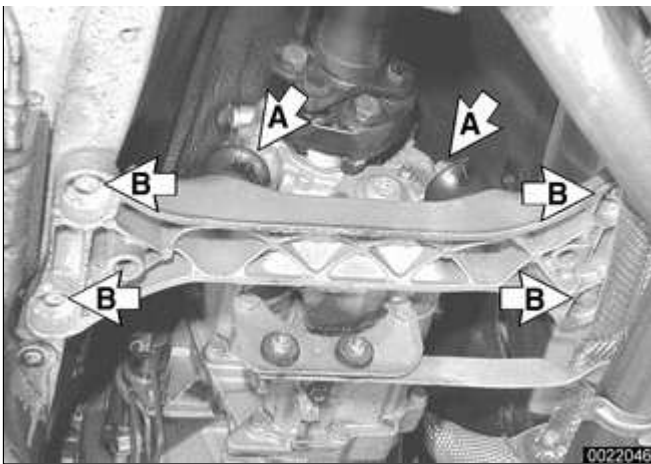


Tightening torques	
M10 (10.9 grade)	60 Nm (44 ft-lb)
M12 (10.9 grade)	100 Nm (74 ft-lb)
Transmission / transfer case crossmember to chassis (M8)	21 Nm (15 ft-lb)
Transfer case to transmission (M10)	41 Nm (30 ft-lb)

### Output shaft seal, replacing (transmission installed)

- Raise and safely support vehicle.
- Support transmission with transmission jack.



On rear wheel drive cars:

- ◆ Remove driveshaft. See ⇒ [260 Driveshaft](#).
- ◆ Remove transmission mount bolts (A).
- ◆ Remove transmission crossmember bolts (B) and tilt down rear of transmission.



On all wheel drive cars:

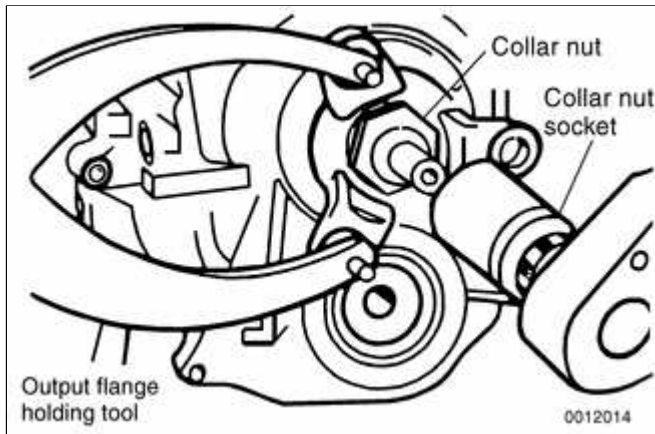
- ◆ Remove front and rear driveshafts. See ⇒ [260 Driveshaft](#)
- ◆ Remove transfer case crossmember bolts (arrows) and remove transfer case. See ⇒ [270 Transfer Case](#).



### CAUTION!

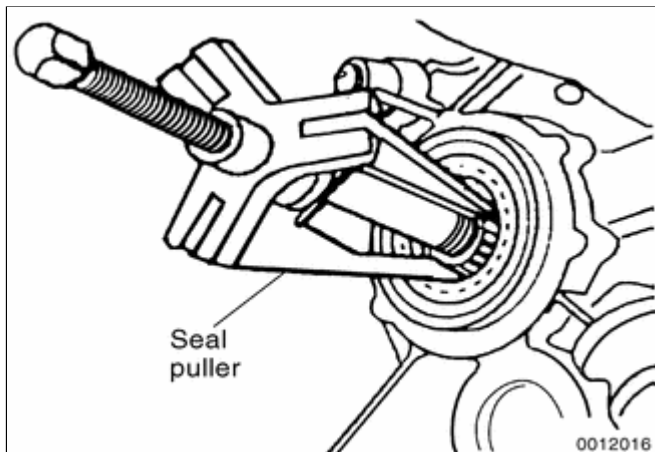
**Tilting the engine to lower the transmission can lead to damage to various components due to lack of clearance.**

- Bend back and remove transmission output collar nut lockplate.

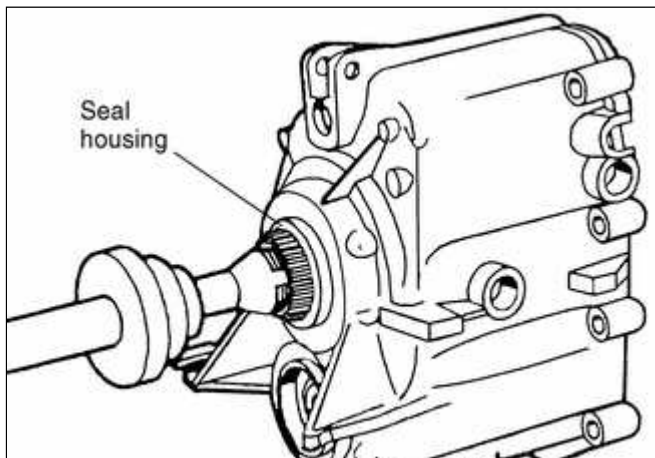


- Remove collar nut with 30 mm thin-walled deep socket. Counterhold output flange to prevent it from turning.

- Remove output flange. If necessary, use a puller.



- Use a seal puller to remove seal from transmission housing



- Coat new seal with transmission fluid and drive into position until it is flush with housing. Use seal driver (BMW special tool 23 2 300) or equivalent.

- Reinstall output flange (and shims, if applicable) to output shaft.

### Note:



*On Getrag S5D 250G transmissions BMW recommends heating the output flange to about 176F (80C) to aid in installation. This can be done by placing the flange in hot water.*

- Coat bearing surface of collar nut with sealer and install nut. Tighten collar nut in two stages. Install new lockplate. Bend tabs into flange grooves.

**Note:**

*BMW recommends the use of a sealer such as Loctite<sup>®</sup> 242 when installing the flange collar nut to prevent oil from leaking past the threads.*

- Installation is reverse of removal, noting the following:
- ◆ Install driveshaft using new nuts. See ⇒ [260 Driveshaft](#).
- ◆ Check transmission and transfer case fluid level, if applicable, topping up as necessary.

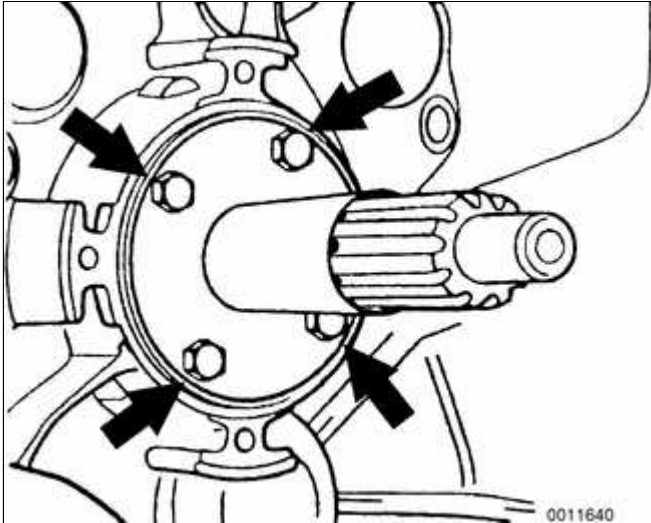
Tightening torque	
Transmission crossmember to chassis	
M8	21 Nm (15 ft-lb)
Transmission output flange to output shaft	
Stage I	190 Nm (140 ft-lb)
Stage II (after loosening)	120 Nm (89 ft-lb)

## Input shaft seal, replacing

**(transmission removed)**

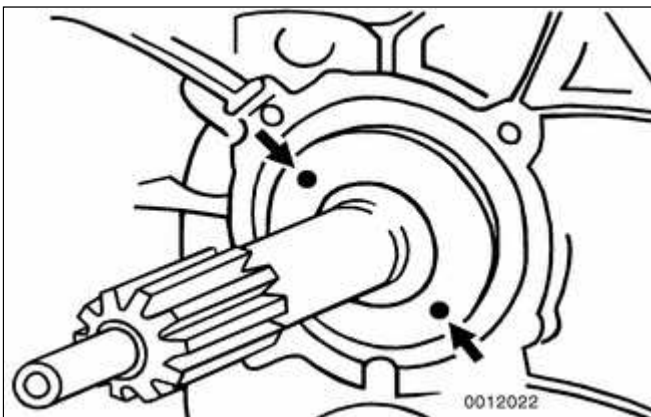
Replacement of the input shaft seal requires the removal of the transmission from the vehicle as described later in this repair group.

- Remove clutch release bearing and release lever from inside bellhousing.



- ✦ Remove bolts (**arrows**) for clutch release-bearing guide sleeve, noting bolt lengths (Getrag transmission shown). Remove sleeve and any spacers (shims) under it.

- With transmission on a workbench, remove input shaft seal cover from inside bell-housing.



- ✦ Locate two indents (**arrows**) in seal. Thread a slide hammer seal puller at indents, pull seal and remove seal
- Use care not to scratch or damage input shaft. Use a protective sleeve or tape the shaft when removing and installing the seal.
- Lubricate new seal with transmission oil and drive into place using an appropriate drift.
- Thoroughly clean guide sleeve mounting bolts, sealing surfaces, and threads in case. Apply sealer (Loctite<sup>®</sup> 242 or equivalent) to guide sleeve sealing surface and bolts. Reinstall guide sleeve and spacer(s).

Tightening torque	
Guide sleeve to transmission	
M6x12 bolt	10 Nm (89 in-lb)

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## Transmission Removal and Installation

Removal and installation of the transmission is best accomplished on a lift using a transmission jack. The engine must be supported from above using appropriate support equipment. This allows the engine to pivot on its mounts to access the upper Torx-head bolts at the bellhousing.

### **WARNING!**

- ♦ *Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.*
- ♦ *The removal of the transmission may upset the balance of the vehicle on a lift.*

## Transmission, removing and installing

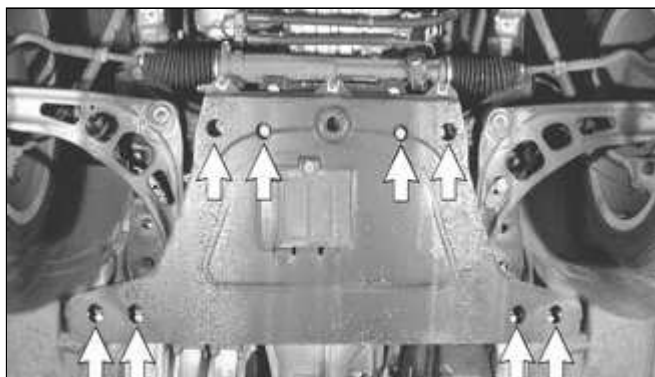
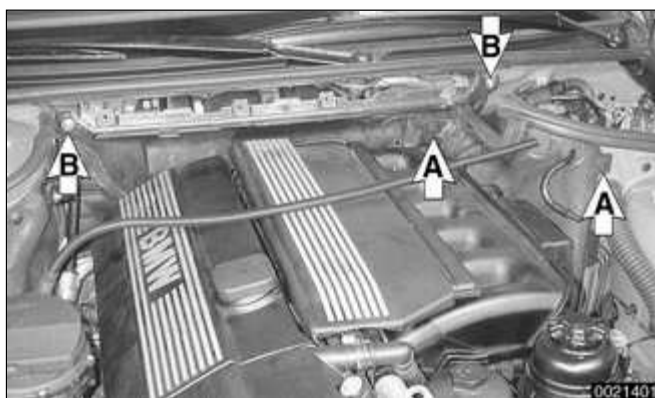
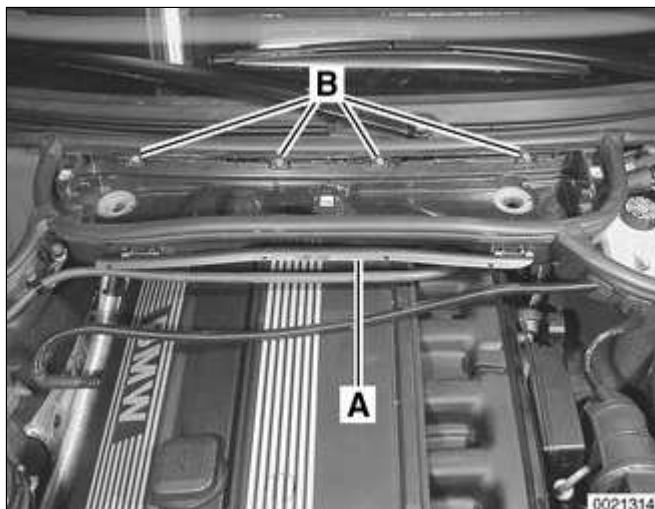
- Disconnect negative (-) cable from battery.

