1996-2002 DRIVE AXLES

RWD Axle Shafts - Z3 Roadster

IDENTIFICATION

ENGINE IDENTIFICATION

Application - Model (Chassis Code)	Engine Size (Code)
1996-98	
Z3 (E36)	1.9L (M44)
1997-00	
Z3 (E36)	2.8L (M52)
1999-00	
Z3 (E36)	2.5L (M52TU)
2000-02	
Z3 (E36)	3.0L (M54)
2001-02	
Z3 (E36)	2.5L (M54)
Z3 (E36)	3.0L (M54)

DESCRIPTION & OPERATION

The BMW Z3 Roadster features independent rear suspension and the drive axles must be able to move at an angle, following movement of rear suspension. To accomplish this, a constant velocity (CV) joint is located at each end of each drive axle. Drive axle inner CV joints are bolted to the final drive flanges of rear differential. On the outer CV joint, a splined axle stub engages with splines in wheel hub and is secured by a large collar nut.

Each CV joint is packed with a special lubricant and is sealed by a rubber boot. CV joint boots should be inspected periodically to ensure they are in good condition. A damaged boot will let in dirt which will quickly destroy the joint. CV joints are not serviceable and must be replaced.

TROUBLE SHOOTING

See DRIVE AXLE NOISE DIAGNOSIS article in GENERAL INFORMATION.

REMOVAL & INSTALLATION

DRIVE AXLE SHAFTS

Removal & Disassembly

NOTE: The large hub collar nut securing axle stub to hub is very tight, and the axle stub is press-fit into wheel drive hub. Removing the axle stub from the hub, installing it, and torquing it properly may require special tools.

1. Raise and support vehicle. Remove rear tire. Apply parking brake. Remove wheel hub dust cap. Remove collar nut lock plate and discard. Remove hub collar nut. Release parking brake. Remove brake caliper and suspend aside. Remove Allen bolt and remove brake rotor.

WARNING: Always loosen or tighten axle hub nut with vehicle on the ground. The leverage required to loosen or tighten nut could topple vehicle from lift or jack stands.

2. Remove the 6 inner CV joint-to-differential final drive flange bolts. Separate inner CV joint from final

drive flange, and support axle shaft using a piece of wire attached to underside of body. DO NOT allow axle shaft to hang freely to prevent damage to outer CV joint.

WARNING: It is recommended that a restraining chain be installed between bottom coil of coil spring and upper control arm to retain spring in case of accidental release. Personal injury can result if compressed coil spring is not released slowly and carefully.

3. Using a transmission jack or equivalent, support rear suspension trailing arm. Remove shock absorber from trailing arm. Lower trailing arm enough to provide clearance to remove axle shaft.
4. Using a suitable puller, press stub axle out of wheel drive hub. See Fig. 1 .
5. Remove axle shaft from vehicle.

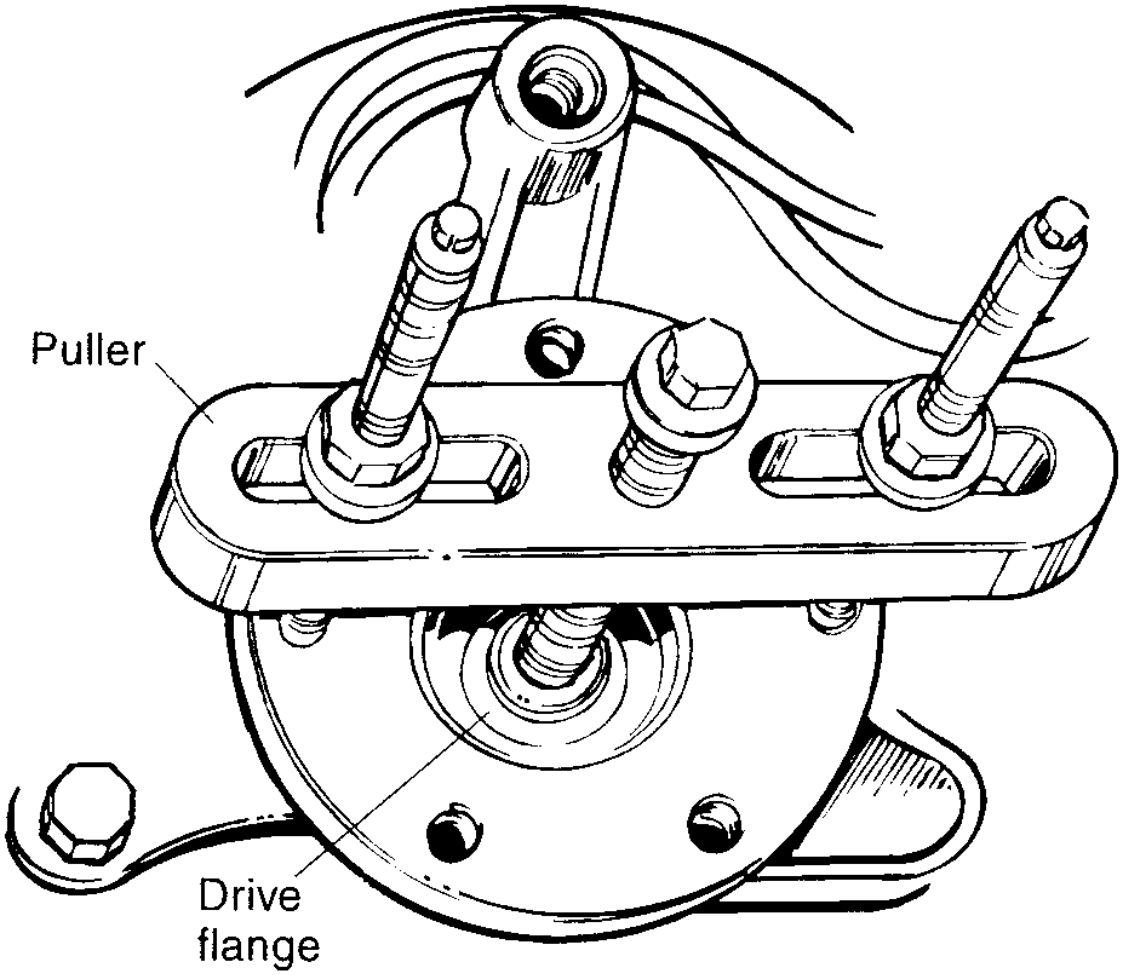

Fig. 1: Pressing Axle Stub Out Of Wheel Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

CAUTION: DO NOT pivot ball hub more than 20 degrees in the outer ring of CV joint. The balls will fall out if hub is pivoted too far.

1. Using BMW Special Tool (332-114, 332-115 and 332-116) or equivalent, draw axle shaft into wheel drive hub.

2. Apply oil to threads of collar nut and install onto axle finger tight.
3. Install shock absorber to trailing arm.
4. Install inner axle shaft CV joint to differential final drive flange and tighten bolts to specification. See TORQUE SPECIFICATIONS .
5. Install brake rotor and caliper.
6. Lower vehicle. Apply parking brake. Tighten hub collar nut to 184 ft. lbs. (250 N.m).
7. Using BMW Special Tool (331-020), drive NEW lock plate on hub collar nut. Install hub dust cover.
8. Raise vehicle and install rear wheel. Lower vehicle.

CV INNER JOINT

Removal

1. Remove axle shaft. See DRIVE AXLE SHAFTS .
2. Remove boot clamps and cut rubber boot from CV joint and axle shaft. Clean grease from CV joint.
3. Remove dust cover from CV joint. Remove circlip holding CV joint-to-axle and discard.
4. Place axle and CV joint on a hydraulic press so joint inner hub is supported on press. See Fig. 2 . Press axle shaft from CV joint. If axle shaft is hollow, use a suitable adapter.
5. Clean all lubricant off axle shaft splines and inner CV joint splines.

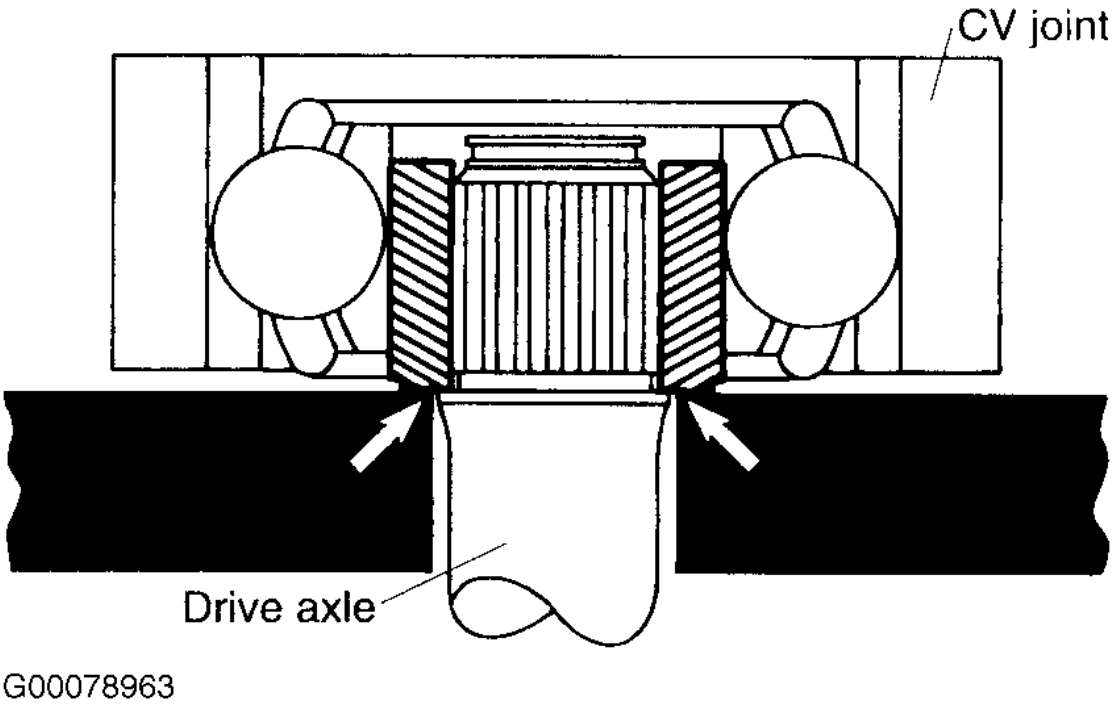

Fig. 2: Supporting CV Joint Hub On Press
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

NOTE: When replacing CV joint, use a complete CV joint boot repair kit. Kit will include a new boot, clamps, special lubricant and CV joint circlip.

1. Place NEW rubber boot, small boot clamp and inner joint cover over axle shaft. Coat axle shaft splines with Loctite No. 270 and press NEW CV joint onto axle. Install NEW circlip holding CV joint-to-axle.

2. Pack CV joint with approximately 2.8 oz. of lubricant supplied in kit.
3. Apply Bostik No. 1513 or a suitable sealant to inner sealing surface on large end of NEW rubber boot, and mount boot on CV joint.
4. Secure large end of rubber boot to CV joint with NEW clamp. Apply Bostik No. 1513 or a suitable sealant to inner sealing surface on small end of new rubber boot and mount on CV joint and secure with new clamp.
5. Install axle shaft. See DRIVE AXLE SHAFTS .

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Axle Hub Collar Nut	184 (250)
Brake Caliper Bolts	50 (67)
Brake Rotor Allen Bolt	12 (16)
CV Joint-To-Final Drive Flange Bolts	
8 mm Bolt	47 (64)
10 mm Bolt	74 (100)
12 mm Bolt	99 (135)
Shock Absorber Bolt	74 (100)

Article GUID: A00134933

PROPELLER SHAFT GENERAL

26 90... TROUBLESHOOTING ON THE PROPELLER SHAFT

PROPELLER SHAFT TROUBLESHOOTING

Condition	Cause	Remedy
Drumming from non-moving vehicle.	a. Propeller shaft without influence.	a. Check engine tuning and remove stress in exhaust assembly.
Vibration while moving off in forward/reverse (center mount knocking).	a. Propeller shaft not aligned precisely. b. Runout on centering spigot, transmission flanges or final drive flanges. c. center-mount rubber damaged. d. Universal joint worn or seized. e. Engine/transmission suspension not OK. f. Joint-disc rubber damaged.	a. Align propeller shaft, refer to 26 11 030 BALANCING PROPELLER SHAFT . b. Check centering journal and flanges for runout using dial gauge, refer to 26 90 ... TROUBLESHOOTING ON THE PROPELLER SHAFT . Align or replace final drive flange. c. Replacing center mount, refer to 26 12 011 REPLACING GROOVED BALL BEARING IN center MOUNT OF PROPELLER SHAFT . d. Check for freedom from clearance or impaired movement, replacing propeller shaft if necessary, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - . e. Check, align or replace mounts. f. Replacing flexible coupling, refer to 26 11 051 REPLACING FLEXIBLE DISC FOR PROPELLER SHAFT .
Vibration at 40 to 50 km/h.	a. Propeller shaft not aligned precisely. b. Runout on centering pin, transmission or final drive flanges. c. center-mount rubber damaged. d. Universal joint worn or seized. e. Joint-disc rubber damaged.	a. Aligning propeller shaft, refer to 26 11 030 BALANCING PROPELLER SHAFT . b. Check centering journal and flanges for runout using dial gauge. Radial runout, max. 0.07mm. Axial runout, max. 0.1mm. Align or replace final drive flange. c. Replacing center mount, refer to 26 12 011 REPLACING GROOVED BALL BEARING IN center MOUNT OF PROPELLER SHAFT . d. Check for freedom from clearance or impaired movement, replacing propeller shaft if necessary, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

		e. Replacing flexible coupling, refer to 26 11 051 REPLACING FLEXIBLE DISC FOR PROPELLER SHAFT .
Drumming at 90/140 km/h.	a. Engine/transmission suspension not OK or installed with stress. b. Exhaust assembly installed with stress. c. Propeller shaft distorted. d. Propeller shaft not installed correctly. e. Excessive clearance on propeller shaft universal joints. f. Radial run-out on input flange of final drive excessive.	a. Check, align or replace mounts. b. Untightening exhaust system, refer to 18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (Z3 M54) . c. Twist each propeller shaft section through 90Â°, refer to 26 11 030 BALANCING PROPELLER SHAFT . d. Adjusting deflection angle of propeller shaft, refer to 26 11 030 BALANCING PROPELLER SHAFT . e. Exchanging propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .
Center-mount noise while driving.	a. Center mount not perpendicular to propeller shaft, not at all or insufficiently preloaded. b. Center-mount grooved ball bearing not OK.	a. Preload center mount at right angles to propeller shaft 2 ... 4 mm in direction of travel. b. Replacing grooved ball bearing. refer to 26 12 011 REPLACING GROOVED BALL BEARING IN center MOUNT OF PROPELLER SHAFT .

PROPELLER SHAFT ASSEMBLY

26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT -

Remove complete exhaust system.

Remove heat shield (1).

