

2004 Isuzu Ascender LS

2004 DRIVELINE/AXLE Propeller Shaft - Ascender

2004 DRIVELINE/AXLE

Propeller Shaft - Ascender

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Propeller Shaft Yoke Retainer Bolts	20 N.m	15 lb ft

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

Application	Type of Material	GM Part Number
Slip Yoke Splines	Lubricant	12377985 or equivalent

COMPONENT LOCATOR

DRIVELINE DISASSEMBLED VIEWS

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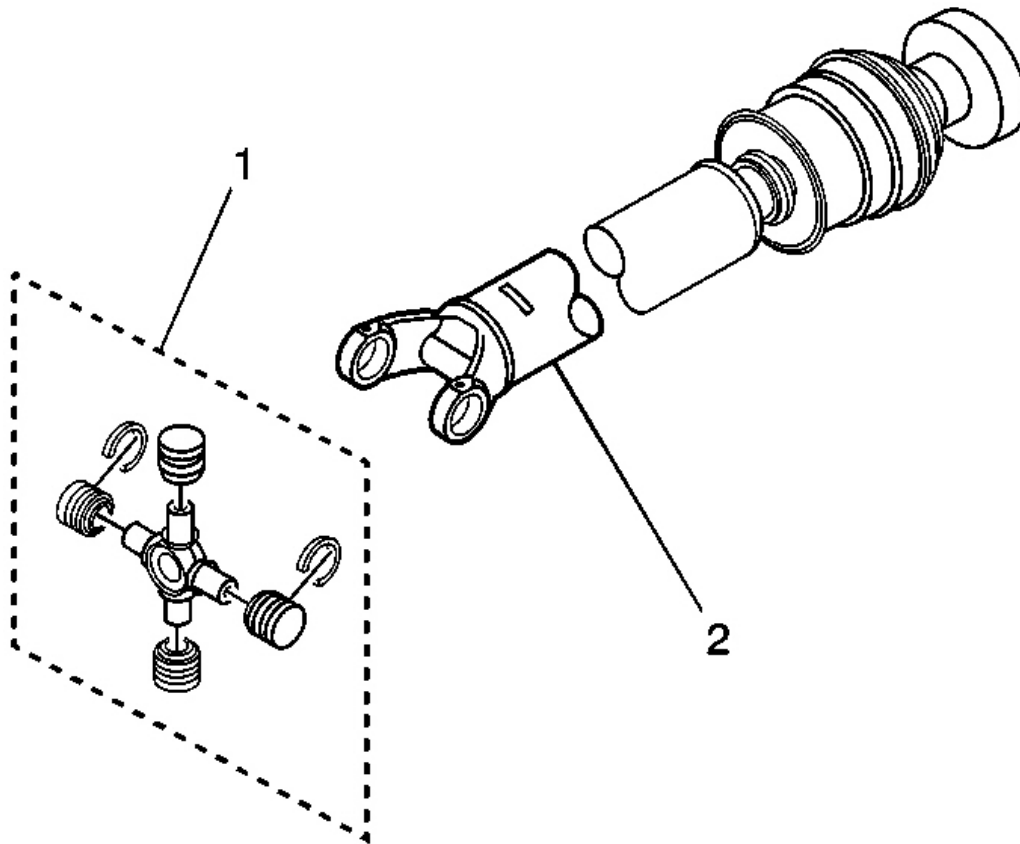


Fig. 1: Front Drive Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Universal Joint Spider Assembly
2	Propeller Shaft Tube Assembly

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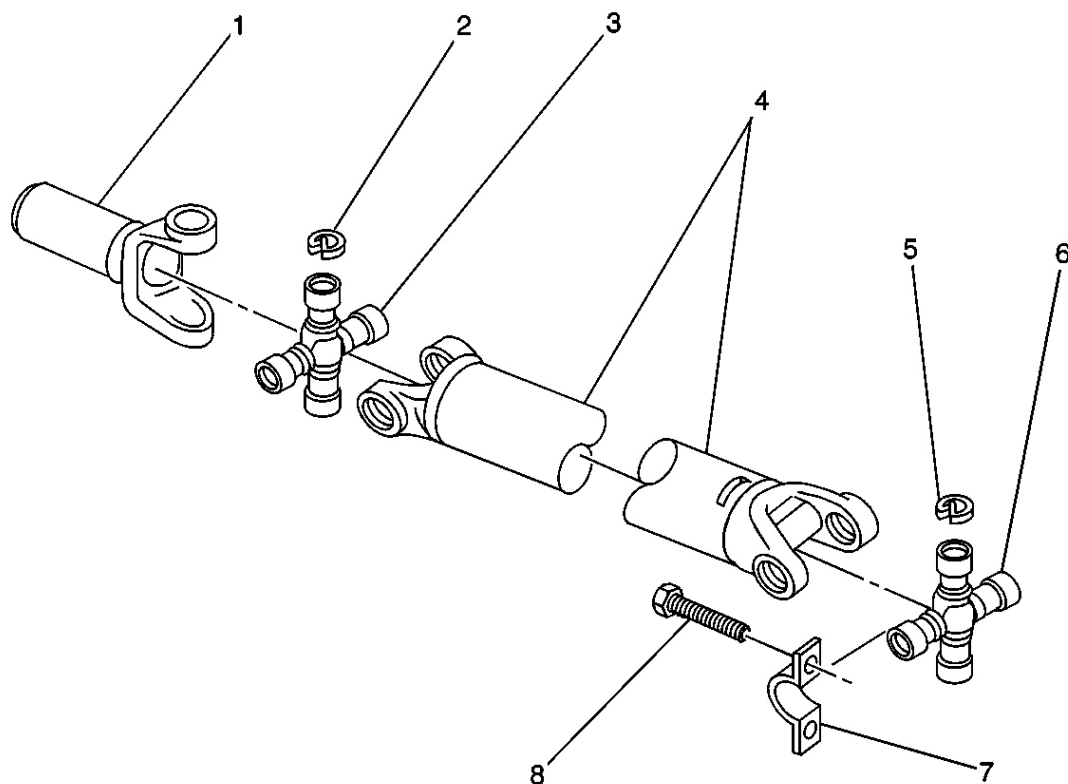


Fig. 2: One-Piece Propeller Shaft

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Propeller Shaft Slip Yoke
2	Propeller Shaft Universal Joint Spider Bearing Retainer Ring
3	Propeller Shaft Universal Joint
4	Propeller Shaft Tube
5	Propeller Shaft Universal Joint Spider Bearing Retainer Ring
6	Propeller Shaft Universal Joint
7	Propeller Shaft Bearing Retainer
8	Propeller Shaft Bearing Retainer Bolt

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - PROPELLER SHAFT

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction

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exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Propeller Shaft** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - PROPELLER SHAFT

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system function. Refer to **Propeller Shaft Description and Operation**.

Classifying the Symptom

Propeller Shaft symptoms can usually be classified into the following categories:

- Leaks
- Noises
- Vibrations

Leak and noise related symptoms are diagnosed within the Propeller Shaft section. For vibration related symptoms, refer to **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction for diagnosis.

Visual/Physical Inspection

- Inspect the system for aftermarket devices which could affect the operation of the Propeller Shaft.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptom List

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

- **Leak at Front Slip Yoke**
- **Universal Joint Noise**
- **Ping, Snap, or Click Noise**
- **Knock or Clunk Noise**
- **Scraping Noise**
- **Squeak Noise**

LEAK AT FRONT SLIP YOKE

Leak at Front Slip Yoke

Checks	Action
DEFINITION: An occasional drop of lubricant leaking from the splined yoke is normal and requires no attention.	

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<p>The slip yoke barrel is burred, nicked, corroded, or worn.</p>	<ol style="list-style-type: none"> 1. Inspect the slip yoke for burrs. Minor burrs can be removed by careful use of crocus cloth or fine stone honing. 2. If the is badly burred, corroded or worn, replace the yoke. 3. Replace the oil seal. Refer to one of the following: <ul style="list-style-type: none"> • <u>Transfer Case Output Shaft Seal Replacement - Rear</u> in Transfer Case - NVG 226-NP4 • <u>Transmission Extension Housing Rear Oil Seal Replacement</u> in Automatic Transmission - 4L60-E
<p>There is a faulty transmission or transfer case output shaft oil seal.</p>	<p>Replace the oil seal. Refer to one of the following:</p> <ul style="list-style-type: none"> • <u>Transfer Case Output Shaft Seal Replacement - Rear</u> in Transfer Case - NVG 226-NP4 • <u>Transmission Extension Housing Rear Oil Seal Replacement</u> in Automatic Transmission - 4L60-E

UNIVERSAL JOINT NOISE

Universal Joint Noise

Problem	Action
<p>One or more of the universal joints are worn or damaged.</p>	<p>Replace the universal joint. Refer to the following:</p> <ul style="list-style-type: none"> • <u>Universal Joint Replacement - Nylon Injected Ring</u> • <u>Universal Joint Replacement - External Snap Ring</u>
<p>One or more of the universal joints have lost lubricant</p>	<p>Replace the universal joint. Refer to the following:</p> <ul style="list-style-type: none"> • <u>Universal Joint Replacement - Nylon Injected Ring</u> • <u>Universal Joint Replacement - External Snap Ring</u>
<p>The yoke retainer strap bolts are loose</p>	<p>Tighten the yoke retainer strap bolts to specifications. Refer to <u>Fastener Tightening Specifications</u>.</p>

PING, SNAP, OR CLICK NOISE

Ping, Snap, or Click Noise

Checks	Action
<p>DEFINITION: A ping, snap or click is usually heard on initial load after the transmission is in gear, either in forward or reverse.</p>	
<p>The fixed yoke or the pinion yoke is loose.</p>	<p>Tighten the bolts and the pinion nut to specified torque. Refer to <u>Fastener Tightening Specifications</u>.</p>
<p>One or more of the universal joints are worn or damaged.</p>	<p>Replace the universal joint. Refer to the following:</p>

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- **Universal Joint Replacement - Nylon Injected Ring**
- **Universal Joint Replacement - External Snap Ring**

KNOCK OR CLUNK NOISE

Knock or Clunk Noise

Checks	Action
DEFINITION: Knocking or clunking noise occurs when operating the vehicle in high gear or coasting in neutral at 16 km/h (10 mph).	
One or more of the universal joints are worn or damaged.	Replace the universal joint. Refer to the following: <ul style="list-style-type: none">• <u>Universal Joint Replacement - Nylon Injected Ring</u>• <u>Universal Joint Replacement - External Snap Ring</u>
The side gear hub counterbore in the differential is worn oversize.	Replace the differential case and/or the side gears. Refer to <u>Differential Replacement</u> in Rear Drive Axle.

