

260 Driveshaft

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GENERAL

The two-piece driveshaft is joined in the center by a sliding splined coupling. This coupling compensates for slight front-and-back movement of the engine and transmission. The front of the driveshaft is connected to the transmission by either a flexible rubber coupling (flex disc) or a universal joint drive.

The rear of the driveshaft is connected to the final drive through a constant velocity (CV) joint. The driveshaft is supported in the center by a center bearing. The bearing is rubber mounted to isolate vibration.

NOTE—
For information about the rear axle (final drive) and rear drive axles, see 331 Final Drive.

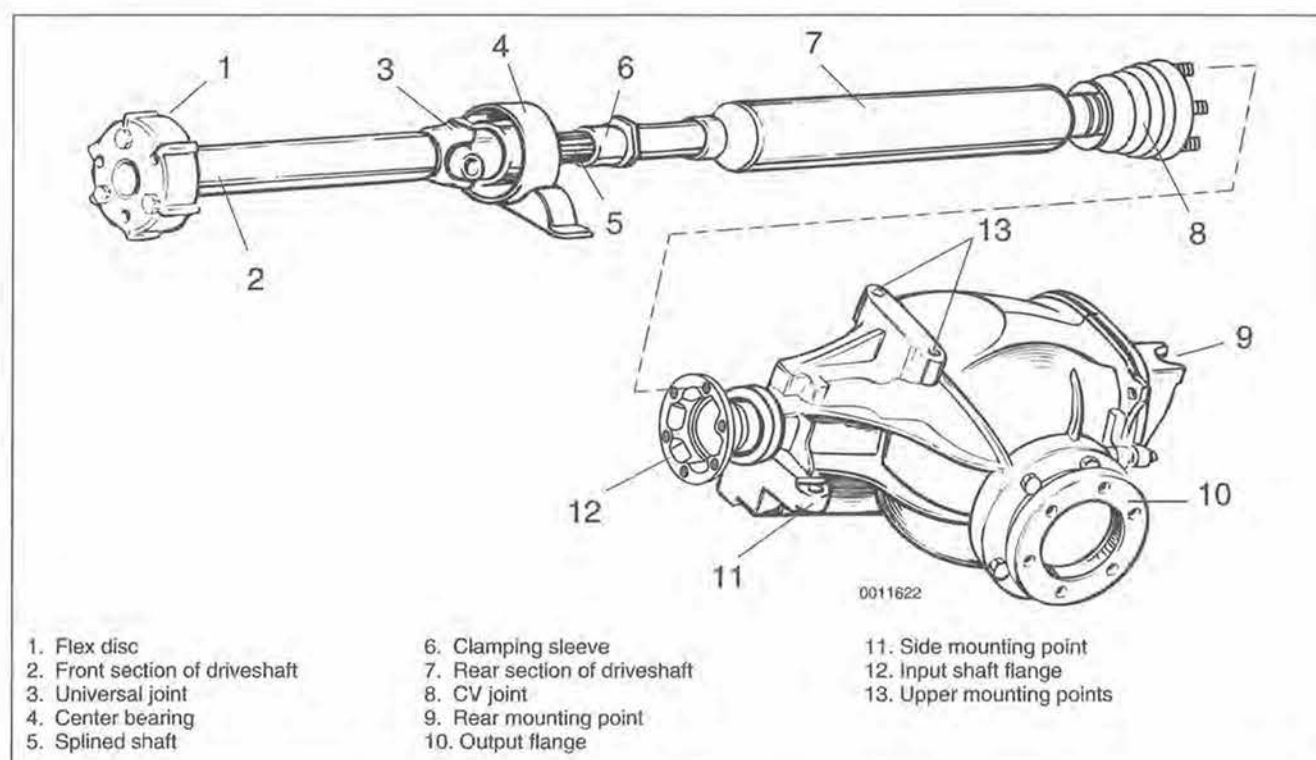
TRUBLESHOOTING

The source of driveline vibrations and noise can be difficult to pinpoint. Engine, transmission, rear axle, or wheel vibrations can be transmitted through the driveshaft to the car body. Noises from the rear of the car may be caused by final drive problems, or by faulty wheel bearings or drive axles. Check that the tires are correctly inflated and are not excessively worn.

