

240 Automatic Transmission

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GENERAL

This repair group covers maintenance and replacement of the automatic transmission.

Automatic transmission internal repairs are not covered. Transmission repairs require special service equipment and knowledge. If transmission internal service is required, consult an authorized BMW dealer about a factory reconditioned unit or a transmission rebuild.

See also:

- **119 Lubrication System** for crankshaft rear main (flywheel) seal.
- **170 Radiator and Cooling System** for ATF cooler and heat exchanger.
- **200 Transmission-General** for drivetrain information.
- **250 Gearshift Linkage** for manual override of gearshift lock
- **260 Driveshafts** for front (xDrive) and rear driveshaft.
- **270 Transfer Case** for xDrive equipped models.

240-2 Automatic Transmission

Automatic transmission applications

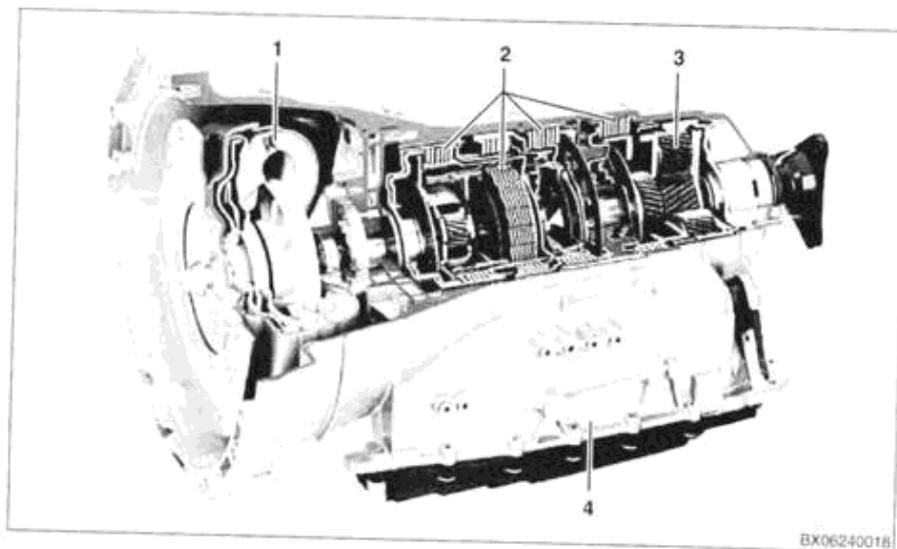
Automatic transmission applications

The 6-speed automatic transmission in 5 Series vehicles was jointly developed by BMW and ZF (*Zahnradfabrik Friedrichshafen*). Application information is in **Table a**.

Model (engine)	Year	Transmission	Max. torque
525i, 530i (M54)	2004 - 2005	GA6HP19Z	350 Nm (258 lb-ft)
525i, 525xi, 530i, 530xi, (N52)	2006 - 2007	GA6HP19Z	400 Nm (295 lb-ft)
545i, 550i (N62, N62TU)	2004 - 2007	GA6HP26Z	600 Nm (443 lb-ft)
528i, 528xi, 535i, 535xi, (N52K, N54)	2008* - 2000	GA6HP19ZTU	400 Nm (295 lb-ft)
550i (N62TU)	2008* - 2009	GA6HP26ZTU	650 Nm (479 lb-ft)

* 2008 model year starts with 03 / 2007 production.

Automatic transmission assembly



1. Torque converter
 - Capable of torque multiplication
2. Multi-plate clutch packs
3. Planetary gear assembly
4. Mechatronics module
 - Valve body (hydraulic unit)
 - Transmission control module (A7000a)

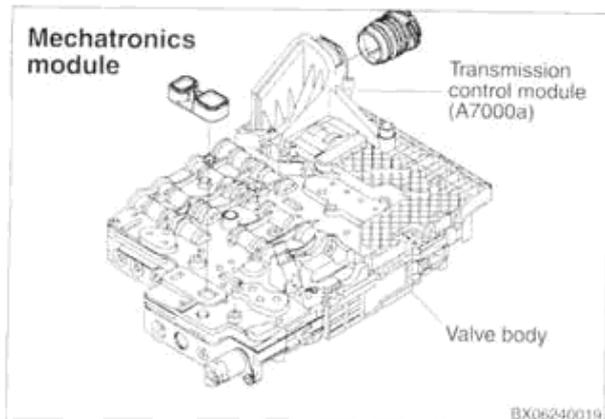
Automatic transmission features

The 6-speed automatic transmission system features the following components or signals:

- Mechatronics module
- Steptronic shift lever (2004 - 2007)
- Gear shift switch (GSW) (2008 - 2009)
- Gearshift paddles (2008 - 2009)
- Instrument cluster display of gear range
- Brake light switch signal
- ECM signal
- DSC signal
- Accelerator pedal signal
- Bus connections

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Automatic transmission features



Mechatronics module

- ▶ Mechatronics module is inside the transmission housing, combining hydraulic unit (valve body) and transmission control module (TCM) (A7000a). TCM operating software is known as electronic transmission control (EGS).

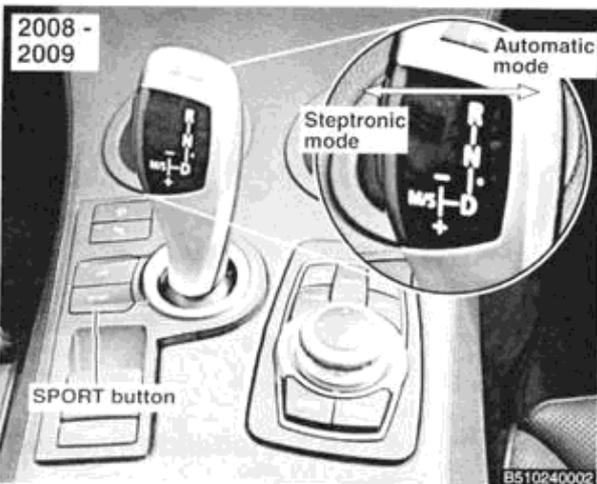
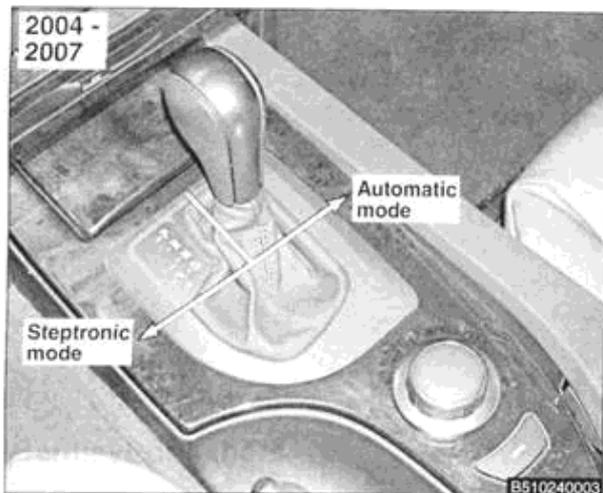
The TCM includes the following components and functions:

- Power supply for solenoid valves and electronic pressure control valves.
- Transmission sensor system:
 - Transmission input speed sensor.
 - Transmission output speed sensor.
 - Transmission oil temperature sensor.
- Mechatronics connector for connection to vehicle wiring harness

Steptronic shift lever

- ▶ Steptronic shift lever is equipped with positions P(ARK), R(EVERSE) and N(EUTRAL) as well as D(RIVE) for automatic mode and M/S for manual and Steptronic mode.

The Steptronic function makes it possible to shift the automatic transmission manually. Manual mode is engaged when the shift lever is moved left from automatic gate into manual gate. In manual mode, pressing the shift lever forward or backward closes electrical contacts, resulting in upshift or downshift.



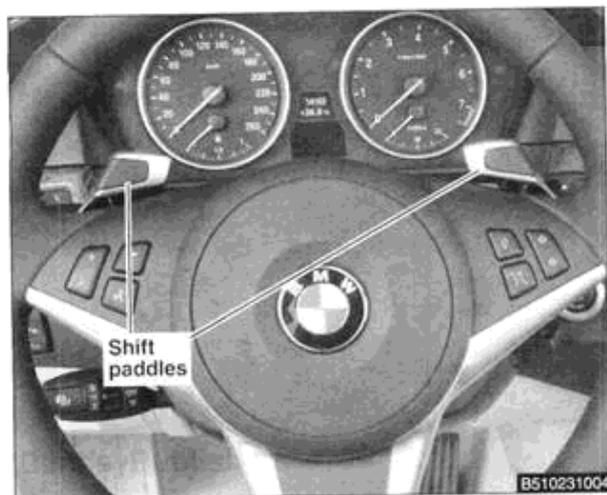
Gear shift switch (GWS)

- ▶ In models built from 03 / 2007 (2008 model year), the shift lever is configured as a control module referred to as gear shift switch or GWS. Transmission gear range selection in these models is actuated electronically instead of via shift cable.

From 06 / 2007, a Sport automatic transmission is also available, featuring a SPORT button on the shifter console. Dynamic driving control (FDC) is activated with the SPORT button: Gearshift times are shortened and shift characteristics are made more sporty.

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Automatic transmission features



Gear shift paddles

- From 06 / 2007 (2008 model year), the Sport automatic transmission also features gearshift paddles. In addition to sequential gear selection with the shift lever, the gears can also be selected using gearshift paddles on the steering wheel.

A shift pulse is transmitted electrically to the TCM. With this shift-by-wire method there is no mechanical linkage between the gearshift paddles and the transmission.

Pull one of the gearshift paddles briefly to change UP a gear. Press one of the gearshift paddles briefly to change DOWN a gear.

Instrument cluster display

- Instrument cluster displays transmission gear range as well as Check Control message via K-CAN. Check Control also alerts the driver with acoustic signals. See **020 Maintenance** for a discussion of Check Control.



Brake light switch signal

Brake light switch signal affects function of shiftlock and adaptive transmission control.

Engine control module (ECM) signal

Engine control module (ECM) signals engine speed, torque and other parameters. TCM signals current transmission operating status back to ECM.

Dynamic stability control (DSC) signal

DSC control module signals cornering, acceleration and traction data.

Accelerator pedal signal

Accelerator pedal module signals driver power demand data.

Bus connections

Bus connections are used to handle electrical complexity throughout the 5 Series chassis. See **600 Electrical System-General** for details of bus systems.

Automatic transmission functions

Automatic transmission functions include the following:

- Adaptive transmission control (AGS)
- Overlap control
- Starter inhibitor
- Parking lock
- Warm-up program
- Engine intervention
- Downshift inhibitor
- Reverse gear inhibitor
- Shift lever lock (shiftlock)
- Standstill decoupling
- Interlock
- Emergency program (limp-home mode)

Adaptive transmission control (AGS)

▶ The transmission offers the choice between a comfort program and a sport program. AGS (a component of EGS) adapts transmission shift characteristics to the driver and the driving situation.

In both programs, AGS can switch from a basic shift map to a performance-orientated map, taking the following conditions into account:

- Comfort program (shift lever position **D**) uses 2 maps: XE (extreme economy) and E (economy).
- Sport program (shift lever position **M/S**) produces dynamic, sporty shift characteristics. There is a basic S (sport) map and a performance-orientated XS (extreme sport) map.

Other AGS functions are as follows:

Adaptation to driver. AGS adapts to different driving styles using the following criteria:

- Kick-fast. If the accelerator pedal is depressed rapidly, the shift program is changed to E in comfort program and XS in sport program.
- Cornering detection reacts to lateral acceleration with an indirect adaptation to the driver type. Lateral acceleration is considered an indirect statement of preferred driving dynamics and does not cause an immediate gearshift response (shifts when cornering could adversely affect driving stability). Lateral acceleration is calculated from wheel-speed, yaw rate and road speed sensor signals.
- Braking is evaluated in a similar way to kick-fast. Braking deceleration is measured and compared with threshold values in the TCM.
- Driver adaptation is restarted each time the vehicle pulls away from a standstill.

Driving uphill or trailer towing function is based on a comparison of vehicle acceleration with a nominal value. From the current engine operating situation, acceleration with normal load on a level surface is calculated. If the actual acceleration is significantly below



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Automatic transmission functions

the theoretical value, driving uphill or trailer towing function is activated.

Driving downhill. If the TCM detects downhill driving, it automatically shift down a gear if vehicle speeds up. This enhances the engine braking effect. A downshift only occurs if the engine speed is below the maximum speed of the lower gear.

TCM detects downhill driving from signals from the throttle valve potentiometer (load), wheel speed sensors (road speed) and brake light switch (brake activation).

Braking deceleration and automatic upshift. To decelerate the vehicle, the foot is taken off the gas and the brake depressed as necessary. The gearshift map triggers an upshift when the throttle is closed. These gearshifts are not necessary in conjunction with brake applications as they prevent the engine braking effect from being exploited.

The intention to apply the brakes is anticipated from the accelerator pedal being rapidly released to the zero position. If such an action is detected, transmission upshift is suppressed for as long as the accelerator pedal is in the zero position and the vehicle is in overrun mode.

Winter program (only with shift lever in position D) is automatically activated if the drive wheels start to spin, even at a low rate of acceleration. The winter program ensures better traction by not using 1st gear. Early upshifts reduce the reactions caused by load changes. Winter program is deactivated if the wheels do not spin for several seconds despite high drive torque.

Overlap control

Overlap control provides gentle shift characteristics as follows: During a shift, pressure is reduced in the active multi-plate clutch and at the same time built up in the clutch that is about to be activated. Gradual reduction and build-up of pressure is maintained until the shift is complete. Overlap control is active for all gearshifts from 1st to 6th gear and from 6th to 1st gear.

Starter inhibitor

It is only possible to start the engine when vehicle is in P or N. Car access system (CAS) with electronic immobilizer (EWS) evaluates signals from the TCM via direct wire or CAN-bus signal indicating that shift lever is in P or N.

Parking lock

Parking lock feature locks the transmission output shaft so that the vehicle is prevented from rolling unexpectedly. Parking lock is designed to provide a reliable brake on gradients up to 32%.

2004 - 2007 models: When the vehicle is stationary, parking lock is engaged purely mechanically via Bowden cable from shift lever to mechatronics module.

2008 - 2009 models: The parking lock is signalled electronically via a button on the gear shift switch (shift lever). It is actuated via a mechanical spring and cable system.



Parking lock is activated under the following conditions:

- Pressure on shift lever button and road speed signal less than 1.2 mph (2 kph).
- Ignition key removed from key slot and road speed signal of 0.
- Engine ON.
 - Shift lever in D or R.
 - Driver door open.
 - Drivers seat belt not fastened in belt buckle.
 - Pedals not depressed [road speed signal less than 2 mph (3 kph)].
- START / STOP button pressed while engine is ON.
 - Shift lever in D or R.
 - Road speed signal 0.

Parking lock is only released when the engine is ON because hydraulic pressure is required to open the parking lock. In case of power failure (such as dead battery) parking lock can be released manually. See **250 Gearshift Linkage**.

Warm-up program

If the engine is started and coolant temperature is lower than approx. 176°F (60°C), the warm-up program is activated. Until the engine warms up, the transmission remains in performance map E or XS, shifting gears at higher speeds. This enables the engine and catalytic converters to reach operating temperature more quickly.

Up to a transmission oil temperature of approximately 95°F (35°C), the torque converter lockup clutch is neither controlled nor closed.

Engine intervention

During a gearshift, the TCM emits signals to retard ignition timing for a few milliseconds. This action briefly reduces the torque, improves shift quality, reduces transmission load and shortens shift time.

Downshift inhibitor

TCM program prevents shifting to a lower gear until engine speed is below maximum speed for the next gear down. Engine speed signal is transmitted by the ECM to the TCM. The downshift inhibitor prevents damage to the engine and transmission.

Reverse gear inhibitor

Shifting into reverse gear is inhibited when the vehicle is moving forward at speeds above 3 mph (5 kph).

Shift lever lock (shiftlock)

The shift lever is locked in positions P or N by an electromagnet actuated by the TCM. Shiftlock engages with shift lever in P or N and ignition ON. Shifting from P or N into a drive gear or reverse is only possible at road speeds less than 3 mph (5 kph) and brake applied at engine speed below 2500 rpm.

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Torque converter

Standstill decoupling

The torque converter is decoupled when the vehicle is at a standstill. Thus only a minimum load remains on the engine and fuel consumption is reduced. Decoupling is effected by clutch action within the transmission.

Interlock

2004 - 2007 models: The ignition lock is mechanically linked to the shift lever by a Bowden cable. Interlock allows the ignition key to be removed only when the shift lever is in P. Conversely, the shift lever can only be moved from P when the ignition key is in the ignition lock and turned at least to ignition ON.

2008 - 2009 models: The remote key (ignition key) can only be removed when CAS registers a road speed signal below 0.6 mph (1 kph). If the remote control is removed from the ignition slot after the engine is switched OFF, the parking lock automatically applies.

Emergency program

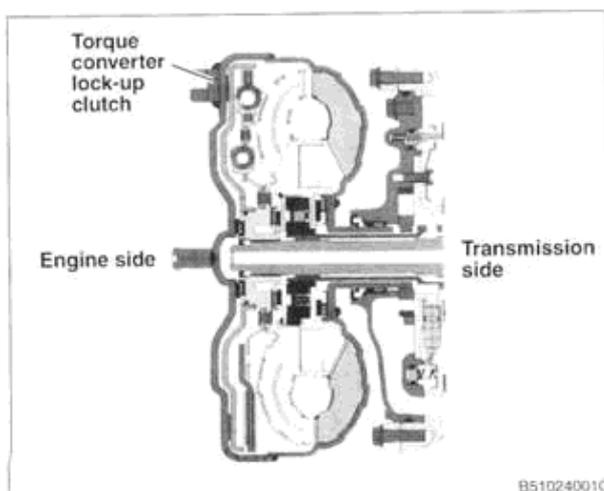
The emergency program (limp home mode) activates if transmission management fails or detects a malfunction that could lead to critical driving conditions. In limp home, the vehicle remains operational but with limitations.