SCRAPING NOISE

Scraping Noise

Checks	Action
DEFINITION: A scraping noise occurs when driving the vehicle at various speeds.	
The pinion flange deflector or the center bearing is rubbing.	Correct the interference as necessary.

SQUEAK NOISE

Squeak Noise

Checks	Action
DEFINITION: When driving the vehicle at various speeds a squeaking sound occurs.	
One or more of the universal joints have lost lubricant.	Replace the universal joint. Refer to the following: <ul style="list-style-type: none">• <u>Universal Joint Replacement - Nylon Injected Ring</u>• <u>Universal Joint Replacement - External Snap Ring</u>

SHUDDER ON ACCELERATION AT LOW SPEED

Shudder on Acceleration at Low Speed

Checks	Action
DEFINITION: When the vehicle is accelerating at low speed a shudder occurs.	
The yoke retainer strap bolts are loose or missing.	Replace or tighten the yoke retainer strap bolts to specifications. Refer to <u>Fastener Tightening Specifications</u> .
The driveline joint angle is excessive or incorrectly set.	Determine if the driveline angle is incorrect and correct as necessary. Refer to <u>Diagnostic Starting Point - Vibration Diagnosis and</u>

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One or more of the universal joints are worn or damaged.	<p>Correction in Vibration Diagnosis and Correction.</p> <p>Replace the universal joint. Refer to the following:</p> <ul style="list-style-type: none">• <u>Universal Joint Replacement - Nylon Injected Ring</u>• <u>Universal Joint Replacement - External Snap Ring</u>
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REPAIR INSTRUCTIONS

PROPELLER SHAFT REPLACEMENT - FRONT

Removal Procedure

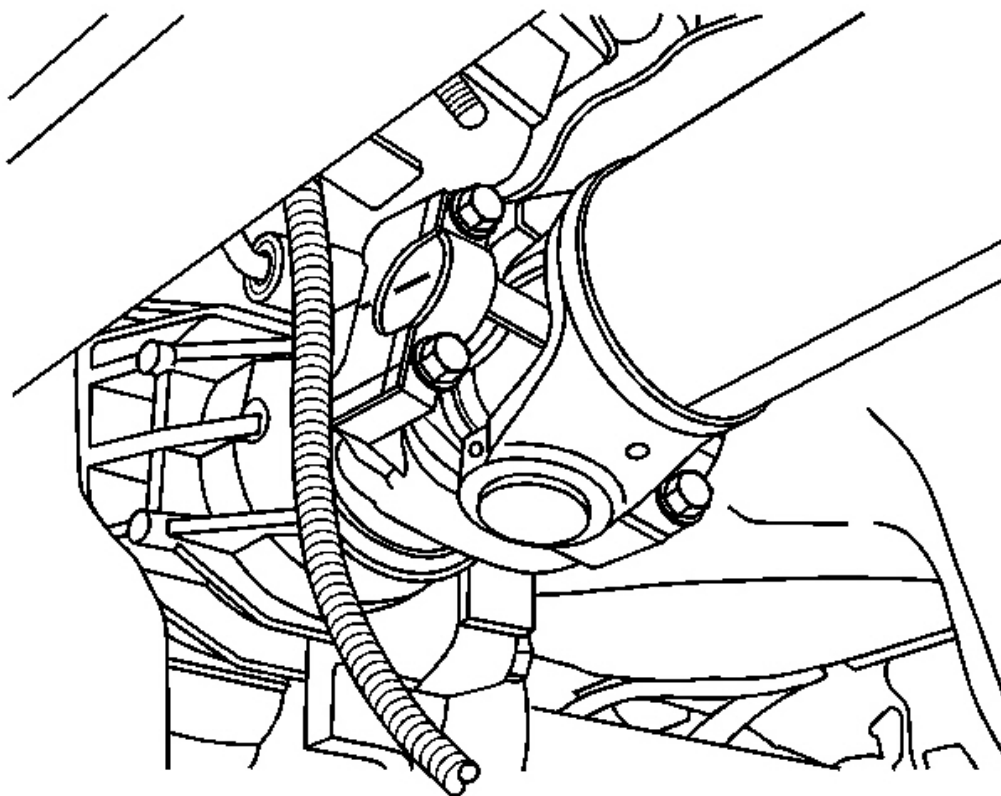


Fig. 3: Propeller Shaft View

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Observe the position of all the driveline components. Accurately mark the relationship of the components before removal. These components

include the propeller shafts, the drive axles, the pinion flanges, and the output shafts. Reassemble all components in the exact relationship to each other as they were before removal. Follow the specifications, the torque values, and any measurements obtained prior to disassembly.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the steering gear crossmember. Refer to **Crossmember Replacement - Rear Steering Gear** in Frame and Underbody.
3. Reference mark the relationship of the propeller shaft to the front axle pinion yoke.
4. Remove the yoke retainer bolts and yoke retainers from the front axle pinion yoke.

NOTE: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such means, the injection joints may fracture and lead to premature failure of the joint.

5. Disconnect the propeller shaft from the front axle pinion yoke.

Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

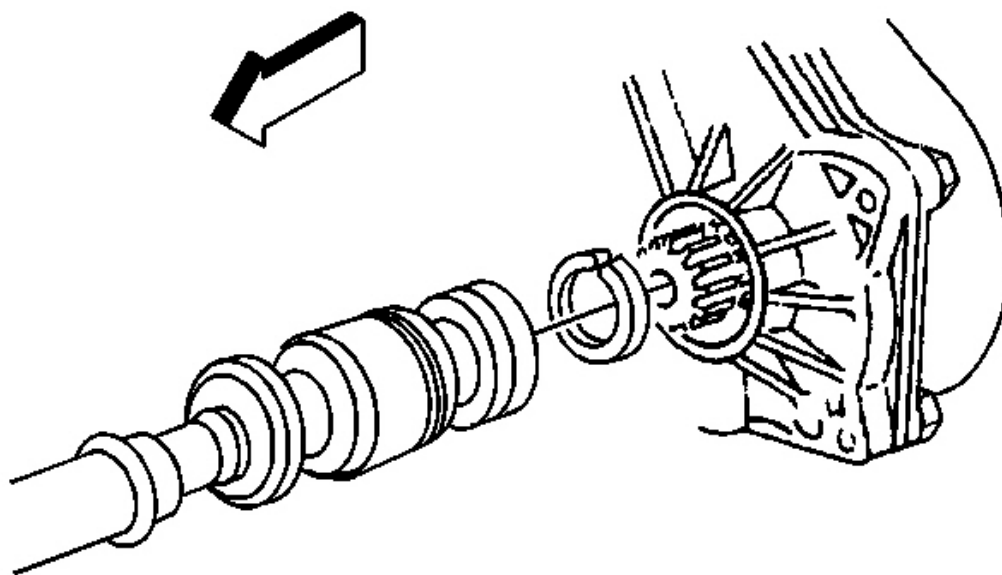


Fig. 4: Front Propeller Shaft Removed From Transfer Case
Courtesy of GENERAL MOTORS CORP.

6. Remove the front propeller shaft from the transfer case.

Installation Procedure

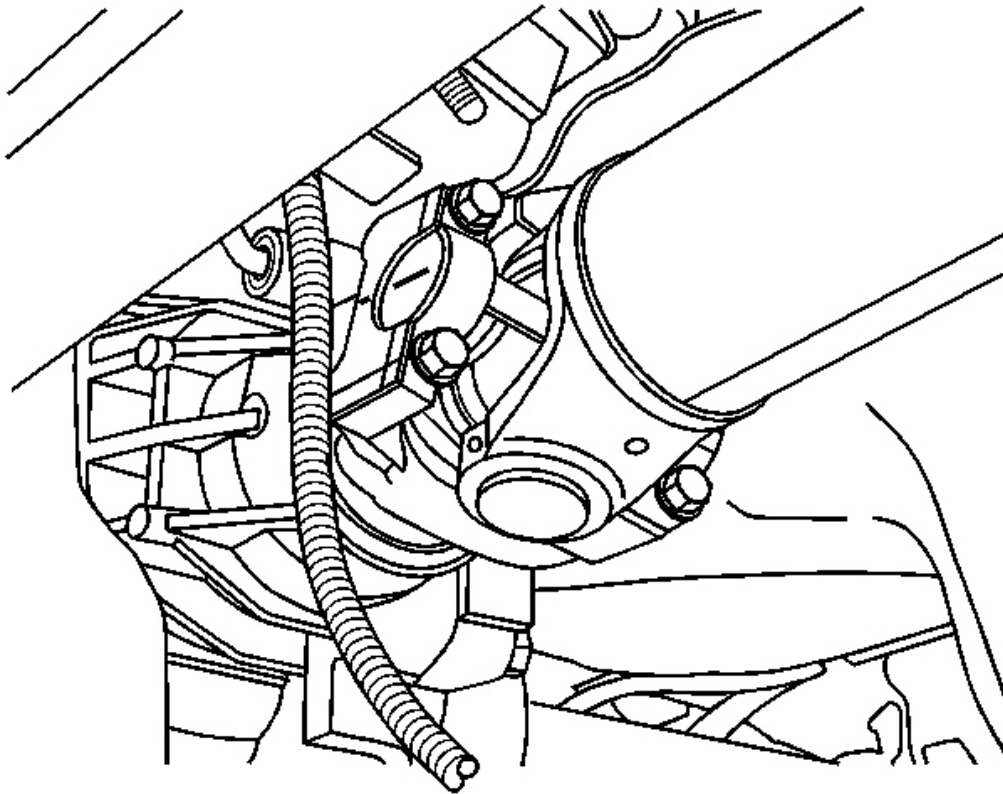


Fig. 5: Propeller Shaft View
Courtesy of GENERAL MOTORS CORP.

