

# **SERVICE MANUAL**

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## **SERVICE MANUAL SECTION**

### **CF 500, CF 600 Driveshaft**

**Truck Model: CF 500**

**Truck Model: CF 600**

**S06002**

**04/29/2005**

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S06002

Read all safety instructions in the "Safety Information" section of this manual before doing any procedures.

Follow all warnings, cautions, and notes.

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## Safety Information

**NOTE:** Read the following before starting the service procedure.

The information contained in this International Service Manual Section was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you service or repair equipment. Be sure to understand all of the procedures and instructions before you begin work on the unit.

International uses the following types of notations to give warning of possible safety problems and to give information that will prevent damage to the equipment being serviced or repaired.



**WARNING:** A warning indicates procedures that must be followed exactly. Personal injury or possible death can occur if the procedure is not followed.

**CAUTION:** A caution indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur.

**NOTE:** A note indicates an operation, procedure or instruction that is important for correct service.

Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required can cause injury to service personnel or damage to vehicle components.

This service manual section is intended for use by professional technicians, NOT a “do-it-yourselfer.” It is written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the service section applies to your vehicle. See your International Truck Dealer for information on whether this service section applies to your vehicle.

## Driveshaft

### Specifications

**Table 1 Torque Specifications**

Description	Nm	lbf-ft
U-joint strap bolts	75	55
Driveshaft flange bolts	54	40
Center bearing support bolts	163	120
U-joint strap bolts retaining the driveshaft to the coupling shaft	75	55
Nut retaining the reverse slip driveshaft flange to the driveshaft	407	300

### Driveshaft Description and Operation

#### Driveshaft

**CAUTION:** All driveshafts are balanced. If undercoating the vehicle, protect the driveshaft and universal joints to prevent overspray of any undercoating material.

**CAUTION:** Driveshafts are precision balanced and subject to handling damage. Do not drop or overangle any of the joints.

The basic function of a driveshaft is to transmit power from one point to another in a smooth and continuous action. In trucks, the driveshaft is designed to send torque through an angle from the transmission to the axle.

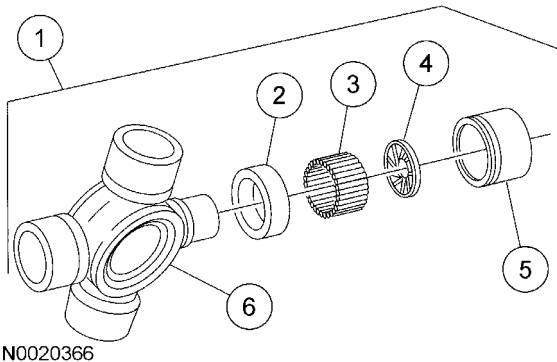
The driveshaft must operate through constantly changing relative angles between the transmission and axle. It must also be capable of changing length while transmitting torque. This is accomplished through universal joints, which permit the driveshaft to operate at different angles and slip joints, which permit contraction and expansion of the axle to take place.

There are 3 types of driveshafts used:

- One-piece driveshaft with 2 U-joints.

- Two-piece driveshaft with 3 U-joints, a front coupling shaft, a center bearing and a rear driveshaft.
- Three-piece driveshaft with 4 U-joints, a front coupling shaft, 2 center bearings and a rear driveshaft assembly.

### Universal Joints

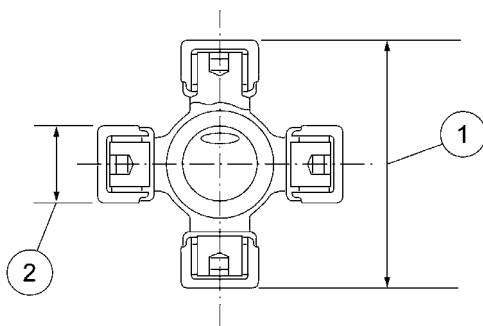


**Figure 1**

1. Universal joint (U-joint)
2. Grease seal
3. Needle rollers
4. Thrust washer
5. Bearing cup
6. Spider

Universal joints have the following features:

- A lubed-for-life design.
- Equipped with nylon thrust washers, located at the base of each bearing cup, which control end play, positions the needle bearings and improves grease movement.



