

## General

The information given in this repair group includes the routine checks and maintenance steps that are both required by BMW under the terms of the vehicle warranty protection and recommended by BMW to ensure long and reliable vehicle operation.

### **Note:**

*Aside from keeping your car in the best possible condition, proper maintenance plays a role in maintaining full protection under BMW's new-car warranty coverage. If in doubt about the terms and conditions of your car's warranty, an authorized BMW dealer should be able to explain them.*

## Service Interval Indicator (SII)

For the 1999 and later 3 Series (E46), BMW introduced an extended oil change interval of approximately 15,000 miles depending on engine operating conditions. The introduction of BMW High Performance Synthetic Oil has made this longer interval possible.

1999 to 6/2000 models. BMW uses a unique system to determine maintenance intervals. BMW's Service Interval Indicator (SII), calculates maintenance intervals based not only on elapsed mileage, but also on such inputs as engine speed, engine temperature, number of starts, length of trips, and the amount of fuel used. At the appropriate time, the system indicates, through lights in the instrument cluster, when the next routine maintenance is due.

6/2000 and later models. For the

mid-2000 models BMW introduced new service interval software which calculates service based on the amount of fuel used. When SII detects total fuel consumption that equals the preset limits (in gallons), the instrument cluster indicates that service is required.

Using a 328i as an example:

- ◆ Standard transmission model: SII illuminates after consumption of 601 gallons of fuel.
- ◆ Automatic transmission model: SII illuminates after consumption of 667 gallons.

After the service is performed the SII can be reset to zero.

- ✦ The SII displays the mileage remaining before service is due. The type of service (OIL SERVICE or INSPECTION) is also illuminated in the display.

**Note:**

*An OIL SERVICE interval will always be followed by an INSPECTION interval, which will then be followed by an OIL SERVICE interval, and so on.*

When the ignition is turned on, the service recommendation and miles remaining are displayed for a few seconds. A flashing message and a negative (-) symbol in front of the number indicate that the service interval has been exceeded by the distance displayed.

The On-Board Computer uses the rate of fuel consumption in the period immediately preceding to calculate the mileage before the next service is due.



## Service Interval Indicator (SII), resetting

The SII signals the need for basic routine maintenance:

- ◆ Engine oil and oil filter change, after the engine has been warmed up.
- ◆ BMW-recommended additional maintenance as listed in ⇒ [Table a.](#)

### Note:

*For reference, the BMW oil service requirements are approximately equivalent to the maintenance that other European manufacturers specify at intervals with a maximum of every 15,000 miles or 12 months.*

When the specified maintenance has been carried out, the SII memory should be reset.

### 1999 to 6/2000 models



- ⚠ In vehicles equipped with the DLC in the right side engine compartment, the SII may be reset using BMW service and scan tool DIS or MoDiC, or a specialty tool from another manufacturer. Plug the tool (arrow) into the DLC

### CAUTION!

**Follow the manufacturer's directions when resetting the SII. If the reset procedures are done incorrectly, the reset tool or the electronic Service Interval Indicator may be damaged.**

Aftermarket reset tools that can reset all models with the DLC can be purchased from one of the following suppliers:

Assenmacher Specialty Tools  
6440 Odell Place, Boulder, CO  
80301  
303-530-2424  
<http://www.asttool.com>

Baum Tools Unlimited, Inc.  
P.O. Box 5867, Sarasota, FL  
34277-5867  
800-848-6657  
<http://www.baumtools.com>

Peake Research, Automotive  
Products Division  
P.O. Box 28776, San Jose, CA 95159  
408-369-0406  
<http://www.peakeresearch.com>

### **6/2000 and later models**

On vehicles without the data link connector (DLC) in the engine compartment the reset tool can no longer be used. Instead, the SII can be reset with the trip odometer reset button in the instrument cluster:

- ◆ The ignition key must be in OFF position.
- ◆ Press and hold trip odometer button in instrument cluster, and turn ignition key to ACCESSORY position.
- ◆ Keep button pressed for approx. 5 more seconds until any of the following appear in the display: "Oil Service" or "Inspection", with "Reset" or "Re".

- ◆ Press button again and hold for approx. 5 seconds until "Reset" or "Re" flash.
- ◆ While display is flashing, press button briefly to reset SII.
- ◆ After display has shown new interval, the following will appear in display for approx. 2 seconds: "End SIA".

The system can only be reset again after the vehicle has been driven approx. 50 to 75 miles (consumes at least 2.5 gal. fuel). If the display shows "Reset" or "Re" when resetting, the minimum driving distance has been fulfilled and the system can be reset again. It is possible to interrupt and end the reset procedure by changing the position of the ignition key.

## Inspection I and Inspection II

The Service Interval Indicator signals the need for more comprehensive maintenance and inspection. There are two sets of inspection requirements. These inspections alternate throughout a car's maintenance history. If the last inspection interval was Inspection I, the next inspection interval (following an oil service) will be Inspection II, the next after that will be Inspection I, and so on.

Inspection I tasks are listed in ⇒ [Table b](#). Inspection II includes most of the tasks from Inspection I with additional Inspection II tasks. A complete listing of Inspection II tasks is in ⇒ [Table c](#).

### **Note:**

*For reference, the BMW Inspection I*

*and Inspection II requirements are approximately equivalent to the maintenance requirements that other European manufacturers specify. Inspection I is normally due at intervals with a maximum of 30,000 miles or 24 months. Inspection II is normally due at intervals with a maximum of 60,000 miles or 48 months.*

## Maintenance Tables

The intervals for most tasks listed in the maintenance table below are determined by the SII.

Except where noted, the maintenance items listed apply to all models and model years covered by this manual. The columns on the right side of each table give quick-reference information about the job. The text in the "additional repair information" column refers to repair groups.

| Table a. Oil service                                                                                                                                                                                                                                                                                                                                 |                                                                                     |                                                                                    |                                                                                   |                            |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------|-------------------------------|
| Maintenance item                                                                                                                                                                                                                                                                                                                                     | Tools required                                                                      | New parts required                                                                 | Warm engine required                                                              | Dealer service recommended | Additional repair information |
| <b>Engine compartment maintenance</b>                                                                                                                                                                                                                                                                                                                |                                                                                     |                                                                                    |                                                                                   |                            |                               |
| Change oil and oil filter                                                                                                                                                                                                                                                                                                                            |    |   |  |                            | ⇒ <a href="#">020</a>         |
| Reset Service Interval Indicator (SII).                                                                                                                                                                                                                                                                                                              |    |                                                                                    |                                                                                   |                            | ⇒ <a href="#">020</a>         |
| Replace interior ventilation microfilter.                                                                                                                                                                                                                                                                                                            |                                                                                     |  |                                                                                   |                            | ⇒ <a href="#">020</a>         |
| <b>Under car maintenance</b>                                                                                                                                                                                                                                                                                                                         |                                                                                     |                                                                                    |                                                                                   |                            |                               |
| Check overall thickness of front and rear brake pads. If replacement is necessary: Examine brake disc surfaces. Clean brake pad contact points in calipers. Grease wheel centering hubs (alloy wheels only). Check thickness of parking brake linings only when replacing rear brake pads. Check operation of parking brake and adjust as necessary. |  |                                                                                    |                                                                                   |                            | ⇒ <a href="#">340</a>         |
| Check and adjust tire pressures, including spare                                                                                                                                                                                                                                                                                                     |  |                                                                                    |                                                                                   |                            | ⇒ <a href="#">020</a>         |

| Table b. Inspection I service                                                                                                                                                                   |                                                                                     |                                                                                   |                                                                                   |                            |                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------|
| Maintenance item                                                                                                                                                                                | Tools required                                                                      | New parts required                                                                | Warm engine required                                                              | Dealer service recommended | Additional repair information                  |
| <b>Under car maintenance</b>                                                                                                                                                                    |                                                                                     |                                                                                   |                                                                                   |                            |                                                |
| Change engine oil and filter.                                                                                                                                                                   |    |  |  |                            | ⇒ <a href="#">020</a>                          |
| Check transmission and differential(s) for external leaks.                                                                                                                                      |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">230</a><br>⇒ <a href="#">240</a> |
| Check CV joint boots for damage or leaks.                                                                                                                                                       |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">311</a><br>⇒ <a href="#">331</a> |
| Visually check fuel tank, fuel lines and connections for leaks.                                                                                                                                 |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">160</a>                          |
| Check condition, position, and mounting of exhaust system. Visually check for leaks.                                                                                                            |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">180</a>                          |
| Check power steering system for leaks. Check power steering fluid level and adjust if necessary.                                                                                                |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">320</a>                          |
| Check steering rack and tie rods for tightness. Check condition of front axle joints, steering linkage and steering shaft joints.                                                               |                                                                                     |                                                                                   |                                                                                   |                            | ⇒ <a href="#">320</a>                          |
| Check overall thickness of front and rear brake pads using special BMW tool. If replacement is necessary: Examine brake disc surfaces. Clean brake pad contact points in calipers. Grease wheel |  |                                                                                   |                                                                                   |                            | ⇒ <a href="#">340</a>                          |