1. Install the propeller shaft in the transfer case.
2. Align the reference marks made during removal.

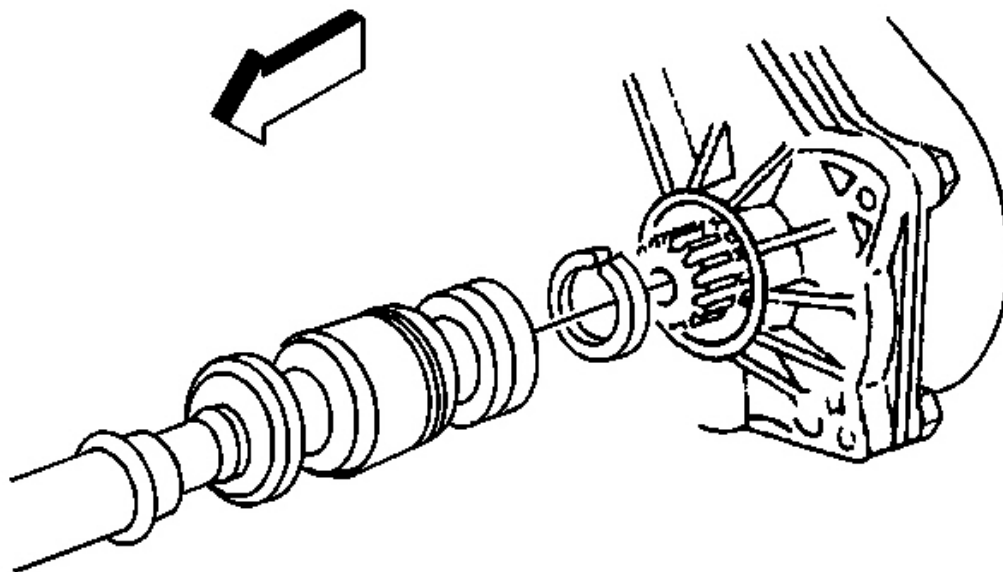


Fig. 6: Front Propeller Shaft Removed From Transfer Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Ensure that the propeller shaft assembly is fully engaged into the slip yoke. The retaining ring will produce a snapping noise when the shaft is properly engaged.

3. Install the propeller shaft to the front axle pinion yoke.

NOTE: Refer to Fastener Notice in Caution and Notices.

4. Install the yoke retainers and the bolts.

Tighten: Tighten the front propeller shaft yoke clamp bolts to 20 N.m (15 lb ft).

5. Install the steering gear crossmember. Refer to Crossmember Replacement - Rear Steering Gear in Frame and Underbody.
6. Lower the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.

PROPELLER SHAFT REPLACEMENT - REAR

Removal Procedure

IMPORTANT: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
2. Reference mark the propeller shaft to the rear axle pinion yoke.
3. Reference mark the propeller shaft to the transmission or transfer case.

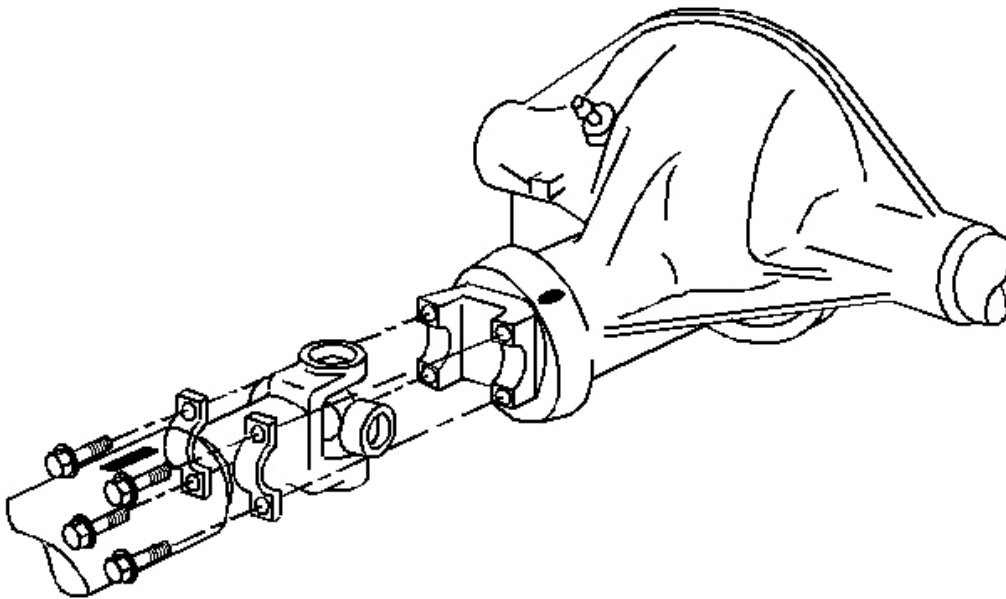


Fig. 7: Rear Axle Pinion Yoke, Bolts And Retainers
Courtesy of GENERAL MOTORS CORP.

4. Remove the bolts and the yoke retainers from the rear axle pinion yoke.

NOTE: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such means, the injection joints may fracture and lead to premature failure of the joint.

5. Slide the propeller shaft forward in order to disconnect the propeller shaft from the rear axle pinion yoke.

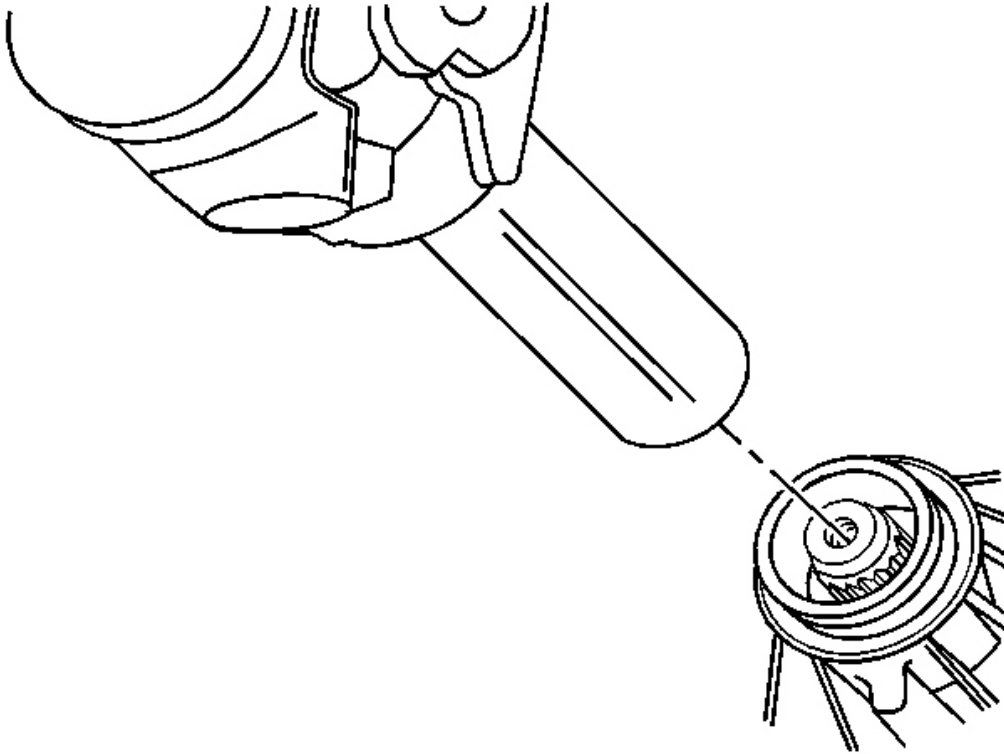


Fig. 8: View Of Propeller Shaft To Transmission Or Transfer Case
Courtesy of GENERAL MOTORS CORP.

6. Slide the propeller shaft rearward in order to disconnect the propeller shaft from the transmission or transfer case.
7. Remove the propeller shaft.

Installation Procedure

1. Inspect the splines of the slip yoke for a sufficient coating of grease/lubricant. If the splines of the slip yoke does not have a sufficient coating of grease/lubricate, lubricate the shaft with P/N 12377985.

