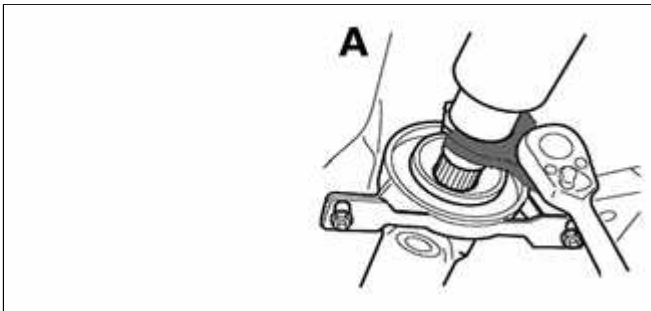


General

This repair group covers the repair and replacement of driveshafts and driveshaft components. Drive axles are covered in ⇒ [311 Front Axle Final Drive](#) and ⇒ [331 Rear Axle Final Drive](#).

Special tools

BMW suggests the use of a special tool in the release of the clamping sleeve which acts as a grease seal for the splined shaft to the rear of the driveshaft center bearing.



- ◀ Clamping sleeve adjustment tool BMW 26 1 040

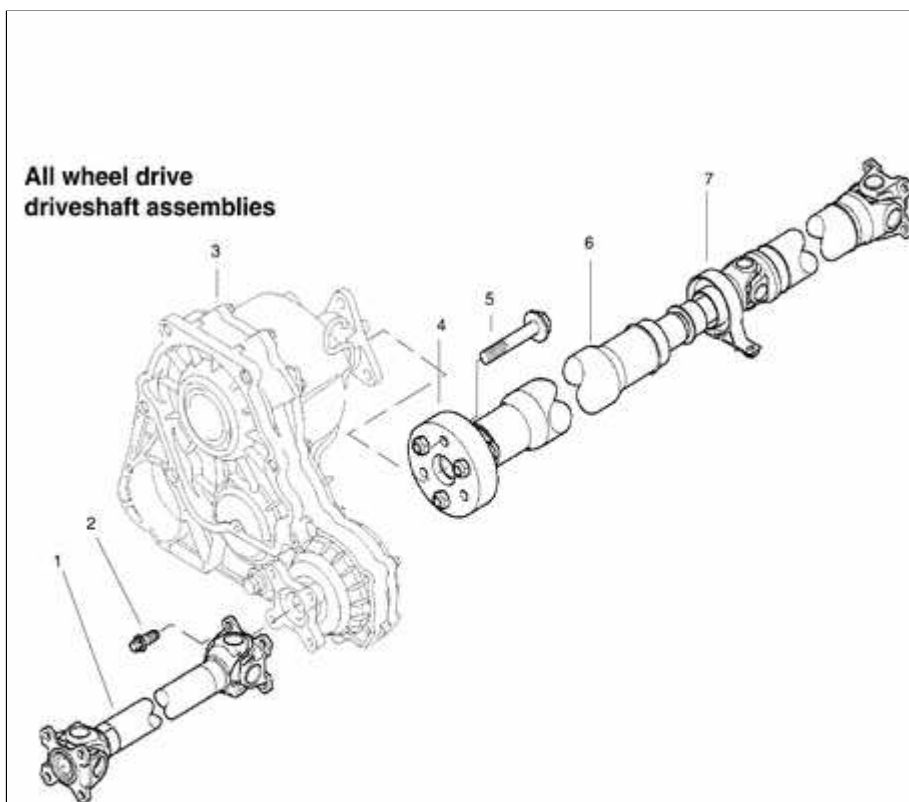
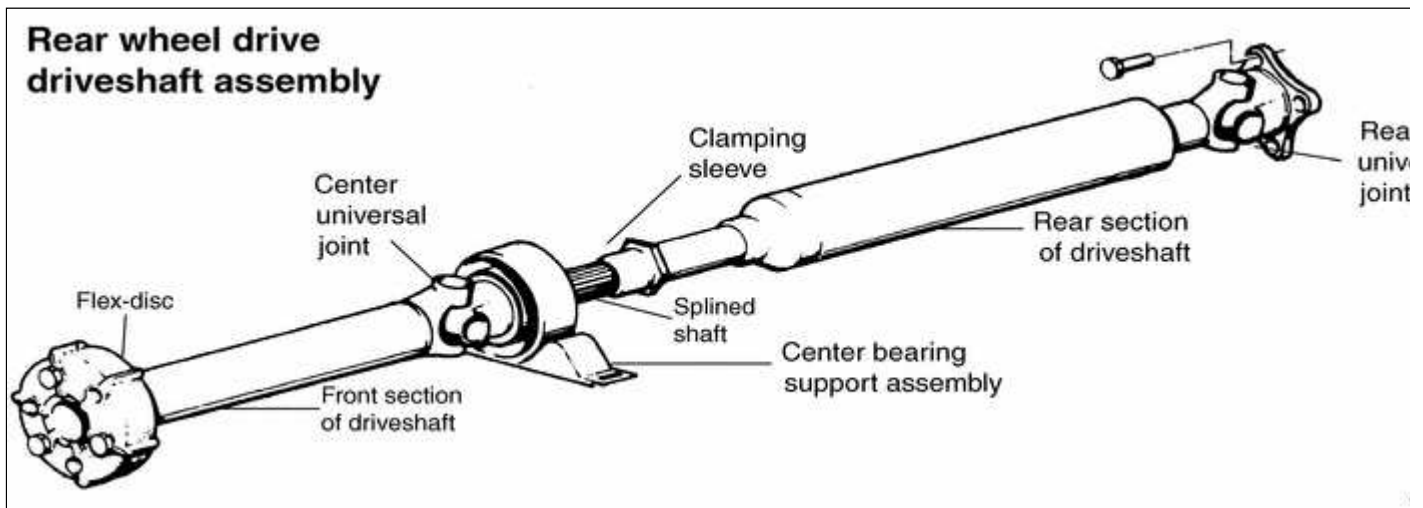
Front and rear driveshafts