**Table 2 Universal Joint (U-Joint) Identification Chart**

Series	Diameter 1 (Spider Outer Diameter with Bearing Cups Fully Seated)	Diameter 2 (Bearing Cup Outer Diameter)
1350	91.9 mm (3.62 in)	30.2 mm (1.19 in)
1410	106.4 mm (4.19 in)	30.2 mm (1.19 in)
1480	106.4 mm (4.19 in)	35.1 mm (1.38 in)

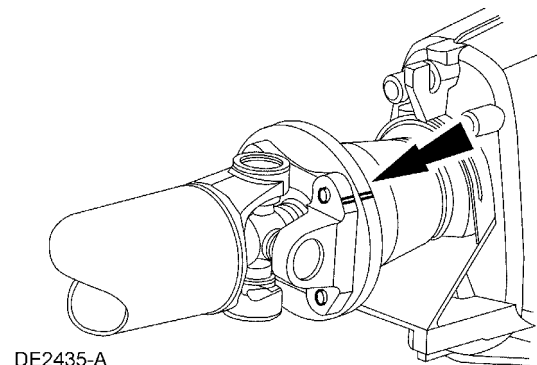
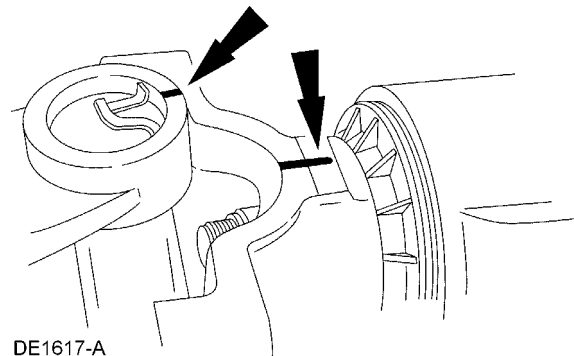
### Driveshaft Diagnosis and Testing

Refer to Noise, Vibration and Harshness in S10019.

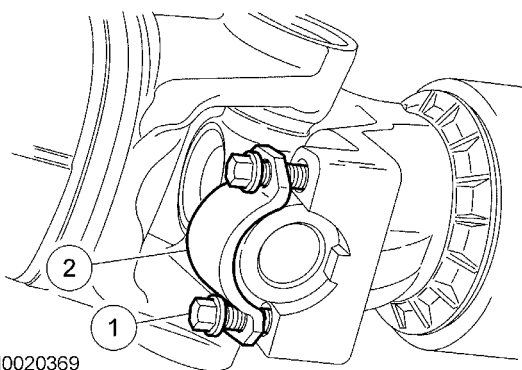
### Removal and Installation

#### Driveshaft — One-Piece

1. Raise and support the vehicle. For additional information, refer to Jacking and Lifting in S10019.
2. Index-mark the driveshaft to maintain balance during installation.



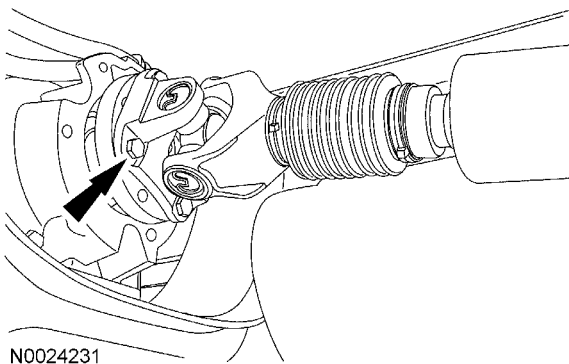
3. Disconnect the driveshaft from the axle.



**Figure 5**

1. Remove and discard the universal joint (U-joint) strap bolts.
2. Remove and discard the U-joint straps.

- Using mechanic's wire, support the driveshaft.
  - To install, tighten to 75 Nm (55 lb-ft).
4. Remove the driveshaft flange bolts and remove the driveshaft.
    - Discard the driveshaft flange bolts.
    - To install, tighten to 54 Nm (40 lb-ft).

