

020 Maintenance

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020-2 Maintenance

Warnings, Cautions and Notes

GENERAL

This repair group details service and maintenance procedures for the 2004 through 2010 BMW 5 series (E60 and E61).

BMW 5 Series vehicles are equipped with condition based service (CBS) capabilities that monitors many vehicle systems and components and suggests service based on the actual current condition of components. Following the CBS recommended service intervals helps ensure safe and dependable operation of the vehicle.

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

BMW is constantly updating their recommended maintenance procedures and requirements. The information contained here may not include updates or revisions made by BMW since the publication of the documents supplied with the vehicle. If there is any doubt about what procedures apply to a specific model or model year, or what intervals to follow, consult an authorized BMW dealer.

Warnings, Cautions and Notes

Throughout this manual, there are numerous paragraphs with the headings **WARNING**, **CAUTION** or **NOTE**. These headings have different meanings.

WARNING—

- Text under this heading warns of unsafe practices that are very likely to cause injury, either by direct threat to the person(s) doing the work or by increased risk of accident or mechanical failure while driving.

CAUTION—

- Text under this heading calls attention to important precautions to be observed during the repair work to help prevent accidentally damaging the vehicle or its parts.

NOTE—

- A note contains information, tips, or pointers which help in doing a better job and completing it more easily.

Read **WARNING**, **CAUTION** and **NOTE** headings before you begin repair work. See also **001 Warnings and Cautions**.

CONDITION BASED SERVICE (CBS)

CBS basics

The BMW maintenance system, called condition based service (CBS) notifies the driver of needed service based on the condition of monitored components. In other words, CBS recommends maintenance only for components that are worn.

CBS uses sensors and special algorithms to monitor vehicle driving conditions, then uses this data to calculate current and future service requirements.

➤ CBS tasks that are monitored are displayed in the instrument cluster or the central control display. The display shows remaining times or distances for the following maintenance tasks.

- Engine oil and filter change
- Front brake pads replacement
- Rear brake pads replacement
- Brake fluid change
- Cabin microfilter replacement*
- Spark plug replacement*
- Vehicle check
- State / emissions inspections.

*The CBS instrument cluster display intervals for spark plugs and cabin microfilter were discontinued as of 2008 models. These items still require periodic replacement. See maintenance tables in this repair group.

CBS sorts service requirements according to date due and notifies the driver when the vehicle needs a service appointment. Mandatory emissions and safety inspection due dates may also be stored and displayed.

NOTE —

- Additional maintenance recommended by BMW is listed in **Table b** and **Table d**, in this repair group.

➤ Service requirement information is stored in the remote key while the vehicle is driven. This information can be accessed by an authorized BMW device center at the time of a service appointment.

For CBS to work correctly, make sure correct local date and time are set in vehicle memory.



Remote with integrated key
(2006 and later models)



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Service recognition

Service recognition

The CBS system recognizes when a service is required using one of the following three methods:

Adaptive. Sensor data and algorithms are used to determine the required maintenance interval for a service based on individual user driving style. Examples:

- Oil change interval is determined by engine oil condition sensor (OZS) monitoring oil condition, oil level, and oil temperature; and from additional algorithms using these parameters: engine load, fuel consumption, time and distance since the last oil change.
- Front and rear brake pad replacement intervals are determined from two-stage brake lining wear sensors on left front and right rear brake pads; and from algorithms using these input parameters: travel distance, wheel speed, braking pressure, braking time, and braking frequency.

Fixed time (months) determines the required maintenance of the following:

- Brake fluid change
- Mandated safety and emissions inspections

Fixed distance (miles) determines the required maintenance of the following:

- Spark plug replacement (dependent on engine)
- Air filter element replacement
- Automatic transmission fluid change
- Microfilter replacement (dependent on vehicle model and CBS version)
- Oxygen sensors replacement
- Vehicle check

CBS items, viewing

The instrument cluster control module communicates service requirements to the central dashboard display where data can be displayed with graphics and text.

NOTE—

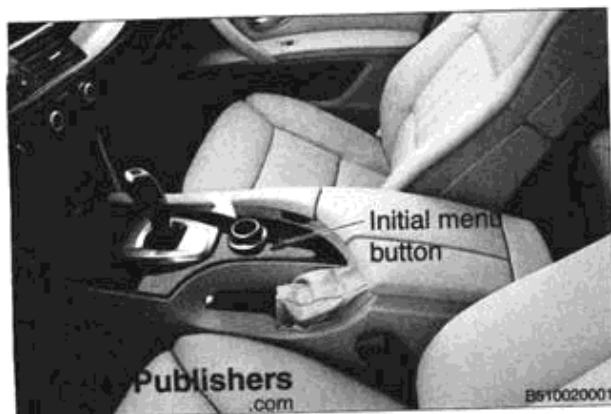
- This procedure is for 2004 - 2009 5 series cars with CID (central information display). Procedure may vary slightly on 2010 and later models fitted the high-definition CIC (car information computer) system and multi-button iDrive controller.

— Switch ignition ON.

➤ Once main screen appears, press down on iDrive controller (arrow) to select **Info sources | Settings** menu.

NOTE—

- Press menu button anytime to return to initial menu.

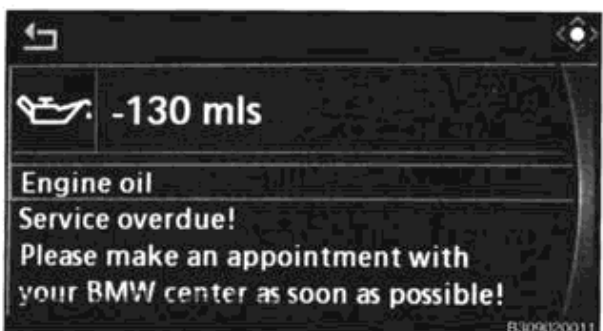




- Turn iDrive controller to select **Service**.