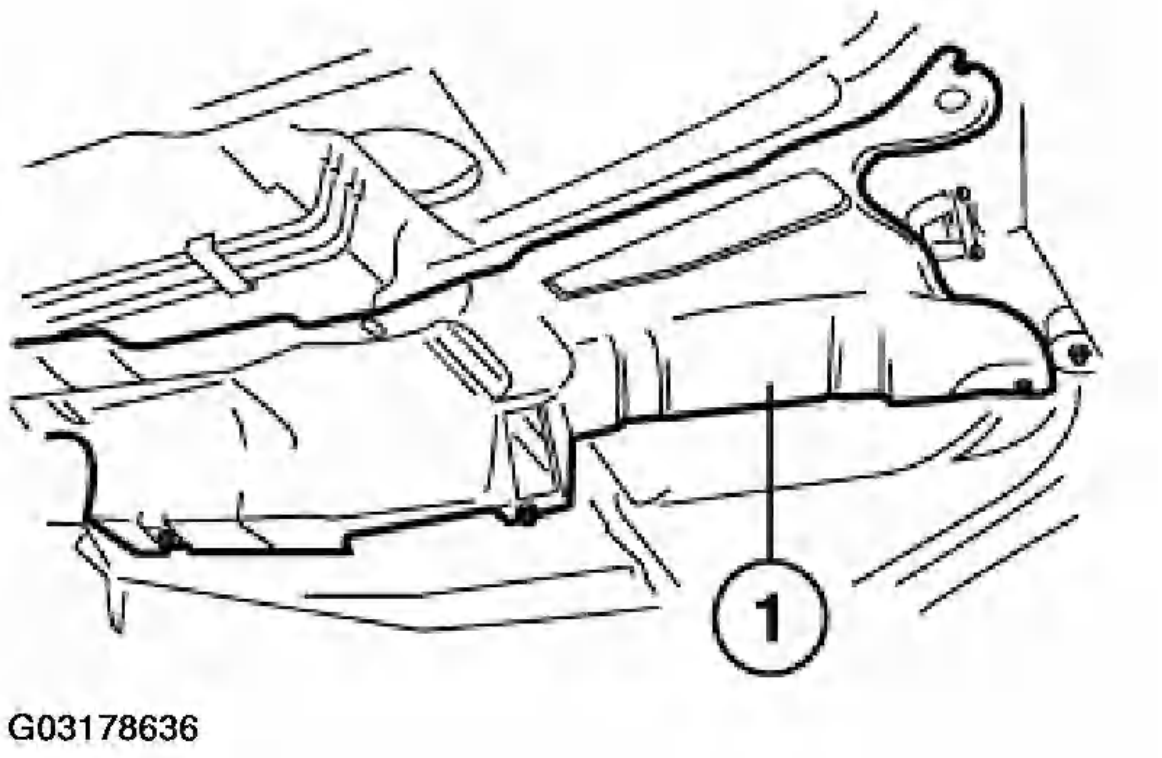

Fig. 1: Removing Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bracket (1 and 2) for exhaust suspension.

Remove bar (3).

Installation:

Install bar (3) with long collar (4) towards front.

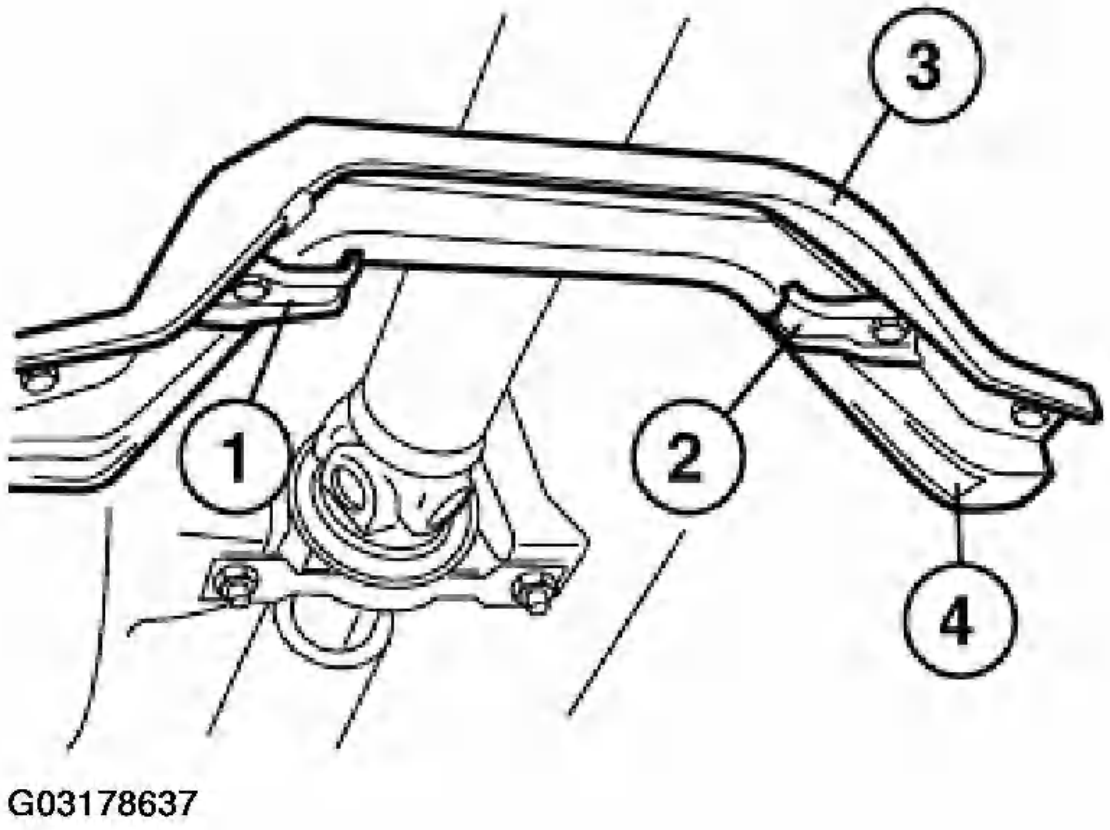

Fig. 2: Removing Bracket For Exhaust Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

Version with joint disc, front:

Remove flexible disc from transmission.

Tightening torque, 26 11 1AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

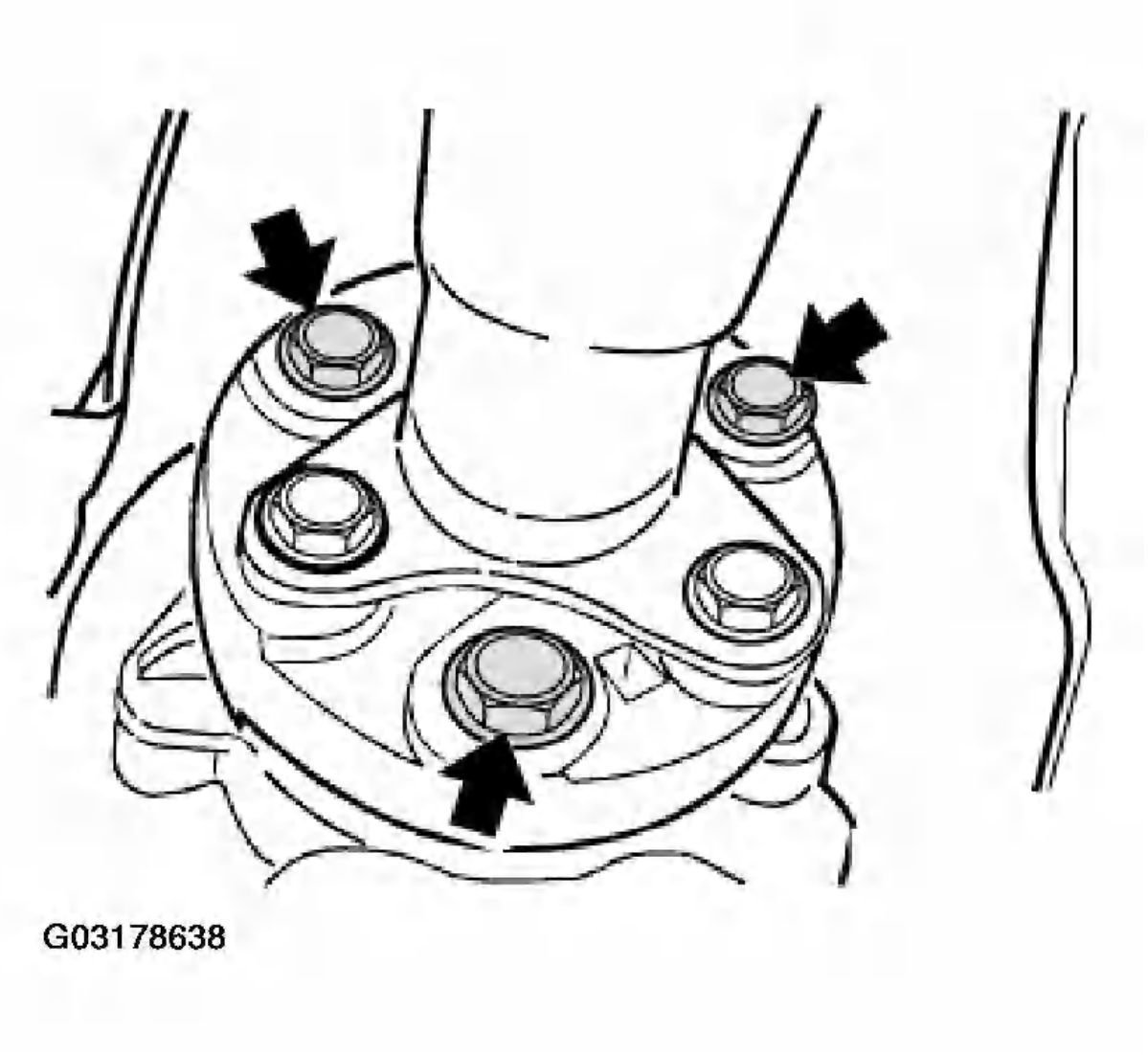

Fig. 3: Removing Flexible Disc From Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace stop nuts.

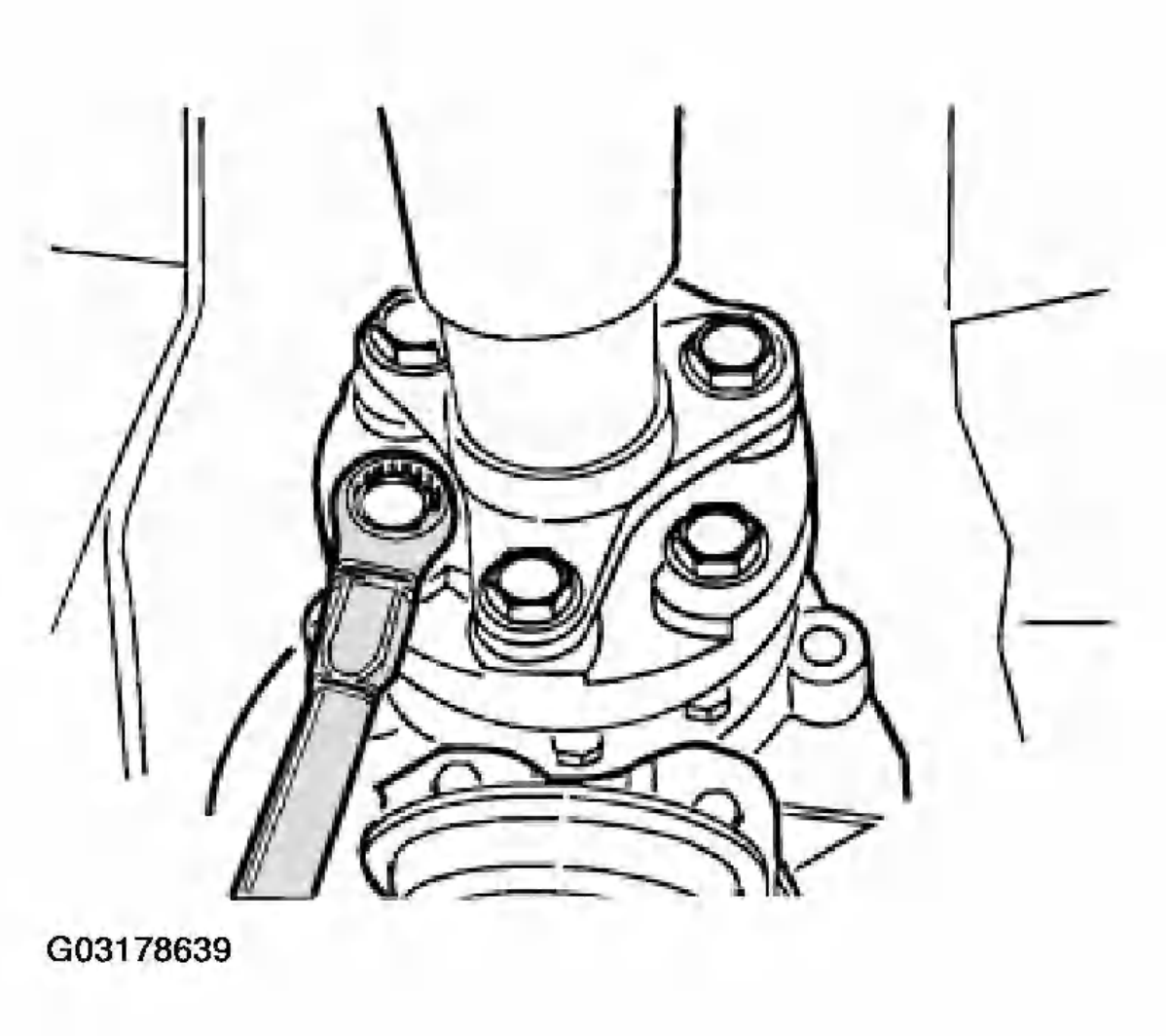

Fig. 4: Removing Stop Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Only tighten screw connection by way of nut.

To prevent subjecting flexible disc to torsion stress, turn nuts/screws on flange side.

Remove constant-velocity joint from final drive.

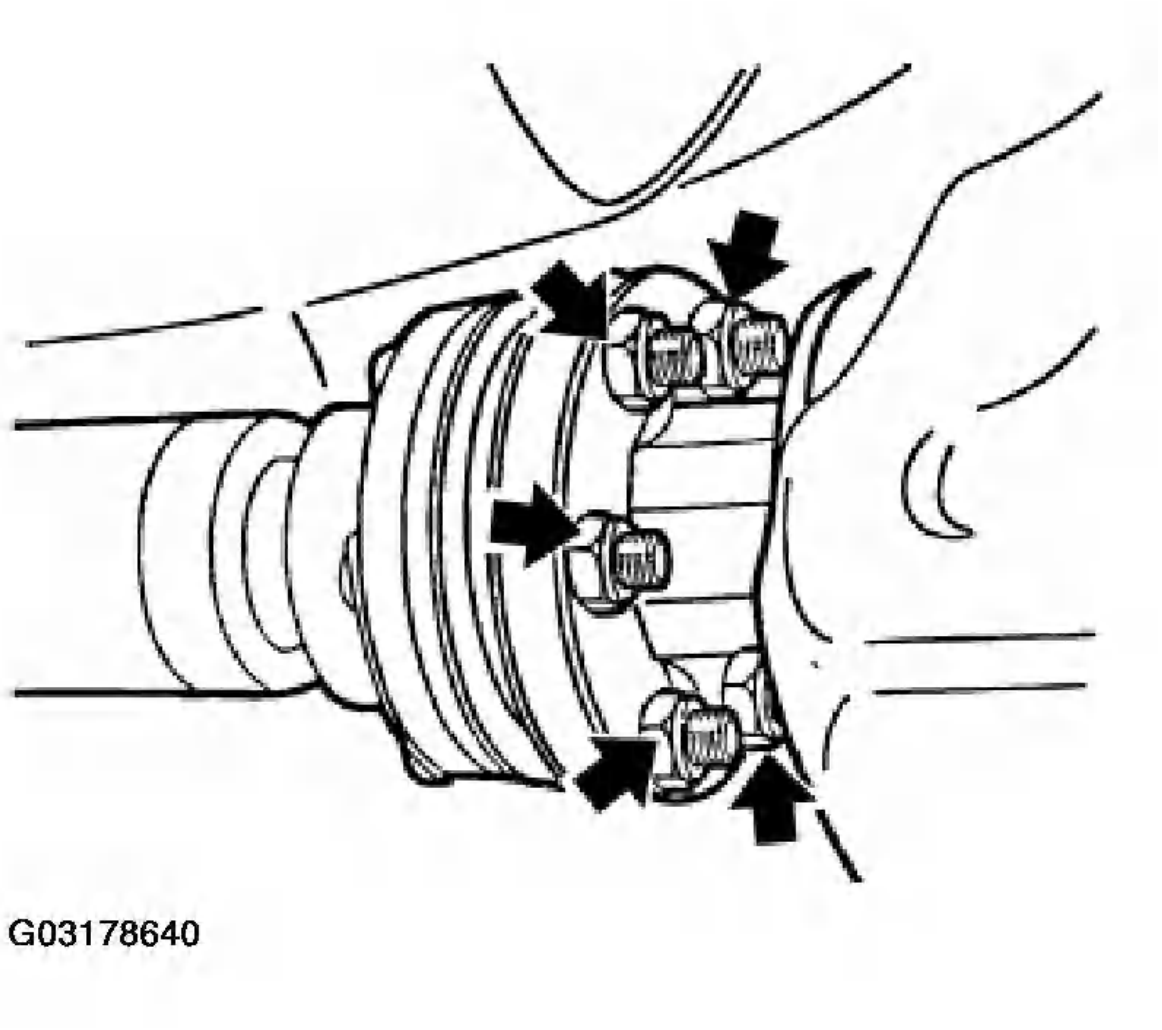

Fig. 5: Removing Constant-Velocity Joint From Final Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Remove center bearing.