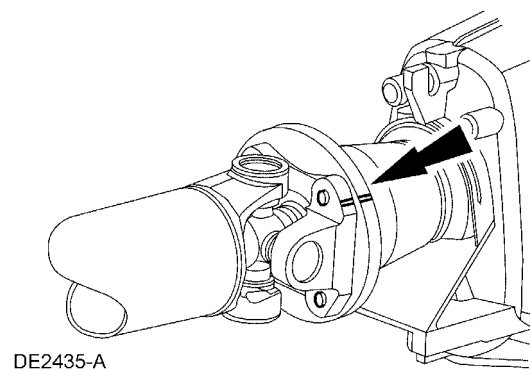
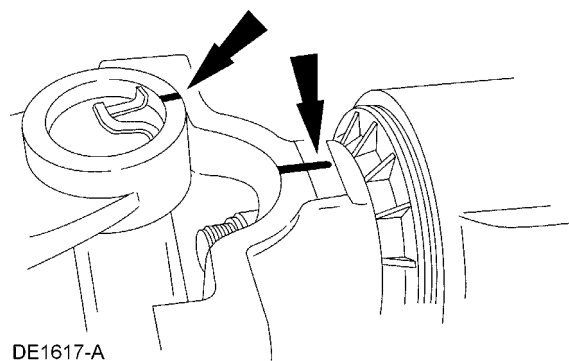


**NOTE:** Install the driveshaft so that the index marks made before removal are aligned, or the yellow mark on the driveshaft tube is in line with the yellow mark on the rear axle flange.

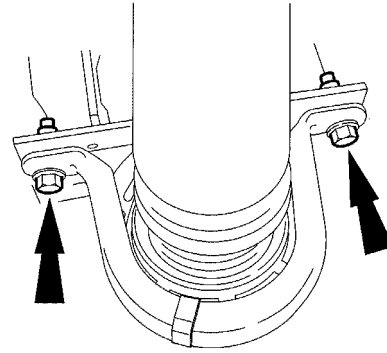
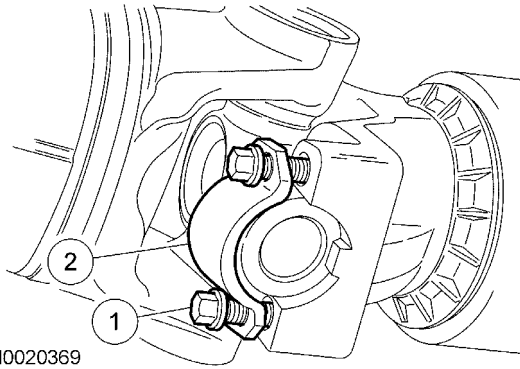
7. To install, reverse the removal procedure.
  - Install new driveshaft fasteners.

### Driveshaft — Rear, Two-Piece

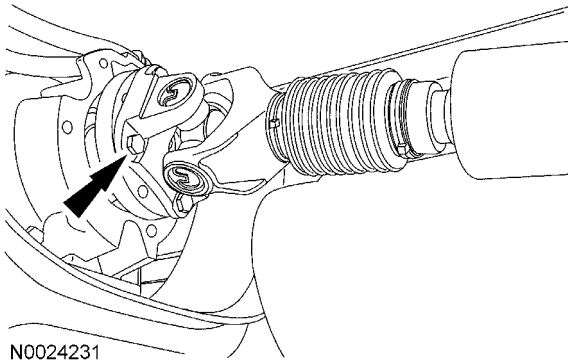
1. Raise and support the vehicle. For additional information, refer to Jacking and Lifting in S10019.
2. Index-mark the driveshaft to maintain balance during installation.



5. Clean grease deposits, dirt and rust from the driveshaft yoke areas and all driveshaft components.
  6. Inspect the driveshaft slip yoke boot for rips or holes. If necessary, install a new driveshaft slip yoke boot.
3. Disconnect the driveshaft from the axle.