### **CAUTION!**

*Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.*



- ◀ Remove engine cooling intake hood fasteners (**arrows**) at front of engine compartment.



➤ Remove housing for interior ventilation microfilter.

- ◆ Remove upper cover and microfilter.
- ◆ Open wiring harness loom cover (A) and remove wires.
- ◆ Unfasten screws (B) and remove lower microfilter housing.

➤ Remove heater bulkhead cover.

- ◆ Remove engine compartment side trim panel. Turn locking knobs (A) and slide trim panel from mounting lip.
- ◆ Remove heater bulkhead cover mounting screws (B) and lift cover up and out from firewall.

- Raise and safely support vehicle.

- Remove engine splashguard from underside of vehicle.

➤ Remove front suspension reinforcement bolts (arrows). Remove reinforcement (coupe shown) and front axle subframe.

**Note:**

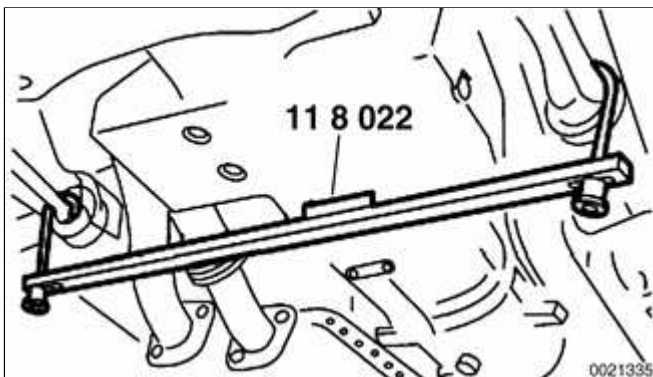
- ◆ *Tubular style front end reinforcements are used in rear*



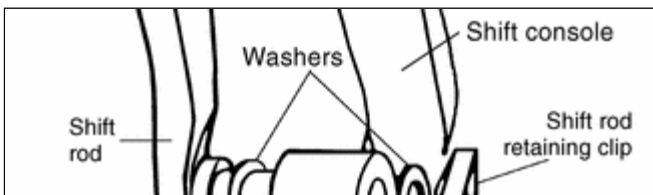


*wheel drive 3 Series sedans and wagons built up to 11/00 and coupes built up to 10/99.*

- ◆ *Pan style front end reinforcements are used on rear wheel drive sedans and wagons built after 12/00, coupes built after 11/99 and all convertibles.*
- ◆ *All wheel drive models require no reinforcement due to the construction of the front subframe.*

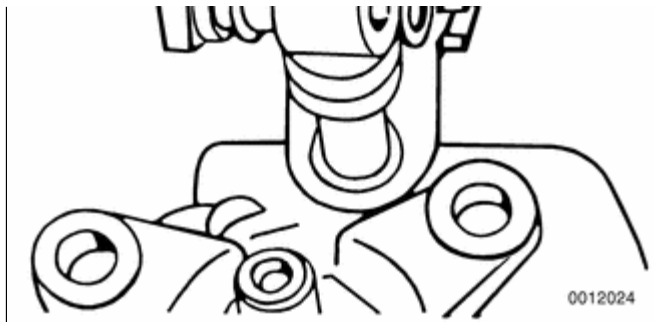


- ✦ Attach BMW special tool 11 8 022 to left and right lower control arms. Tighten knurled screws until tool makes contact with engine oil pan.
  - Support transmission with transmission jack. Remove reinforcing cross brace from below engine/transmission.
  - Disconnect harness connector from back-up light switch on transmission.
  - Remove exhaust system and heat shield. See ⇒ [180 Exhaust System](#)
  - Remove driveshaft. See ⇒ [260 Driveshaft](#).
  - On all wheel drive vehicles: Remove transfer case. See ⇒ [270 Transfer Case](#).
- ✦ Disconnect shift rod from selector shaft coupling.



- Disconnect shift console from top





of transmission. See ⇒ [250 Gearshift Linkage](#).

- Unbolt clutch slave cylinder from side of transmission. Do not disconnect fluid hose. Suspend slave cylinder from chassis using stiff wire.

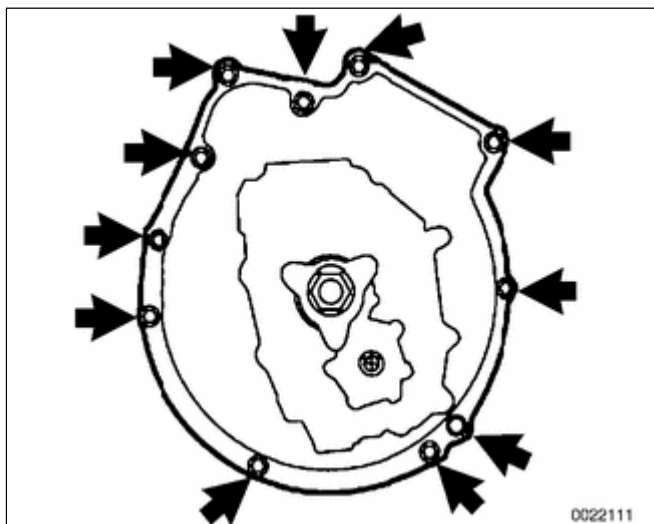
### **CAUTION!**

***Do not operate clutch pedal with slave cylinder removed from transmission.***

- Loosen knurled screws of BMW special tool 11 8 022 until transmission/engine assembly is just above, but not in contact with fire wall and heater connections.

### **CAUTION!**

***Tilting the engine to lower the transmission can lead to damage to various components due to lack of clearance at rear of engine -Remove brake fluid reservoir if necessary.***

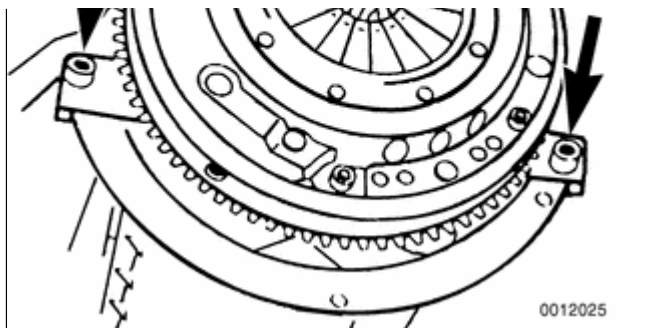


- Remove transmission mounting Torx-head bolts (**arrows**). Note length and location of bolts.

- Remove transmission by pulling backward until the transmission input shaft clears the clutch disc splines, then pull downwards. Lower jack and remove transmission.



- Installation is reverse of removal, keeping in mind the following:



- ◆ When installing a new transmission, be sure to transfer parts from old transmission if applicable.
- ◆ Thoroughly clean input shaft and clutch disc splines. Lightly lubricate transmission input shaft before installing.
- ◆ Be sure bellhousing dowels (**arrows**) are correctly located.
- ◆ Center rear of transmission in driveshaft tunnel before tightening transmission support bracket.
- ◆ Always replace front end reinforcement mounting fasteners on vehicles equipped with the plate style reinforcement.

**Note:**

*Torx-head mounting bolts should always be used with washers to prevent difficult removal in the future.*

- Install driveshaft and preload center bearing bracket. Use new nuts when mounting driveshaft to transmission/flex disc and final drive. See ⇒ [260 Driveshaft](#).
- Refill transmission with appropriate lubricant before starting or towing the car. See ⇒ [Transmission Fluid Service](#) earlier in this repair group.

**Tightening torques**

Front end reinforcement to chassis and subframe (M10)

Tightening torques	
(tubular style)	42 Nm (31 ft-lb)
(pan style)	59 Nm (44 ft-lb) + 90°
Rubber mount to transmission or bracket nut (M8)	21 Nm (15 ft-lb)
Slave cylinder to transmission	22 Nm (16 ft-lb)
Transmission crossmember to chassis	
M8	21 Nm (15 ft-lb)
Transmission to engine (Torx-head)	
M8	22 Nm (16 ft-lb)
M10	43 Nm (32 ft-lb)
M12	72 Nm (53 ft-lb)
Transmission drain/fill plug	50 Nm (37 ft-lb)

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## General

This section covers maintenance and replacement of the E46 automatic transmission. Internal repairs to the automatic transmission are not covered. Special tools and procedures are required to disassemble and service internal automatic transmission components.

Automatic transmissions are identified by code letters found on a data plate located on the side or rear of the transmission case. See ⇒ [200 Transmission-General](#) for application information. For gear ratio specifications, see ⇒ [Table a. Automatic transmission applications.](#)

### **CAUTION!**

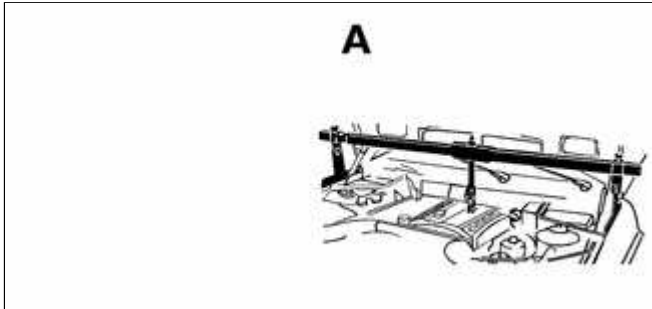
***ATF does not circulate unless the engine is running. When towing an automatic transmission vehicle, use a flat-bed truck or raise the rear wheels off the ground. All wheel drive vehicles equipped with automatic transmissions must be towed using a flat-bed truck only.***

The electronic transmission control module (TCM) monitors transmission operation for faults and alerts the driver by illuminating the transmission fault indicator on the instrument panel. On-board diagnostic codes stored in the TCM must be downloaded and interpreted by trained technicians using special BMW diagnostic equipment.

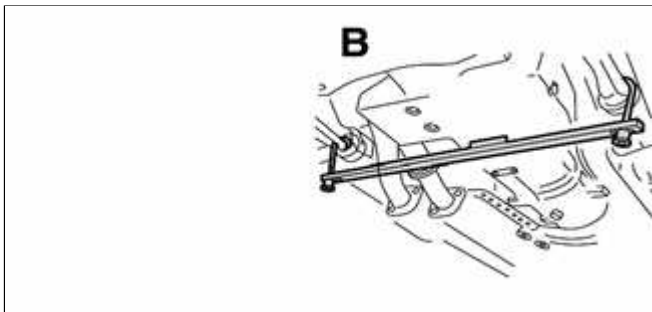
## Special tools

Some special tools are required for the removal and installation of an automatic transmission on the E46 BMW models. While these tools are not

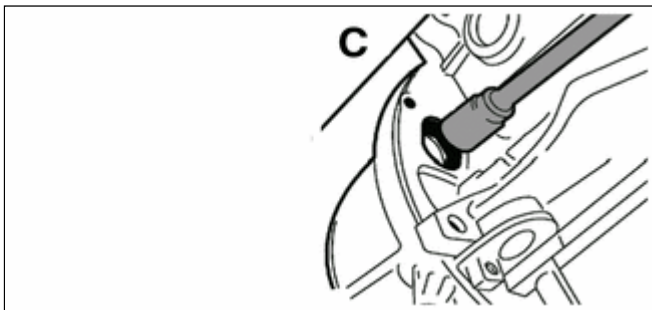
absolutely necessary, they are especially helpful when dealing with the removal and replacement of the torque converter.