If TCM fails, the following forward gears can be engaged:

- Failure in 1st - 3rd gear: Emergency 3rd gear activated.
- Failure in 4th - 6th gear: Emergency 5th gear activated.
- Engine restart is possible in 3rd gear.

Torque converter

◀ Torque is transmitted from the engine to the transmission by a hydro-dynamic torque converter (fluid coupling). The converter is equipped with slip-controlled lock-up clutch.



Cautions

CAUTION—

- When performing any repair which involves separating the engine and transmission, check that bell housing dowels are undamaged and in place before reassembly. If the alignment of the engine flywheel to the transmission input shaft or torque converter is incorrect, any of the following complaints may result:
 - Noise from transmission input shaft.
 - Internal damage to the transmission.
- When removing interior trim clips, avoid damaging trim pieces by using a plastic prying tool or a screwdriver with the tip wrapped with masking tape.
- To avoid electrochemical corrosion to engine components made of aluminum-magnesium alloy, do not use steel fasteners. Use aluminum fasteners only.
- The end faces of aluminum fasteners are usually painted blue. For reliable identification, test fasteners for aluminum composition with magnet.
- Replace aluminum fasteners each time they are loosened.
- Follow torque instructions, including angle of rotation specifications, when installing aluminum fasteners.
- Fill transmission only with BMW approved synthetic oil. Filling with incorrect lube could cause the following damage:
 - Premature wear.
 - Reduced service life of bearings.
 - Tooth profile damage.
 - Damage to radial shaft oil seals.

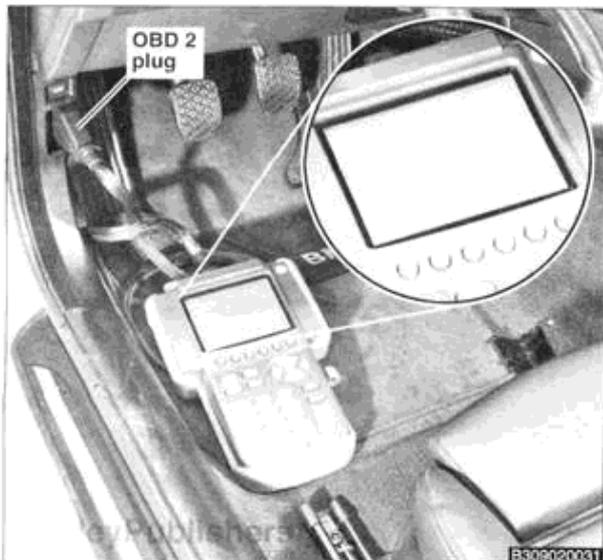
TROUBLESHOOTING

Minor automatic transmission problems may be corrected by changing the automatic transmission fluid (ATF) and filter. See **Automatic Transmission Fluid (ATF) Service** on this repair group.

Begin by checking ATF level and condition. Check to see if the fluid is dirty or has a burned odor indicating overheated fluid. The burned odor may be the results of burned discs in the clutch packs. The friction material from the burned disc can clog valve body passages.

Software in the transmission control module (TCM) monitors transmission operation for faults and alerts the driver by illuminating the transmission fault indicator on the instrument panel. The self-diagnostic software stores diagnostic trouble codes (DTCs) which may be accessed as follows:

- Connect BMW scan tool to OBD 2 plug on left door post. (Plug is behind plastic trim.)
 - Place transmission shift lever in P or N. Engage parking brake.
 - Switch ignition ON. Follow scan tool on-screen instructions.
 - For a listing of scan tool suppliers, see **020 Maintenance**.



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Mechatronics service notes

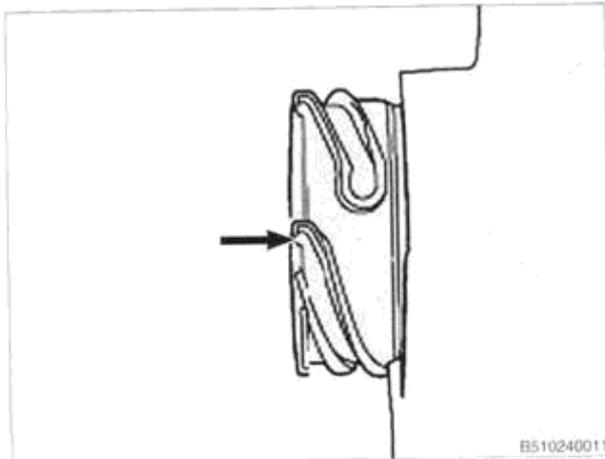
Mechatronics service notes

The mechatronics electrical connection is delicate. Use care when removing and replacing the multi-pin connector. If pins are damaged, replace the complete mechatronic module.

Leaks around the mechatronics sleeve can be misdiagnosed as coming from the transmission pan gasket. If a leak at the mechatronics sleeve is confirmed, replace the sleeve.

An incorrectly installed mechatronics sleeve can cause damaged connector pins and intermittent transmission communication faults. Example of faults include:

- Serial wire message missing (BMW fault code 5079).
- Serial line signal plausibility (BMW fault code 507A).
- Transmission emergency program light illuminated.
- Transmission entering failsafe mode.

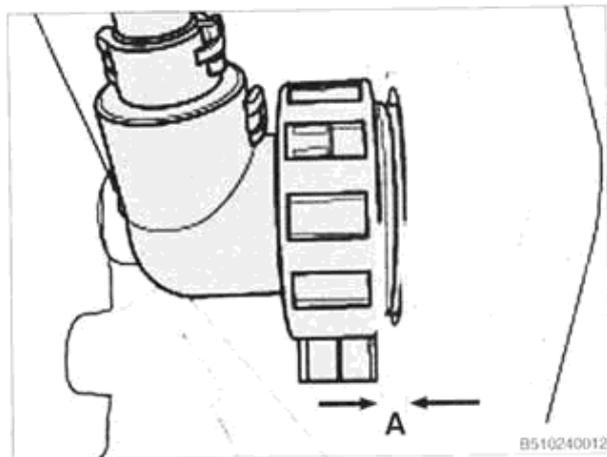


- Push sealing sleeve (**arrow**) into mechatronics housing. Use new O-rings and lubricate sleeve with transmission fluid.

- Reattach mechatronics connector, making sure connector pins are not damaged. Close white locking tab on connector. Do not use excessive force. Excessive force indicates an incorrectly installed sleeve.

- With harness connector installed and locked, make sure distance between connector and housing surface (**A**) does not exceed $\frac{1}{4}$ " (3 mm).

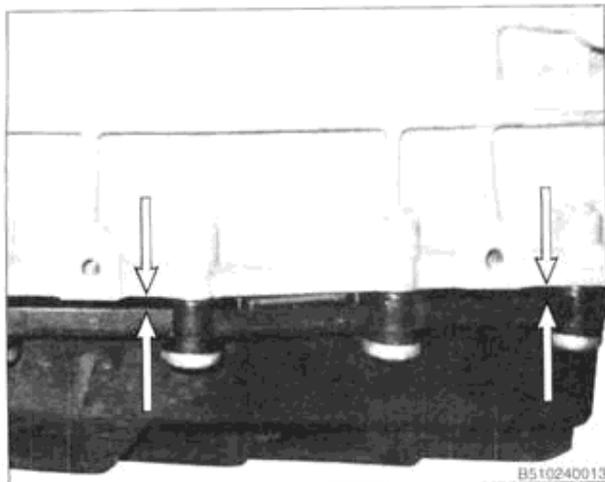
- If distance between connector and housing surface (**A**) measures approximately $\frac{1}{4}$ " - $\frac{1}{2}$ " (7 - 8 mm), sealing sleeve installation is incorrect and may permanently damage connector pins.



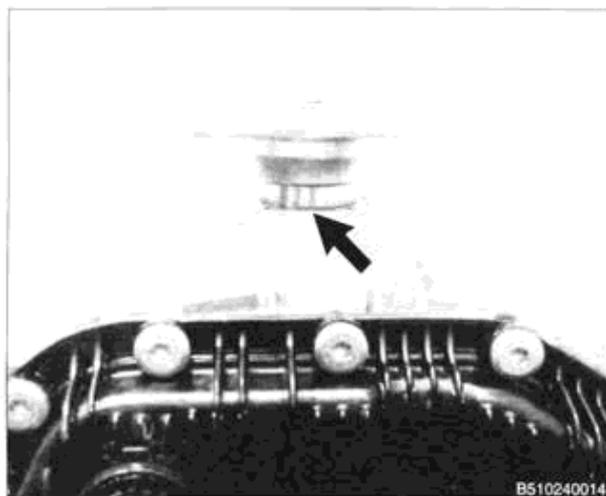
Visible fluid leaks

If visual inspection reveals oil drops or other evidence of oil leaks from transmission, check the following:

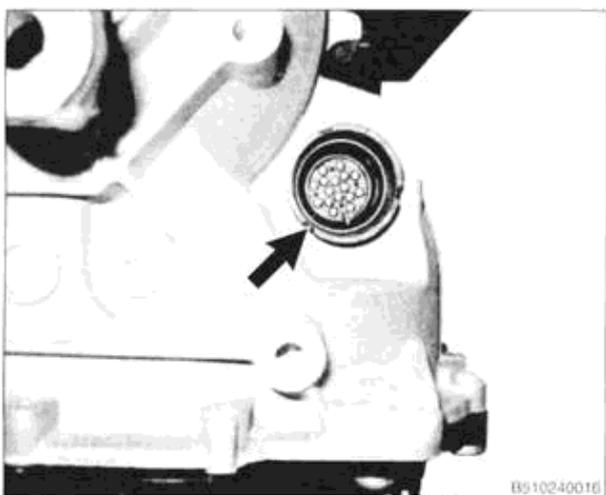
- Check transmission sump gasket for leaks at spots marked with **arrows**.



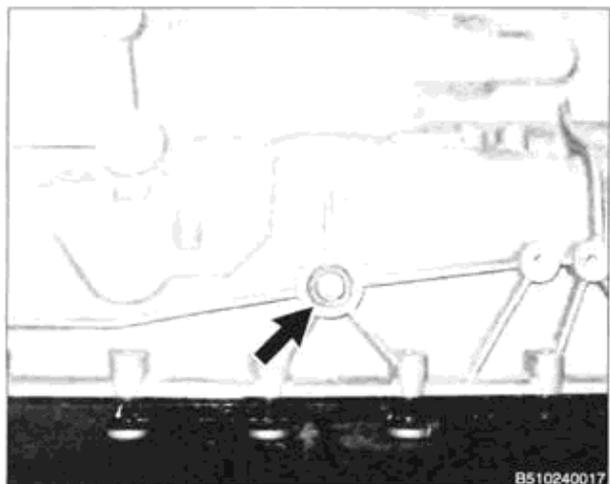
⚡ Check transmission output shaft seal (**arrow**) for leaks.



⚡ Check mechatronics connector sleeve (**arrow**) for leaks.



⚡ Check selector shaft bearing seal (**arrow**) for leaks.



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ATF level, checking

AUTOMATIC TRANSMISSION FLUID (ATF) SERVICE

5 Series automatic transmission fluid (ATF) has a condition-based service (CBS) interval of approximately 100,000 miles (160,000 km). For an explanation of condition-based service, see **020 Maintenance**.

Check ATF level if there is evidence of a leak, a complaint related to fluid level or after transmission repairs. If service or repairs have to be made to the transmission or ATF cooler, use only the approved transmission fluid.

The automatic transmission is not equipped with a dipstick. Check ATF level while monitoring ATF temperature with special equipment. Make sure transmission is at operating temperature and vehicle is level throughout tests.

Be sure necessary equipment, catch bin, transmission fluid and fluid pump are available before starting the fluid level checking procedure.

ATF service interval	
Condition-based: check instrument cluster to monitor service interval. See 020 Maintenance .	approximately 100,000 miles

ATF level, checking

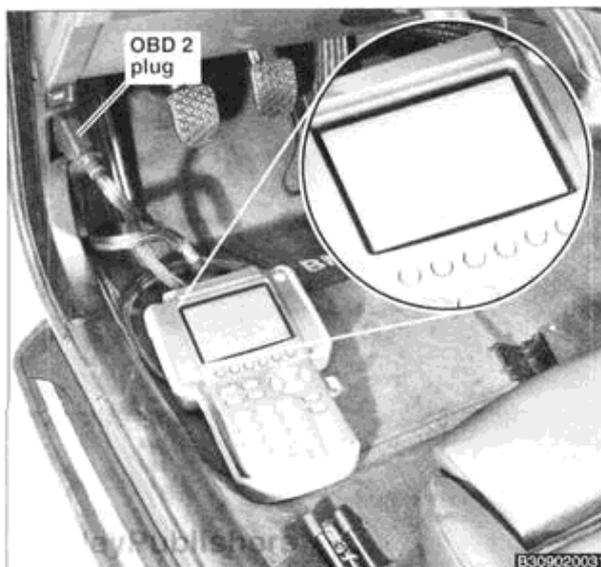
Transmission fluid expands with temperature. BMW requires that the ATF be checked when fluid temperature is between 30 - 50°C (86 - 122°F).

- Drive vehicle to warm up ATF to operating temperature.
- Connect BMW scan tool and call up "Service functions (drive)." Set scan tool to measure ATF temperature.
- With engine running, switch on air-conditioning to increase engine idle speed.
- Apply parking brake.
- While applying foot brake firmly move gear shift lever through all gear positions, pausing in each gear briefly.
- Raise and safely support vehicle. Place oil drip pan underneath.

CAUTION—

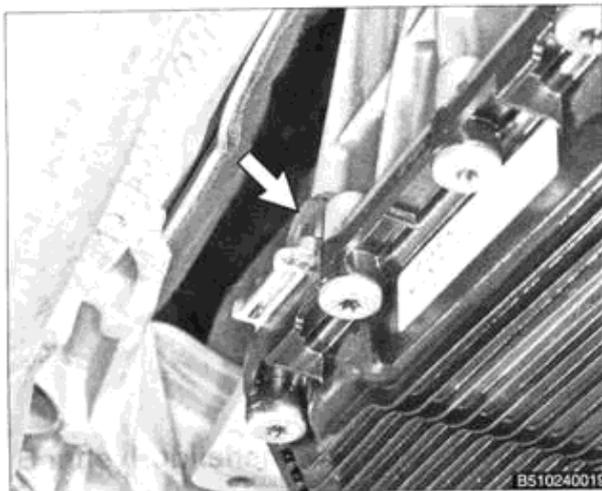
- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shields under transmission. See **020 Maintenance**.



Automatic Transmission 240-13

ATF, draining and filling



⚠ With engine running, shift lever in P and ATF temperature as specified, remove ATF fill plug (**arrow**).

- For best results, check fluid level at 30°C (85°F).
- An accurate level check is not possible if fluid temperature rises above 50°C (120°F).

ATF level checking

Fluid temperature	30° - 50° C (86° - 122° F)
-------------------	----------------------------

- Level is correct if small stream of fluid runs out of fill hole.
- If no fluid runs out, add fluid until it starts to overflow.

CAUTION—

- Do not mix BMW transmission oils, and do not replace with another oil.

Automatic transmission fluid (ATF)

BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
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- Install fill plug using new sealing ring.

Tightening torque

Fill plug to transmission housing	35 Nm (26 ft-lb)
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- Press on brake pedal. With engine running at idle speed, shift through gears several times. Shift to P.
- Connect BMW scan tool and call up "Service functions (drive)." Follow on-screen instructions to complete ATF level check.

ATF, draining and filling

- Drive vehicle to warm up ATF to operating temperature.
- Raise vehicle and support safely.

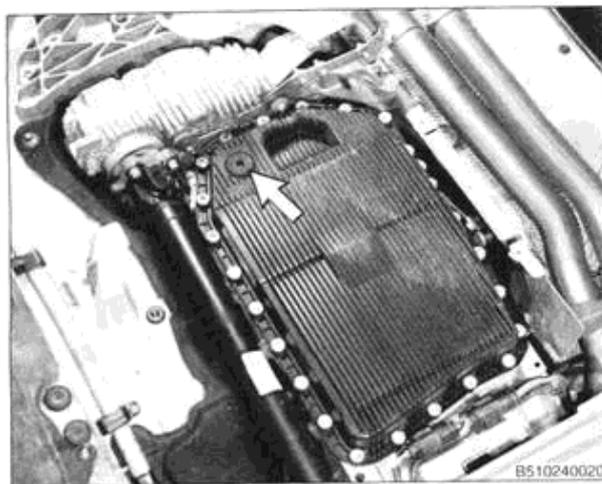
WARNING—

- Make sure the vehicle 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 splash shield underneath transmission. See **020 Maintenance**. If necessary to improve access, remove splash shield and exhaust brackets.
- Place 5-gallon drain pan underneath transmission sump.
- ⚠ Remove ATF drain plug (**arrow**) and allow to drain.

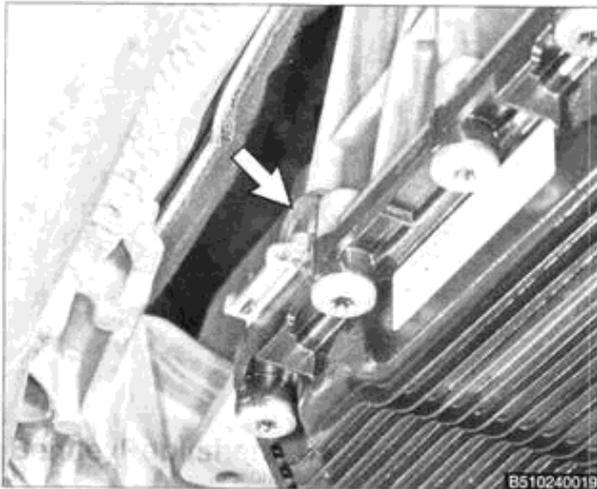
WARNING—

- Use gloves to protect your hands. Hot ATF scalds.



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ATF sump, removing and installing



- Replace drain plug and tighten.