**Figure 9**

1. Remove and discard the universal joint (U-joint) strap bolts.
  2. Remove and discard the U-joint straps.
- Using mechanic's wire, support the driveshaft.
  - To install, tighten to 75 Nm (55 lb-ft).
4. Remove the driveshaft flange bolts and disconnect the driveshaft from the output flange.
    - Discard the driveshaft flange bolts.
    - Using mechanic's wire, support the driveshaft.
    - To install, tighten to 54 Nm (40 lb-ft).



5. Remove the center bearing support bolts and remove the driveshaft assembly.
  - Discard the center bearing support bolts.
  - To install, tighten to 163 Nm (120 lb-ft).

6. Clean grease deposits, dirt and rust from the following:
  - The driveshaft yoke areas.
  - All driveshaft components.
  - Wipe the bearing and rubber insulator of the driveshaft center bearing. Do not immerse the bearing and rubber insulator in solvent.
7. Inspect the following:
  - The driveshaft slip yoke boot for rips or holes. If necessary, install a new driveshaft slip yoke boot.
  - The driveshaft center bearing for wear or rough action. If wear or roughness is evident, install a new driveshaft center bearing.
  - The center bearing rubber insulator for evidence of hardening, cracking or deterioration. If necessary, install a new center bearing rubber insulator.

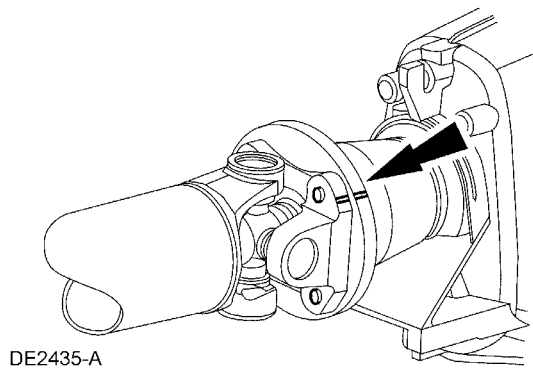
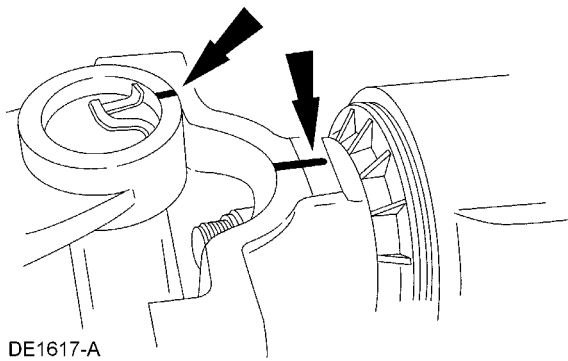
**NOTE:** Install the driveshaft so that the index marks made before removal are aligned, or the yellow mark on the driveshaft tube is in line with the yellow mark on the rear axle flange.

8. To install, reverse the removal procedure.
  - Install new driveshaft fasteners.

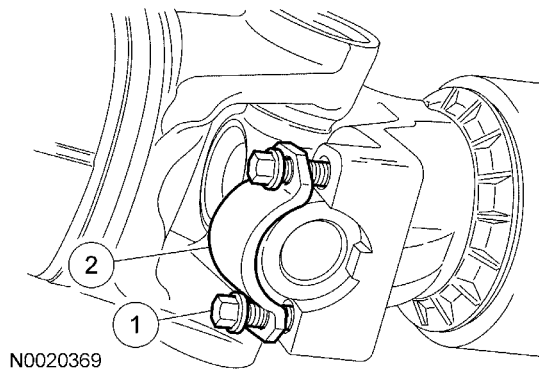
### Driveshaft — Rear, Three-Piece

1. Raise and support the vehicle. For additional information, refer to Jacking and Lifting in S10019.
2. Index-mark the driveshaft to maintain balance during installation.





3. Disconnect the driveshaft from the axle.



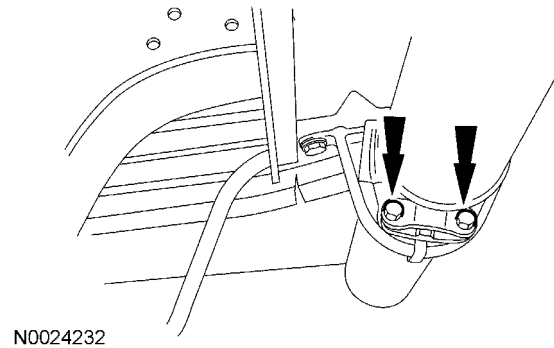
**Figure 14**

1. Remove and discard the universal joint (U-joint) strap bolts.
2. Remove and discard the U-joint straps.

- Using mechanic's wire, support the driveshaft.
- To install, tighten to 75 Nm (55 lb-ft).