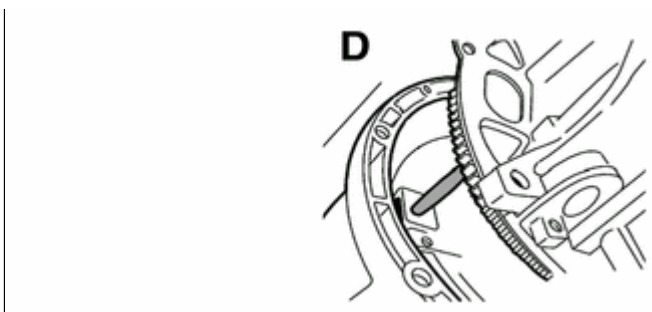
- ◀ Engine support bracket BMW 00 0 200 / 208



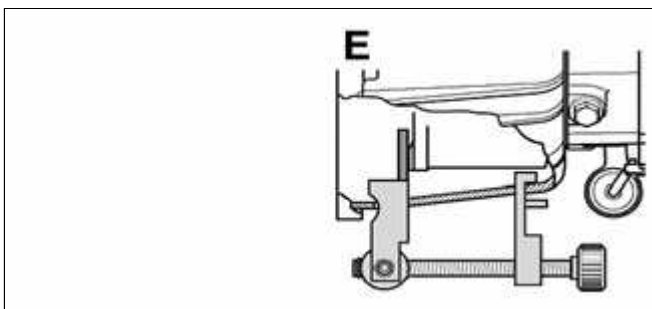
- ◀ Oil pan support bracket BMW 11 8 022



- ◀ Torque converter socket BMW 24 1 100



- ◀ Spline bore alignment tool BMW 24 2 300



- ◀ Torque converter clamp BMW 24 4 131 / 135

Internal repairs to the automatic transmission require special service equipment and knowledge. If it is determined that internal service is required, consult an authorized BMW

dealer about a factory reconditioned unit or a transmission rebuild.

323i/Ci and 328i/Ci models manufactured from 08/98 to 03/00 are equipped with the A5S 360R automatic transmission. Vehicles produced after 03/00 are equipped with the A5S 325Z transmission.

**Table a. Automatic transmission applications**

Model	Year	Engine	Transmission
323i/Ci 328i/Ci	1999 - 2000 2000 - 2001	M52TU	GM A5S 360R ZF A5S 325 Z
325i/Ci 330i/Ci	2000 - 2001	M54	ZF A5S 325 Z
325xi 330xi	2000 - 2001	M54	GM A5S 390R

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## Transmission Service



- ✦ The automatic transmissions installed in the 3 Series are filled with either Dexron III ATF, or Texaco 8072B a special life-time oil.

### **CAUTION!**

**Mixing different types of transmission fluids will lead to transmission failure.**

### **Note:**

*The transmission lubricant installed can be found on a sticker on the transmission pan. Dexron III ATF (black sticker) reads "ATF-Oil!". Special life-time oil (green sticker) reads "Life-Time Oil". In addition, a sticker may be located on the fluid sump indicating the type of transmission lubricant used. If in doubt, consult an authorized BMW dealer for alternate fluid use and current information regarding transmission operating fluids.*

## Automatic transmission fluid (ATF) level, checking

The automatic transmission is not equipped with a dipstick. Checking the ATF level requires measuring and maintaining a specified ATF temperature within a narrow range during the checking procedure. The checking temperature is not fully warm or cold (the ATF pan should be approximately warm to the touch).

- Raise and safely support vehicle to access ATF fill plug.

### **CAUTION!**

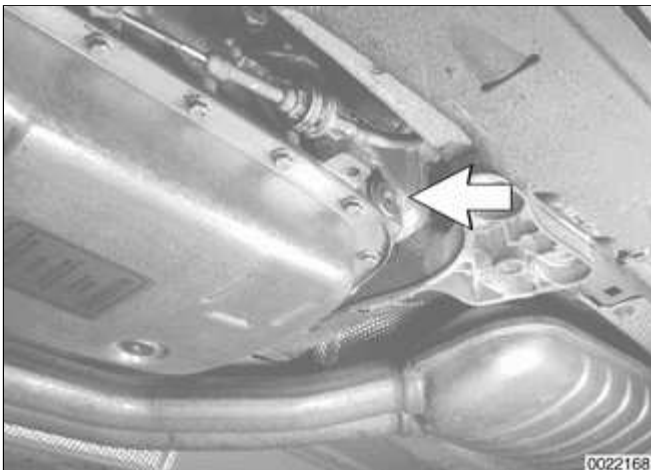


**Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.**

- Warm up drivetrain by running engine until ATF reaches specified temperature. Apply brake and, while idling engine, shift through all gears several times. Turn engine off.

ATF level checking	
Fluid temperature	30° - 50°C (85° - 120°F)

- Connect vehicle to BMW diagnostic scan tool DIS or MoDiC using the Data Link Connector (DLC) in the engine compartment, or under driver's side of dash (model year 2000 and later cars) in order to read transmission temperature.



- 4 Remove ATF fill plug (**arrow**). Place transmission in neutral and restart engine. (A5S 360R transmission shown.)

**Note:**

*Make sure ATF temperature is greater than 30°C, before releasing fill plug.*

- With ATF between 30° - 50°C (85° - 120°F), add fluid until it spills from fill hole.

**WARNING!**

**Hot ATF can scald. Wear eye protection and protective clothing and gloves during the check. If the transmission was overfilled, hot ATF**

**will spill from the filler hole when the fill plug is removed.**

- Reinstall fill plug using new sealing ring.

Tightening torques	
ATF drain plug to ATF sump	
A5S 360R / A5S 390R (M14)	20 Nm (15 ft-lb)
A5S 325Z	35 Nm (26 ft-lb)
ATF fill plug to ATF sump	
A5S 360R / A5S 390R (M14)	20 Nm (15 ft-lb)
A5S 325Z	30 Nm (22 ft-lb)

## ATF, draining and filling

The procedure given here includes removal and installation of the ATF fluid strainer (filter).

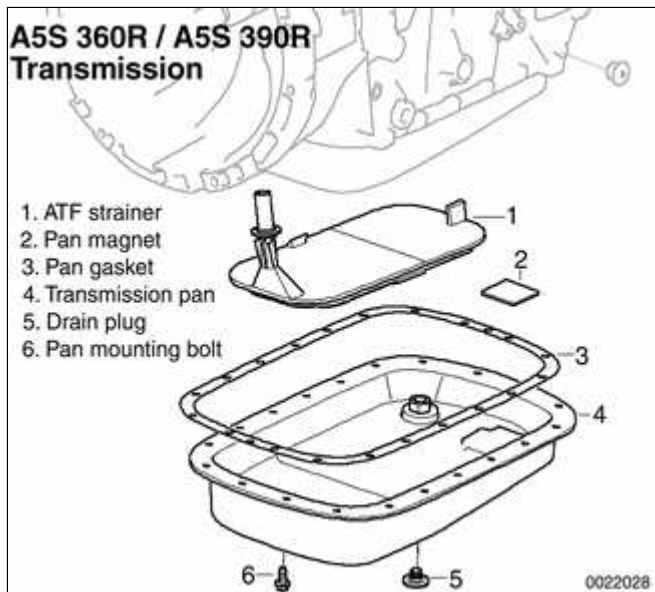


- Remove ATF drain plug (**arrow**) and drain fluid into container. (A5S 360R transmission shown.)

### **WARNING!**

**The ATF must not be hot when draining. Do not drain the ATF if the engine and/or transmission is hot. Hot ATF can scald. Wear eye protection, protective clothing and gloves.**

- Remove transmission pan mounting bolts and remove pan.
- Remove pan gasket and clean gasket sealing surface.



✈ Pull ATF fluid strainer from transmission pump housing. If strainer sealing ring remains in pump housing remove using a seal puller.

- Installation is reverse of removal.
- ◆ Always replace seal for drain plug and all gasket(s) and O-rings.
- ◆ Clean sump and sump magnet(s) using a lint-free cloth.
- ◆ Tighten transmission pan bolts in sequential order.
- ◆ Fill transmission with approved fluid.
- ◆ Check fluid level as described under ⇒ [Automatic transmission fluid \(ATF\) level, checking](#)

**Note:**

*Use new sump bolts purchased from BMW. Alternatively, clean old bolts and coat with Loctite® thread locking compound or equivalent.*

Automatic transmission fluid capacity	
A5S 360R / A5S 390R	
with torque converter	9 liters (9.5 qt)
without torque converter	4 liters (4.2 qt)
A5S 325Z (2.5 liter)	
with torque converter	8.9 liters (9.4 qt)

<b>Automatic transmission fluid capacity</b>	
without torque converter	6.2 liters (6.5 qt)
A5S 325Z (3.0 liter)	
with torque converter	8.7 liter (9.2 qt)
without torque converter	6.1 liter (6.4 qt)

<b>Tightening torques</b>	
ATF drain plug to ATF sump	
A5S 360R / A5S 390R (M14)	18 Nm (14 ft-lb)
A5S 325Z	35 Nm (26 ft-lb)
ATF fill plug to ATF sump	
A5S 360R / A5S 390R (M14)	18 Nm (14 ft-lb)
A5S 325Z	30 Nm (23 ft-lb)
ATF sump to transmission	
A5S 360R / A5S 390R (M14)	10 Nm (7 ft-lb)
A5S 325Z	6 Nm (4 ft-lb)

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## Transmission Removal and Installation

Removal and installation of the transmission is best accomplished on a lift using a transmission jack. Use caution and safe workshop practices when working beneath car and lowering transmission.

### **CAUTION!**

- ♦ *Be sure the vehicle is properly supported. The removal of the transmission may upset the balance of the vehicle on a lift.*
- ♦ *Tilting the engine to remove the transmission can lead to damage to various components due to lack of clearance.*
- ♦ *On cars with AST remove throttle body.*
- ♦ *Remove brake fluid reservoir if necessary.*

Torx-head bolts are used to mount the transmission to the bellhousing. Be sure to have appropriate tools on hand before starting the job.

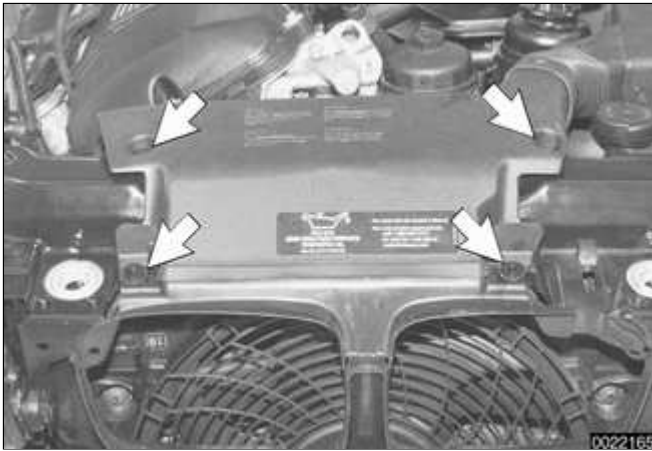
### Transmission, removing and installing

- Disconnect negative (-) cable from battery.