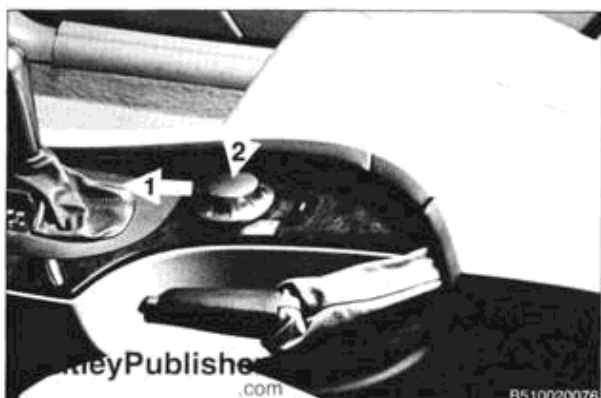


- Turn iDrive controller to select maintenance items.
- Service items highlighted in green: No service currently required
 - Service items highlighted in yellow: Service deadline is approaching
 - Service items highlighted in red: Service deadline has passed



- Press down on controller to access additional information for each listed task.

Example: Select **Engine oil** then press down controller to enter **Engine oil** screen. Here you can see engine oil service is overdue by 130 miles.



- Push forward (1), then down (2) on controller to return to **Service Info** menu.

020-6 Maintenance

CBS items, resetting

CBS items, resetting

After carrying out maintenance tasks, e.g. changing engine oil, reset CBS item to its full service interval. This can be done using the BMW factory scan tool, or manually using the instrument cluster set / reset button as described below.

- Enter vehicle and close all doors.
- Switch ignition ON, but do not start engine.
 - Make sure lower displays in cluster shows clock and *mileage*.
- Press and hold instrument cluster set / reset button for 10 seconds (**arrow**) to enter CBS reset mode.
 - Lower LCD display: Remaining driving distance and date of next scheduled service shown. Service requirements are displayed in order of priority.
 - ⚠ indicates that Check Control messages are stored. See **Check Control** in this repair group.
- Press set / reset button repeatedly to scroll through CBS icons. Hold button until **RESET?** appears. Press button again and hold until distance / time display in the lower window changes to dashes.
- To confirm reset, press BC button while looking at CBS reset icon. Acknowledgment of reset is shown with **OK**.



1. Vehicle check. See **Table d**.
2. Next oil change due. See **Engine oil service** in this repair group.
3. Next safety inspection and road test due.
4. Next emissions inspection due.
5. Next front brake service due. See **Brake Service** in this repair group. See also **340 Brakes**.
6. Next rear brake service due. See **Brake Service** in this repair group. See also **340 Brakes**.
7. Next brake fluid change due. See **340 Brakes**.

NOTE —

- On 2004 - 2007 cars, a spark plug icon and a cabin microfilter icon are displayed in the CBS menu. On 2008 and later cars, these items are deleted from the display.



Car information computer (CIC)

2010 models with navigation option are equipped with a new version of iDrive with multiple menu buttons. The display for this system is known as car information computer (CIC). Functionally, system operations are similar to the earlier version.

RECOMMENDED MAINTENANCE

Table a lists maintenance services prompted by CBS.

Table b lists service and maintenance required at specified mileage intervals (not prompted by CBS).

Table c gives the details of an engine oil service.

CAUTION—

- The publisher of this manual recommends that engine oil and filter be replaced at intervals not exceeding 7500 miles or one year, whichever comes first.

Table d lists other recommended periodic vehicle inspection tasks.

The number in the "additional repair information" column refers to the repair group in this manual where additional information can be found.

Table a. CBS prompted service

	Additional repair information
Engine oil service (CBS prompts based on engine oil condition.)	020
Front brake pads: Replace. (CBS prompts based on pad thickness.)	340
Rear brake pads: Replace. (CBS prompts based on pad thickness.)	340
Brake fluid: Change / flush every 2 years. (CBS prompts based on elapsed time since last change)	340
Spark plugs: Replace. (CBS prompts based on elapsed mileage.)*	020
Cabin microfilter: Replace. (CBS prompts based on elapsed mileage.)*	020
State inspection: Emissions (CBS prompts based on elapsed mileage, per state law.)	
State inspection: Safety (CBS prompts based on elapsed mileage, per state law.)	
Vehicle check (CBS prompts after every second oil change.)	
*Items discontinued from CBS menu as of 2008 models.	
• Spark plugs: Replace every 100,000 miles	
• Cabin microfilter: Replace at every engine oil service, or approximately every 15,000 miles.	