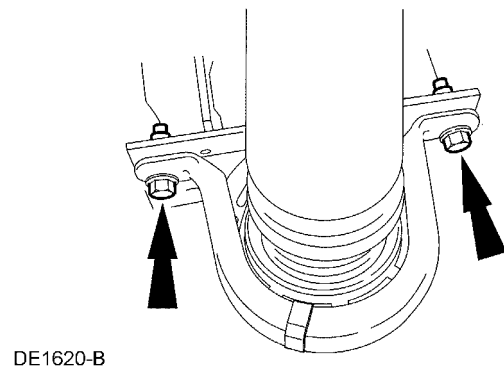
4. Disconnect the driveshaft from the coupling shaft.

- Using mechanic's wire, support the driveshaft.
- To install, tighten to 75 Nm (55 lb-ft).



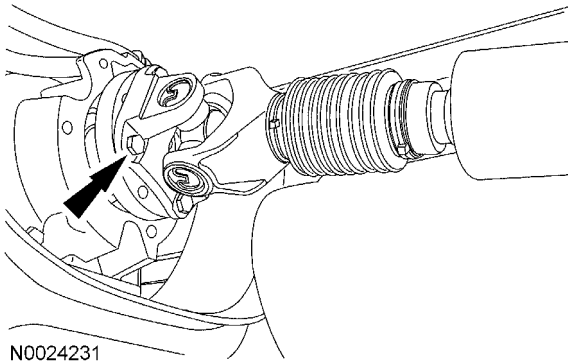
5. Remove the center bearing support bolts and remove the rear driveshaft assembly.

- Discard the center bearing support bolts.
- To install, tighten to 163 Nm (120 lb-ft).



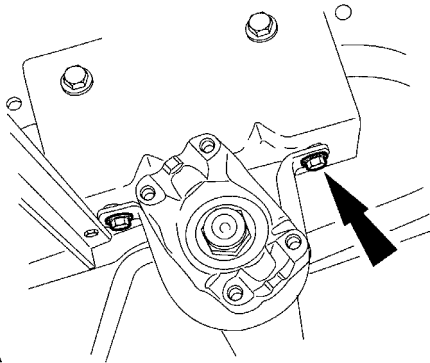
6. Remove the driveshaft flange bolts and disconnect the driveshaft from the output flange.

- Discard the flange bolts.
- Using mechanic's wire, support the driveshaft.
- To install, tighten to 54 Nm (40 lb-ft).



7. Remove the center bearing support bolts and remove the driveshaft.

- Discard the center bearing support bolts.
- To install, tighten to 163 Nm (120 lb-ft).



8. Clean grease deposits, dirt and rust from the following:

- The driveshaft yoke areas.
- All driveshaft components.
- Wipe the bearing and rubber insulator of the driveshaft center bearings. Do not immerse the bearing and rubber insulator in solvent.

9. Inspect the following:

- The driveshaft slip yoke boot for rips or holes. If necessary, install a new driveshaft slip yoke boot.

- The driveshaft center bearings for wear or rough action. If wear or roughness is evident, install a new driveshaft center bearing.
- The center bearing rubber insulators for evidence of hardening, cracking or deterioration. If necessary, install a new center bearing rubber insulator.

**NOTE:** Install the driveshaft so that the index marks made before removal are aligned, or the yellow mark on the driveshaft tube is in line with the yellow mark on the rear axle flange.