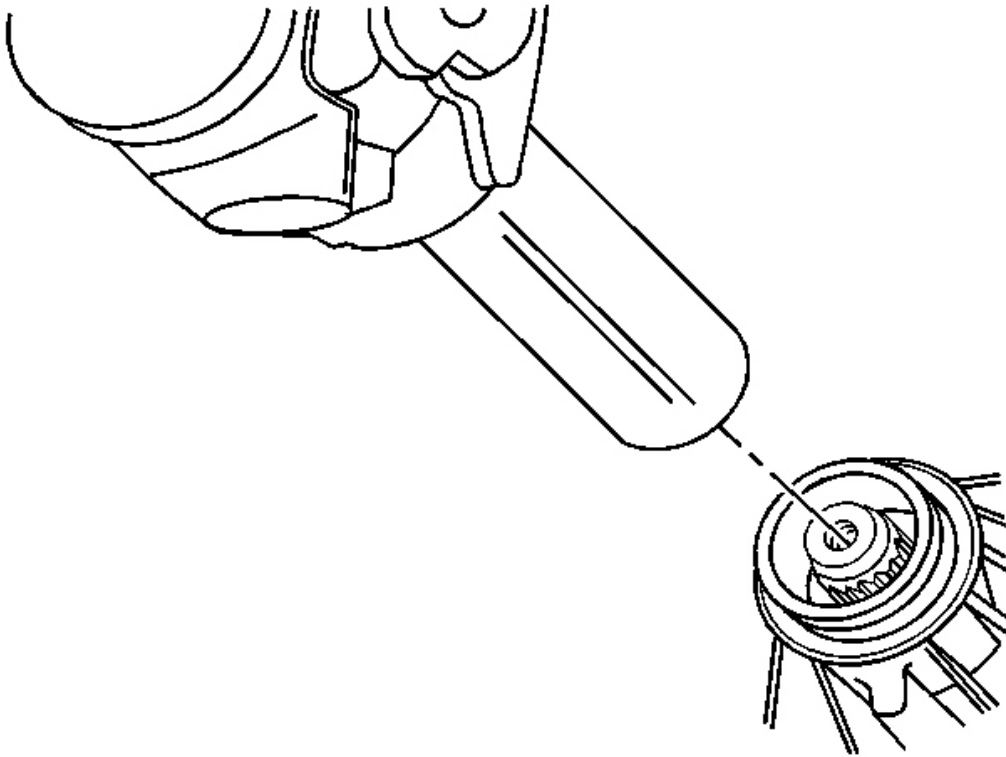


Fig. 9: View Of Propeller Shaft To Transmission Or Transfer Case
Courtesy of GENERAL MOTORS CORP.

2. Install the propeller shaft into the transmission or transfer case.

Align the reference marks made during removal.

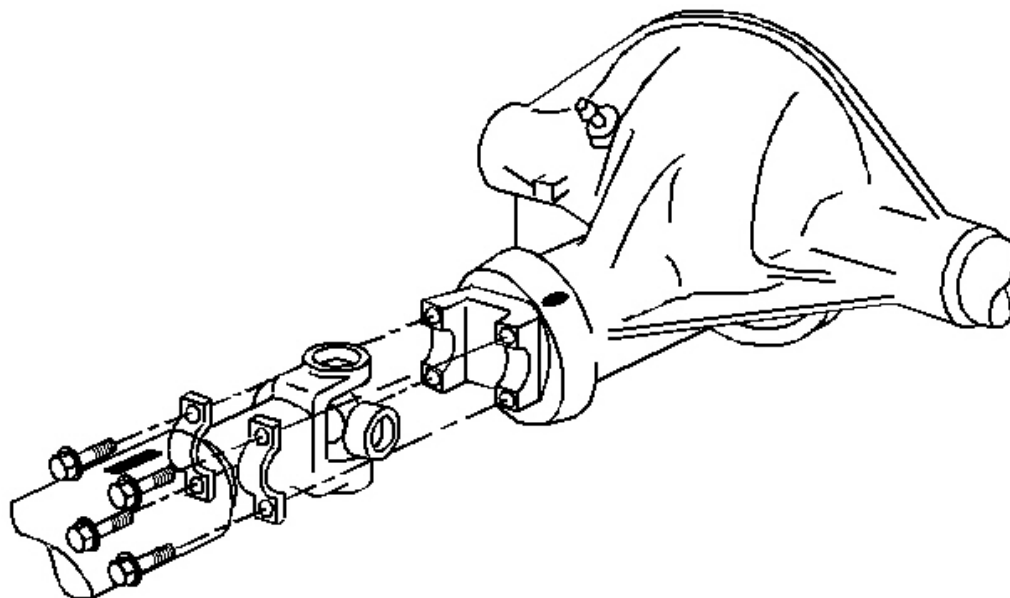


Fig. 10: Rear Axle Pinion Yoke, Bolts And Retainers
Courtesy of GENERAL MOTORS CORP.

3. Install the propeller shaft to the rear axle pinion yoke.

Align the reference marks made during removal.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the yoke retainers and the bolts.

Tighten: Tighten the bolts to 20 N.m (15 lb ft).

5. Lower the vehicle.

UNIVERSAL JOINT REPLACEMENT - NYLON INJECTED RING

Tools Required

- J 9522-3 U Joint Bearing Separator. See Special Tools and Equipment.
- J 9522-5 U Joint Bearing Spacer Remover. See Special Tools and Equipment.

Disassembly Procedure

NOTE: Never clamp propeller shaft tubing in a vise. Clamping could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.

1. Support the propeller shaft in a line horizontal with the table of a press.
2. Mark the propeller shaft as to which end is the transmission end and which end goes to the rear axle.

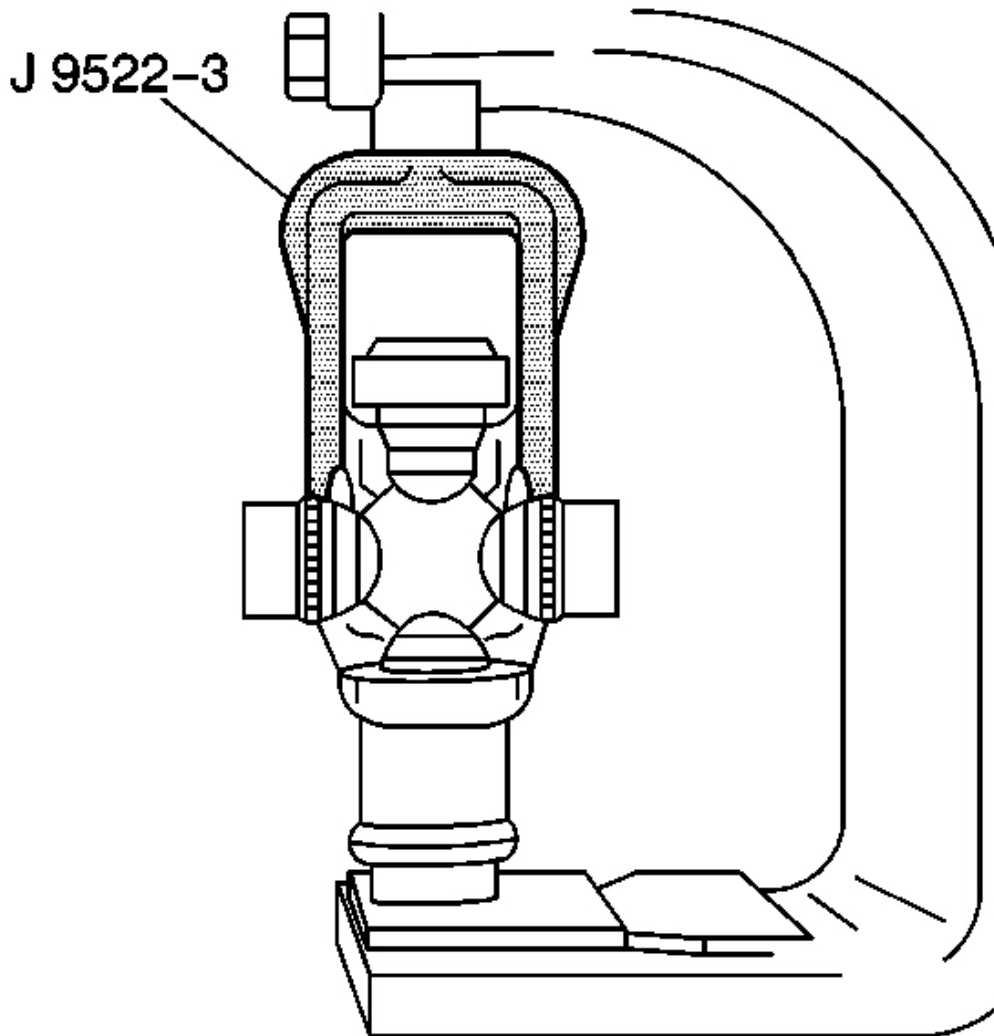


Fig. 11: Assembling Universal Joint

Courtesy of GENERAL MOTORS CORP.

