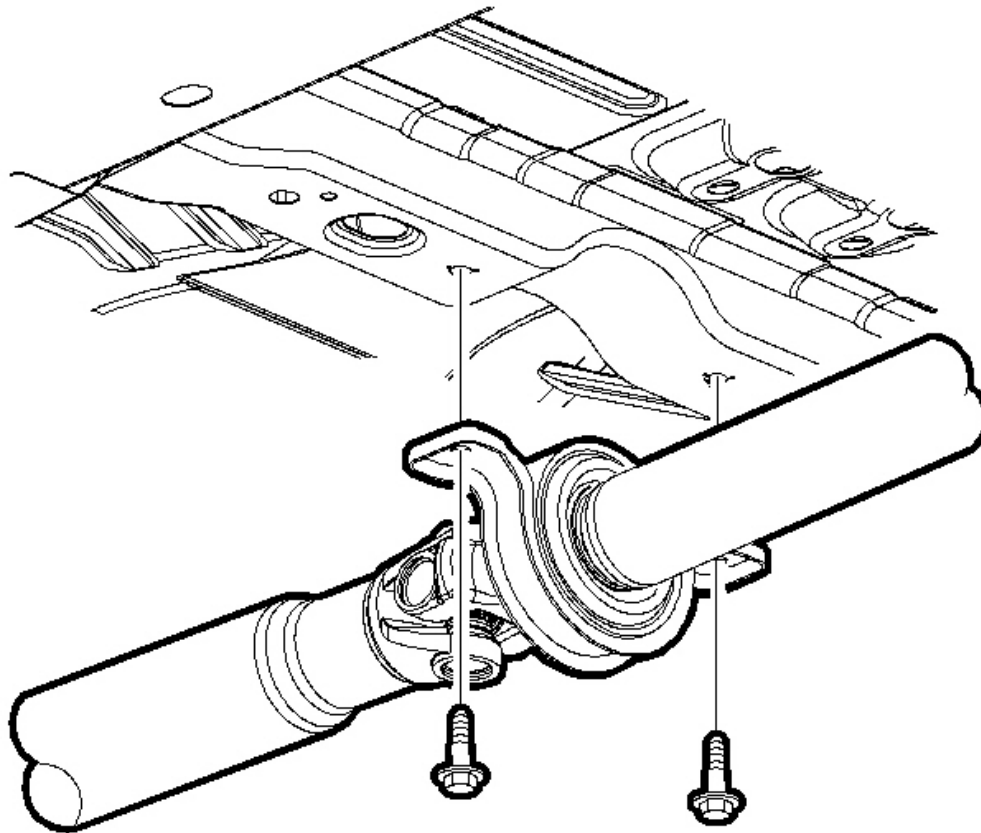


Fig. 5: Placing Support Under Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

11. Place a support under the propeller shaft at the support bearing.
12. Remove the bolts securing the propeller shaft support bearing to the vehicle underbody.
13. While supporting the propeller shaft, move the propeller shaft rearward to disengage the constant velocity joint from the PTO flange.
14. Remove the propeller shaft from the vehicle.

Installation Procedure

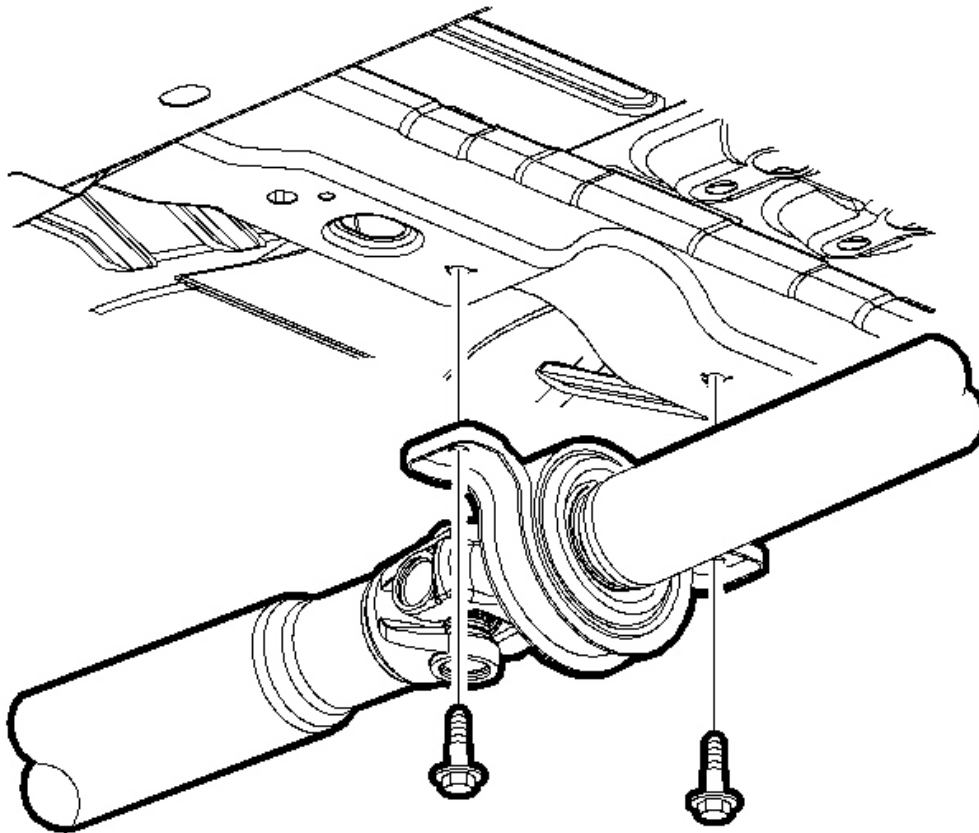


Fig. 6: Placing Support Under Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

1. While supporting the front, center, and rear of the propeller shaft, install the propeller shaft to the vehicle.
2. Install, but do not tighten, the support bearing mounting bolts.

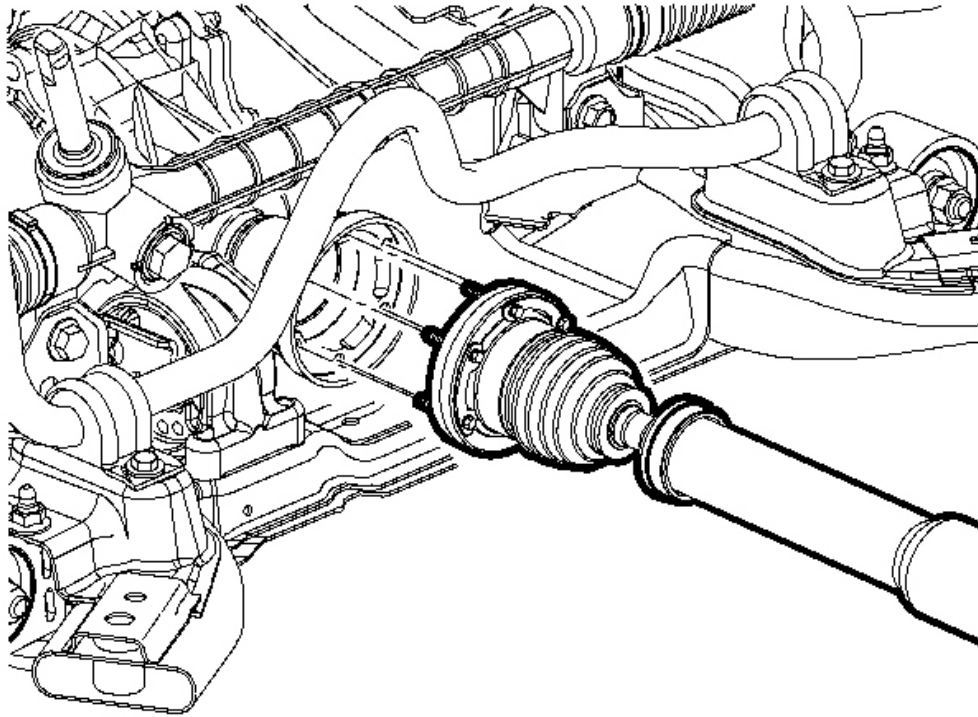


Fig. 7: Removing/Installing Propeller Shaft To The PTO Flange
Courtesy of GENERAL MOTORS CORP.

3. Pull the forward section of the propeller shaft rearward and install the propeller shaft to the PTO flange.
4. Align the index marks on the propeller shaft constant velocity joint and the PTO flange.
5. Thoroughly clean the propeller shaft flange mounting bolts and apply threadlocker, GM P/N 89021297 (Canadian P/N 10953488), to the bolt threads.

NOTE: Refer to Fastener Notice in Cautions and Notices.

6. Install the front propeller shaft mounting bolts.

Tighten: Tighten the bolts to 25 N.m (19 lb ft).

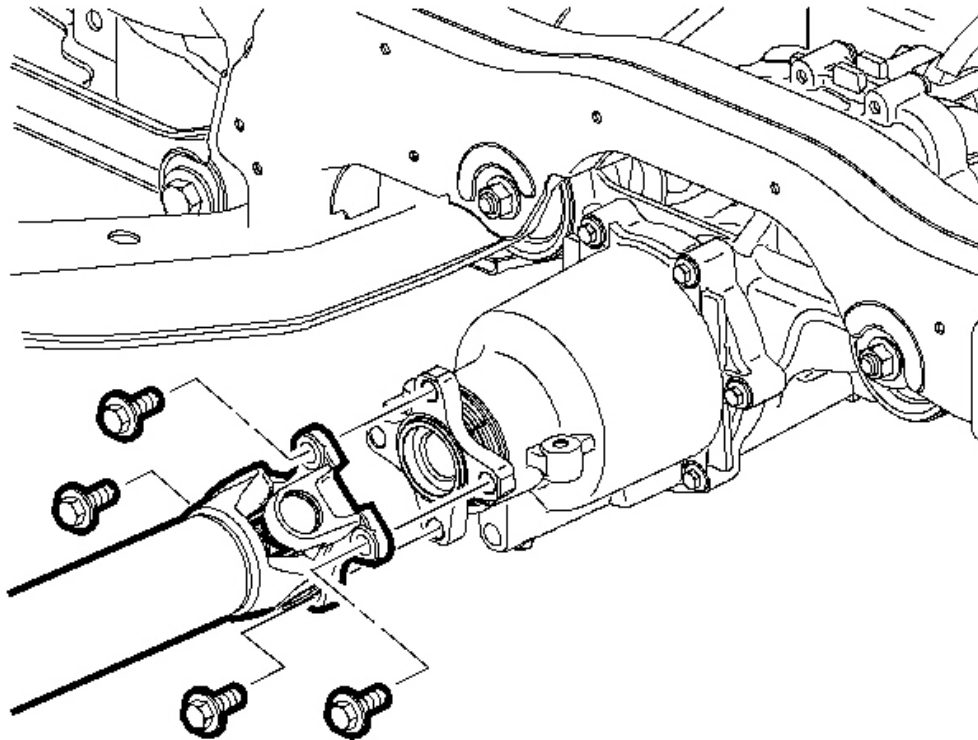


Fig. 8: Removing/Installing Bolts Securing The Propeller Shaft Yoke
Courtesy of GENERAL MOTORS CORP.