10. To install, reverse the removal procedure.

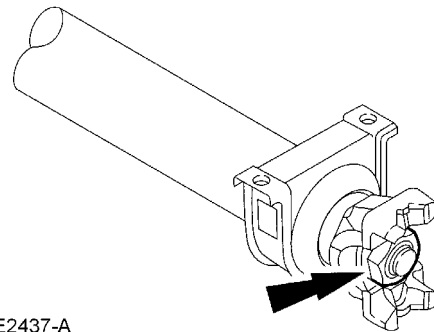
- Install new driveshaft fasteners.

## Disassembly and Assembly

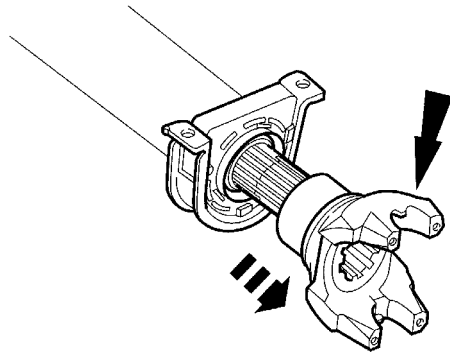
### Center Bearing

**CAUTION:** Do not clamp the driveshaft in the jaws of a vise or a similar holding fixture.

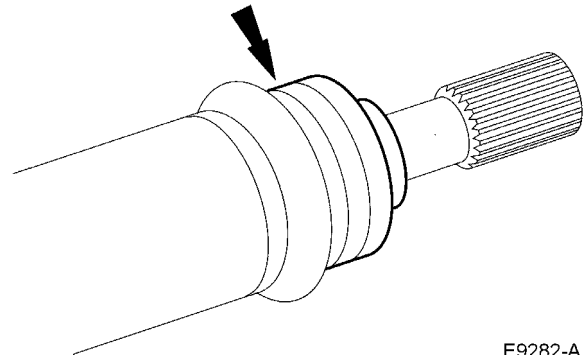
1. Place the driveshaft on a suitable workbench.
  2. On reverse slip driveshafts, while using a suitable flange holding tool to prevent shaft rotation, remove the driveshaft flange nut.
- To install, tighten to 407 Nm (300 lb-ft).



3. On reverse slip driveshafts, remove the flange.

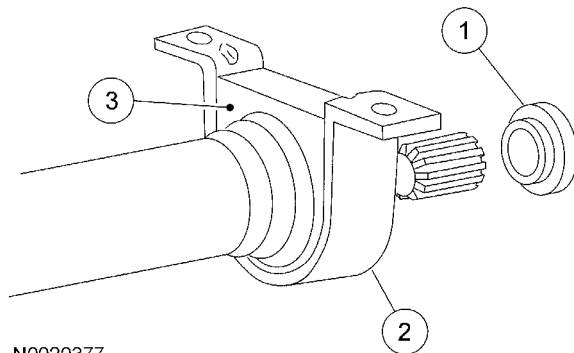


DE0872-A



E9282-A

4. Remove the driveshaft slip yoke and the slip yoke boot.
5. Remove the rubber insulator surrounding the bearing.

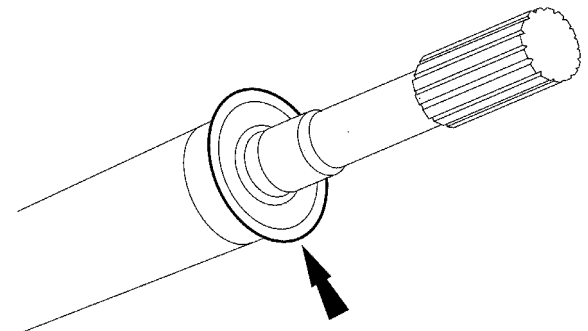


N0020377

**Figure 21**

1. Remove the driveshaft center bearing retainer.
  2. Remove the driveshaft center bearing bracket.
  3. Remove the rubber insulator.
6. Using a suitable press, remove the bearing from the driveshaft.

7. Using a suitable press, remove the dust slinger.



E9283-A

**NOTE:** Clean grease deposits, dirt and rust from the stub shaft.

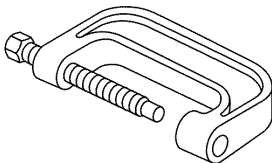
**NOTE:** Inspect the stub shaft splines for nicks, gouges or burrs. Remove with a file or emery cloth.