3. Place the universal joint so that the lower ear of the yoke is supported on a 30 mm (1 1/8 in) socket.

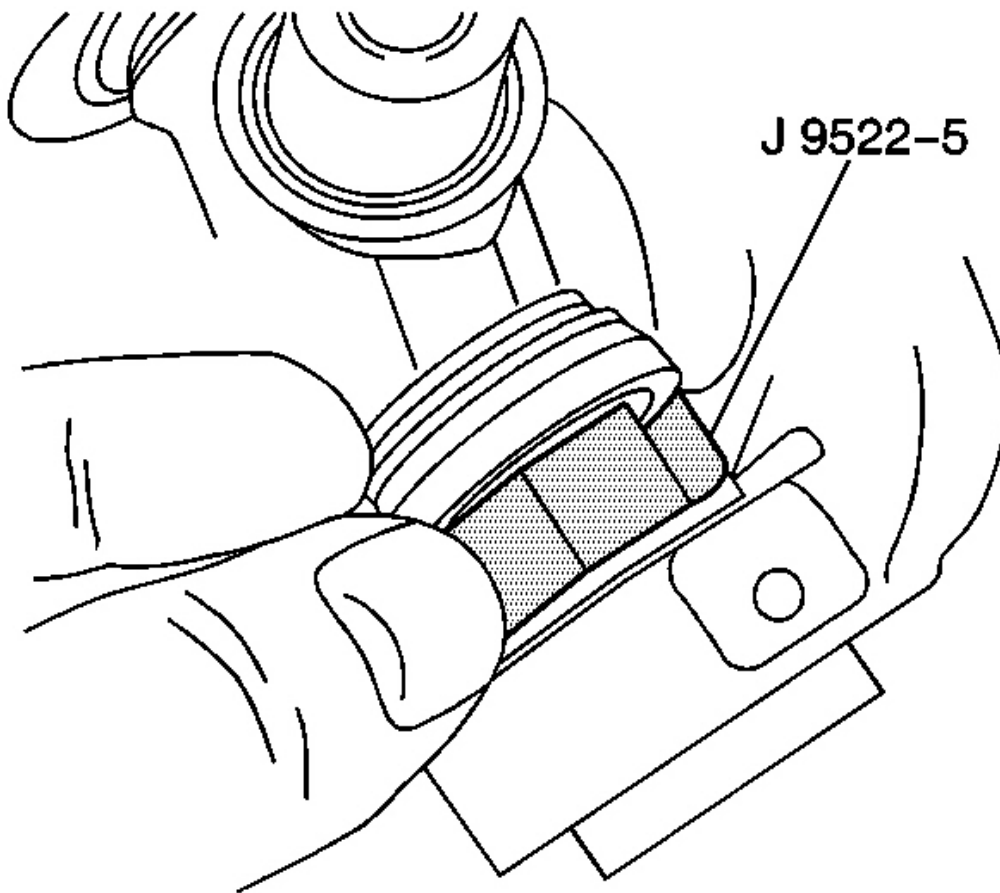


Fig. 12: Inserting J 9522-5 Between The Seal And The Bearing Cup
Courtesy of GENERAL MOTORS CORP.

4. In order to shear the plastic retaining ring on the bearing cup, place **J 9522-3** on the open horizontal bearing cups. See **Special Tools and Equipment**. Press the lower bearing cup out of the yoke ear.
5. If you do not completely remove the bearing cup, lift the cross and insert **J 9522-5** between the seal and the bearing cup you are removing. See **Special Tools and Equipment**. Continue to press the bearing cup out of the yoke.
6. Rotate the propeller shaft. Press the opposite bearing cup out of the yoke.
7. Mark the orientation of the slip yoke to the tube for proper reassembly.

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8. Remove the cross from the yoke.
9. Remove the remaining universal joint parts from the yoke. If you are replacing the front universal joint, remove the bearing cups in the slip yoke in the same manner.
10. Inspect the retaining ring grooves for plastic.
11. Inspect the bearing cup bores in the yoke ears for burrs or imperfections.
12. Clean the remains of the sheared plastic bearing retainers from the grooves in the yoke.
13. The sheared plastic may prevent the bearing cups from pressing into place and thus prevent the bearing retainers from properly seating.

Assembly Procedure

1. Remove the bearing cups from the universal joint.

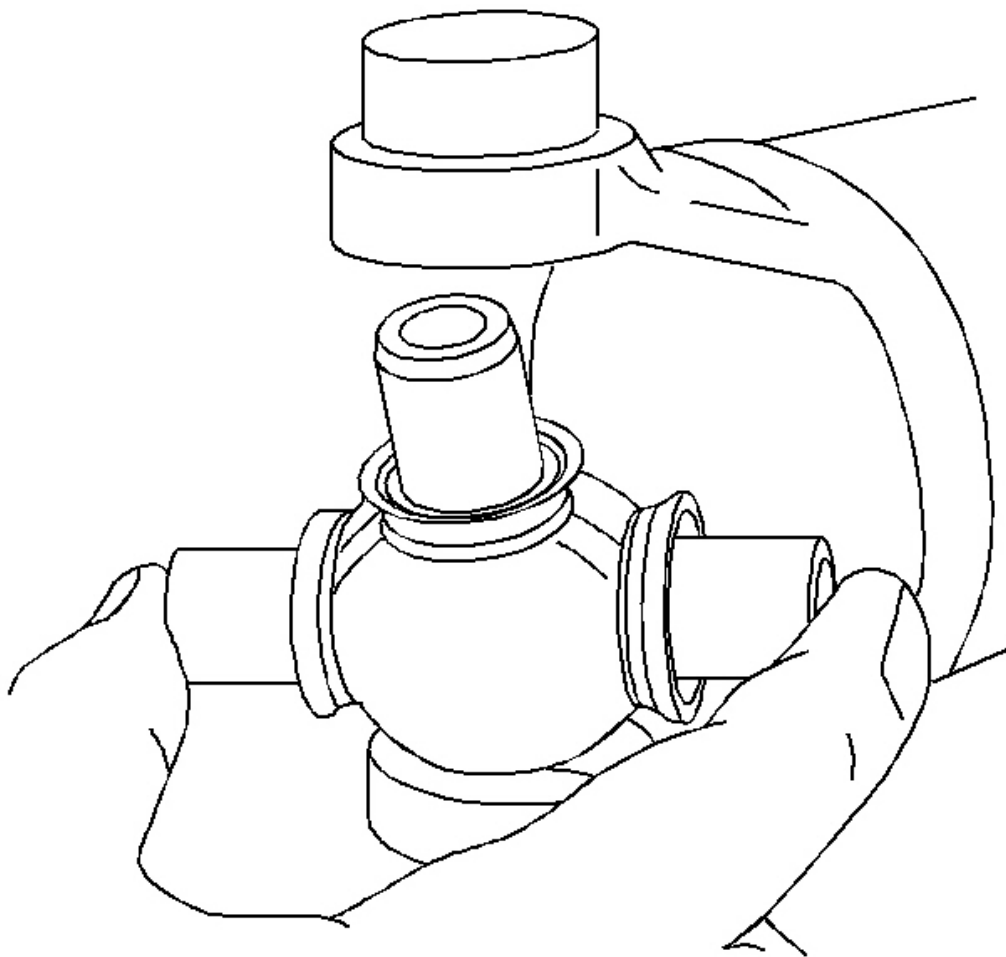


Fig. 13: Assembling Trunnion Into Yoke
Courtesy of GENERAL MOTORS CORP.

2. Assemble 1 bearing cup part way into 1 side of the yoke.
3. Turn the yoke ear toward the bottom.
4. Assemble the cross into the yoke so the trunnion seats freely into the bearing cup.
5. With the trunnion seated in the bearing cup, press the bearing cup into the yoke until the bearing cup is flush with the yoke ear.

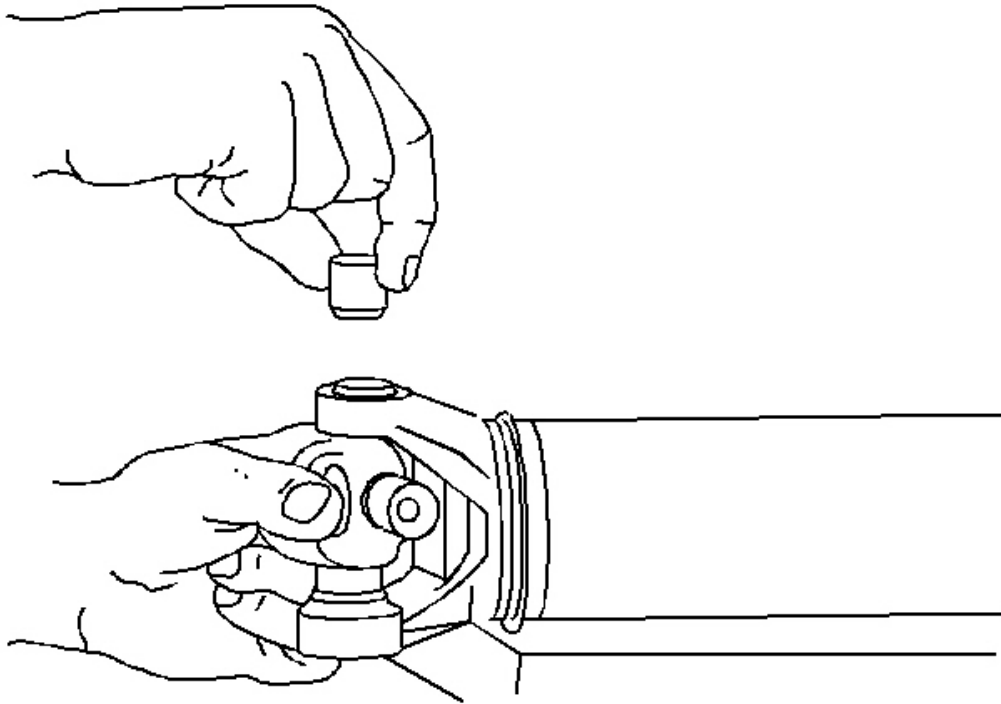


Fig. 14: Installing Bearing Cup Into Yoke Ear
Courtesy of GENERAL MOTORS CORP.

6. Assemble the opposite bearing cup part way into the yoke ear.
7. Ensure that the trunnions start straight and true into both bearing cups.
8. Press the opposite bearing cup into the yoke ear while working the cross all the time in order to inspect for a free unbinding movement of the trunnions in the bearing cups.

IMPORTANT: If there seems to be a hang up or binding, stop pressing, and inspect the needle bearings for misalignment in the bearing cup.