7. Align the index marks on the propeller shaft yoke flange and the rear drive module flange and install the propeller.
8. Thoroughly clean the yoke mounting bolts and apply threadlocker, GM P/N 89021297 (Canadian P/N 10953488), to the bolt threads.
9. Install the bolts to the propeller shaft yoke and rear drive module flange.

Tighten: Tighten the bolts to 50 N.m (37 lb ft).

10. Tighten the support bearing mounting bolts.

Tighten: Tighten the bolts to 25 N.m (19 lb ft).

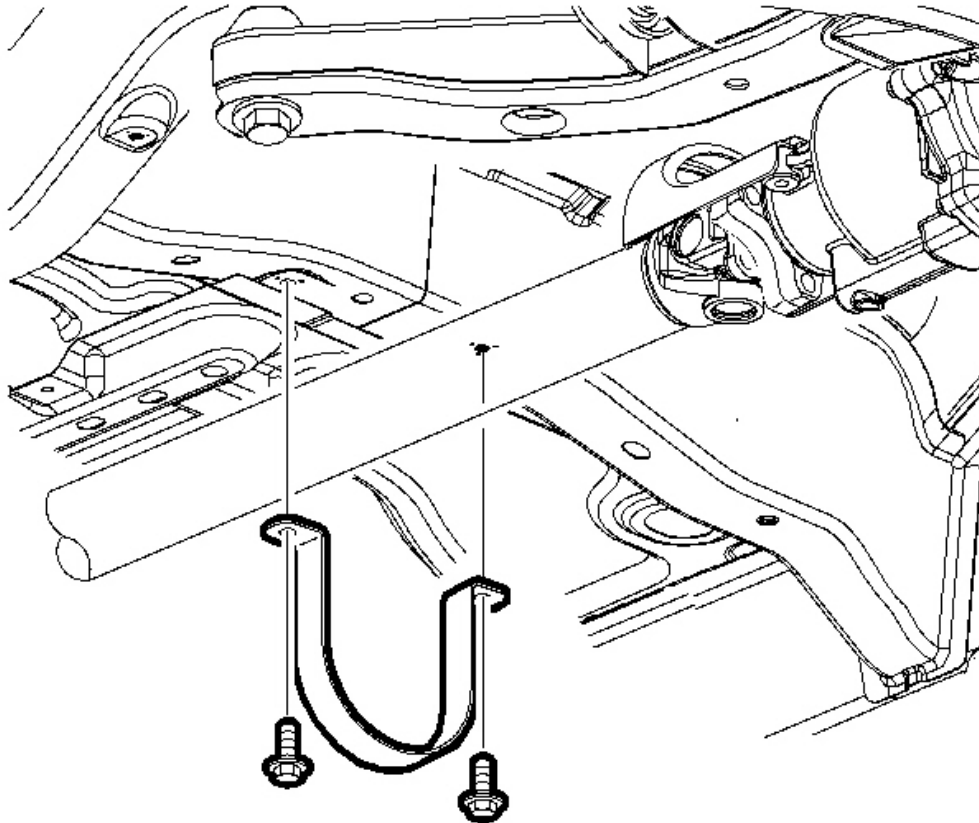


Fig. 9: View Of Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

11. Remove the support stands from the propeller shaft.
12. Install the guard loop to the vehicle underbody.
13. Install the bolts to the guard loop.

Tighten: Tighten the bolts to 25 N.m (19 lb ft).

14. Lower the vehicle.

CENTER BEARING REMOVAL

Removal Procedure

Tools Required

- **J 22912-01** Split-Plate Bearing Puller. See **Special Tools and Equipment** .
- **J 45270** Universal Joint Remover/Installer. See **Special Tools and Equipment** .

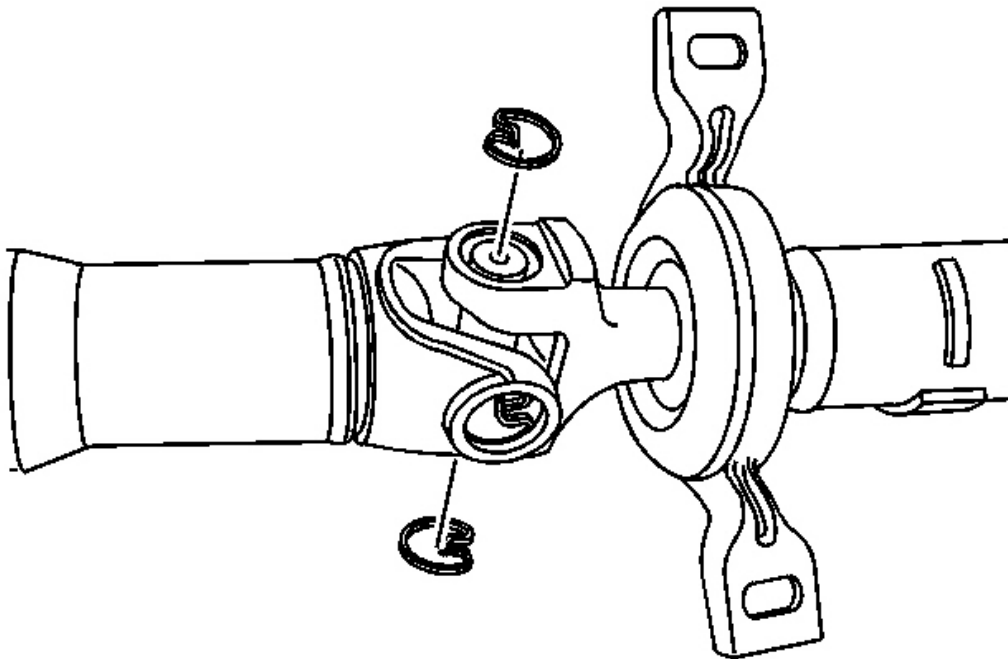


Fig. 10: Removing/Installing Universal Joint Caps & Retaining Clips
Courtesy of GENERAL MOTORS CORP.

NOTE: Never clamp propeller shaft tubing in a vise. Clamping propeller shaft tubing in a vise could dent or deform the tube, causing an imbalance or unsafe condition. Always clamp on one end of the yokes and support the shaft horizontally.

IMPORTANT: Prior to disassembly, mark the positions of the driveshaft components

relative to the driveshaft tube. All components must be reassembled in the same relationship to maintain proper balance.

1. Remove the snap rings.
 1. Pinch the ends of the snap ring together with a pair of pliers.
 2. If the snap ring does not readily snap out of the groove in the yoke, tap the end of the bearing cup lightly in order to relieve pressure from ring.

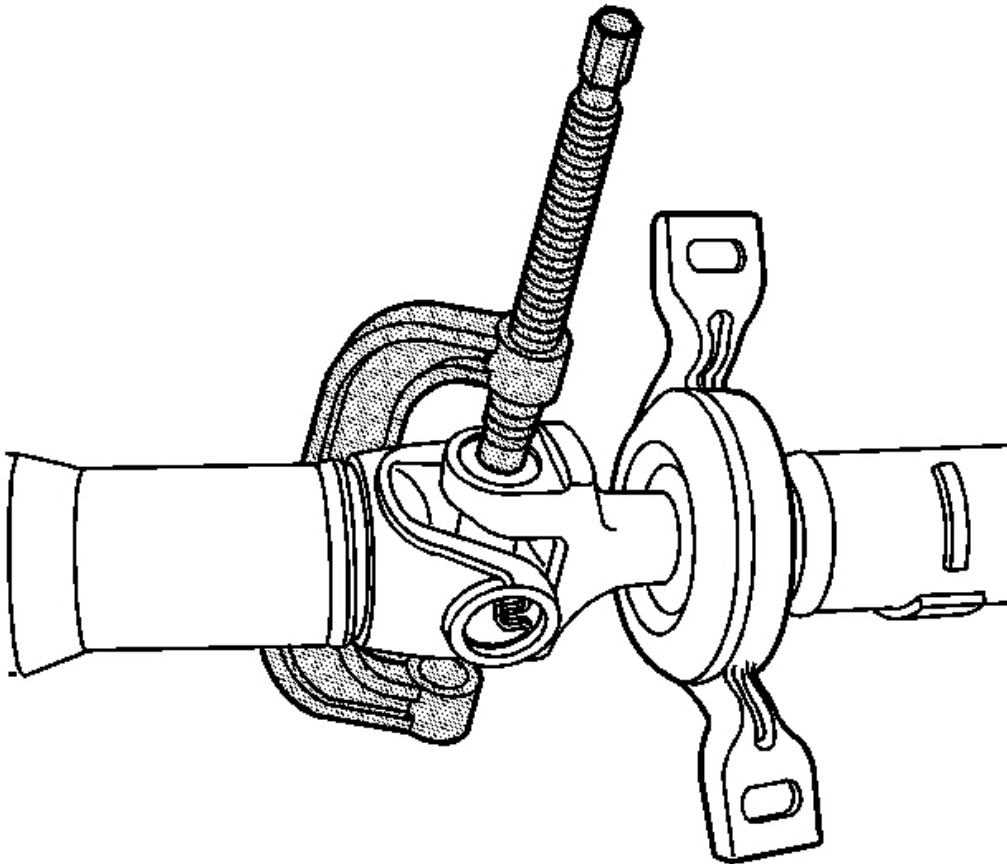


Fig. 11: Removing Universal Joint Caps Using J45270
Courtesy of GENERAL MOTORS CORP.

2. Remove the universal joint caps using **J 45270** . See **Special Tools and Equipment** .
3. Remove the front shaft half.

