

Wheel Drive Shafts

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Description and Operation

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Wheel Drive Shafts Description and Operation

Wheel drive shafts are flexible assemblies consisting of an inner tripod joint and an outer constant velocity joint connected by an axle shaft. The inner joint is completely flexible, and can plunge in and out. The outer joint is also flexible, but cannot plunge in and out. These drive axles are used to transmit rotational force from the transaxle to the front tire and wheel assemblies.

Seal and Clamp

The wheel drive shafts use inboard and outboard joint seals made of thermoplastic material, and clamps made of stainless steel. The functions of the seals are as follows:

- The seals protect the internal parts of the inboard and outboard joints.
- - They protect the joint lubricating grease from surrounding detrimental atmospheric conditions, such as extreme temperatures, ozone gas, etc.
 - They protect the joint lubricating grease from foreign materials, such as stones, dirt, water, salt, etc.
- The seals facilitate angular and axial movement of the inboard joint.
- The seals facilitate angular movement of the outboard joint.

The function of the clamps is as follows:

- Provide a leak proof connection at both the housing and the axle shaft for the inboard and outboard joints.
- The thermoplastic material performs well against normal handling, operational wear, and conditions. This material however, is not strong enough to withstand abusive handling or damage due to objects such as sharp tools or the sharp edge of any other surrounding component on the vehicle.

Inner Joint

The inner joints are of the tripod design without an over-extension limitation retainer. The inner joints incorporate a male spline which interlocks with the transaxle, or the intermediate drive shaft if equipped, using snap rings.

Outer Joint

The outer joints are of the Rzeppa, constant velocity joint design. The shaft end which mates with the wheel bearing and hub assembly, incorporates a spline.

Diagnostic Information and Procedures

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Symptoms - Wheel Drive Shafts

1. Note:

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

2. Perform the [Vibration Analysis - Road Testing](#) 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](#).

VisualPhysical 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 VisualPhysical 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](#)

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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 outer joint manually. Any binding or impeded movement of the joint may indicate damage which could contribute to the concern.

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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 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.

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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 joints manually. Do not allow the joints 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.

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Repair Instructions

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Front Wheel Drive Shaft Replacement

Special Tools

- DT-6332 Seal Protector
- DT-50183 Wheel Drive Shaft Remover
- DT-50186 Wheel Hub Holding Tool
- DT-50188 Hub Spindle Remover

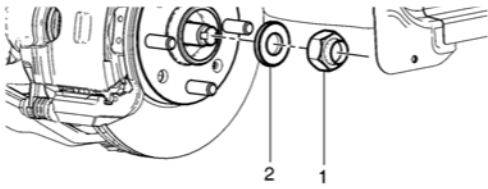
Removal Procedure

1. Caution:

Refer to [Vehicle Lifting and Jacking Caution](#).

2. Raise and support the vehicle. Refer to [Vehicle Lifting and Jacking Caution](#).
3. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
4. Remove the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
5. Drain the transmission fluid, as necessary.
6. [Click here for full size](#)
7. Install the DT-50186 tool (1) to the wheel hub with the wheel nuts.





8.

[Click here for full size](#)

9. Note:

Use a suitable tool to release the crimping on the wheel drive shaft retaining nut.

10. Note:

The wheel drive shaft retaining nut (1) must be discarded after removal.

11. Remove the wheel drive shaft nut (1) and washer (2) from the wheel drive shaft and discard.

12. Remove the *DT-50186* tool from the wheel hub.

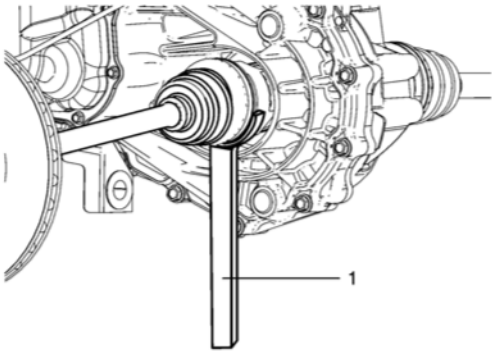
13. Disconnect the outer tie rod assembly from the steering knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#).