9. Press the bearing cup into the yoke until the bearing retainer groove clears the inside of the yoke.

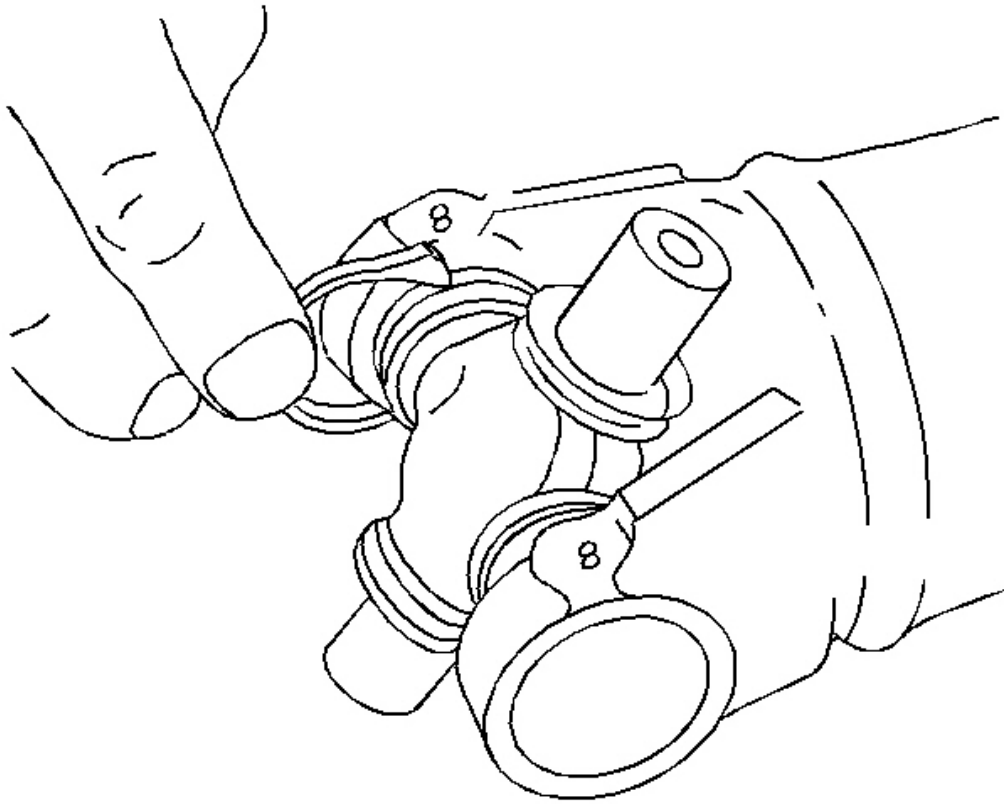


Fig. 15: Assembling Bearing Retainer In Retainer Groove
Courtesy of GENERAL MOTORS CORP.

10. Assemble the bearing retainer in the retainer groove.
11. Continue pressing until you can snap both retainers into place.

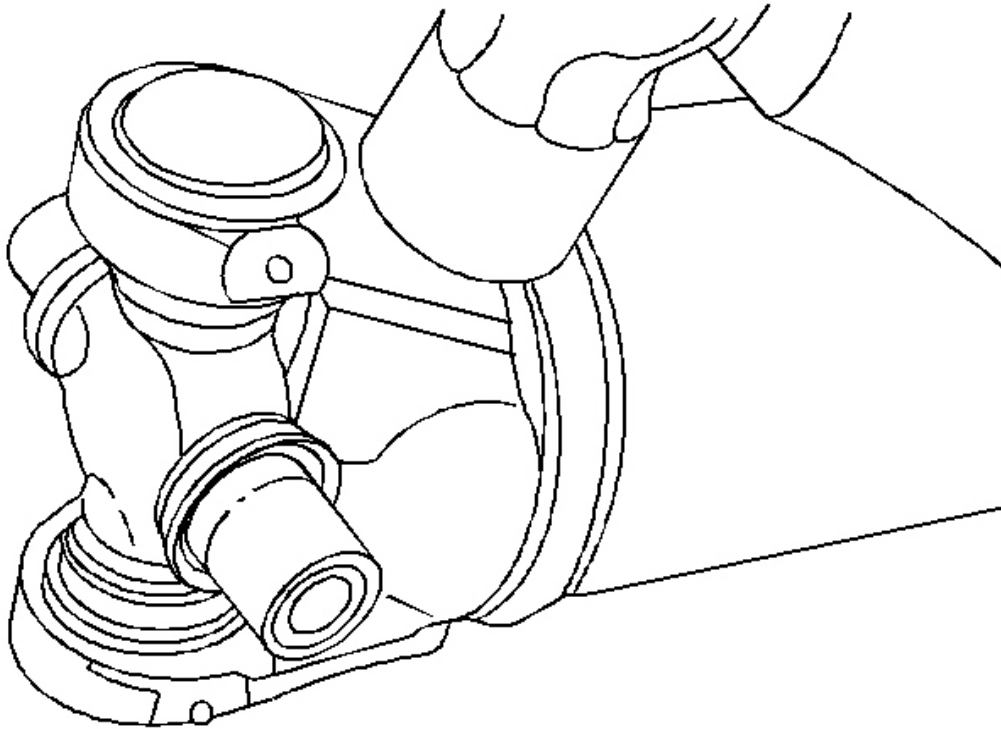


Fig. 16: Springing Yoke Using Hammer
Courtesy of GENERAL MOTORS CORP.

12. If seating the retainer is difficult, spring the yoke slightly with a firm blow from a dead blow hammer.
13. It may be necessary to lubricate the snap ring with a slight amount of chassis grease so the snap ring seats in the bearing cup groove.

UNIVERSAL JOINT REPLACEMENT - EXTERNAL SNAP RING

Tools Required

- **J 9522-3** U-Joint Bearing Separator. See **Special Tools and Equipment**.
- **J 9522-5** U-Joint Bearing Spacer Remover. See **Special Tools and Equipment**.

Disassembly Procedure

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

surface. Nicks may damage the bushing or cut the lip seal.

1. Support the propeller shaft in a line horizontal with the table of a press.
2. Mark the propeller shaft in order to show which end connects to the transmission and which end goes to the rear axle.
3. Disassemble the snap rings by pinching the ends together with a pair of pliers.
4. If the ring does not readily snap out of the groove in the yoke, tap the end of the cup lightly in order to relieve the pressure from the ring.

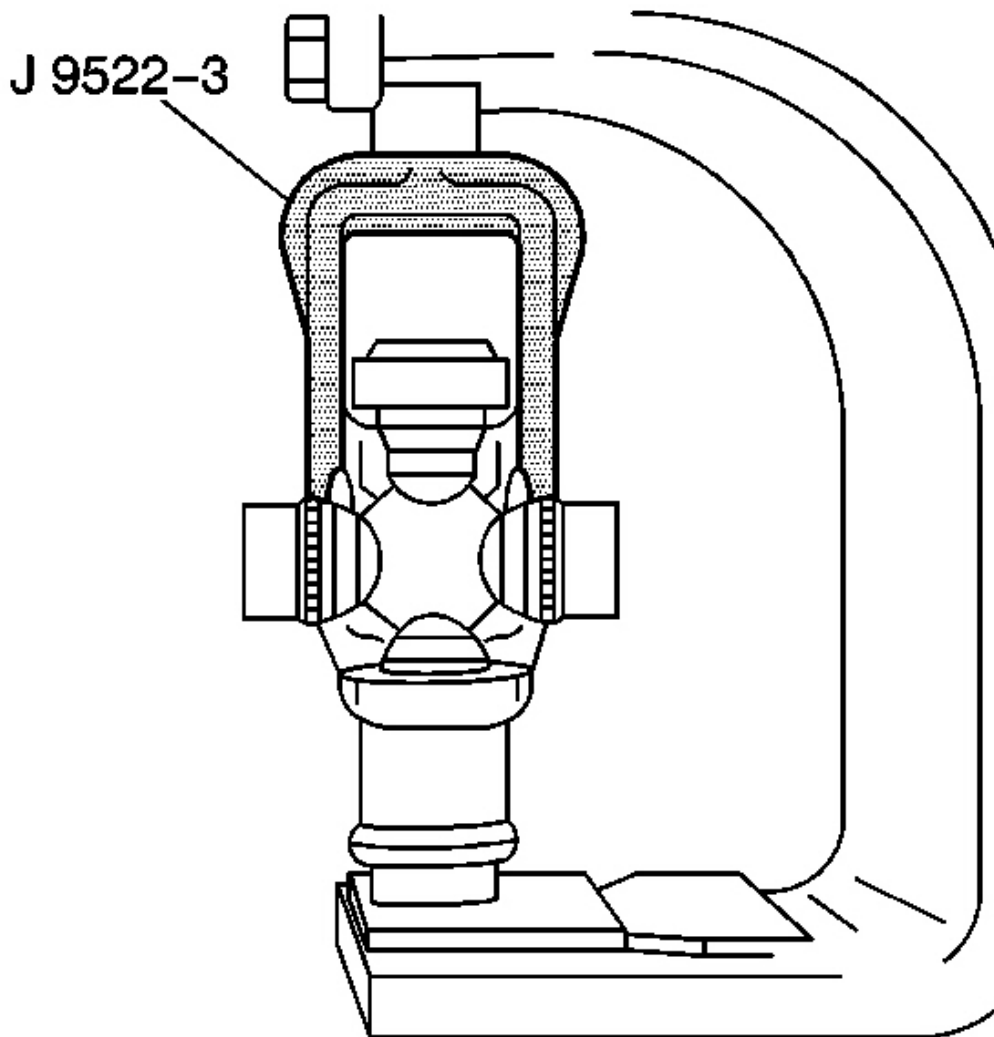


Fig. 17: Assembling Universal Joint
Courtesy of GENERAL MOTORS CORP.