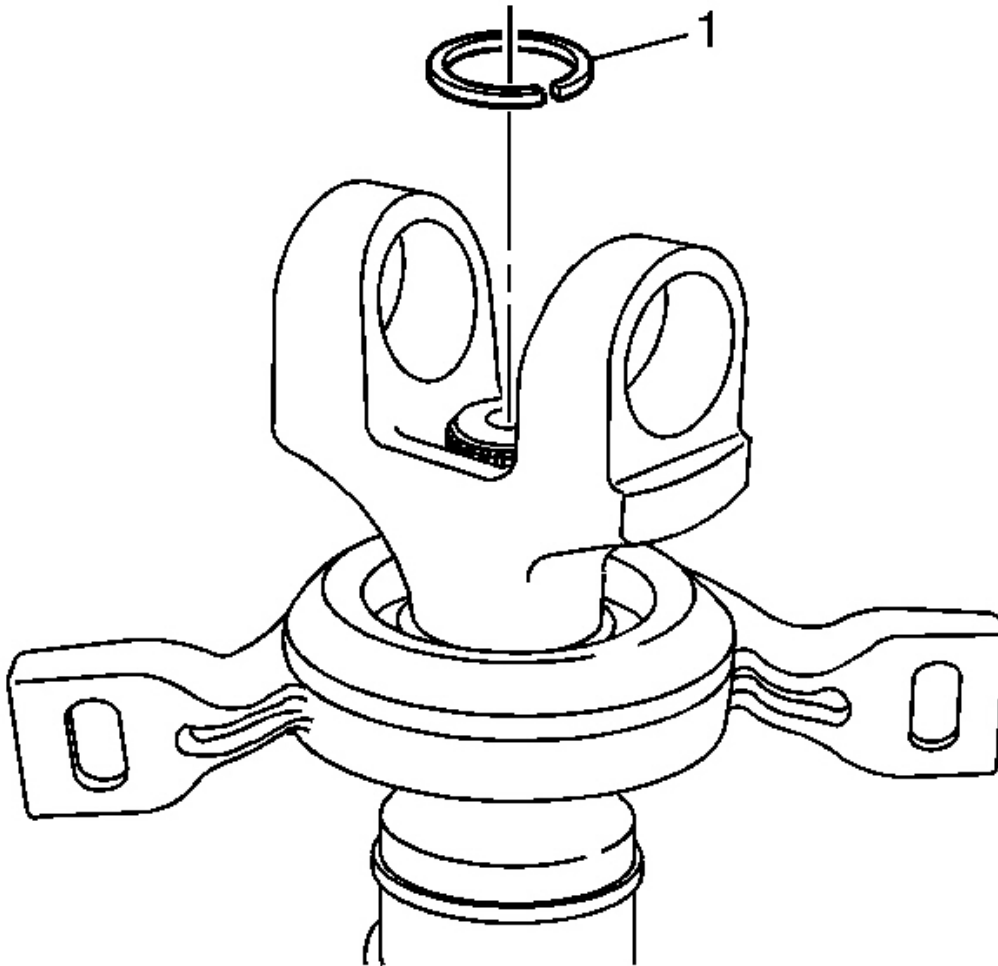


Fig. 12: Removing/Installing Lock Ring From The Groove
Courtesy of GENERAL MOTORS CORP.

4. Remove the lock ring (1) from the groove.
5. Discard the lock ring.

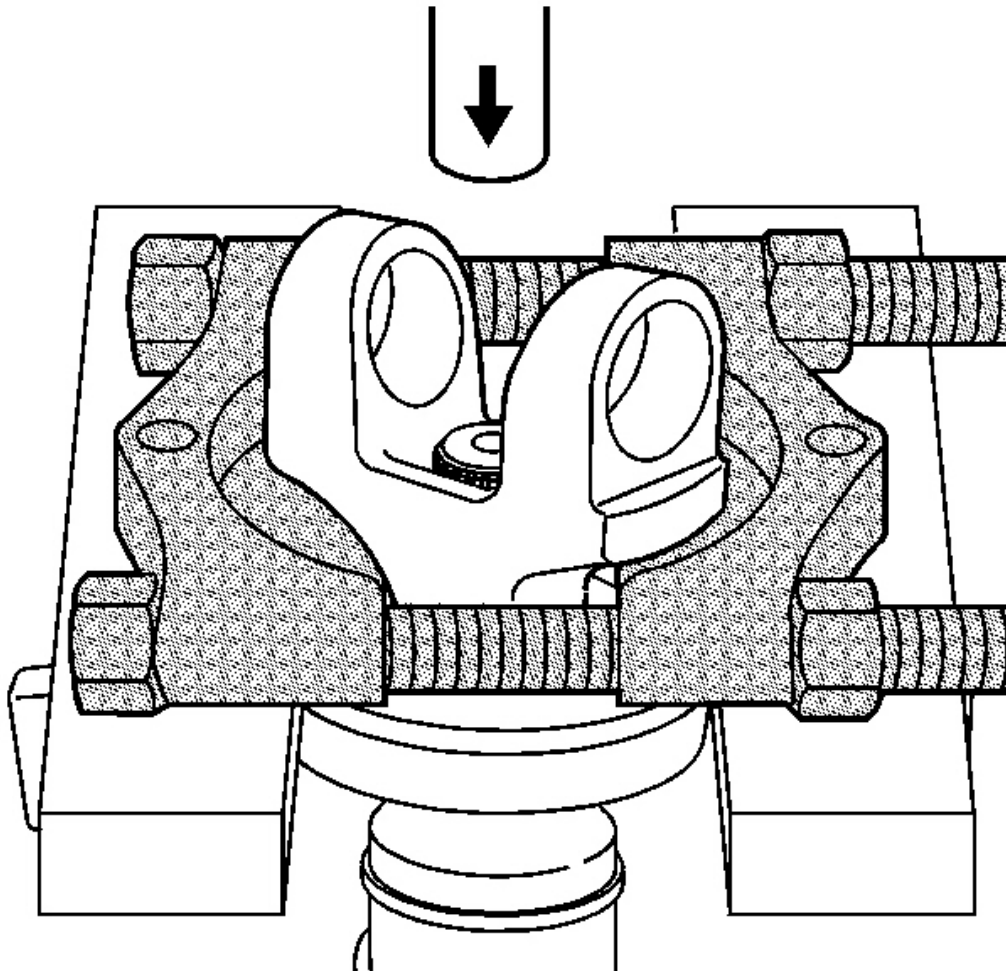


Fig. 13: Placing J22912-01 On The Splined Yoke
Courtesy of GENERAL MOTORS CORP.

6. Place **J 22912-01** on the splined yoke, as illustrated. See **Special Tools and Equipment** .
7. Using a press, remove the yoke.

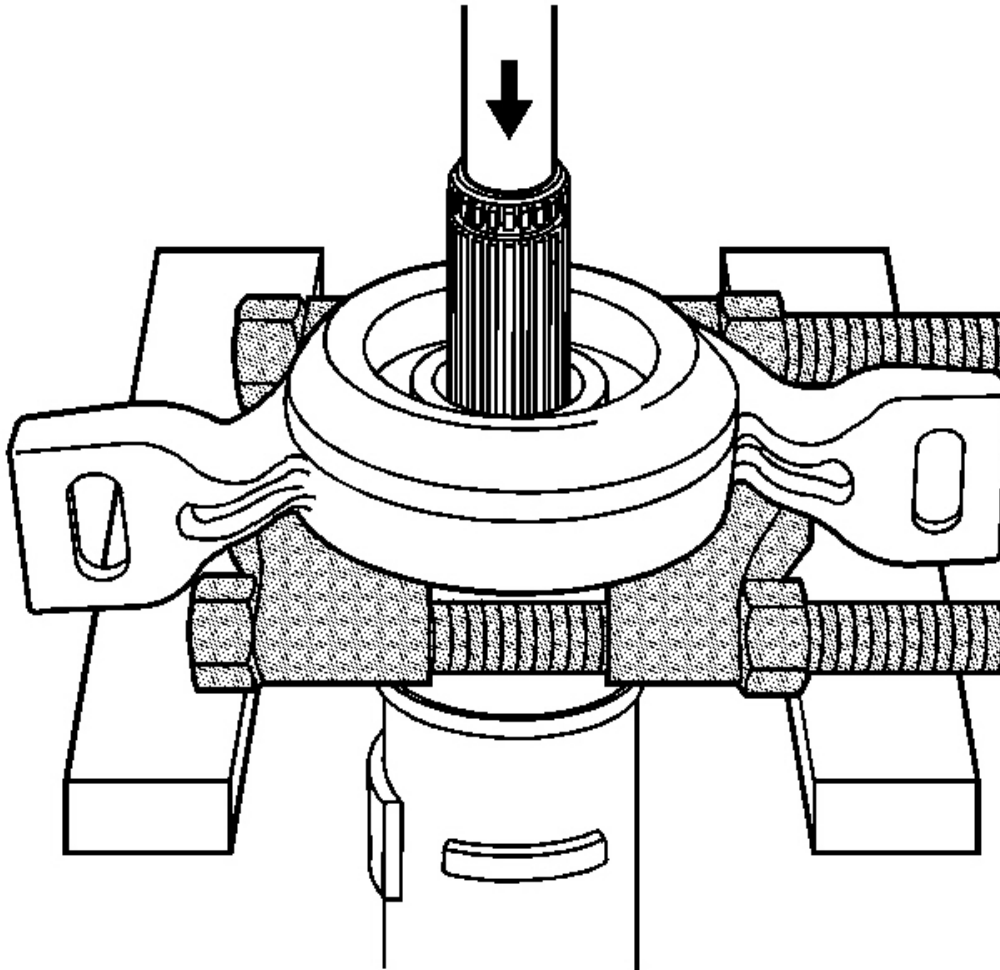


Fig. 14: Placing J22912-01 Behind Support Bearing
Courtesy of GENERAL MOTORS CORP.

8. Place **J 22912-01** behind the support bearing. See Special Tools and Equipment .
9. Place the shaft in a press; then, support **J 22912-01** and press off the support bearing. See Special Tools and Equipment .