Tightening torque

Drain plug to plastic sump	8 Nm (6 ft-lb)
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- ◀ Remove ATF fill plug (arrow). Fill transmission until ATF flows out of fill hole.

Table b. Automatic transmission fluid (ATF)

BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume. Torque converter does not drain when transmission is drained using drain plug.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

- Install fill plug.
- Press on brake pedal. With engine running at idle speed, shift through gears several times. Shift to P.
- Connect BMW scan tool and call up "Service functions (drive)." Follow on-screen instructions to complete ATF level check. See **ATF level, checking** in this repair group.
- Reinstall fill plug using new sealing ring.

Tightening torques

Fill plug to transmission housing	35 Nm (26 ft-lb)
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ATF sump, removing and installing

- Raise and safely support vehicle. Place oil drip pan underneath.

CAUTION—

- Make sure the vehicle 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 splash shield underneath transmission. See **020 Maintenance**. If necessary to improve access, remove splash shield and exhaust brackets.

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ATF sump, removing and installing

- Remove ATF drain plug and allow to drain. Reinstall and torque drain plug. See **ATF, draining and filling** in this repair group.

WARNING—

- Use gloves to protect your hands. Hot ATF scalds.

Tightening torque

Drain plug to plastic sump	8 Nm (6 ft-lb)
----------------------------	----------------

- Remove ATF sump retaining bolts (arrows) and lower sump.

- ATF sump components:

- Oil pickup tube sealing O-ring
- M6 bolt
 - If necessary, replace with M6 x 28.5 mm Torx T40
 - Tighten to 10 Nm (7 ft-lb)
- Gasket
- ATF sump (plastic)
- Drain plug
 - Tighten to 8 Nm (6 ft-lb)

- Remove and discard old sump gasket and oil pickup tube sealing O-ring. Use shop towels to clean sump interior and seal and gasket grooves.

CAUTION—

- Do not degrease sump with cleaning agent.

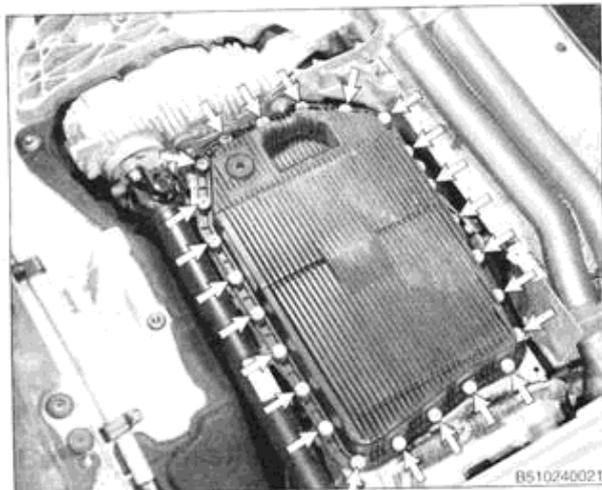
- Install new sealing O-ring.

- Make sure locating tab (arrow) on new gasket mates correctly with bore at edge of sump.

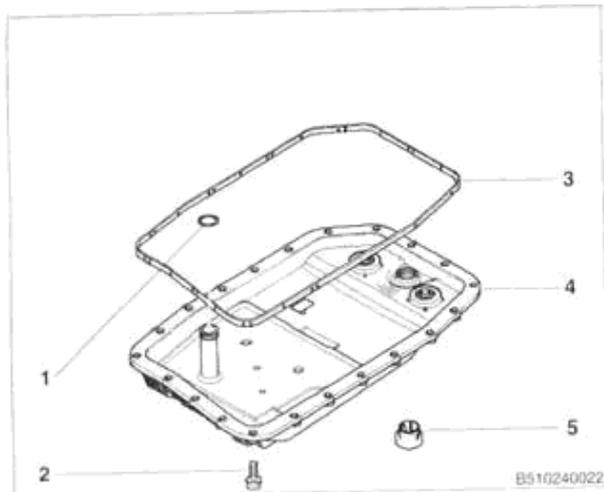
- Reinstall sump. Install retaining bolts hand-tight. Tighten bolts gradually and in crisscross pattern.

Tightening torque

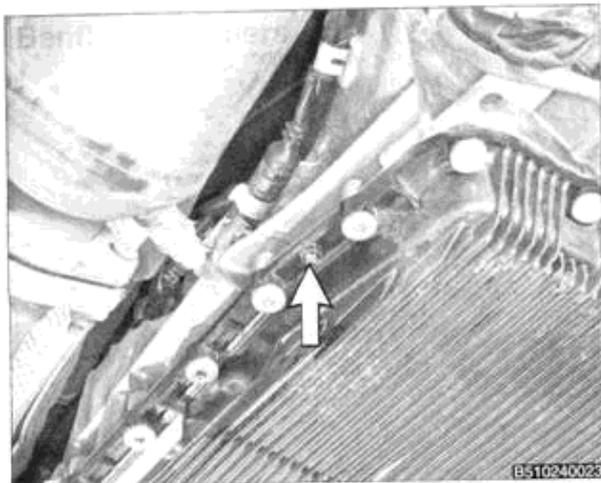
ATF sump to transmission housing	10 Nm (7 ft-lb)
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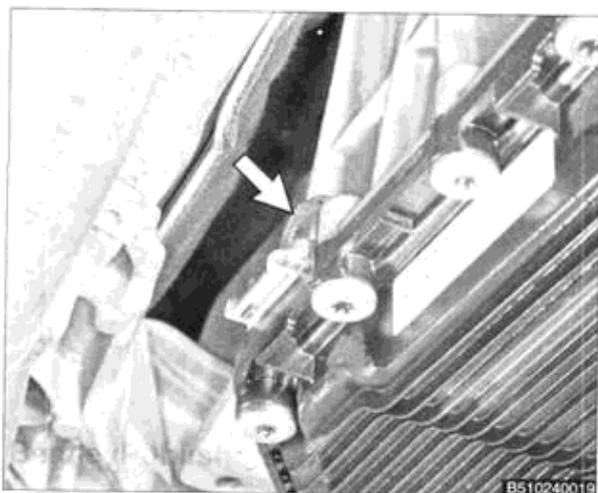
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240-16 Automatic Transmission

ATF sump, removing and installing



- Remove ATF fill plug (arrow). Fill transmission until ATF flows out of fill hole.

Automatic transmission fluid (ATF)

BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume. Torque converter does not drain when transmission is drained using drain plug.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

- Install fill plug.
- Press on brake pedal. With engine running at idle speed, shift through gears several times. Shift to P.
- Connect BMW scan tool and call up "Service functions (drive)." Follow on-screen instructions to complete ATF level check. See **ATF level, checking** in this repair group.
- Reinstall fill plug using new sealing ring.

Tightening torques

Fill plug to transmission housing	35 Nm (26 ft-lb)
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TRANSMISSION REMOVAL AND INSTALLATION

Removal and installation of the transmission is best accomplished on an automotive lift using a transmission jack. Use caution and safe workshop practices when working underneath vehicle and lowering transmission. Be sure to have appropriate tools on hand before starting the job.

CAUTION—

- Replace aluminium fasteners each time they are released. Do not use steel fasteners in place of aluminium. Electrochemical corrosion will result.

Transmission, removing and installing (6HP19Z transmission, M54 engine)

WARNING—

- Allow engine and transmission to cool down before starting work on the transmission.

Transmission, removing (M54 engine)

- Disconnect negative (-) cable from battery.

CAUTION—

- Prior to disconnecting the battery, read the battery disconnection cautions given in **001 Warnings and Cautions**.

- ◀ Support engine from above with suitable hoist.

- Raise and safely support vehicle.

WARNING—

- Make sure the vehicle 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 splash shields and supporting brackets under engine and transmission. See **020 Maintenance**.

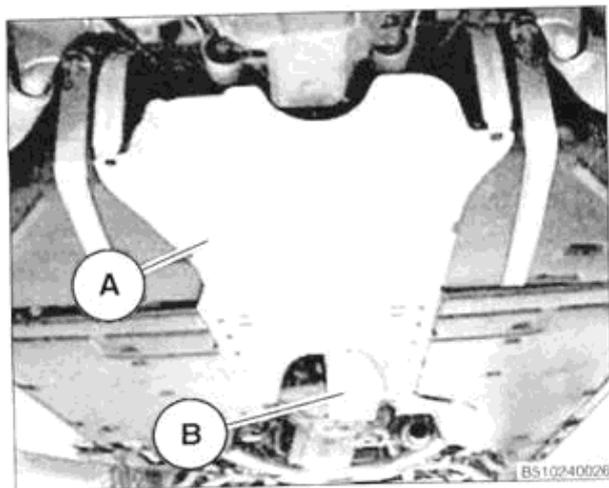
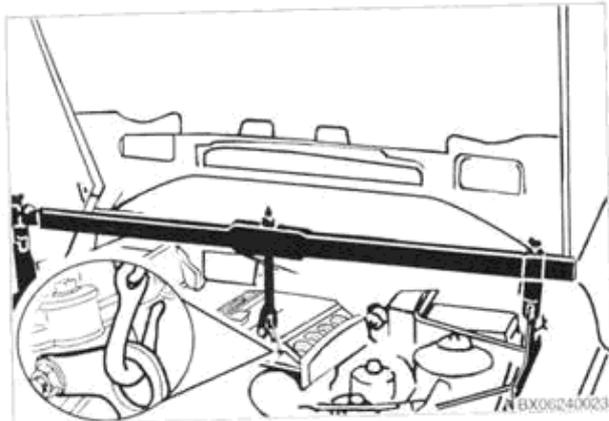
- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.

- Remove complete exhaust system. See **180 Exhaust System**.

CAUTION—

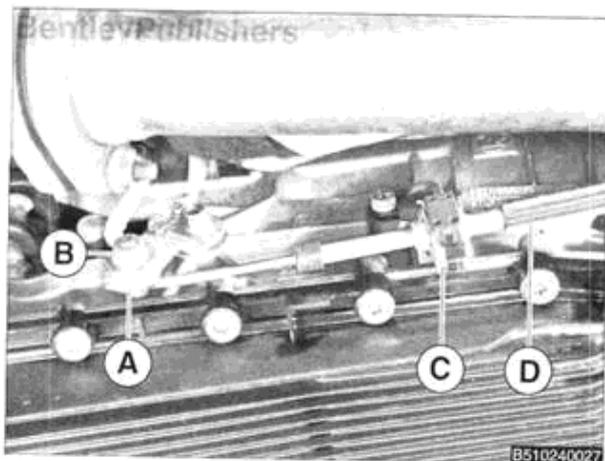
- To avoid damaging oxygen sensors, transport and store exhaust system carefully.

- ◀ Remove heat shields (A, B).

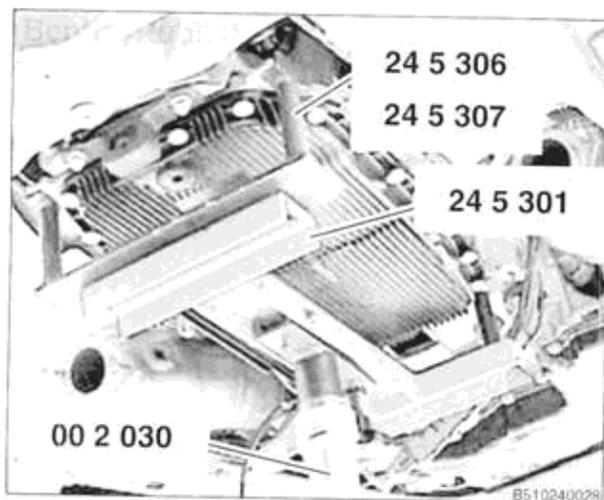


240-18 Automatic Transmission

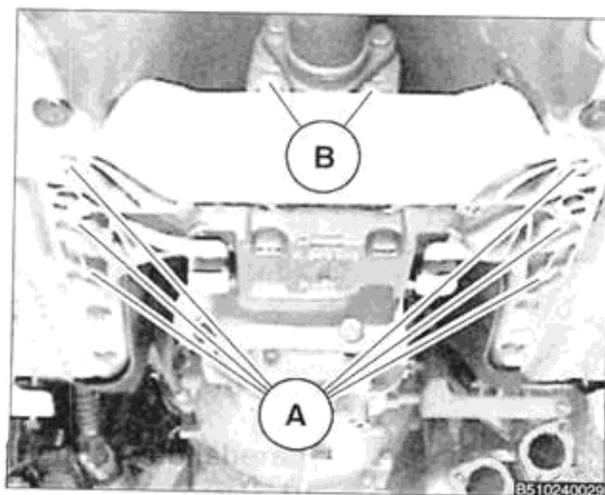
Transmission, removing and installing (6HP19Z transmission, M54 engine)



- Working at shift cable connection on left side of transmission:
- Counterhold clamping sleeve (A) and loosen nut (B). Use a screwdriver to pry off retainer clip (C) and pull cable (D) out of support bracket.



- Support transmission with transmission jack. Illustration shows BMW special tools.



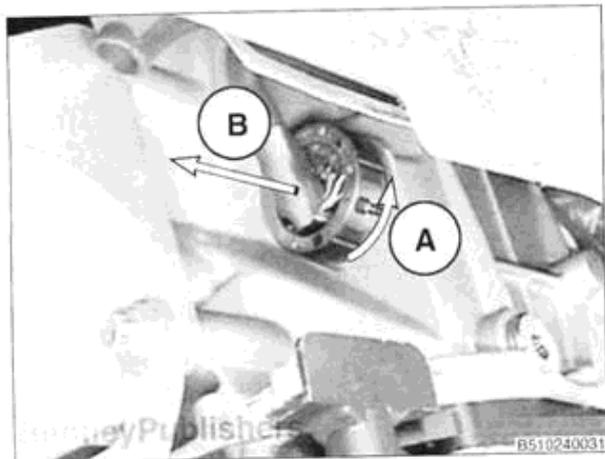
- Remove transmission rear support fasteners (A, B). Remove rear support.
- Detach rear driveshaft from transmission:
- Remove driveshaft center bearing support fasteners. Support center of driveshaft.
 - Unbolt rear driveshaft flex-disc from transmission flange.
 - Lower center of driveshaft sufficiently to disengage flex-disc from transmission output flange. Tie driveshaft to side with stiff wire. See 260 Driveshafts.

CAUTION—

- To prevent damage to rear driveshaft CV joint, do not allow driveshaft to hang down unsupported.

Automatic Transmission 240-19

Transmission, removing and installing (6HP19Z transmission, M54 engine)

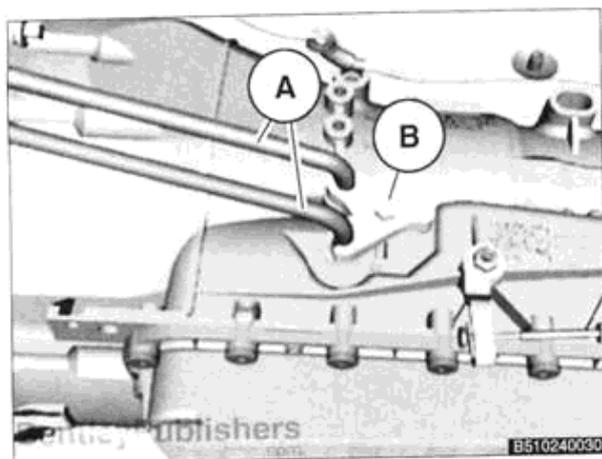


Working at rear of transmission housing:

- Twist mechatronics electrical connector bayonet lock in direction of curved arrow (A) to release.
- Carefully pull connector off pins (B).
- Insert BMW special tool 24 2 390 in place of mechatronics connector to protect delicate pins.

CAUTION—

- Do not touch pins.



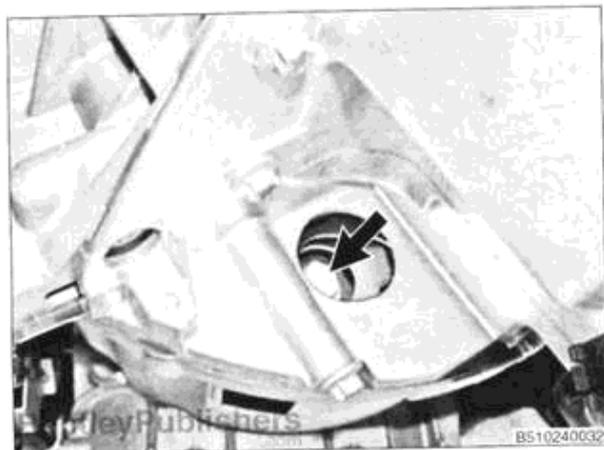
Working at ATF cooler lines (A) on left side of transmission:

- Remove fluid line bracket hold-down bolt (B)
- Detach fluid lines from transmission housing.

CAUTION—

- Be prepared to catch dripping fluid.
- Remove and discard fluid line O-ring seals. Be sure to use new ones when reassembling.

- If necessary, remove small cover over torque plate mounting bolts access hole.

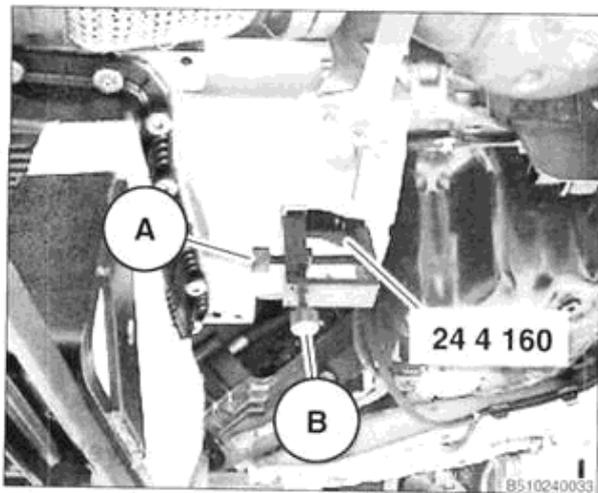


Rotate engine by hand in direction of rotation using bolt on crankshaft vibration damper until torque plate mounting bolt (arrow) is visible through access hole in engine bell housing flange.