Smooth operation of the driveshaft and final drive depends on the condition of the rubber isolation components, center bearing, end joints, the lubricant level and type in the final drive, and properly tightened fasteners. Any symptom of vibration or noise may be caused by worn or damaged components.

Aside from inspecting for worn or broken parts, troubleshooting should also consider the installed angles of the driveshaft. Also check the splined coupling for free movement.

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Driveshaft Noise and Vibration

When troubleshooting driveshaft problems, begin with a close visual inspection. Check the driveshaft for broken or missing balance weights. The weights are welded to the driveshaft. Check the torque of the fasteners at the flange connections, check the rubber of the flex disc and center bearing for deterioration or tearing, and check for preload at the center bearing. See **Driveshaft center bearing, replacing** for preload specifications.

Check the end joints for play. With the driveshaft installed, pull and twist the driveshaft while watching the joint. The BMW specification for play is very small, so almost any noticeable play could indicate a problem.

Further inspection requires removal of the driveshaft. Check the front centering guide for correct installation as described in **Driveshaft centering guide, replacing**. Also check runout at the transmission output flange and output shaft, and at the final drive input flange. Check the bolt hole bores in the flange for wear.

Driveshaft flange runout (max. allowable)

- Transmission output flange
 - axial play 0.10 mm (0.004 in.)
 - radial play 0.07 mm (0.003 in.)
- Final drive input flange
 - radial play (measured at driveshaft centering lip) 0.07 mm (0.003 in.)

NOTE—

- If inspection reveals nothing wrong with the driveshaft, it may need to be rebalanced. This can be done by any repair shop with the right equipment. Also, check the alignment of the driveshaft as described below.
- Minor driveshaft vibrations can often be corrected simply by disconnecting the driveshaft at the final drive, and repositioning the driveshaft 90 °, 180 ° or 270 ° in relation to the final drive input flange.

Table a lists symptoms of driveshaft problems and their probable causes. Most of the repair information is contained within this repair group. The bold type refers to repair information contained outside of this repair group.

Table a. Driveshaft Troubleshooting

Symptom	Probable cause	Corrective action
1. Vibration when moving off (forward or reverse)	a. Incorrect preload of center bearing b. Center bearing rubber deteriorated or torn. c. Flex disc damaged or worn d. Engine or transmission mounts faulty e. Front centering guide worn, or driveshaft mounting flanges out of round f. Universal joints worn or seized g. Sliding coupling seized h. Driveshaft misaligned	a. Check preload of center bearing. Readjust if necessary. b. Inspect center bearing. Replace if necessary. c. Inspect flex disc. Replace if necessary. d. Inspect engine and transmission mounts. Align or replace, if necessary. e. Check front centering guide and replace if necessary. Check runout of driveshaft flanges. f. Check universal joint play and movement. Replace driveshaft if necessary. g. Remove driveshaft and check movement of sliding coupling. Clean coupling splines and replace parts as necessary. h. Check driveshaft alignment.
2. Vibration, audible rumble over 35 mph (60 km/h)	a. Front centering guide worn, or driveshaft mounting flanges out of round or damaged b. Mounting flange bolts loose or holes worn c. Driveshaft unbalanced d. Universal joints worn or seized e. Center bearing faulty f. Final drive rubber mount faulty	a. Check front centering guide and replace if necessary. Check runout of driveshaft mounting flanges. b. Remove driveshaft and check transmission output flange and final drive input flange. Replace if necessary. c. Check driveshaft for loose or missing balance plates. Have driveshaft rebalanced or replace if necessary. d. Check universal joint play and movement. Replace driveshaft if necessary. e. Replace center bearing. f. Inspect final drive rubber mount and replace if necessary.
3. Noise during on/off throttle or when engaging clutch	a. Final drive components worn or damaged (excessive pinion-to-ring-gear clearance) b. Drive axle or CV joint faulty c. Sliding coupling seized	a. Remove final drive and repair. b. Inspect drive axles and CV joints. Repair or replace as necessary. See 331 Final Drive c. Remove driveshaft and check movement of sliding coupling. Clean coupling splines and replace parts as necessary.