CENTER BEARING CLEANING AND INSPECTION

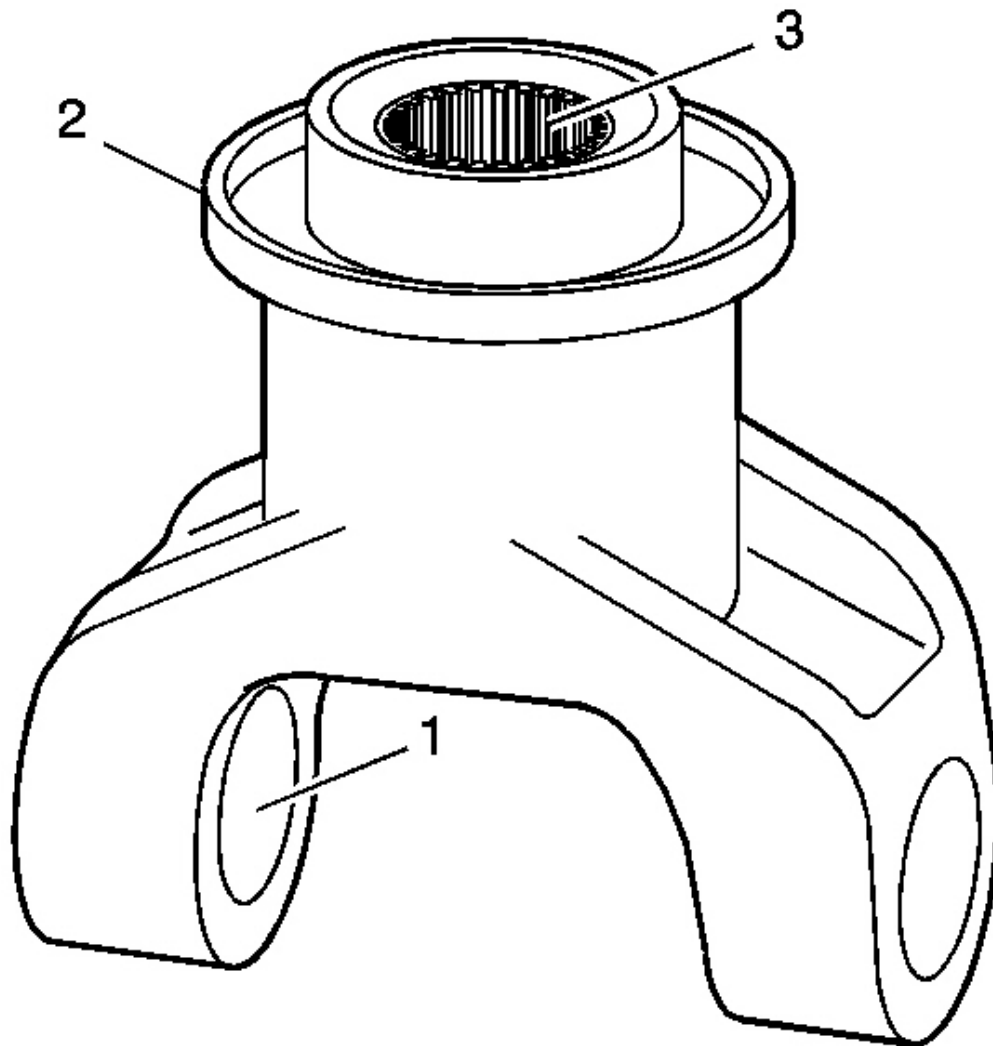


Fig. 15: View Of Center Bearing
Courtesy of GENERAL MOTORS CORP.

1. Clean and inspect the universal joint cap bore (1).
2. Check the slinger (2) for bent lip or looseness.
3. Clean and inspect the splines (3).

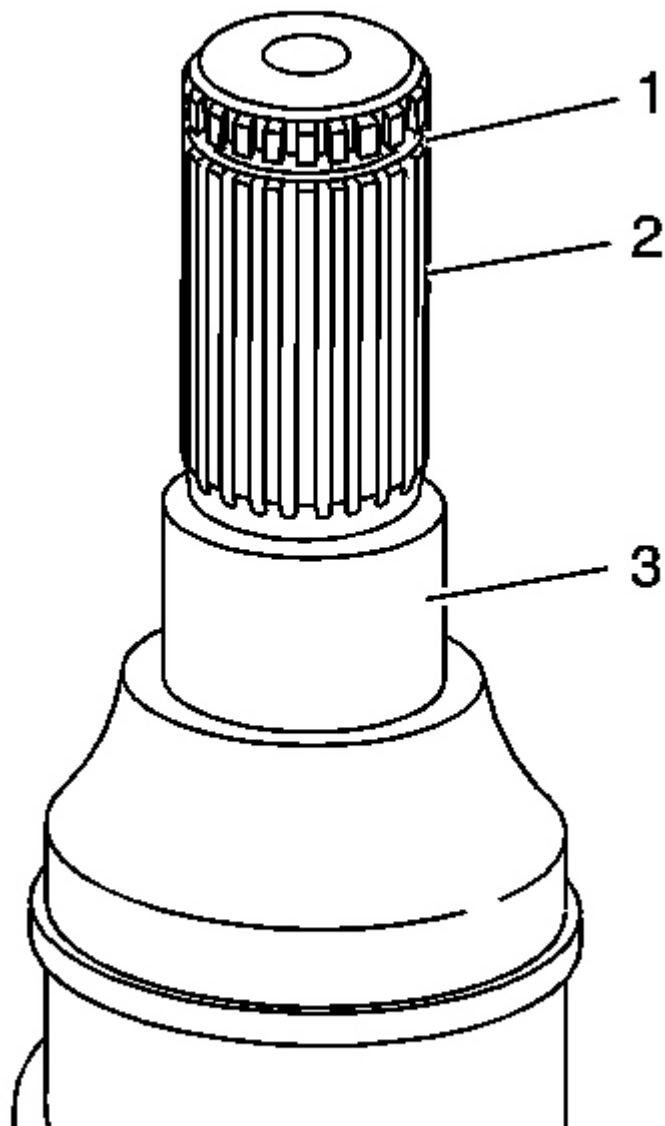


Fig. 16: Cleaning/Inspecting Snap Ring Groove, Yoke Splines & Bearing Mating Surfaces
Courtesy of GENERAL MOTORS CORP.

4. Clean the snap ring groove (1).
5. Clean and inspect the yoke splines (2).
6. Clean and inspect the bearing mating surfaces (3).

CENTER BEARING INSTALLATION

Installation Procedure

Tool Required

J 44870 Yoke Installer. See Special Tools and Equipment .

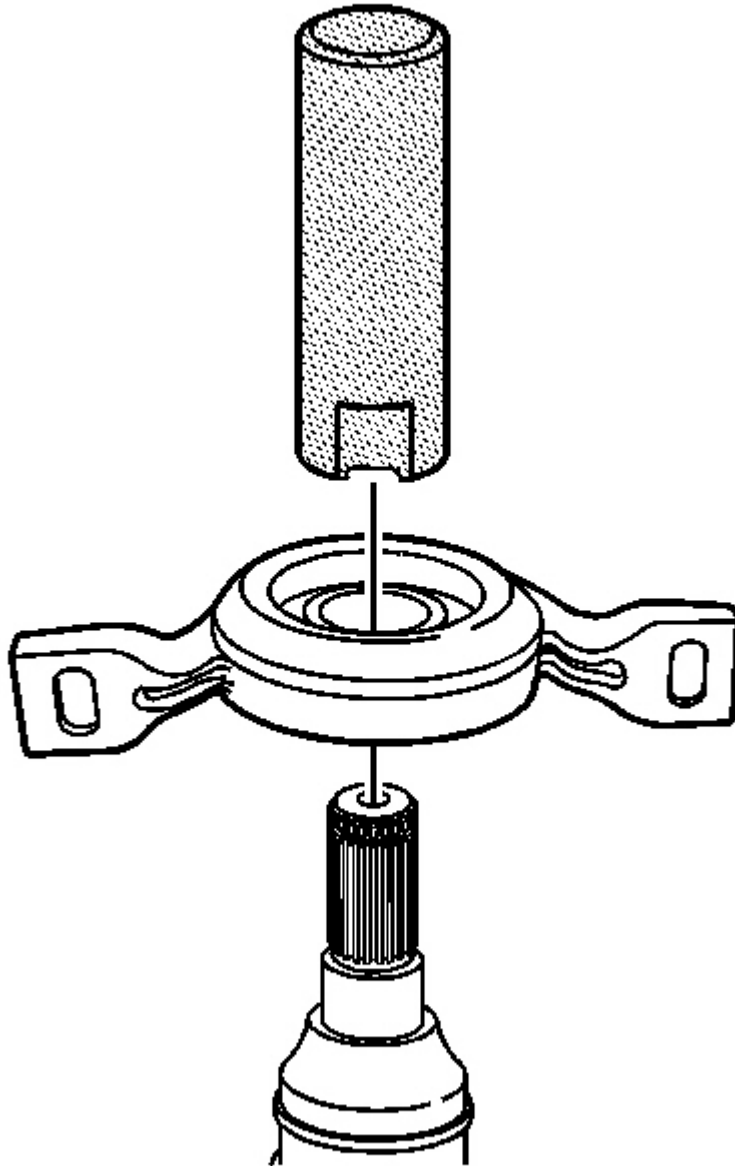


Fig. 17: Installing Support Bearing Using J44870
Courtesy of GENERAL MOTORS CORP.

1. Using **J 44870** , install the support bearing on the drive shaft until it seats firmly. See **Special Tools and Equipment** .

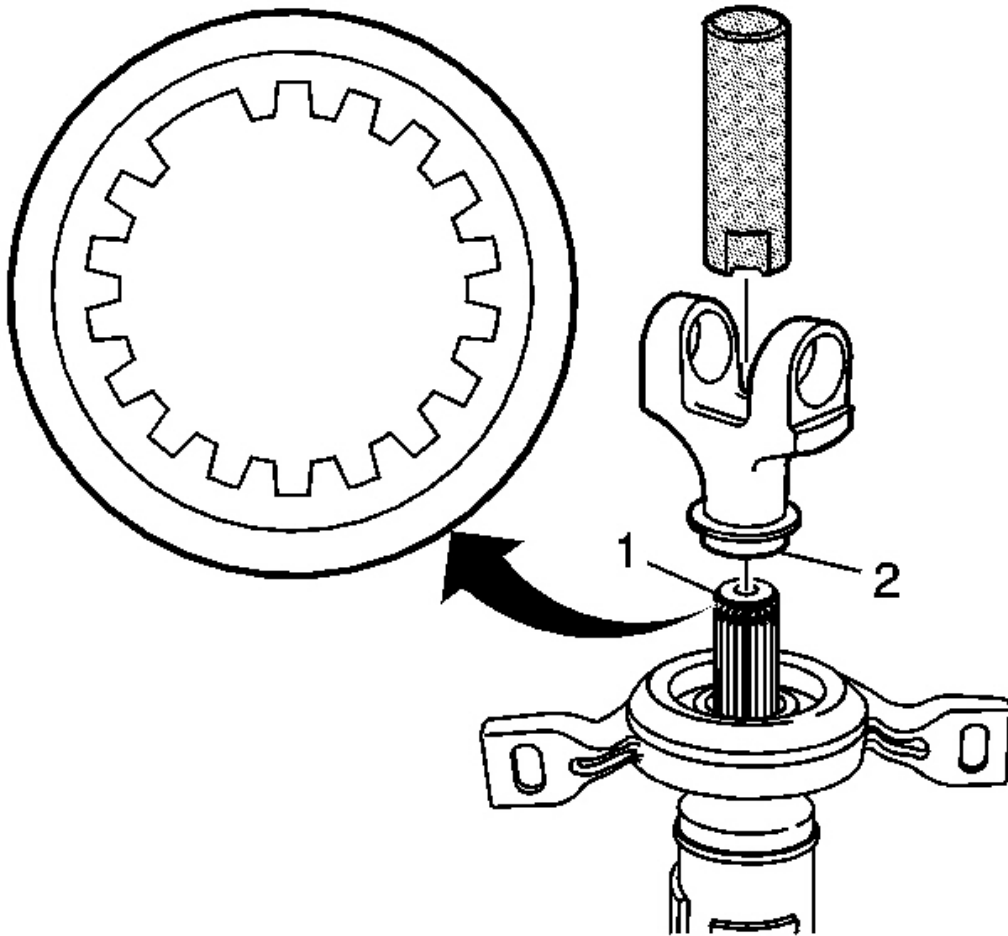


Fig. 18: Aligning Splines On The Shaft & On The Yoke
Courtesy of GENERAL MOTORS CORP.