| Table b. Inspection I service                                                                                                                                                                                   |                                                                                     |                    |                      |                            |                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------|----------------------|----------------------------|------------------------------------------------|
| Maintenance item                                                                                                                                                                                                | Tools required                                                                      | New parts required | Warm engine required | Dealer service recommended | Additional repair information                  |
| centering hubs (alloy wheels only). Check thickness of parking brake linings only when replacing rear brake pads. Check operation of parking brake and adjust as necessary.                                     |                                                                                     |                    |                      |                            |                                                |
| Check front control arm bushings for damage or wear.                                                                                                                                                            |                                                                                     |                    |                      |                            | ⇒ <a href="#">310</a>                          |
| Check brake system connections and lines for leaks, damage and incorrect positioning.                                                                                                                           |                                                                                     |                    |                      |                            | ⇒ <a href="#">340</a>                          |
| Check parking brake actuator. Adjust if necessary.                                                                                                                                                              |   |                    |                      |                            | ⇒ <a href="#">340</a>                          |
| Check all tire pressures (including spare) and correct if necessary. Check condition of tires (outer tread surfaces), tread wear pattern; in case of uneven tread wear, perform a wheel alignment if requested. |  |                    |                      |                            | ⇒ <a href="#">020</a>                          |
| Inspect entire body according to terms of rust perforation limited warranty. (Must be performed at least every two years.)                                                                                      |                                                                                     |                    |                      |                            |                                                |
| <b>Engine compartment maintenance</b>                                                                                                                                                                           |                                                                                     |                    |                      |                            |                                                |
| Read out on-board diagnostic (OBD II) system.                                                                                                                                                                   |  |                    |                      |                            | ⇒ <a href="#">100</a><br>⇒ <a href="#">130</a> |

| Table b. Inspection I service                                                                                                                                                                                                                           |                                                                                     |                                                                                   |                      |                            |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|----------------------------|-------------------------------|
| Maintenance item                                                                                                                                                                                                                                        | Tools required                                                                      | New parts required                                                                | Warm engine required | Dealer service recommended | Additional repair information |
| Check engine coolant system/heater hose connections for leaks. Check coolant level and antifreeze protection level. Add coolant as necessary.                                                                                                           |    |                                                                                   |                      |                            | ⇒ <a href="#">170</a>         |
| Check windshield washer fluid level and antifreeze protection. Add washer fluid as necessary.                                                                                                                                                           |                                                                                     |                                                                                   |                      |                            | ⇒ <a href="#">611</a>         |
| Replace ventilation microfilter. (Note: reduce replacement intervals in dusty operating conditions).                                                                                                                                                    |                                                                                     |  |                      |                            | ⇒ <a href="#">020</a>         |
| Reset service interval indicator.                                                                                                                                                                                                                       |  |                                                                                   |                      |                            | ⇒ <a href="#">020</a>         |
| <b>Body/electrical</b>                                                                                                                                                                                                                                  |                                                                                     |                                                                                   |                      |                            |                               |
| Check operation of air conditioner.                                                                                                                                                                                                                     |                                                                                     |                                                                                   |                      |                            | ⇒ <a href="#">640</a>         |
| Check operation of headlights, parking lights, back-up lights, license plate lights, interior lights, glove box light, engine compartment light, trunk light, turn signals, emergency flashers, stop lights, horns, headlight flasher and dimmer switch |                                                                                     |                                                                                   |                      |                            | ⇒ <a href="#">630</a>         |
| Check instrument panel and dashboard lights.                                                                                                                                                                                                            |                                                                                     |                                                                                   |                      |                            | ⇒ <a href="#">620</a>         |
| Check wipers and windshield washer                                                                                                                                                                                                                      |                                                                                     |                                                                                   |                      |                            | ⇒ <a href="#">611</a>         |

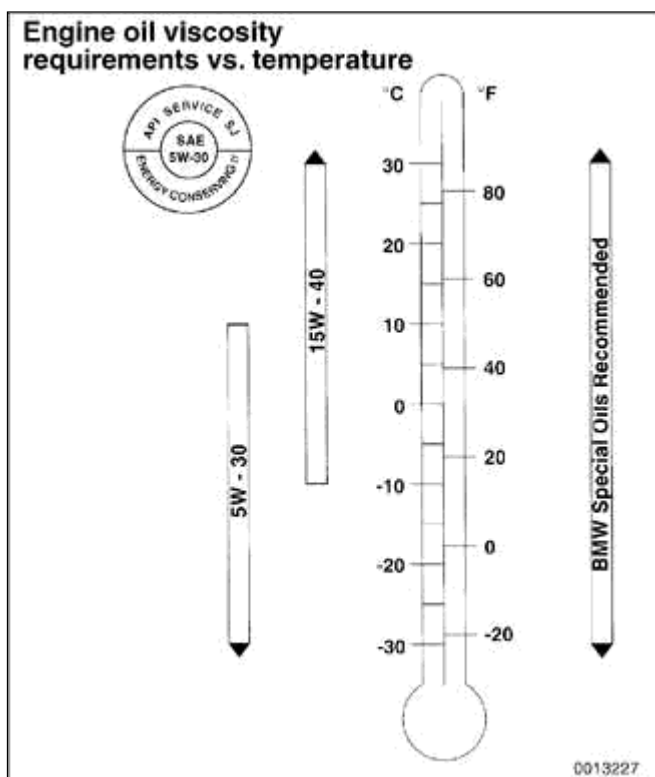
| Table b. Inspection I service                                                                                                                |                                                                                     |                                                                                   |                      |                                                                                       |                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|------------------------------------------------|
| Maintenance item                                                                                                                             | Tools required                                                                      | New parts required                                                                | Warm engine required | Dealer service recommended                                                            | Additional repair information                  |
| system. Check aim of washer jets and adjust if necessary.                                                                                    |                                                                                     |                                                                                   |                      |                                                                                       |                                                |
| Check condition and function of seat belts.                                                                                                  |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">720</a>                          |
| Visually examine all airbag units for torn covers, obvious damage or attachment of decals, decorations or accessories.                       |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">721</a>                          |
| Check central locking system and double lock.                                                                                                |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">515</a>                          |
| Replace batteries for alarm remote controls in all master keys.                                                                              |    |  |                      |                                                                                       | ⇒ <a href="#">515</a>                          |
| Check operation and condition of all door, hood and trunk latches.                                                                           |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">410</a><br>⇒ <a href="#">515</a> |
| Check heater, air conditioner blower, and rear window defogger operation.                                                                    |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">640</a>                          |
| Convertible models: Activate automatic roll-over protection system via diagnostic link. Note: first remove hardtop or lower convertible top. |  |                                                                                   |                      |  | ⇒ <a href="#">541</a>                          |
| Check all warning/indicator lights, check control.                                                                                           |                                                                                     |                                                                                   |                      |                                                                                       | ⇒ <a href="#">620</a>                          |
| Check operation of rear view mirrors.                                                                                                        |                                                                                     |                                                                                   |                      |                                                                                       |                                                |
| <b>Road test</b>                                                                                                                             |                                                                                     |                                                                                   |                      |                                                                                       |                                                |

| Table b. Inspection I service                                                                                                                                |                |                    |                      |                            |                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------|----------------------|----------------------------|-------------------------------|
| Maintenance item                                                                                                                                             | Tools required | New parts required | Warm engine required | Dealer service recommended | Additional repair information |
| Check braking performance, steering, heating, air conditioner operation. Check manual transmission and clutch operation or automatic transmission operation. |                |                    |                      |                            |                               |

| Table c. Inspection II service                                                                  |                                                                                     |                                                                                     |                      |                                                                                       |                               |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|-------------------------------|
| Maintenance item                                                                                | Tools required                                                                      | New parts required                                                                  | Warm engine required | Dealer service recommended                                                            | Additional repair information |
| <b>Engine compartment maintenance</b>                                                           |                                                                                     |                                                                                     |                      |                                                                                       |                               |
| Replace air filter element. (Note: reduce replacement intervals in dusty operating conditions). |  |  |                      |                                                                                       | ⇒ <a href="#">020</a>         |
| <b>Brake system service</b>                                                                     |                                                                                     |                                                                                     |                      |                                                                                       |                               |
| Replace brake fluid every 2 years (time interval begins from vehicle production date).          |  |  |                      |  | ⇒ <a href="#">340</a>         |
| <b>Cooling system service</b>                                                                   |                                                                                     |                                                                                     |                      |                                                                                       |                               |
| Replace coolant every 4 years (time interval begins from vehicle production date).              |  |  |                      |                                                                                       | ⇒ <a href="#">170</a>         |
| <b>Oxygen sensor service</b>                                                                    |                                                                                     |                                                                                     |                      |                                                                                       |                               |
| Replace oxygen sensor every 100,000 miles.                                                      |  |  |                      |                                                                                       | ⇒ <a href="#">180</a>         |

| Table c. Inspection II service           |                                                                                   |                                                                                   |                      |                            |                               |
|------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------|----------------------------|-------------------------------|
| Maintenance item                         | Tools required                                                                    | New parts required                                                                | Warm engine required | Dealer service recommended | Additional repair information |
| <b>Spark plug service</b>                |                                                                                   |                                                                                   |                      |                            |                               |
| Replace spark plugs every 100,000 miles. |  |  |                      |                            | ⇒ <a href="#">020</a>         |

## Fluid and Lubricant Specifications



✦ The illustration shows engine oil viscosity (SAE grade) vs. operating temperature range for the BMW engines covered in this manual.