Tightening torque, 26 11 6AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Pretension center bearing in direction of travel 2 ... 4 mm (A).

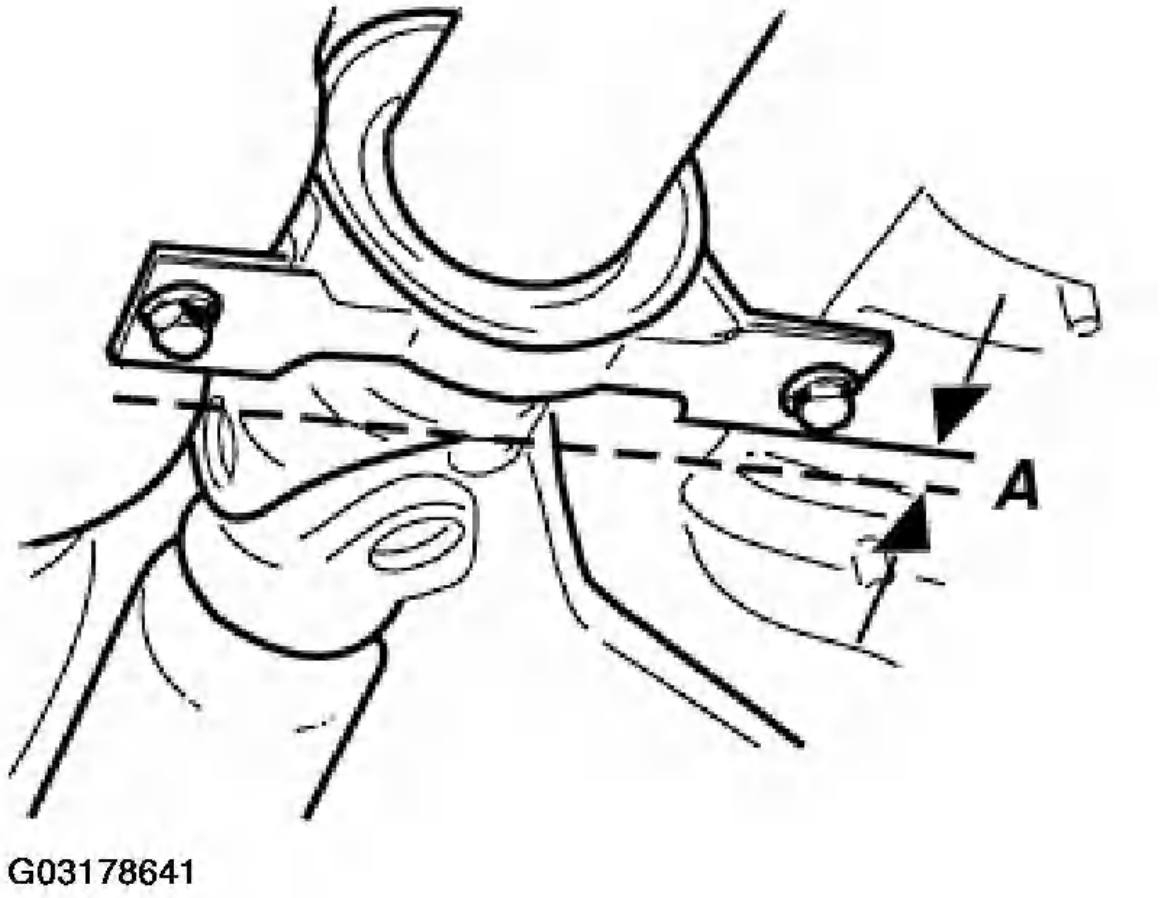

Fig. 6: Identifying Center Bearing Pretension
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not let propeller shaft fall into joints. In particular, on constant-velocity joint, rubber collar can become squashed, or joints may be damaged.

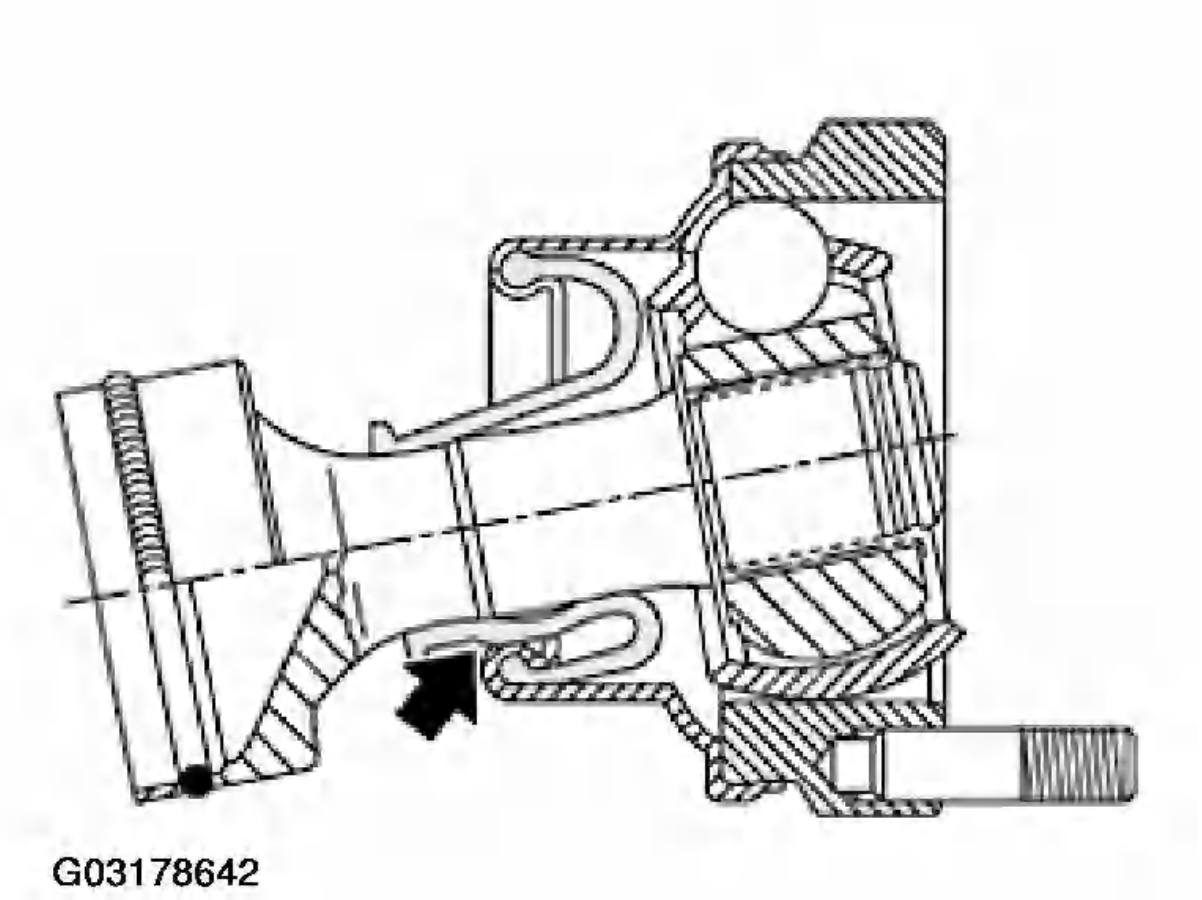

Fig. 7: Identifying Squashed Rubber Collar On Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft downwards at center bearing and in so doing detach from centering pin on manual transmission or constant-velocity joint from final drive.

NOTE: Protect constant velocity joint with transportation cap against contamination.

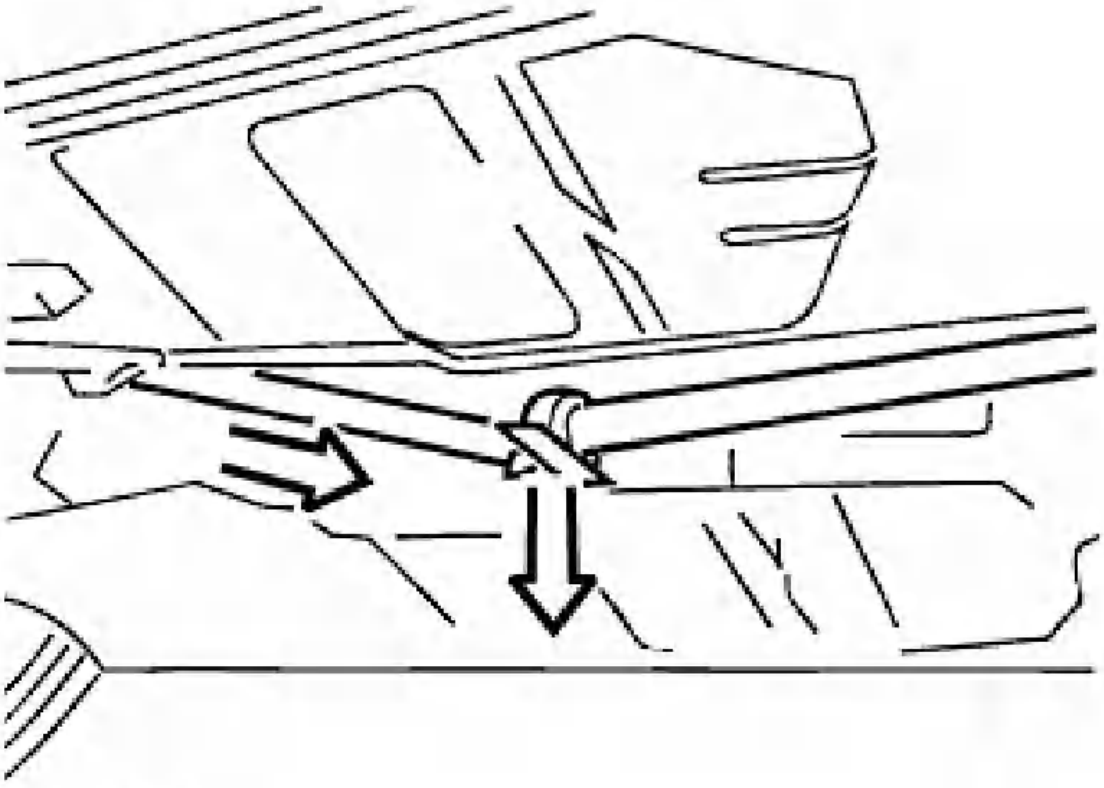

Fig. 8: Pulling Propeller Shaft Downwards At Center Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Top up grease fill.

Quantity of grease, refer to 26 00 PROPELLER SHAFT IN GENERAL .

Withdraw constant-velocity joint (1) up to stop.

Decrease sealing surfaces on constant velocity joint and drive flange.

Replace gasket (2).

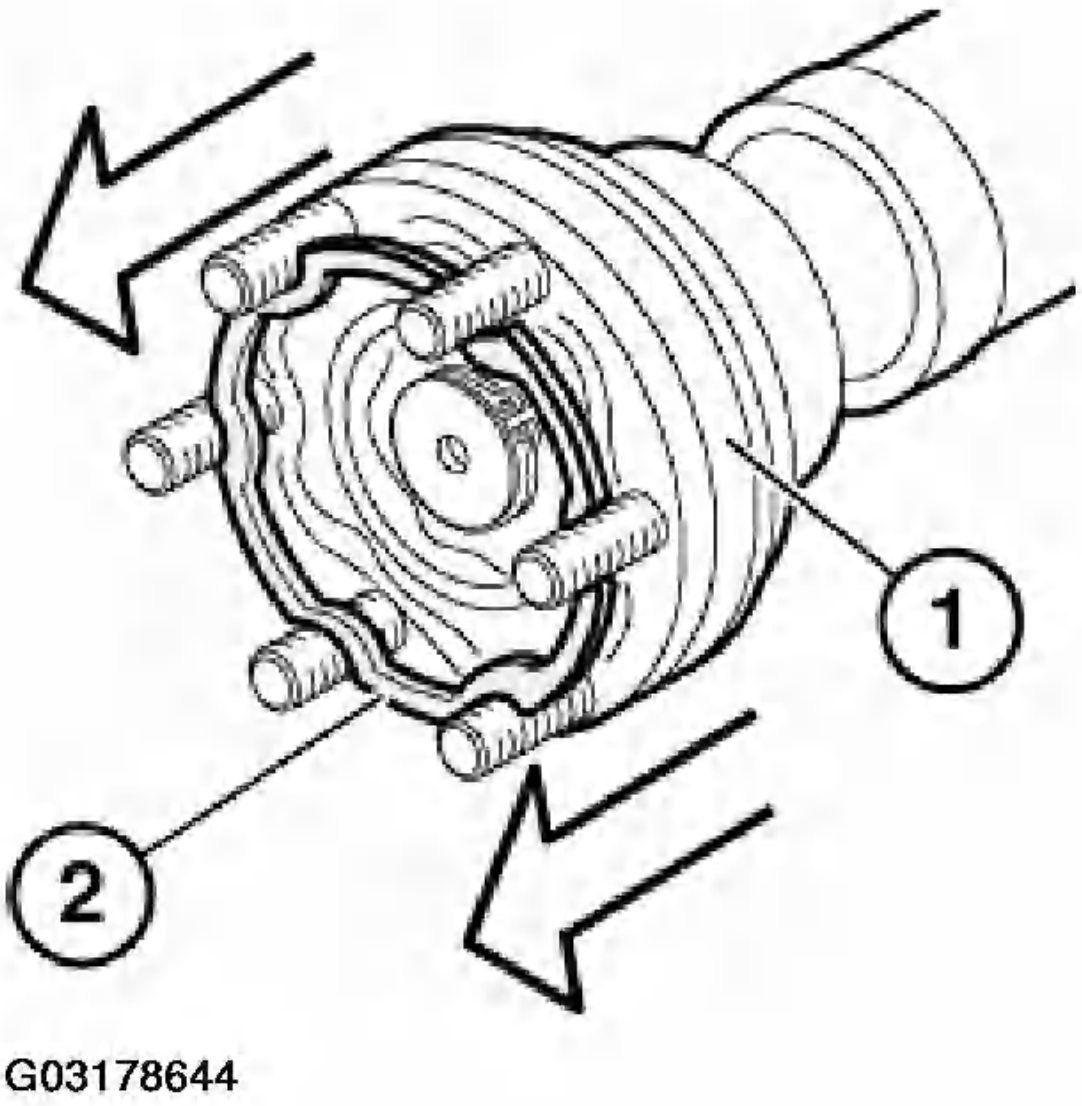

Fig. 9: Removing Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Use new nuts.

Attach propeller shaft with pulled-apart constant-velocity joint to drive flange of final drive.

CAUTION: The constant-velocity joint must not be compressed during assembly because the grease fill can force away the sealing ring, leading to leakage from the constant-velocity joint.

By alternately tightening 2 opposing nuts, draw constant-velocity joint uniformly into drive flange.

Then tighten down the remaining nuts.

Tightening torque, 26 11 4AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Check centering mount (4).