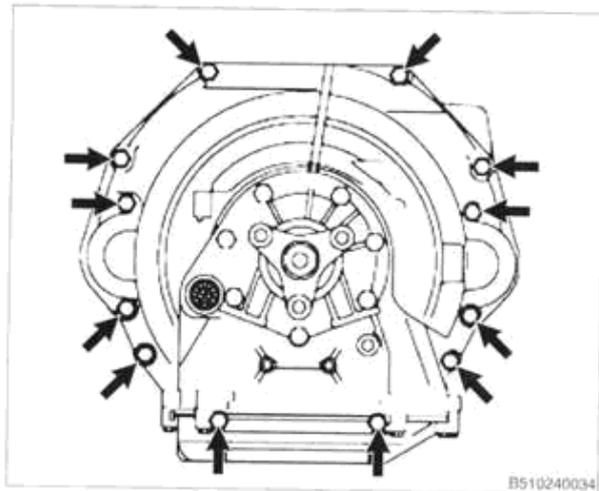
- Loosen and remove bolt.
- Rotate engine to gain access to and remove remaining torque plate bolts.

240-20 Automatic Transmission

Transmission, removing and installing (6HP19Z transmission, M54 engine)



- ◀ Use BMW special tool 24 4 160 or equivalent to secure torque converter in bell housing before you separate transmission from engine. This prevents torque converter from pulling off transmission input shaft and damaging torque converter oil seal.
 - Insert tool in bell housing opening and secure in place lightly using knurled knob **A**.
 - Twist in knurled knob **B** and tighten.
 - Tighten down knob **A**.



- ◀ Remove transmission bell housing bolts (**arrows**). Discard aluminum bolts.
- Remove transmission by pulling back and down. Lower jack slowly while watching carefully to make sure no lines, hoses or wires become snagged.

WARNING—

- Be sure the vehicle is properly supported. The removal of the transmission may upset the balance of the vehicle on the lift.

CAUTION—

- Tilting the engine to remove the transmission can lead to damage to engine compartment components due to lack of clearance.
- Do not allow the torque converter to fall off the transmission input shaft.

- Blow out oil cooler lines with low-pressure compressed air and flush cooler with clean ATF twice.

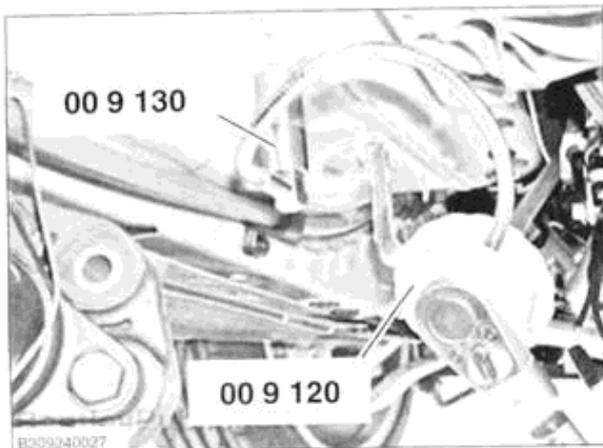
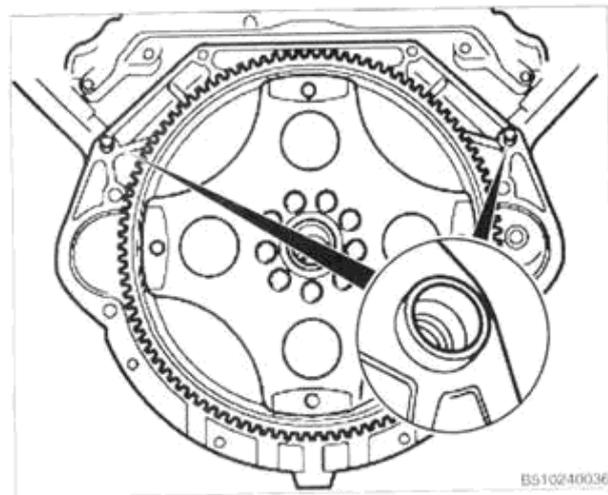
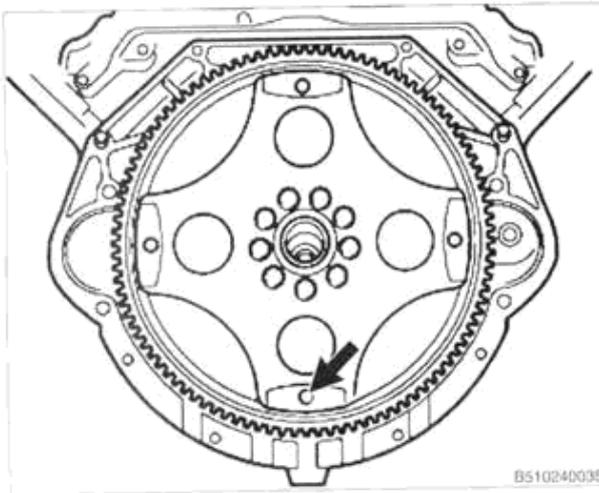
CAUTION—

- Wear safety glasses when working with compressed air.
- Do not reuse ATF used for flushing.

- Inspect engine torque plate and flywheel for cracks or elongated holes. Replace if necessary.
- If torque converter seal is leaky, or torque converter position on transmission input shaft was disturbed during removal, replace torque converter seal. See **Torque converter oil seal, removing and installing** in this repair group.

Automatic Transmission 240-21

Transmission, removing and installing (6HP19Z transmission, M54 engine)



Transmission, installing

- Rotate engine until torque plate bore for mounting bolt (**arrow**) is accessible through opening in engine bell housing.
- Check that bell housing dowel sleeves (**arrows**) are in good shape and correctly seated. Replace if needed.
 - Check that torque converter is seated correctly in transmission.
 - Rotate torque converter until threaded mounting hole in converter is lined up with bore in torque plate.
 - Join transmission to engine. Make sure torque converter and torque plate bolt bores are lined up by installing one bolt finger-tight.
- Using new aluminum bolts, tighten bell housing fasteners to initial torque.
 - Use torque angle tool (BMW special tools 00 9 120 / 00 9 130 or equivalent) and tighten fasteners to final torque angle.
 - Install and tighten remaining torque converter bolts.

Tightening torques

Torque converter to torque plate: • M10 x 10.9	56 Nm (41 ft-lb)
Transmission rear support to body (M8)	19 Nm (14 ft-lb)
Transmission rear support to transmission	19 Nm (14 ft-lb)
Transmission to engine (M12 aluminum): • Initial torque • Torque angle	25 Nm (18 ft-lb) + 130°
Transmission to engine (M10 x 30 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 90 - 110°
Transmission to engine (M10 x 85 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 180 - 200°

240-22 Automatic Transmission

Transmission, removing and installing (6HP19Z transmission, M54 engine)

- Remainder of installation is reverse of removal. Remember to:
 - Install new sealing washers or O-rings on ATF cooler line fittings.
 - Adjust gearshift mechanism. See **250 Gearshift Linkage**.
 - Driveshaft tightening torques are in **260 Driveshafts**. To avoid damaging driveshaft flex-disc, counterhold flex-disc bolt heads while tightening nuts.
 - Fill transmission with clean ATF. See **ATF, draining and filling** in this repair group.
 - Use new bolts to reinstall front end reinforcement plate. See **310 Front Suspension**.

Tightening torques	
Drain plug to plastic sump	8 Nm (6 ft-lb)
Fill plug to transmission housing	35 Nm (26 ft-lb)

Automatic transmission fluid (ATF)	
BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)

WARNING—

- Allow engine and transmission to cool down before starting work on the transmission.

Transmission, removing (N52, N54 engines)

- 2008 - 2009 models (starting production date 03 / 2007): Release parking lock manually. See **250 Gearshift Linkage**.
- Disconnect negative (-) cable from battery.

CAUTION—

- Prior to disconnecting the battery, read the battery disconnection cautions given in **001 Warnings and Cautions**.

- Support engine from above with suitable hoist.
- Raise and safely support vehicle.

WARNING—

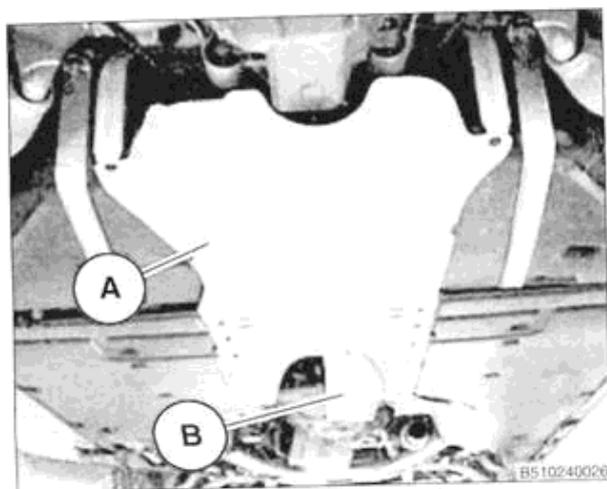
- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shields and supporting brackets under engine and transmission. See **020 Maintenance**.
- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Remove complete exhaust system. See **180 Exhaust System**.

CAUTION—

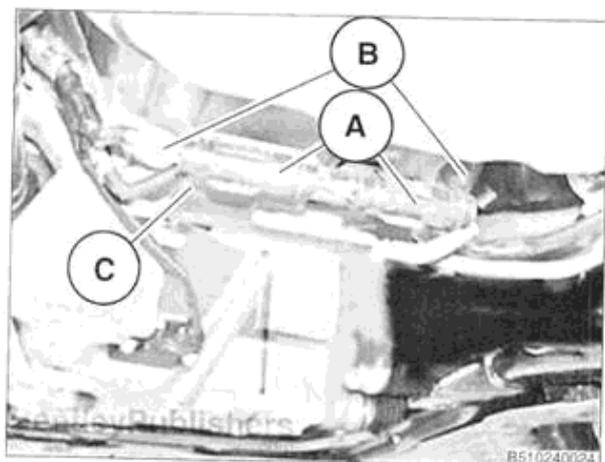
- To avoid damaging oxygen sensors, transport and store exhaust system carefully.

- ◀ Remove heat shields (A, B).

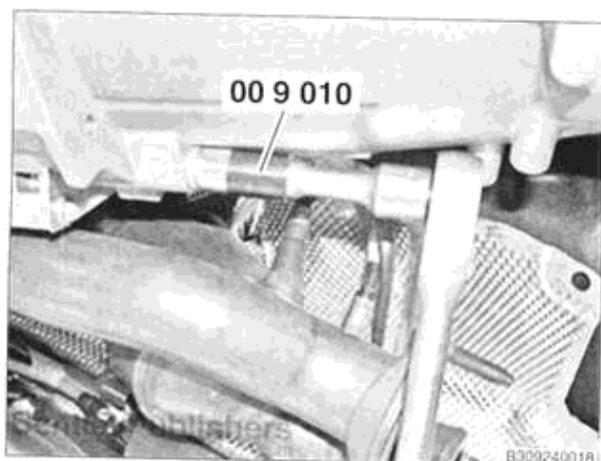


240-24 Automatic Transmission

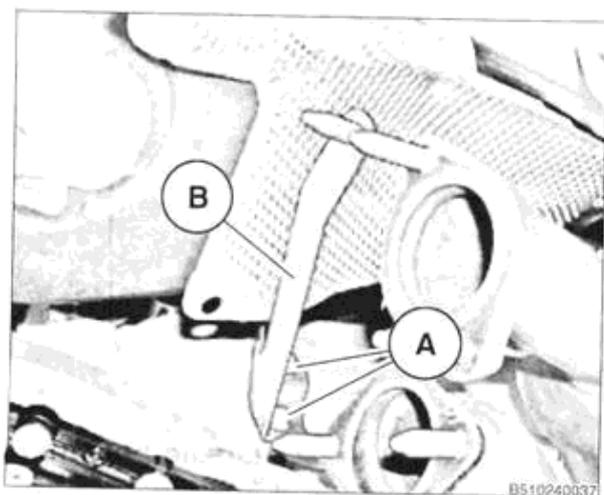
Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



- ◀ Separate oxygen sensor electrical connectors (A). Remove fasteners (B) and remove retaining plate (C).



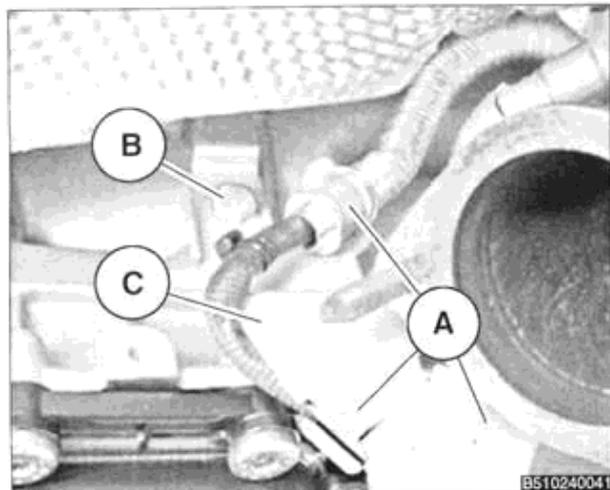
- ◀ Use BMW special tool 00 9 010 (Torx E18 socket) to remove aluminium fastener next to electrical connector brackets. Discard fastener.



- ◀ N52 engine: Working at front exhaust pipe flanges, remove heat shield bracket fasteners (A) and remove bracket (B).

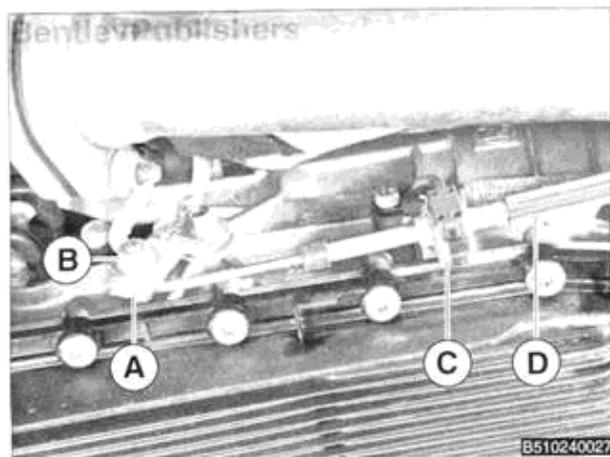
Automatic Transmission 240-25

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



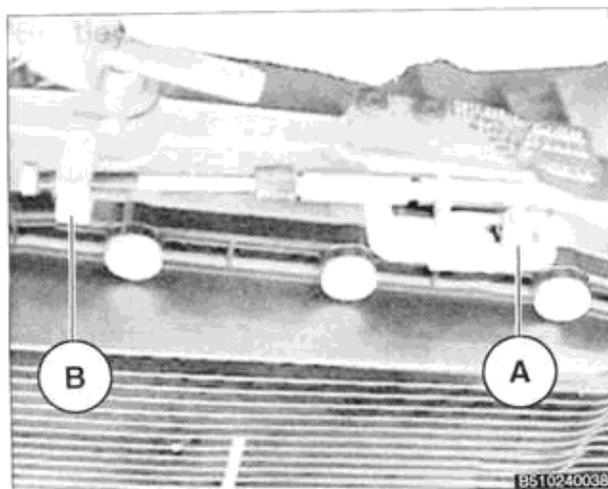
⚡ N54 engine: Working at front exhaust pipe flanges:

- Detach electrical harness from bracket (A).
- Remove wire bracket mounting fastener (B).
- Remove bracket (C).



⚡ 2006 - 2007 models: Working at shift cable connection on left side of transmission:

- Counterhold clamping sleeve (A) and loosen nut (B). Use a screwdriver to pry off retainer clip (C) and pull cable (D) out of support bracket.

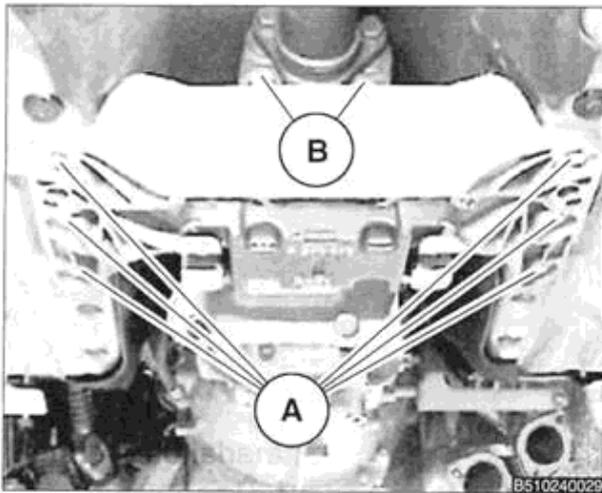


⚡ 2008 - 2009 models: Working at parking lock cable on left side of transmission:

- Remove cable bracket fastener (A).
 - Disengage cable end from parking lock lever (B).
- Support transmission with transmission jack. Secure transmission to jack with suitable strap.

240-26 Automatic Transmission

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



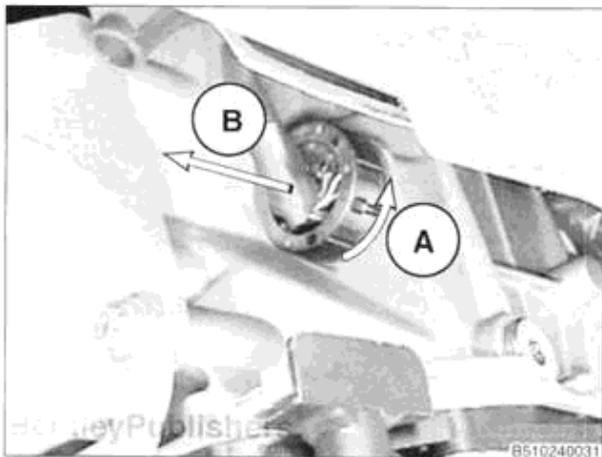
Remove transmission rear support fasteners (A, B). Remove rear support.