2. Align the splines on the shaft and the splines on the yoke.
3. Using **J 44870** , install the yoke (2) on the drive shaft (1) until the lock ring groove is visible. See **Special Tools and Equipment** .

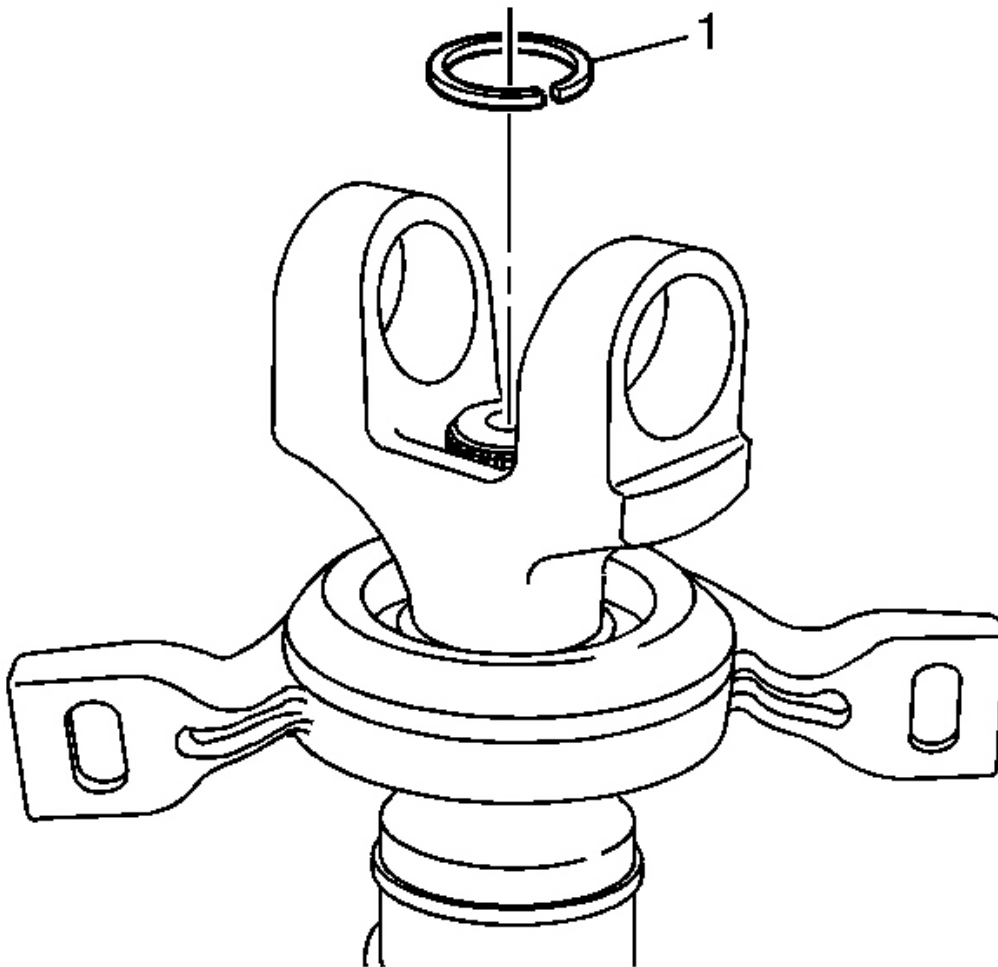


Fig. 19: Removing/Installing Lock Ring From The Groove
Courtesy of GENERAL MOTORS CORP.

4. Install the lock ring (1) in the groove.

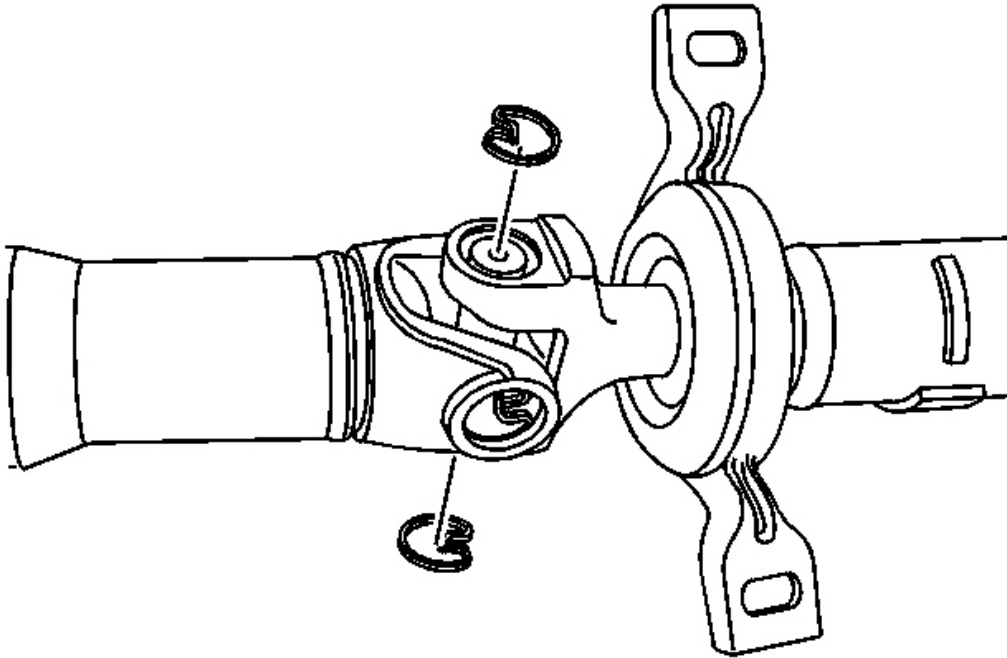


Fig. 20: Removing/Installing Universal Joint Caps & Retaining Clips
Courtesy of GENERAL MOTORS CORP.

5. Install the universal joint caps and the retaining clips.

UNIVERSAL JOINT REPLACEMENT - EXTERNAL SNAP RING

Tool Required

J 45270 Universal Joint Remover/Installer. See **Special Tools and Equipment** .

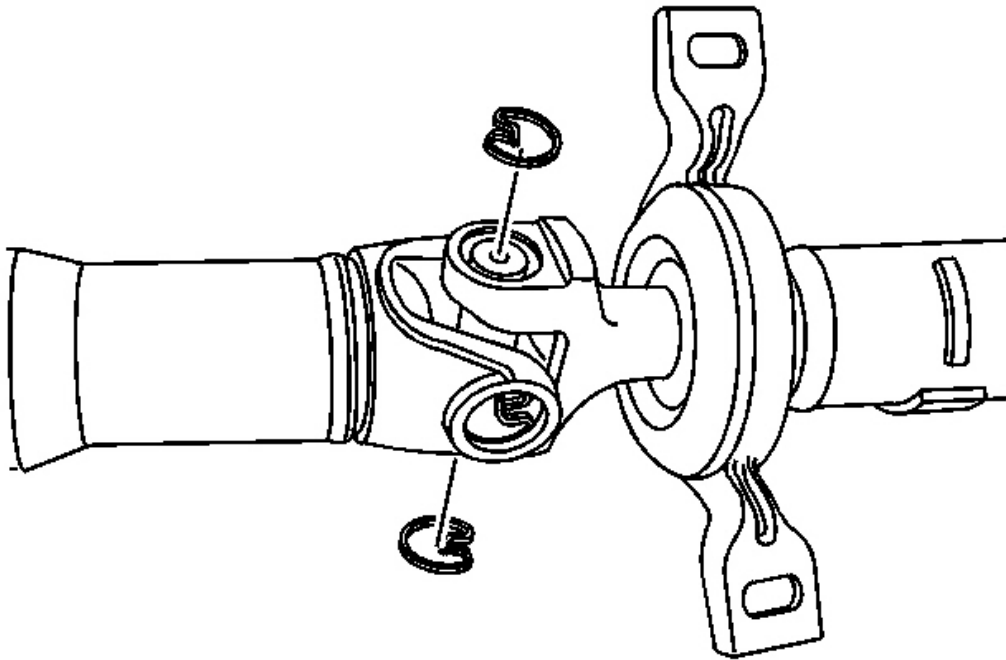


Fig. 21: Removing/Installing Universal Joint Caps & Retaining Clips
Courtesy of GENERAL MOTORS CORP.

NOTE: Never clamp propeller shaft tubing in a vise. Clamping propeller shaft tubing in a vise could dent or deform the tube, causing an imbalance or unsafe condition. Always clamp on one end of the yokes and support the shaft horizontally.

IMPORTANT: Prior to disassembly, mark the positions of the driveshaft components relative to the driveshaft tube. All components must be reassembled in the same relationship to maintain proper balance.

1. Remove the propeller shaft.
2. Remove the snap rings.
 1. Pinch the ends of the snap ring together with a pair of pliers.
 2. If a snap ring does not readily snap out of the groove in the yoke, tap the end of the bearing cup lightly in order to relieve pressure from ring.

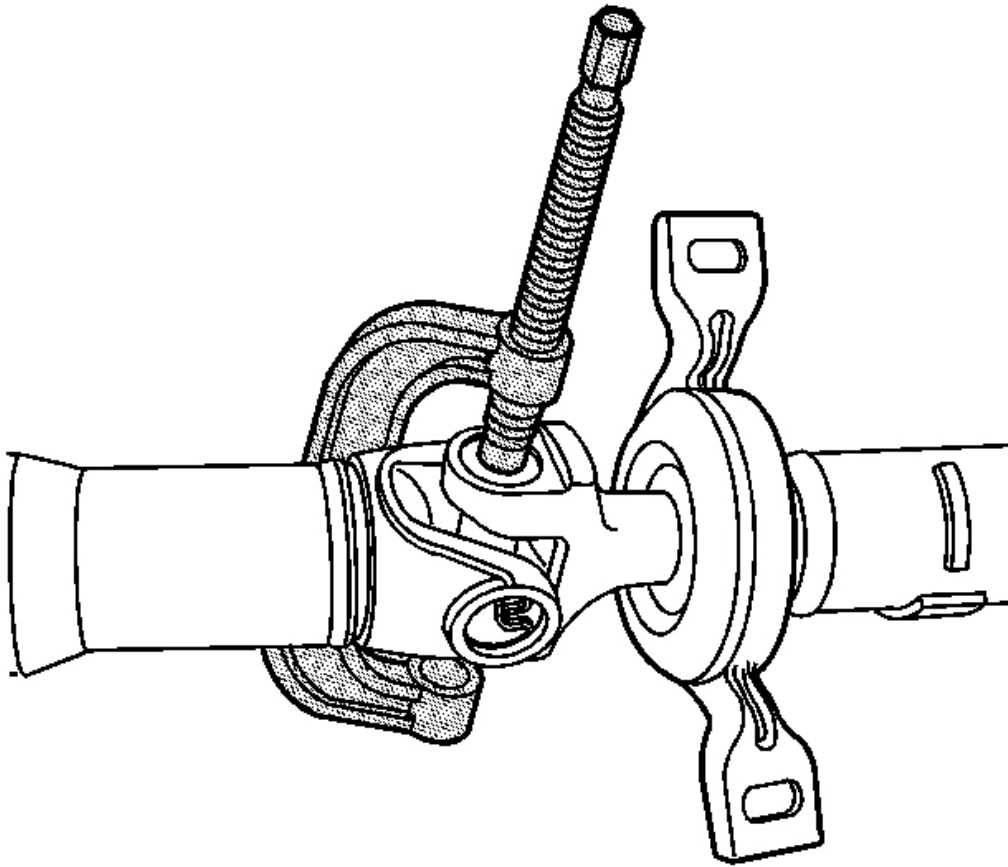


Fig. 22: Removing Universal Joint Caps Using J45270
Courtesy of GENERAL MOTORS CORP.