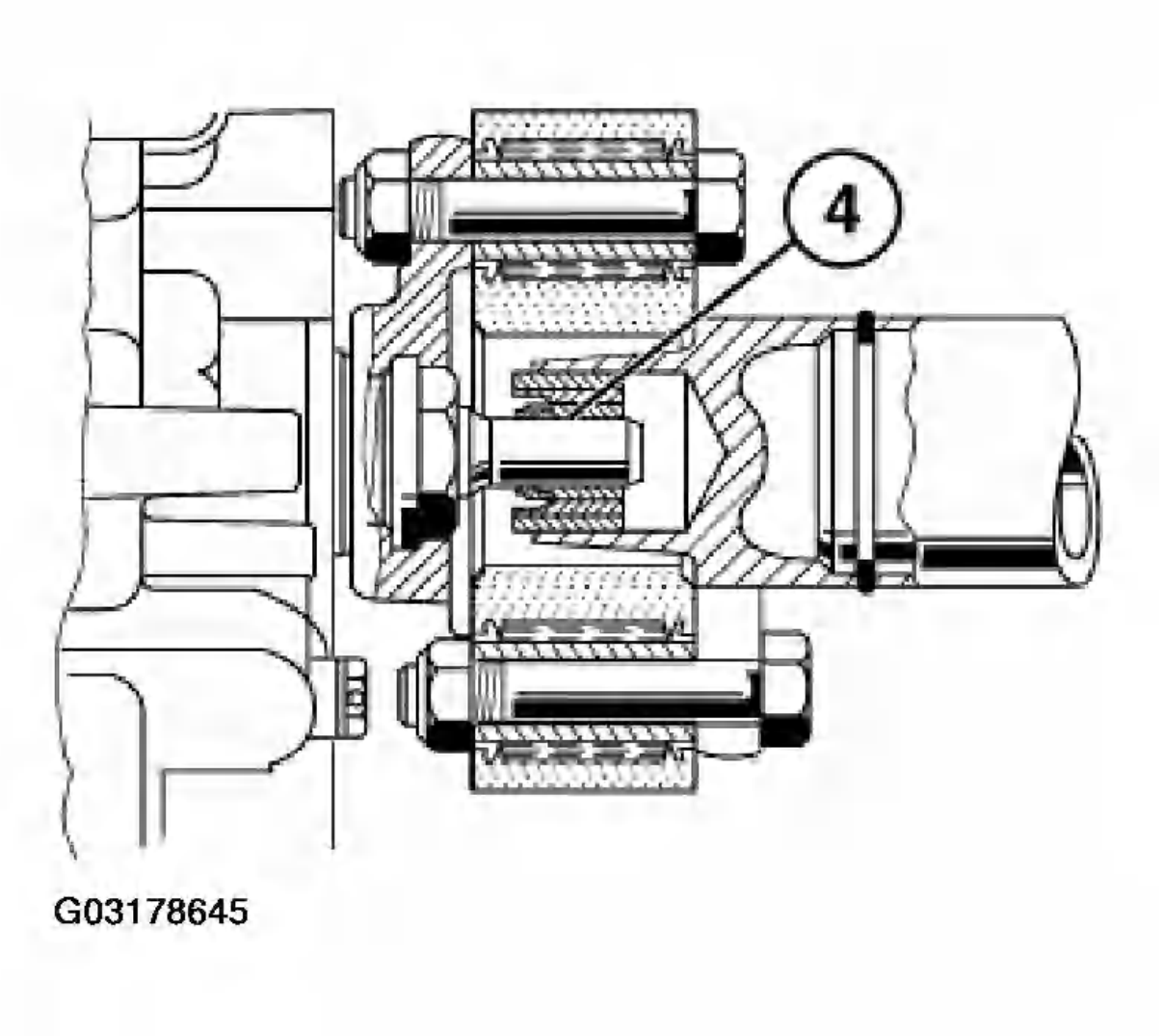

Fig. 10: Checking Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Replace damaged centering mount.

Coat centering mount with Molykote Long-term 2 grease.

26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT-VERSION WITH SLIDE

For Special Tool identification, see SPECIAL TOOLS - Z3 .

Special Tools Required:

- 26 1 040

Remove complete exhaust system. Refer to 18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (Z3 M54) .

E36 / S54 (Z3):

Remove heat shield (1).

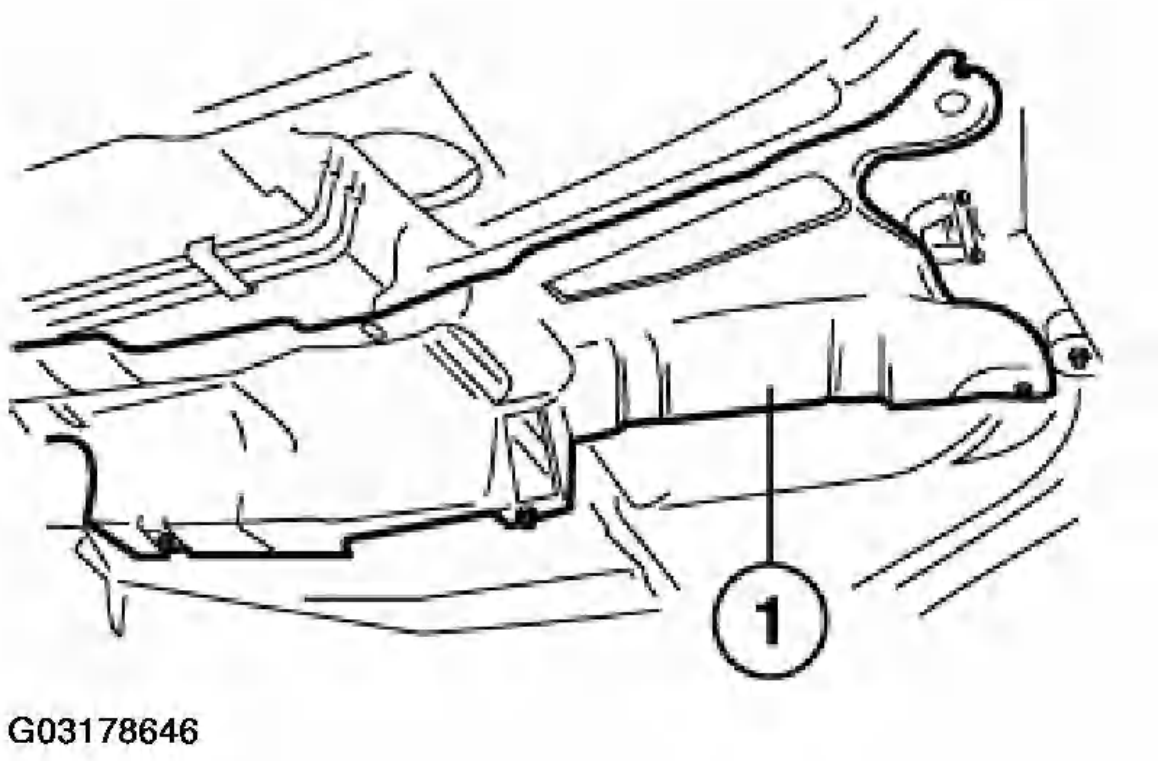

Fig. 11: Removing Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bracket (1 and 2) for exhaust suspension. Remove bar (3).

Installation:

Install bar (3) with long collar (4) towards front.

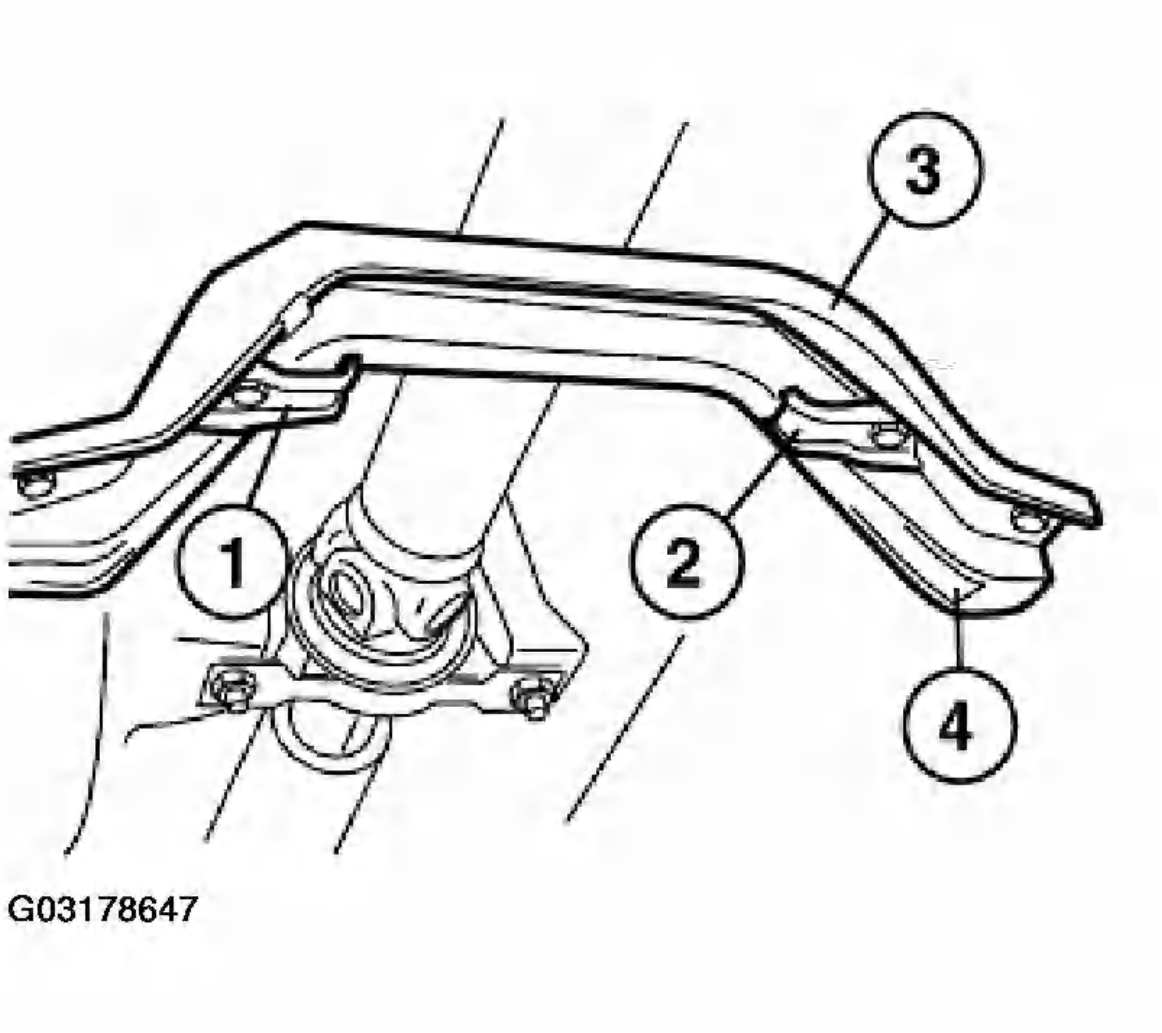

Fig. 12: Removing Bracket For Exhaust Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

Version With Flexible Disc:

Remove flexible disc from transmission.

Release nuts.

Tightening torque, 26 11 1AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

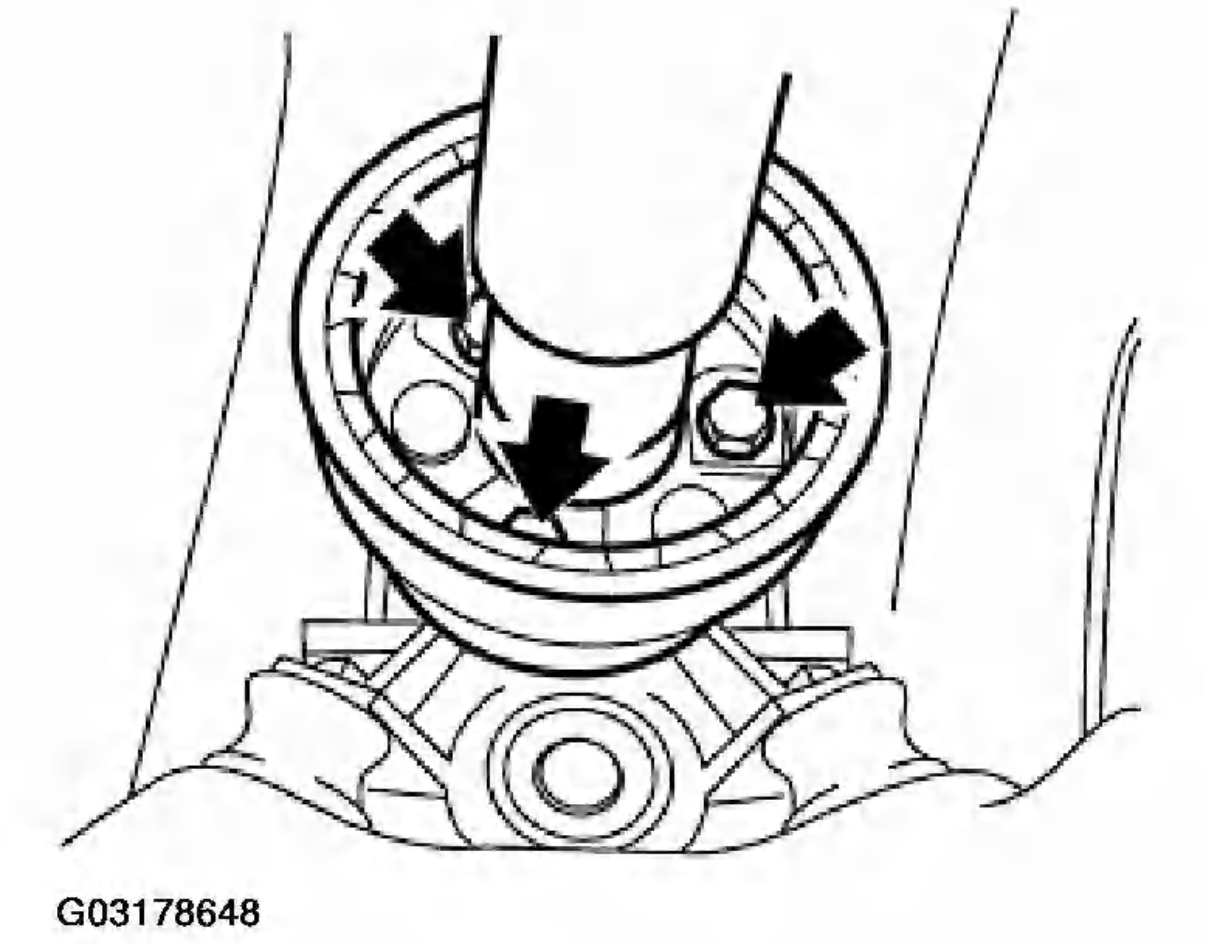

Fig. 13: Removing Flexible Disc From Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace self-locking nuts.

Tighten screw connection by way of nut.

To prevent subjecting flexible disc to torsion stress, only turn nuts/screws on flange side.