DRIVESHAFT SERVICE

Most components of the driveshaft are easily replaced once the driveshaft is removed from the car. Repair kits for the universal joints are not available, and it is not common practice to repair the universal joints on BMW driveshafts. Worn or damaged universal joints usually require replacement of that section of the driveshaft.

The front of the driveshaft is aligned with the transmission by a centering guide. The guide is recessed into the front of the driveshaft. It engages the end of the transmission output shaft when the driveshaft is installed.

The driveshaft is balanced to close tolerances. Whenever it is to be removed or disassembled, the mounting flanges and driveshaft sections should be marked with paint or a punch before proceeding with work. This will ensure that the driveshaft can be reassembled or installed in exactly the same orientation.

Universal joint play

- Maximum allowable 0.15 mm (0.006 in.)

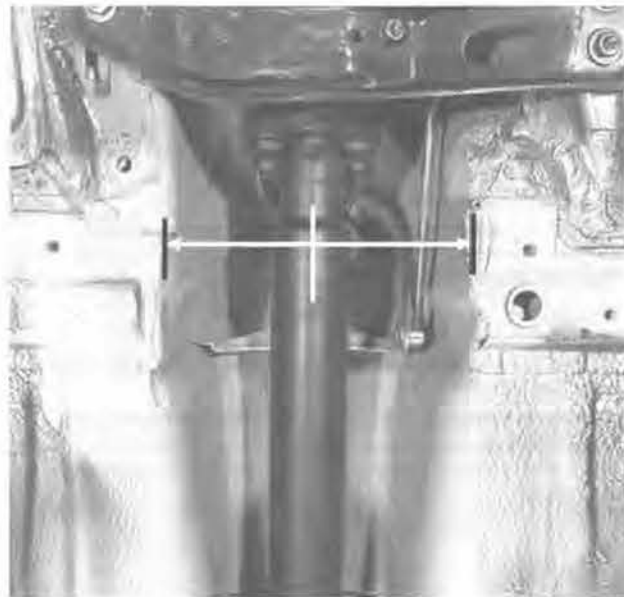
Driveshaft, aligning

The alignment of the driveshaft does not normally need to be checked unless the engine/transmission or the final drive have been removed and installed. If, however, all other parts of the driveshaft have been inspected and found to be okay, but there is still noise or vibration, driveshaft alignment should be checked.

There are two important driveshaft alignment checks. The first is to make sure that the driveshaft runs straight from the transmission to the final drive, without any variation from side-to-side caused by misalignment of the engine/transmission in its mounts. Make a basic check by sighting along the driveshaft from back to front. Any misalignment should be apparent from the center bearing forward. To adjust the side-to-side alignment, loosen the transmission or engine mounts to reposition them, then retighten the mounts.

The second important driveshaft alignment check is more complicated. It checks the amount the driveshaft is angled vertically at the joints. This angle is known as driveshaft deflection.

In general, there should be little deflection in the driveshaft between the engine, the center bearing, and the final drive. Precise checks require the use of a large protractor or some other means of measuring the angle of the engine and the final drive and comparing these angles to the angle of the driveshaft sections.



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To change the deflection angle, shims can be placed between the center bearing and the body or between the transmission and its rear support. When using shims to change a deflection angle, keep in mind that the angle of adjacent joints will also change. Deflection angles should be as small as possible.

CAUTION—

The maximum allowable change in height of the center bearing or transmission support using shims is 3 mm (0.12 in.).