020-8 Maintenance

Car information computer (CIC)

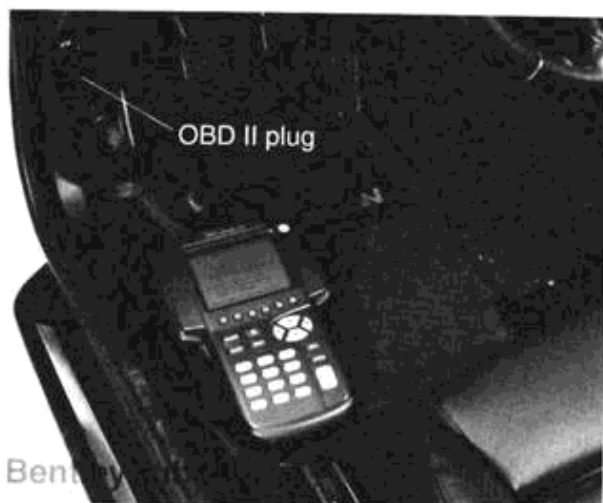
	Additional repair information
Table b. Additional services	
Every 3rd engine oil service or 45,000 miles	
Air filter element: Replace. Reduce change interval in dusty conditions.	020
Every 100,000 miles	
Oxygen sensors, (N62 engine): Replace.	180
Automatic transmission fluid (ATF): Replace.	240
Every 120,000 miles	
Oxygen sensors (M54, N52, N54, N62TU engines): Replace.	180
<i>Note:</i> BMW states that engine coolant, manual transmission fluid, differential fluid and transfer case fluid are life-time fluids and do not require replacement.	

	Additional repair information
Table c. Engine oil service	
Engine oil and oil filter, change. See 119 Lubrication System .	020
Brief diagnostic tests: • Check Control: Check messages. • Indicator and warning lights: Scan for fault codes using BMW scan tool or equivalent. • CBS display: Reset engine oil service interval. • Tires: Check tread, adjust pressures. • Tire pressure monitor: Reset (where applicable, 2006 and later cars).	020
Parking brake: Check operation, adjust as necessary.	340
Washer fluid, top off	

	Additional repair information
Table d. Vehicle check	
Horn, headlight flasher, hazard warning flasher: Check operation.	
Instrument cluster and control lighting, heater blower: Check operation	
Lighting system (dome lights, glove compartment light, flashlight, trunk or cargo compartment lights, turn signals, hazard warning flasher, back-up lights, brake lights, license plate lights): Check operation.	630
Safety belts: Check condition and function.	720
Wipers and washers: Check.	611
Body: Check for corrosion.	
Tires: Check tread depth, wear pattern, condition, inflation pressure, correct pressure as necessary.	
Run-flat indicator / tire pressure monitor: Initialize	300
Battery: Check state of charge, charge as required.	121
Power steering fluid: Check fluid level.	020, 320

Table d. Vehicle check (continued)

	Additional repair information
Airbags: Inspect for torn covers, damage or attached stickers.	721
Mirrors: Inspect.	510
Engine coolant: Check level and concentration.	020, 170
Windshield washer: Intensive cleaning system, check protection level, fluid level, top off if necessary.	
Brake system connections and lines: Check for leaks, damage and correct positioning.	
Underbody (transmission, rear axle, fuel lines, exhaust system): Check for damage, leaks and corrosion.	
Steering components: Check for clearance, leaks, damage and wear.	
Road test: Check for performance, braking, steering, suspension, noises.	



BASIC SERVICE INFORMATION

Diagnostic trouble codes (DTCs), accessing

Diagnostic trouble codes (DTCs) that are stored in the engine control module (ECM) or other electronic modules may be accessed as follows:

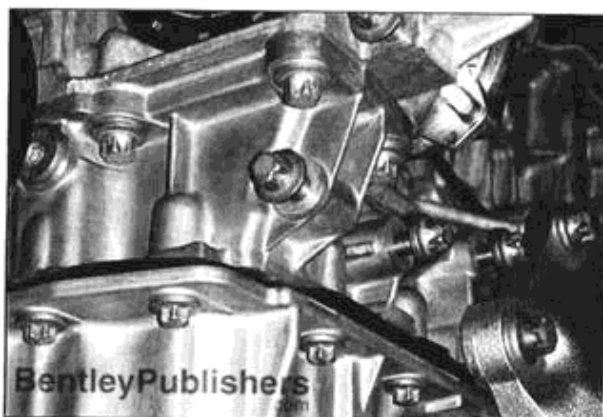
- Place transmission selector lever in PARK or NEUTRAL. Engage parking brake. Make sure ignition is OFF.
- Connect BMW scan tool to OBD II plug on left door post. Plug is behind plastic trim.
- Turn ignition key on.
- Follow scan tool instructions as they appear on scan tool screen.
- For a listing of scan tool suppliers, see **Tools** in this repair group. For additional information, see **OBD On-Board Diagnostics**.

Non-reusable fasteners

Many fasteners used on the vehicles covered by this manual must be replaced with new ones once they are removed. These include but are not limited to: bolts, nuts (self-locking, nylock, etc.), roll pins, clips and washers. Use genuine BMW replacement parts for this purpose.

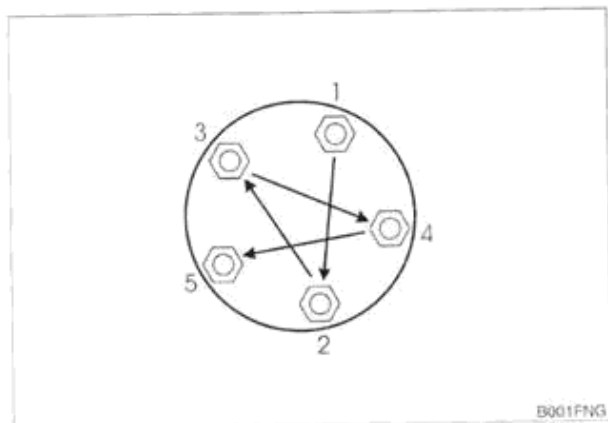
Some bolts, known as torque-to-yield fasteners, are designed to stretch during assembly and are permanently altered, rendering them unreliable once removed. Replace these where instructed to do so. Failure to replace these fasteners could cause personal injury or vehicle damage.