Fluid and lubricant capacities and specifications for E46 cars are listed in ⇒ [Table d.](#)

### **WARNING!**

*The use of fluids that do not meet BMW's specifications may impair performance and reliability, and may void warranty coverage.*

**Table d. Fluids and lubricants**

| Fluid                                                                                                                        | Approximate capacity      | Specification                              |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------------|
| Engine oil with filter change                                                                                                |                           |                                            |
| Rear wheel drive                                                                                                             | 6.5 liters (6.9 US qt.)   | Synthetic oil with API rating SH or higher |
| All wheel drive                                                                                                              | 7.5 liters (8 US qt.)     |                                            |
| Manual transmission oil                                                                                                      |                           |                                            |
| Getrag S5D 250G                                                                                                              | 1.1 liters (1.15 US qt.)  | BMW 83 22 9 408 942 (MTF-LT-1)             |
| ZF S5D 320Z                                                                                                                  | 1.3 liters (1.37 US qt.)  |                                            |
| ZF S5D 280Z                                                                                                                  | 1.35 liters (1.42 US qt.) |                                            |
| Automatic transmission fluid (ATF)<br>(drain and fill)<br>(additional fluid required when installing a dry torque converter) |                           |                                            |

| Table d. Fluids and lubricants                                                            |                                                                                                  |                                             |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------|
| Fluid                                                                                     | Approximate capacity                                                                             | Specification                               |
| ZF A5S 325Z                                                                               | Complete refill:<br>9.0 liters (9.5 US qt.)<br>Oil and filter change:<br>4.0 liters (4.2 US qt.) | BMW 83 22 9 407 807 (Exxon LT 71141)        |
| GM A5S 360R                                                                               |                                                                                                  | BMW 83 22 0 024 359                         |
| GM A5S 390R                                                                               |                                                                                                  | (Texaco ETL 8072B)                          |
| Differential, front or rear(drain and fill)<br>(Lifetime fluid; no fluid change required) |                                                                                                  |                                             |
| Front differential                                                                        | Fill:<br>0.7 liter (0.74 US qt.)<br>Refill:<br>0.6 liter (0.63 US qt.)<br>Rear wheel drive:      | BMW SAF-XO synthetic oil                    |
| Rear differential                                                                         | 0.9 liter (0.95 US qt.)<br>All wheel drive:<br>1.0 liter (1.06 US qt.)                           |                                             |
| Power steering fluid                                                                      |                                                                                                  |                                             |
| All models                                                                                | Permanently sealed (no drain plug)                                                               | Dexron III® ATF                             |
| Brake fluid                                                                               |                                                                                                  |                                             |
| All models                                                                                |                                                                                                  | SAE DOT4                                    |
| Engine coolant                                                                            |                                                                                                  |                                             |
| All models                                                                                | 8.4 liters (8.9 US qt.)                                                                          | 50% BMW anti-freeze/<br>50% distilled water |

**CAUTION!**

**Multi-viscosity engine oils should not be**

***used in the manual transmission. Use of such an oil could shorten the service life of the transmission.***

## **Brake fluid**

Brake fluid absorbs moisture easily, and moisture in the fluid affects brake performance and reliability. This is why brake fluid should be flushed from the system every two years. When replacing or adding brake fluid, use only new fluid from previously unopened containers. Do not use brake fluid that has been bled from the system, even if it is brand new. Use only DOT 4 brake fluid.

### **Note:**

See ⇒ [340 Brakes](#) for more brake fluid information.

## **Engine coolant (anti-freeze)**

BMW recommends coolant that is a 50/50 mixture of distilled water and phosphate/nitrate free anti-freeze containing ethylene glycol. Anti-freeze raises the boiling point and lowers the freezing point of the coolant. It also contains additives that help prevent cooling system corrosion.

## **Differential gear oil**

BMW recommends using only a specially formulated synthetic gear oil (SAF-XO) that is available through an authorized BMW dealer parts department. For additional information on this lubricant and any other lubricants that may be compatible, contact an authorized BMW dealer service department.

## **Power steering fluid**

The power steering fluid is Dexron III® ATF, or equivalent. The system is permanently filled and does not have a drain. Routinely adding ATF is not required unless the system is leaking.

## Transmission fluid, automatic

The automatic transmissions installed in the E46 models are filled with special automatic transmission fluids, depending on transmission type and model year.

### **Note:**

- ◆ *The transmission lubricant type can be found on the "type-plate" on the side of the transmission. See ⇒ [240 Automatic Transmission](#).*
- ◆ *Consult an authorized BMW dealer for alternate fluid use and the most-up-to-date information regarding transmission operating fluids.*

## Transmission fluid, manual

The manual transmissions installed in the E46 models are normally filled with a special lifetime fluid (MTF-LT-1). Consult ⇒ [230 Manual Transmission](#) for further information.

## Engine Oil Service

With the introduction of synthetic oil and extended oil change intervals, a new oil filter with improved filter paper design was introduced. The new filter paper resists deterioration caused by high oil temperatures over an extended time.

**Note:**

*Early style oil filter numbers with BMW part numbers 11 42 1 427 908 or 11 42 1 745 390 should not be used in the 1999 and later BMW models.*

Use any synthetic low viscosity oil to top off the engine oil level between oil changes, as long as it meets the API classification SH. Castrol is now the supplier of both the mineral based oil used in earlier models and the synthetic based oil used from model year 1999.

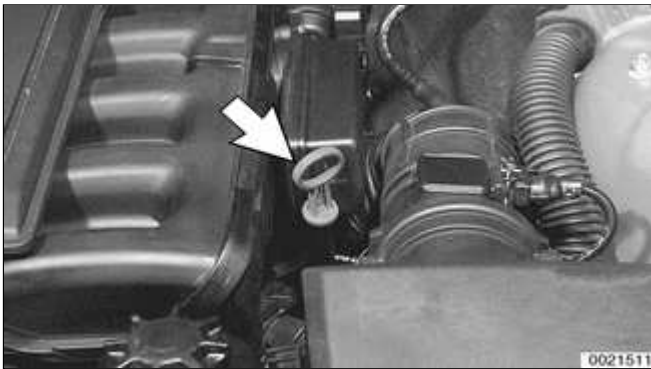
| Oil recommendation                                           |       |
|--------------------------------------------------------------|-------|
| BMW High Performance Synthetic (part number 07 51 0 017 866) | 5W-30 |

**Note:**

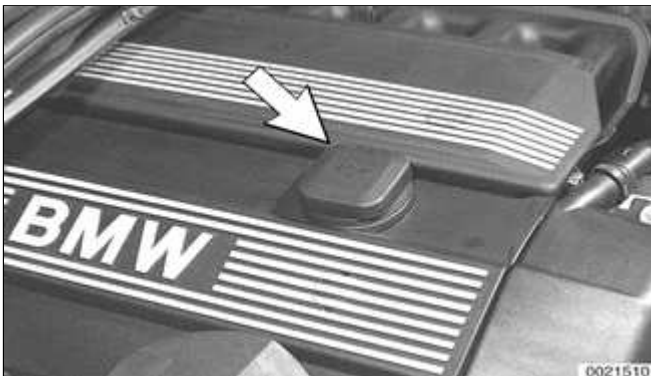
- ◆ *The use of engine oil additives is not recommended when using BMW High Performance Synthetic engine oil.*
- ◆ *BMW is constantly upgrading recommended maintenance procedures and requirements. The information contained here is as accurate as possible at the time of*

*publication. If there is any doubt about what procedures apply to a specific model or model year, or what intervals should be followed, remember that an authorized BMW dealer has the latest information on factory-recommended maintenance.*

## Engine oil, checking level



- ⚡ Engine oil level is checked with a dipstick (**arrow**) in engine block.
  - ◆ Check oil level with car on a level surface, after engine has been stopped for at least a few minutes.
  - ◆ Check level by pulling out dipstick and wiping it clean. Reinsert it all way and withdraw it again.
  - ◆ Oil level is correct if it is between two marks near end of stick.



