

020 Maintenance

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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.

BMW has taken a unique approach to establishing maintenance intervals. BMW's Service Indicator System computes maintenance intervals based not only on elapsed mileage, but also on such inputs as engine speed, engine temperature, number of starts, and lengths of trips. At the appropriate time, the system indicates, through lights in the instrument cluster, when the next routine maintenance is due.

NOTE —

BMW is constantly updating their 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.

BMW Service Indicator

◀ The BMW Service Indicator notifies the driver when maintenance is required. The service indicator consists of multiple light emitting diodes (LEDs)—typically five green, one yellow, and one red—as well as OIL SERVICE and INSPECTION indicators.

When the ignition is turned on, the green LEDs come on. They go out when the engine is started. After the Service Indicator is reset, all green LEDs will be illuminated with the key on. As the car is driven in normal use, fewer and fewer green LEDs will be illuminated before start-up, indicating that the next maintenance interval is approaching.

When the car has accumulated sufficient use to require the next maintenance interval, the yellow LED will come on along with either the OIL SERVICE indicator or the INSPECTION indicator. These LEDs will stay on after the engine is started. If maintenance service is delayed, the red LED will also illuminate as a reminder that maintenance service is overdue.

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.



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Oil Service

The Oil Service indicator signals the need for the most basic level of routine maintenance. BMW's required oil service specifies changing the engine lubricating oil and the engine oil filter after the engine has been warmed up. BMW-recommended additional maintenance for this service is 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 7,500 miles or 6 months.
- Be sure to follow the instructions for resetting the Oil Service indicator light. The Inspection indicator can be accidentally reset rendering its function inaccurate.

Inspection I and Inspection II

The Inspection indicator signals the need for more comprehensive maintenance and inspection. There are two sets of inspection requirements, Inspection I and Inspection II. 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 are listed 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 15,000 miles or 12 months. Inspection II is normally due at intervals with a maximum of 30,000 miles or 24 months. Later cars may have different Inspection intervals.

Resetting Service Indicator

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

- ◀ The service indicator is reset using a special tool. The tool is plugged into the diagnostic connector in the engine compartment.

CAUTION—

Follow the manufacturer's directions when resetting the service indicator. If the reset procedures are done incorrectly, the reset tool or the electronic service indicator may be damaged.



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Aftermarket reset tools can be purchased from one of the following manufacturers:

Assenmacher Specialty Tools
Boulder CO 80301
(303) 530-2424

Peake Research, Automotive Products Division
P.O. Box 28776
San Jose CA 95159
(408) 359-0406

MAINTENANCE TABLES

Table a through **Table d** on the following pages list the routine maintenance tasks specified by BMW. The intervals for most of these tasks are determined by the Service Indicator. The maintenance intervals for a few additional items are based on either elapsed mileage or time. These intervals are clearly indicated in separate tables.

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 bold text references the repair group where additional repair information can be found.

Table a. Oil Service

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Engine compartment maintenance				
Change oil and oil filter	*	*	*	
Check fluid levels (coolant, steering, brake/clutch, ATF)		*	*	
Under car maintenance				
Check steering box and steering linkages for leaks and excess play. Repair Group 320				
Inspect brake system. Check brake calipers, rotors, and brake pad thickness. Inspect for damaged hoses and lines, leaks or damage. Check hand brake, adjust cable if necessary. Repair Group 340				
Check and adjust tire pressures, including spare	*			
Body and interior maintenance				
Check operation of exterior and interior lights, including glove box light, engine compartment light, trunk light, instrument panel lights, horns, headlight flasher and dimmer switch. Check headlight and driving light aiming. 6 Electrical System				
Check condition and function of seat belts. Repair Group 720				

Continued on next page

Table a. Oil Service

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Check windshield washer fluid level and concentration, add as necessary. Check operation of washer system. Check condition of wiper blades. Repair Group 611		*		
Road Test Check braking performance, steering, heating and ventilation, manual or automatic transmission, and mirrors.				

Table b. Inspection I Service

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Engine compartment maintenance				
Check and adjust valve clearance (M30 engine). Repair Group 116	*	*		
Change oil and oil filter.	*	*	*	
Check brake/clutch fluid level		*		
Check battery acid level and correct as necessary. Repair Group 020	*			
Check engine coolant level and anti-freeze protection and add as necessary. Inspect for cooling system leaks Repair Group 170	*	*		
Lubricate throttle linkage				
Under car maintenance				
Check transmission for external leaks				
Check manual transmission oil level and add as necessary Repair Group 230	*	*		
Check final drive lubricant and add as necessary. Repair Group 331	*	*		
Check fuel tank, fuel lines, and all connections for leaks				
Inspect exhaust system. Repair Group 180				
Check steering box and steering linkages. Check power steering system for leaks. Check fluid level. Repair Group 320		*		*
Inspect brake system for damaged hoses and lines, leaks or damage. Remove calipers and check brake pad wear. Check brake rotors for scoring damage. Repair Group 340	*			
Check parking brake operation, adjust cable if necessary. Repair Group 340	*			

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Table b. Inspection I Service (continued)

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Inspect front and rear suspension, including wheel bearings, for play. Repair Groups 310/330				*
Inspect wheels and tires, including spare, check tire pressure and condition	*			
Check hydraulic fluid level for Level Control System (LAD), if applicable. See Repair Group 330		*		
Body and Interior Maintenance				
Lubricate door hinges and hood latch, hood hinges				
Check headlight and driving light aiming and adjust as necessary.	*			*
Check operation of headlights, parking lights, back-up lights, license plate lights, interior lights, glove box light, engine compartment light, trunk light, instrument panel lights, turn signals, emergency flashers, stop lights, horns, headlight flasher and dimmer switch				
Check active check control panel for faults. 6 Electrical System				
Check function of air conditioning. Check refrigerant charge at sight glass, where applicable. Tighten A/C compressor mounting bolts. Repair Group 640	*			
Check function of seat belts. Repair Group 720				
Check windshield washer fluid level and concentration, add as necessary. Check operation of washer system. Check condition of wiper blades Repair Group 611		*		
Tighten nuts and bolts for door locks and striker plates				
Replace intake dust/pollen microfilter in A/C unit. Repair Group 640	*	*		
Replace batteries for alarm/remote control in master key (1995 models)		*		
Road Test				
Check braking performance, steering, HVAC, manual or automatic transmission, and mirrors				

Table c. Inspection II Service

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Engine compartment maintenance				
Check and adjust valve clearance (M30 engine). Repair Group 116	*	*		
Inspect V-belt /Poly-ribbed drive condition. Check V-belt tension (M30 engines).	*			
Lubricate throttle linkage.				