### **CAUTION!**

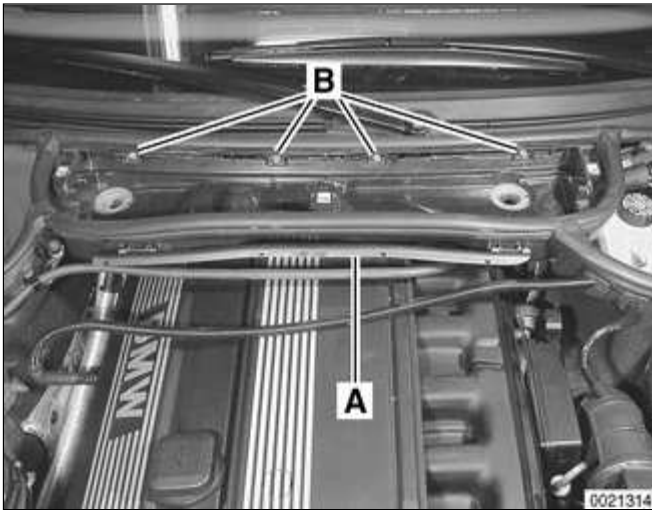
*Prior to disconnecting the battery,*

**read the battery disconnection cautions given at the front of this manual on page viii.**



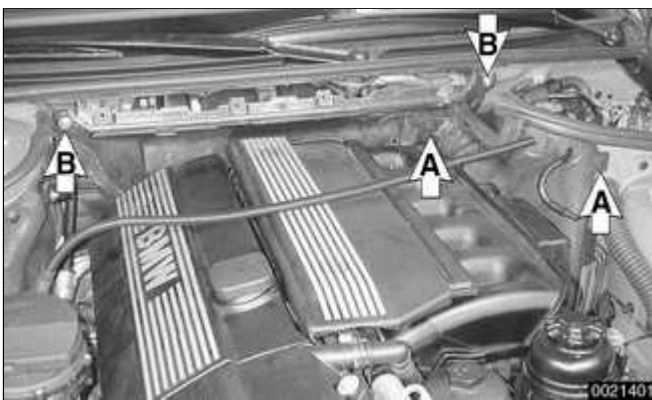
- Remove engine cooling intake hood fasteners (**arrows**) at front of engine compartment.

- Remove engine driven cooling fan, unfasten cooling fan cowl and pull slightly upwards. See ⇒ [170 Radiator and Cooling System](#).



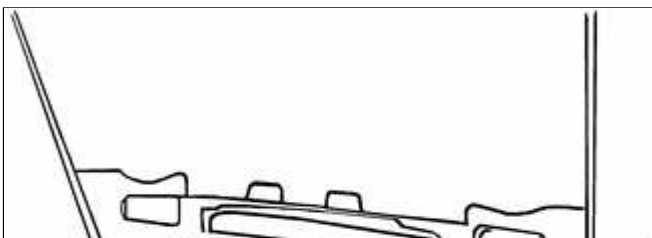
- Remove housing for interior ventilation microfilter.

- ◆ Remove upper cover and microfilter.
- ◆ Open wiring harness loom cover (**A**) and remove wires.
- ◆ Unfasten screws (**B**) and remove lower microfilter housing.



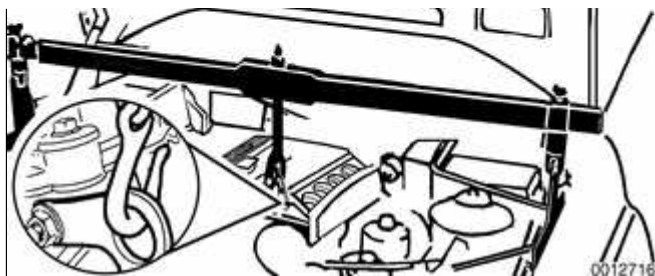
- Remove heater bulkhead cover.

- ◆ Remove engine compartment side trim panel. Turn locking knobs (**A**) and slide trim panel from mounting lip.
- ◆ Remove heater bulkhead cover mounting screws (**B**) and lift cover up and out from firewall.



- Install engine support across engine bay. Raise and safely support vehicle.

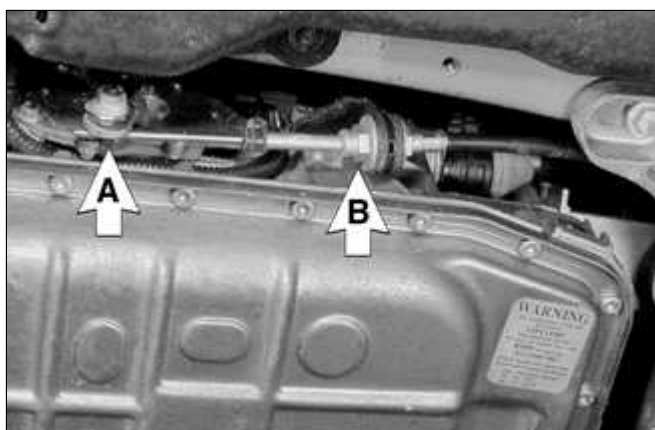
**CAUTION!**



- ♦ **Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.**

- ♦ **Removal of transmission will cause engine to tip unless engine support is used.**

- Remove engine splash guard from underside of vehicle.
- Remove front suspension reinforcement at lower control arms and front subframe.
- Drain ATF from transmission as described earlier.
- Remove exhaust system and exhaust heat shield. See ⇒ [180 Exhaust System](#).
- Remove driveshaft(s). See ⇒ [260 Driveshaft](#).
- On all wheel drive equipped vehicles: Remove transfer case. See ⇒ [270 Transfer Case](#).

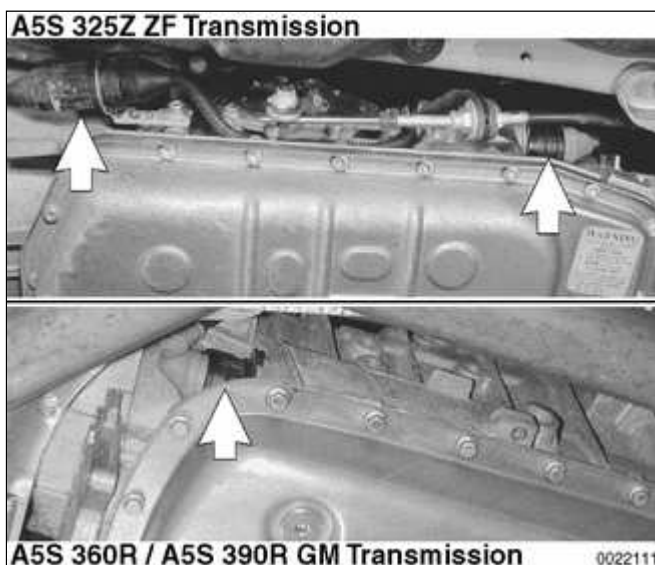


- ✦ With selector lever in Park, disconnect shift selector lever cable from lever and remove cable bracket.
- ♦ Hold linkage clamping bolt (A) stationary when loosening selector lever cable clamping nut (B).
- ♦ Loosen cable clamping nut and

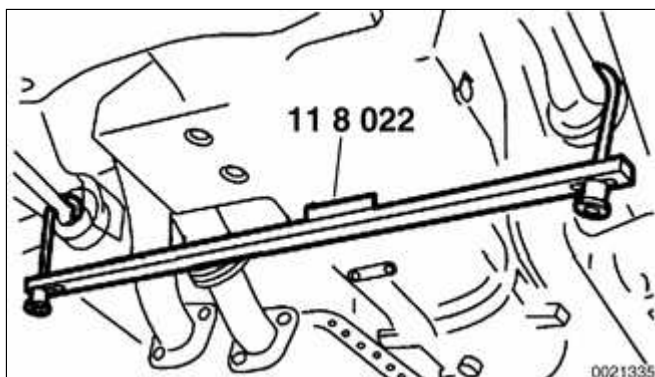




remove cable from bracket. (A5S 325Z transmission shown.)



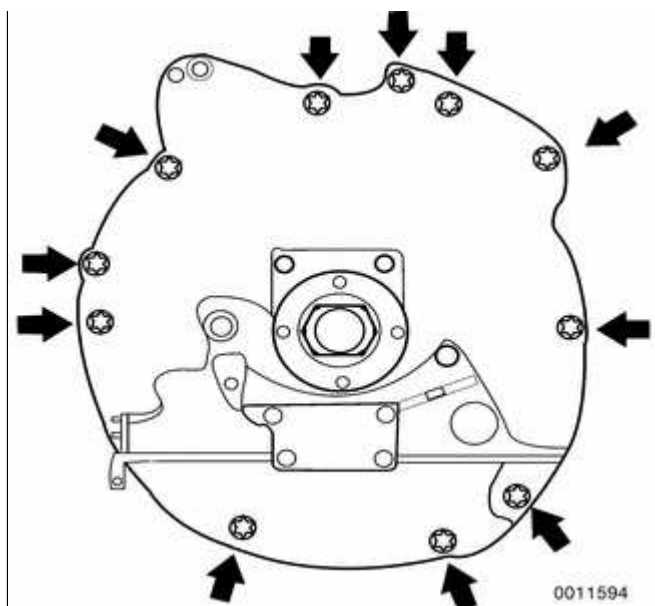
- ✦ Disconnect electrical harness connector(s) from transmission by turning bayonet lock ring(s) (**arrows**) counterclockwise.
  - ◆ On A5S 325Z disconnect two connectors on the left side of the transmission.
  - ◆ On A5S 360R / A5S 390R disconnect the harness connector at the right rear of the transmission.
  - ◆ Remove wiring harness(s) from transmission housing.
- Disconnect transmission cooler line clamps from engine. Disconnect cooler lines from transmission.



- ✦ Attach BMW special tool 11 8 022 to lower control arms.
  - Support transmission with transmission jack. Remove transmission support crossmember.
  - Lower transmission until engine cylinder head touches firewall. Tighten knurled screws of BMW special tool 11 8 022 until tool supports engine oil pan securely.



- ✦ Remove access plug in cover plate on right side of engine block and remove torque converter bolts. Turn crankshaft to access bolts.



Remove bellhousing-to-engine mounting bolts (**arrows**).

- Install BMW special tools 24 4 131 and 24 4 135 to secure torque converter in place during transmission removal.

**CAUTION!**

**Do not allow the torque converter to fall off the transmission input shaft.**

- Remove transmission by pulling back and down. Lower jack to allow transmission to clear vehicle.
- Installation is reverse of removal, noting the following:
  - ◆ Blow out oil cooler lines with low-pressure compressed air and flush cooler with clean ATF twice before reattaching lines to transmission.

**CAUTION!**

- ◆ **Wear safety glasses when working with compressed air.**
- ◆ **Do not reuse ATF after flushing.**
- ◆ Install new sealing washers on hollow bolts.

- ◆ Install new O-rings on transmission cooler lines, where applicable.
- ◆ Inspect engine drive plate for cracks or elongated holes. Replace if necessary.
- ◆ Check to be sure torque converter is seated correctly in transmission during final installation.
- ◆ When mounting transmission to engine, the three mounting tabs on torque converter must be aligned with indentations on drive plate. Use an alignment dowel to line up bolt holes, if necessary.
- ◆ Fill transmission with clean ATF until oil level is even with fill hole. Then check fluid level as described earlier.
- ◆ Adjust gearshift mechanism. See ⇒ [270 Transfer Case](#).

**Note:**

*Torx-head mounting bolts should always be used with washers to prevent difficult removal in the future.*

Tightening torques	
ATF drain plug to ATF sump	
A5S 325Z	35 Nm (26 ft-lb)
A5S 360R	20 Nm (15 ft-lb)
ATF fill plug to ATF sump	
A5S 325Z	30 Nm (22 ft-lb)
A5S 360R	20 Nm (15 ft-lb)

Tightening torques	
Front suspension reinforcement to chassis (M10)	42 Nm (30 ft-lb)
Torque converter to drive plate (M10)	45 Nm (33 ft-lb)
Transmission support crossmember to chassis	23 Nm (17 ft-lb)
Transmission to engine (Torx-head with washer)	
M8	21 Nm (15 ft-lb)
M10	42 Nm (31 ft-lb)
M12	72 Nm (53 ft-lb)

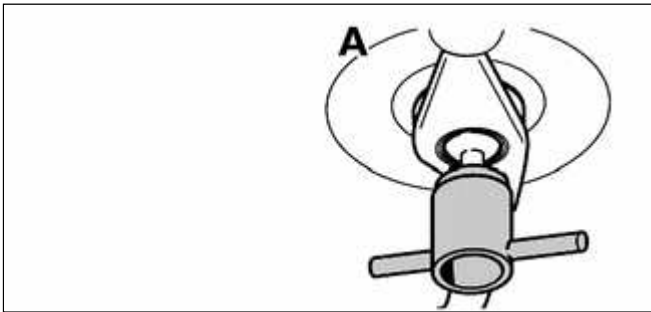
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## General

This repair group covers transmission gearshift and linkage service for both manual and automatic transmission equipped vehicles.