Detach rear driveshaft from transmission:

- Remove driveshaft center bearing support fasteners. Support center of driveshaft.
- Unbolt rear driveshaft flex-disc from transmission flange.
- Lower center of driveshaft sufficiently to disengage flex-disc from transmission output flange. Tie driveshaft to side using stiff wire. See **260 Driveshafts**.

CAUTION—

- To prevent damage to rear driveshaft CV joint, do not allow driveshaft to hang down unsupported.

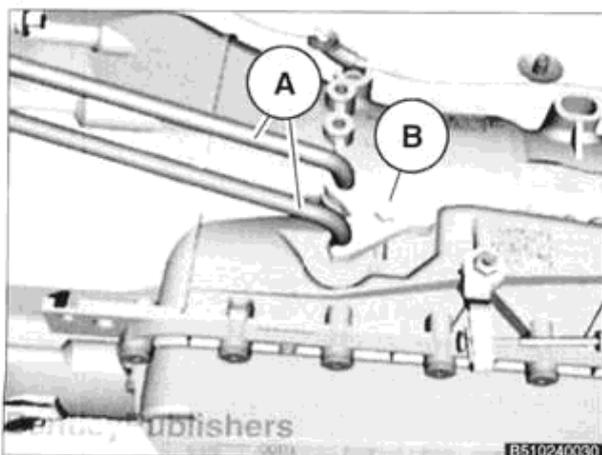


Working at rear of transmission housing:

- Twist mechatronics electrical connector bayonet lock in direction of curved arrow (A) to release.
- Carefully pull connector off pins (B).
- Insert BMW special tool 24 2 390 in place of mechatronics connector to protect delicate pins.

CAUTION—

- Do not touch pins.



Working at ATF cooler lines (A) on left side of transmission:

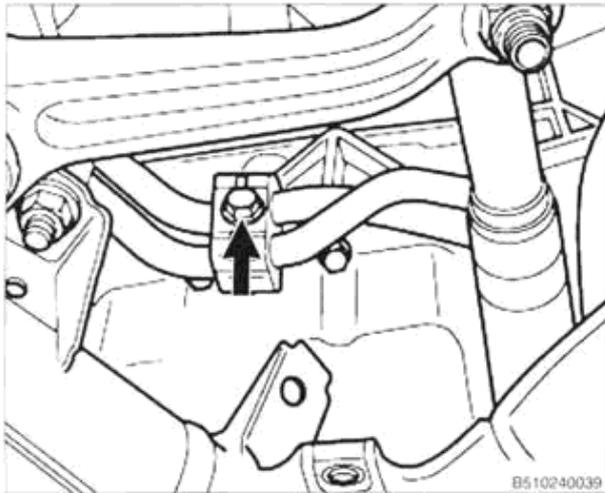
- Remove fluid line bracket hold-down bolt (B)
- Detach fluid lines from transmission housing.

CAUTION—

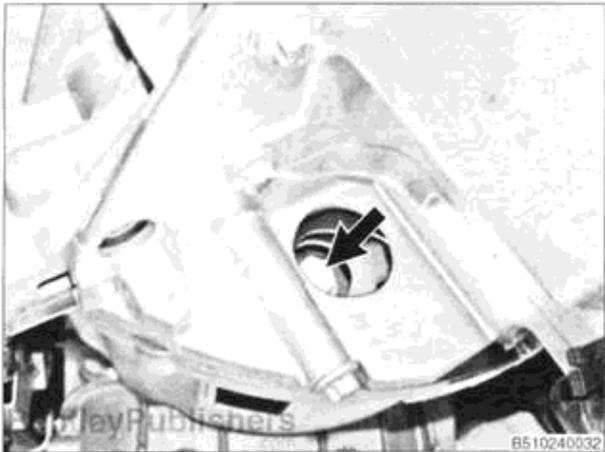
- Be prepared to catch dripping fluid.
- Remove and discard fluid line O-ring seals. Be sure to use new ones when reassembling.

Automatic Transmission 240-27

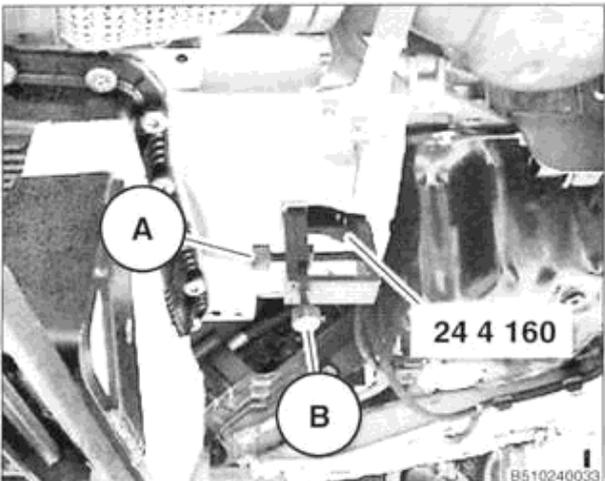
Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



- Remove transmission fluid cooler line bracket mounting bolt (arrow) at engine oil pan.



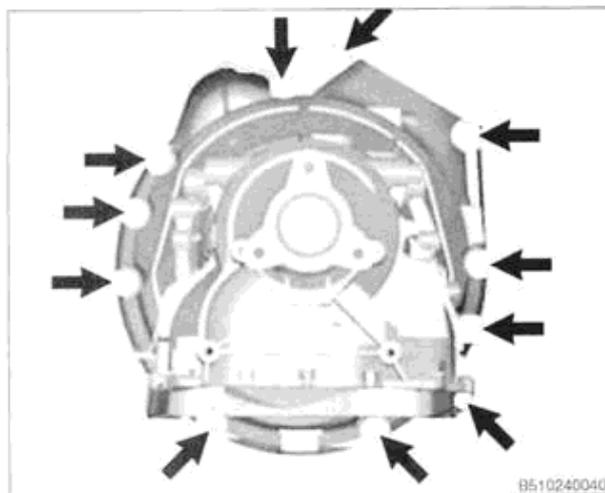
- Rotate engine by hand in direction of rotation using bolt on crankshaft vibration damper until torque plate mounting bolt (arrow) is visible through access hole in engine bell housing flange.
 - Loosen and remove bolt.
 - Rotate engine to gain access to and remove remaining torque plate bolts.



- Use BMW special tool 24 4 160 or equivalent to secure torque converter in bell housing before you separate transmission from engine. This prevents torque converter from pulling off transmission input shaft and damaging torque converter oil seal.
 - Insert tool in bell housing opening and secure in place lightly using knurled knob **A**.
 - Twist in knurled knob **B** and tighten.
 - Tighten down knob **A**.

240-28 Automatic Transmission

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



Remove transmission bell housing bolts (**arrows**). Discard aluminum bolts.

Remove transmission by pulling back and down. Lower jack slowly while watching carefully to make sure no lines, hoses or wires become snagged.

WARNING—

- Be sure the vehicle is properly supported. The removal of the transmission may upset the balance of the vehicle on the lift.

CAUTION—

- Tilting the engine to remove the transmission can lead to damage to engine compartment components due to lack of clearance.
- Do not allow the torque converter to fall off the transmission input shaft.

Blow out oil cooler lines with low-pressure compressed air and flush cooler with clean ATF twice.

CAUTION—

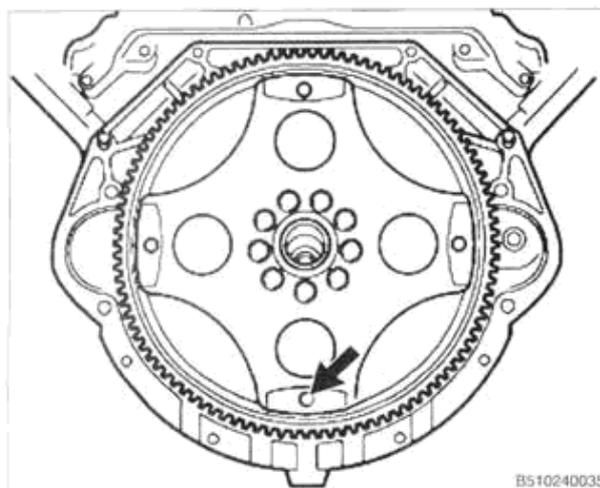
- Wear safety glasses when working with compressed air.
- Do not reuse ATF used for flushing.

Inspect engine torque plate and flywheel for cracks or elongated holes. Replace if necessary.

If torque converter seal is leaky, or torque converter position on transmission input shaft was disturbed during removal, replace torque converter seal. See **Torque converter oil seal, removing and installing** in this repair group.

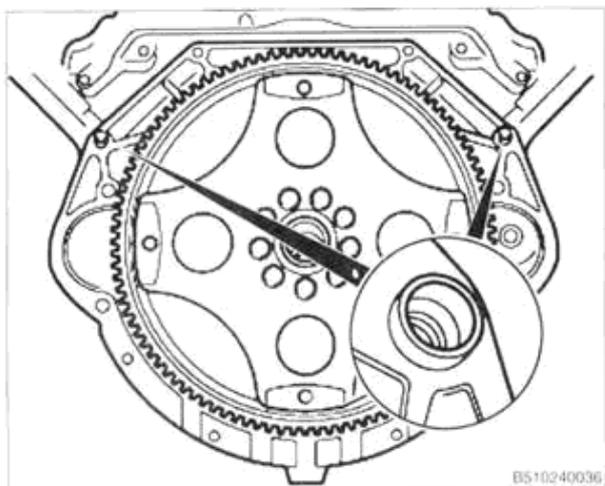
Transmission, installing (N52, N54 engines)

Rotate engine until torque plate bore for mounting bolt (**arrow**) is accessible through opening in engine bell housing.

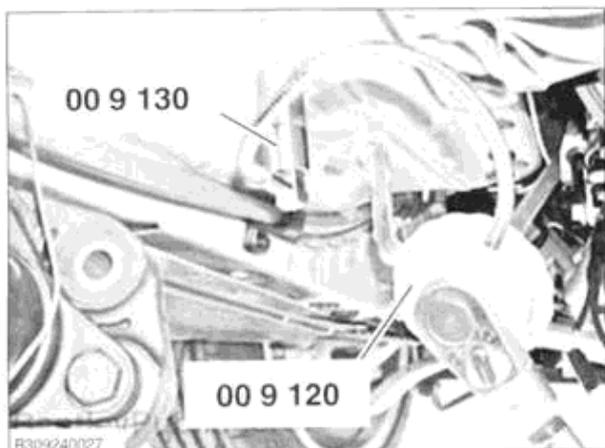


Automatic Transmission 240-29

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)



- ⚠ Check that bell housing dowel sleeves (**arrows**) are in good shape and correctly seated. Replace if needed.
- Check that torque converter is seated correctly in transmission.
- Rotate torque converter until threaded mounting hole in converter is lined up with bore in torque plate.
- Join transmission to engine. Make sure torque converter and torque plate bolt bores are lined up by installing one bolt finger-tight.



- ⚠ Using new aluminum bolts, tighten bell housing fasteners to initial torque.
 - Use torque angle tool (BMW special tools 00 9 120 / 00 9 130 or equivalent) and tighten fasteners to final torque angle.
 - Install and tighten remaining torque converter bolts.

Tightening torques	
Torque converter to torque plate: • M10 x 10.9	56 Nm (41 ft-lb)
Transmission rear support to body (M8)	19 Nm (14 ft-lb)
Transmission rear support to transmission	19 Nm (14 ft-lb)
Transmission to engine (M12 aluminum): • Initial torque • Torque angle	25 Nm (18 ft-lb) + 130°
Transmission to engine (M10 x 30 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 90 - 110°
Transmission to engine (M10 x 85 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 180 - 200°

240-30 Automatic Transmission

Transmission, removing and installing (6HP19Z transmission, N52, N54 engines)

- Remainder of installation is reverse of removal. Remember to:
 - Install new sealing washers or O-rings on ATF cooler line fittings.
 - 2006 - 2007 models: Adjust gearshift mechanism. See **250 Gearshift Linkage**.
 - 2008 - 2009 models: Adjust parking lock cable free play. See **250 Gearshift Linkage**.
 - Driveshaft tightening torques are in **260 Driveshafts**. To avoid damaging driveshaft flex-disc, counterhold flex-disc bolt heads while tightening nuts.
 - Fill transmission with clean ATF. See **ATF, draining and filling** in this repair group.
 - Use new bolts to reinstall front end reinforcement plate. See **310 Front Suspension**.

Tightening torques	
Drain plug to plastic sump	8 Nm (6 ft-lb)
Fill plug to transmission housing	35 Nm (26 ft-lb)

5 Series automatic transmission fluid (ATF)	
BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

**Transmission, removing and installing
(6HP19Z xDrive transmission)****WARNING—**

- Allow engine and transmission to cool down before starting work on the transmission.

Transmission, removing (xDrive transmission)

- 2008 - 2009 models (starting production date 03 / 2007): Release parking lock manually. See **250 Gearshift Linkage**.
- Disconnect negative (-) cable from battery.

CAUTION—

- Prior to disconnecting the battery, read the battery disconnection cautions given in **001 Warnings and Cautions**.

- Support engine from above with suitable hoist.
- Raise and safely support vehicle.

WARNING—

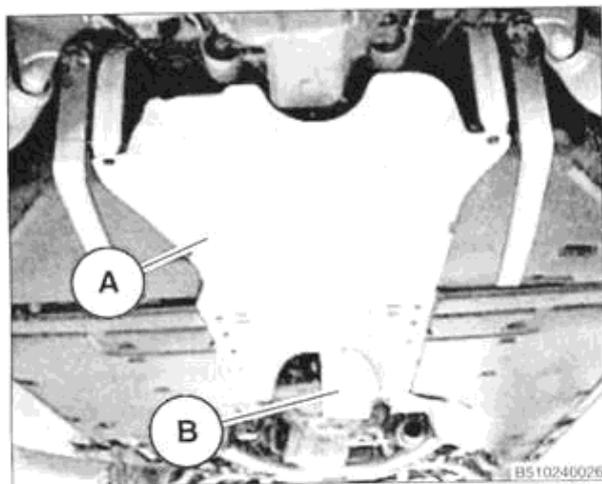
- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shields and supporting brackets under engine and transmission. See **020 Maintenance**.
- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Remove complete exhaust system. See **180 Exhaust System**.

CAUTION—

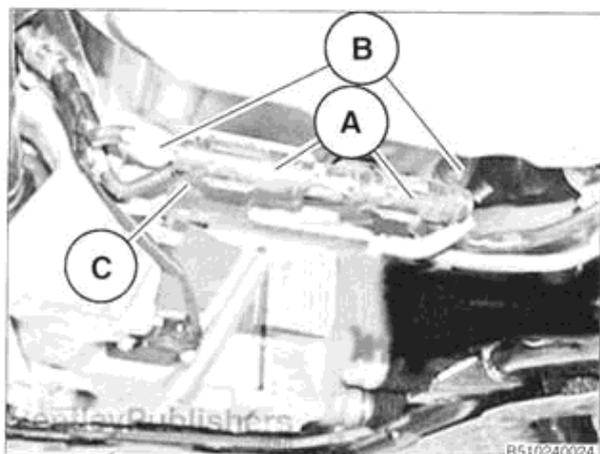
- To avoid damaging oxygen sensors, transport and store exhaust system carefully.

- ◀ Remove heat shields (A, B).

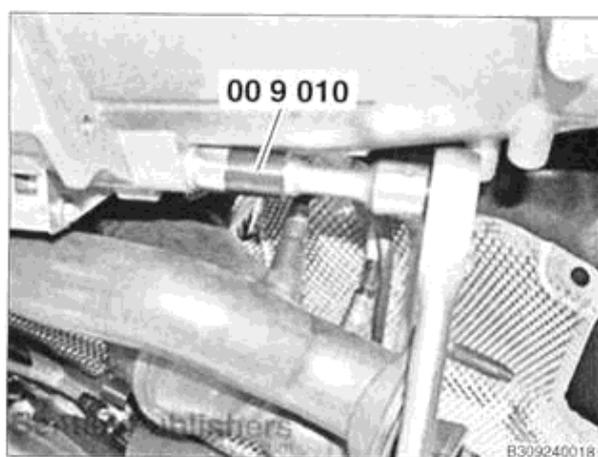


240-32 Automatic Transmission

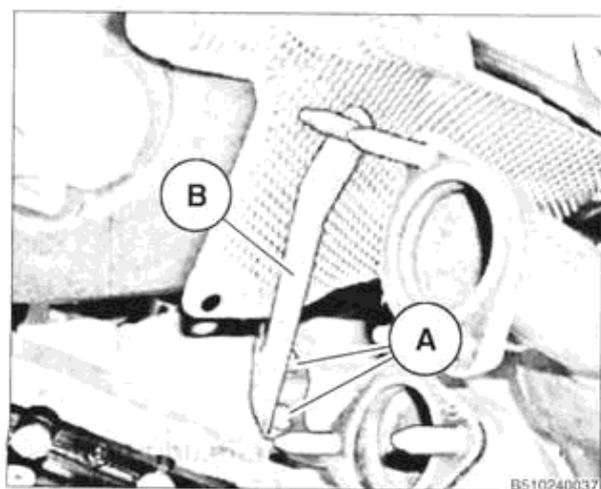
Transmission, removing and installing (6HP19Z xDrive transmission)



- ◀ Separate oxygen sensor electrical connectors (A). Remove fasteners (B) and remove retaining plate (C).