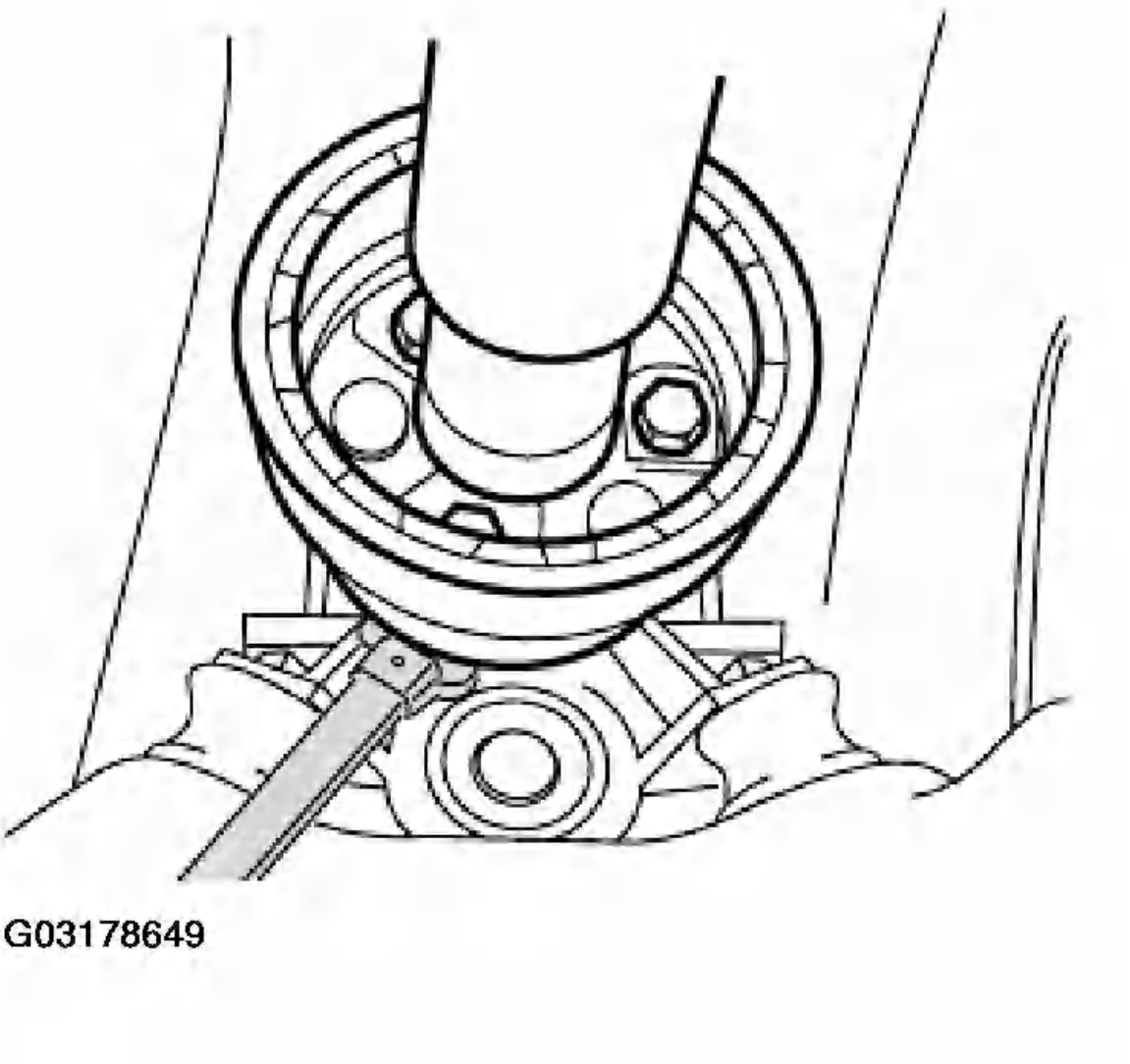

Fig. 14: Removing Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Version with Universal joint:

Remove universal joint from transmission.

Release nuts.

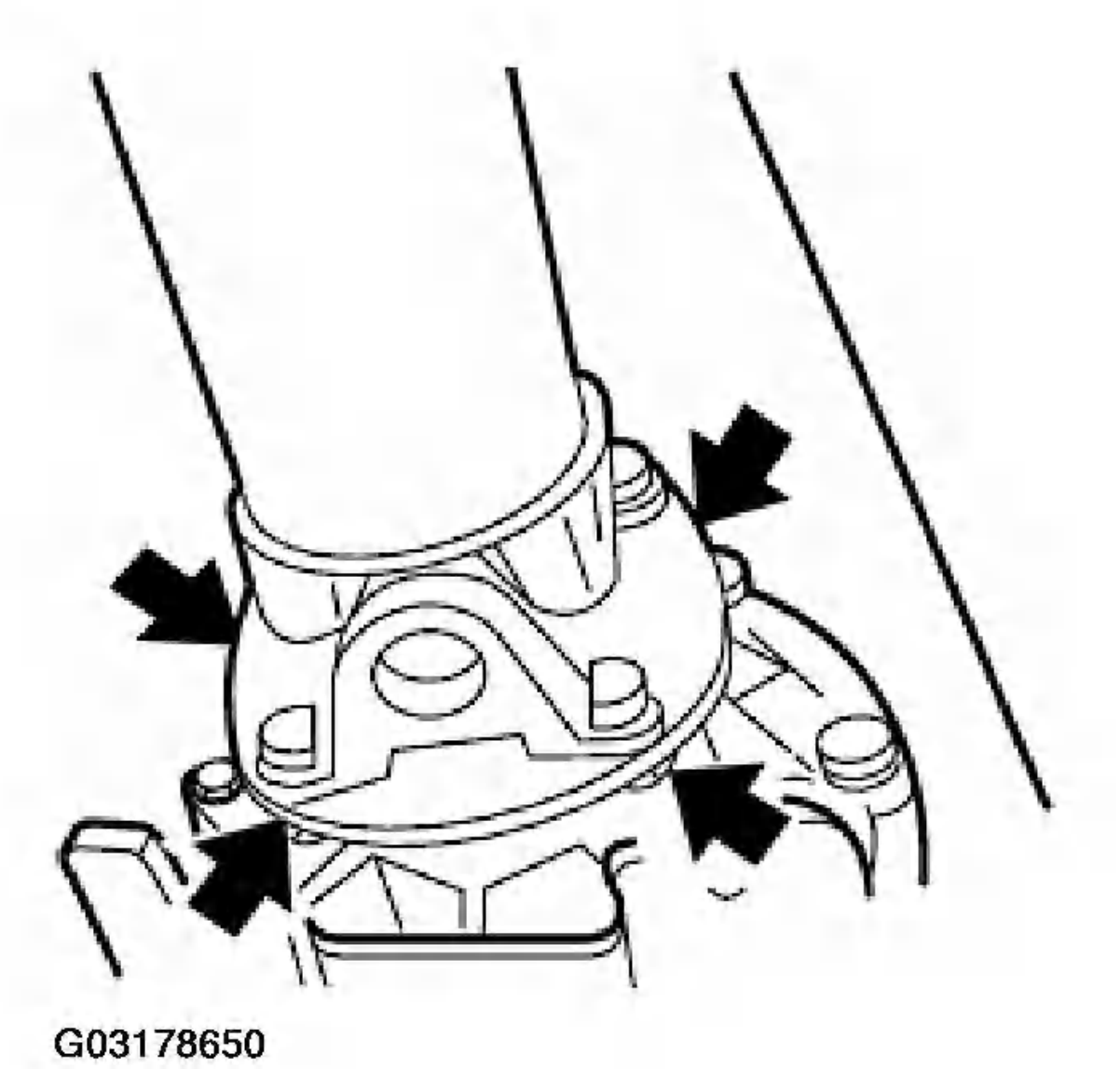

Fig. 15: Removing Universal Joint From Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, 26 11 2AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Replace self-locking nuts.

Tighten screw connection by way of nut.

Release threaded sleeve (1) several turns with special tool 26 1 040.

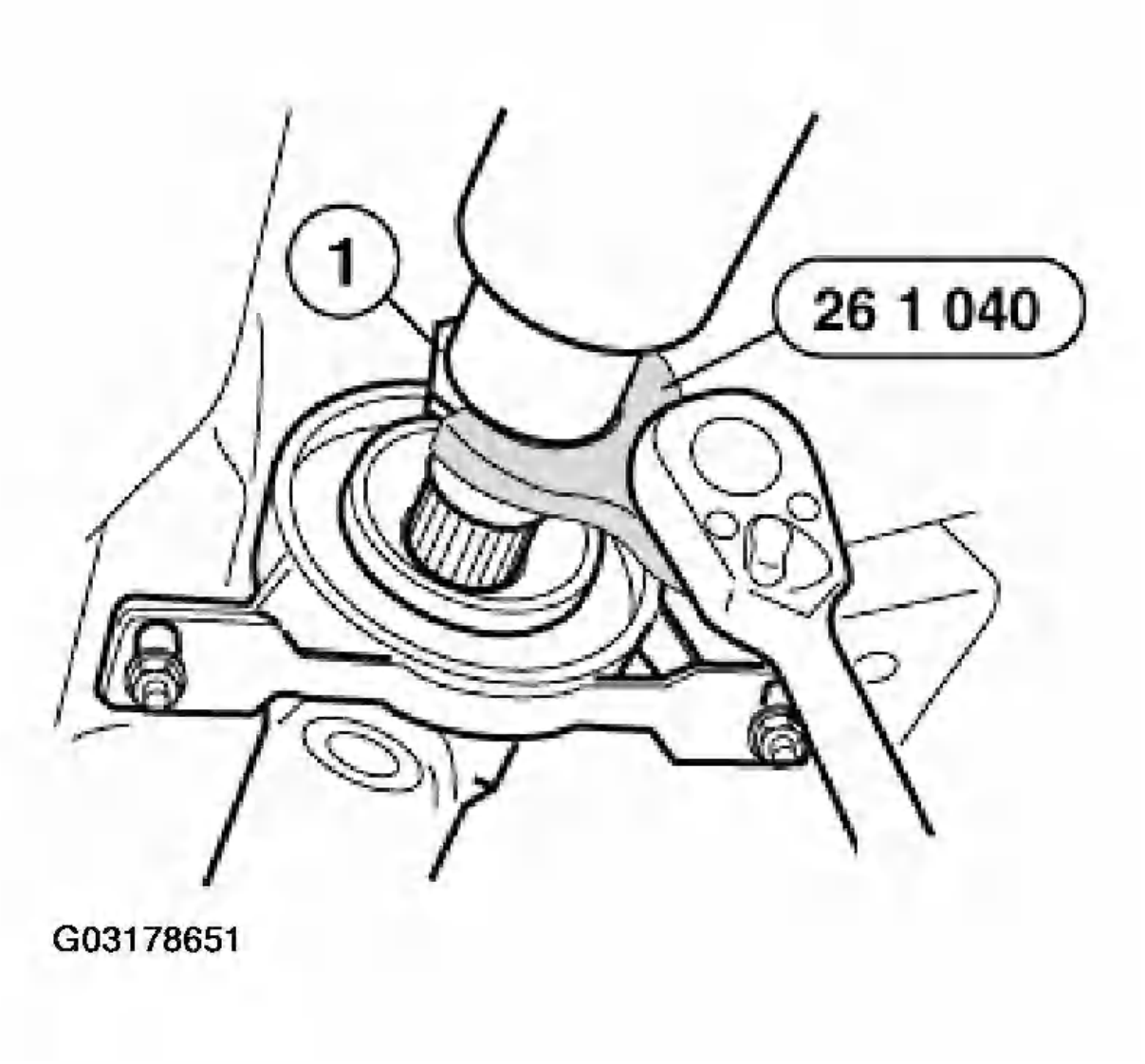

Fig. 16: Releasing Threaded Sleeve With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, 26 11 3AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

After completing installation, tighten threaded sleeve with special tool 26 1 040.

CAUTION: Removal of propeller shaft: Mark universal joint to drive flange of rear axle. This will eliminate complaints of droning.

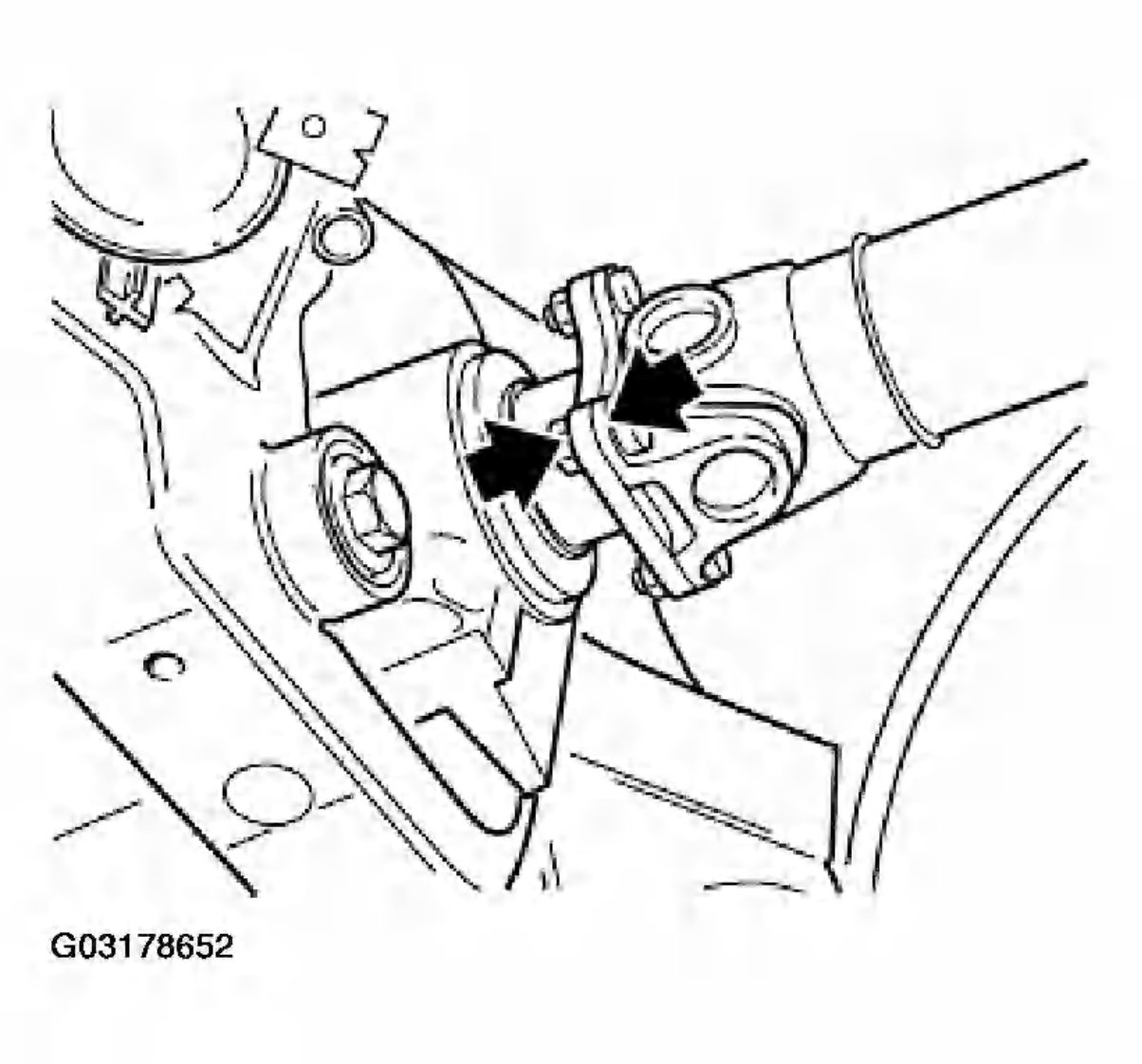

Fig. 17: Marking Universal Joint To Drive Flange Of Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Remove universal joint from final drive.

Release nuts.

Tightening torque, 26 11 4AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Replace self-locking nuts.