The rear driveshaft is a two-piece unit joined in the center by a sliding splined coupling. This coupling compensates for fore and aft movement of the drive line. The driveshaft is connected to the transmission by a rubber flex-disc and to the rear final drive by a universal joint. It is supported in the middle by a center support bearing. The bearing is mounted in rubber to isolate vibration.

All wheel drive models incorporate two driveshafts. The rear driveshaft is a two-piece unit with splined center coupling much like that of a rear wheel drive model, but it is shorter and connects the transfer case to the rear differential. A short, one-piece

driveshaft runs from the transfer case to the front differential. The front driveshaft bolts to the transfer case and differential directly, using no flexible rubber disk.

Rear wheel drive driveshaft assembly



All wheel drive driveshaft assemblies

- 1 - Front driveshaft assembly
- 2 - Torx screw M10
- ◆ tighten to 70 Nm (52 ft-lb)
- 3 - Transfer case
- 4 - Flex disc
- 5 - Bolt M12



◆ tighten to 100 Nm
(74 ft-lb)

6 - **Rear driveshaft
assembly**

7 - **Driveshaft
center bearing
mount**

Troubleshooting

The source of driveline vibrations and noise can be difficult to pinpoint. Engine, transmission, front and rear axle, or wheel vibrations can be transmitted through the driveshaft to the car body. Noises from the car may be caused by final drive problems, or by faulty wheel bearings, drive axles, or even worn or improperly inflated tires.

Note:

For drive axle repair information, see ⇒ [311 Front Axle Final Drive](#) or ⇒ [331 Rear Axle Final Drive](#).

Driveshaft noise or vibration may be caused by worn or damaged components. Check the universal 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.

Check the torque of the fasteners at the flange connections. At the rear driveshaft check the rubber of the flex-disc and center bearing for deterioration or tearing and check for preload at the center bearing with a visual inspection. Check the driveshafts for broken or missing balance weights. The weights are welded

tabs on the driveshaft tubes. In addition to inspecting for faulty driveshaft parts, the installed angles of the driveshaft should also be considered.