## Special tools

BMW suggests the use of one special tool in the removal of the gear shift lever for manual transmission equipped vehicles.

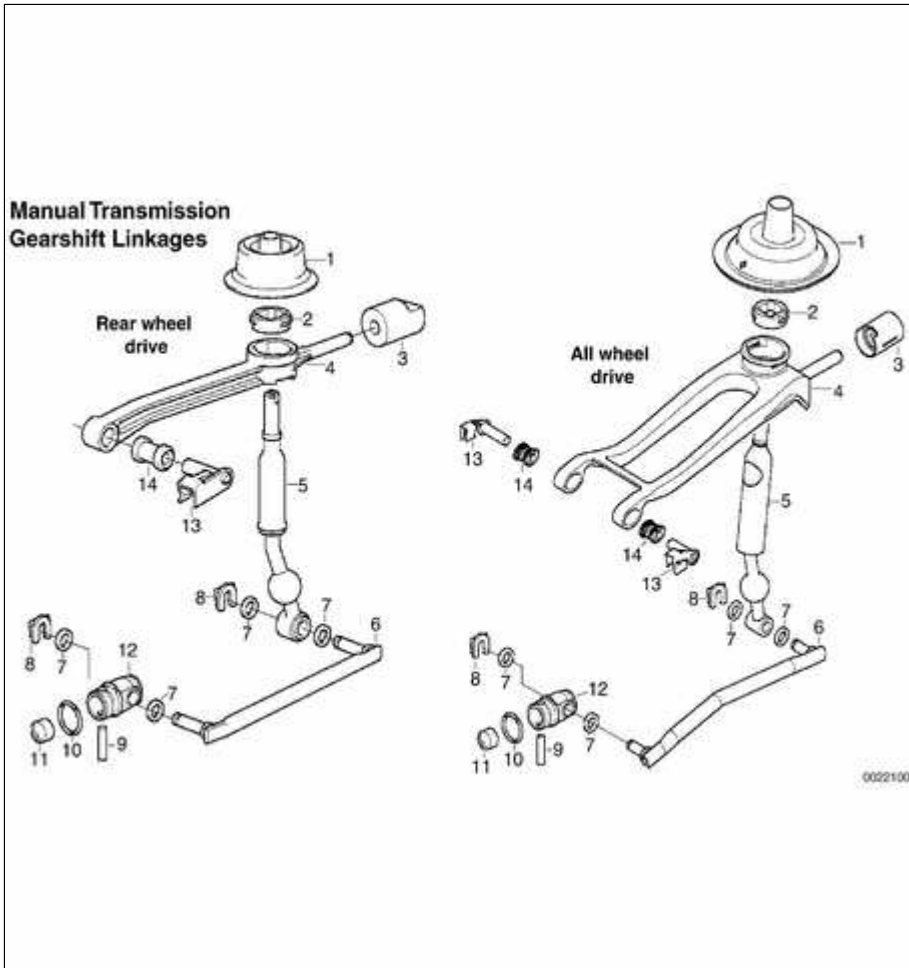


Pin wrench BMW 25 1 110

To gain access to the complete gearshift mechanism it is necessary to remove the exhaust system and the driveshaft as described in ⇒ [180 Exhaust System](#) and ⇒ [260 Driveshaft](#).

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## Manual Transmission Gearshift



### Manual Transmission Gearshift Linkages

- 1 - Rubber boot
- 2 - Shift lever bearing
- 3 - Shift arm bearing
- 4 - Shift arm
- 5 - Shift lever
- 6 - Selector rod
- 7 - Spacer ring
- 8 - Circlip
- 9 - Dowel pin
- 10 - Lock ring
- 11 - Washer
- 12 - Gear selector rod joint
- 13 - Bearing bolt
- 14 - Bearing bushing

**Gearshift lever, removing  
(manual transmission)**

Use the above illustration as a guide when removing and installing the linkage.

- Remove shift knob by pulling knob straight off the manual gearshift.

**Note:**

*Removal of the shift knob will require about 90 lbs. of force. Do not twist knob or locating key can be damaged.*

- Pry up on rear of shift boot to unclip, then remove boot from front retainers.
- Raise vehicle to gain access to underside of vehicle.

**WARNING!**

***Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.***

- Remove complete exhaust system. See ⇒ [180 Exhaust System](#).
- Remove driveshaft(s). See ⇒ [260 Driveshaft](#).



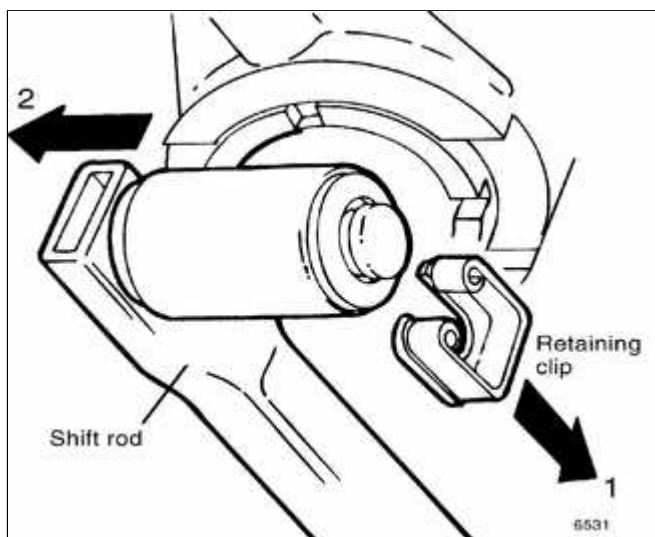
- ◀ Support transmission with transmission jack. Remove crossmember (**arrow**) from rear of transmission.

- Lower rear of transmission to access gearshift linkage.

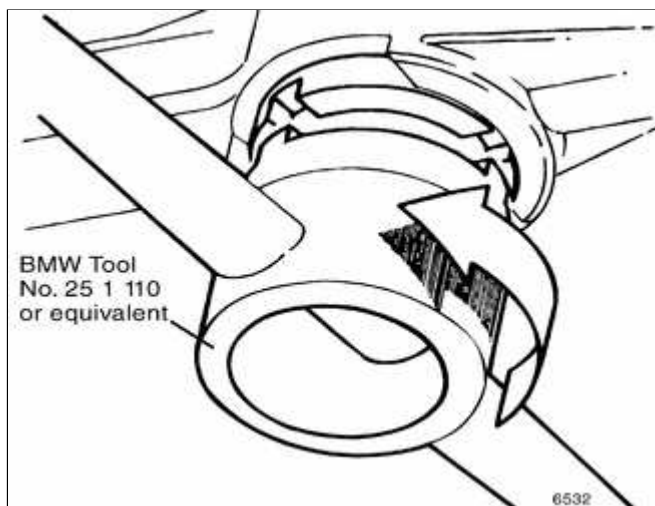
**CAUTION!**

***Tilting the engine to lower the transmission can lead to damage to***



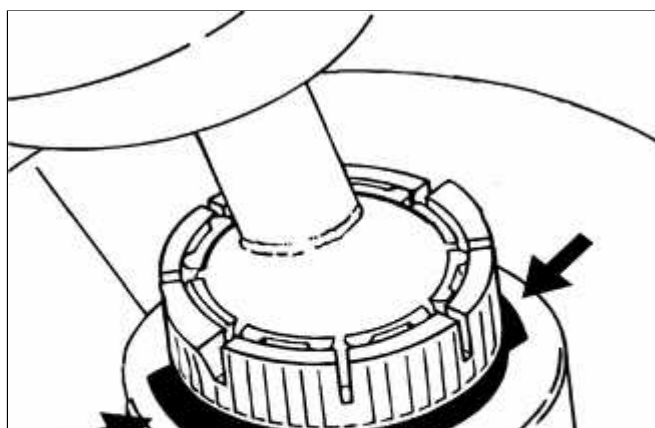


- ◀ Working above transmission, disconnect shift rod from gearshift lever by pulling off shift rod retaining clip in direction of arrow (1). Disengage shift rod from gearshift lever (2). Note washers on either side of shift rod end.



- ◀ Release gearshift lever retaining ring from below using BMW special tool 25 1 110. Turn tool 90° ( turn) counterclockwise.
  - Raise transmission and temporarily install transmission crossmember.
  - Lower vehicle. Working from inside passenger compartment, pull up on gearshift lever to remove it together with retaining ring and rubber grommet.

### Gearshift lever, installing (manual transmission)



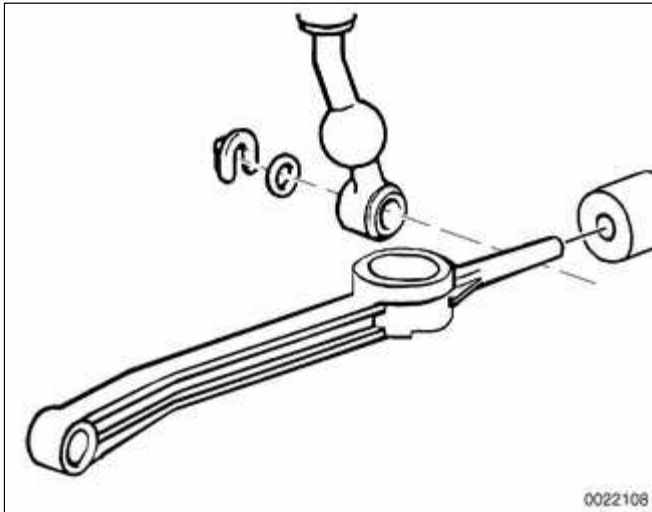
- ◀ Install shift lever, aligning locking tabs with openings in shift console (**arrows**). Press down on retaining ring until it clicks into place.
  - Install rubber grommet with arrow pointing forward. Install shift rod and shift boot.

**Note:**



*Install rubber grommet correctly so that it seals out water.*

- Connect shift rod to shift lever.  
Install transmission crossmember.  
Lift transmission and tighten crossmember bolts.



⚡ Before connecting the shift rod to the lever, be sure the gearshift lever is facing the correct way as illustrated.

- Install driveshaft(s) and heat shield.  
See ⇒ [260 Driveshaft](#).
- Reinstall exhaust system. See ⇒ [180 Exhaust System](#)
- Lower vehicle. Install shift boot cover. Push shift knob onto lever.

### Tightening torques

#### Rear driveshaft to final drive flange

With U-joint (M10 ribbed nut)	80 Nm (59 ft-lb)
With U-joint (M10 compressed nut)	64 Nm (47 ft-lb)

#### 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)

Front driveshaft to final drive flange (with U-joint) (M10)	70 Nm (52 ft-lb)
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Transmission crossmember to body (M8)	21 Nm (15 ft-lb)
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## Automatic Transmission Gearshift

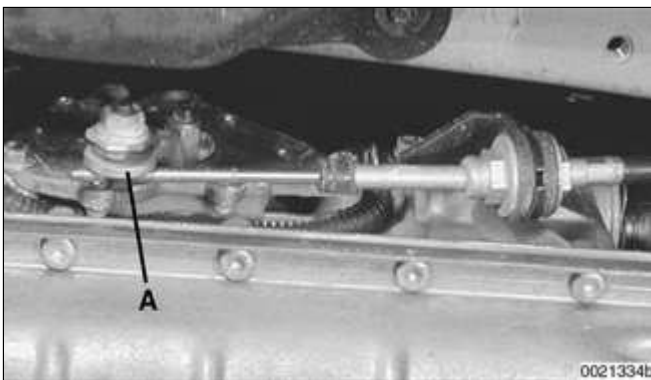
In E46 models, the electronic immobilizer (EWS) prevents starter operation unless the gear position is Park or Neutral.