3. Use **J 45270** to remove the U-joint caps. See **Special Tools and Equipment** .

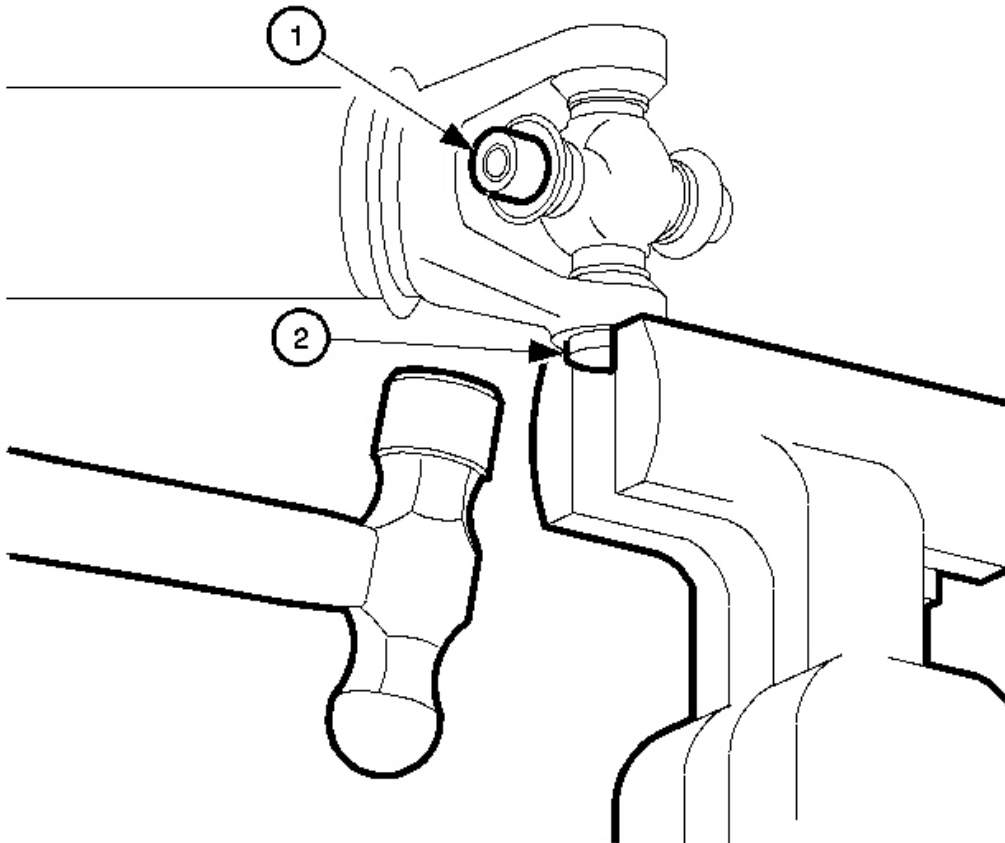


Fig. 23: Tapping Upwards On The Propeller Shaft Yoke With A Hammer
Courtesy of GENERAL MOTORS CORP.

4. If the bearing cup is not completely removed (2), place the exposed portion of the bearing cap into a soft-jaw vise. Tap upwards on the propeller shaft yoke with a hammer until the bearing cap is free of the propeller shaft yoke.
5. Rotate the propeller shaft and press the opposite bearing cup out of the yoke.

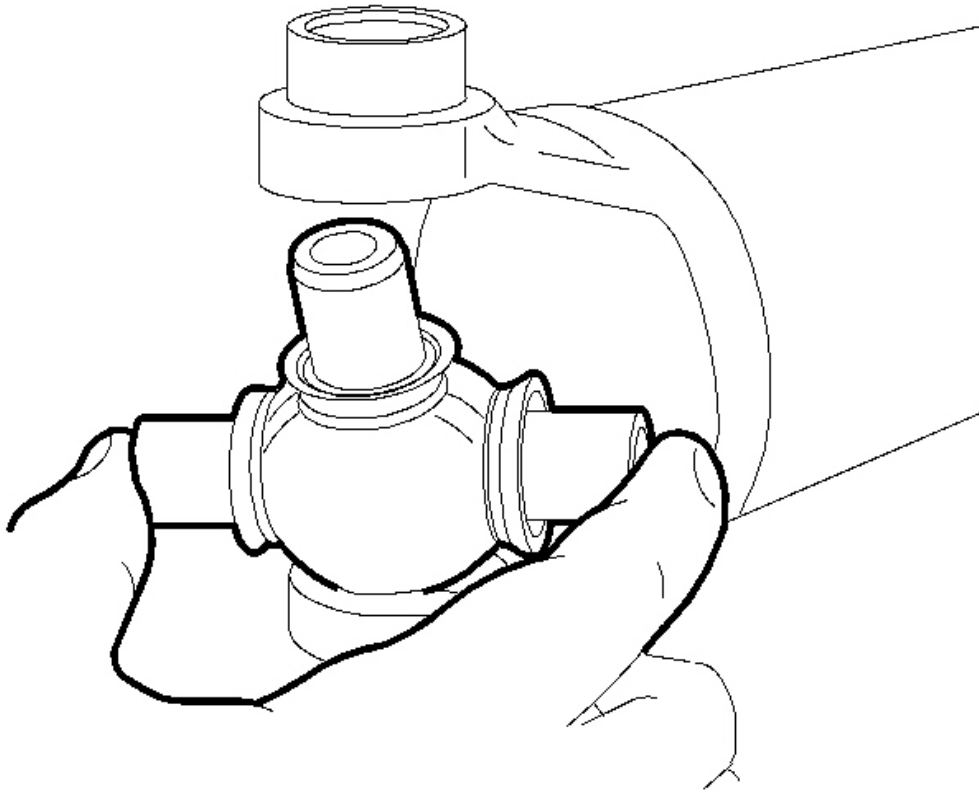


Fig. 24: Removing/Installing Cross From The Yoke
Courtesy of GENERAL MOTORS CORP.

6. Remove the cross from the yoke.
7. Remove the remaining universal joint parts from the yoke.
8. Inspect the retaining ring grooves for the following:
 - Dirt
 - Corrosion
 - Pieces of the old ring
9. Inspect the bearing cup bores for burns or imperfections.

IMPORTANT: Corrosion or dirt may prevent bearing cup installation and may prohibit the proper seating of the bearing retainers.

10. Clean the retaining ring grooves.

Installation Procedure

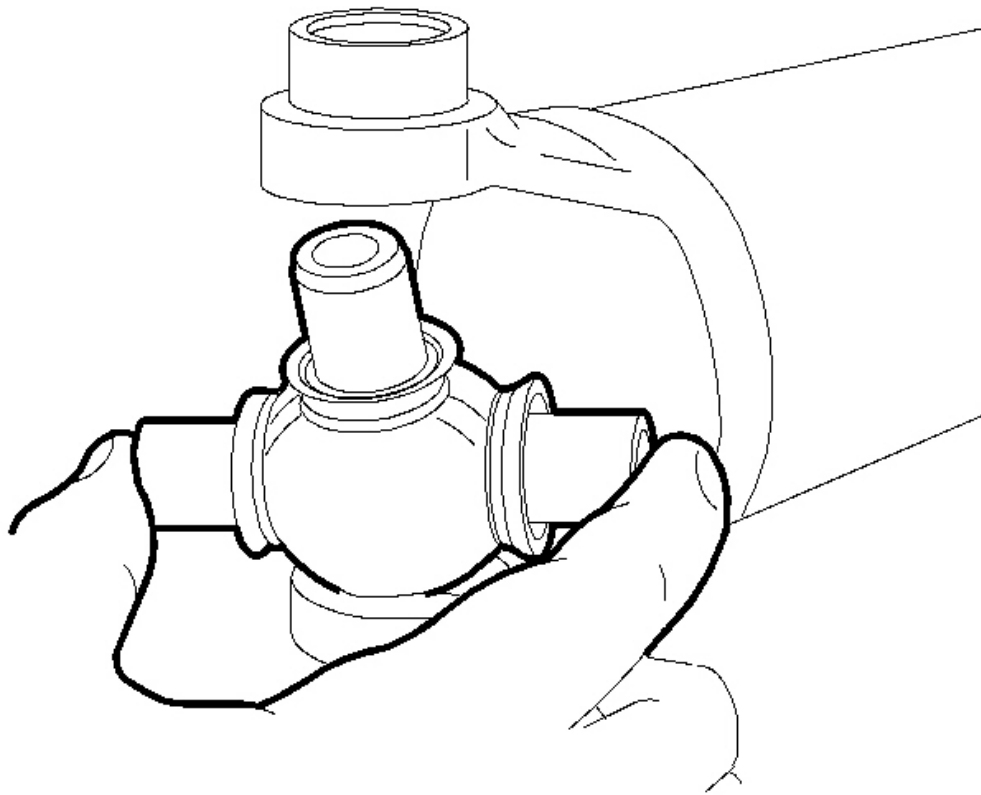


Fig. 25: Removing/Installing Cross From The Yoke
Courtesy of GENERAL MOTORS CORP.

1. Remove the bearing cups from the new universal joint journals.
2. Coat the needle bearings in the bearing cups with a thin layer of grease that is present on the journal. Use your finger to apply the grease.

3. Install one bearing cup partway into one side of the yoke.
4. Turn the yoke ear toward the bottom.
5. Install the cross into the yoke so that the trunnion seats freely into the bearing cup.