Further inspection requires removal of the driveshafts. Check the front centering guide on the transmission output flange for damage or misalignment. Also check runout at the transmission or transfer case output flange and output shaft, and at the final drive input flange. Check the bolt hole bores in the flange for wear and elongation.

Driveshaft flange runout (max. allowable)	
Transmission / transfer case 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.)

Spin the rear driveshaft center bearing and check for smooth operation without play. Check that the splines of the sliding coupling move freely. Clean and lubricate the splines with molybdenum disulfide grease (Molykote® Longterm 2or equivalent).

Check the universal joints for wear or binding. If any joint is difficult to move or binds, the driveshaft section should be replaced.

Universal joint play	
Maximum allowable	0.15 mm (0.006 in.)

⇒ [Table a. Driveshaft troubleshooting](#)

lists symptoms of driveshaft problems and their probable causes. Most of the repair information is contained within this repair group.

Note:

With the driveshaft installed, the actual amount that the universal joints pivot is limited. For the most accurate test, check universal joints in their normal range of movement.

If inspection reveals nothing wrong with the driveshaft, it may need to be rebalanced. This can be done by a speciality driveshaft repair shop. Also, check the alignment of the driveshaft as described below.

Note:

Minor driveshaft vibrations can often be corrected simply by disconnecting the driveshaft at the final drive and repositioning it 90, 180 or 270 in relation to the final drive input flange.

Table a. Driveshaft troubleshooting

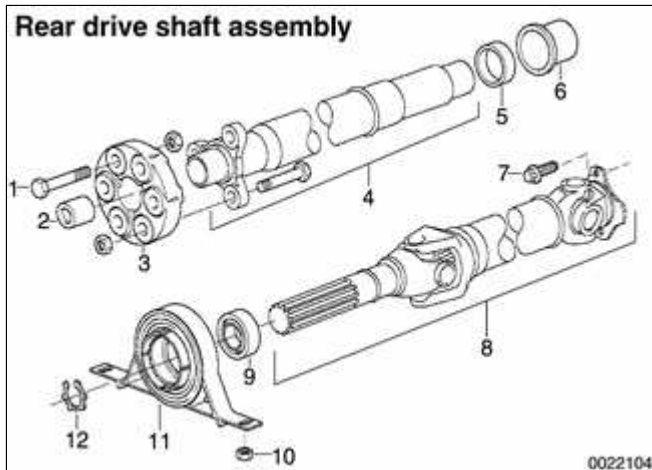
Symptom	Probable cause	Corrective action
Vibration when starting off (forward or reverse).	Incorrect preload of center bearing.	Check preload of center bearing. Readjust preload.
	Center bearing rubber deteriorated.	Inspect center bearing and rubber. Replace if necessary.
	Flex-disc damaged or worn.	Inspect flex-disc. Replace if necessary.
	Engine or transmission mounts faulty.	Inspect engine and transmission mounts. Align or replace, if necessary.
	Front centering guide worn, or driveshaft mounting flanges out of round.	Check front centering guide and replace if necessary. Check runout of driveshaft flanges.

Symptom	Probable cause	Corrective action
	Universal joints worn or seized.	Check universal joint play and movement. Replace driveshaft if necessary.
	Sliding coupling seized.	Remove driveshaft and check movement of sliding coupling. Clean coupling splines and replace parts as necessary.
	Driveshaft misaligned.	Check driveshaft alignment.
Noise during on/off throttle or when engaging clutch.	Final drive components worn or damaged (excessive pinion-to-ring-gear clearance).	Remove final drive and repair.
	Drive axle or CV joint faulty.	Inspect drive axles and CV joints. Repair or replace as necessary.
	Sliding coupling seized.	Remove driveshaft and check movement of sliding coupling. Clean coupling splines and replace parts as necessary.
Vibration at 25 to 30 mph (40 to 50 km/h).	Front centering guide worn, or driveshaft mounting flanges out of round or damaged.	Check front centering guide and replace if necessary. Check runout of driveshaft mounting flanges.
	Universal joints worn or seized.	Check universal joint play and movement. Replace driveshaft if necessary.
	Flex-disc damaged or worn.	Inspect flex-disc. Replace if necessary.
	Center bearing rubber deteriorated.	Inspect center bearing. Replace if necessary.
	Sliding coupling seized.	Remove driveshaft and check movement of sliding coupling. Clean coupling splines and replace parts as necessary.
	Misaligned installed position.	Check driveshaft alignment.
Vibration, audible rumble over 35 mph (60 km/h).	Front centering guide worn, or driveshaft mounting flanges out of round or damaged.	Check front centering guide and replace if necessary. Check runout of driveshaft mounting flanges.