14. Separate the control arm ball joint from the steering knuckle. Refer to [Lower Control Arm Replacement](#).

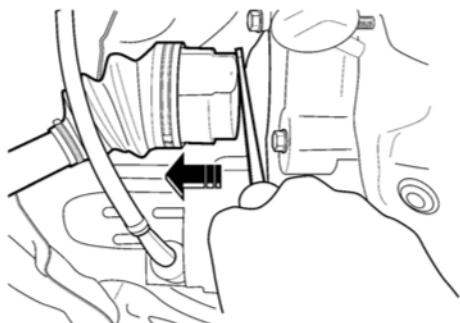
15.

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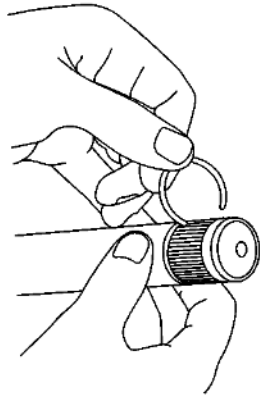
16. Using the *DT-50188* remover (2), separate the wheel drive shaft from the steering knuckle (1).



17. [Click here for full size](#)
18. For the manual transmission, install the *DT-50183* remover (1) on the groove of inner joint and remove the wheel drive shaft from the transaxle.



19. [Click here for full size](#)
20. For the automatic transmission, insert a big flat-head screwdriver between the inner joint and the transaxle, and remove the wheel drive shaft from the transaxle.

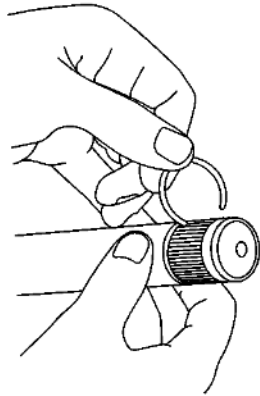


21.

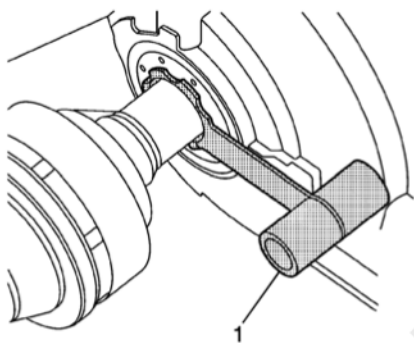
[Click here for full size](#)

22. Remove and DISCARD the retaining ring from the front wheel drive shaft.

Installation Procedure



1. [Click here for full size](#)
2. Install the NEW retaining ring to the front wheel drive shaft.



3.

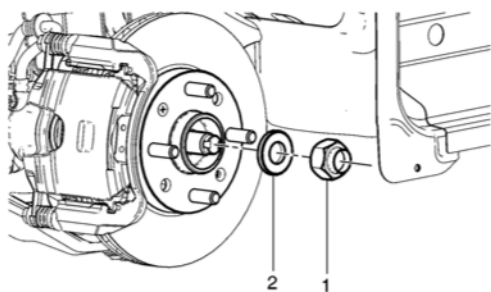
[Click here for full size](#)

4. Position the *DT-6332* protector in the transaxle.

5. Install the wheel drive shaft until the wheel drive shaft splines are past the axle seal.
6. Remove the *DT-6332* protector from the wheel drive shaft.
7. Install the wheel drive shaft until it is fully seated in the transaxle.
8. Note:

In the following step, DO NOT pull on the wheel drive shaft. Pull only on the inner joint.