Table c. Inspection II Service (continued)

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Change air filter.	*	*		
Change oil and oil filter.	*	*	*	
Check brake/clutch fluid level.		*		
Check battery acid level and correct as necessary. Repair Group 020				
Check engine coolant level and anti-freeze protection and add as necessary. Inspect for cooling system leaks. Repair Group 170	*	*		
Under car maintenance				
Change automatic transmission fluid (except 740i/L models). Repair Group 240	*	*	*	*
Change manual transmission oil. Repair Group 230	*	*	*	*
Check clutch plate for wear. Repair Group 210	*			
Check drive axle boots for leaks. Repair Group 330				
Change final drive fluid (1995 models: change synthetic oil every 2nd Inspection II).	*	*	*	*
Replace fuel filter.	*	*		
Replace air filter element.	*	*		
Check fuel tank, fuel lines and all connections for leaks.				
Inspect exhaust system. Repair Group 180				
Check steering box and steering linkages. Check power steering system for leaks. Check fluid level. Repair Group 320		*		*
Inspect brake system for damaged hoses and lines, leaks or damage. Remove calipers and check brake pad wear. Check brake rotors for scoring damage. Repair Group 340	*			
Check parking brake operation, adjust cable if necessary. Check thickness of parking brake linings. Repair Group 340	*			
Inspect front and rear suspension, including front and rear wheel bearings, for play. Repair Group 310/330	*			*
Inspect wheels and tires, including spare, check tire pressure and condition.	*			
Cars with traction control ASC+T: replace ASC+T filter.	*	*		
Check hydraulic fluid level for Level Control System (LAD), if applicable. See Repair Group 370		*		
Body and Interior Maintenance				
Lubricate door hinges and hood latch, hood hinges.	*			
Check headlight and driving light aiming and adjust as necessary.	*			*

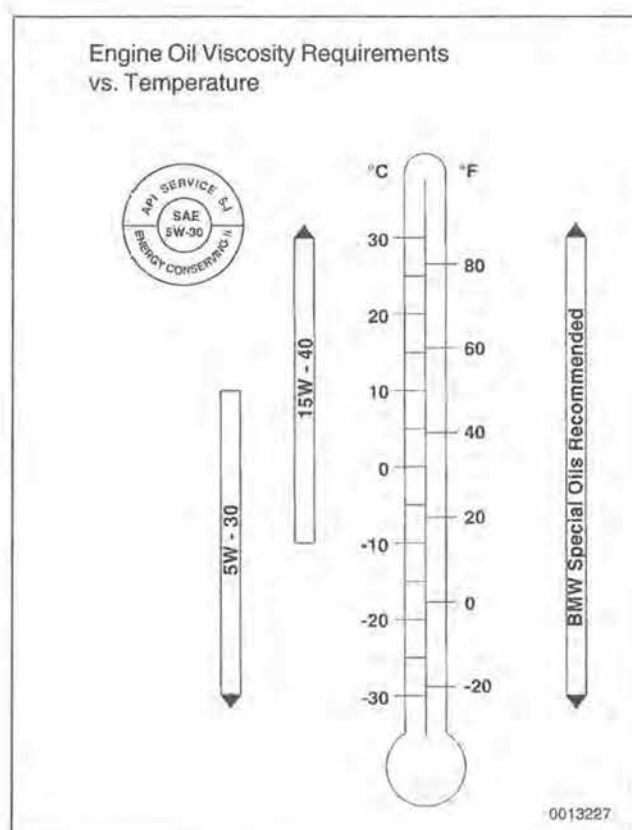
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Table c. Inspection II Service (continued)

Maintenance item	Tools required	New parts required	Warm engine required	Dealer service recommended
Check operation of headlights, parking lights, back-up lights, license plate lights, interior lights, glove box light, engine compartment light, trunk light, instrument panel lights, turn signals, emergency flashers, stop lights, horns, headlight flasher and dimmer switch.				
Check active check control panel for faults. 6 Electrical System				
Body and Interior Maintenance (cont.)				
Check function of air conditioning. Check refrigerant charge at sight glass, where applicable. Tighten A/C compressor mounting bolts. Repair Group 640	*	*		
Check function of seat belts. Repair Group 320				
Check windshield washer fluid level and concentration, add as necessary. Check operation of washer system. Check condition of wiper blades Repair Group 611		*		
Tighten nuts and bolts for door locks and striker plates.	*			
Replace intake dust/pollen microfilter in A/C unit. Repair Group 640	*	*		
Replace batteries for alarm/remote control in master key.		*		
Check ground connection of SRS (airbag) front sensor to body, if applicable. Repair Group 721	*			*
Road Test				
Check braking performance, steering, HVAC, manual or automatic transmission and mirrors				

Table d. Scheduled Maintenance—Time/Mileage Intervals

Maintenance item	every 12 months	every 24 months	every 48 months	every 50,000 miles	every 60,000 miles	every 100,000 miles	New parts required	Dealer service recommended
Replace oxygen sensor. Repair Group 180					*		*	
Flush and replace brake fluid/clutch fluid. Repair Group 340		*					*	
Drain and flush cooling system and replace coolant. Repair Group 170		*					*	
Anti-corrosion warranty inspection.	*							*



FLUID AND LUBRICANT SPECIFICATIONS

Engine oil viscosity (SAE grade) vs. operating temperature range shown for BMW engines covered in this manual.