**NOTE:** The driveshaft center bearing bracket must be installed with the deep flange rearward.

8. To assemble, reverse the disassembly procedure.
  - Lubricate the stub shaft spline with grease.
    - Use Premium Long-Life Grease XG-1-C or equivalent
  - Install new driveshaft slip yoke boot clamps.

## Driveshaft Universal Joint — Single Cardan, Flange Yoke Disassembly

**Table 3 Special Tool**

 <p>ST1172-A</p>	<p>Installer/Remover, C-Frame and Screw OTC 7248</p>
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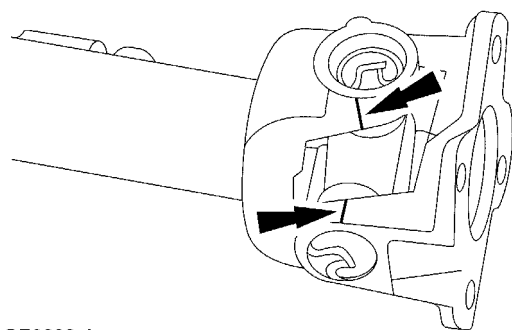
### Initial Disassembly

**CAUTION:** Do not, under any circumstance, clamp the driveshaft in the jaws of a vise or similar holding fixture. Denting or localizing fracture can result, causing driveshaft failure during vehicle operation.

1. Place the driveshaft on a suitable workbench. Do not damage the tube.

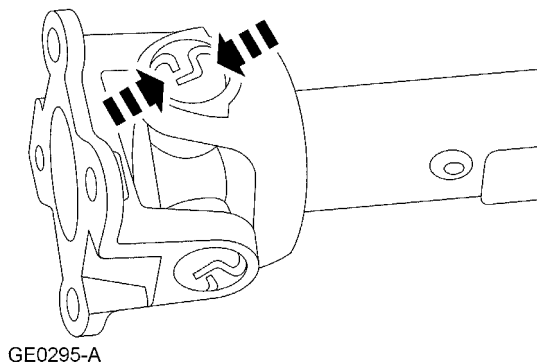
**NOTE:** If components are not marked and installed incorrectly, driveline imbalance can occur.

2. Index-mark the driveshaft components.



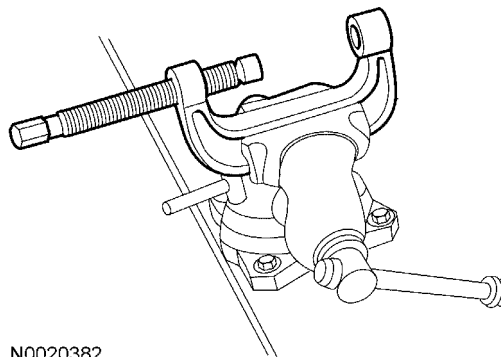
GE0293-A

3. Remove and discard all 4 of the snap rings.



GE0295-A

4. Clamp the special tool in a vise.

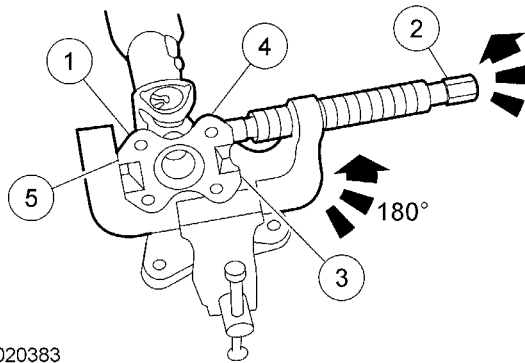


N0020382

### Bearing Cup Removal

**NOTE:** If necessary, use a pair of pliers to remove a bearing cup that fails to press out all the way.

5. Remove the bearing cups and the flange.



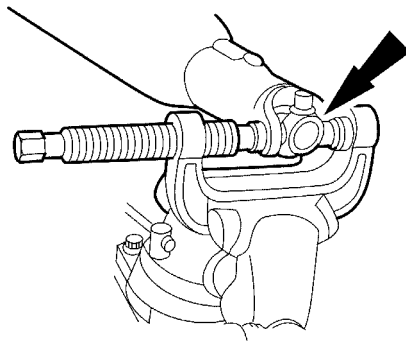
N0020383

**Figure 27**

1. Position the flange in the special tool.
2. Press out a bearing cup.
3. Rotate the flange 180 degrees.
4. Press on the spider to remove the remaining bearing cup.
5. Remove the flange.