9. With the wheel drive shaft installed, grasp the inner tripod housing and pull the tripod outward to ensure that the wheel drive shaft is properly engaged. The wheel drive shaft will remain in place if properly installed.
10. Install the wheel drive shaft to the front wheel hub/bearing.
11. Install the control arm ball joint to the steering knuckle. Refer to [Lower Control Arm Replacement](#).
12. Install the outer tie rod assembly to the steering knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#).



13.
[Click here for full size](#)
14. Hand tighten the NEW wheel drive shaft nut(2) on the wheel drive shaft(1).
15.
[Click here for full size](#)
16. Install the *DT-50186* tool (1) to the wheel hub with two wheel nuts.
17. Support the *DT-50186* tool (1) outer end on a safety stand.
18. Caution:
Refer to [Fastener Caution](#).
19. Using a torque wrench and the appropriate size socket, install the wheel drive shaft nut and tighten to 240N-m (177lb-ft).
20. Remove the *DT-50186* tool (1) from the wheel hub.
21.
[Click here for full size](#)
22. Using a punch (1), stake the wheel drive shaft nut.
23. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
24. Fill the transaxle fluid and inspect the fluid level of the transaxle, as necessary. Refer to [Transmission Fluid Drain and Fill](#).
25. Install the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
26. Lower the vehicle.

Related Part Information

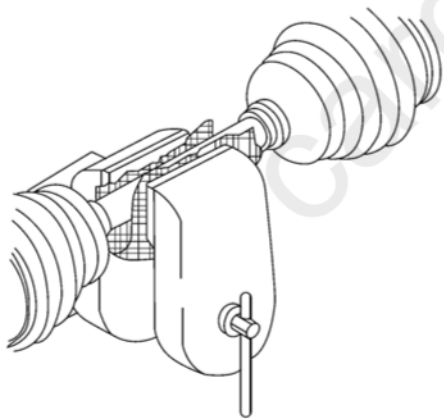
Part Name	Catalog Name	Part Code
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV(FORG)	0545A
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV	0550A
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV	0600A
Front Wheel Drive Shaft	SHAFT KIT,FRT WHL DRV	0600B
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV	0601A
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV	0602A
Front Wheel Drive Shaft	SHAFT,FRT WHL DRV(W/WHL SPD SEN RING)	0610A
Front Wheel Drive Shaft	SHAFT KIT,FRONT WHEEL DRIVE	SJ326

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Front Wheel Drive Shaft Inner Joint Replacement

Disassemble Procedure

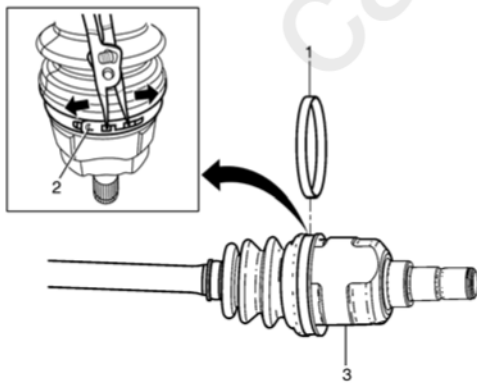
1. Remove the wheel drive shaft from the vehicle. Refer to [Front Wheel Drive Shaft Replacement](#).



2.

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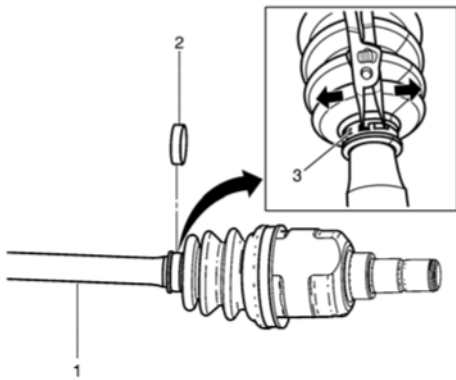
3. Position wheel drive shaft bar in a soft-jawed vise and clamp securely.



4.