The fluids and lubricants specified by BMW are listed in **Table e.**

WARNING —

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

Table e. Fluids and Lubricants

Fluid	Approximate capacity	Specification
Engine oil with filter change		
735i/iL (M30)	5.75 L (6.1 US qt.)	API service SH or SJ
740i/iL (M60)	7.50 L (7.9 US qt.)	
750iL (M70)	7.50 L (7.9 US qt.)	
Manual transmission oil	Gear oil, depending on application and model year See 230 Manual Transmission	
Automatic transmission fluid (ATF) (drain and fill)		
735i/iL	3.0 L (3.2 US qt.)	Dexron III® ATF
740i/iL	Lifetime fill 5.5 L (5.8 US qt.) dry 3.7 L (3.9 US qt.) drain & refill	Shell LA 2634 ATF fluid or contact BMW dealer
750iL	3.5 L (3.7 US qt.)	Dexron III® ATF
Final drive (drain and fill)		
735i/iL/750iL	1.9 L (2.0 US qt.)	Hypoid gear oil SAE 90 (GL-5)
740i/iL/750iL (1993-1994)	1.9 L (2.0 US qt.)	BMW Synthetic Final Drive Oil or Castrol SAF-XO
Power steering fluid		
All models	Consult owner's manual and reservoir tank label Dexron III Pentosin 7.1 Pentosin CHF 11S from 09/1991	
Brake fluid		
All models	—	SAE Dot 4
Engine coolant		
735i/iL	12.5 L (13.2 US qt.)	50% BMW anti freeze/ 50% water
740i/iL	12.5 L (13.2 US qt.)	
750iL	15 L (15.8 US qt.) (to 9/90) 13 L (13.7 US qt.) (from 9/90)	

CAUTION—

Multi-viscosity engine oils should not be used in manual transmissions. Use of such an oil could shorten the service life of the transmission.

NOTE—

Changing the manual transmission gear oil to a less viscous engine oil (lower SAE viscosity rating) or ATF may increase the level of gear noise in the passenger compartment.

ENGINE OIL SERVICE

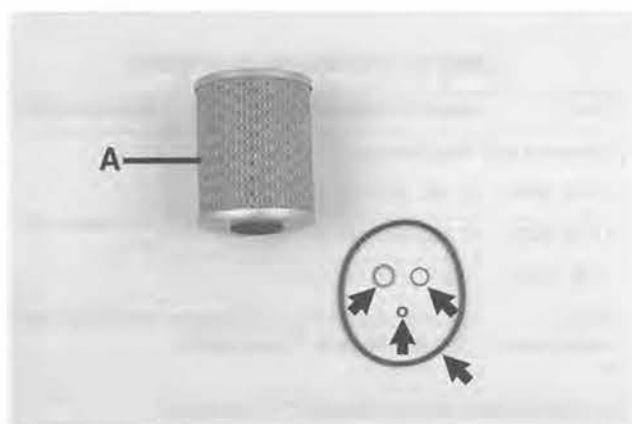
The OIL SERVICE light in the service interval indicator should be the basic guide to scheduling oil changes. The oil service light should come on at or before 7,500 miles. If the car is used primarily for short trips in slow moving traffic, or routinely operated aggressively, the oil service light should come on earlier.

Engine oil and filter, changing

- Run engine for a few minutes to warm engine and then turn engine off.

**Remove oil filter.**

- On all engines, loosen oil filter cover or oil filter cover mounting bolt.
- On all engines, remove old O-ring(s) from cover and from end of bolt (**arrows**).
- Lubricate and install new O-ring(s) in filter cover and on filter bolt (M30 engines only). Install new filter cartridge (**A**) and cover.



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Tightening Torque

- Oil filter cover to oil filter housing
- M10 or M 12 bolt 33 Nm (24 ft-lb)
- Screw-on cover 25 Nm (18 ft-lb)

CAUTION—

Overtightening the oil filter will make the next change much more difficult, and may deform the gasket, causing leaks.



- With car on level ground, place a drain pan under oil drain plug (**arrow**).

NOTE—

The car will not need to be raised if a shallow drain pan is used.



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ENGINE OIL SERVICE

- Using a socket or box wrench, loosen drain plug from bottom of oil sump. By hand, remove plug and let oil drain into pan.

CAUTION—

- Pull the loose plug away from the hole quickly to avoid being burned by the hot oil. It will run out quickly when the plug is removed.
- 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 tighten plug.

Tightening Torques	
• Engine oil drain plug to oil sump	
M12 bolt	25 Nm (18 ft-lb)
M22 bolt	60 Nm (44 ft-lb)

- Refill crankcase with oil. Check oil level when finished adding oil. Oil specifications are found under **Fluid and Lubricant Specifications**.
- Start engine and check that oil pressure warning light immediately goes out. Allow engine to run for a few minutes to circulate new oil. Check for leaks at drain plug and oil filter. Stop engine and recheck oil level.

CAUTION—

- Dispose of used oil properly. Use tight-sealing containers and mark them clearly. Check with the place of purchase about disposal.
- If the oil pressure warning light does not immediately go out after the engine is started, quickly turn the engine off. Loosen the oil filter or filter cover slightly. Restart the engine. As soon as oil begins to run out of the filter or filter cover, turn the engine off and tighten the filter or cover. This will release any trapped air that is blocking oil flow.

ENGINE COMPARTMENT
MAINTENANCE

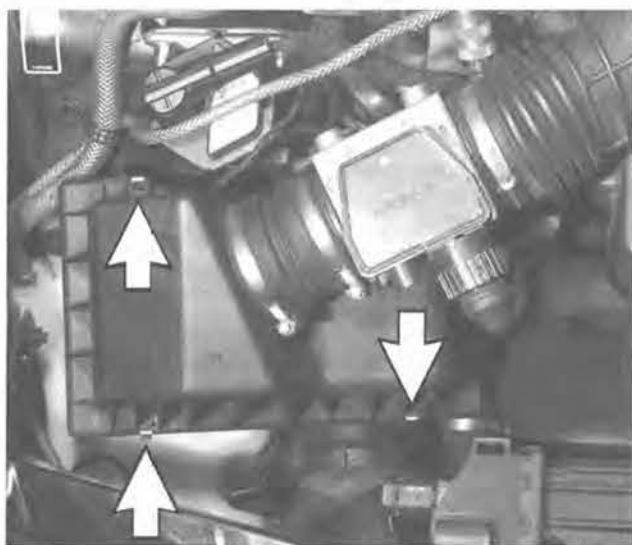
Air filter element, replacing

The specified maintenance intervals for replacing the air filter element are based on normal use. If the car is operated primarily in dusty conditions, the air filter should be serviced more frequently. A dirty air filter starves the engine for air, reducing power output.

NOTE—

- On the M30 or M60 engine, the air filter housing is in the front right corner of the engine compartment.
- The M70 engine has two air filters, one in each front corner of the engine compartment.

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- Upper and lower parts of air filter housing are fastened together with spring clips around outside edge (**arrows**).
- To replace air filter element, unfasten clips as necessary.



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- Separate upper air filter housing from lower part just enough to remove filter element.

- Take note of installed position of filter.
 - Wipe clean inside of air filter housing using a lint-free cloth and install new filter.
 - Reinstall upper air filter housing, making sure that two halves are mated correctly.
 - Refasten spring-clips and tighten mounting nuts.