- Many components on the later 6-cylinder engines are assembled using aluminum bolts in order to reduce electrochemical corrosion. Most aluminum bolt heads are painted blue. These fasteners also stretch in use; replace with new during reassembly. Always use aluminum bolts where specified.



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Tightening fasteners



Tightening fasteners

Tighten fasteners on a component gradually and evenly to avoid misalignment or over-stressing any one portion of the component. For components sealed with gaskets, this method helps to ensure that the gasket seals correctly.

Where there are several fasteners, tighten them in a sequence alternating between opposite sides of the component. Repeat the sequence until all the fasteners are evenly tightened to the proper specification.

For some repairs a specific tightening sequence is necessary, or particular order of assembly is required. Such special conditions are noted in the text, and the necessary sequence is described or illustrated. Where no specific torque is listed, use **Table e** as a general guide for tightening fasteners.

NOTE—

- Metric bolt classes or grades are marked on the bolt head.
- Do not confuse wrench size with bolt diameter.
- Values in **Table e** are for reference only.

Table e. General bolt tightening torques in Nm (max. permissible)

Bolt diameter	Bolt Class (according to DIN 267)		
	8.8	10.9	12.9
M5	6	8	10
M6	10	14	17
M8	24	34	40
M10	47	66	79
M12	82	115	140
M14	130	180	220

Buying parts

Many of the maintenance and repair tasks in this manual call for the installation of new parts, or the use of new gaskets and other materials when reinstalling parts. Make sure the parts that are needed are on hand before beginning the job. Read the introductory text and the complete procedure to determine which parts are needed.

For some bigger jobs, partial disassembly and inspection is required to determine a complete parts list. Read the procedure carefully and, if necessary, make other arrangements to get the necessary parts while your vehicle is disassembled.

Genuine BMW parts

Genuine BMW replacement parts from an authorized BMW dealer are designed and manufactured to the same high standards as the original parts. They are the correct material, manufactured to the same specifications, and guaranteed to fit and work as intended. Most genuine BMW parts carry a limited warranty.

Many independent repair shops make a point of using genuine BMW parts. They know the value of doing the job right with the right parts. Parts from other sources may be as good as BMW parts, particularly if manufactured by one of BMW's original equipment suppliers, but it is often difficult to know.

BMW is constantly updating and improving their vehicles, often making improvements during a given model year. BMW may recommend a newer, improved part as a replacement, and your authorized dealer's parts department will know about it. The BMW parts organization is best equipped to deal with your BMW parts needs.

Non-returnable parts

Some parts cannot be returned. The best example is electrical parts. Buy electrical parts carefully, and be as sure as possible that a replacement is needed, especially for expensive parts such as electronic control modules. It may be wise to let an authorized BMW dealer or other qualified shop confirm your diagnosis before replacing a non-returnable part.

Model and model year

When ordering parts it is important that you know the correct model and engine designation for your vehicle. This manual covers 5 Series sedan and wagon body styles with multiple engine variants in both rear wheel drive and xDrive. For information on engine codes and engine applications, see **100 Engine-General**.

Model year is not necessarily the same as date of manufacture or date of sale. A 2007 model may have been manufactured in late 2006 and perhaps not sold until early 2008. It is still a 2007 model. Model years covered by this manual are 2006 to 2010.

Service

BMW dealers are uniquely qualified to provide service for BMW vehicles. Their authorized relationship with the large BMW service organization means that they have access to special tools and equipment, together with the latest and most accurate repair information.

The BMW dealer's service technicians are highly trained and very capable. Authorized BMW dealers are committed to supporting the BMW product. On the other hand, there are many independent shops that provide quality repair work. Checking with other BMW owners for recommendations on service facilities is a good way to learn of reputable BMW shops in your area.

Tools

Most maintenance can be accomplished with a small selection of tools. Tools range in quality from inexpensive junk, which may break at first use, to very expensive and well-made tools for the professional. The best tools for most do-it-yourself BMW owners lie somewhere in between.

Many reputable tool manufacturers offer good quality, moderately priced tools with a lifetime guarantee. These are your best buy. They cost a little more, but they are good quality tools that will do what is expected of them. Sears' Craftsman® line is one such source of good quality tools.

Some of the repairs covered in this manual require the use of special tools, such as a custom puller or specialized electrical test equipment. These special tools are called out in the text and can be purchased through an authorized BMW dealer. As an alternative, some specialty and scan tools may be purchased from the following tool manufacturers or distributors:

Specialty tool suppliers

Assenmacher Specialty
Tools, Inc.
800-525-2943
www.asttool.com

Samstag Sales
615-735-3388
www.samstagsales.com

Autologic Diagnostics (UK)
44-1865-870050
www.autologic-diagnos.co.uk

Baum Tools Unlimited, Inc.
800-848-6657
www.baumtools.com

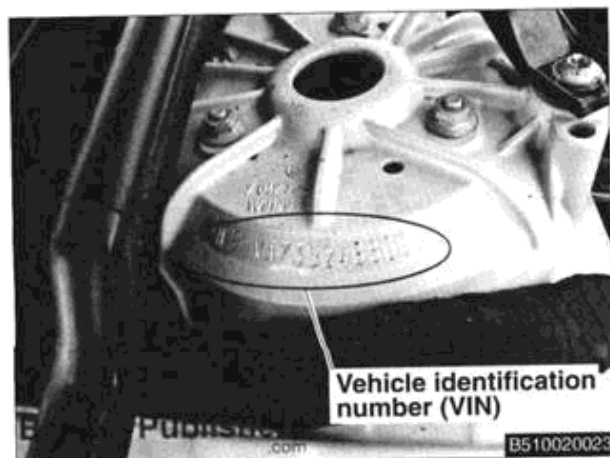
Tool Source
888-220-8350
www.toolsources.com