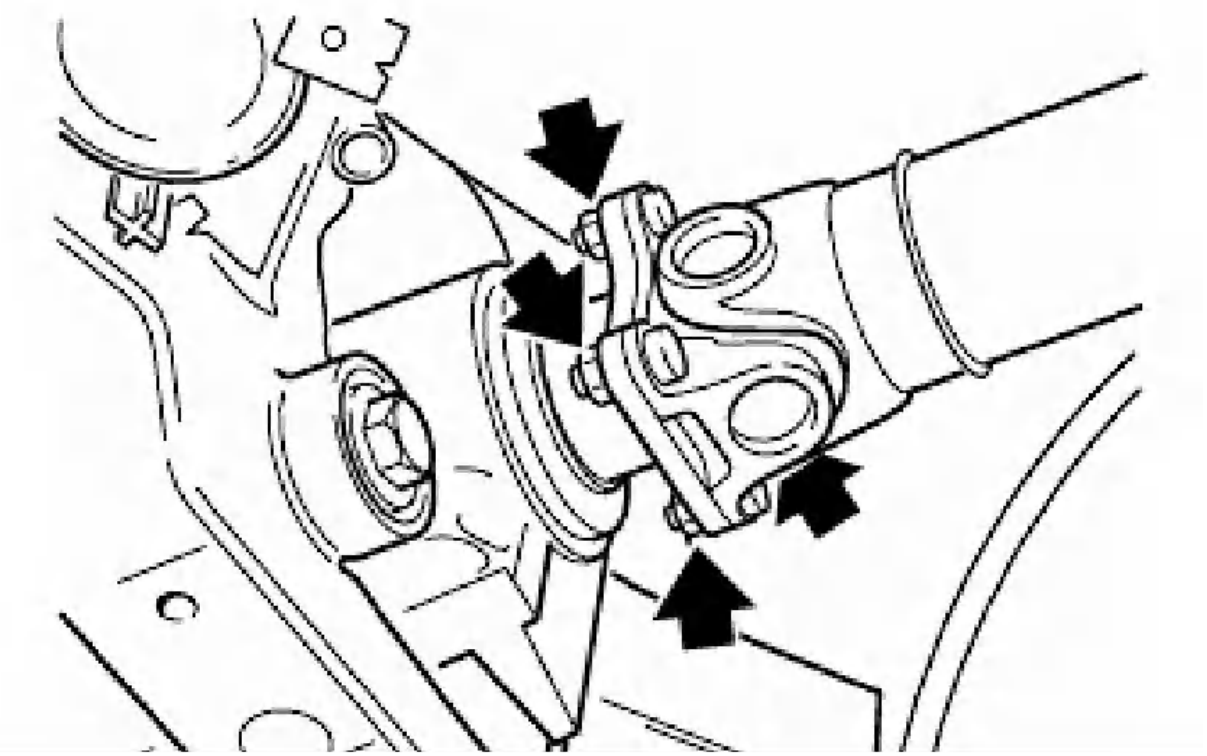

Fig. 18: Removing Universal Joint From Final Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Grip propeller shaft at center mount and release nuts.

Tightening torque 26 11 6AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Pretension center mounts in direction of travel 4 ... 6 mm (A).

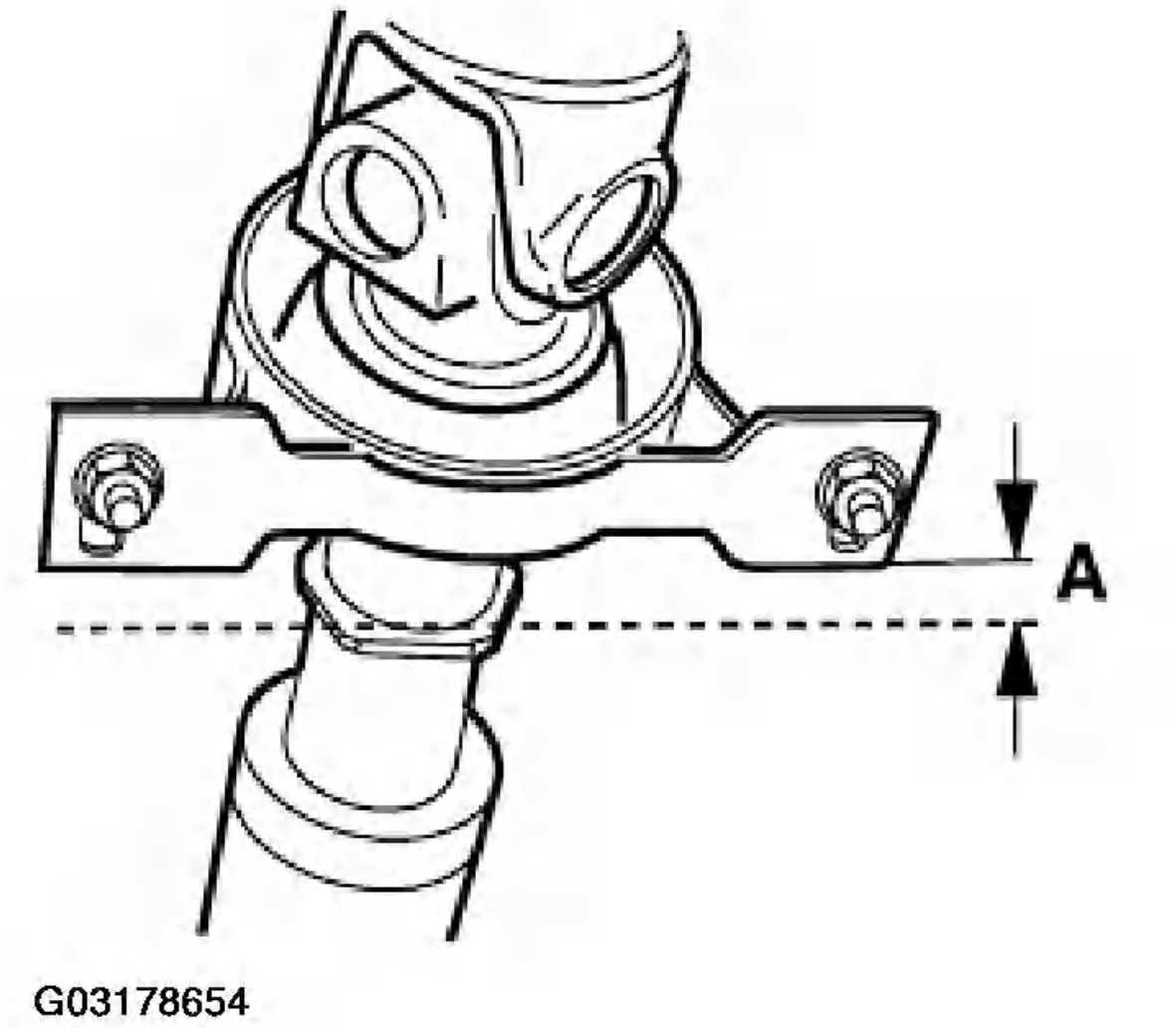

Fig. 19: Identifying Center Mount Nuts Pretension
Courtesy of BMW OF NORTH AMERICA, INC.

Bend propeller shaft downwards at center mount and in so doing detach centering mount on manual transmission/universal joint from final drive.

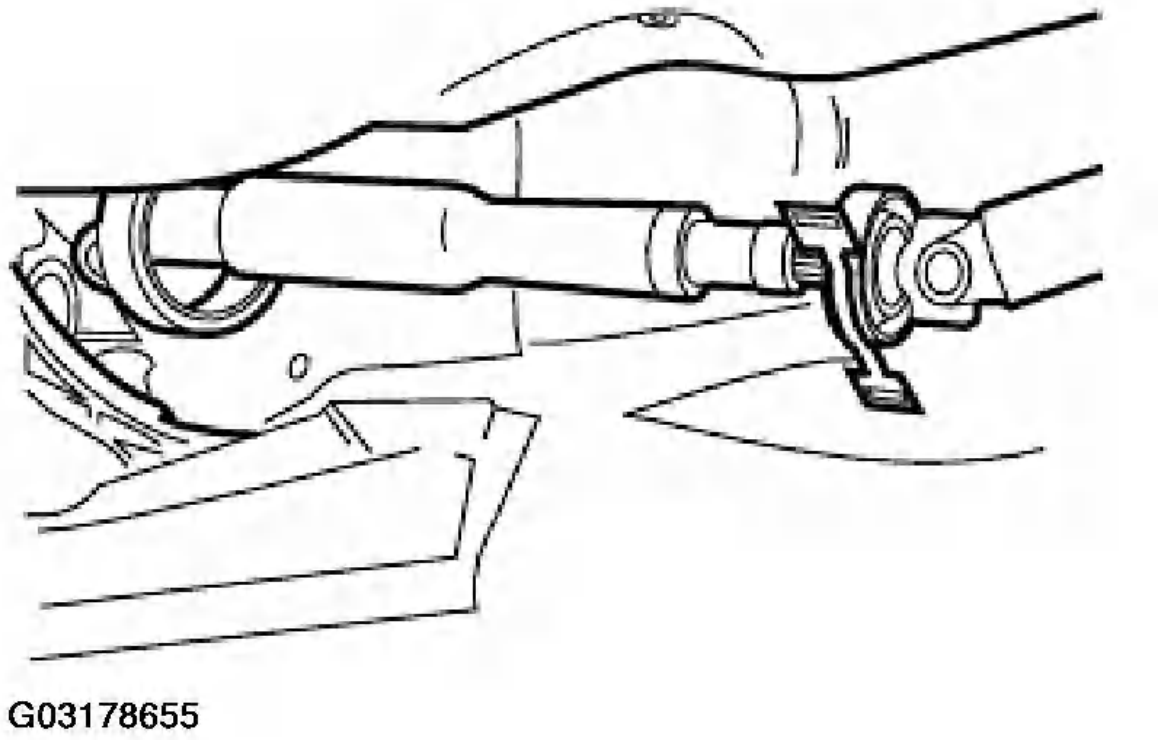

Fig. 20: Bending Propeller Shaft Downwards At Center Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check centering mount (4).

Fig. 21: Checking Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Replace a damaged centering mount.

Coat centering mount with Molykote Long-term 2 grease.

26 11 030 BALANCING PROPELLER SHAFT

In the event of vibration or drumming:

Requirements:

Propeller shaft in perfect optical condition.

Balance propeller shaft if balance plates are missing or propeller shaft is suspected to have imbalance (refer to instructions supplied with balancing equipment).

CAUTION: A jacked-up vehicle must only be test operated when suspension of driven wheels is supported (deflection angle of output shafts).

Maximum speed specified for a jacked-up vehicle or vehicle on a dynamometer must never be exceeded.

Conform with safety regulations.

Center Propeller Shaft:

Loosen exhaust assembly, rubber engine mounts and transmission cross member.

Position Special Tool 26 1 020 at rear engine-carrier bore and at center of transmission.

NOTE: Transmission is offset by 10 mm to right when viewed in forwards direction of travel.

As a result of this, center point must be taken 10 mm to left of center of transmission.

Fig. 22: Positioning Special Tool At Rear Engine-Carrier Bore And At Center Of Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Determine measuring point on transmission.

Move transmission sidewards until special-tool gauge has equal distances on left and right sides.

Fig. 23: Moving Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crossmember.

Tightening torque 24 71 1AZ. Refer to TORQUE SPECIFICATIONS .

26 11 051 REPLACING FLEXIBLE DISC FOR PROPELLER SHAFT

For Special Tool identification, see SPECIAL TOOLS - Z3 .

Special Tools Required:

- 26 1 040

Remove complete exhaust system. Refer to 18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (Z3 M54) .

E36 / S54 (Z3):

Remove heat shield (1).

Fig. 24: Removing Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bracket (1 and 2) for exhaust suspension.

Remove bar (3).

Installation:

Install bar (3) with long collar (4) towards front.

Fig. 25: Removing Bracket For Exhaust Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

Remove flexible disc from transmission.

Release screws.

Tightening torque, 26 11 1AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Installation:

Replace self-locking nuts.

Only tighten screw connection by way of nut.

Fig. 26: Removing Flexible Disc From Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Version With Slide:

Release threaded sleeve several turns with special tool 26 1 040.

Installation:

After completing installation, tighten threaded sleeve with special tool 26 1 040.

Tightening torque, 26 11 3AZ. Refer to 26 11 PROPELLER SHAFT, COMPLETE .

Fig. 27: Removing Threaded Sleeve With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Press propeller shaft away from guide pin on transmission.

Tilt front section of propeller shaft downwards.

Fig. 28: Aligning Front Section Of Propeller Shaft Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove flexible disc from propeller shaft.

Fig. 29: Removing Self-Locking Nuts On Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, 26 11 1AZ. Refer to PROPELLER SHAFT ASSEMBLY .

Installation:

Replace self-locking nuts.

Only tighten screw connection by way of nut.

Replace flexible disc.

CAUTION: Arrows on circumference of flexible disc must point to flange arms.

Fig. 30: Identifying Arrows On Circumference Of Flexible Disc
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check centering mount.

Fig. 31: Checking Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Replace a damaged centering mount. Refer to 26 11 090 REMOVING AND INSTALLING OR REPLACING CENTER MOUNT OF PROPELLER SHAFT .

Grease centering mount.

26 11 090 REMOVING AND INSTALLING OR REPLACING CENTER MOUNT OF PROPELLER SHAFT

Remove propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

Completely fill center bore with viscous grease.

Drive special tool 11 1 130 into center bore with a plastic hammer.

Fig. 32: Installing Special Tool Into Center Bore
Courtesy of BMW OF NORTH AMERICA, INC.

The center mount is forced out by applying pressure to grease fill (1).

If necessary, top up grease repeatedly.

NOTE: To drive out the mount, you can also fill the centering bore with water instead of grease.

Remove grease or water from mount bore.

Drive in center mount (1) with special tools 00 5 500 and 11 2 030 up to protrusion (A).

Fig. 33: Installing Center Mount With Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Apply Molykote Long-term 2 grease to center mount (1).

Lubricant volume: approx. 2 g.

Installation:

Overlap A = 4.5^{+02} mm

Fig. 34: Identifying Overlap (Dimension A)
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 160 REPLACING CONSTANT-VELOCITY JOINT FOR PROPELLER SHAFT

Removing joint:

Remove and install complete propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

Remove hose clamp.

Fig. 35: Removing Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out circlip (1).

Installation note:

Replace circlip.

Fig. 36: Removing Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Push back boot.

Apply Special Tool 26 1 070.

Pull off constant-velocity joint using a standard puller.

Fig. 37: Removing Constant-Velocity Joint Using Standard Puller
Courtesy of BMW OF NORTH AMERICA, INC.

Installing joint:

Fill new constant-velocity joint with 80 grams of grease.

NOTE: Do not cant inner race and cage as balls would fall out.

Fig. 38: Filling Constant-Velocity Joint With Grease
Courtesy of BMW OF NORTH AMERICA, INC.

Clean splines to free them of grease and coat with bolt cement.

Fig. 39: Identifying Splines
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Keep bolt cement out of ball grooves.

Drive constant-velocity joint onto propeller shaft using Special Tool 23 1 040.

Fig. 40: Installing Constant-Velocity Joint Onto Propeller Shaft Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Install circlip (1).

NOTE: Ensure correct seating and a tight fit.

Fig. 41: Installing Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Pull boot onto propeller shaft.

Install hose clamp on boot and tighten.

Fig. 42: Installing Hose Clamp On Boot
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of Constant-Velocity Joint:

Fig. 43: Cross Sectional View Of Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 665 REPLACING BOOT - CONSTANT-VELOCITY JOINT REMOVED

Drive out cheese-head bolts using a plastic hammer.

Remove washers.

Fig. 44: Removing Washers
Courtesy of BMW OF NORTH AMERICA, INC.

Pull or knock off end cover (1).

Watch out for seal (2) between constant-velocity joint and end cover.

Fig. 45: Removing End Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Check grease filling, adding grease if necessary, refer to 26 00 PROPELLER SHAFT IN GENERAL .

Mount new end cover and boot on propeller shaft or on constant-velocity joint.

Install washers and cheese-head bolts.

Drive in cheese-head bolts to fit tightly using a plastic hammer.

Fig. 46: Installing Washers And Cheese-Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Pull boot onto propeller shaft.

Install hose clamp on boot and tighten.

Fig. 47: Installing Hose Clamp On Boot
Courtesy of BMW OF NORTH AMERICA, INC.