WARNING—

When reinstalling a used air filter element, reinstall the filter in the same position that it was in before removal. Reversed installation will allow accumulated dirt to be drawn into the engine.

Spark plugs, replacing

High temperature and high-voltage sparks eventually wear out the spark plug electrodes, and the spark plugs must be replaced.

- On M30 or M70 engine: Label and gently remove spark plug wire by pulling on protective boot. Blow or brush away any dirt from around the base of the plug to prevent it from entering the engine when the plug is removed.

CAUTION—

Spark plugs should be replaced one at a time so that the spark plug wires do not get mixed up. If all of the wires need to be removed together, label each wire so that they can be reinstalled on the correct spark plug.



- ◀ On M60 engine: Individual ignition coils are mounted above each spark plug.
 - To access plugs, remove ignition coil mounting bolts and electrical harness connectors (**arrows**). See **120 Ignition System**.
- Use a 13/16 in. or 5/8 in. spark plug socket to remove and reinstall spark plugs.
 - Correct spark plugs for different engines covered by this manual are listed in **Table f**.
 - Use a spark plug gap gauge to check gap, if applicable. If necessary, bend outer electrode slightly to adjust gap to meet specification.
 - Do not bend or file center electrode.
 - Lubricate spark plug threads with anti-seize compound.
 - Thread plugs into cylinder head by hand to prevent cross-threading.
 - Torque spark plugs.

Tightening Torque

- Spark plug to cylinder head 30 Nm (22 ft-lb)

NOTE—

Abnormal spark plug condition or engine damage could also result from spark plugs of the wrong specification. Check replacement plugs carefully and follow the spark plug manufacturer's recommendations.

Table f. Spark Plug Applications

Model/ (Engine code)	Spark plug (Bosch)	Electrode gap
735i/iL (M30)	W8 LCR	0.7-0.8 mm (0.028-0.032 in.)
740i/iL (M60)	F7 L DCR	non-adjustable
750iL (M70)	F8 LCR	0.7-0.8 mm (0.028-0.032 in.)

Distributor cap/rotor/spark plug wires, replacing

The distributor cap, rotor, and spark plug wires deliver high-voltage spark to the spark plugs. They are subject to insulation breakdown, corrosion fouling, and electrode wear and damage. The components should be inspected and replaced as necessary at the intervals listed under **Table b** or **Table c** to ensure maximum engine efficiency. Guidelines for visual inspection and testing, and instructions for replacement are found in **120 Ignition System**.



Fuel filter, replacing

NOTE—

All twelve and some eight cylinder models (from March 1993) are equipped with two fuel filters.

The fuel filter(s), located beneath the right rear of the car, just in front of the fuel tank, should be replaced at the specified interval.

- Disconnect negative (–) battery cable as described later in this group.
- ◀ Clamp filter inlet and outlet hoses to lessen fuel spillage.
 - Loosen clamping bracket (A) and then hose clamps (B).
 - Install filter and use new hose clamps.

NOTE—

The direction of fuel flow is indicated on the filter(s).

WARNING—

Fuel will be spilled 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. Make sure no dirt gets into the fuel lines.

Valve clearance, adjusting (M30 engine)

1988–1992 735i/iL models require periodic valve clearance checking and adjusting. The complete valve adjustment procedure is covered in **116 Cylinder Head and Valvetrain**.

Battery maintenance

Simple maintenance of the battery and its terminal connections will ensure maximum starting performance, especially in colder temperatures. For a more detailed discussion of the battery and charging system, see **121 Battery, Starter, Alternator**.

NOTE—

- The battery is mounted beneath the rear seat. See **520 Seats**.
- A secure battery hold-down is important in order to prevent vibrations and road shock from damaging the plates.

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

To remove battery corrosion, begin by disconnecting the cables. Disconnect the negative (–) cable first. Clean the terminal posts and the cable clamps with a wire brush. Clean the main chassis ground terminal next to the battery.

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

WARNING—

- Battery acid is caustic and 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.
- Hydrogen gas given off by the battery during charging is explosive. Do not smoke. Keep open flames away from the top of the battery, and prevent electrical sparks by turning off the battery charger before connecting or disconnecting it.

CAUTION—

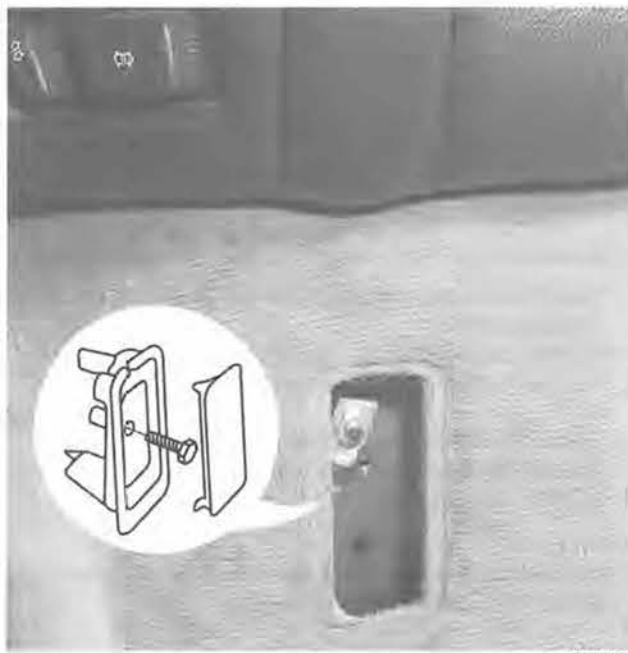
- Disconnecting the battery cables with the engine running, or reconnecting the cables to the incorrect posts will damage the electrical system.
- Be sure to have the radio code on hand before disconnecting battery.
- To avoid causing battery acid damage to the interior, remove battery from car before using a battery charger.

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.