### Gearshift mechanism, adjusting (automatic transmission)

- Position gearshift lever in Park.
- Raise vehicle to gain access to shift linkage.

#### **WARNING!**

***Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose.***



- ✦ Loosen selector clamping nut (A). Counterhold clamping bolt when loosening nut.

- Push shift lever of transmission forward toward engine (Park position) while applying light pressure on cable end. Tighten cable clamping nut.

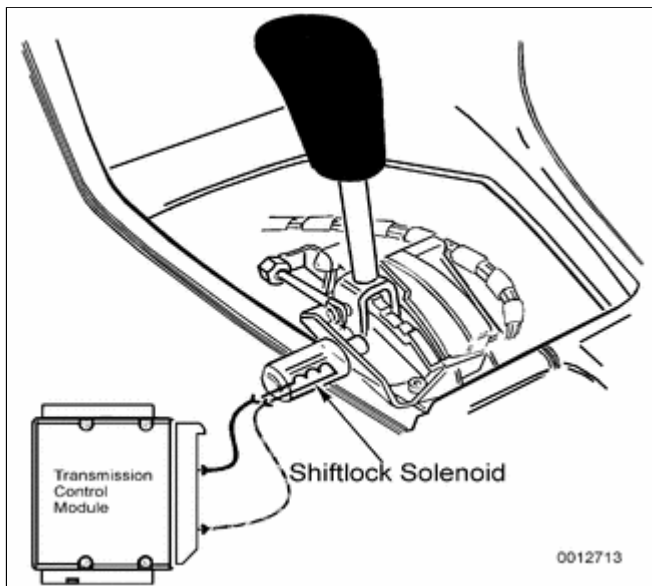
#### **Note:**

*Do not overtighten the nut so that it twists the cable .*

Tightening torque	
Shift cable clamping nut	10 - 12 Nm (7.5 - 9 ft-lb)

## Automatic shiftlock, checking function (automatic transmission)

The automatic shiftlock uses an electric solenoid to lock the selector lever in Park or Neutral. Depressing the foot brake with the ignition on energizes the solenoid, allowing the lever to be moved into a drive gear. The solenoid is energized only when the engine speed is below 2,500 rpm and the vehicle speed is below 3 mph. The solenoid is mounted in the right-hand side of the selector lever housing.



⚡ Automatic shiftlock prevents drive gear selection until the brake pedal is depressed.

- With engine running and car stopped, place selector lever in Park or Neutral.
- Without depressing brake pedal, check that selector lever is locked in position Park or Neutral.
- Depress brake pedal firmly. Solenoid should be heard to energize.
- Check that selector lever can now be moved out of Park or Neutral.

### Note:

*The next test should be performed in an open area with the parking brake on and with extreme caution.*

- With selector lever in Park or Neutral and brake pedal depressed, raise engine above 2,500 rpm. Check that selector

lever cannot be moved out of Park or Neutral.

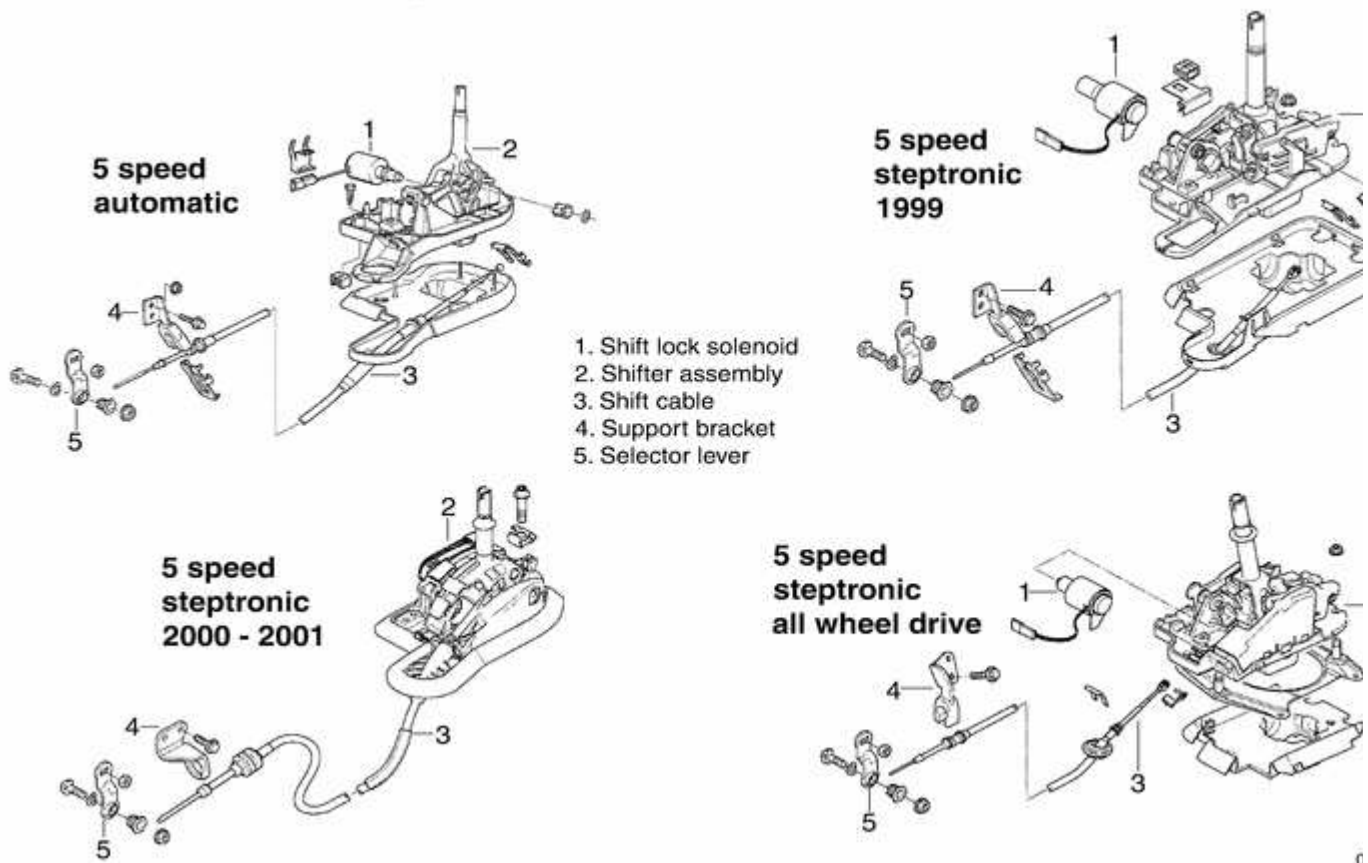
If any faults are found check the electrical operation of the shiftlock solenoid and check for wiring faults to or from the transmission control module (TCM). See ⇒ [610 Electrical Component Locations](#) and Electrical Wiring Diagrams.

**Note:**

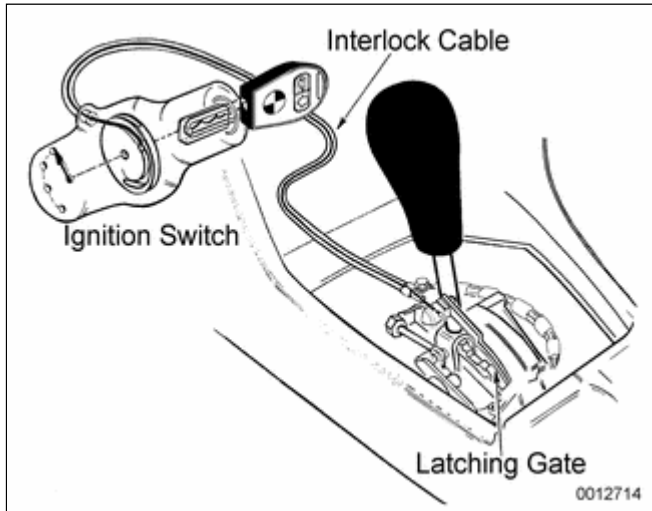
*The solenoid is controlled via the TCM, using brake pedal position, engine speed, and road speed as controlling inputs.*

## Automatic transmission gearshift mechanism

### Automatic transmission gearshift mechanism



## Shift interlock, checking function (automatic transmission)



✦ The shift interlock uses a cable between the ignition switch and the shift lever to lock the shift lever in the park position when the key is in the off position or removed. This feature also prevents the key from being removed from the ignition lock until the selector lever is in Park.

- Shift selector lever to Park position and turn ignition key to the off position.
- Remove ignition key. Check that selector lever cannot be shifted out of Park position.

### **Note:**

- ◆ *It must only be possible to remove ignition key with selector lever in Park position.*
- ◆ *Shift interlock cable must not be kinked.*
- Turn ignition key on and depress brake pedal. Check that selector lever moves freely from gear to gear.
- With selector lever in a gear position other than Park, attempt to turn key to off position and remove. Key should not go into off position.

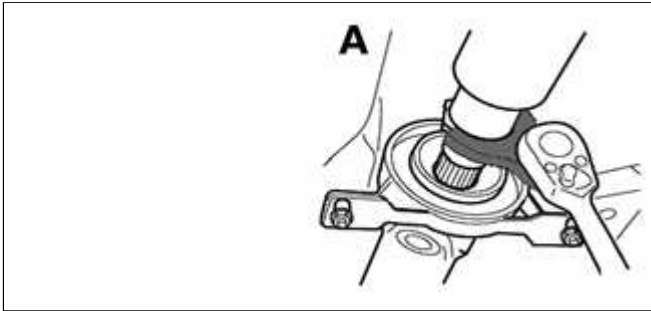
If any faults are found check cable for kinks and check cable attachment points for damage or faults.