Symptom	Probable cause	Corrective action
	Mounting flange bolts loose or holes worn.	Remove driveshaft and check transmission output flange and final drive input flange. Replace if necessary.
	Driveshaft unbalanced.	Check driveshaft for loose or missing balance weights. Have driveshaft rebalanced or replace if necessary.
	Universal joints worn or seized.	Check universal joint play and movement. Replace driveshaft if necessary.
	Sliding coupling seized.	Remove driveshaft and check movement of sliding coupling. Clean coupling splines or replace parts as necessary.
	Incorrect preload of center bearing.	Check preload of center bearing. Readjust if necessary.
	Center bearing faulty.	Replace center bearing.
	Final drive rubber mount faulty.	Inspect final drive rubber mount and replace if necessary.
	Driveshaft misaligned.	Check driveshaft alignment.

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Rear Driveshaft Service



Repair kits for the universal joints are not available for BMW driveshafts. Worn or damaged universal joints usually require replacement of the driveshaft.

- 1 - Hex bolt, M12
- 2 - Centering sleeve
- 3 - Flexible disk
- 4 - Front section of driveshaft
- 5 - Clamping sleeve
- 6 - Clamping ring
- 7 - Torx screw
- 8 - Rear section of drive shaft
- 9 - Center bearing
- 10 - Nut
- 11 - Center bearing support
- 12 - Lock ring

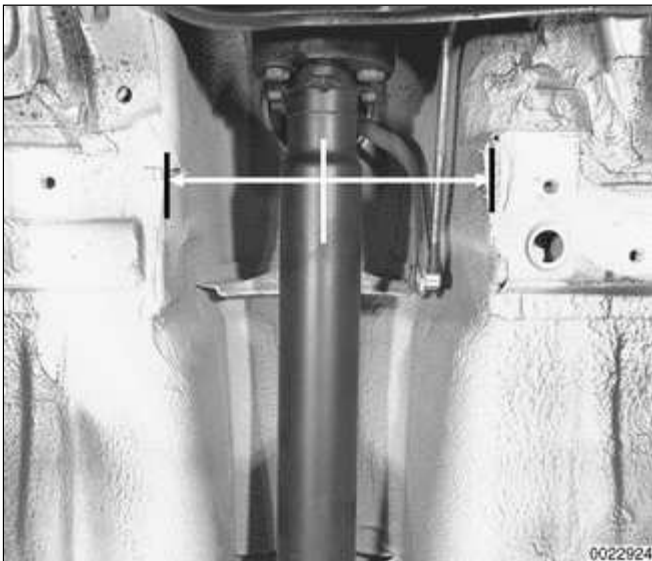
The driveshaft is balanced to close tolerances. Whenever it is to be removed or disassembled, the mounting flanges and driveshaft sections should be marked with paint or a punch before proceeding with work. This will ensure that the driveshaft can be reassembled or installed in exactly the original orientation.

Rear 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 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 transmission or engine mounts to reposition them, then retighten mounts. The driveshaft should be exactly centered in driveshaft tunnel.

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.