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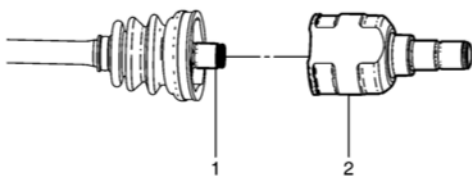
5. Using a needle-nose plier, remove the boot retaining clamp(1) with the ear(2) released for the tripod housing(3).



6.

[Click here for full size](#)

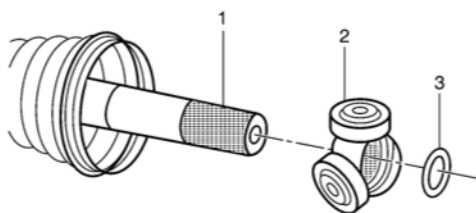
7. Using a needle-nose plier, remove the boot retaining clamp(2) with the ear(3) released for the wheel drive shaft(1).



8.

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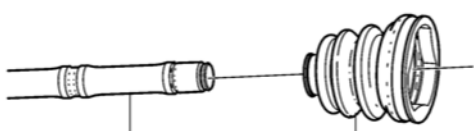
9. Remove the tripod housing(2) from the wheel drive shaft(1).



10.

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



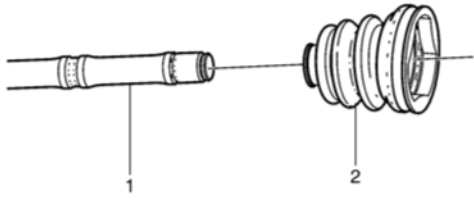
12.

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

14. Inspect the wheel drive shaft inner joint for damage and excessive wear. Refer to [Wheel Drive Shaft Inner Joint Inspection](#).

Assemble Procedure

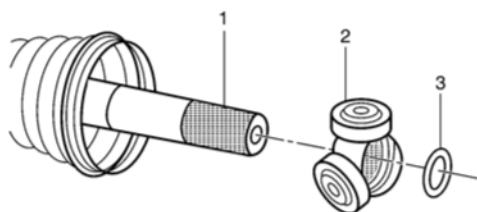


1. [Click here for full size](#)

2. Note:

Ensure the seal clamp is positioned correctly in the seal groove.

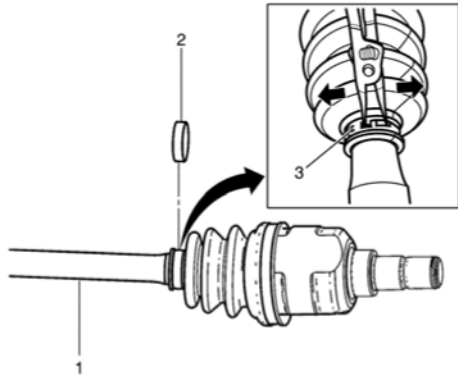
3. Position the boot(2) on the wheel drive shaft(1).



4.

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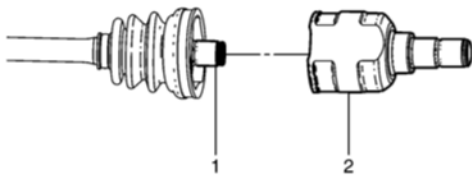
5. Install the tripod spider assembly (2) to the wheel drive shaft (1), until seated against shoulder.
6. Install the retaining ring (3) in the wheel drive shaft (1).



7.

[Click here for full size](#)

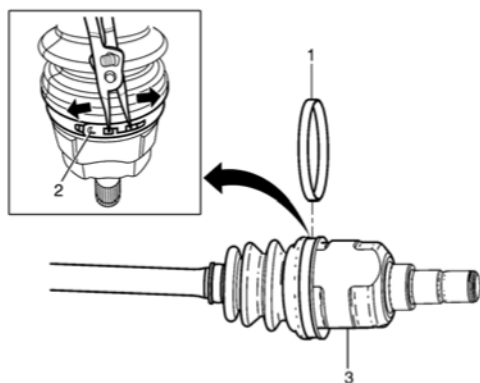
8. Using the needle-nose plier, install the boot retaining clamp (2) with the ear (3) hooked for the wheel drive shaft (1).
9. Place approximately half of the lubricant in the boot and the other half in the in the tripod housing.