- ⚡ Add oil through filler cap (**arrow**) on top of cylinder head. Add only amount needed to bring oil level to MAX mark on dipstick, using an oil of correct viscosity and grade. Too much oil can be just as harmful as too little.

## Engine oil and filter, changing

A complete oil change requires new oil, a new oil filter insert kit, and a new drain plug sealing washer. The tools needed, a 17 mm drain plug socket or box wrench and a drain pan (8 - 10 US

qt. capacity)), are described in ⇒ [010 General](#).

**Note:**

*If using a "fast-lube" service facility for oil changes, make sure the technician hand-starts and torques the engine oil drain plug using hand-tools. Power tools can strip the threads of the plug and the oil pan.*

- Run engine for a few minutes to warm engine oil. Shut engine off.
- With car on level ground, place drain pan under oil drain plug.



- ✦ Using a 36 mm wrench, loosen and remove oil filter housing cover (**arrow**). Remove filter cartridge and discard any O-rings.



- ✦ On Coupe or Convertible model: Remove oil drain plug access panel in center of front end reinforcement plate below engine.



- ✦ Using a socket or box wrench, loosen drain plug at oil drain pan. Remove plug by hand and let oil drain into pan.



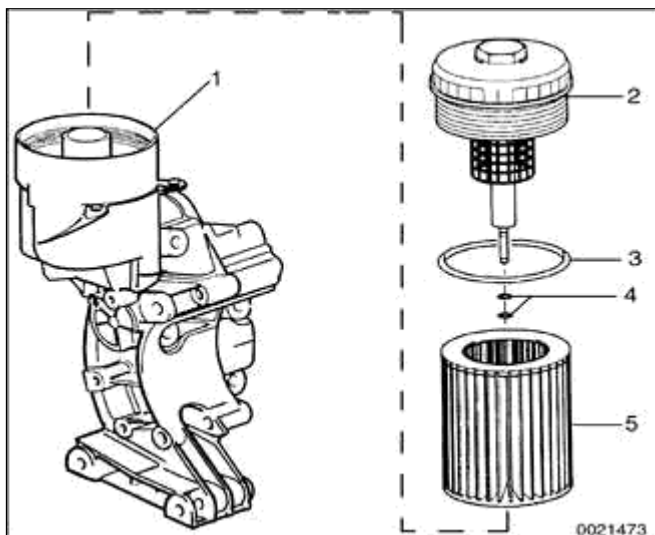
### CAUTION!

**Pull the loose plug away from the hole quickly to avoid being scalded by hot oil. It will run out quickly when the plug is removed. If possible, use gloves to protect your hands.**

- When oil flow has diminished to an occasional drip, reinstall drain plug with a new metal sealing washer and torque plug.

### Tightening torques

|                                  |                  |
|----------------------------------|------------------|
| Engine oil drain plug (M12 bolt) | 25 Nm (18 ft-lb) |
|----------------------------------|------------------|



### Working at oil filter housing:

- ◆ Lubricate and install new oil filter O-rings.
- ◆ Install a new filter cartridge and housing cover.

- ◆ Tighten cover.

- 1 - Filter housing
- 2 - filter housing cover -tighten to 25 Nm (18 ft-lb)
- 3 - O-ring (always replace)
- 4 - O-rings (always replace)
- 5 - Filter element

### Tightening torque

|                                 |                  |
|---------------------------------|------------------|
| Oil filter cover filter housing | 25 Nm (18 ft-lb) |
|---------------------------------|------------------|

- Refill crankcase with oil.  
Approximate oil capacity is listed in [⇒ Table d](#). Use dipstick to check correct oil level.
- Start engine and check that oil pressure warning light immediately goes out.
- Allow engine to run for a few minutes to circulate new oil, then check for leaks at drain plug and oil filter. Stop engine and recheck oil level.

## Engine Compartment Maintenance

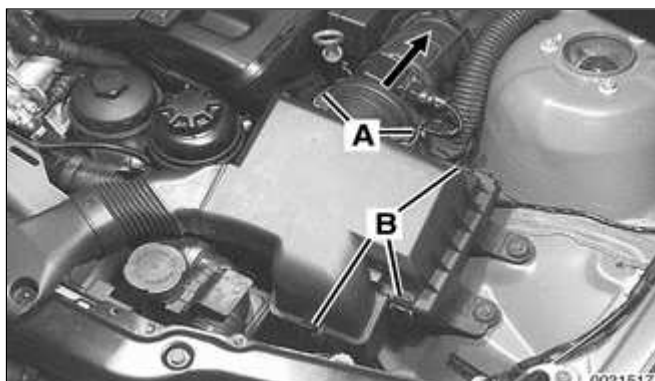
The information under this heading describes routine maintenance other than oil change done in the engine compartment. It is not necessary for the car to be raised and supported off the ground. Information on oil change is given earlier in this group.

### Accelerator linkage

The accelerator and throttle linkage should be lubricated periodically. Use a general purpose oil on the joints and bearings of the linkage. Use a multipurpose grease on the bearing points of the throttle plate.

### Air filter, replacing

The specified replacement intervals for the air filter are based on normal use. If the car is operated primarily in dusty conditions, the air filter should be serviced more frequently.



- ✦ Release mass air flow sensor clips (A) and pull sensor assembly out of air filter upper housing (arrow).

- Release upper air filter housing clips (B).



- ✦ Lift air filter upper housing, and then remove filter element insert from cartridge.
- On installation, install O-ring for



mass air flow sensor (**arrow**) into retaining clips in air filter upper housing.

## Cooling system service

Routine cooling system maintenance consists of maintaining the coolant level and inspecting hoses. Because the coolant's anti-corrosion and anti-freeze additives gradually lose their effectiveness, replacement of the coolant every four years is recommended.

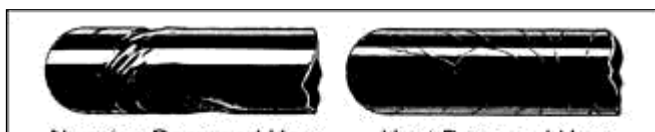
### CAUTION!

***Use only BMW approved phosphate-free anti-freeze when filling the cooling system. Use of anti-freeze containing phosphates is considered to be harmful to the cooling system.***



- ✦ The float in the radiator tank indicates coolant level, and should be inspected while the coolant is cold. When the upper mark on the float is level with the top of the filler neck, coolant is at the minimum allowable level. When the lower mark on the float is level with the top of the filler neck, the coolant is at the maximum level.

Hose connections should be tight and dry. Coolant seepage indicates either that the hose clamp is loose, that the hose is damaged, or that the connection is dirty or corroded. Dried coolant has a chalky appearance. Hoses should be firm and springy. Replace any hose that is cracked, that has become soft and limp, or has been contaminated by oil.



- ✦ As a preventive measure, replacement of the cooling system hoses every four years is also recommended. The

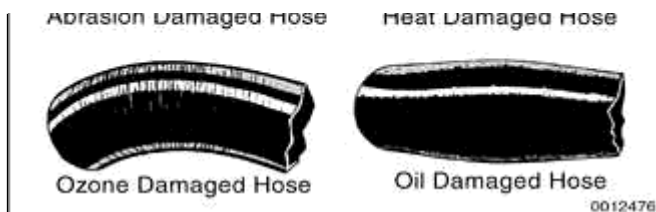


illustration shows examples of damage to coolant hoses. Any of conditions shown is cause for replacement. (Courtesy of Gates Rubber Company, Inc.)

## Engine drive belt service

Drive belts and pulleys transfer power from the engine crankshaft to various accessories. E46 models use two poly-ribbed (serpentine) belts:

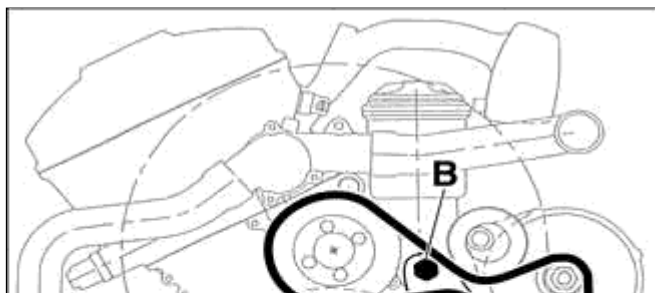
- ◆ The outer belt only turns the A/C compressor
- ◆ The inner, longer belt activates the alternator, coolant pump and power steering.

Automatic belt tensioners are used to keep the belts tensioned properly. Unless a tensioner mechanism malfunctions, the poly-ribbed belts do not require tension adjustment.

Inspect drive belts with the engine off. If the belt shows signs of wear, cracking, glazing, or missing sections, it should be replaced immediately. To reduce the chance of belt failure while driving, replacement of the belts every four years is recommended.