## 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

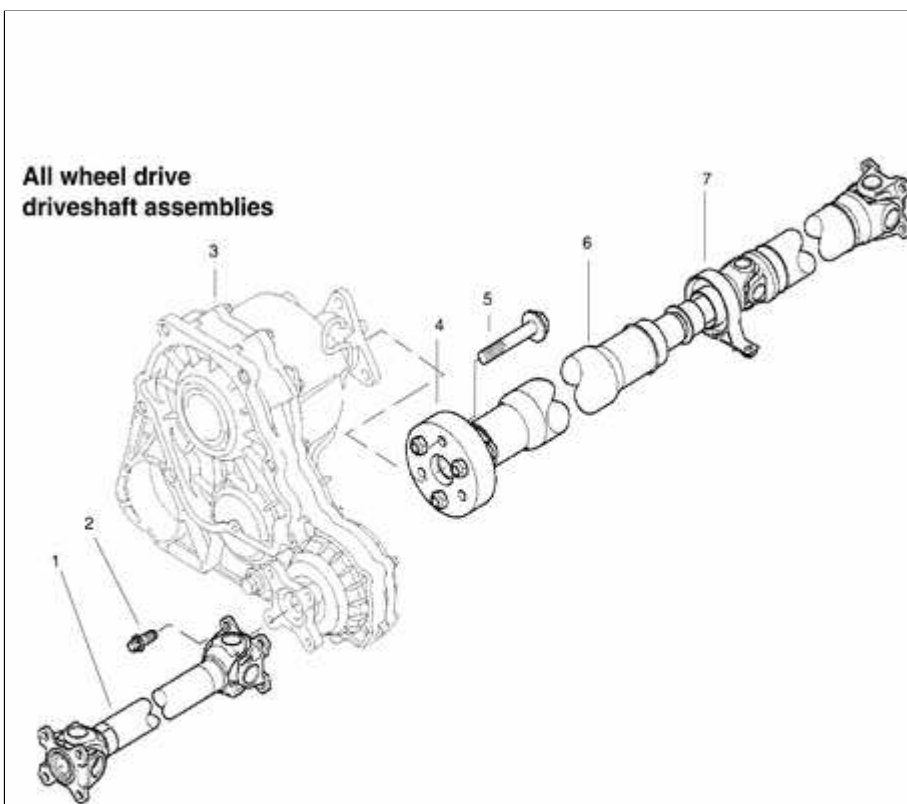
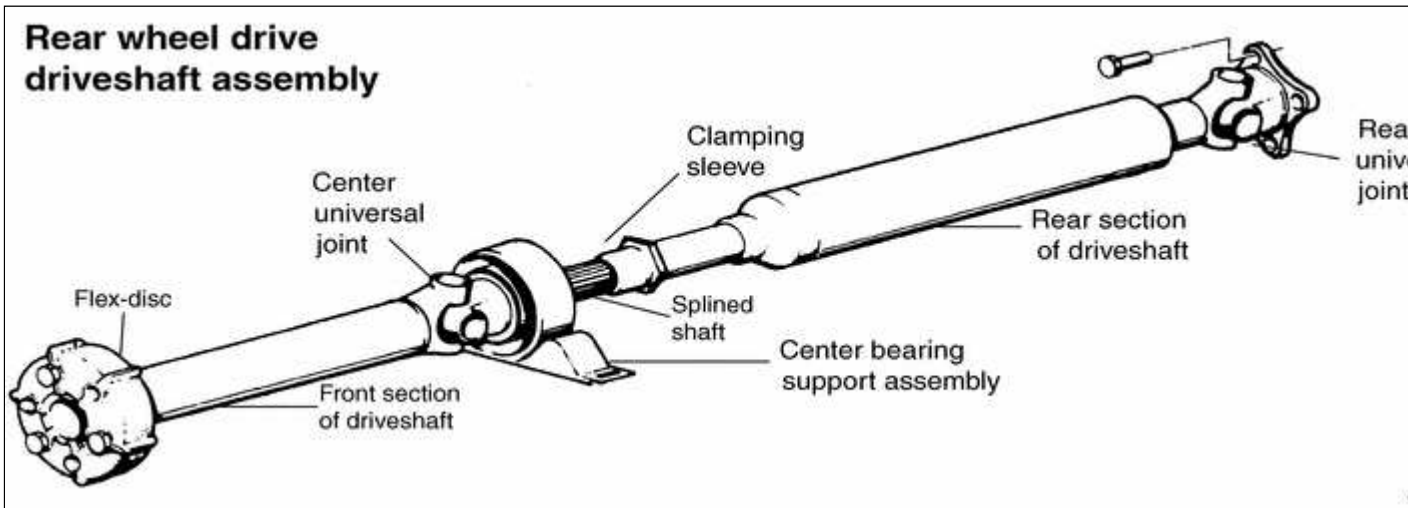
## Front and rear driveshafts

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.

<b>Driveshaft flange runout (max. allowable)</b>	
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.

<b>Universal joint play</b>	
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**

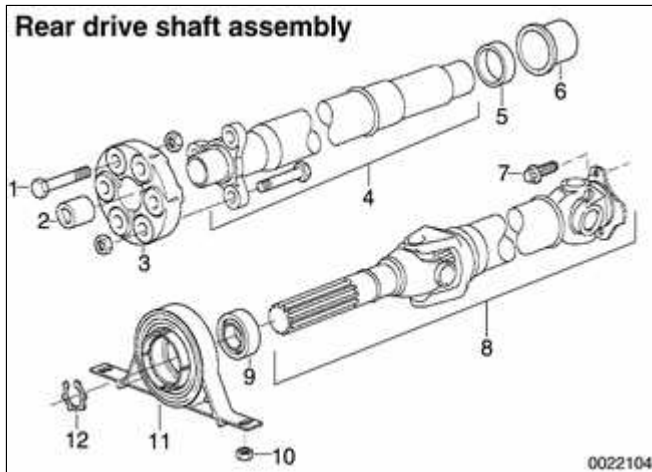
Symptom	Probable cause	Corrective action
Vibration when starting off (forward or reverse).	Incorrect preload of center bearing.	Check preload of center bearing. Readjust preload.
	Center bearing rubber deteriorated.	Inspect center bearing and rubber. Replace if necessary.
	Flex-disc damaged or worn.	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

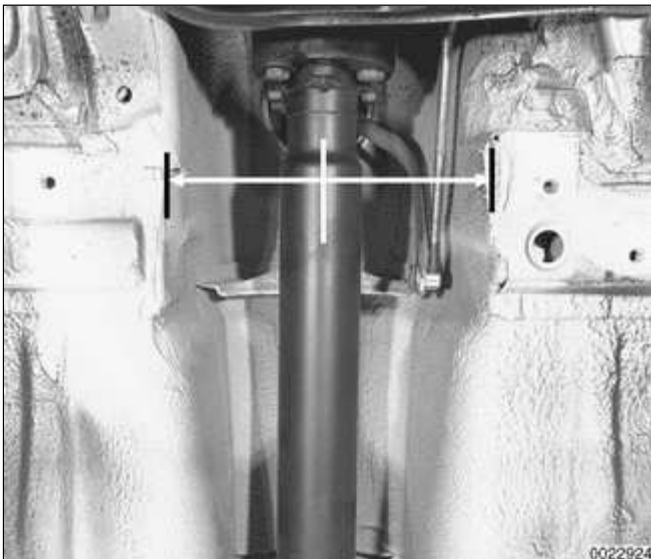
The driveshaft is balanced to close tolerances. Whenever it is to be removed or disassembled, the mounting flanges and driveshaft sections should be marked with paint or a punch before proceeding with work. This will ensure that the driveshaft can be reassembled or installed in exactly the original orientation.

### 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.

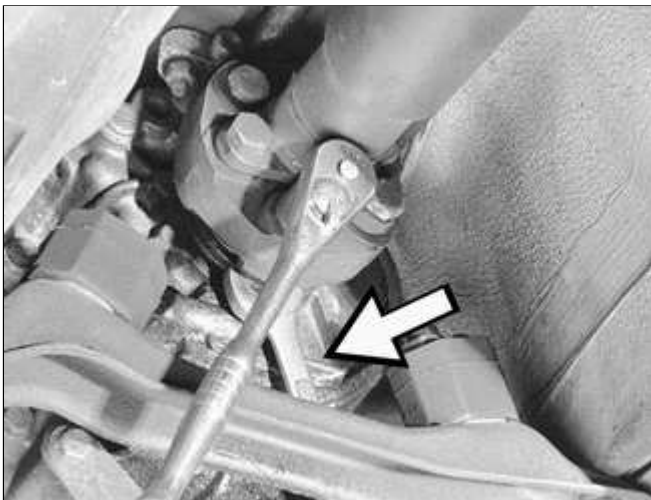
To change the deflection angle, shims can be placed between the center bearing and the body or between the transmission and its rear support. When using shims to change a deflection angle, keep in mind that the angle of adjacent joints will also change. Deflection angles should be as small as possible.

## Rear driveshaft, removing

### **WARNING!**

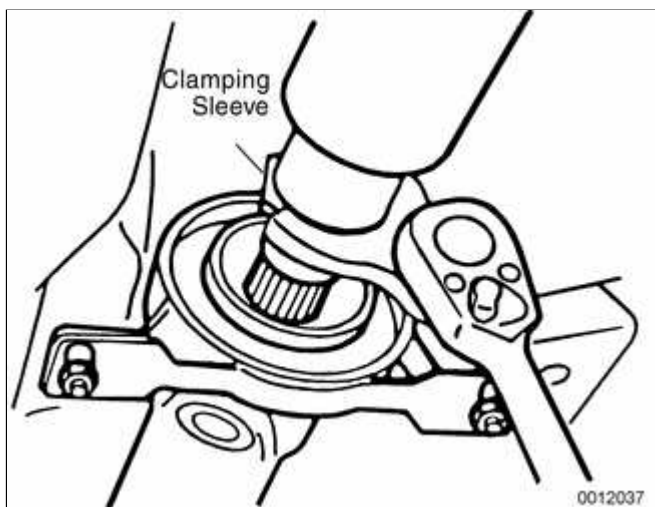
- ♦ *Be sure the wheels are off the ground before removing the driveshaft. Set the parking brake before removing the driveshaft.*
- ♦ *Once the driveshaft has been removed, the vehicle can roll regardless of whether the transmission is in gear or not.*
- ♦ *The driveshaft is mounted to the transmission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





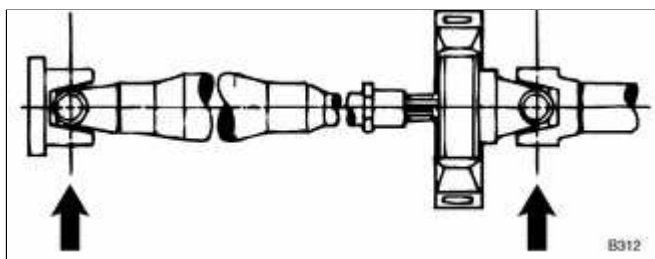
✦ Using BMW special tool 26 1 040, loosen threaded clamping sleeve on driveshaft a few turns.

- 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:**

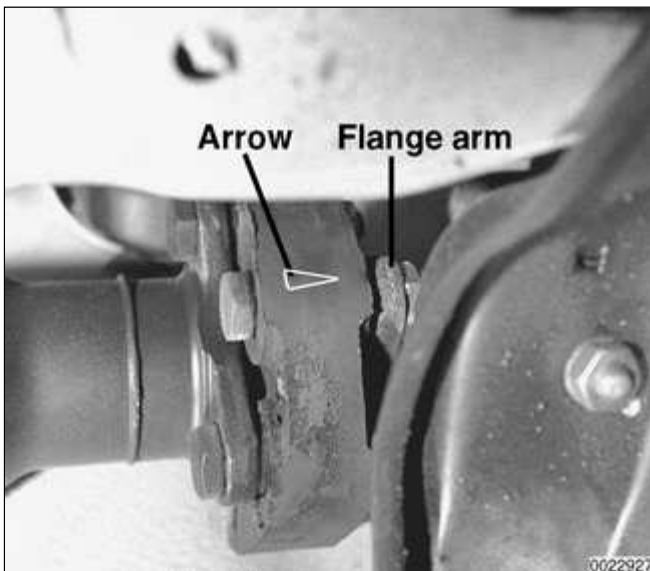
*It is possible to only partially remove the driveshaft, leaving it connected to the final drive. The driveshaft can be tilted down in the center and slid off the transmission flange once the clamping sleeve is loosened and the center bearing bracket is unbolted. Suspend the driveshaft using stiff wire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

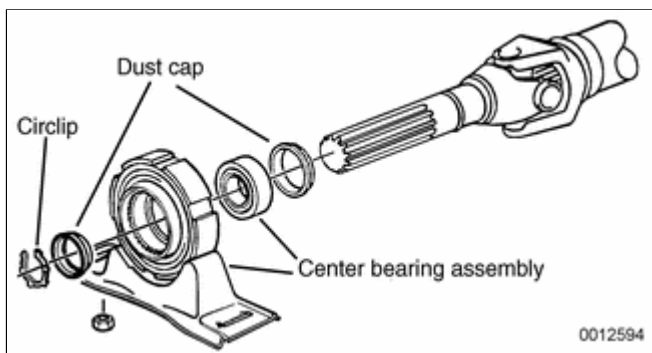
**Note:**

*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



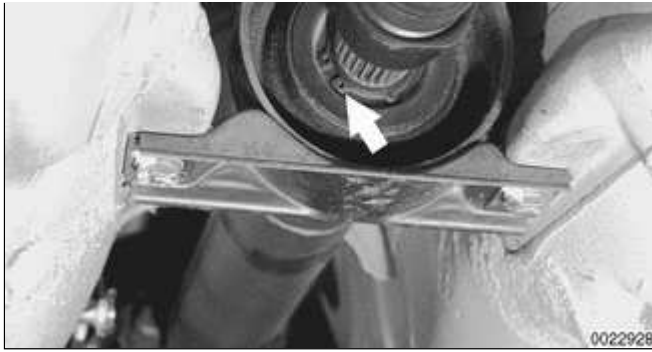
➤ To replace the center bearing assembly, the driveshaft must be removed from the car. The center bearing assembly consists of a grooved ball bearing in a rubber mount. The bearing assembly is pressed onto the front section of the driveshaft and secured by a circlip.