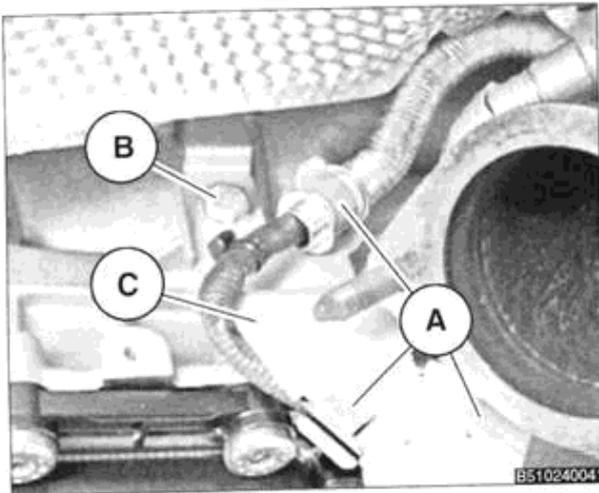
- ◀ Use BMW special tool 00 9 010 (Torx E18 socket) to remove aluminium fastener next to electrical connector brackets. Discard fastener.



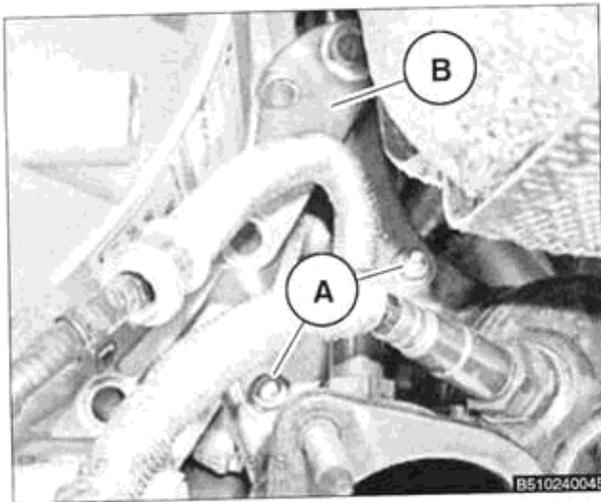
- ◀ N52 engine: Working at front exhaust pipe flanges, remove heat shield bracket fasteners (A) and remove bracket (B).

Automatic Transmission 240-33

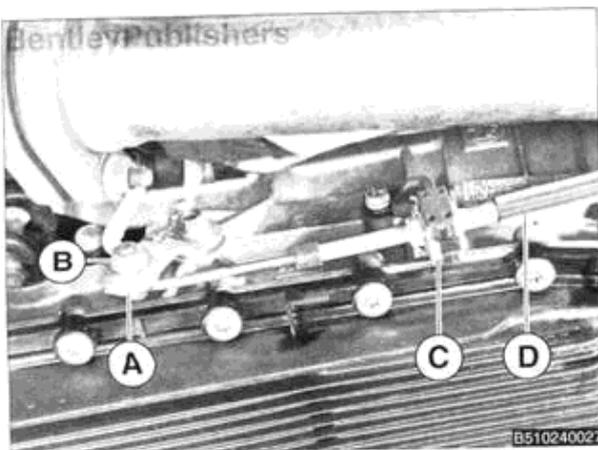
Transmission, removing and installing (6HP19Z xDrive transmission)



- ◀ N54 engine: Working at front exhaust pipe flanges:
- Detach electrical harness from bracket (A).
 - Remove wire bracket mounting fastener (B).
 - Remove bracket (C).



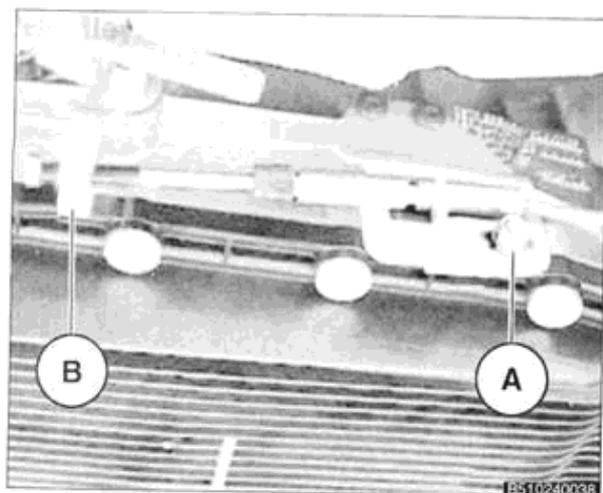
- ◀ N54 engine: Working at front exhaust pipe flanges:
- Remove wire bracket mounting fastener (A).
 - Remove bracket (B).



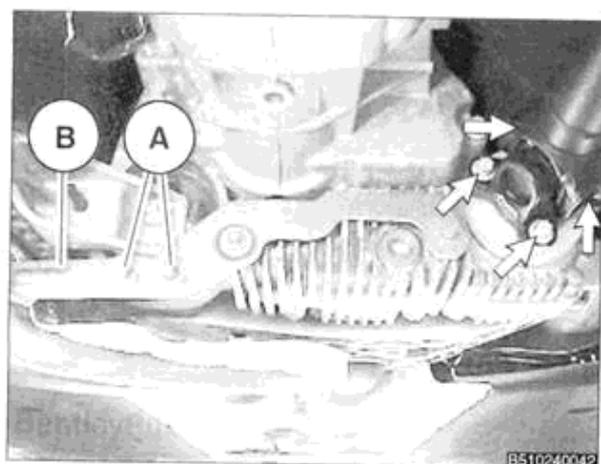
- ◀ 2006 - 2007 models: Working at shift cable connection on left side of transmission:
- Counterhold clamping sleeve (A) and loosen nut (B). Use a screwdriver to pry off retainer clip (C) and pull cable (D) out of support bracket.

240-34 Automatic Transmission

Transmission, removing and installing (6HP19Z xDrive transmission)



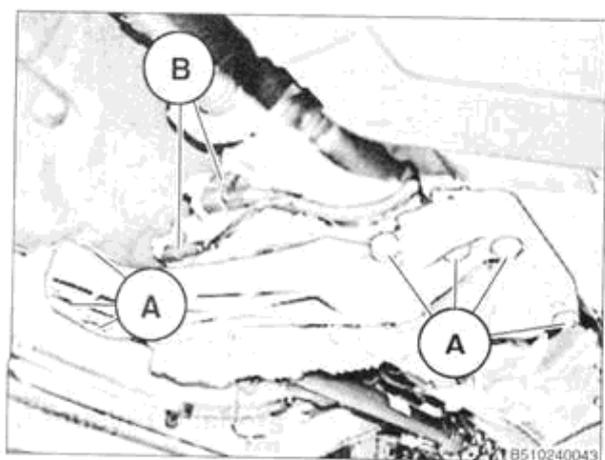
- ◀ 2008 - 2009 models: Working at parking lock cable on left side of transmission:
 - Remove cable bracket fastener (A).
 - Disengage cable end from parking lock lever (B).
- Support transmission with transmission jack. Secure transmission to jack with suitable strap.



- ◀ Working underneath transmission at front of transfer case:
 - Remove front driveshaft mounting bolts (arrows) and tie driveshaft to one side.
 - Remove mounting bolts (A) and remove exhaust bracket (B).
- Detach rear driveshaft from transfer case:
 - Remove driveshaft center bearing support fasteners. Support center of driveshaft.
 - Unbolt rear driveshaft flex-disc from transfer case flange.
 - Lower center of driveshaft sufficiently to disengage flex-disc from transfer case output flange. Tie driveshaft to side. See **260 Driveshafts**.

CAUTION—

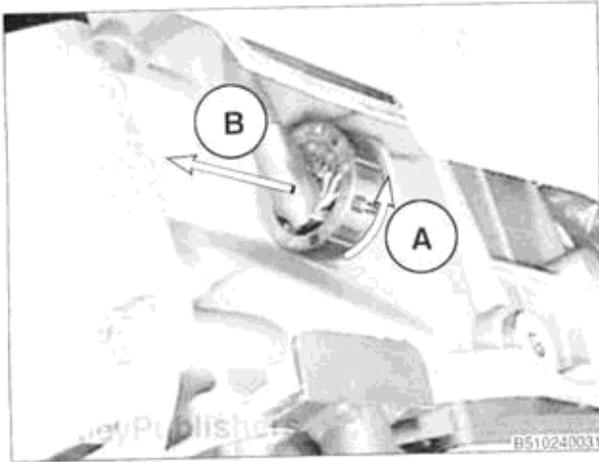
- To prevent damage to rear driveshaft CV joint, do not allow driveshaft to hang down unsupported.



- ◀ Working underneath vehicle at rear of transfer case:
 - Remove transmission rear support mounting bolts (A). Remove support.
 - Detach transfer case electrical connectors (B).

Automatic Transmission 240-35

Transmission, removing and installing (6HP19Z xDrive transmission)

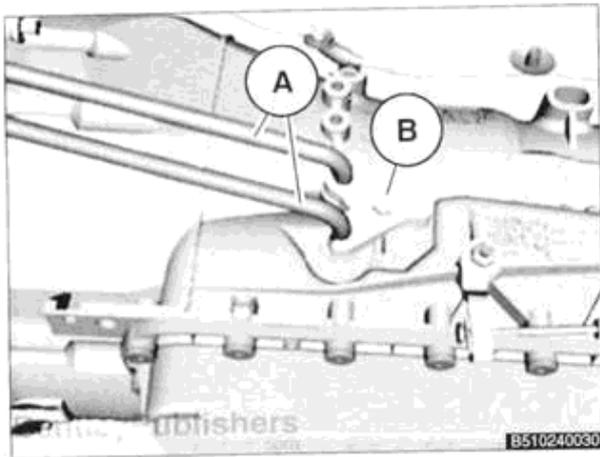


Working at rear of transmission housing:

- Twist mechatronics electrical connector bayonet lock in direction of curved arrow (A) to release.
- Carefully pull connector off pins (B).
- Insert BMW special tool 24 2 390 in place of mechatronics connector to protect delicate pins.

CAUTION—

- Do not touch pins.

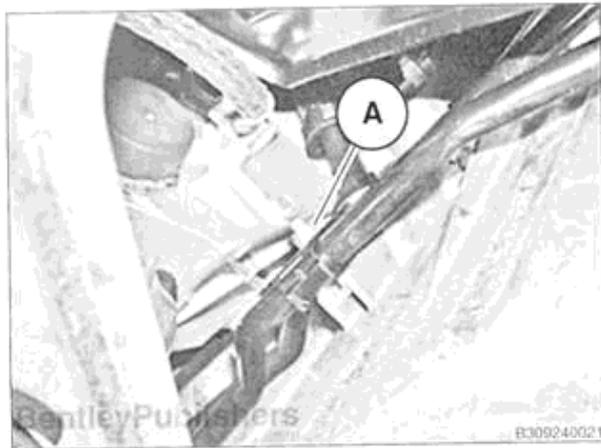


Working at ATF cooler lines (A) on left side of transmission:

- Remove fluid line bracket hold-down bolt (B)
- Detach fluid lines from transmission housing.

CAUTION—

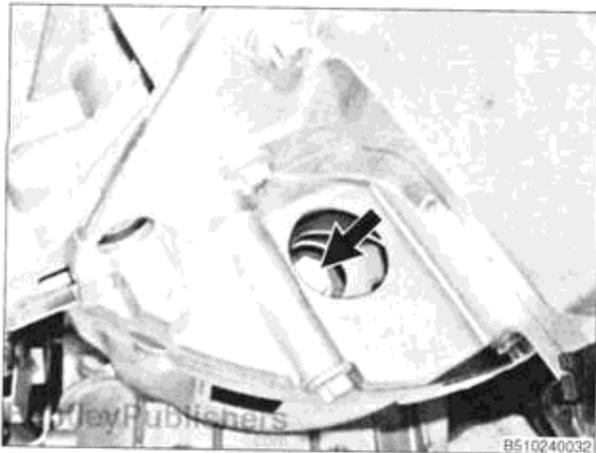
- Be prepared to catch dripping fluid.
- Remove and discard fluid line O-ring seals. Be sure to use new ones when reassembling.



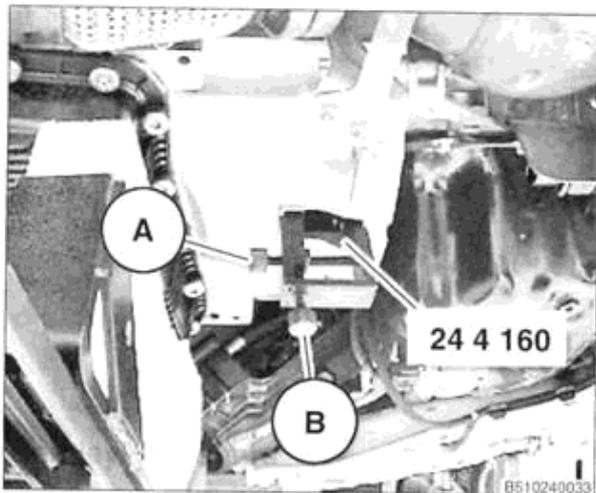
Remove transmission fluid cooler line bracket mounting bolt (arrow) at engine oil pan.

240-36 Automatic Transmission

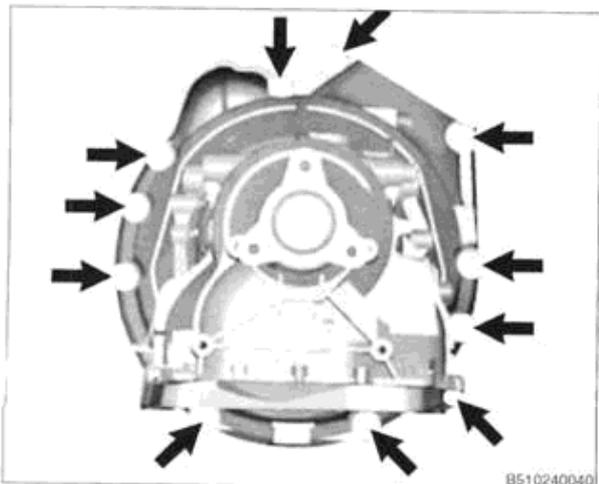
Transmission, removing and installing (6HP19Z xDrive transmission)



- ▶ Rotate engine by hand in direction of rotation using bolt on crankshaft vibration damper until torque plate mounting bolt (**arrow**) is visible through access hole in engine bell housing flange.
 - Loosen and remove bolt.
 - Rotate engine to gain access to and remove remaining torque plate bolts.



- ▶ Use BMW special tool 24 4 160 or equivalent to secure torque converter in bell housing before you separate transmission from engine. This prevents torque converter from pulling off transmission input shaft and damaging torque converter oil seal.
 - Insert tool in bell housing opening and secure in place lightly using knurled knob **A**.
 - Twist in knurled knob **B** and tighten.
 - Tighten down knob **A**.



- ▶ Remove transmission bell housing bolts (**arrows**). Discard aluminum bolts.
- Remove transmission by pulling back and down. Lower jack slowly while watching carefully to make sure no lines, hoses or wires become snagged.

WARNING—

- Be sure the vehicle is properly supported. The removal of the transmission may upset the balance of the vehicle on the lift.

CAUTION—

- Tilting the engine to remove the transmission can lead to damage to engine compartment components due to lack of clearance.
- Do not allow the torque converter to fall off the transmission input shaft.

Automatic Transmission 240-37

Transmission, removing and installing (6HP19Z xDrive transmission)

- Blow out oil cooler lines with low-pressure compressed air and flush cooler with clean ATF twice.

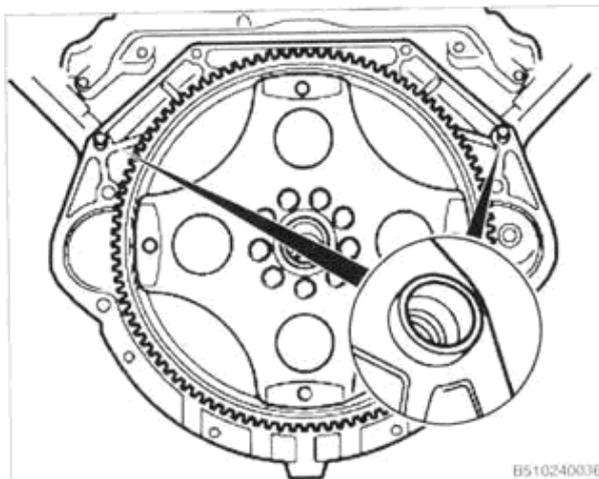
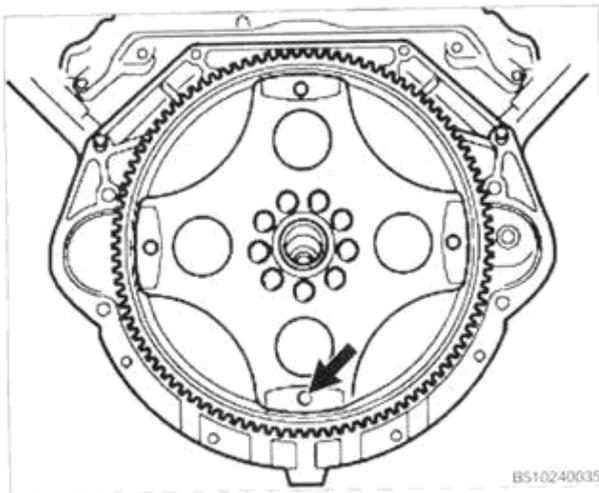
CAUTION—

- Wear safety glasses when working with compressed air.
- Do not reuse ATF used for flushing.

- Inspect engine torque plate and flywheel for cracks or elongated holes. Replace if necessary.
- If torque converter seal is leaky, or torque converter position on transmission input shaft was disturbed during removal, replace torque converter seal. See **Torque converter oil seal, removing and installing** in this repair group.

Transmission, installing (xDrive transmission)

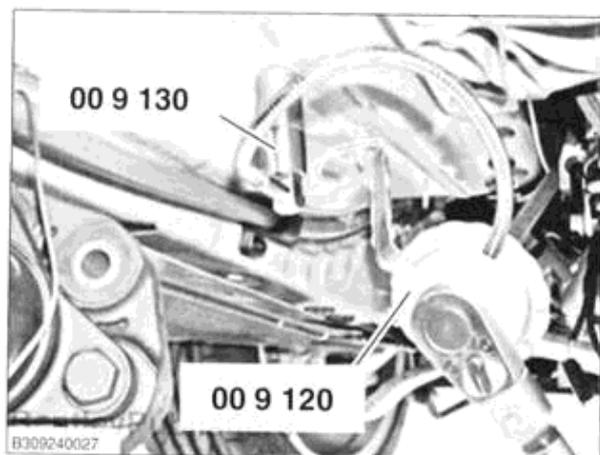
- Rotate engine until torque plate bore for mounting bolt (**arrow**) is accessible through opening in engine bell housing.