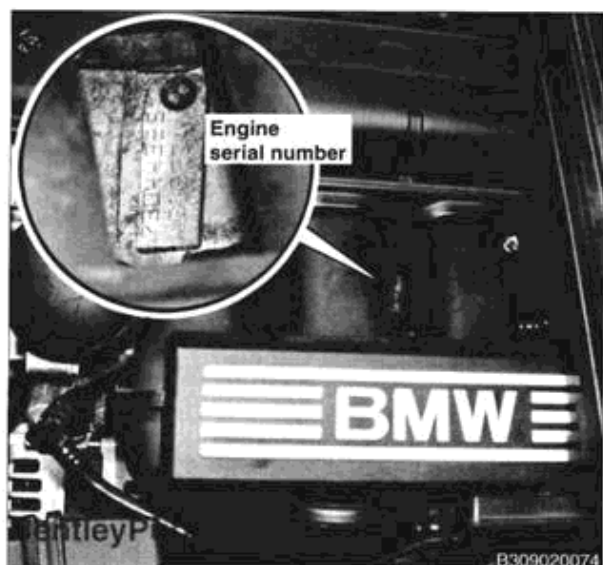
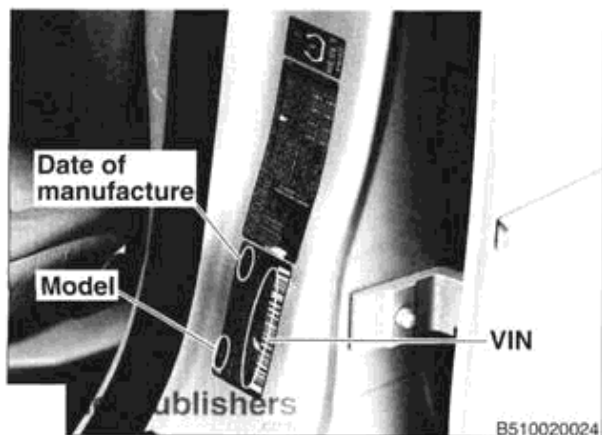
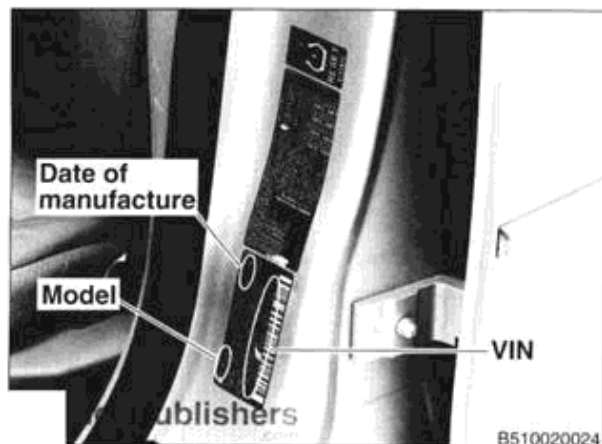
ZDMAK Tools
(877) 938-6657
www.zdmak.com

IDENTIFICATION PLATES AND LABELS

- Vehicle identification number (VIN)** . This is a combination of letters and numbers that identify the particular vehicle. The VIN appears on the state registration document and on the vehicle itself. One location is on the right front strut tower in the engine compartment, another in the lower left corner of the windshield.

For additional information, see **002 Vehicle Identification and VIN Decoder**.





➤ **Model and date of manufacture.** This information may be necessary when ordering replacement parts or determining if any of the warranty recalls are applicable to your vehicle. The VIN plate on the driver door jamb below the door striker also specifies model, month and year the vehicle was built.

Engine code. 5 Series vehicles covered in this manual are powered by either 6-cylinder or V8 engines. For information on engine codes and engine applications, see **100 Engine-General**.

Transmission code. The transmission type with its identifying code may be important when buying parts such as seals or gaskets. For information on transmission codes and applications, see **200 Transmission-General**.

➤ **Tire pressures.** Recommended tire pressures as well as wheel size, tire size, gross vehicle weight, and carrying capacity are listed on a sticker on the driver door jamb.

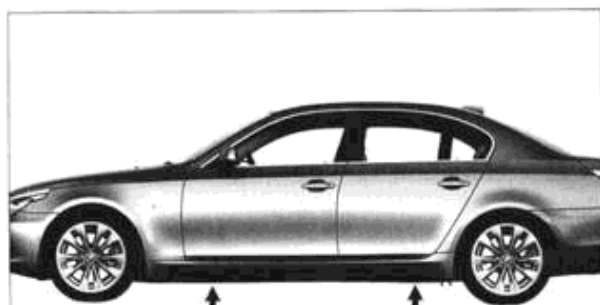
NOTE —

- Observe tire pressure monitor (or flat tire monitor) sticker (**arrow**). On-board system should be reinitialized whenever tire pressure is adjusted. Reinitialize FTM or TPM. See **300 Suspension, Steering and Brakes-General** or your owner's manual for instructions.

➤ **Engine serial number** is on left side of engine block behind and under intake manifold. 6 cylinder engine shown.

020-14 Maintenance

Raising vehicle safely using floor jack



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RAISING VEHICLE

Raising vehicle safely using floor jack

WARNING—

- When raising the vehicle using a floor jack or hydraulic lift, carefully position the jack pad to prevent damaging the vehicle body.
- Watch the jack closely. Make sure it stays stable and does not shift or tilt.