- 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<sup>®</sup> 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.

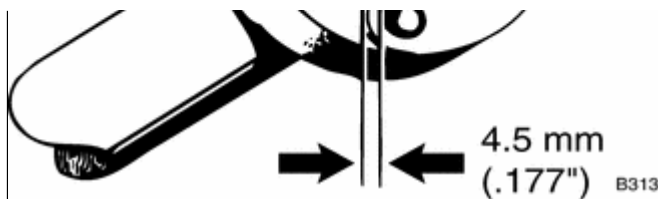
**Note:**

*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<sup>®</sup> 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.***

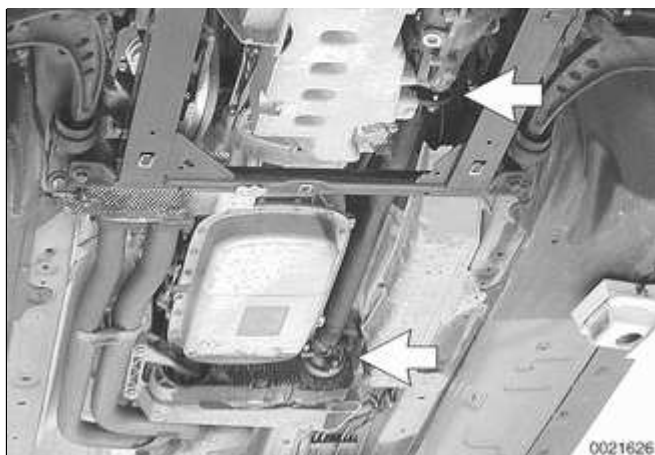
- Raise vehicle and safely support to access front driveshaft.

#### **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**).



- Installation is reverse of removal.

<b>Tightening torques</b>	
Driveshaft to drive flange (M10)	70 Nm (52 ft-lb)

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## General

This repair group covers removal and installation of the all wheel drive transfer case. Internal transfer case repair is not covered. Special press tools and procedures are required to disassemble and service the internal geartrain.

Some procedures covered in this repair group will require you to refer to the following repair groups:

◆ ⇒ [180 Exhaust System](#)

◆ ⇒ [260 Driveshaft](#)

The transfer case is used in all wheel drive models to direct power from the transmission to both the front and rear differentials via driveshafts. This transfer case is unique in that it delivers 38% of the transmission's torque output to the front differential, and 62% of the torque to the rear. Unlike the transfer cases used in many four wheel drive trucks, the transfer case used is a single range unit, permanently engaged to drive all four wheels all of the time.

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## Transfer Case

### Transfer case, removing and installing

- Raise vehicle and safely support to access transfer case.

#### **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.*

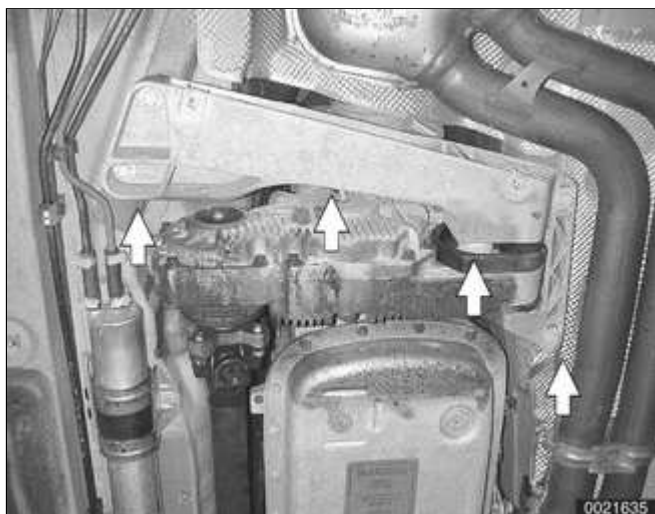
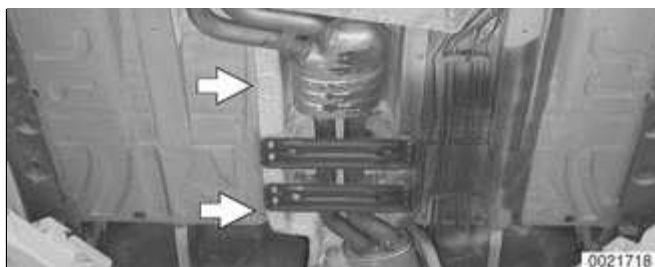
- Remove engine splash guard from underside of vehicle.

- Remove exhaust system. See ⇒ [180 Exhaust System](#).



- ✦ Remove exhaust system heat shields (arrows).

- Remove front drive shaft. See ⇒ [260 Driveshaft](#).
- Support transmission with transmission jack or suitable shop hoist.



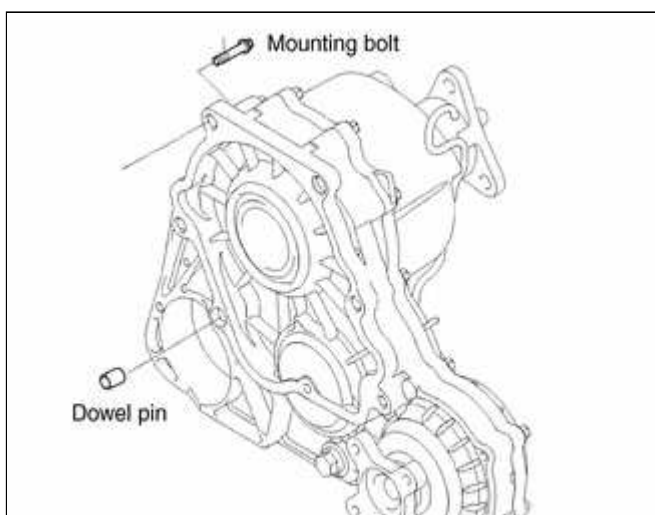
➤ Remove transmission crossmember (arrows).

- Detach transfer case vent tube.
- Keeping the driveshaft in place, remove nuts retaining rear driveshaft to transfer case at flexible disc.

**CAUTION!**

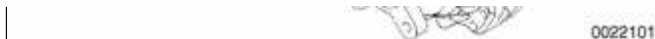
***Do not allow the driveshaft to hang down. This may damage universal joints at drive shaft ends.***

- Support rear driveshaft center bearing and release mounting nuts.
- Lower rear driveshaft at center bearing and remove from transmission output flange at flexible disk. Support from vehicle body using stiff wire.



➤ Remove bolts retaining transfer case to transmission and remove transfer case.

- Installation is reverse of removal, noting the following:
- ◆ Replace dowel pins in transfer case mounting surface if damaged.
- ◆ Coat dowel pins with anti-seize



before installing.

- ◆ On manual transmission cars:  
Replace sealing O-ring between  
transmission and transfer case.

**Note:**

*When refilling transfer case, recheck oil  
level again after driving car  
approximately 200 meters (600 ft).*

Tightening torques	
Transmission crossmember to body (M8)	21 Nm (15 ft-lb)
Transfer case to transmission (M10)	41 Nm (30 ft-lb)
Transfer case filler plug (M18)	33 Nm (24 ft-lb)

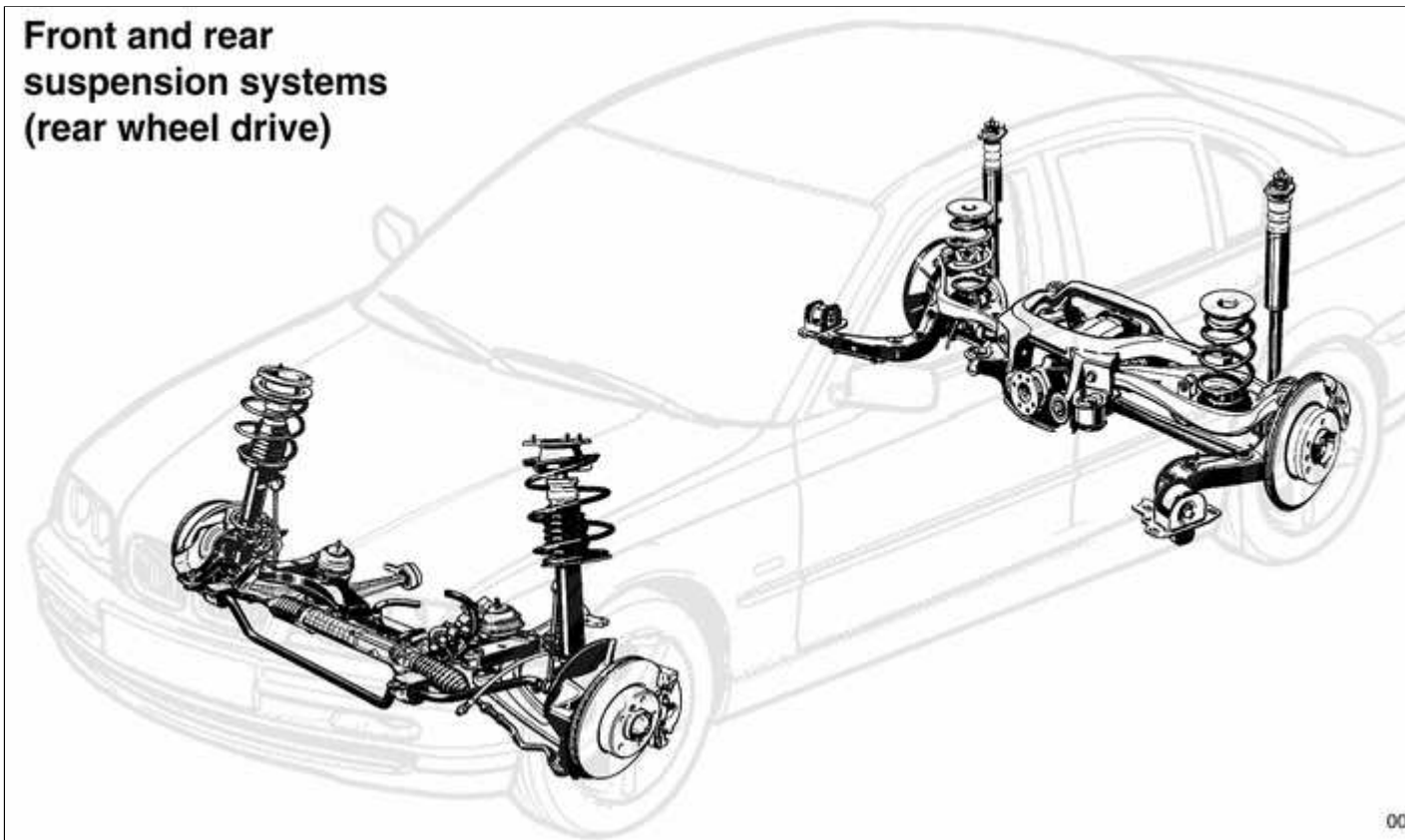
Fluid capacities	
Transfer case oil change	0.16 liter (0.16 qt.)
New transfer case fill	0.24 liter (0.25 qt.)

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## General

This section covers general information for front and rear suspension, steering system, and the electronic braking and stability control systems.

### Front and rear suspension systems (rear wheel drive)



### Front suspension



- ◀ In rear wheel drive cars, the control arm on each side connects the steering arm (A) to mounting points on the subframe (B) and the body frame rail (C). On all wheel drive cars the rear mounting of the control arm is to the subframe.