- Check that bell housing dowel sleeves (**arrows**) are in good shape and correctly seated. Replace if needed.
- Check that torque converter is seated correctly in transmission.
- Rotate torque converter until threaded mounting hole in converter is lined up with bore in torque plate.
- Join transmission to engine. Make sure torque converter and torque plate bolt bores are lined up by installing one bolt finger-tight.

240-38 Automatic Transmission

Transmission, removing and installing (6HP19Z xDrive transmission)



- ◀ Using new aluminum bolts, tighten bell housing fasteners to initial torque.
- Use torque angle tool (BMW special tools 00 9 120 / 00 9 130 or equivalent) and tighten fasteners to final torque angle.
- Install and tighten remaining torque converter bolts.

Tightening torques	
Torque converter to torque plate: • M10 x 10.9	56 Nm (41 ft-lb)
Transmission rear support to body (M8)	19 Nm (14 ft-lb)
Transmission rear support to transmission	19 Nm (14 ft-lb)
Transmission to engine (M12 aluminum): • Initial torque • Torque angle	25 Nm (18 ft-lb) + 130°
Transmission to engine (M10 x 30 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 90 - 110°
Transmission to engine (M10 x 85 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 180 - 200°

- Remainder of installation is reverse of removal. Remember to:
 - Install new sealing washers or O-rings on ATF cooler line fittings.
 - 2006 - 2007 models: Adjust gearshift mechanism. See **250 Gearshift Linkage**.
 - 2008 - 2009 models: Adjust parking lock cable free play. See **250 Gearshift Linkage**.
 - Driveshaft tightening torques are in **260 Driveshafts**. To avoid damaging driveshaft flex-disc, counterhold flex-disc bolt heads while tightening nuts.
 - Fill transmission with clean ATF. See **ATF, draining and filling** in this repair group.
 - Use new bolts to reinstall front end reinforcement plate. See **310 Front Suspension**.

Tightening torques	
Drain plug to plastic sump	8 Nm (6 ft-lb)
Fill plug to transmission housing	35 Nm (26 ft-lb)

5 Series automatic transmission fluid (ATF)	
BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

Transmission, removing and installing (6HP26Z, V8 engine)

Transmission, removing (V8 engine)

- 2008 - 2009 models (starting production date 03 / 2007): Release parking lock manually. See **250 Gearshift Linkage**.
- Disconnect negative (-) cable from battery.

CAUTION—

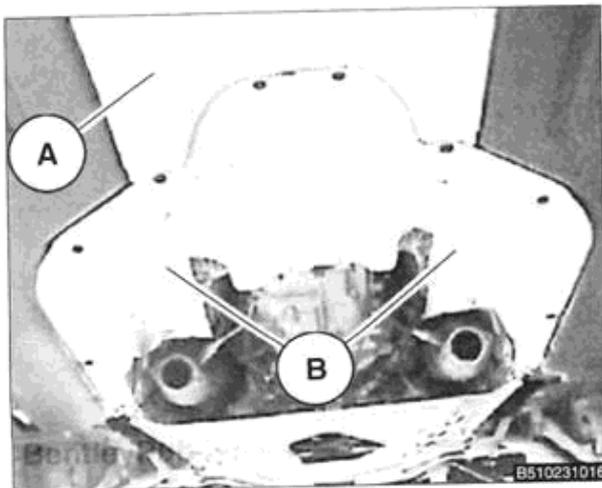
- Prior to disconnecting the battery, read the battery disconnection cautions given in **001 Warnings and Cautions**.

- Support engine from above with suitable hoist.
- Raise and safely support vehicle.

WARNING—

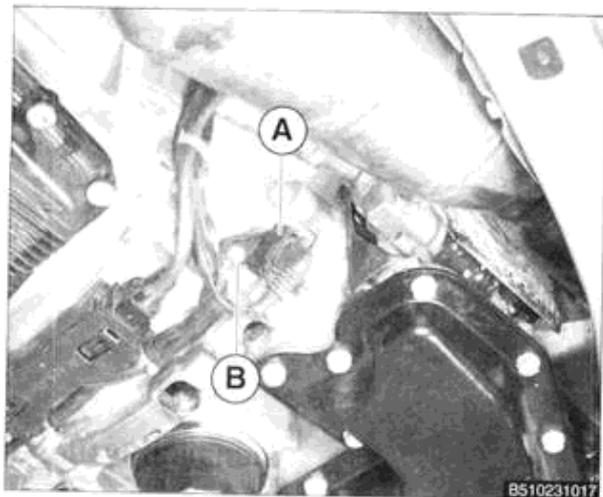
- Make sure the vehicle is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shields and supporting brackets under engine and transmission. See **020 Maintenance**.
- Remove front end reinforcement. Discard mounting bolts. See **310 Front Suspension**.
- Remove exhaust system from catalytic converters back. See **180 Exhaust System**.
- Remove oxygen sensors and store them safely.
- ◀ Remove heat shields (A, B).



240-40 Automatic Transmission

Transmission, removing and installing (6HP26Z, V8 engine)



- Working underneath right side of engine bellhousing:
- Detach plug (A) from crankshaft sensor.
 - Remove sensor mounting screw (B) and remove speed sensor.



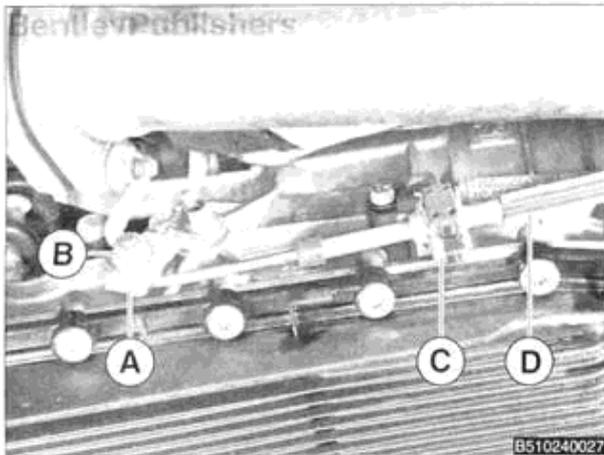
- Working underneath engine oil pan:
- Detach electrical connector (arrow) from oil level sensor.
 - Unclip harness from harness support clips.



- Working underneath transmission bell housing, detach harness connector (arrow) from cable loom. Unclip loom from transmission housing and tie to one side.

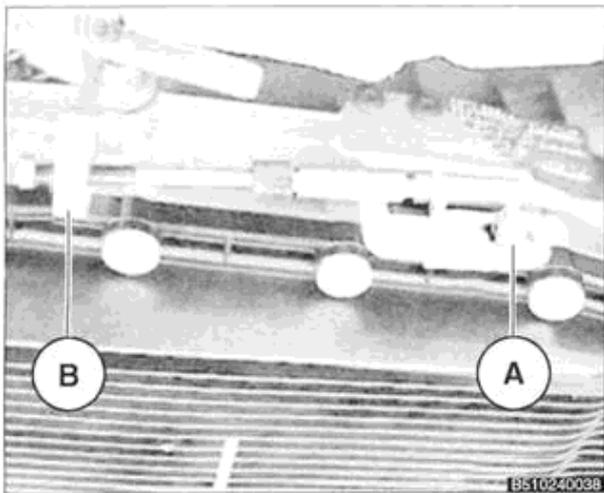
Automatic Transmission 240-41

Transmission, removing and installing (6HP26Z, V8 engine)



2006 - 2007 models: Working at shift cable connection on left side of transmission:

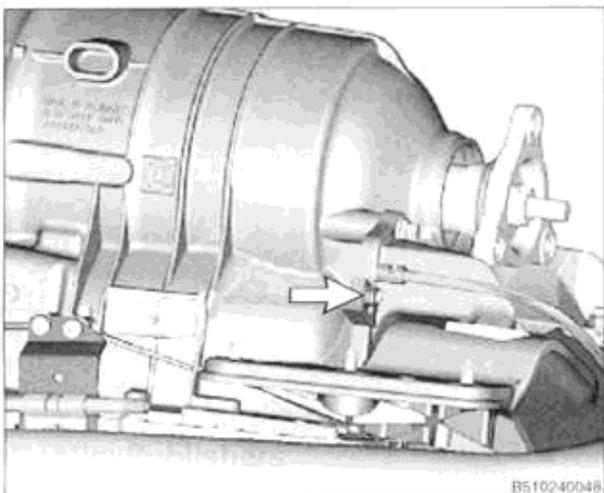
- Counterhold clamping sleeve (A) and loosen nut (B). Use a screwdriver to pry off retainer clip (C) and pull cable (D) out of support bracket.



2008 - 2009 models: Working at parking lock cable on left side of transmission:

- Remove cable bracket fastener (A).
- Disengage cable end from parking lock lever (B).

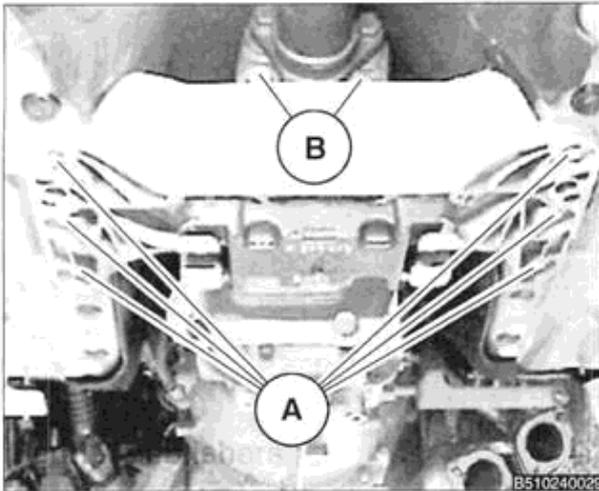
— Support transmission with transmission jack. Secure transmission to jack with suitable strap.



2006 - 2007 models: If necessary, remove fastener (arrow) and detach transmission ground strap.

240-42 Automatic Transmission

Transmission, removing and installing (6HP26Z, V8 engine)



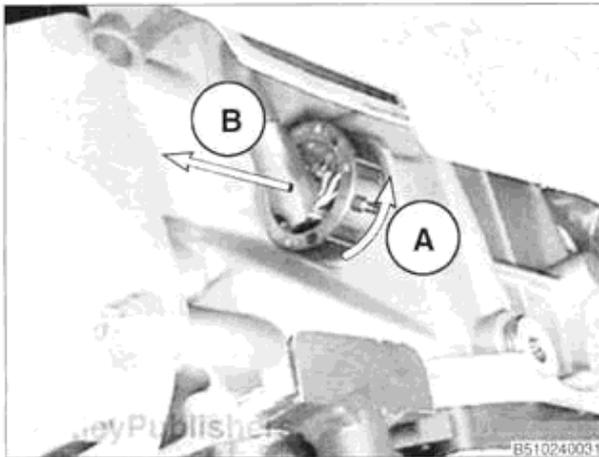
Remove transmission rear support fasteners (A, B). Remove rear support.

Detach rear driveshaft from transmission:

- Remove driveshaft center bearing support fasteners. Support center of driveshaft.
- Unbolt rear driveshaft flex-disc from transmission flange.
- Lower center of driveshaft sufficiently to disengage flex-disc from transmission output flange. Tie driveshaft to side using stiff wire. See **260 Driveshafts**.

CAUTION—

- To prevent damage to rear driveshaft CV joint, do not allow driveshaft to hang down unsupported.

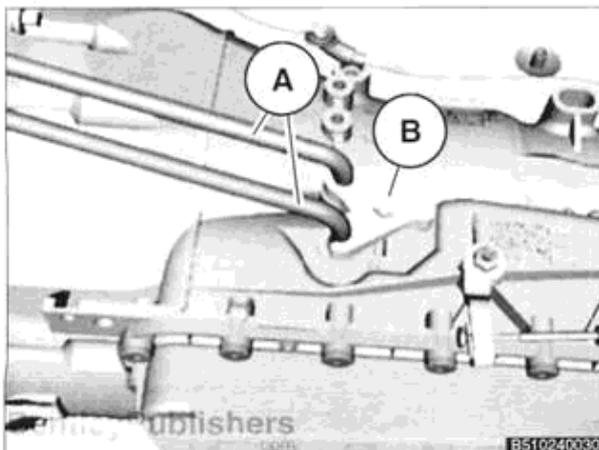


Working at rear of transmission housing:

- Twist mechatronics electrical connector bayonet lock in direction of curved arrow (A) to release.
- Carefully pull connector off pins (B).
- Insert BMW special tool 24 2 390 in place of mechatronics connector to protect delicate pins.

CAUTION—

- Do not touch pins.



Working at ATF cooler lines (A) on left side of transmission:

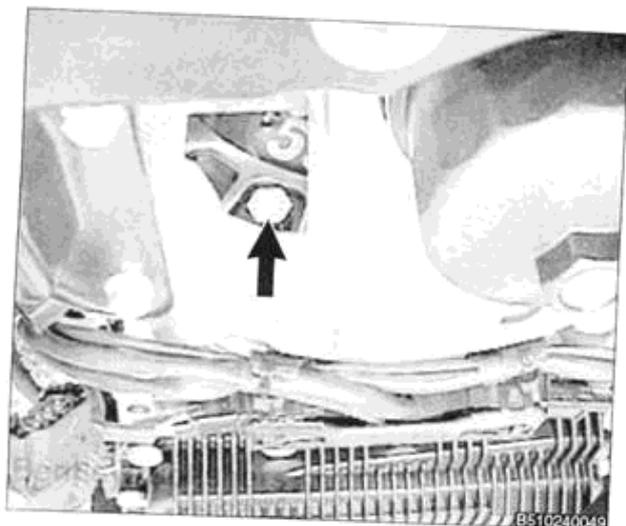
- Remove fluid line bracket hold-down bolt (B)
- Detach fluid lines from transmission housing.

CAUTION—

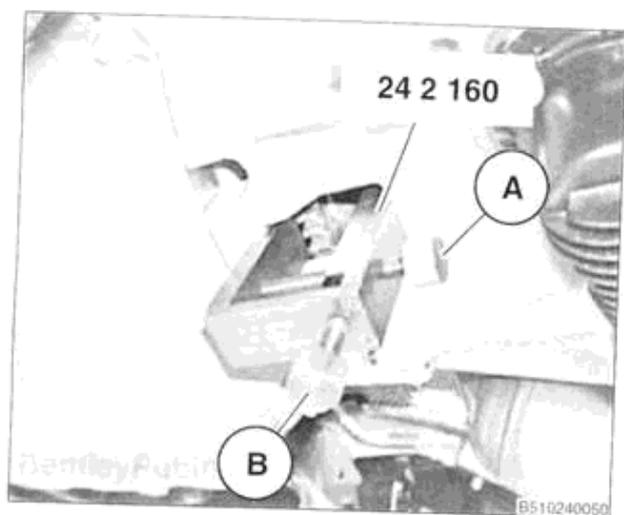
- Be prepared to catch dripping fluid.
- Remove and discard fluid line O-ring seals. Be sure to use new ones when reassembling.

Automatic Transmission 240-43

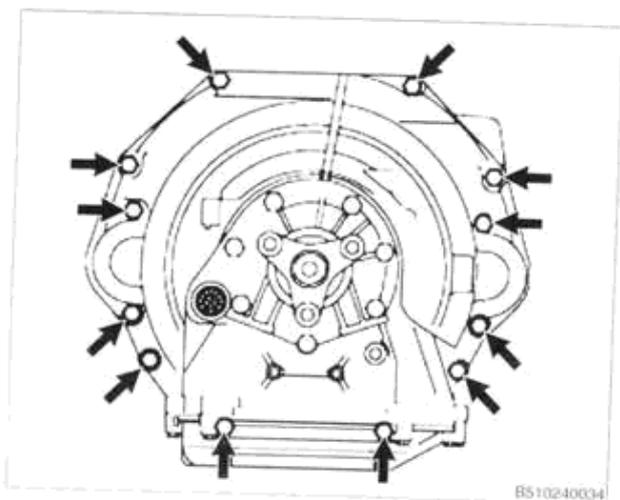
Transmission, removing and installing (6HP26Z, V8 engine)



- ◀ Rotate engine by hand in direction of rotation using bolt on crankshaft vibration damper until torque plate mounting bolt (arrow) is visible through access hole in engine bell housing flange.
- Loosen and remove bolt.
- Rotate engine to gain access to and remove remaining torque plate bolts.



- ◀ Use BMW special tool 24 4 160 or equivalent to secure torque converter in bell housing before you separate transmission from engine. This prevents torque converter from pulling off transmission input shaft and damaging torque converter oil seal.
- Insert tool in bell housing opening and secure in place lightly using knurled knob A.
- Twist in knurled knob B and tighten.
- Tighten down knob A.



- ◀ Remove transmission bell housing bolts (arrows). Discard aluminum bolts.
- Remove transmission by pulling back and down. Lower jack slowly while watching carefully to make sure no lines, hoses or wires become snagged.

WARNING—

- Be sure the vehicle is properly supported. The removal of the transmission may upset the balance of the vehicle on the lift.

CAUTION—

- Tilting the engine to remove the transmission can lead to damage to engine compartment components due to lack of clearance.
- Do not allow the torque converter to fall off the transmission input shaft.

240-44 Automatic Transmission

Transmission, removing and installing (6HP26Z, V8 engine)

- Blow out oil cooler lines with low-pressure compressed air and flush cooler with clean ATF twice.