- For safety and to avoid damaging vehicle, use jack only at four jacking pads (**arrows**) just behind front wheels and just in front of rear wheels. Jack pad locations are marked by small molded arrows on rocker panel cover.

CAUTION—

- Check to make sure the hard rubberized jack pads have not fallen off the vehicle. Do not jack the car up if the pad is missing. Damage to the vehicle may result.

- Park vehicle on flat, level surface.
- If changing a tire, loosen lug bolts before raising vehicle. See **Changing a tire** in this repair group.
- Use wheel chocks to block wheel that is opposite and farthest from jack to prevent vehicle from unexpectedly rolling.

WARNING—

- Do not rely on the transmission or the parking brake to keep the vehicle from rolling. They are not a substitute for positively blocking the opposite wheel.

- Place floor jack into position, making sure base of jack is resting on flat, solid surface. Use a board or other support to provide a firm surface for jack, if necessary.
- Raise vehicle slowly while constantly checking position of jack and vehicle.

Raising vehicle using hydraulic lift

- Place lifting pads under jacking pads (**arrows**) just behind front wheels and just in front of rear wheels. Raise vehicle carefully, checking to make sure that it is solidly balanced on lift.

Working under vehicle safely

WARNING—

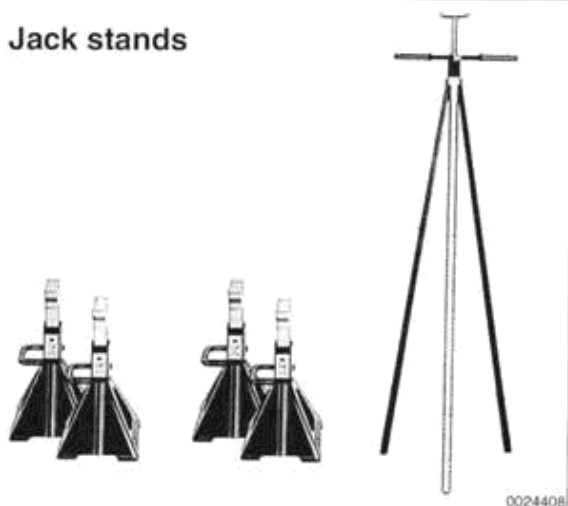
- A jack is a temporary lifting device. Do not use a jack alone to support the vehicle while you are under it.
- Do not work under a lifted vehicle unless it is solidly supported on jack stands that are intended for that purpose.
- Do not use wood, concrete blocks or bricks to support a vehicle. Wood may split. Blocks and bricks, while strong, are not designed for that kind of load and may break or collapse.
- Use care when removing major (heavy) components from one end of the vehicle. The sudden change in weight and balance can cause vehicle to tip off the lift or jack stands.
- Do not support vehicle at engine oil pan, transmission, fuel tank, or on front or rear axle. Serious damage may result.

- Disconnect negative (-) cable from battery so that vehicle cannot be started. Let others know what you are doing.

CAUTION—

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

Jack stands



- Raise vehicle slowly. See **Raising vehicle safely using floor jack** in this repair group.
- Use at least two jack stands to support vehicle. Use jack stands designed for the purpose of supporting a vehicle.
- Place jack stands on firm, solid surface. If necessary, use a flat board or similar solid object to provide a firm footing.
- Lower vehicle slowly until its weight is fully supported by jack stands. Watch to make sure that the jack stands do not tip or lean as the vehicle settles on them.
- Observe jacking precautions again when raising vehicle to remove jack stands.

EMERGENCIES

The following is a list of emergency procedures and where they are covered in this manual:

- **Flat tire** warning. See **Flat tire indication** in this repair group.
- **Fuel flap** manual release. See **515 Central Locking and Anti-theft**.
- **Jump start**. See **Jump starting** in this repair group.
- **Sunroof** manual closing. See **540 Sunroof**.
- **Trunk** emergency opening. See **412 Trunk, Tailgate**.
- **Tire** change. See **Tire change** in this repair group.
- **Towing**. See **Towing** in this repair group.

020-16 Maintenance

Indicator and warning lights



Indicator and warning lights

Many vehicle systems are self-monitored for faults while driving. Generally, a red warning light that illuminates while driving should be considered serious. If you cannot immediately determine the seriousness of the warning light, stop the vehicle in a safe place and switch engine OFF as soon as possible. Consult the owner's manual for additional information on the warning light and the recommended action.

- If the malfunction indicator light (MIL) (Service Engine Soon warning light) comes on or flashes, it generally indicates an emissions-related fault in the engine management system. Faults such as a bad oxygen sensor or a faulty fuel injector can cause exhaust or evaporative emissions to exceed a specified limit. When these limits are exceeded, the MIL illuminates. The engine can be safely driven with the light on, but the faults should be interrogated with a scan tool as soon as possible. See **OBD On-Board Diagnostics** for more information on the MIL and the on-board diagnostic system.

Flat tire indication

- Tire air pressure is automatically checked by either the flat tire monitor (FTM) system or the tire pressure monitoring (TPM) system, depending on model year and equipment installed.

The FTM system uses ABS wheel speeds sensors to calculate tire pressure. TPM system uses electronics in wheels to measure tire pressure.

If a flat tire or substantial loss of tire pressure is detected, warning lights in yellow and red illuminate in the instrument cluster and a tire failure message appears in Check Control and the center dashboard display. In addition, an acoustic signal sounds.

WARNING —

- In case of run-on flat tire failure, drive cautiously and do not exceed a speed of 50 mph or 80 km/h. With tire pressure loss, vehicle handling changes. This includes reduced tracking stability in braking, extended braking distance and altered steering characteristics.
- If unusual vibration or loud noises occur while driving on a damaged tire, this may be an indication that the tire has failed completely. Reduce speed and pull over as soon as possible at a suitable location. Otherwise parts of the tire could come loose, resulting in an accident. Do not continue driving.