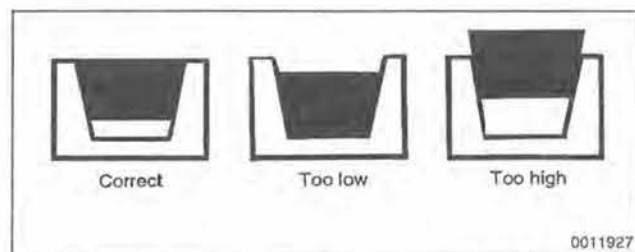
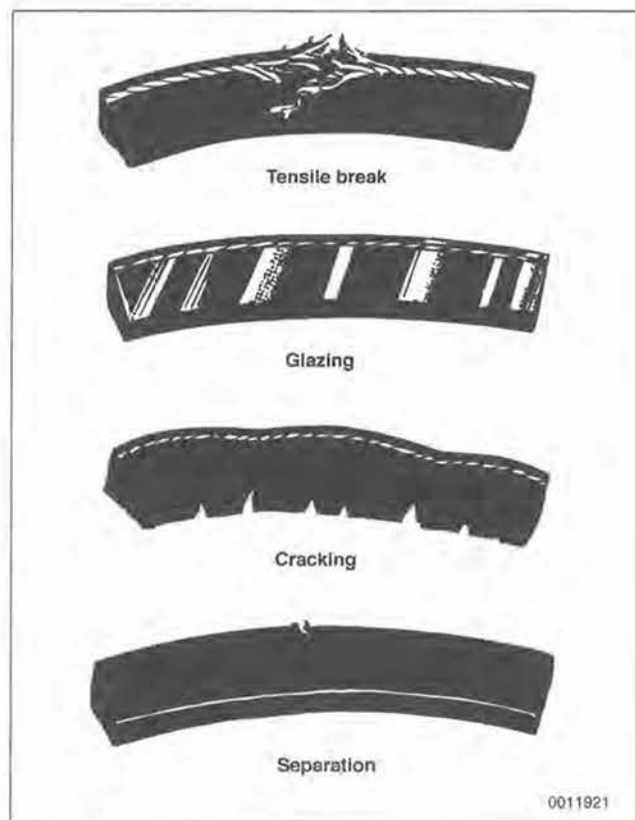
Battery, disconnecting

Always disconnect the negative (–) cable first, and connect it last.

- ◀ The negative battery cable can be disconnected through an access panel in the carpeting below right rear seat.
- Insulate removed battery cable end to prevent accidental reconnection.



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Throttle housing and linkage, lubricating

The linkage at the throttle housing should be lubricated at the normal maintenance intervals. 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.

V-belts, checking and replacing (M30 engine)

V-belts should be inspected during regular maintenance intervals. Incorrect tension can decrease the life of the belt and the component it drives. Inspect belts with the engine off. Twist the belt to inspect its sidewalls and bottom. Belt structural damage, glazed or shiny sidewalls caused by a loose belt, or separation caused by oil contamination are all reasons to replace a belt.

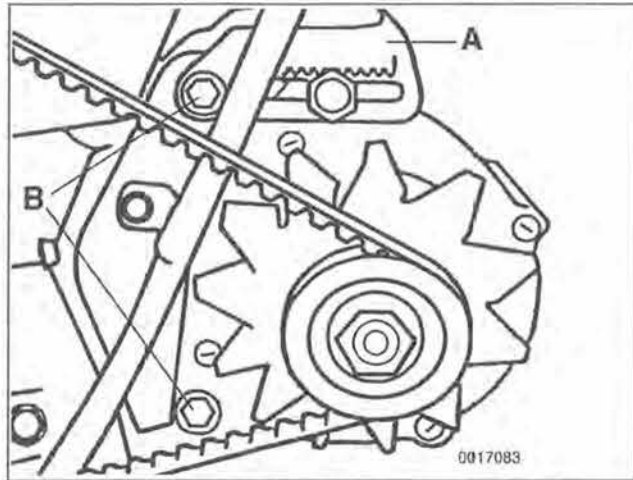
Belt squealing is normally caused by loose belt tension. Loud squealing may only be corrected by belt replacement. Belt dressings should not be used to correct the problem.

A worn belt may ride too low in the pulley grooves. A belt that is too wide for the application may ride too high in the pulley grooves.

- Replacement of V-belts every four years is recommended.
- Loosen mounting bolts and adjust until belt tension is as loose as possible.
- Remove belt by slipping it over pulleys. In some cases it may be necessary to remove one V-belt to get to another.
- Cross section and length determine belt size.
- Use old belt for comparison, or make sure that new belt fits into pulley groove.

NOTE—

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



- When installing a new belt, gently pry it over pulleys. Too much force may damage belt or accessory. Tension belt(s), run engine for a few minutes (at least 1500 rpm), then re-check belt tension.

➤ V-belt tension is adjusted through a toothed-rack mechanism (A). Adjust V-belts by first loosening mounting nuts/bolts (B) until unit pivots freely. Use a torque wrench and a crowfoot wrench to turn tensioning gear bolt. Hold wrench steady and tighten locknut on rear of tensioning gear bolt. Tighten all other mounting nuts.

NOTE—

V-belt tension should be checked using a V-belt tension gauge.

Tightening Torques

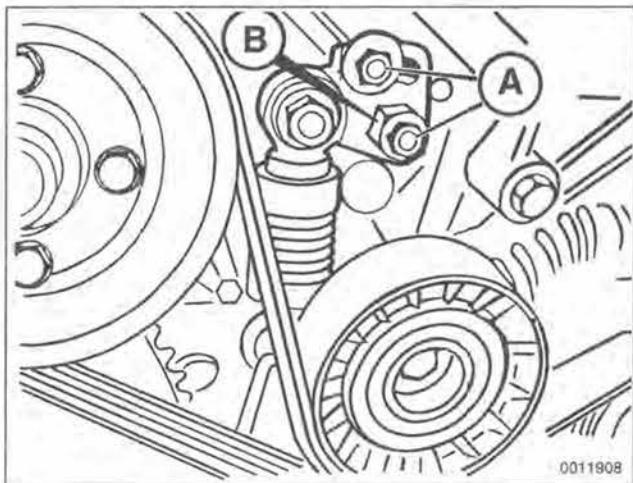
- A/C belt tension 7 - 8.5 Nm (62 - 75 in-lb)
- Alternator belt tension) 7 Nm (62 in-lb)
- Power steering belt tension) . 8 - 8.5 Nm (71 -75 in-lb)
- Tensioning gear locking nut 24 Nm (18 ft-lb)

CAUTION—

Do not over tighten the V-belts. Overtightening will cause shaft bearings to fail prematurely