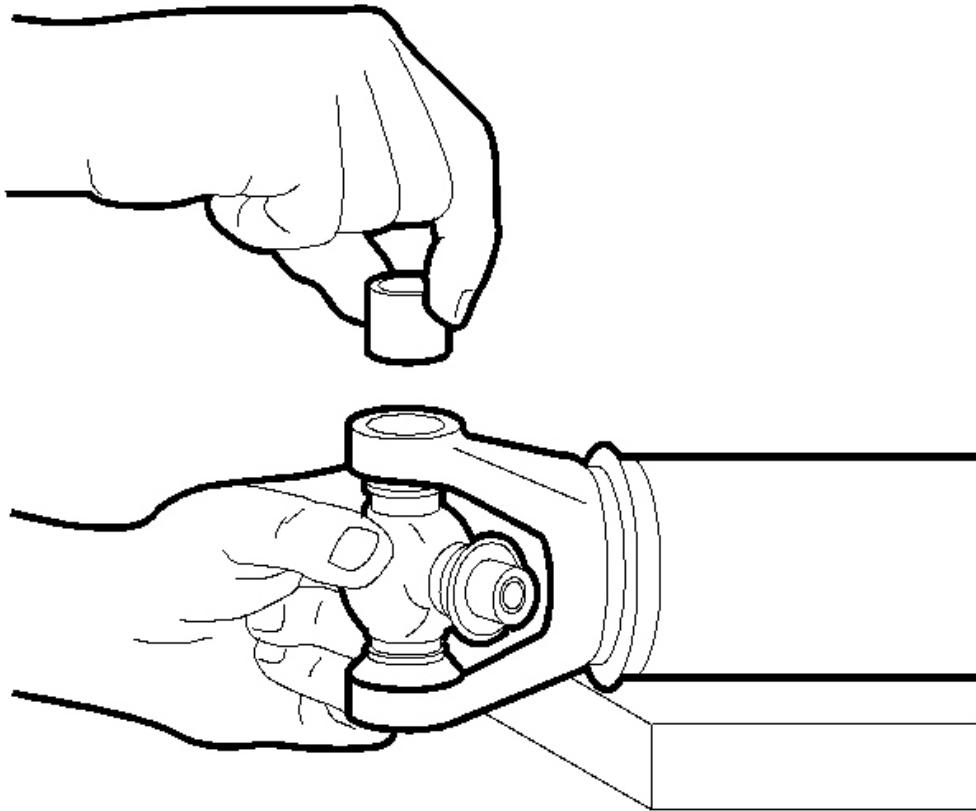


Fig. 26: Installing Opposite Bearing Cup Partway Into The Yoke Ear
Courtesy of GENERAL MOTORS CORP.

6. With the trunnion seated in the bearing cup, press the bearing cup into the yoke until it is flush with the yoke ear.
7. Install the opposite bearing cup partway into the yoke ear.
8. Make sure that the trunnions are started straight and true into both bearing cups.

IMPORTANT: If the bearing cup seems to bind or hang-up, stop pressing. Check the needle bearings for misalignment in the bearing cup.

9. Press the opposite bearing cup into the yoke ear.
- Work the cross all the time.
 - Check for free unbinding movement of the trunnions in the bearing cups.
 - Press the bearing cup into the yoke until the bearing retainer groove is visible over the top of the bearing cup.

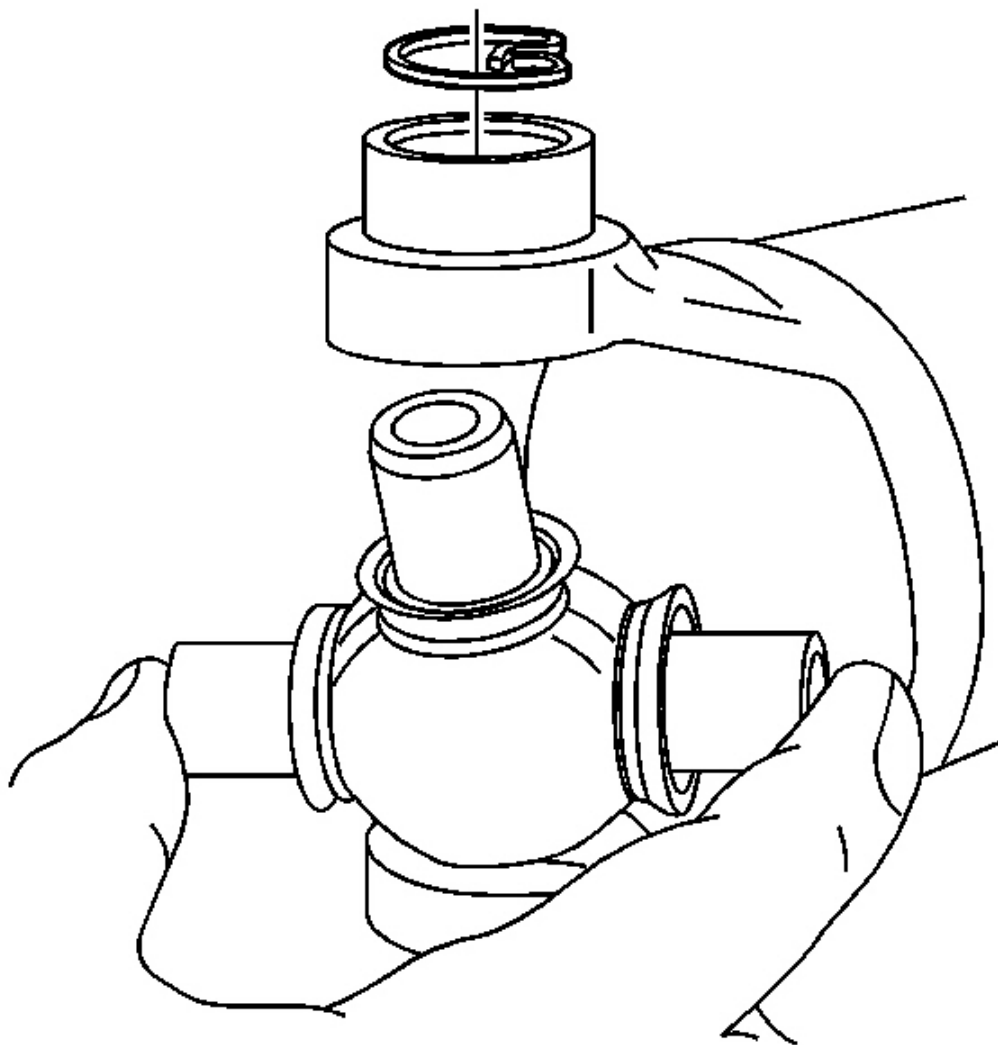


Fig. 27: Assembling Universal Joint Using Yellow Snap Rings
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Assemble the universal joint using the yellow snap rings supplied in the kit. If difficulty is encountered with the yellow snap rings, install the black snap rings supplied in the kit.

10. Install the bearing retainer in the retainer groove.
 - Continue pressing until you can snap both retainers into place.
 - A small amount of chassis grease may help the snap ring seat in the bearing cup groove.