Driveshaft, removing and installing

WARNING—

- Removal of the driveshaft will disconnect the transmission from the final drive. Do not rely on engagement of the transmission to prevent the car from rolling. Chock all wheels. Use caution when working beneath the car and lowering the driveshaft. Firmly set the parking brake.

- The driveshaft is mounted to the transmission and final drive with self-locking nuts. These nuts are designed to be used only once and should be replaced.

— Remove exhaust system and heat shields. See **180 Exhaust System**.

◀ Loosen driveshaft sliding coupling clamping sleeve (arrow) several turns.

NOTE—

BMW special tool 26 1 040 can be used to loosen the clamping sleeve.

— Using paint or a punch, make matching marks on driveshaft and attaching flanges.

◀ Remove nuts and bolts holding flex disc or end joint to transmission flange. Do not pull driveshaft off flange at this time. Note open-end wrench used to counterhold bolt.

NOTE—

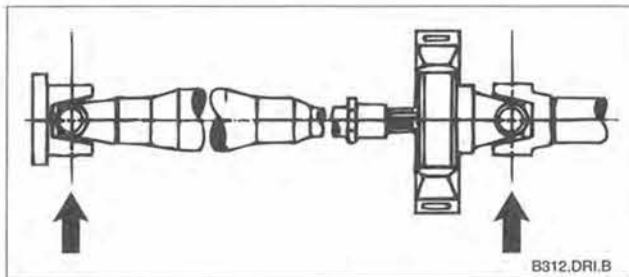
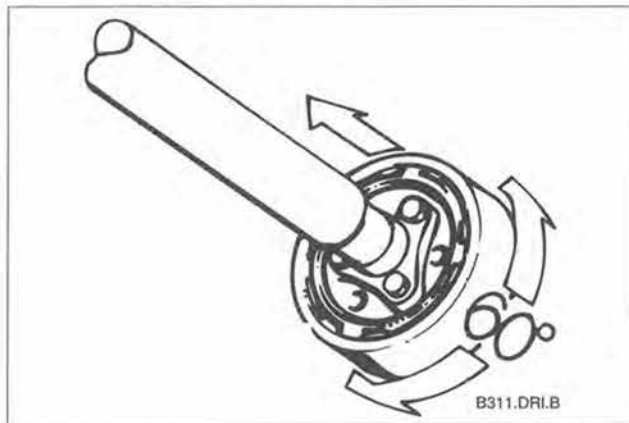
Removal of the bolts may be made easier by placing a large hose clamp around the flex disc and tightening the clamp slightly to compress the coupling.



260-6 DRIVESHAFT



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➤ Remove bolts from driveshaft at final drive flange.

- Support driveshaft and remove center bearing mounting bolts.

WARNING—

Do not let the rear section rest on the fuel tank connection line.

- Remove driveshaft.
 - Bend driveshaft down at center bearing, and then pull it off at front. If necessary, slide driveshaft together at splined coupling.

NOTE—

- Do not pull driveshaft sections apart.

➤ On models with a vibration damper, the damper can be removed from the transmission flange by turning it about 60° and pulling it over the flange.

If the splined coupling is to be cleaned or if the rubber bushing behind the clamping sleeve is being replaced, mark the two sections of the driveshaft before separating. Lubricate the splines with molybdenum disulfide grease (Molykote Longterm 2® or equivalent) before reassembly. Inspect the flange bolt mounting holes and replace any worn components.

➤ Assemble driveshaft with U-joints on same plane.

- If the two sections are pulled apart without the driveshaft being marked, reassemble the two halves so that the universal joints are on the same plane. There is still the possibility of the driveshaft being reassembled wrong by 180° and causing vibration. In this case remove the driveshaft and turn one section 180°, and reassemble.

- Prior to installation, lightly lubricate centering guide in flex disc with molybdenum disulfide grease (Molykote Longterm 2® or equivalent).