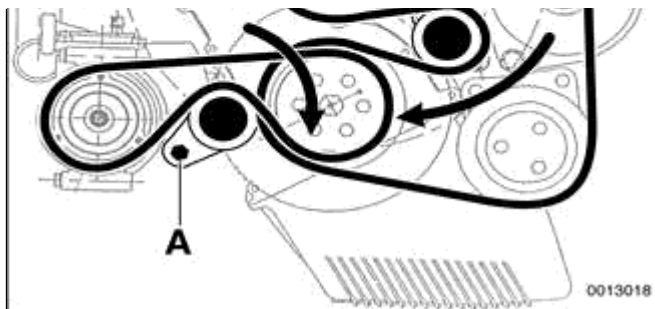
### **Note:**

*When belts are replaced with new ones, store the old set in the luggage compartment for emergency use.*



To remove drive belts:

- ◆ Use long-handled wrench to turn A/C belt tensioner release lug (A) clockwise (against spring tension). Remove A/C belt.



- ◆ Similarly, turn main engine drive belt tensioner lug (B) clockwise and remove belt.

### **WARNING!**

**Observe care when replacing belts. Personal injury could result if a tensioner springs back into position uncontrollably.**

### **CAUTION!**

**Mark drive belt rotation direction if removing and reusing an old belt.**

- When installing a new belt, gently pry it over the pulleys. Too much force may damage the belt or the accessory.

## **Idle speed**

Engine idle speed can change due to a number of factors, including normal wear. The idle speed in E46 models is electronically adaptive and non-adjustable. See ⇒ [130 Fuel Injection](#) for more information.

## **Oxygen sensors**

The engine management system in E46 models is equipped with multiple oxygen sensors. A regulating sensor is mounted before each catalytic converter and a monitoring sensor downstream of each converter. The regulating sensor monitors engine combustion efficiency and helps to control the fuel injection system and exhaust emissions. The monitoring sensor is used by the on-board diagnostic (OBD II) system to monitor the function of the catalytic converter.

OBD II enhanced emission standards require the engine control module (ECM) to monitor the oxygen content in the exhaust both before and after the catalytic converter. This allows for tighter control of the tail pipe emissions and also allows the ECM to diagnose converter problems. If the ECM detects that catalytic converter or oxygen sensor efficiency has degraded past a certain pre-programmed limit, it will turn on the Check Engine light, and store a diagnostic trouble code (DTC) in the ECM. See ⇒ [OBD On Board Diagnostics](#) in the rear of this manual for more information on OBD systems.

Replacement of oxygen sensors at the specified intervals ensures that the engine and emission control system will continue to operate as designed. Extending the replacement interval may void the emission control warranty coverage. See ⇒ [180 Exhaust System](#) for information on replacing the oxygen sensors.

| Tightening torque                 |                  |
|-----------------------------------|------------------|
| Oxygen sensor to exhaust manifold | 50 Nm (37 ft-lb) |

**Note:**

*A special socket for replacing the oxygen sensor is available from most automotive parts stores. The socket has a groove cut down one side to allow the sensor to be installed without damaging the wire harness.*

## Power steering fluid, checking level



- To check power steering fluid level in fluid reservoir:



- ◆ Park car on level ground with engine off.
- ◆ Level is correct if it is between **MIN** and **MAX** marks on dipstick.
- ◆ If level is below **MIN** mark, start engine and add fluid to reservoir to bring level up.
- ◆ Stop engine and recheck level.
- ◆ Hand-tighten reservoir cap.

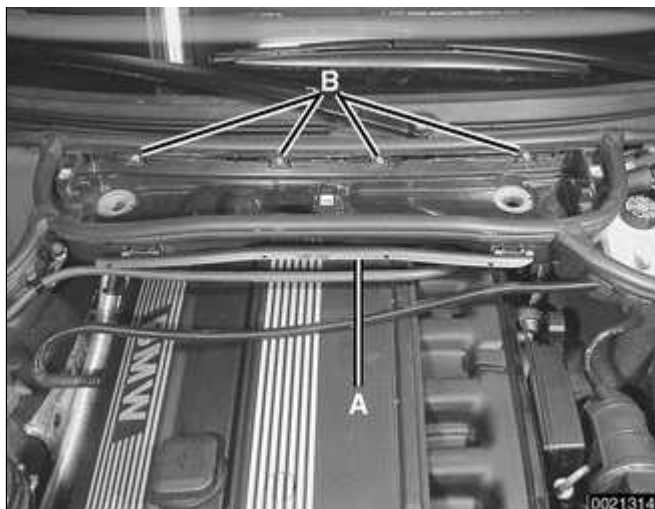
#### Power steering fluid

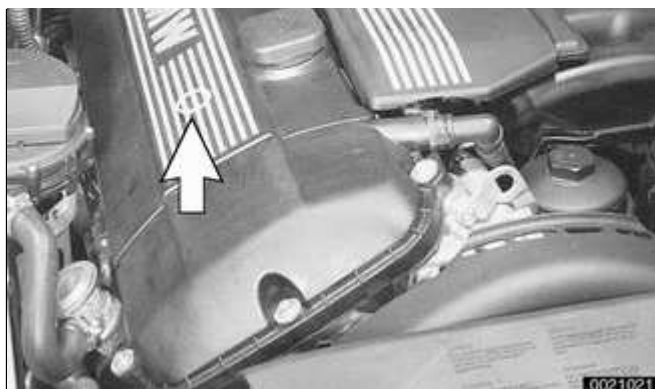
|                   |                 |
|-------------------|-----------------|
| Recommended fluid | Dexron III® ATF |
|-------------------|-----------------|

### Spark plugs, replacing

E46 engines use a "coil-over" configuration, with one ignition coil above each spark plug.

- ✦ Remove microfilter housing:
  - ◆ Remove microfilter for interior ventilation. See ⇒ [Ventilation microfilter, replacing](#)
  - ◆ Open wiring harness loom (**A**), remove harness and lay aside.
  - ◆ Unfasten screws (**B**) and take off lower microfilter housing.
- ✦ Remove engine cover over ignition coils:
  - ◆ Remove oil filler cap.





- ◆ Remove plastic trim covers (**arrows**).
- ◆ Remove cover hold down bolts.



- ✦ Remove ignition coil grounding harnesses (**arrows**).



- ✦ Remove ignition coils:
  - ◆ Pull up on spring clips to disconnect ignition coil harness connectors.
  - ◆ Remove coil mounting bolts. Remove coils.
  - Remove spark plugs.
  - Installation is reverse of removal, bearing in mind the following:
  - ◆ Lightly lubricate new spark plug threads with copper-based anti-seize compound.
  - ◆ Thread plugs into cylinder head by hand to prevent cross-threading.

- ◆ Be sure to reinstall coil grounding harness.

#### Spark plug recommendations

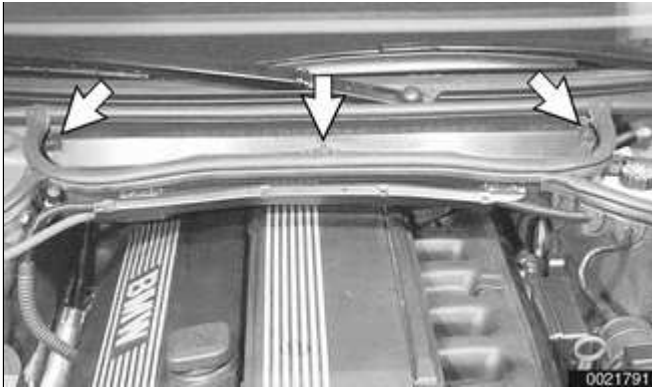
|       |            |
|-------|------------|
| Bosch | FGR7 DQP   |
| NGK   | BKR6 EQUIP |

#### Tightening torque

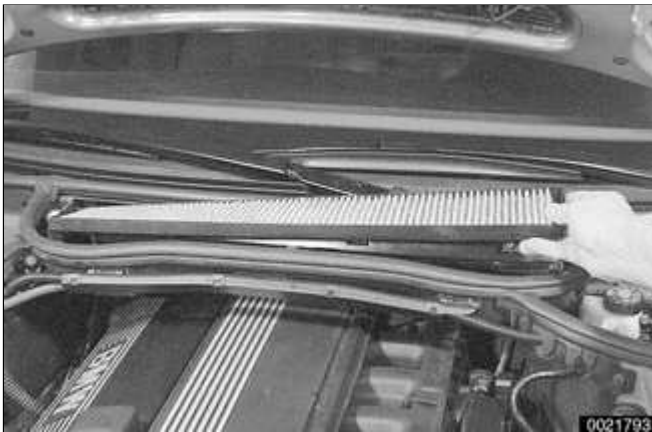
|                             |                  |
|-----------------------------|------------------|
| Spark plug to cylinder head | 25 Nm (18 ft-lb) |
|-----------------------------|------------------|

### Ventilation microfilter, replacing

- ✦ Working at cowl housing inside engine compartment, twist microfilter cover retainers (**arrows**) 90° each and pull cover up.