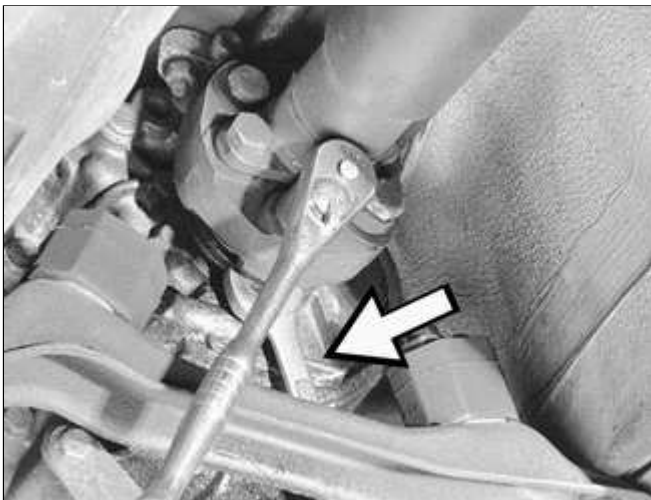
To change the deflection angle, shims can be placed between the center bearing and the body or between the transmission and its rear support. When using shims to change a deflection angle, keep in mind that the angle of adjacent joints will also change. Deflection angles should be as small as possible.

Rear driveshaft, removing

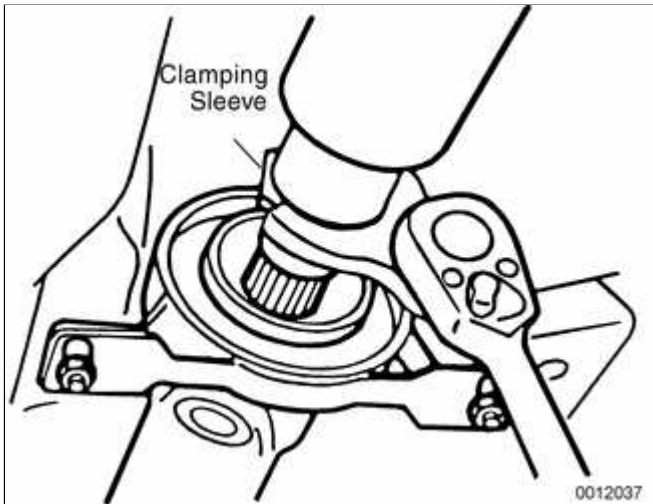
WARNING!

- ◆ **Be sure the wheels are off the ground before removing the driveshaft. Set the parking brake before removing the driveshaft.**
- ◆ **Once the driveshaft has been removed, the vehicle can roll regardless of whether the transmission is in gear or not.**
- ◆ **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 during reassembly.**

- Remove complete exhaust system. See ⇒ [180 Exhaust System](#).
- Remove exhaust heat shields.
- Matchmark front and rear driveshaft connections at transmission and final drive.



- ▲ Remove driveshaft mounting bolts. Discard old nuts. Note open-end wrench (**arrow**) being used to counterhold bolt at transmission flex-disc.
- Support driveshaft sections from body using stiff wire.



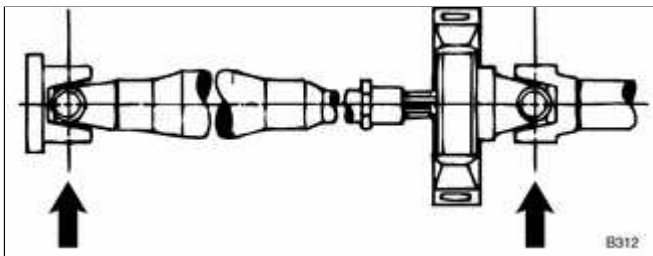
✦ Using BMW special tool 26 1 040, loosen threaded clamping sleeve on driveshaft a few turns.

- Remove center support bearing mounting bolts.
- Remove driveshaft but do not separate two halves. Pull down on center of driveshaft to facilitate removal.

Note:

If driveshaft halves were separate and not matchmarked, see ⇒ [Rear driveshaft, installing](#). If a vibration occurs, disassemble driveshaft and rotate one section 180°.

Rear driveshaft, installing



✦ Align driveshaft matchmarks at final drive and then at transmission flange. Centerlines of universal joints (**arrows**) must be parallel or at 90° to each other. Position center support bearing and start attaching nuts. Use new self-locking nuts.

- Tighten flange nuts while preventing bolts from twisting in coupling. Tighten final drive flange first, then tighten coupling at transmission.



✦ Preload center support bearing by pushing bearing forward (**arrow**) 4-6 mm (0.16-0.24 in.) from center. Tighten attaching bolts.

CAUTION!