- ◀ Preload center bearing toward front 4–6 mm (arrow).
- Reinstall driveshaft by first positioning it against final drive flange and then sliding it onto transmission flange. Align any marks made during removal. Position center bearing up against the body and loosely install the mount bolts. Use new self-locking nuts. Torque driveshaft nuts while holding the bolts. Preload bearing mount toward front of car, then tighten mounting bolts. The remainder of installation is reverse of removal.

Center bearing mount

- Preload
(towards front of car) 4 to 6 mm (5/32 to 1/4 in.)

Tightening Torques

- Driveshaft center mount to body 21 Nm (16 ft-lb)
- Driveshaft clamping sleeve 10 Nm (89 in-lb)
- Driveshaft to final drive flange (with CV joint)
 - M8 ribbed nut 43 Nm (32 ft-lb)
 - M8 compression nut 32 Nm (23 ft-lb)
 - M10 ribbed nut 90 Nm (66 ft-lb)
 - M10 compression nut 64 Nm (47 ft-lb)
- Driveshaft to final drive flange (with U-joint)
 - M10 ribbed nut 90 Nm (66 ft-lb)
 - M10 compression nut 64 Nm (47 ft-lb)
- Driveshaft to transmission or final drive flange
 - M10/8.8 grade 48 Nm (36 ft-lb)
 - M10/10.9 grade 64 Nm (47 ft-lb)
 - M12 100 Nm (74 ft-lb)
- Rear transmission bracket to transmission/body
 - M8 23 Nm (17 ft-lb)
 - M10 42 Nm (31 ft-lb)

WARNING—

- Do not reuse self-locking nuts. These nuts are designed to be used only once.
- Avoid stressing the flex disc when torquing the bolts. Do this by holding the bolts steady and turning the nuts on the flange side.

NOTE—

Bolt grade is marked on the bolt head. When replacing bolts, only use bolts of the same strength and hardness as the originals installed.

Flex disc, replacing

The flex disc between the front section of the driveshaft should be checked for cracks, tears, missing pieces, or distortion. Check for worn bolt hole bores in the flange. When replacing the flex disc, use new self-locking nuts.

- Remove driveshaft. See **Driveshaft, removing and installing**.

NOTE—

- It is possible to only partially remove the driveshaft, leaving it connected to the final drive. The driveshaft can be tilted down in the center and slid off the transmission flange once the center bearing bracket is unbolted from the body.
- Use care when using this method. Suspend the driveshaft using stiff wire in as close to the installed position as possible. If the driveshaft hangs unsupported, the rear universal joint may be damaged.

- Unbolt flex disc from driveshaft.

NOTE—

Removal and installation of the bolts may be made easier by placing a large hose clamp around the flex disc, and tightening the clamp slightly to compress the coupling.

- ◀ Install new flex disc using new self-locking nuts. Molded arrows on coupling should face flange arms.

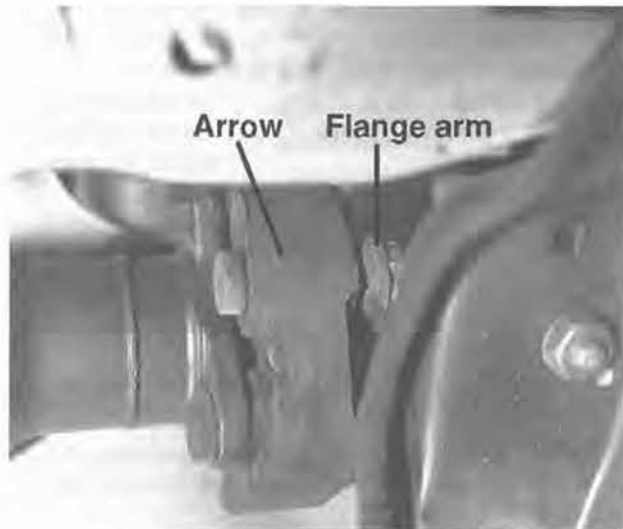
NOTE—

Torque only the nuts while holding the bolt heads stationary. This will prevent damaging the rubber disc.