5. Place the universal joint so that the lower ear of the yoke is supported on a 30 mm (1-1/8 in) hex head socket or a 27 mm (1-1/16 in) socket.

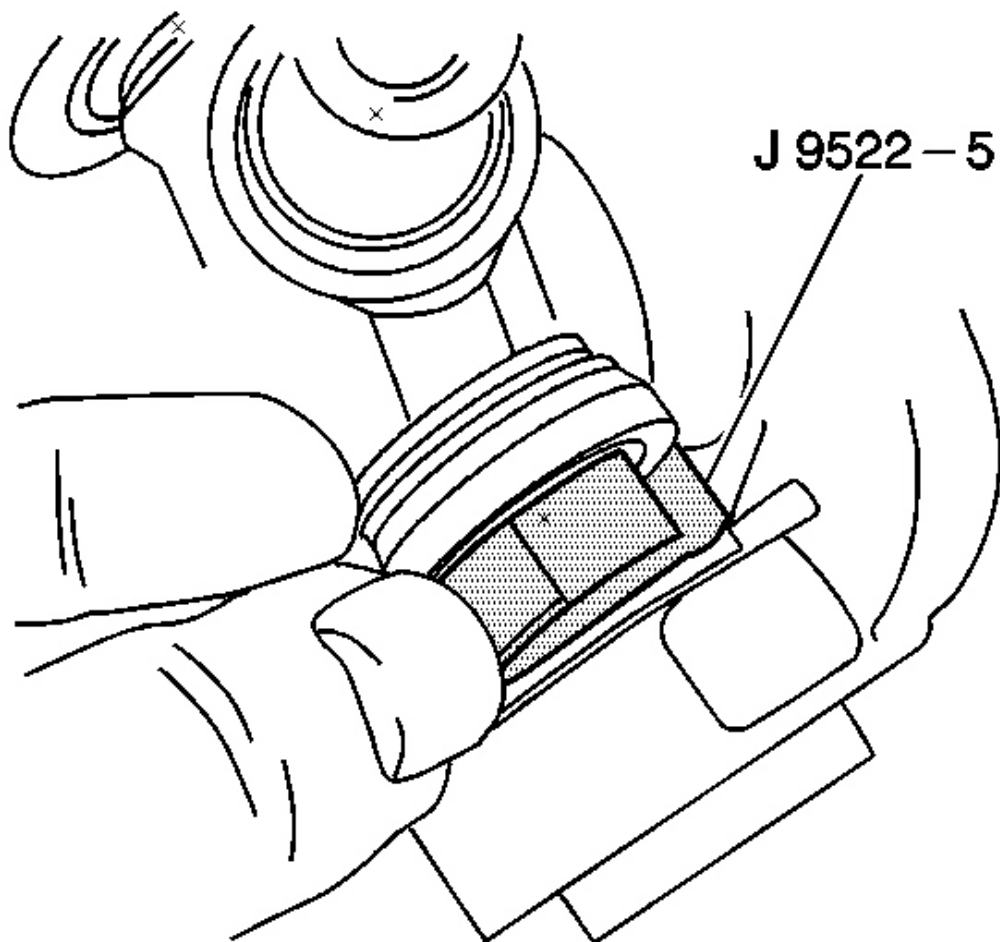


Fig. 18: Placing J 9522-5 Between The Seal And The Bearing Cup
Courtesy of GENERAL MOTORS CORP.

6. Place **J 9522-3** on the open horizontal bearing cups. Press the lower bearing cup out of the yoke ear.
7. If you do not completely remove the bearing cup, lift the cross and insert **J 9522-5** between the seal and the bearing cup you are removing. Continue pressing the bearing cup out of the yoke.
8. Rotate the propeller shaft. Press the opposite bearing cup out of the yoke.

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9. Mark the orientation of the slip yoke to the tube for proper reassembly.
10. Remove the cross from the yoke.
11. Remove the remaining universal joint parts from the yoke.
12. If you are replacing the front universal joint, remove the bearing cups in the slip yoke in the same manner.
13. Inspect the retaining ring grooves for dirt, corrosion, or pieces of the old ring.
14. Inspect the bearing cup bores for burrs or imperfections.
15. Clean the retaining ring grooves. Corrosion, dirt, rust, or pieces of the old retaining ring may prevent the bearing cups from pressing into place or prevent the bearing retainers from properly seating.

Assembly Procedure

1. Remove the bearing cups from the universal joint.

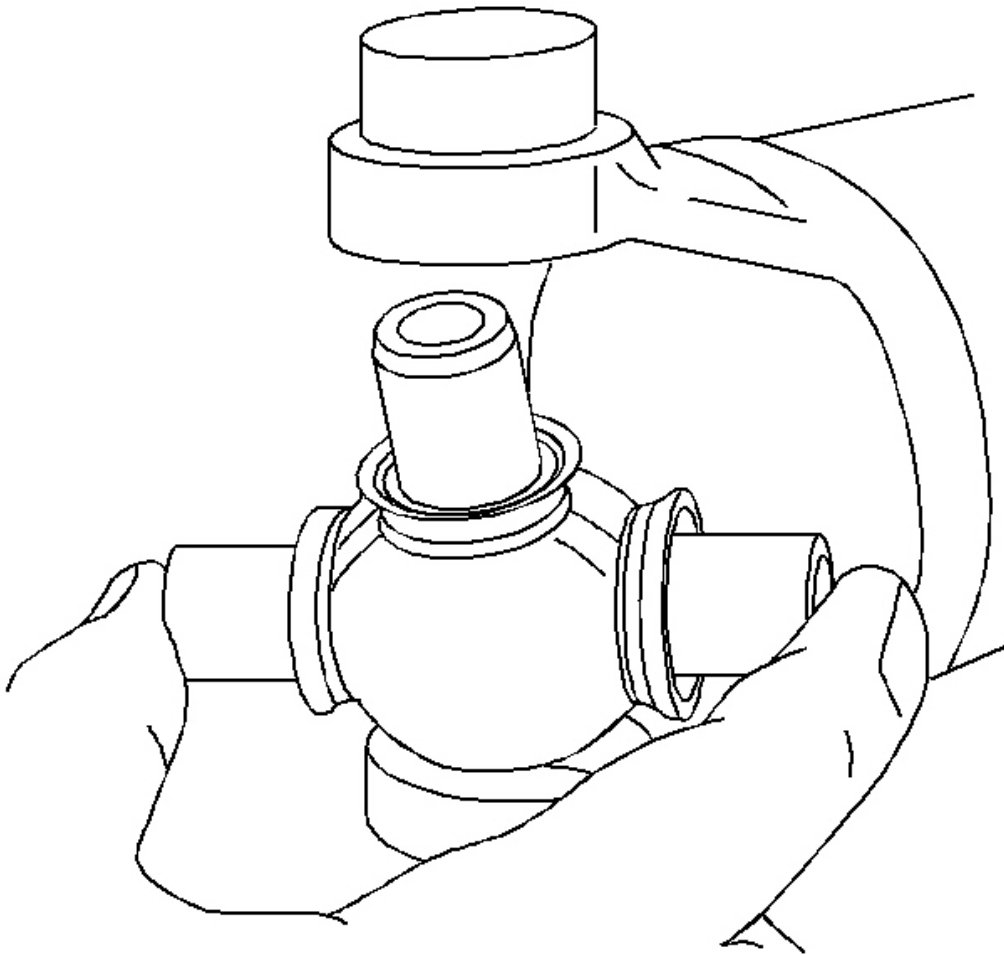


Fig. 19: Assembling Trunnion Into Yoke
Courtesy of GENERAL MOTORS CORP.

2. Assemble 1 bearing cup part way into 1 side of the yoke. Turn the yoke ear toward the bottom.
3. Assemble the cross into the yoke so that the trunnion seats freely into the bearing cup.

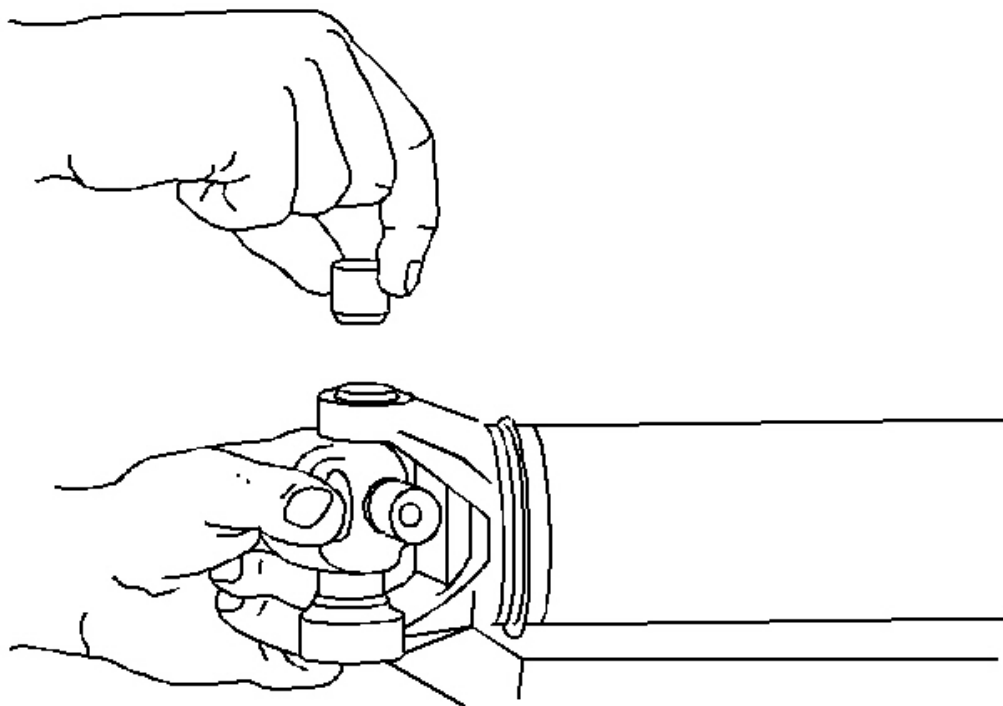


Fig. 20: Installing Bearing Cup Into Yoke Ear
Courtesy of GENERAL MOTORS CORP.