- ✦ Pull filter out and replace.



## Other Mechanical Maintenance

### Battery, checking and cleaning

The battery is located in the right side of the luggage compartment. Simple maintenance of the battery and its terminal connections will ensure maximum starting performance, especially in winter when colder temperatures reduce battery power.

**Note:**

*Design characteristics of the convertible body cause vibrations in the trunk area. Therefore, E46 Convertibles require a special battery designed for constant vibration. When replacing the battery, be sure the replacement is designed specifically for the Convertible.*

Battery cables should be tight. The terminals, the cable clamps, and the battery case should be free of the white deposits that indicate corrosion and acid salts. Even a thin layer of dust containing conductive acid salts can cause battery discharge.

- To remove battery corrosion:
  - ◆ Disconnect battery cables.  
Disconnect negative (-) cable first.
  - ◆ Remove battery from trunk.
  - ◆ Clean terminal posts and cable clamps with a wire brush.

- ◆ Clean main chassis ground terminal next to battery. Corrosion can be washed away with a baking soda and water solution that will neutralize acid. Apply solution carefully, though, since it will also neutralize acid inside battery.
- ◆ Reconnect cable clamps, positive (+) cable first.
- ◆ Lightly coat outside of terminals, hold down screws, and clamps with petroleum jelly, grease, or a commercial battery terminal corrosion inhibitor.

### **WARNING!**

- ◆ ***Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.***
- ◆ ***Battery acid is extremely dangerous. Take care to keep it from contacting eyes, skin, or clothing. Wear eye protection. Extinguish all smoking materials and do not work near any open flames.***

Battery electrolyte should be maintained at the correct level just above the battery plates and their separators. The correct level is approximately 5 mm (1/4 in.) above the top of battery plates or to the top of the indicator marks (if applicable). The battery plates and the indicator marks can be seen once the filler caps are removed. If the electrolyte level is low, replenish it by adding distilled water

only.

**Note:**

*The original equipment battery in E46 models is maintenance free. The original electrolyte will normally last the entire service life of the battery under moderate climate conditions.*

## Battery, replacing



- ✦ The original equipment BMW battery is equipped with a built-in hydrometer "magic eye" (**arrow**). Battery condition is determined by the color of the eye:

- ◆ Green: Adequate charge
- ◆ Black: Inadequate charge; recharge
- ◆ Yellow: Defective battery; replace

Batteries are rated by ampere hours (Ah), the number of hours a specific current drain can be sustained before complete discharge, or by cold cranking amps (CCA), the number of amps available to crank the engine in cold weather conditions. In general, replacement batteries should always be rated equal or higher than the original battery.

**CAUTION!**

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

The battery is held in place by a single hand screw and plate. A secure battery hold-down is important in order to prevent vibrations and road shock from

damaging the battery.

**Note:**

- ◆ *Always disconnect the negative (-) cable first, and connect it last. While changing the battery, clean away any corrosion in or around the battery tray.*
- ◆ *Design characteristics of the convertible body cause vibrations to oscillate in the trunk area. Therefore, the convertible model uses a special battery and battery retaining mechanism designed for this constant vibration.*
- ◆ *More battery and charging system information is in ⇒ [121 Battery, Alternator, Starter](#).*

## Brake fluid, replacing

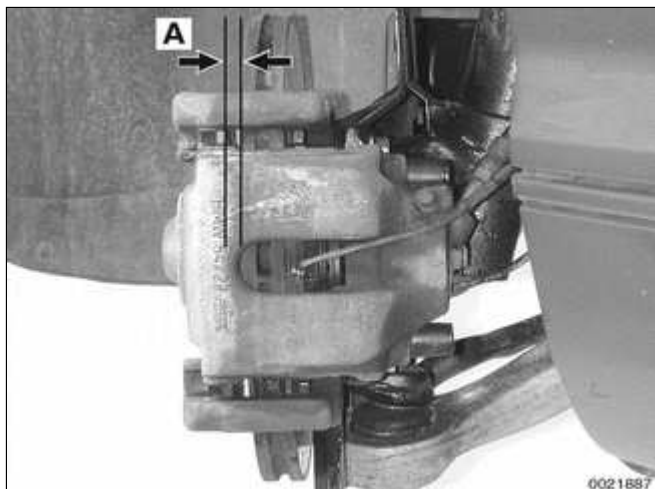
BMW strictly recommends replacing the brake fluid every two years. This will help protect against corrosion and the effects of moisture in the fluid.

**Note:**

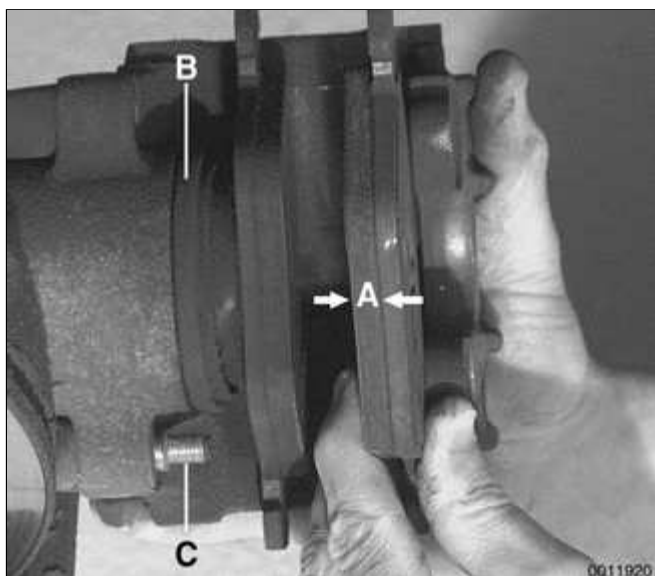
See ⇒ [340 Brakes](#) for brake fluid flushing procedures.

## Brake pad/rotor wear, checking

All E46 cars are fitted with disc brakes at all four wheels. Although the brakes are equipped with a brake pad warning system, the system only monitors one wheel per axle. It is recommended that pad thickness should be checked whenever the wheels are off or brake work is being done.



- ✦ Disc brake pad wear can be checked through opening in caliper:
  - ◆ Measure distance (A) of brake pad "ear" to brake rotor. See ⇒ [340 Brakes](#). Compare to specification below.



- ✦ Unbolt caliper from steering arm to properly inspect:
  - ◆ Brake pad thickness (A)
  - ◆ Brake rotors
  - ◆ Condition of caliper seal (B)
  - ◆ Condition of caliper slider bolts (C)

**Note:**

*Brake caliper removal and installation procedures are given in ⇒ [340 Brakes](#).*

| <b>Brake pad lining minimum thickness</b> |                   |
|-------------------------------------------|-------------------|
| Front or rear pad<br>Dimension A          | 3.0 mm (0.12 in.) |

|                                  |                   |
|----------------------------------|-------------------|
| Front or rear pad<br>Dimension A | 3.0 mm (0.12 in.) |
|----------------------------------|-------------------|

## Brake system, inspecting

Routine maintenance of the brake system includes maintaining the brake fluid in the reservoir, checking brake pads for wear, checking parking brake function, and inspecting the system for fluid leaks or other damage:

- ◆ Check that brake hoses are correctly routed to avoid chafing or kinking.
- ◆ Inspect unions and brake calipers for signs of fluid leaks.
- ◆ Inspect rigid lines for corrosion, dents, or other damage.
- ◆ Inspect flexible hoses for cracking.
- ◆ Replace faulty hoses or lines, see ⇒ [340 Brakes](#).

### **WARNING!**

***Incorrect installation or overtightening hoses, lines, and unions may cause chafing or leakage. This can lead to partial or complete brake system failure.***

## **Parking brake, checking**

The parking brake system is independent of the main braking system and may require periodic adjustment depending on use. Adjust the parking brake if the brake lever can be pulled up more than 8 clicks. Check that the cable moves freely. A description of the parking brake and parking brake adjustment can be found in ⇒ [340 Brakes](#).

### **Note:**

*The parking brake may lose some of its effectiveness if it is not used frequently. This is due to corrosion build-up on the parking brake drum. To remove corrosion, apply the parking brake just until it begins to grip, then pull the lever*

*up one more stop (click). Drive the car approximately 400 meters (1,300 ft.) and release the brake. To recheck the adjustment of the parking brake see ⇒ [340 Brakes](#).*

## Clutch fluid, checking

The hydraulic clutch and the brake system share the same reservoir and the same brake fluid. Clutch fluid level and brake fluid level are checked at the same time.