**Final Disassembly**

6. Repeat bearing cup removal in this procedure to remove the remaining bearing cups and the spider from the driveshaft.

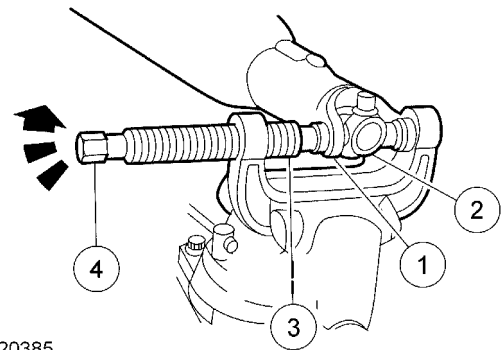


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**Driveshaft Universal Joint — Single Cardan, Flange Yoke Assembly****Bearing Cup Installation**

**NOTE:** Install the Universal Joint Kits as complete assemblies only. Do not mix components from other kits.

1. Install a new spider and bearing cups.



N0020385

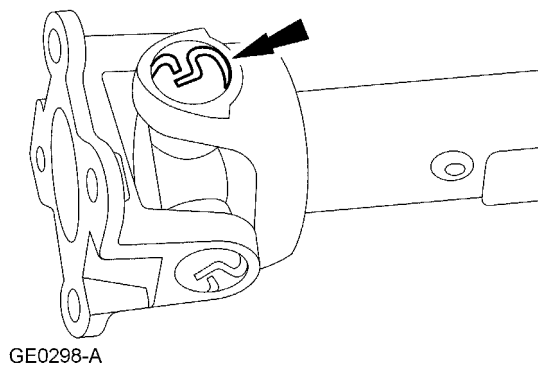
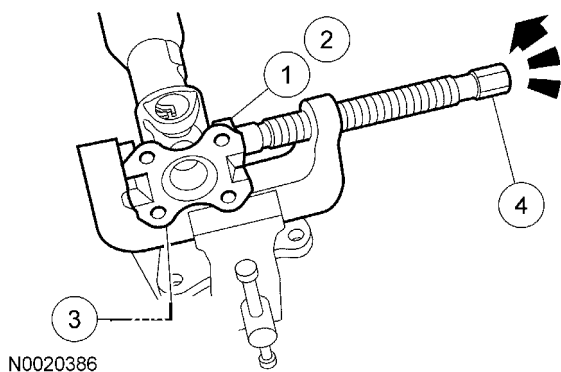
**Figure 29**

1. Start a new bearing cup in the driveshaft yoke.
  - a. Check the needle bearings for correct positioning.
2. Position the new spider in the driveshaft yoke.
3. Position the driveshaft yoke in the special tool.
4. Press the bearing cup to just below the snap ring groove.
  - a. Repeat to install the new bearing cup on the opposite side of the driveshaft yoke.

**Flange Installation**

2. Inspect the flange. Install a new flange, if necessary.
3. Install the new bearing cups and the flange.

7. Clean the yoke area at the end of the driveshaft.

**Figure 30**

1. Start a new bearing cup in the flange.
  - a. Check the needle bearings for correct positioning.
2. Position the flange on the spider.
3. Position the assembly in the special tool.
4. Press the bearing cup to just below the snap ring groove.
  - a. Repeat to install the new bearing cup on the opposite side of the flange.

**CAUTION: Do not strike the bearings.**

5. Check the U-joint for freedom of movement.
  - If binding, strike the yoke with a brass or plastic hammer.

### Final Assembly

**NOTE:** Use the yellow snap rings supplied in the kit to assemble the universal joint (U-joint). If difficulty is encountered with the yellow snap rings, install the black snap rings.

4. Remove the driveshaft from the special tool, and install the 4 new snap rings.