26 90 ... TROUBLESHOOTING ON THE PROPELLER SHAFT

Refer to 26 90... TROUBLESHOOTING ON THE PROPELLER SHAFT .

CENTER CONSOLE ASSEMBLY

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER BEARING - VERSION WITH SLIDE

Remove propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

CAUTION: The propeller shaft is balanced as a single unit.

Mark propeller shaft front section relative to propeller shaft rear section with paint pencil.

Marking which involves surface damage caused by engraving (e.g. center punch) is not permitted.

Fig. 48: Marking Propeller Shaft Front And Rear Sections
Courtesy of BMW OF NORTH AMERICA, INC.

Detach propeller shaft rear section.

Installation:

Remove clamping bush (1).

Before assembling the propeller shaft, first fit clamping bush (1), shim (2) and rubber ring (3).

Clean and lubricate splines with Molykote Long-term 2 (refer to BMW Parts Service).

Assemble propeller shaft so that markings are flush with each other.

Fig. 49: Aligning Propeller Shaft Rear And Front Sections
Courtesy of BMW OF NORTH AMERICA, INC.

Only possible for version with universal joint on transmission:

NOTE: Propeller shaft sections are mounted in such a way that universal joints are in one plane.

If sliding piece is mistakenly dismantled without marking, the only assembly error possible is a 180Â° offset due to balancing operation.

Fig. 50: Locating Universal Joints
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out circlip (4).

Take off dust cover (5).

Fig. 51: Removing Circlip And Dust Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Apply Kukko puller on center bearing in such a way that dust cover (6) cannot be damaged.

Pull off center bearing with ball bearing.

Fig. 52: Applying Kukko Puller On Center Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

If dust cover was damaged (deformed), pull off dust cover with Kukko puller and replace.

Knock on dust cover to fit tightly using Special Tool 23 1 160.

Fig. 53: Removing Dust Cover With Kukko Puller
Courtesy of BMW OF NORTH AMERICA, INC.

Drive on center bearing with ball bearing to fit tightly using special tool 23 1 160.

Fig. 54: Installing Center Bearing With Ball Bearing Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Check synchronization and movement of center bearing.

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER MOUNT - VERSION WITHOUT SLIDE

Remove propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

Mark installed position of front propeller-shaft section to rear propeller-shaft section.

Fig. 55: Identifying Alignment Marks On Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Propeller shaft was balanced in assembled state so that propeller-shaft sections must not be turned when reinstalled.

Unscrew bolt (1).

Fig. 56: Removing Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off front section of propeller shaft.

Installation Note:

Assemble propeller shaft in such a way that punch marks are located on opposite sides.

Secure screw (1) with screw retainer.

Tightening torque 26 11 5AZ. Refer to PROPELLER SHAFT ASSEMBLY .

Pull off center mount complete with grooved ball bearing using a standard puller.

Fig. 57: Removing Center Mount With Grooved Ball Bearing Using Standard Puller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation Note:

Pay attention to installed direction of dust cover (2).

Fig. 58: Installing Dust Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Press grooved ball bearing (3) into center mount.

Fig. 59: Installing Grooved Ball Bearing Into Center Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Drive on center mount with ball bearing using Special Tool 24 1 040.

Fig. 60: Installing Center Mount With Ball Bearing Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Check center mount for ease of movement.

26 12 011 REPLACING GROOVED BALL BEARING IN CENTER MOUNT OF PROPELLER SHAFT

Remove center mount, refer to 26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER BEARING - VERSION WITH SLIDE .

Press out grooved ball bearing with Special Tool 23 1 160.

Fig. 61: Removing Grooved Ball Bearing With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Always coat center mount in area of ball bearing with Circolight.

Press in ball bearing as far as stop using a suitable sleeve.

Fig. 62: Installing Ball Bearing Using Suitable Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

26 12 500 CHECKING/PRETENSIONING PROPELLER-SHAFT CENTER MOUNT

Contained in section on removing propeller shaft, refer to 26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT - VERSION WITH REAR CONSTANT-VELOCITY JOINT - .

Article GUID: A00202360

PROPELLER SHAFT

26 1 000 GAUGE

ORDER NUMBER: 26 1 000 SPECIAL TOOL GENERAL SPECIFICATION

Note:	For aligning center mount of propeller shaft
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Order number:	26 1 000
Â	Gauge
Consisting of:	Â
1 = 26 1 001	Rail
2 = 26 1 002	Bearing bracket
3 = 26 1 003	Chocks
Â	NOTE: For propeller shaft 50 mm dia. front, 70 mm dia. rear
4 = 26 1 004	Chock for propeller shaft (50 mm dia. front, 60 mm dia. rear)
5 = 26 1 005	Knurled screws

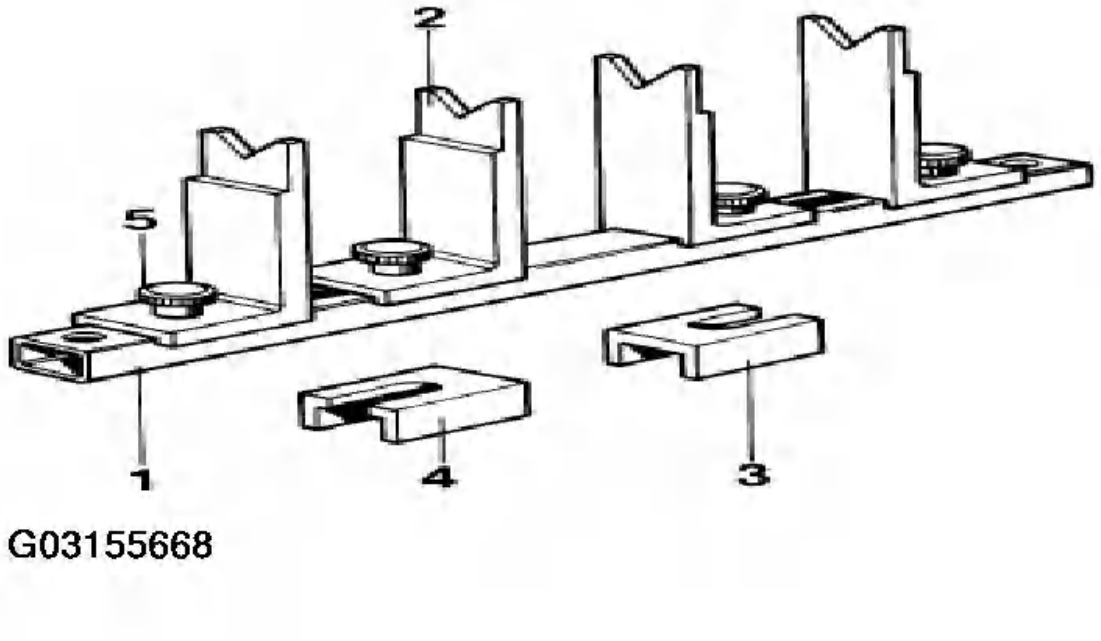

Fig. 1: Identifying Special Tool 26 1 000 Gauge For Aligning Centre Mount Of Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

26 1 030 FIXTURE

ORDER NUMBER: 26 1 030 SPECIAL TOOL GENERAL SPECIFICATION

Note:	For checking and adjusting diffraction angle of propeller shaft
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39
Order number:	26 1 030
Â	Fixture
Consisting of:	Â
1 = 26 1 031	Spirit level

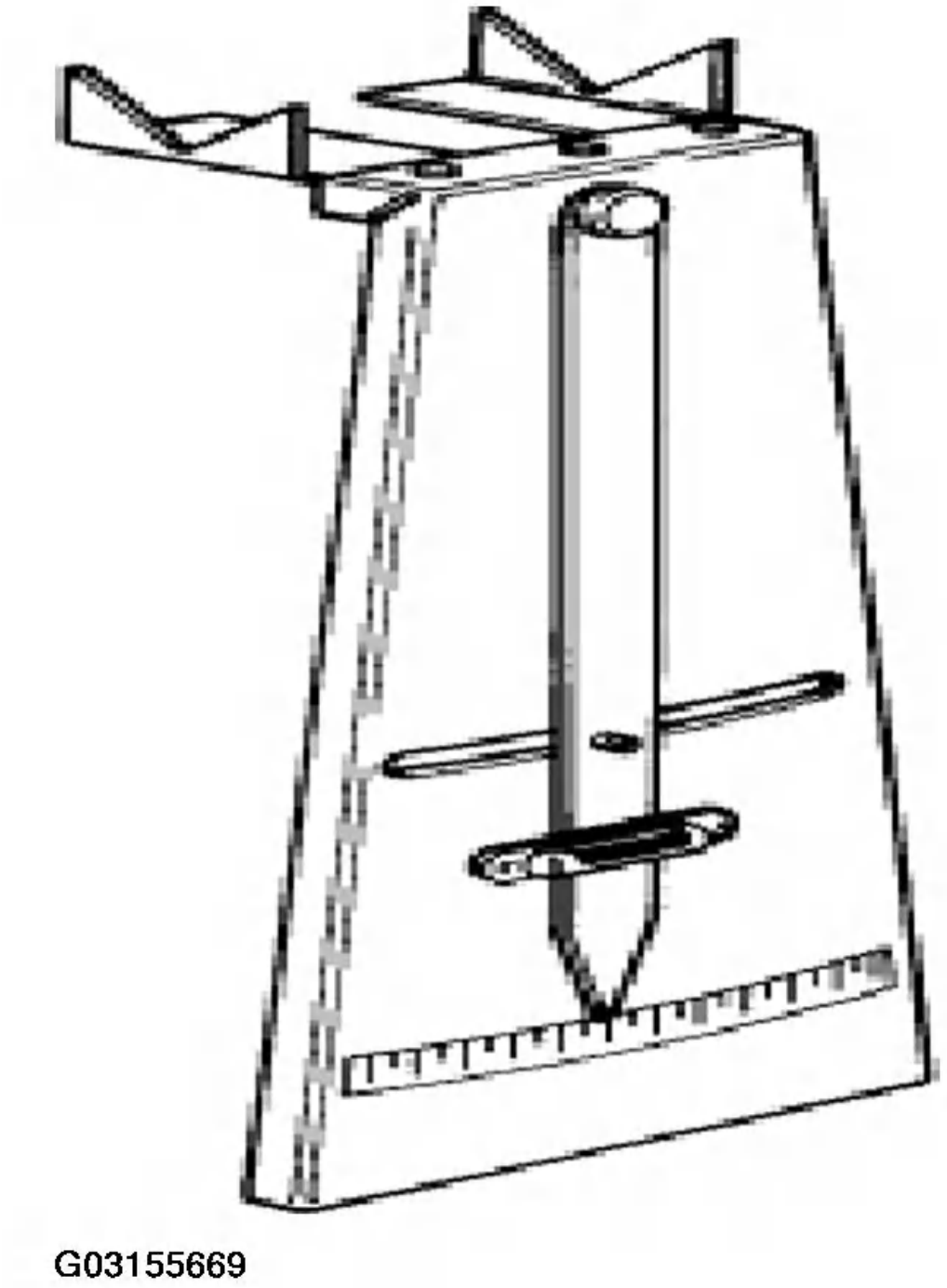

Fig. 2: Identifying Special Tool 26 1 030 Fixture For Checking And Adjusting Diffraction Angle Of Propeller Shaft

26 1 040 SPANNER

ORDER NUMBER: 26 1 040 SPECIAL TOOL GENERAL SPECIFICATION

Note:	For threaded bushing on slide of propeller shaft - Not for four-wheel drive vehicles
Series:	E12, E21, E23, E24, E28, E30, E31, E32, E34, E36, E38, E39, E46, E85
Storage location:	A33
Order number:	26 1 040
Â	Spanner

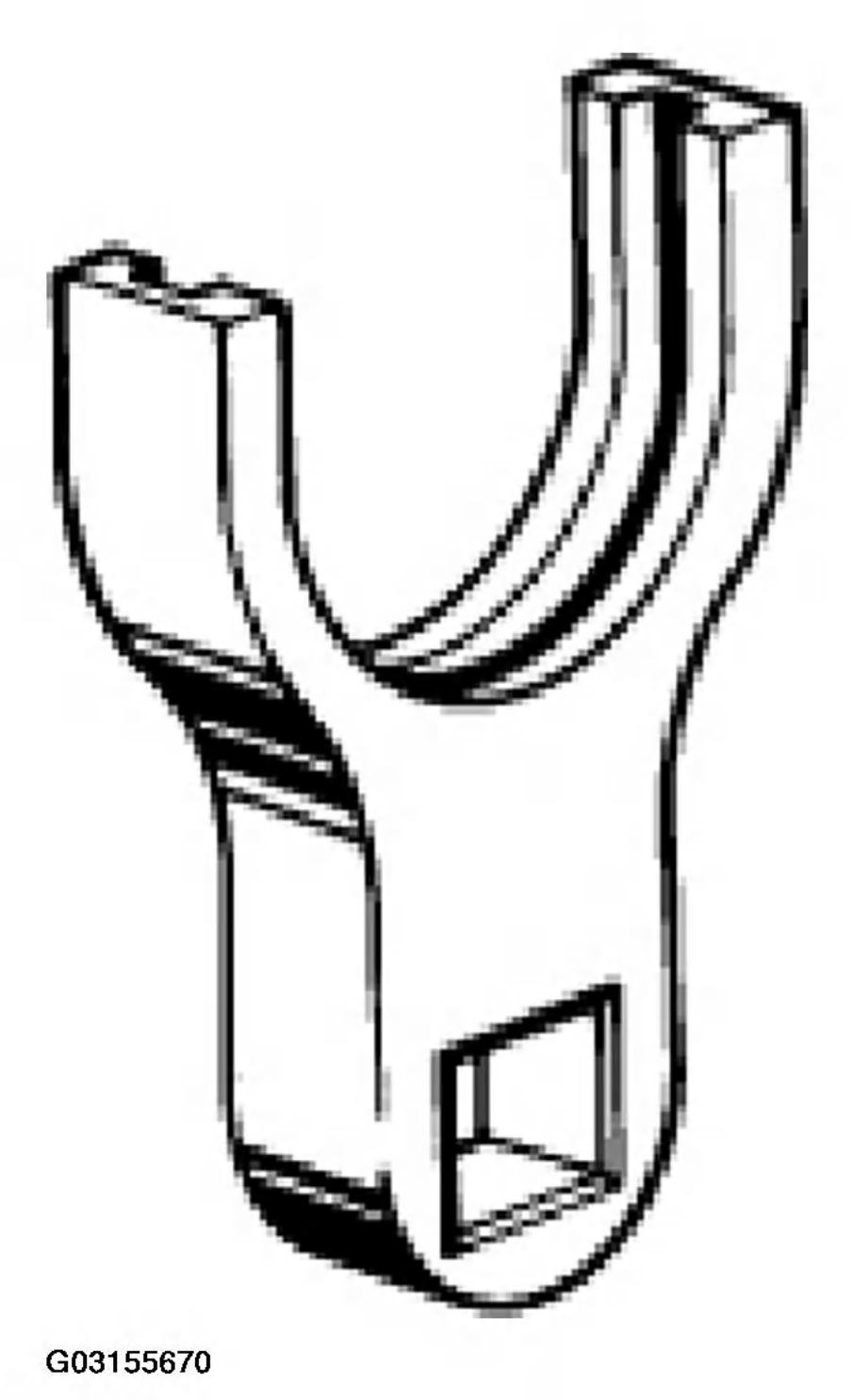

Fig. 3: Identifying Special Tool 26 1 040 Spanner For Threading Bushing On Slide Of Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

26 1 110 REMOVAL DISK

Minimum set: Mechanical tools

ORDER NUMBER: 26 1 110 SPECIAL TOOL GENERAL SPECIFICATION

Note:	For detaching constant-velocity joint from propeller shaft.
Series:	E31, E32, E34, E36, E36/7, E38, E39, E46, E52, E53, E60, E61, E63, E64, E65, E66, E67, E83, E85,