### **Note:**

- ◆ See ⇒ [340 Brakes](#) for more information.
- ◆ See ⇒ [210 Clutch](#) for information on the clutch and the hydraulic clutch operating system.

## Drive axle joint (CV joint) boots, inspecting

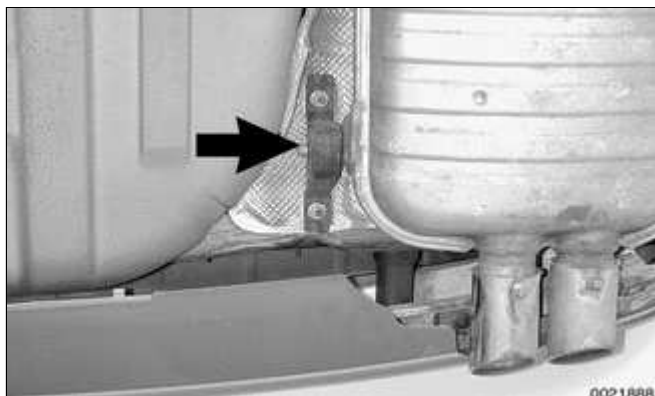
CV joint protective boots must be closely inspected for cracks and any other damage that will allow contaminants to get into the joint. If the rubber boots fail, the water and dirt that enter the joint will quickly damage it.

### **Note:**

*Replacement of the CV joint boots and inspection of the joints are described in ⇒ [311 Front Axle Final Drive](#) and ⇒ [331 Rear Axle Final Drive](#).*

## Exhaust system, inspecting

Exhaust system life varies widely according to driving habits and



environmental conditions. If short-distance driving predominates, the moisture and condensation in the system will not fully dry out. This will lead to early corrosion damage and more frequent replacement.

⚡ Scheduled maintenance of the exhaust system is limited to inspection:

- ◆ Check to see that all the hangers (**arrow**) are in place and properly supporting the system and that the system does not strike the body.
- ◆ Check for restrictions due to dents or kinks.
- ◆ Check for weakness or perforation due to rust.

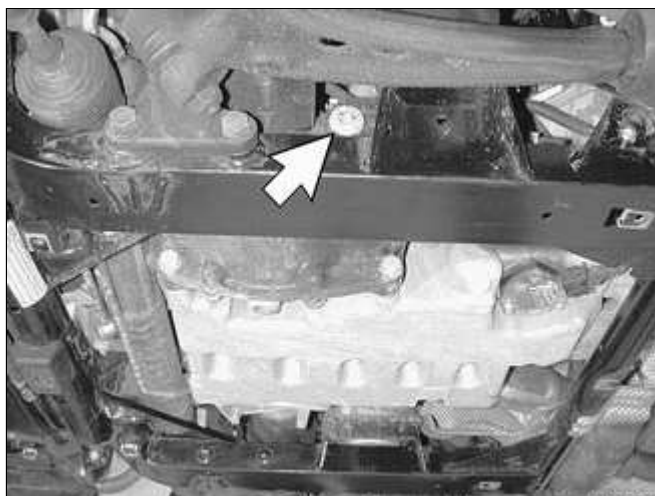
**Note:**

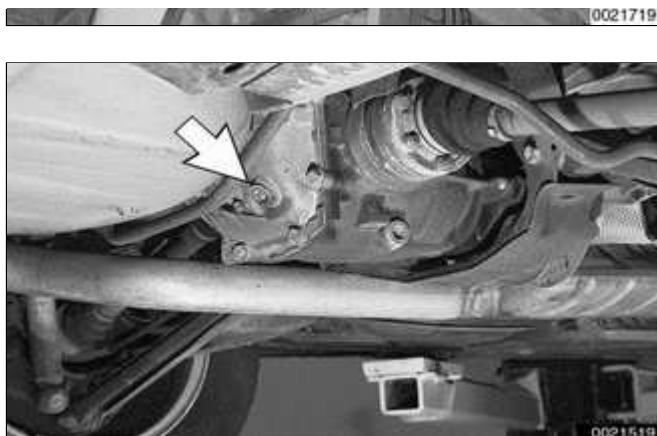
*Alignment of the system and the location of the hangers are described in ⇒ [180 Exhaust System](#).*

## Differential oil level, checking

The differential units in E46 models are filled with lifetime oil that ordinarily does not need to be changed.

- ⚡ All wheel drive models: Check front differential fluid level at front differential filler plug (**arrow**).





- ✦ Check rear differential oil level at rear differential filler plug (**arrow**).
- Check lubricant level with car on a level surface:
  - ◆ Remove oil filler plug.
  - ◆ Level is correct when fluid just reaches edge of filler hole.
  - ◆ If necessary, top up fluid.
  - ◆ Install and tighten oil filler plug when oil level is correct.

The differential should be filled with a special BMW lubricant available through an authorized BMW dealer.

**Note:**

- ◆ *Use a 14 mm or 17 mm Allen socket to remove the drain plug.*
- ◆ *If the car is raised in the air, it should be level.*

| Tightening torques                        |                  |
|-------------------------------------------|------------------|
| Front differential filler plug to housing | 65 Nm (48 ft-lb) |
| Rear differential filler plug to housing  | 70 Nm (52 ft-lb) |

## Fuel filter, replacing

The fuel filter is located beneath the center of the car, approximately under

the driver's seat. A protective cover must be removed to access the filter.



- ✦ Fuel filter for M52 TU engine is shown in illustration.



- ✦ E46 cars with M54 engine are equipped with a fuel filter that has a built in fuel pressure regulator.
  - Disconnect battery negative (-) cable.
  - Drain fuel filter from inlet side into a container and inspect drained fuel. Check for rust, moisture and contamination.
  - When replacing fuel filter:
    - ◆ Clamp filter inlet and outlet hoses to lessen fuel spillage.
    - ◆ Loosen center clamping bracket and hose clamps on either end of filter.
    - ◆ Note arrow or markings indicating direction of flow on new filter.
    - ◆ Install new filter using new hose clamps.

**WARNING!**

***Fuel will be expelled when the filter***

***is removed. Do not smoke or work near heaters or other fire hazards. Keep a fire extinguisher handy.***

**CAUTION!**

***Clean thoroughly around the filter connections before removing them.***

**Note:**

*When installing fuel filter cover, take care to reinstall foam rubber seal in front of cover correctly to prevent flooding of filter with rain splash water.*

## **Fuel tank and fuel lines, inspecting**

Inspect the fuel tank, fuel lines, and fuel system for damage or leaks. Check for fuel leaks in the engine compartment or fuel odors in the passenger compartment. Check for faulty flexible fuel lines by bending them. If any leaks are present, fuel should be expelled. Check for any evaporative emissions hoses that may have become disconnected, checking carefully at the charcoal canister and evaporative emissions purge system.

**WARNING!**

***When checking for fuel leaks, the engine must be cold. A hot exhaust manifold or exhaust system could cause the fuel to ignite or explode causing serious personal injury. Ventilate the work area and clean up spilled fuel immediately.***

**Note:**

See ⇒ [130 Fuel Injection](#) and ⇒ [160 Fuel Tank and Fuel Pump](#) for component locations and additional information.

## Suspension, front, inspecting

Inspection of the front suspension and steering includes a check of all moving parts for wear and excessive play. Inspect ball joint and tie-rod rubber seals and boots for cracks or tears that could allow the entry of dirt, water, and other contaminants.

On All wheel drive models check front differential fluid level and check CV joint boots for cracks.

### **Note:**

See ⇒ [310 Front Suspension](#) and ⇒ [331 Rear Axle Final Drive](#)

## Suspension, rear, inspecting

Differential and rear drive axle service consists of checking and changing the gear oil, inspecting for leaks, and checking the rear drive axle rubber boots for damage.

The areas where leaks are most likely to occur are around the drive shaft and drive axle mounting flanges.

### **Note:**

*For more information on identifying oil leaks and their causes, see ⇒ [330 Rear Suspension](#) and ⇒ [311 Front Axle Final Drive](#).*

## Tires, checking inflation pressure

Correct tire pressures are important to handling and stability, fuel economy, and tire wear. Tire pressures change with temperature. Pressures should be checked often during seasonal temperature changes. Correct inflation

pressures can be found on the driver's door pillar and in the owner's manual. Note that tire pressures should be higher when the car is more heavily loaded.

### **WARNING!**

***Do not inflate any tire to a pressure higher than the tire's maximum inflation pressure listed on the sidewall. Use care when adding air to warm tires. Warm tire pressures can increase as much as 4 psi (0.3 bar) over their cold pressures.***

## **Tires, rotating**

BMW does not recommend tire rotation. Due to the car's suspension design, the front tires begin to wear first at the outer shoulder and the rear tires begin to wear first at the middle of the tread or inner shoulder. Rotating the tires may adversely affect road handling and tire grip.