10.

[Click here for full size](#)

11. Install the tripod housing(2) on the wheel drive shaft(1).



12.

[Click here for full size](#)

13. Using a needle-nose plier, install the boot retaining clamp(1) with the ear(2) hooked for the tripod housing(3).

14. Move the tripod assembly in a circular motion 4 or 5 times to distribute the grease in the tripod assembly.
15. Install the wheel drive shaft from the vehicle. Refer to [Front Wheel Drive Shaft Replacement](#).

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Front Wheel Drive Shaft Outer Joint Replacement

Special Tools

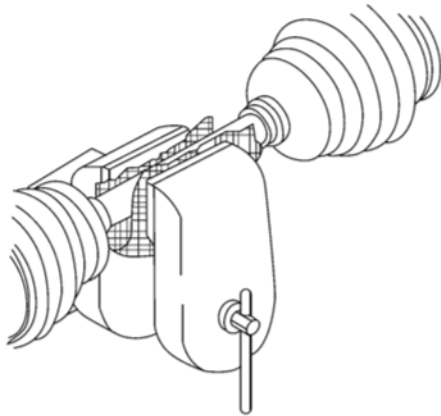
DT-50185 Wheel Drive Shaft Outer Joint Boot Clamp Installer

Note:

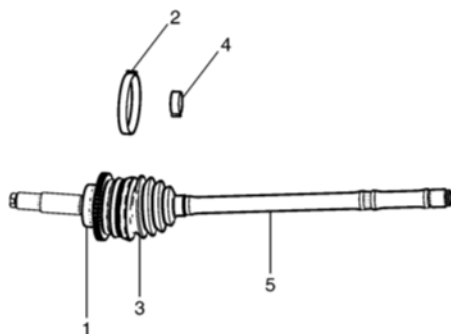
Outer constant velocity joint and axle shaft cannot be separated and are replaced as a complete assembly.

Disassemble Procedure

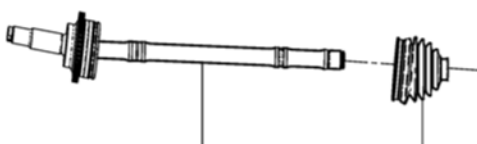
1. Remove the wheel drive shaft from the vehicle. Refer to [Front Wheel Drive Shaft Replacement](#).



2. [Click here for full size](#)
3. Clamp the drive axle shaft in a soft-jawed vice.
4. Remove the inner joint boot from the wheel drive shaft. Refer to [Front Wheel Drive Shaft Inner Joint Replacement](#).



5. [Click here for full size](#)
6. Using a flat-bladed tool, remove the boot retaining clamp(2) from the outer joint(1) and the boot(3). Discard the clamp.
7. Using a pair of side cutters, remove and discard the boot retaining clamp(4) from the boot(3) and the wheel drive shaft(5). Discard the clamp.

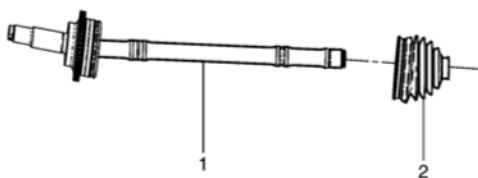


8.

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9. Slide the boot toward the inner joint and remove the boot(2) from the wheel drive shaft(1).