NOTE—

- Remove the hose clamp if one was used during installation or if the flex disc came supplied with one.
- The bolt grade is marked on the head. When replacing bolts, only use bolts of the same strength and hardness as the originals installed.

- Reinstall driveshaft.



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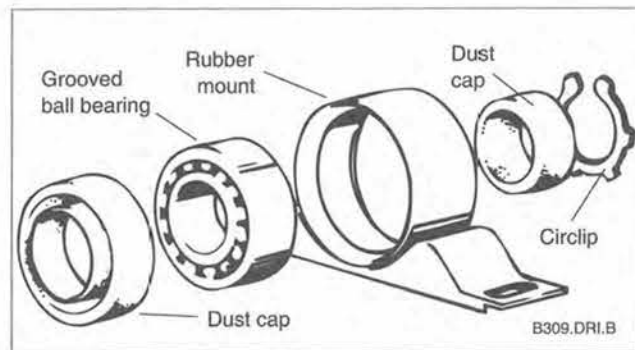
Tightening Torques

- Flex disc to driveshaft or transmission flange

M10 8.8 grade.	48 Nm (35 ft-lb)
M10 10.9 grade.	64 Nm (47 ft-lb)
M12.	100 Nm (74 ft-lb)

WARNING—

Do not reuse self-locking nuts. These nuts are designed to be used only once and should be replaced whenever they are removed.



Center bearing, replacing

To replace the center bearing, the driveshaft must be removed from the car. The bearing assembly is pressed onto the front section of the driveshaft and secured by a circlip or a bolt. The center bearing consists of a ball bearing assembly press-fit in a rubber mount.

- Remove driveshaft. See **Driveshaft, removing and installing**.



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- Make matching marks (**arrows**) on front and rear driveshaft sections.
- Unscrew clamping sleeve fully and pull driveshaft sections apart. Remove rubber bushing, washer, and clamping sleeve from front section.
- Inspect condition of rubber bushing for splined coupling. Replace worn or damaged parts.



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- Remove center bearing circlip (**arrow**) and dust guard, if applicable. Remove bearing from driveshaft using puller.
- Make sure dust guard is on driveshaft, and then press center mount onto driveshaft flush with dust guard.
- Place clamping sleeve, washer, and rubber bushing on front driveshaft section. Lubricate splines with molybdenum disulfide grease (Molykote Longterm 2[®] or equivalent) and then reassemble driveshaft. Make sure matching marks align. Do not retighten clamping sleeve until driveshaft is installed.
- Reinstall driveshaft.
- Tighten clamping sleeve.
- Install driveshaft. See **Driveshaft, removing and installing**.

Tightening Torque

- Clamping sleeve 10 Nm (7.5 ft-lb)

Front centering guide, replacing

The front centering guide centers the driveshaft to the transmission. The guide is press-fit into a cavity in the front of the driveshaft and slides onto the transmission output shaft.

A worn centering guide can cause driveshaft wobble and vibration. It is necessary to remove the driveshaft to inspect and replace the centering guide. No specifications are given for wear of the guide, but generally the guide should fit snugly on the transmission output shaft.

NOTE—

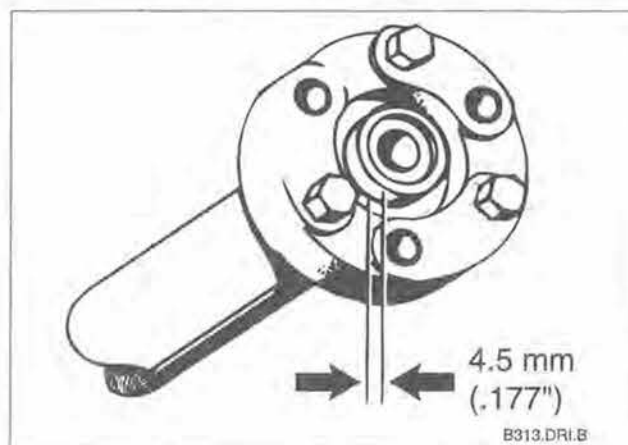
Some driveshafts have a dust cap installed on the end of the driveshaft over the centering guide. The dust cap may become bent or distorted when the driveshaft is removed or installed. Damage to the dust cap should not affect the centering guide and should not be mistaken for guide wear.