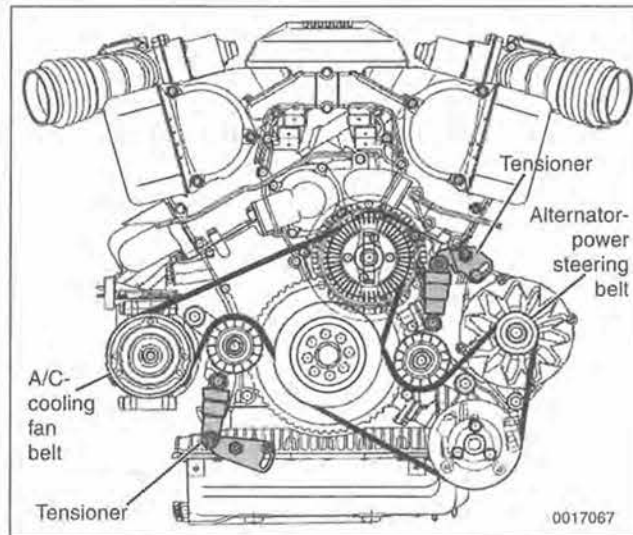
Poly-ribbed belts, checking and replacing (M60 or M70 engine)

The automatic-tensioning poly-ribbed belt(s) should be inspected during regular maintenance intervals. Inspect the belt with the engine off. Twist the belt to inspect its sidewalls and bottom. Belt structural damage, glazed or shiny contact surfaces, cracking, or oil contamination are all reasons to replace a belt.



➤ To replace the poly-ribbed belts on M60 or M70 engines, loosen the mounting nuts on the belt tensioner (A). Then use an open end wrench to rotate the tensioner counter-clockwise (B), releasing belt tension. Tighten the tensioner mounting nuts to hold the tensioner in position. Remove the belt. Install the new belt and then loosen the tensioner mounting nuts. Tighten the nuts once the belt is tensioned.

020-18 MAINTENANCE



➤ M70 engine poly-ribbed belts and tensioners.

NOTE—

If reinstalling belt, label rotation direction.

Cooling system maintenance

Cooling system maintenance consists of maintaining the coolant and inspecting coolant hoses. Because the coolant's anti-corrosion and anti-freeze additives gradually lose their effectiveness, replacement of the coolant every 2-3 years is recommended. As a preventive measure, replacement of the cooling system hoses every 4 years is also recommended.

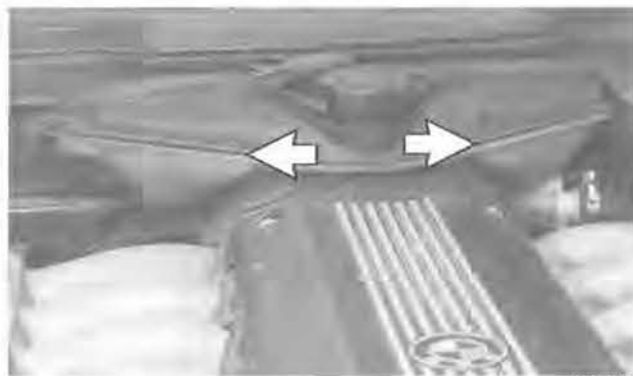
CAUTION—

Use only BMW-approved long life anti-freeze when filling the cooling system. Use of anti-freeze containing phosphates or a high silicate content is considered to be harmful to the cooling system.

A translucent expansion tank in the rear of the engine compartment provides easy monitoring of coolant level. Because the expansion tank is translucent, the coolant level can be checked visually without opening the system.

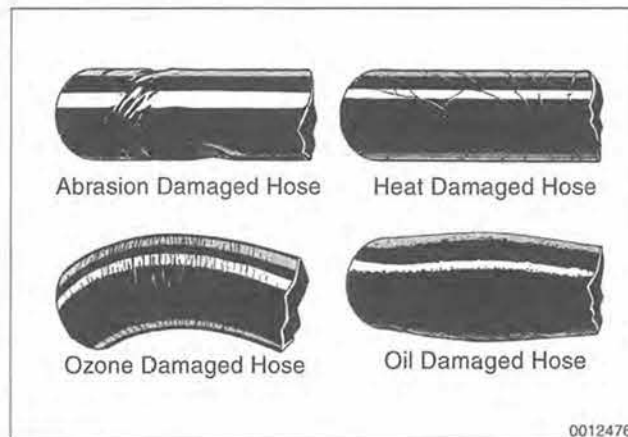
➤ Always check the coolant level with the engine cold. The coolant level should be at the maximum mark on the expansion tank (**arrows**).

— Coolant 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.



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ENGINE COMPARTMENT MAINTENANCE



➤ Hoses should be firm and springy. Replace any hose that is cracked, that has become soft and limp, or has been contaminated by oil.

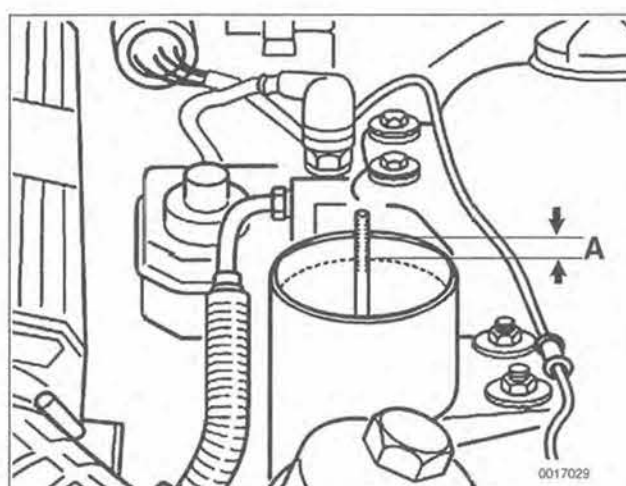
Power steering fluid level, checking

Check the power steering fluid level in the fluid reservoir, just to left of engine behind the front power distribution box. The car should be parked on level ground with the engine off.

NOTE—

The power steering system is filled with either Dexron III automatic transmission fluid (ATF) or one of two types of Pentosin hydraulic fluid.

- In cars that use ATF: The fluid level is correct if it is between the MAX and MIN marks on the dipstick.
- If the level is below the MIN mark, start the engine and add fluid to the reservoir to bring the level up. Stop the engine and recheck the level.
 - Hand-tighten the reservoir cap.



- In cars that use hydraulic fluid: With engine off, fill reservoir until fluid level (A) is approximately 25 mm (1 in.) below reservoir rim.

NOTE—

- Early E32 cars use Pentosin® CHF 7.1 hydraulic fluid.
- Beginning with cars produced in September 1991, Pentosin® CHF 11 S is used in the hydraulic system.

CAUTION—

Check the hydraulic reservoir for a label identifying the type of fluid used. Do not mix fluids.