Avoid sudden braking and steering maneuvers. At the next opportunity, check air pressure in all four tires. Tire pressure specifications are given on a sticker on the driver door jamb.

If all four tires are inflated to the correct pressures, reinitialize FTM or TPM. Initialization is covered in **300 Suspension, Steering and Brakes-General**.

If warning lights illuminate in yellow and a tire failure message appears in Check Control, FTM or TPM has a malfunction. Have the system checked as soon as possible.



Jump starting

Jump start the vehicle with a discharged or dead battery using the good battery from another vehicle. See owner's manual for proper instruction on jump starting.

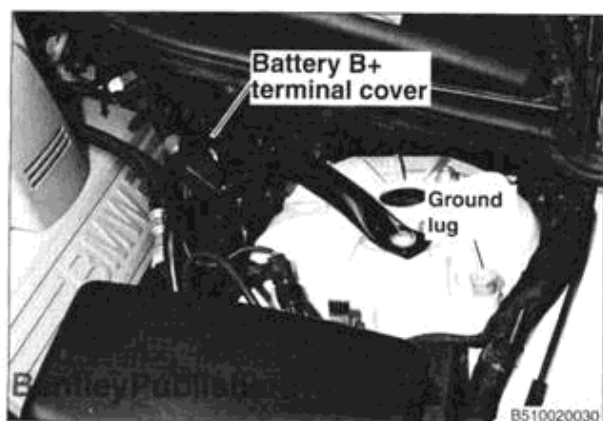
- Attach jumper cables to engine compartment B+ terminal (flip cover down to access) and ground lug.

WARNING —

- Do not jump-start the engine if you suspect that the battery is frozen. Trapped gas may explode. Allow the battery to thaw first.

CAUTION —

- To avoid damage to vehicle electronics, make sure the 12V battery on the car giving assistance is approximately the same capacitance (in Amp-hours) as the dead battery in your 5 Series. This information can be found on the battery.
- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.



Tire change

The following details a procedure for changing a tire using floor jack and hand tools. See owner's manual for instructions on using the vehicle-supplied jack.

NOTE —

- On vehicles equipped with run-on flat tires, there is no need to change a wheel immediately in case of a puncture. See owner's manual for safe driving speed and distance for a run-flat tire with no air pressure.
- On cars with run-on flat tires, there is no spare tire or tire changing tools.

- Chock wheel diagonally opposite to the one being changed.

WARNING —

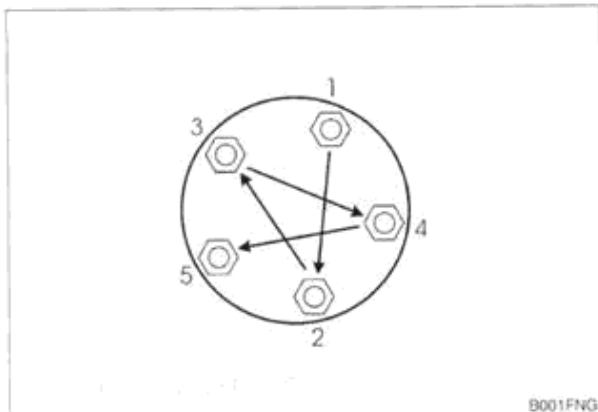
- Do not rely on the transmission or the parking brake to keep the vehicle from rolling. They are not a substitute for positively blocking the opposite wheel.



- Loosen lug bolts while vehicle is on ground, but leave them a little snug.
- Place jack under jacking point nearest wheel being changed. Use a board to provide a firm footing for jack if ground is soft. Raise vehicle only far enough so that the wheel is fully off ground and then remove lug bolts and wheel.
- Install new wheel. Install lug bolts and tighten hand-tight using lug wrench.

020-18 Maintenance

Towing



- Lower vehicle. With all wheels on ground, fully tighten lug bolts in a crisscross pattern. Check inflation pressure of newly installed tire.

Tightening torque

Wheel to wheel hub	$120 \pm 10 \text{ Nm}$ ($89 \pm 7 \text{ ft-lb}$)
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Towing

The safest technique for towing vehicles covered by this manual (rear wheel drive or xDrive, manual or automatic transmission) is by using flat bed equipment.

WARNING—

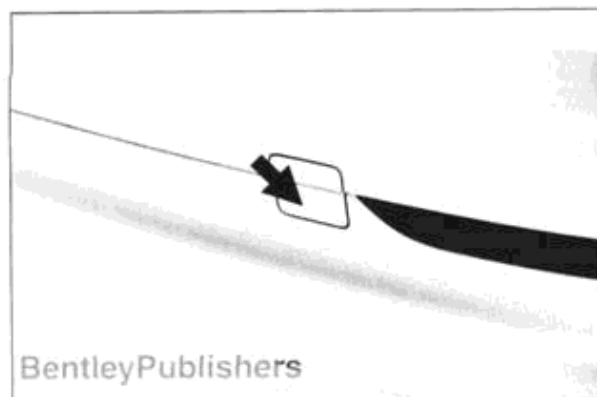
- Do not tow with rear wheel lifted and front wheels on the ground. There is no steering lock on some vehicles. Vehicle may self-steer and sway dangerously from side to side.