The maximum allowable change in



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

- Tighten threaded sleeve on driveshaft to proper torque.
- Install heat shields.
- Install exhaust system. See ⇒ [180 Exhaust System](#). Connect wiring harness to oxygen sensors.
- Road test vehicle to check for noise or vibration.

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.**

Tightening torques	
Center bearing to body	21 Nm (15 ft-lb)
Clamping sleeve	10 Nm (89 in-lb)
Drive axle to differential flange	
M10 Torx bolt	83 Nm (61 ft-lb)
M10 with locking teeth (replace bolts)	96 Nm (71 ft-lb)
M10 with ribbed teeth (black)	100 Nm (74 ft-lb)
M10 with ribbed teeth (silver) ZNS	80 Nm (59 ft-lb)

Tightening torques	
(replace bolts)	
Flex-disc to driveshaft or transmission flange	
M10 (8.8 grade)	48 Nm (35 ft-lb)
M10 (10.9 grade)	60 Nm (44 ft-lb)
M12 (10.9 grade)	100 Nm (74 ft-lb)
Transmission crossmember to body (M8)	21 Nm (15 ft-lb)

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 rear driveshaft and the output flange of the transmission or transfer case should be checked for cracks, tears, missing pieces, or distortion. Check for worn bolt hole bores in the flange.

- Remove driveshaft as described earlier.

Note:

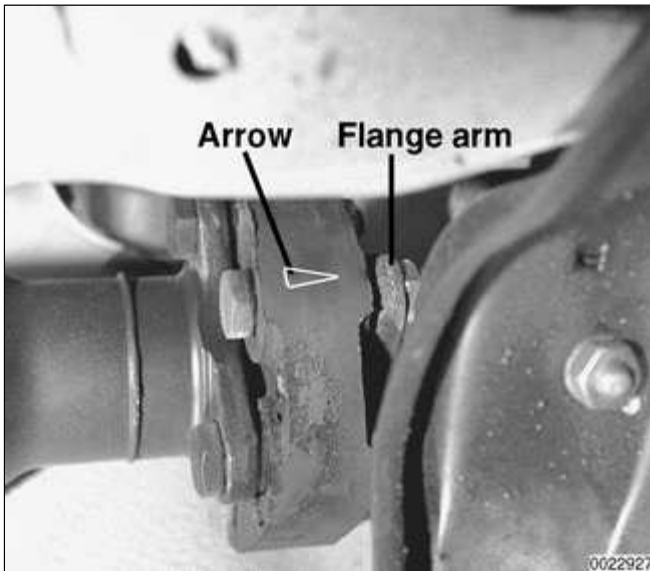
It is possible to only partially remove the driveshaft, leaving it connected to the final drive. The driveshaft can be tilted down in the center and slid off the transmission flange once the clamping sleeve is loosened and the center bearing bracket is unbolted. Suspend the driveshaft using stiff wire 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.

- Install driveshaft as described earlier.

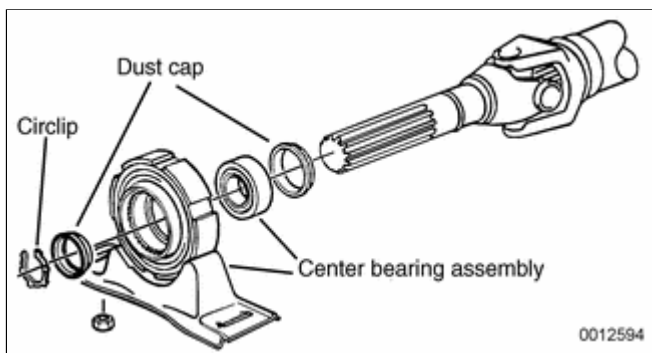
Note:

Torque only the nuts while holding the bolt heads. This will prevent damaging or fatiguing the rubber.