## **Transmission service, automatic**

The automatic transmission is not equipped with a dipstick. Therefore, checking the ATF level is an involved procedure which includes measuring and maintaining a specified ATF temperature during the checking procedure.

### **Note:**

*For more complete ATF service information, including checking ATF level and ATF filter replacement procedures, see ⇒ [240 Automatic Transmission](#).*

## Transmission service, manual

Manual transmission service consists of inspecting for leaks and checking the fluid.

Evidence of transmission leaks is likely to be seen around the driveshaft mounting flange and at the bottom of the bellhousing.

### **Note:**

*For more information on identifying oil leaks and their causes, see ⇒ [230 Manual Transmission](#) and ⇒ [210 Clutch](#).*

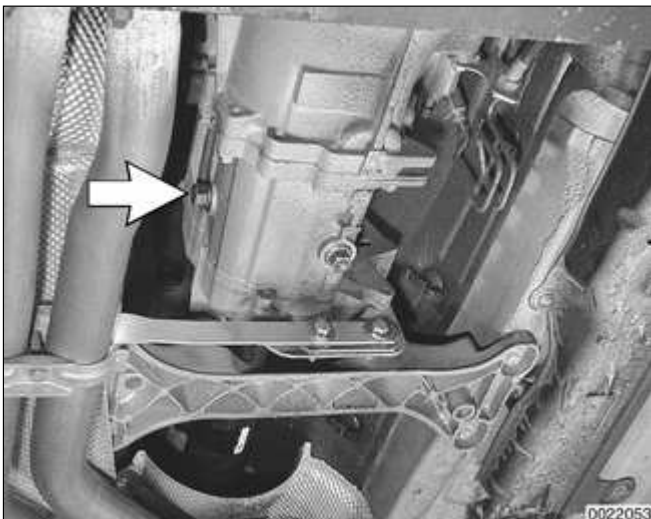
## Transmission fluid, checking and filling (manual transmission)

The manual transmission in E46 models is filled with lifetime oil that ordinarily does not need to be changed.

- ✦ Check manual transmission oil level at transmission filler plug (**arrow**). Make sure car is on level surface.

### **Note:**

*Transmission fluid level checking and replacement procedures are covered in ⇒ [230 Manual Transmission](#).*



## Wheels, aligning

BMW recommends checking the front and rear alignment once a year and

whenever new tires are installed.

**Note:**

See ⇒ [320 Steering and Wheel Alignment](#) for a more detailed discussion of alignment requirements and specifications.

## Body and Interior Maintenance

### Body and hinges, lubricating

The door locks and lock cylinders can be lubricated with an oil that contains graphite.

The body and door hinges, the hood latch, and the door check rods should be lubricated with SAE 30 or SAE 40 engine oil. Lubricate the seat runners with multipurpose grease. Do not apply any oil to rubber parts. If door weatherstrips are sticking, lubricate them with silicone spray or talcum powder. The hood release cable should be lubricated as well.

The use of winter lock de-icer sprays should be kept to an absolute minimum, as the alcohol in the de-icer will wash the grease out of the lock assemblies, and may cause the locks to corrode internally, or become difficult to operate.

### Exterior washing

The longer dirt is left on the paint, the greater the risk of damaging the glossy finish, either by scratching or by the chemical effect dirt particles may have on the painted surface.

Do not wash the car in direct sunlight. If the engine hood is warm, allow it to cool. Beads of water not only leave spots when dried rapidly by the sun or heat from the engine, but also can act as small magnifying glasses and burn spots into the finish. Wash the car with a mixture of lukewarm water and a car

wash product. Rinse using plenty of clear water. Wipe the body dry with a soft cloth towel or chamois to prevent water-spotting.

## **Interior care**

Dirt spots can usually be removed with lukewarm soapy water or a dry foam cleaner. Use spot remover for grease and oil spots. Do not pour the liquid directly on the carpet or fabric, but dampen a clean cloth and rub carefully, starting at the edge of the spot and working inward. Do not use gasoline, naphtha, or other flammable substances.

## **Leather upholstery and trim**

Leather upholstery and trim should be periodically cleaned using a slightly damp cotton or wool cloth. The idea is to get rid of the dirt in the creases and pores that can cause brittleness and premature aging. On heavily soiled areas, use a mild detergent (such as Woolite<sup>®</sup>) or other specially formulated leather cleaners. Use two tablespoons to one quart of cold water. Dry the trim and upholstery completely using a soft cloth. Regular use of a good quality leather conditioner will reduce drying and cracking of the leather.

## **Polishing**

Use paint polish only if the finish assumes a dull look after long service. Polish can be used to remove tar spots and tarnish, but afterwards a coat of wax should be applied to protect the clean finish. Do not use abrasive polish or cleaners on aluminum trim or accessories.

## Seat belts

Dirt and other abrasive particles will damage seat belt webbing. If it is necessary to clean seat belts, use a mild soap solution. Bleach and other strong cleaning agents may weaken the belt webbing and should be avoided.

### **WARNING!**

***Do not clean the seat belt webbing using dry cleaning or other chemicals. Allow wet belts to dry before allowing them to retract.***

The condition of the belt webbing and the function of the retractor mechanisms should be inspected.

### **Note:**

See ⇒ [720 Seat Belts](#) for seat belt inspection information.

## Special cleaning

Tar spots can be removed with a bug and tar remover. Never use gasoline, kerosene, nail polish remover, or other unsuitable solvents. Insect spots also respond to tar remover. A bit of baking soda dissolved in the wash water will facilitate their removal. This method can also be used to remove spotting from tree sap.

## Washing chassis

Periodic washing of the underside of the car, especially in winter, will help prevent accumulation of road salt and rust. The best time to wash the underside is just after the car has been driven in wet conditions. Spray the chassis with a powerful jet of water.

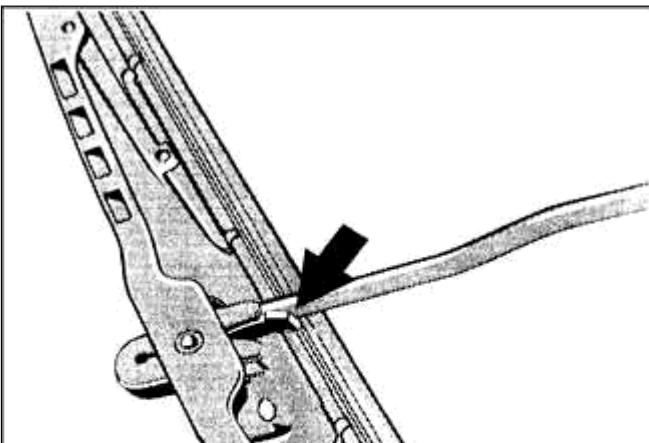
Commercial or self-service car washes may not be best for this, as they may recycle the salt-contaminated water.

## Waxing

For a long-lasting, protective, and glossy finish, apply a hard wax after the car has been washed and dried. Use carnauba or synthetic based products. Waxing is not needed after every washing. You can tell when waxing is required by looking at the finish when it is wet. If the water coats the paint in smooth sheets instead of forming beads that roll off, a new coat of wax is needed. Wax should not be applied to black trim pieces, rubber, or other plastic parts.

## Windshield wiper blade maintenance

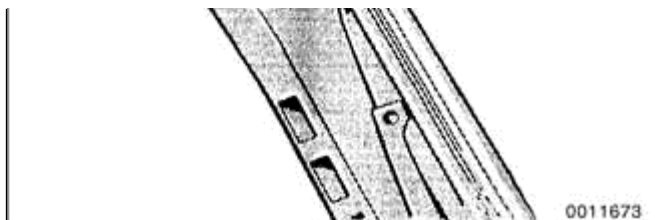
Common problems with the windshield wipers include streaking or sheeting, water drops after wiping, and blade chatter. Streaking is usually caused when wiper blades are coated with road film or car wash wax. Clean the blades using soapy water. If cleaning the blades does not cure the problem, they should be replaced. BMW recommends replacing the wiper blades twice a year, before and after the cold season.



- To replace wiper blade, depress retaining tab (**arrow**) and slide blade out of arm.

On older cars, check the tension spring that holds the wiper to the glass. Replace the wiper arm if the springs are weak.

Drops that remain behind after wiping are caused by oil, road film, or diesel exhaust coating the windshield. Use an



alcohol or ammonia solution, or a non-abrasive cleanser to clean the windshield.

Wiper blade chatter may be caused by dirty or worn blades, by a dirty windshield, or by bent or twisted wiper arms. Clean the blades and windshield as described above. Adjust the wiper arm so that there is even pressure along the blade, and so that the blade is perpendicular to the windshield at rest. Lubricate the wiper linkage with a light oil. The linkage is located under the hood on the driver's side. If the problem persists, the blades are excessively aged or worn and should be replaced.

**Note:**

See ⇒ [611 Wipers and Washers](#) for more information.