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Hydraulic brake booster fluid, checking

Early 735i/iL models (to 3/88) and all 750iL models are equipped with a hydraulic brake booster system. The hydraulic fluid reservoir for this system is shared with the power steering system, shown earlier.

Brake/clutch fluid level, checking

✦ The level of the brake fluid will drop slightly as the brakes wear.

- Check the fluid level is between the MIN and MAX (arrow) marks on the brake fluid reservoir. W
- When filling the reservoir, use only new brake fluid from previously unopened containers. See **Fluid and Lubricant Specifications**.

NOTE—

- The brake fluid also serves as the hydraulic fluid for the clutch on cars with manual transmission.
- Low fluid level in the brake fluid reservoir may be due to leaks in the brake system or in the hydraulic clutch.

Oxygen sensor, replacing

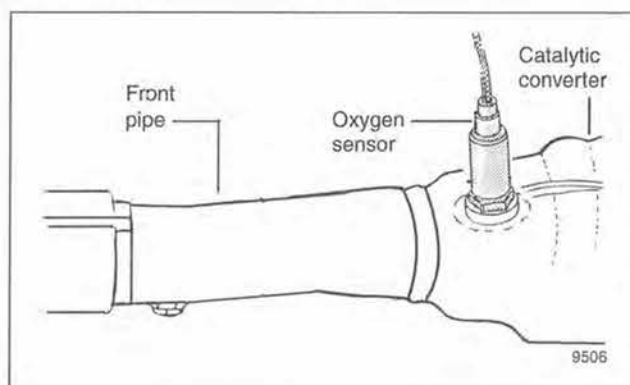
The oxygen sensor monitors engine combustion efficiency by measuring the oxygen content of the exhaust gasses. The output signal from the sensor is used to precisely control fuel delivery. Any problems with the oxygen sensor will directly affect exhaust emissions and the way the engine runs.

Replacement of the oxygen sensor at the specified interval ensures that the engine and emission control system will continue to operate as designed.

✦ The sensor is mounted the catalytic converter. For more information on testing the oxygen sensor system, see **130 Fuel injection**. See **180 Exhaust System** for oxygen sensor replacement procedures.

NOTE—

Special sockets for replacing the oxygen sensor are 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. See **010 General** for information on sources.



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UNDER-CAR MAINTENANCE

Tires, checking inflation pressure

Correct tire inflation 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 higher pressure 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. Owing 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.

NOTE—

The main purpose of tire rotation is to promote even wear and maximum tire life. Tire life may be decreased slightly if the tires are not rotated.

Wheels, aligning

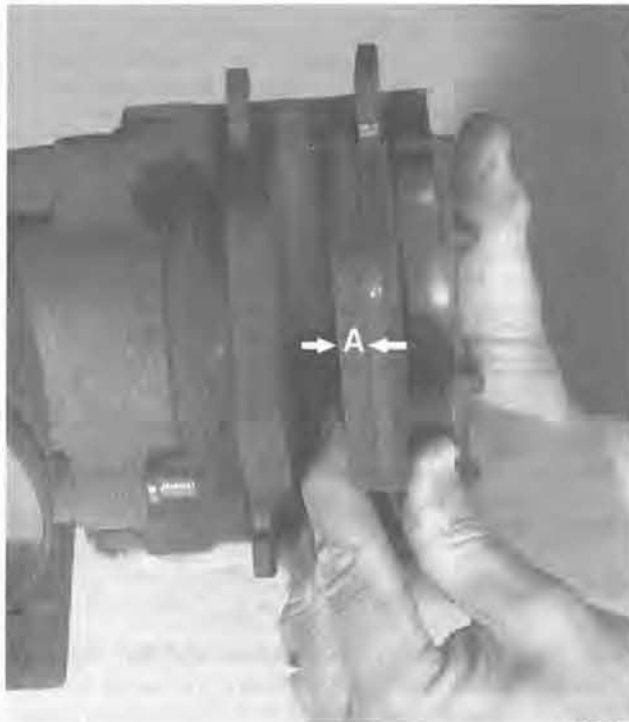
BMW recommends checking the front and rear alignment once a year and whenever new tires are installed. See **320 Steering and wheel alignment** for a more detailed discussion of alignment requirements and specifications.

Brake system, inspecting

Routine maintenance of the brake system includes maintaining an adequate level of brake fluid in the reservoir, checking brake pads for wear, checking hand brake function, and inspecting the system for fluid leaks or other damage.

Brake hoses and lines, inspecting

Check that all 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 as described in **340 Brakes**.



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CAUTION—

- *Incorrect installation or overtightening hoses, lines, and unions may cause chafing or leakage. This can lead to partial or complete brake system failure.*
- *Brake fluid is poisonous. Do not siphon brake fluid by mouth. Wear gloves when working with brake fluid or brake pads to prevent contamination of cuts.*

Brake pad/rotor wear, checking

Although the cars covered by this manual are equipped with a brake pad warning system, the system only monitors one wheel per axle. There can be slight variations in brake pad wear at each wheel, so brake pad thickness should be checked whenever the wheels are off or brake work is being done.

- ✦ The brake caliper should be removed to properly inspect brake pad thickness (A) and rotors. Brake caliper removal and installation procedures are given in **340 Brakes**.

**Brake Pad Lining Minimum Thickness
(Dimension A)**

- Front and rear disc brake pads 2.0 mm (0.08 in)

NOTE—

For parking brake lining wear, see **Parking brake, checking** below.

WARNING—

Friction materials such as brake linings may contain asbestos fibers. Do not create dust by grinding, sanding, or cleaning the pads with compressed air. Avoid breathing asbestos fibers and asbestos dust, as it may result in serious diseases such as asbestosis and cancer, or in death.

Brake fluid, replacing

BMW strictly recommends replacing the brake fluid every year. This will help protect against corrosion and the effects of moisture in the fluid. See **340 Brakes** for brake fluid flushing procedures.

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 on the ratchet mechanism. Check that the cable moves freely. A complete 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 over time 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.

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 for restrictions due to dents or kinks. Check for weakness or perforation due to rust. Check to see that all the hangers are in place and properly supporting the system and that the system does not strike the body. Alignment of the system and the location of the hangers are described in 180 Exhaust System.

Manual transmission service

Manual transmission service consists of inspecting for leaks, checking and changing the gear oil, checking the clutch fluid level, and checking the clutch disc for wear.