Tightening torques	
Center bearing to body	21 Nm (15 ft-lb)
Clamping sleeve	10 Nm (89 in-lb)
Drive axle to differential flange	
M10 Torx bolt	83 Nm (61 ft-lb)
M10 with locking teeth (replace bolts)	96 Nm (71 ft-lb)
M10 with ribbed teeth (black)	100 Nm (74 ft-lb)
M10 with ribbed teeth (silver) ZNS (replace bolts)	80 Nm (59 ft-lb)
Flex-disc to driveshaft or transmission flange	
M10 (8.8 grade)	48 Nm (35 ft-lb)

Tightening torques	
M10 (10.9 grade)	60 Nm (44 ft-lb)
M12 (10.9 grade)	100 Nm (74 ft-lb)
Transmission crossmember to body (M8)	21 Nm (15 ft-lb)

Center bearing assembly, replacing



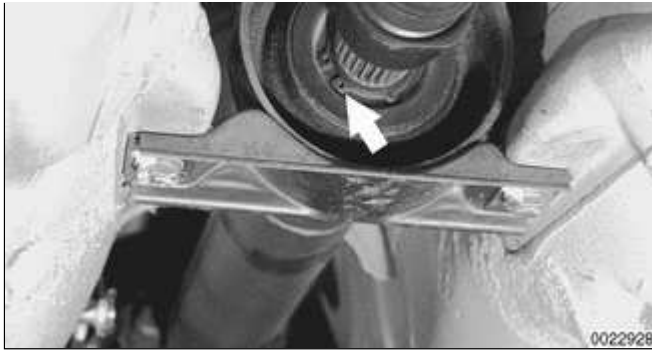
➤ To replace the center bearing assembly, the driveshaft must be removed from the car. The center bearing assembly consists of a grooved ball bearing in a rubber mount. The bearing assembly is pressed onto the front section of the driveshaft and secured by a circlip.

- Remove rear driveshaft. See ⇒ [Rear driveshaft, removing](#).
- Match mark front and rear driveshaft sections before separating.
- Loosen 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.



➤ Remove center bearing circlip (**arrow**) and dust guard.

- Install puller so that it pulls on



inner hub of bearing. Pulling on outer ring of mount may tear rubber, and entire bearing assembly will need to be replaced.

- Before installation, 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.

Note:

Do not retighten clamping sleeve until driveshaft is installed.

- Install driveshaft as described earlier
- Tighten clamping sleeve.

Tightening torque	
Clamping sleeve	10 Nm (7.5 ft-lb)

Front centering guide, replacing

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

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 as described earlier.
- Pack cavity behind centering guide with heavy grease until grease is flush with bottom edge of guide.
- Insert 14 mm (approximately in.) diameter mandrel or metal rod into guide. Strike guide with hammer to force centering guide out.

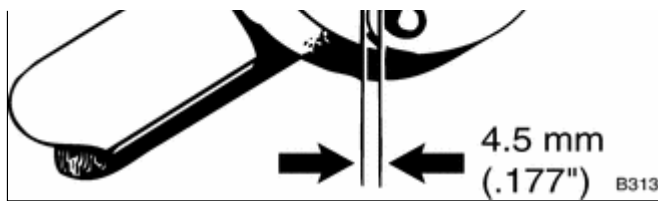
Note:

The mandrel should 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[®] Longterm 2 or equivalent) and drive it into driveshaft.



- ▲ When installing new driveshaft centering guide, the sealing lip of the guide should face outward and it should be driven into the driveshaft to drive guide to a protrusion depth of 4.5 mm (.177 in.).



- Install driveshaft as described earlier.

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Front Driveshaft Service

Repair kits for the universal joints are not available for BMW driveshafts. Worn or damaged universal joints usually require replacement of the driveshaft.

Front driveshaft, removing and installing

CAUTION!

Do not move vehicle using engine power once front driveshaft has been removed.

- Raise vehicle and safely support to access front driveshaft.

WARNING!

- ◆ ***When raising the car using a floor jack or a hydraulic lift, carefully position the jack pad to prevent damaging the car body. A suitable liner (wood, rubber, etc.) should be placed between the jack and the car to prevent body damage.***
- ◆ ***Watch the jack closely. Make sure it stays stable and does not shift or tilt. As the car is raised, the car may roll slightly and the jack may shift.***
- Remove underbody splash guard.



- ▲ Remove bolts holding driveshaft to transfer case output flange and front differential input flange (**arrows**).