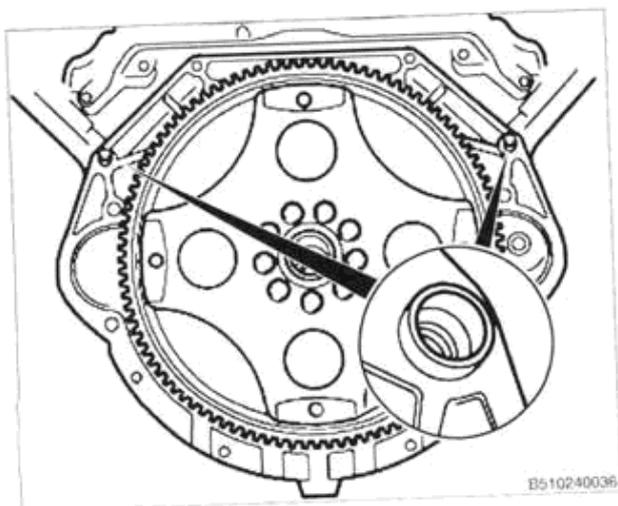
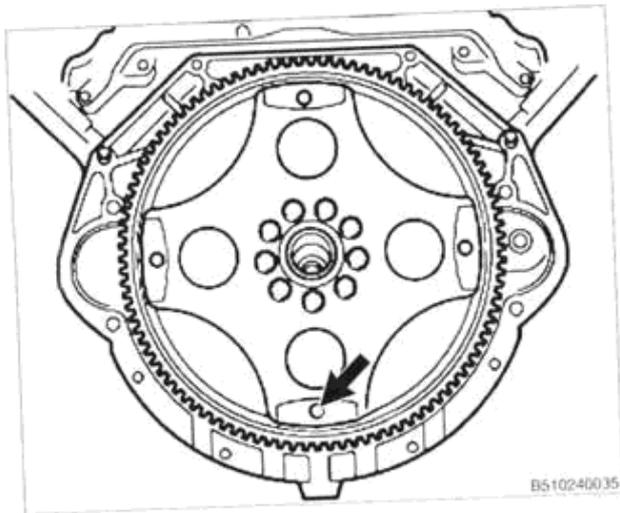
CAUTION—

- Wear safety glasses when working with compressed air.
- Do not reuse ATF used for flushing.

- Inspect engine torque plate and flywheel for cracks or elongated holes. Replace if necessary.
- If torque converter seal is leaky, or torque converter position on transmission input shaft was disturbed during removal, replace torque converter seal. See **Torque converter oil seal, removing and installing** in this repair group.

Transmission, installing (V8 engine)

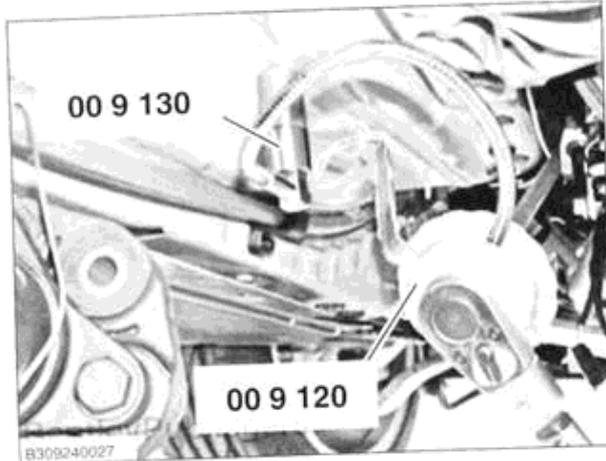
- ◀ Rotate engine until torque plate bore for mounting bolt (arrow) is accessible through opening in engine bell housing.



- ◀ Check that bell housing dowel sleeves (arrows) are in good shape and correctly seated. Replace if needed.
- Check that torque converter is seated correctly in transmission.
- Rotate torque converter until threaded mounting hole in converter is lined up with bore in torque plate.
- Join transmission to engine. Make sure torque converter and torque plate bolt bores are lined up by installing one bolt finger-tight.

Automatic Transmission 240-45

Transmission, removing and installing (6HP26Z, V8 engine)



Using new aluminum bolts, tighten bell housing fasteners to initial torque.

- Use torque angle tool (BMW special tools 00 9 120 / 00 9 130 or equivalent) and tighten fasteners to final torque angle.
- Install and tighten remaining torque converter bolts.

Tightening torques

Torque converter to torque plate: • M10 x 10.9	56 Nm (41 ft-lb)
Transmission rear support to body (M8)	19 Nm (14 ft-lb)
Transmission rear support to transmission	19 Nm (14 ft-lb)
Transmission to engine (M12 aluminum): • Initial torque • Torque angle	25 Nm (18 ft-lb) + 130°
Transmission to engine (M10 x 30 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 90 - 110°
Transmission to engine (M10 x 85 aluminum): • Initial torque • Torque angle	20 Nm (15 ft-lb) + 180 - 200°

- Remainder of installation is reverse of removal. Remember to:
 - Install new sealing washers or O-rings on ATF cooler line fittings.
 - 2006 - 2007 models: Adjust gearshift mechanism. See **250 Gearshift Linkage**.
 - 2008 - 2009 models: Adjust parking lock cable free play. See **250 Gearshift Linkage**.
 - Driveshaft tightening torques are in **260 Driveshafts**. To avoid damaging driveshaft flex-disc, counterhold flex-disc bolt heads while tightening nuts.
 - Fill transmission with clean ATF. See **ATF, draining and filling** in this repair group.
 - Use new bolts to reinstall front end reinforcement plate. See **310 Front Suspension**.

Tightening torques

Drain plug to plastic sump	8 Nm (6 ft-lb)
Fill plug to transmission housing	35 Nm (26 ft-lb)

5 Series automatic transmission fluid (ATF)

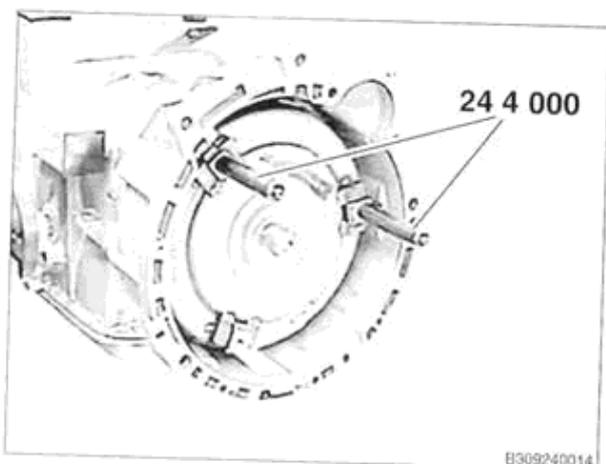
BMW recommended fluid	BMW part no. 83 22 0 142 516 Shell M-1375.4
Fill capacity	approx. 9 - 10 liters (9.5 - 10.6 US qt)

CAUTION—

- Do not overfill with ATF. Transmission fill capacity given in specifications includes torque converter volume.
- ATF expands when transmission is warmed up. Final fluid level is set with ATF at a temperature of 30° - 50°C (86° - 122°F).

240-46 Automatic Transmission

Torque converter, removing and installing



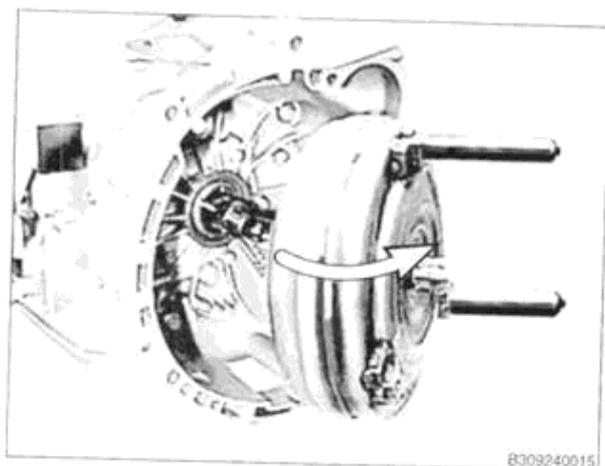
TORQUE CONVERTER SERVICE

Torque converter, removing and installing

- Remove transmission. See **Transmission Removal and Installation** in this repair group.
- ◀ Screw BMW special tools 24 4 000 into torque converter. Pull converter straight off transmission input shaft.

CAUTION—

- When torque converter is removed, transmission fluid will drain out. Be prepared to catch dripping fluid.



- ◀ Remove torque converter slowly and set down vertically to avoid spilling additional transmission fluid.
- Replace torque converter seal. See **Torque converter oil seal, removing and installing** in this repair group.
- Reinstall torque converter, taking care to not damage new seal. Lightly oil converter seal surface and rotate converter during installation, applying slight pressure until recesses in converter locate audibly in ATF pump. Then press converter in firmly.

CAUTION—

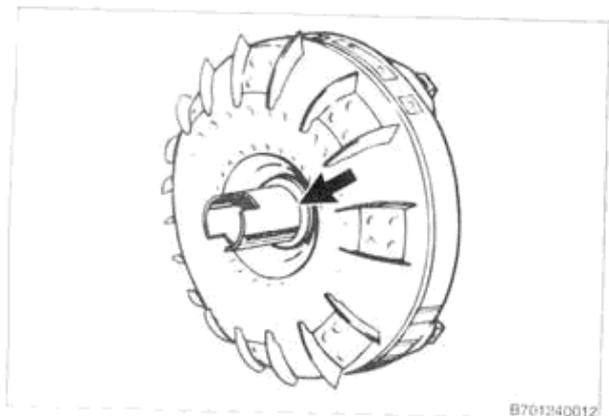
- If torque converter is not installed correctly, impeller driver in converter is destroyed when transmission is mated to engine.

Torque converter oil seal, removing and installing

ATF leaking from the torque converter seal usually collects at the bottom of the bell housing and drips out.

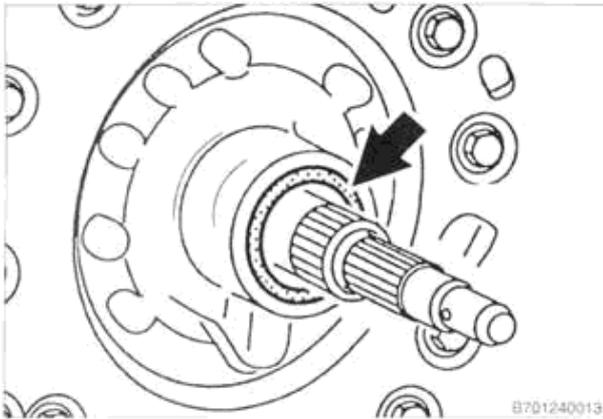
Torque converter oil seal leakage is often caused by a worn or scored bushing in the torque converter hub. Check bushing when replacing seal. A damaged bushing rapidly wears the new seal.

- Remove transmission. See **Transmission Removal and Installation** in this repair group.
- Carefully slide torque converter off transmission input shaft. Be prepared to catch ATF as it flows out of torque converter. See **Torque converter, removing and installing** in this repair group.
- ◀ Check converter hub bushing surface (**arrow**) for scoring or wear.
 - Remove sharp edges and burrs with fine emery cloth.
 - If hub is deeply scored, replace torque converter.

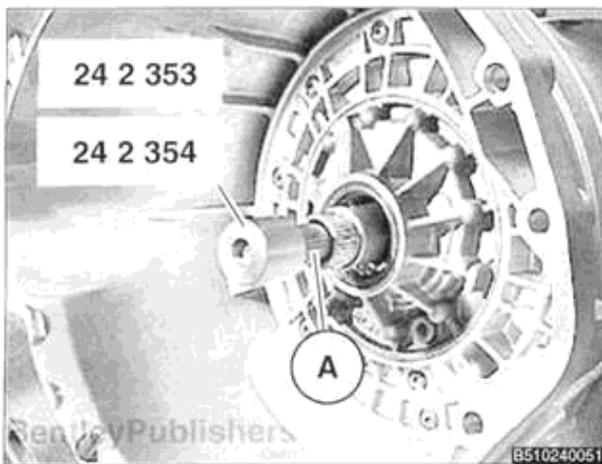


Automatic Transmission 240-47

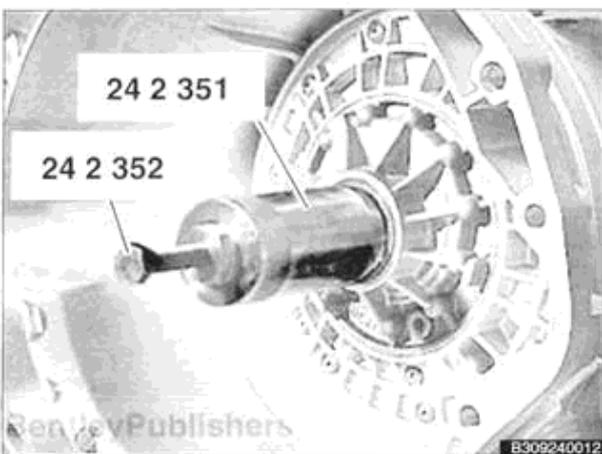
Torque converter oil seal, removing and installing



- Use small screwdriver to pry out seal retaining circlip (if equipped) (arrow) from ATF pump at front of transmission case.



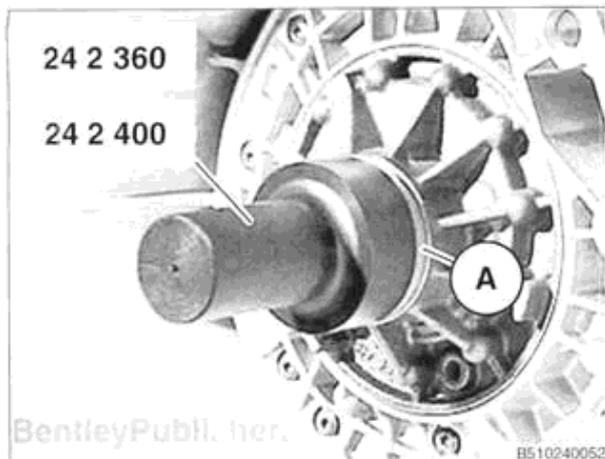
- Attach BMW special tool 24 2 353 or 24 2 354 (depending on transmission) to transmission input shaft (A).



- Screw BMW special tool 24 2 351 into seal. Use BMW special tool 24 2 352 to gradually draw out seal.

240-48 Automatic Transmission

Torque plate and flywheel, removing and installing



◀ Coat sealing lips of new seal with transmission fluid. Use BMW special tool 24 2 360 or 24 2 400 (depending on transmission) and soft-faced hammer to drive seal (A) into transmission as far as it will go.

- Reinstall retaining circlip (if equipped).
- Reinstall torque converter, taking care to not damage new seal. Lightly oil converter seal surface and rotate converter during installation, applying slight pressure until recesses in converter locate audibly in ATF pump. Then press converter in firmly.

CAUTION—

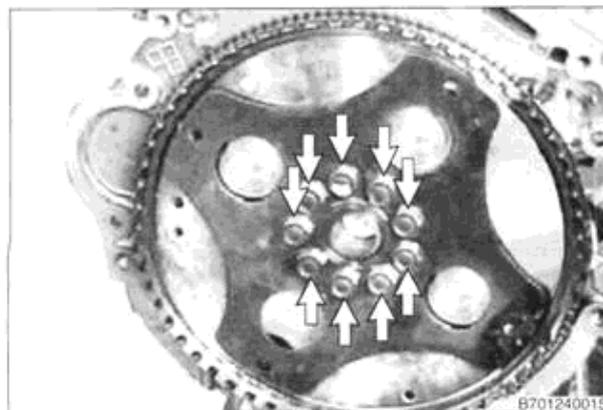
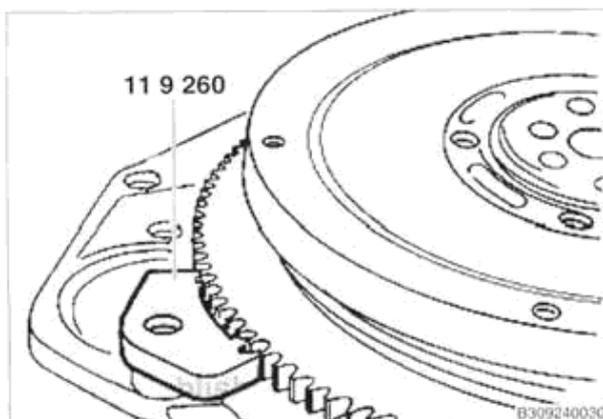
- If torque converter is not installed correctly, impeller driver in converter is destroyed when transmission is mated to engine.

Torque plate and flywheel, removing and installing

Crankshaft rear main (flywheel) seal replacement is covered in **119 Lubrication System**.

- Remove transmission. See **Transmission, removing and installing** in this repair group.

◀ Use BMW special tool 11 9 260 or equivalent to lock flywheel.

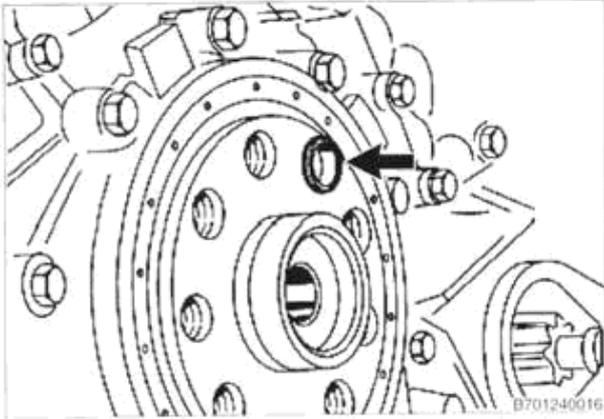


◀ Loosen and remove flywheel bolts (arrows) and discard.

- Remove torque plate and flywheel.
- Clean bolt threads in crankshaft.

Automatic Transmission 240-49

Torque plate and flywheel, removing and installing



When installing:

- Note that flywheel is located with dowel sleeve (**arrow**).
- Make sure torque converter mounting holes in torque plate and flywheel line up.
- Use new flywheel bolts.

Tightening torque

Flywheel and torque plate to crankshaft (M12 x 1.5) (use new bolts)	130 Nm (96 ft-lb)
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- Reinstall transmission.