4. With the trunnion seated in the bearing cup, press the bearing cup into the yoke until the bearing cup is flush with the yoke ear.
5. Install the opposite bearing cup part way into the yoke ear.
6. Ensure that the trunnions start straight and true into both bearing cups.
7. Press the opposite bearing cup into the yoke ear while working the cross all the time in order to inspect for free unbinding movement of the trunnions in the bearing cups.

IMPORTANT: If there seems to be a hang up or binding, stop pressing. Inspect the needle bearings for misalignment in the bearing cup.

8. Press the bearing cup into the yoke until the bearing cup retainer groove is visible over the top of the bearing cup.

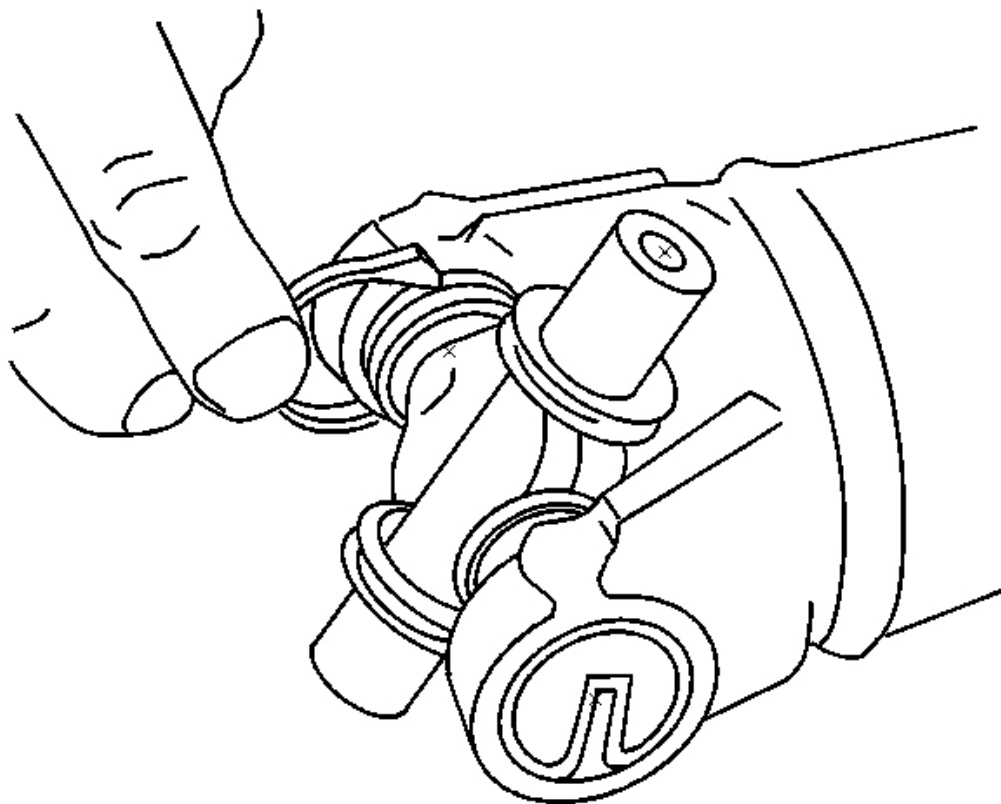


Fig. 21: Assembling Bearing Retainer Into Retainer Groove
Courtesy of GENERAL MOTORS CORP.

9. Assemble the bearing retainer in the retainer groove.
10. Continue pressing until both retainers can be snapped into place.

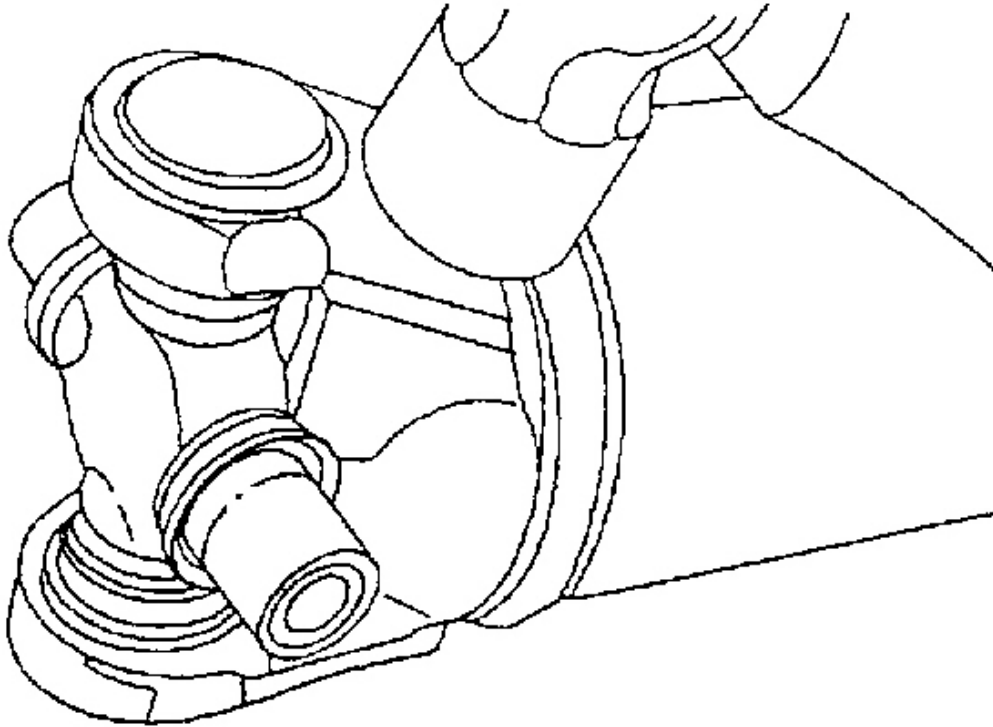


Fig. 22: Seating Retainer Using Hammer (External Snap Ring)
Courtesy of GENERAL MOTORS CORP.

11. If the retainer is difficult to seat, the yoke can be sprung slightly with a firm blow from a dead blow hammer.
12. It may be necessary to lubricate the snap ring with a slight amount of chassis grease so that the snap ring seats in the bearing cup groove.

DESCRIPTION AND OPERATION

PROPELLER SHAFT DESCRIPTION AND OPERATION

The front propeller shaft consists of the following components:

- Propeller shaft tube
- Universal joint
- Flange yoke
- Constant velocity joint

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The rear propeller shaft consists of the following components:

- Propeller shaft tube
- 2 universal joints
- Slip yoke

Front Propeller Shaft Operation

The front propeller shaft connects the transfer case to the front axle. It transmits the rotating force from the transfer case to the front axle when the transfer case is engaged.

Rear Propeller Shaft Operation

The rear propeller shaft connects the transmission or transfer case to the rear axle. It transmits the rotating force from the transmission or transfer case to the rear axle.

Propeller Shaft Phasing Description

The propeller shaft is designed and built with the yoke lugs or ears in line with each other. This produces the smoothest running shaft possible. A propeller shaft designed with built in yoke lugs in line is known as in - phase. An out of phase propeller shaft often causes vibration. The propeller shaft generates vibration from speeding up and slowing down each time the universal joint goes around. The vibration is the same as a person snapping a rope and watching the wave reaction flow to the end. An in phase propeller shaft is similar to 2 persons snapping a rope at the same time and watching the waves meet and cancel each other out. A total cancellation of vibration produces a smooth flow of power in the drive line. All splined shaft slip yokes are keyed in order to ensure proper phasing.

Universal Joint Description

The universal joint is connected to the propeller shaft. The universal consist of 4 caps with needle bearings and grease seals mounted on the trunnions of a cross or spider. These bearings and caps are greased at the factory and no periodic maintenance is required. The bearings and caps are pressed into the yokes and held in place with snap rings, except for 2 bearings on some models witch are strapped onto the pinion flange of the differential. Universal joints are designed to handle the effects of various loads and rear axle windup conditions during acceleration and braking. The universal joint operates efficiently and safely within the designed angle variations. When the design angles are exceeded, the operational life of the joint decreases.

SPECIAL TOOLS AND EQUIPMENT

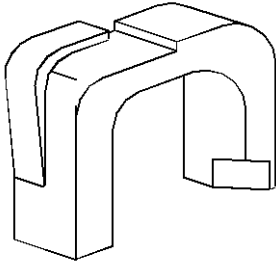
SPECIAL TOOLS

Special Tools

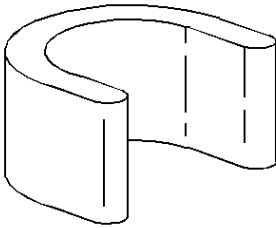
Illustration	Tool Number/ Description

2004 Isuzu Ascender LS

2004 DRIVELINE/AXLE Propeller Shaft - Ascender



J 9522-3
U Joint Bearing Separator



J 9522-5
U Joint Bearing Spacer Remover (Use with J 9522-3)