Assemble Procedure

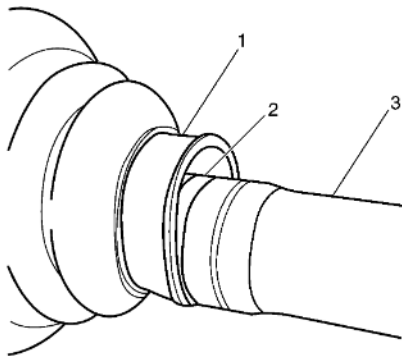


1. [Click here for full size](#)

2. Note:

Ensure the seal clamp is positioned correctly in the seal groove.

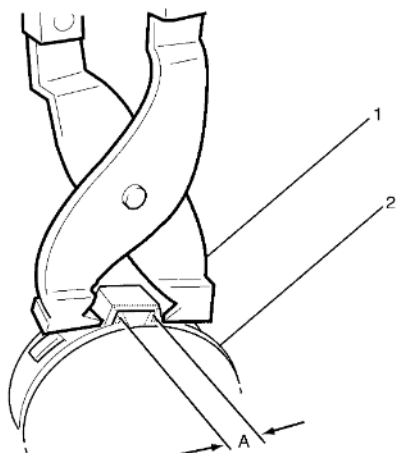
3. Position the boot(2) on the wheel drive shaft(1).



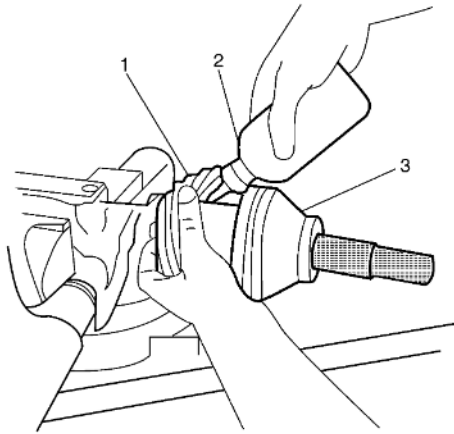
4.

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5. Ensure that the boot (1) is properly seated in the groove (2) in the wheel drive shaft (3).



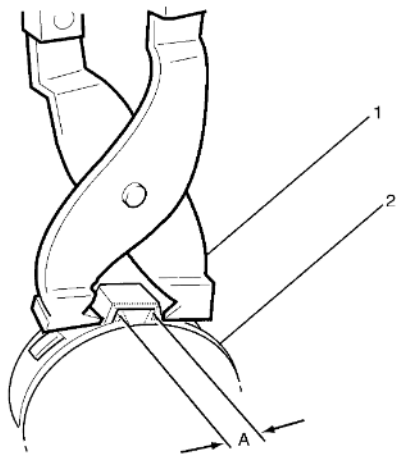
6. [Click here for full size](#)
7. Using the *DT-50185* wheel drive shaft outer joint boot clamp installer (1), close the clamp (2) for the wheel drive shaft until the gap (A) measures 2.10mm (0.83in).



8.

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9. Place approximately half the lubricant (2) inside the outer joint boot (1) and the other half in the outer joint (3)



10. [Click here for full size](#)
11. Using the DT-50185 wheel drive shaft outer joint boot clamp installer (1), close the clamp (2) for the outer joint until the gap (A) measures 2.10mm (0.83in).
12. Remove the wheel drive shaft from the bench vise.
13. Move the outer joint in a circular motion 4 to 5 times to distribute the lubricant.

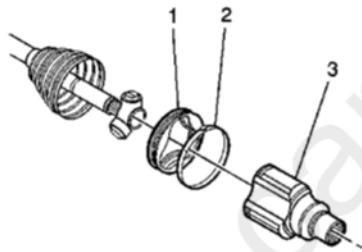
14. Install the wheel drive shaft in the vehicle. Refer to [Front Wheel Drive Shaft Replacement](#).