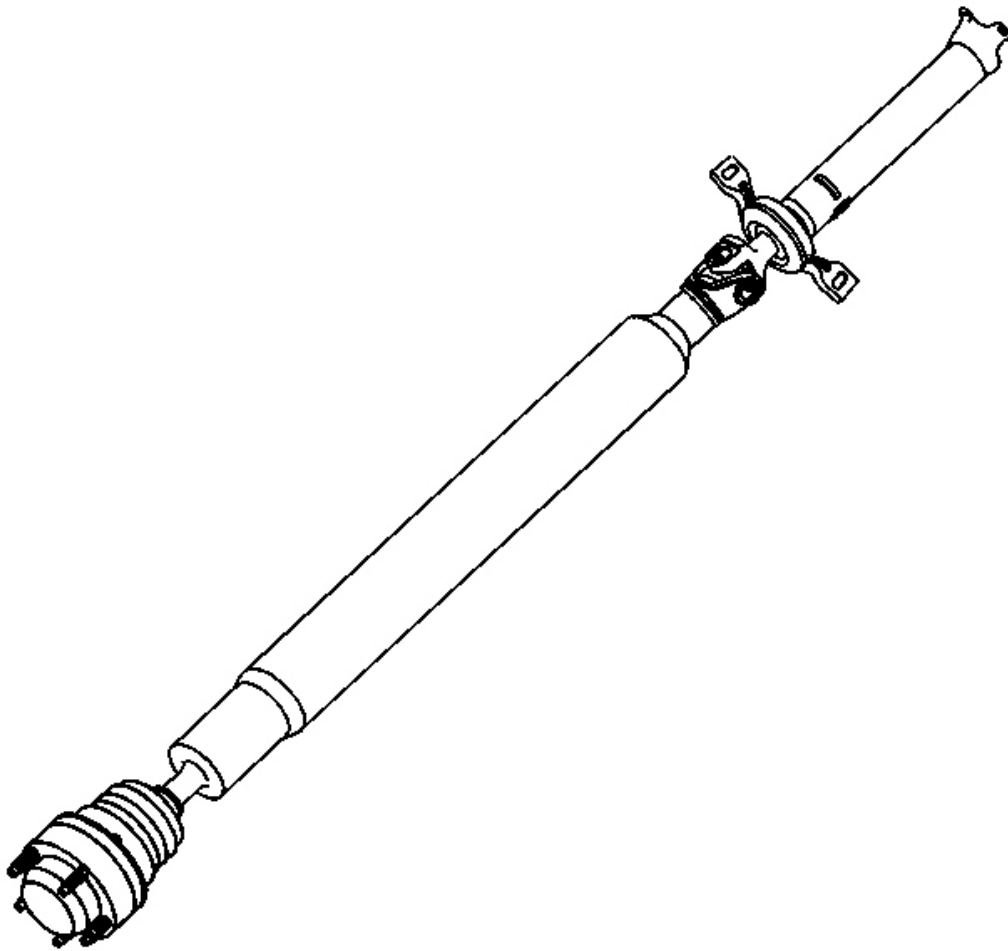


Fig. 28: View Of Propeller Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

11. After the clips are installed, check for binding.

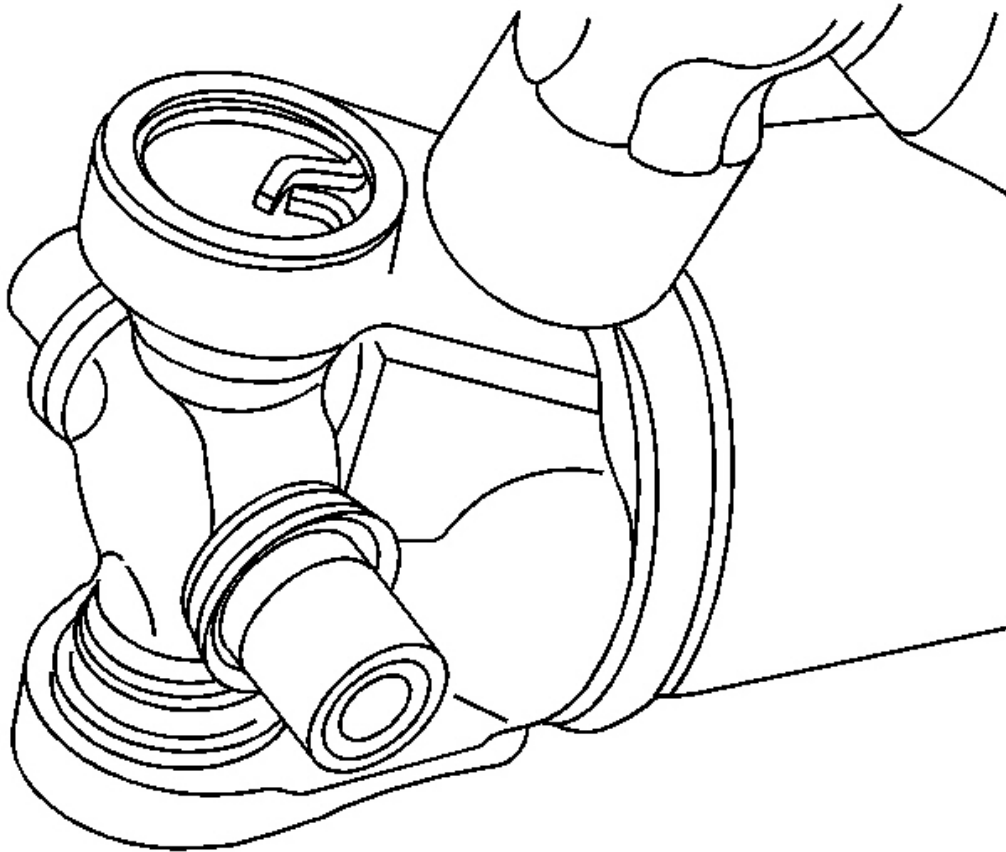


Fig. 29: Strike Flange Area In Order To Remove Excess Pressure From The Cross
Courtesy of GENERAL MOTORS CORP.

12. If cross binding is felt, it may be necessary to strike the flange area in order to remove excess pressure from the cross.

CONSTANT VELOCITY JOINT CLEANING AND INSPECTION

Cleaning and Inspection

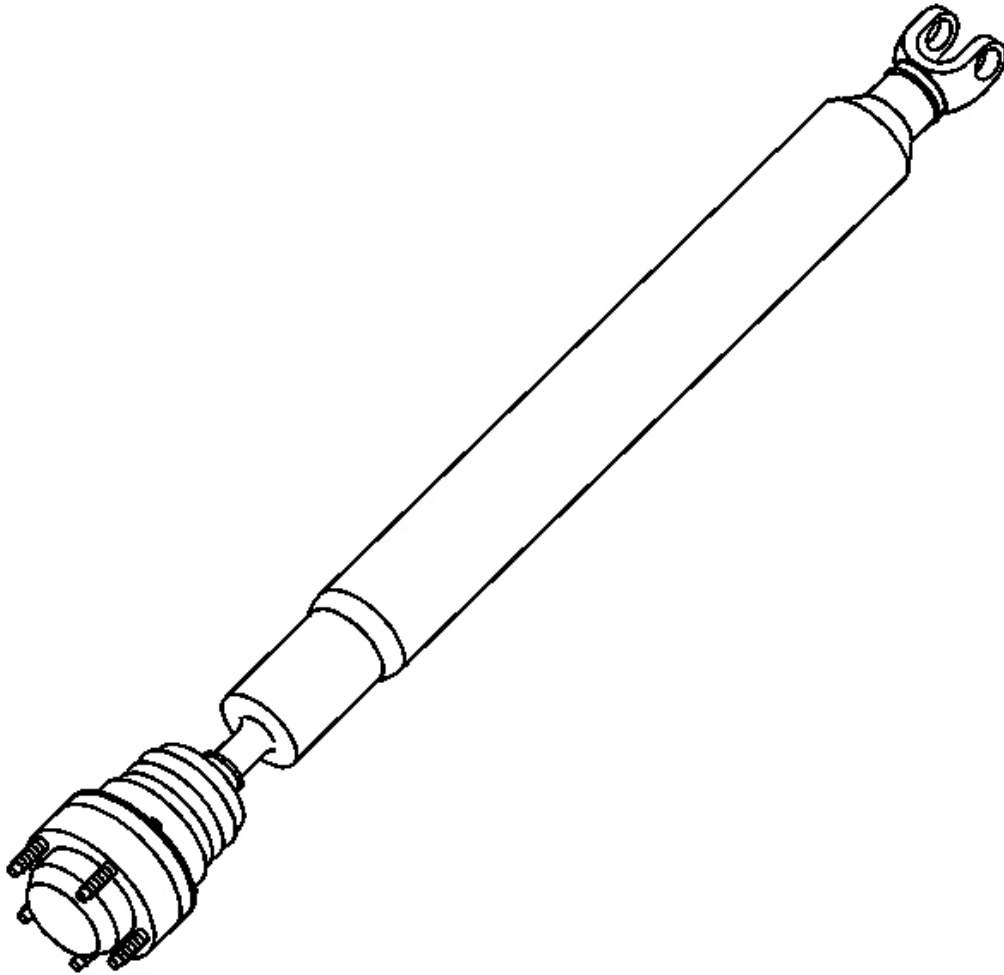


Fig. 30: View Of Constant Velocity (CV) Joint
Courtesy of GENERAL MOTORS CORP.

Replace the propeller shaft half if any of the following occur:

IMPORTANT: The constant velocity (CV) joint assembly is not serviceable. If the dust boot is torn or the joint is worn or damaged, replace the propeller shaft as an assembly.

- Inspect the constant velocity (CV) joint boot for rips or cracks.
- Rotate the constant velocity (CV) joint to inspect for binding.
- Inspect the constant velocity (CV) joint for grease or oil leakage.

DESCRIPTION AND OPERATION

PROPELLER SHAFT DESCRIPTION AND OPERATION

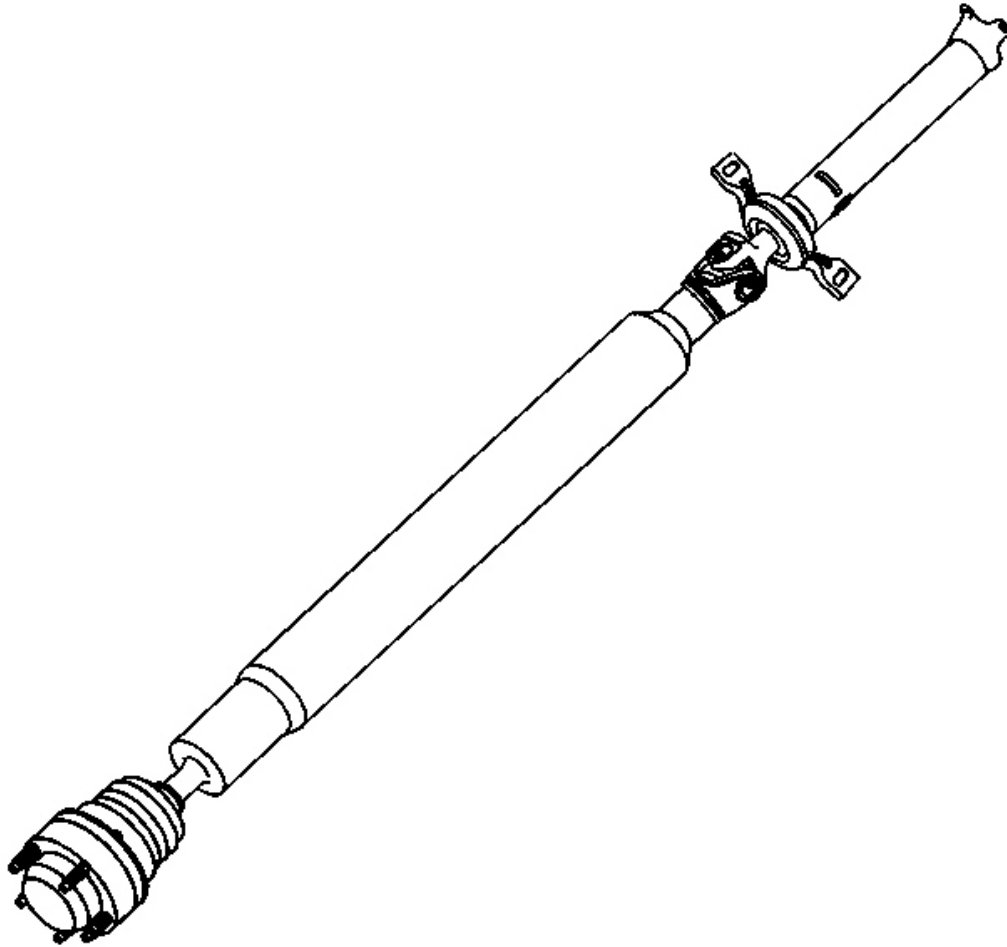


Fig. 31: View Of Propeller Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

The propeller shaft assembly is a 2-piece design. The front shaft consists of a plunging A-type constant velocity joint at the front and a universal joint and yoke at the rear.

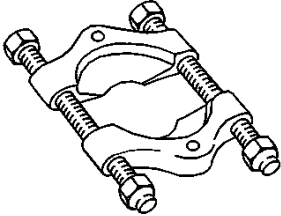
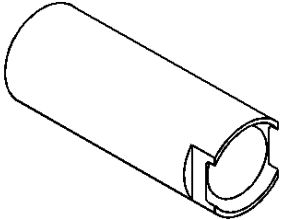
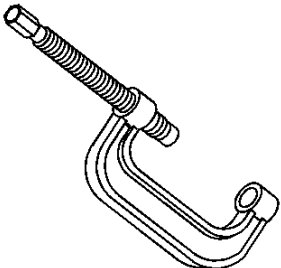
The rear shaft consists of a center bearing and a center yoke, which are pressed onto the rear half of the propshaft and retained by a snap ring. The front and rear shafts are joined together at the yokes with a universal joint. The rear shaft attaches to the axle with a flange which is attached to the rear shaft with a universal joint.

The center bearing provides support where the front and rear shafts mate and is bolted to the underbody. The front constant velocity joint is bolted to the power take-off unit (PTO), and the rear universal joint flange is bolted to the rear differential.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 22912-01 Split-Plate Bearing Puller
	J 44870 Yoke Installer
	J 45270 U-joint Remover and Installer