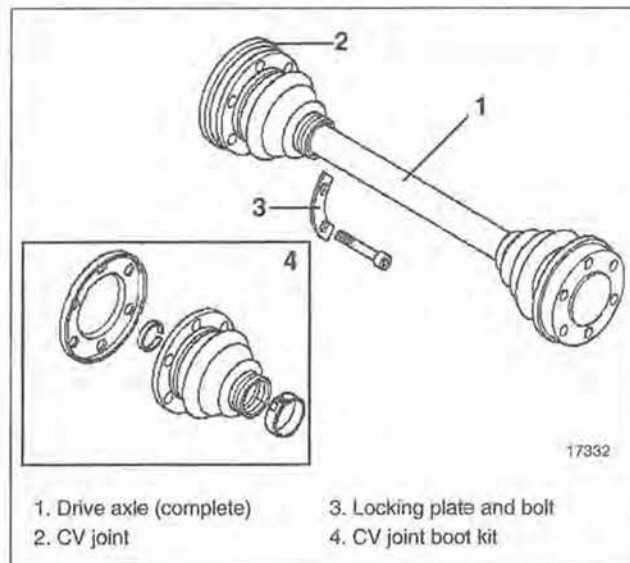
- Remove driveshaft. See **Driveshaft, removing and installing**.
- Pack cavity behind centering guide with heavy grease until grease is flush with bottom edge of guide.
- Insert 14 mm (approximately 1/2 in.) diameter mandrel or metal rod into guide. Strike guide with hammer. Centering guide is forced out.

NOTE—

The mandrel needs to fit snugly in the centering guide so that the grease cannot escape around the sides of the mandrel.

- Remove old grease from driveshaft, lubricate new centering guide with molybdenum disulfide grease (Molykote Long-term 2® or equivalent) and drive it into the driveshaft.
- The sealing lip of the guide should face outward and the guide should be driven into the driveshaft to a specified depth.
- Reinstall driveshaft. See **Driveshaft, removing and installing**.





Driveshaft constant velocity (CV) joint, replacing

The constant velocity (CV) joint on the rear of the driveshaft bolts directly to the final drive output flange. The CV joint can be replaced after removing the driveshaft. Always replace clamps, circlips, boots, gaskets, and covers. Have these items on hand before starting the job.

- Remove driveshaft. See **Driveshaft, removing and installing**.
- Remove boot clamp at back of CV joint.
- At front of joint, remove circlip securing joint to shaft. Pull joint off driveshaft using a suitable puller. Remove bolts from joint.

NOTE—

The CV joint is cemented (Loctite®) to driveshaft and will require a puller to break free. The CV joint mounting bolt shoulders are knurled and need to be driven out of joint.

- Pack the new joint with CV joint grease, working the grease down into the cage. Install a new gasket and dust cover.

Driveshaft CV Joint Lubricant Capacity (approx.)

- CV joint grease 80 grams

NOTE—

Do not swivel the CV joint inner race when packing it with grease. The balls can fall out of the cage.

- Tap bolts and retainers through joint holes. Clean splines on driveshaft and apply a small amount of bolt cement to splines.
- Place joint boot on shaft. Install joint onto driveshaft and tap it on (use wooden dowel).
- Install new circlip on shaft. Install new boot clamp.
- Reinstall driveshaft.

Tightening Torque

- Driveshaft to final drive flange (with CV joint)
 - M8 ribbed nut 43 Nm (32 ft-lb)
 - M8 compression nut 32 Nm (23 ft-lb)
 - M10 ribbed nut 70 Nm (52 ft-lb)
 - M10 compression nut 64 Nm (47 ft-lb)