Evidence of transmission leaks is most likely to be seen around the drive shaft mounting flange, and at the bottom of the bellhousing between the transmission and the engine. For more information on identifying oil leaks and their causes, see 230 Manual Transmission and 210 Clutch.

Manual transmission oil, checking and filling

BMW recommends checking the manual transmission oil level and changing the oil at specified intervals. Check and fill the transmission with the car on a level surface. Transmission oil level checking and oil replacement procedures are covered in 230 Manual Transmission.

Automatic transmission service

Several different automatic transmissions are used in the cars covered by this manual, depending on engine and model year. Some early transmissions are equipped with a dipstick, while most later transmissions are not. On automatic transmissions not equipped with a dipstick, checking the ATF level is an involved procedure that requires measuring and maintaining a specified ATF temperature during the checking procedure.

NOTE—

The automatic transmission in 740i/IL models uses a special ATF oil that does not require changing for the life of the transmission.

For complete ATF service, including checking ATF level and ATF filter replacement procedures, see **240 Automatic Transmission**.

Front suspension and steering linkages, inspecting

Inspection of the front suspension and steering includes a check of all moving parts for wear and excessive play. Also inspect the rubber seals and boots for cracks or tears that could allow the entry of dirt, water, and other contaminants. See **310 Front Suspension**.

Rear suspension, inspecting

Final drive 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.

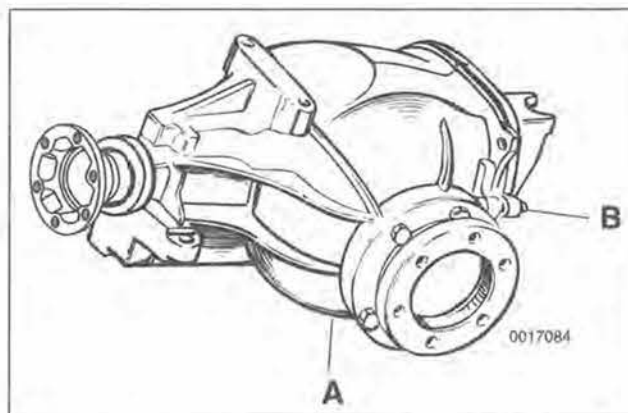
The areas where leaks are most likely to occur are around the drive shaft and drive axle mounting flanges. For more information on identifying oil leaks and their causes, see **330 Rear Suspension** and **331 Final Drive**.

Final drive oil level, checking

- Check the oil level with the car level. Remove the oil filler plug (B). The level is correct when the fluid just reaches the edge of the filler hole. Remove oil through drain plug (A). Install and tighten the oil filler plug when the oil level is correct.

NOTE—

- Use a 14 mm or 17 mm allen bit socket to remove the drain plug. Alternatively, cut approximately 30 mm (1.2 in.) from an allen key and use an open-end wrench on the key stub.
- Oil specifications vary depending on type of final drive unit installed. See **331 Final Drive** for more information. To identify differential type (limited slip vs. open), locate the sheet metal data tag on the left-hand side of final drive unit. This tag identifies type and final drive ratio. For example S 3,10 means that it is a limited slip differential (S) with a 3.10 final ratio.



Tightening Torque

- Final drive filler plug to final drive housing 70 Nm (52 ft-lb)

CV joint boots, inspecting

The rear drive axle protective boots, generally referred to as CV joint boots, should be 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 enters the joint will quickly damage it. Replacement of the CV joint boots and inspection of the joints are described in **330 Rear Suspension**.

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 fuel lines by bending them. If any leaks are present, fuel or fuel vapors will be expelled.
 - Check for a damaged fuel tank. Incorrectly raising the car can damage the tank.
 - Check for any evaporative emissions hoses that may have become disconnected, checking carefully at the charcoal canister and evaporative emissions purge valve (where applicable).
 - See **130 Fuel Injection** and **160 Fuel Tank and Fuel Pump** for component locations and additional information.

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.

BODY AND INTERIOR MAINTENANCE

Windshield wiper blades, replacing

BMW recommends replacing the wipers blades at specified time intervals. Normally twice a year (before and after the cold season) works well. See **611 Wipers and Washers** for more information wiper troubleshooting and wiper blade replacement.

NOTE—

*When replacing the wiper blades, check the tightness of the wipers arm nuts. Loose wiper arms can lead to damaged wiper linkages. If found to be loose, align wiper arms and tighten the nuts to the torque listed in **611 Wipers and Washers**.*

Ventilation microfilter, replacing (1991 and later)

The ventilation system filters pollen and airborne particles before it enters the passenger compartment. The paper-element should be replaced at every Inspection I, or every 15K miles. A dirty filter will restrict air flow into the passenger compartment and lead to poor performance of the heating and A/C system. Microfilter replacement is covered in **640 Heating and Air Conditioning**.

Body Lubrication

The body and door hinges, the hood latch, and the door check rods can be lubricated with a medium weight engine oil. Lubricate the seat runners with multipurpose grease.

Lubricate the sunroof guide rails with silicone spray. If door weatherstrips are sticking, lubricate them with silicone spray or talcum powder. Do not apply any oil to rubber parts.

The hood release cable should be lubricated as well. The radio antenna mast should be cleaned and lubricated with a product such as WD-40®.

The door locks and lock cylinders can be lubricated with an oil that contains graphite. Such a lubricant is available from BMW, Part No. 81 22 9 407 421

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.

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. See **720 Seat Belts** for seat belt inspection information.

CLEANING AND PRESERVING

Exterior finish care

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.

Washing

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 act as tiny magnifying glasses that can burn spots into the finish. Wash the car with a mixture of lukewarm water and a mild soap made expressly for washing cars. Rinse using plenty of clear water under as little pressure as possible. Wipe the body dry with a soft terry-cloth towel or chamois to prevent water-spotting.

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.

Chassis washing

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.

Special cleaning

Tar and insect spots can be removed with a bug and tar remover. Never use gasoline, kerosene, nail polish remover, or other unsuitable solvents. This method can also be used to remove spotting from tree sap.

Interior care

Dirt spots can usually be removed with lukewarm soapy water. Use spot remover for grease and oil spots. Do not pour the liquid directly on the carpet, 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 to clean the carpeting.

Vinyl and cloth upholstery and trim

Use a dry foam cleaner. Grease or paint spots can be removed by wiping with a cloth soaked with this cleaner. Use the same cleaner, applied with a soft cloth or brush, on the headliner and side trim panels. For cloth-covered seat areas, use the techniques described previously for cleaning the carpeting.

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®). 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.