Related Part Information

Part Name	Catalog Name	Part Code
Front Wheel Drive Shaft Constant Velocity Joint	JOINT KIT,FRT WHL DRV SHF C/V	X0081
Front Wheel Drive Shaft Constant Velocity Outer Joint	JOINT,FRT WHL DRV SHF CV OTR	X0154
Front Wheel Drive Shaft Tri-Pot Joint	JOINT,FRT WHL DRV SHF TRI-POT	X0178
Front Wheel Drive Shaft Constant Velocity Joint	JOINT,FRT WHL DRV SHF CV	X0239
Front Wheel Drive Shaft Tri-Pot Joint	JOINT KIT,FRT WHL DRV SHF TRI-POT	X0242
Front Wheel Drive Shaft Cross Groove Joint	JOINT KIT,FRT WHL DRV SHF CR GRV	X0253
Front Wheel Drive Shaft Constant Velocity Joint	JOINT,FRT WHL DRV SHF CV	X0287
Front Wheel Drive Shaft Constant Velocity Outer Joint	JOINT,FRT WHL DRV SHF CV OTR	X0315
Front Wheel Drive Shaft Universal Joint	JOINT,FRT WHL DRV SHF UNIVERSAL	X0466
Front Wheel Drive Shaft Constant Velocity Outer Joint	JOINT KIT,FRT WHL DRV SHF CV OTR	X0472

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Wheel Drive Shaft Inner Joint Inspection



1. [Click here for full size](#)
2. Remove the wheel drive shaft tripod bushing clamp(2) from the tripod housing(3).
3. Remove the wheel drive shaft tripod housing(3) from the wheel drive shaft.
4. Remove the wheel drive shaft tripod joint boot bushing(1).
5. Using a suitable cleaner, remove the excess grease from the tripod assembly.
6. Inspect the following items for damage or excessive wear:
7.
 - The wheel drive shaft tripod boot
 - The wheel drive shaft tripod assembly
 - The wheel drive shaft tripod joint housing
 - The wheel drive shaft
8. If any of the items in step 5 are found to be defective, replace those items that are serviceable.

Specifications

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Fastener Specifications

Single Use Non-Threaded Fasteners/Components

Application
Note:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.
Front Wheel Drive Shaft Inner Joint Boot Inner Clamp
Front Wheel Drive Shaft Inner Joint Boot Outer Clamp
Front Wheel Drive Shaft Outer Joint Boot Inner Clamp
Front Wheel Drive Shaft Outer Joint Boot Outer Clamp

Single Use Threaded Fastener/Component Tightening Specifications

Application	Specification
	Metric (English)
Note:	
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.	
Wheel Drive Shaft Nut	240â€”N-mâ€”(177â€”lbâ€”ft)

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Adhesives, Fluids, Lubricants, and Sealers

Lubricant“ Inner Joint and Boot	Lubricant“ Outer Joint and Boot
CK-2“ (YE)90“grams	RBA (BK)60“grams

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Special Tools and Equipment

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Special Tools

Illustration	Tool Number/ Description
	DT-50183 Wheel Drive Shaft Remover
Click here for full size	

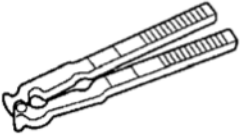
Illustration	Tool Number/ Description
	DT-50185 CH-804 Wheel Drive Shaft Outer Joint Boot Clamp Installer
Click here for full size	

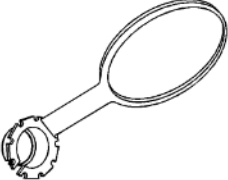
Illustration	Tool Number/ Description
	DT-6332 Seal Protector
Click here for full size	

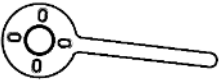
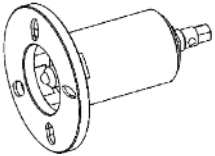
Illustration	Tool Number/ Description
	DT-50186 Wheel Hub Holding Tool
Click here for full size	

Illustration	Tool Number/ Description
	DT-50188 Hub Spindle Remover
Click here for full size	

DRIVER INFORMATION AND ENTERTAINMENT

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