	E87, E90, E91
Storage location:	C26
SI number:	1 06 94 (801)
Order number:	26 1 110
Â	Removal disk

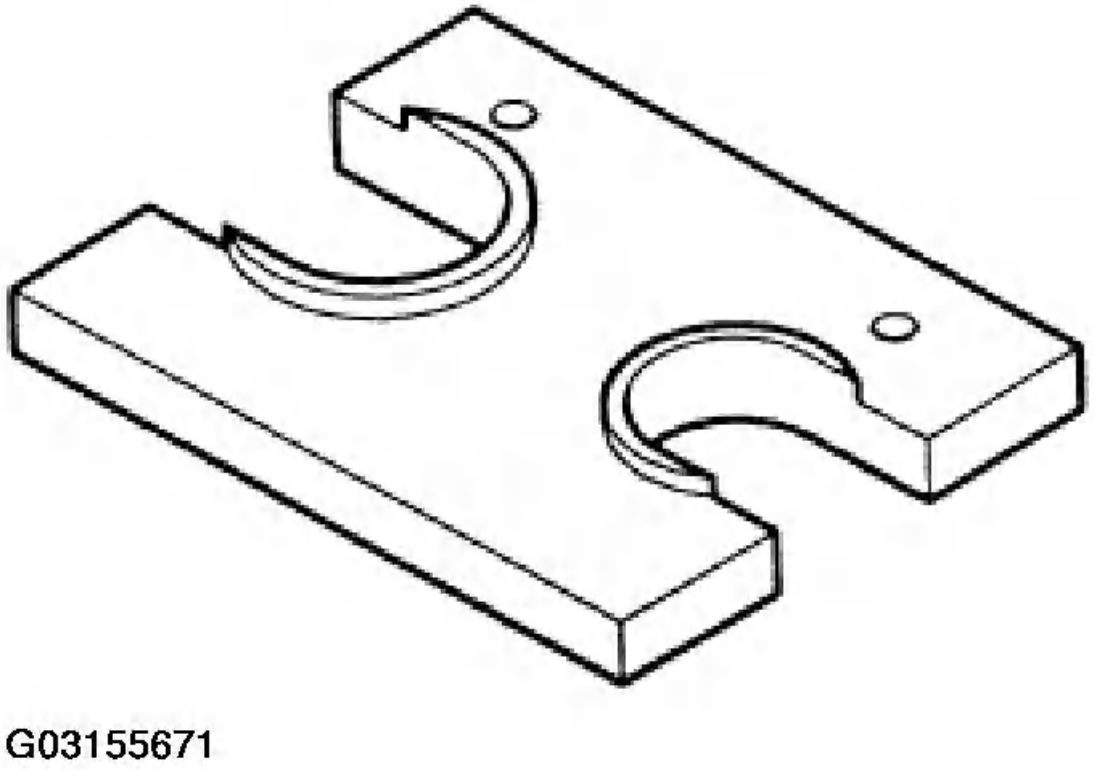

Fig. 4: Identifying Special Tool 26 1 110 Removal Disk For Detaching Constant-Velocity Joint From Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

26 1 300 INCLINATION ANGLE MEASURING DEVICE

ORDER NUMBER: 26 1 300 SPECIAL TOOL GENERAL SPECIFICATION

Note:	For determining bending angle of propeller shaft
Series:	E12, E21, E23, E24, E28, E30, E30/C, E30tou, E31, E32, E32/3, E34, E34tou, E36, E36/2, E36/3, E36/5, E36/7, E36/C, E36tou, E38, E38/3, E39, E39PL, E39tou, E46, E46/16, E46/2, E46/3, E46/5, E46/C, E52, E53, E60, E65, E66, E67, E85, RR1
Order number:	26 1 300
Â	Inclination angle measuring device

Fig. 5: Identifying Special Tool 26 1 300 Inclination Angle Measuring Device
Courtesy of BMW OF NORTH AMERICA, INC.

Article GUID: A00202807

PROPELLER SHAFT GENERAL

26 00 PROPELLER SHAFT IN GENERAL

PROPELLER SHAFT IN GENERAL TECHNICAL SPECIFICATION

Grease for slide	.....	Molykote Longtherm 2
Grease for constant velocity joint	.....	Optimol
Volume of grease for velocity joints	g	80

Article GUID: A00202376

PROPELLER SHAFT ASSEMBLY

26 11 PROPELLER SHAFT, COMPLETE

PROPELLER SHAFT, COMPLETE - TIGHTENING TORQUE SPECIFICATIONS

Application	Type	Thread	Tightening Specification	Measure
1AZ Flexible disk to propeller shaft and transmission output flange Steel propeller shaft	All	M10 8.8	Â	48 Nm
Â	All	M10 10.9	Â	64 Nm
Â	E31 / E38 / E39 / E46	M14	Â	140 Nm
Â	E32 / E34 / E36 / E38 / E39	M12 8.8	Â	81 Nm
Â	E60 / E63 / E64	M12 8.8	Â	90 Nm
E32 / E34 / E36 / E38 / E39 / E46 / E53 / E85 / E60	M12 10.9	Â	Â	100 Nm
M5(E39) / M3,	M12 10.9	Â	Â	115 Nm
E65	M12 10.9	Â	Â	90 Nm
Flexible disk to transmission output flange	E46 / E39 / E60 / M57 only	Â	Screw with rolled-on shim only	Â
Â	Â	Â	Jointing torque	50 Nm
Â	Â	Â	Torque angle	90 Â°
Flexible disk to transmission output flange	E65 / E66 / All except N73, M67	Â	Screw with rolled-on shim only	Â
Â	Â	Â	Jointing torque	50 Nm
Â	Â	Â	Torque angle	90 Â°
Flexible disk on propeller shaft	E83	M12 10.9	Tighten via nut	100 Nm
Flexible disk to transmission output flange	E83	M12 10.9	Â	90 Nm
Aluminum propeller shaft: Flexible disk to transmission output flange E39 / E60	M12 10.9	Â	100 Nm	Â
Aluminum propeller shaft: Flexible disk on propeller shaft	E39 / E60	M12 10.9	Â	90 Nm
Â	E60 / E61 / E63 / E64	M10 10.9	Â	64 Nm
Â	E60	M12 8.8	Â	90 Nm
Â	E63 (N52)	M12	Â	110 Nm

Flexible disk to transmission output flange ZNS bolts Shiny zinc coating All versions	Â	Â	Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail	Â
Â	60 / E61 / E63 / E64 / E65 / E83 / E85 / E87 / E90 /	M10 - 10.9	Jointing torque	20 Nm
Â	Â	Â	Torque angle	90Â°
Â	E46 / E60 / E61 / E63 / E64 / E65 / E83 / E85 / E87 / E90	M12-10.9	Jointing torque	55 Nm
Â	Â	Â	Torque angle	90Â°
Â	E60 / E61 / E63 / E64 / E65	M12-8.8	Jointing torque	30 Nm
Â	Â	Â	Torque angle	90 Â°
2AZ Coupling propeller shaft to transmission	All	M10	Â	60 Nm
Â	E32 / E31	M12	Â	95 Nm
3AZ clamping ring for slide afte installation in the car	All	Â	Â	10 Nm
Â	E30 / Four Wheel Drive	Â	Â	22 Nm

26 11 PROPELLER SHAFT, COMPLETE

PROPELLER SHAFT, COMPLETE - TIGHTENING TORQUE SPECIFICATIONS

Application	Type	Thread	Tightening Specification	Measure
4AZ Propeller shaft to drive flange (rear axle)	Â	Â	Â	Â
Version, universal joint: >Compression nut	All	M10	Only finned nuts to higher tightening torque	64 Nm
Version, universal joint: >Torx bolt	All	M10	Â	85 Nm
Version, constant-velocity joint: >Torx bolt	E46 (M3) / E38/ E39/ E46 / E60 / E83 (M57TU) E63 (N52)	M10	Â	70 Nm
Version, constant-velocity joint: >Compression nut	All	M8	Â	32 Nm
Compression nut	All	M10	Â	64 Nm
Finned nut	All	M8	Â	43 Nm
Finned nut	All	M10	Â	70 Nm
ZNS bolts, shiny zinc coating All versions with universal or	Â	Â	Replace bolts and nuts Jointing torque and angle of rotation must be	Â

constant-velocity joint			observed without fail	
Â	E46 / E60 / E61 / E63 / E64 / E65 / E83 / E85 / E87 / E90	M10 - 10,9	Jointing torque	20 Nm
Â	Â	Â	Torque angle	90Â°
Â	E90	M12-10,9	Jointing torque	55 Nm
Â	Â	Â	Torque angle	90Â°
5AZ Pivot to center propeller shaft journal with Loctite (Version without slide)	All	Â	Â	97 Nm
6AZ Center mount to body	All	Â	21 Nm	Â
7AZ Flexible disk to front axle differential	E53	M10 - 10,9	Â	60 Nm
8AZ Flexible disk on propeller shaft	E53	M10 - 10,9	Â	64 Nm
9AZ Front propeller shaft to transfer box/front differential	E83	M10 - 10,9	Â	85 Nm
Â	E60 / E61	M8	Â	51 Nm
ZNS bolts Shiny zinc coating	Â	Â	Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail	Â
Â	E46 / E83	M10 - 10,9	Jointing torque	5 Nm
Â	Â	Â	Torque angle	90Â°
Â	E53	M10 - 12,9	Jointing torque	5 Nm
Â	Â	Â	Torque angle	90Â°

Article GUID: A00202656

OPERATING FLUIDS

Operating Fluids - Front Axle - All Models

1.0 GENERAL INFORMATION ON HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease consists of a lithium complex soap in a mineral oil product with a selected combination of additives. Extremely fine soap is contained in the oil, and serves as the basic ingredient.

This lubricating grease possesses the following properties:

- Very good thermal resistance and penetration stability

  The structure and consistency must be maintained over long service life with temperatures from -22Â°F to +302Â°F (-30Â°C to +150Â°C) in continuous operation and very high loads.

- Oxidation stability

  A lubricating grease contains effective inhibitors (which limit or prevent chemical reactions) in order to stop oxidation at very high operating temperatures.

- Water resistance and corrosion inhibition

  A high temperature multi-purpose grease is water resistant. At the same time lubricated parts are given maximum protection against rust by the corrosion inhibitors.

2.0 APPROVED HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease is used for the lubrication of wheel bearings.

BALL BEARINGS (E24 FROM MID 1982, E28, E30, E31, E32 AND ALL FOLLOWING)

Provided with lifetime lubrication.

No subsequent lubrication approved!

TAPERED ROLLER BEARINGS (E23, E21)

50 grams grease packing in wheel hub and 20 grams in wheel hub grease cap per wheel.

Grease type: Retinax A

CRC Part No. SL 3131 (former BMW Part No. 81 22 9 407 710)

3.0 APPROVED FRONT AXLE FINAL DRIVE OILS

Approvals are the same as for rear axle final drive oils. Refer to REAR AXLE .

Article GUID: A00217933

OPERATING FLUIDS

Operating Fluids - Rear Axle - All Models

1.0 GENERAL INFORMATION ON FINAL DRIVE OIL

Final Drive oil or hypoid gear lubricant must conform with the following requirements because of the high loads which occur on the profiles of the hypoid gear teeth:

- Load carrying capacity.
- Sufficient protection against seizure.
- Good wear protection.
- Optimal friction and temperature behavior.
- Seal compatibility.
- Aging resistance.

These and other properties are already contained in brand-name hypoid gear lubricants because of the high content of EP additives (EP = extreme pressure).

OIL ADDITIVES

The factory has not approved oil additives for hypoid gear lubricants.

All final drives are designed in such a manner that they do not require any type of oil additives. Any type of additives is fundamentally rejected by the factory. BMW NA cannot accept any liability for follow-up damage resulting from the use of additives.

2.0 APPROVED FINAL DRIVE OILS FOR FRONT AND REAR AXLE FINAL DRIVES WITH AND WITHOUT LIMITED SLIP OR VISCOUS COUPLING

Mineral based final drive oils are no longer recommended due to the release of synthetic final drive oils for all vehicles with or without limited slip differentials.

LIMITED SLIP DIFFERENTIALS

With the introduction of the Z3 roadster a new synthetic final drive oil for all vehicles with a multi-plate limited-slip differential has been released. The new BMW final drive oil SAF-XJ will replace the old final drive oil SAF-XLS.

The SAF-XLS final drive oil is not to be used in the final drive of the Z3 roadster.

Use only the SAF-XJ in the final drive of the Z3 roadster.

NOTE: If a non-limited slip differential oil is used in a limited slip differential a whining or chattering sound can be heard on very tight turns and will eventually result in a failure of the differential.

DIFFERENTIAL OIL SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil	55 liter drum	83 22 1 470 080
(with multi-plate Limited Slip Differential) (SAF-XJ)		

E60 M5 utilizes a multi-plate Limited Slip Differential requiring SAF XJ fluid.

Non-Limited Slip Differentials

NON-LIMITED SLIP DIFFERENTIAL OIL SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil	55 liter drum	83 22 9 407 768
(without multi-plate limited slip differential,or with viscous differential lock (325iX/iXA) (SAF-XO)		

NOTE: See S.I. Bulletin B 33 01 92 for additional final drive oil info.

3.0 FINAL DRIVE OIL FOR BMW M1 MOTORSPORT COUPE

The final drive of a BMW M1 is integrated in the manual transmission and oil supply is accomplished with a mutual oil filling.

Use reputable brand SAE 80 manual transmission oil conforming with specifications MIL-L-2105 A or API-GL 4.

4.0 OIL CHANGE INTERVALS

Maintenance requirements per the vehicle's Service Booklet or the respective Service Maintenance Checklist.

Replacement final drives: same as for new vehicles.

All models as of 9/97 production are factory-filled with synthetic rear axle oil having a lifetime service rating. No oil changes are required for the life of the vehicle.

5.0 CARS WITHOUT SERVICE INDICATOR (INCLUDING BMW M1)

First oil change at 600 miles

Further oil changes at 18,000 miles

Special Rule For BMW 530I, 528I (E 12):

1st oil change at 600 miles after final drive replacement.
2nd oil change at 4,500 miles after final drive replacement.
Further oil changes at 9,000 miles intervals, beginning at 9,000 miles.

6.0 CARS WITH SERVICE INDICATOR

Refer to Service Maintenance checklist for respective model year.

BREAK-IN PROCEDURES

Drive the car with changing engine speeds and road speeds during the first 1,200 miles/2,000 km, but never faster than 2/3rds of maximum speed in a selected gear. Avoid using full throttle and kick-down positions of the accelerator pedal during this period.

BMW M3/M5/M6 Up to 1,200 miles max. engine speed 5500 RPM

Generally avoid full-throttle position of the accelerator.

These break-in procedures are, of course, also applicable to replacement final drives.

7.0 OUTPUT SHAFTS

The joints of output shafts have permanent grease lubrication and require no servicing.

The amount of joint grease required after repairing is supplied in the " dust cover repair kit".

8.0 WHEEL BEARINGS

BALL BEARINGS E24 (SINCE 5/82), E28, E30, E31, E32 AND ALL FOLLOWING

Bearing unit is lubricated for its service life, cannot be disassembled and does not require subsequent lubrication.

GROOVED BALL BEARINGS E12, E21, E23, E24 BEFORE 5/82

Grease type: Retinax A (former BMW Part No. 81 22 9 407 710)

CRC Part No. SL 3131

9.0 DIFFERENTIAL HOUSING FINAL DRIVE COVERS AND HOUSING

On 735i/iL, 750iL, M6 and M5 (E28) models, the attaching bolts are to be installed with Hylogrip/Loctite 270 (green) thread sealant (former BMW Part No. 81 22 9 400 086).

SEALANT SPECIFICATION

Wurth	Part No. 8932700
Loctite	Part No. 21438

See S.I. Bulletins B 33 01 89 (1869) and B 33 01 88 (1621).

Article GUID: A00217935