CAUTION—

- Rear wheel drive: Do not tow with sling-type equipment. Use a lift bar. Do not use tow hook to tow faster than 30 mph (50 kph) or for a distance greater than 95 miles (150 km).
- Rear wheel drive with automatic transmission: Automatic transmission fluid (ATF) does not circulate when the vehicle is on rear wheels. Severe transmission damage may result. Use flat bed equipment.
- xDrive: Do not tow with front or rear axle raised individually. Do not use tow hook or cable except for very short distances to winch it to a safe place. Use flat bed equipment.
- Winch or tow vehicle with transmission lever in N (neutral).



- To access front threaded towing eye socket, press on lower edge of cover (**arrow**) on front bumper until cover disengages.



- To access rear threaded towing eye socket, press on lower edge of cover (**arrow**) on rear bumper until cover disengages.

- Remove towing eye from cargo compartment tool kit and fully screw into threaded hole in bumper until tight.
- Use towing eye for winching vehicle on flat bed.

ENGINE COMPARTMENT

Engine compartment inspection

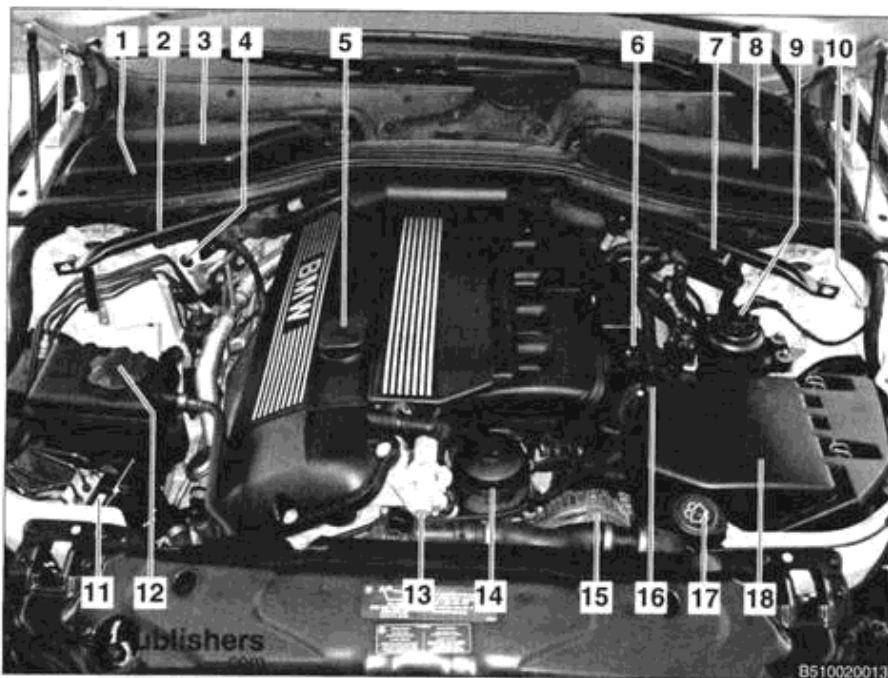
Remove upper and lower engine covers as required and check engine compartment for signs of fluid leaks. Fluid leaks attract dust making them easier to spot. Expensive repairs can be avoided by prompt repair of minor fluid leaks.

Working from below, visually inspect for oil and ATF leaks at engine and transmission. Also inspect cooling, fuel, heating and air-conditioning systems for leakage. Visually inspect hoses and hose connections for leaks, worn areas, porosity and brittleness.

Check that fluid levels are between MIN and MAX marks.

The following illustrations show representative engine compartment layouts. There may be minor differences among model years, such as engine cover configuration.

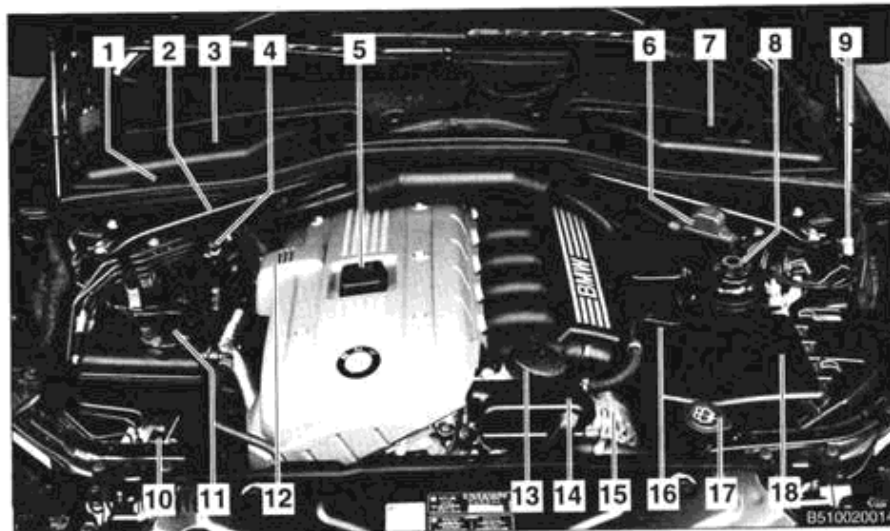
M54 engine compartment



1. Hood alarm switch
2. Strut tower brace
3. Cabin microfilter, right (under cover)
4. A/C refrigerant port
5. Oil filler cap
6. Engine oil dipstick
7. Battery B+ junction
8. Brake fluid reservoir (under cabin microfilter housing)
9. Power steering fluid reservoir
10. Ground lug
11. ABS / DSC control module
12. Coolant reservoir cap
13. Intake VANOS solenoid
14. Oil filter housing
15. Alternator (Generator)
16. Mass air flow sensor
17. Windshield washer reservoir cap
18. Intake air filter housing

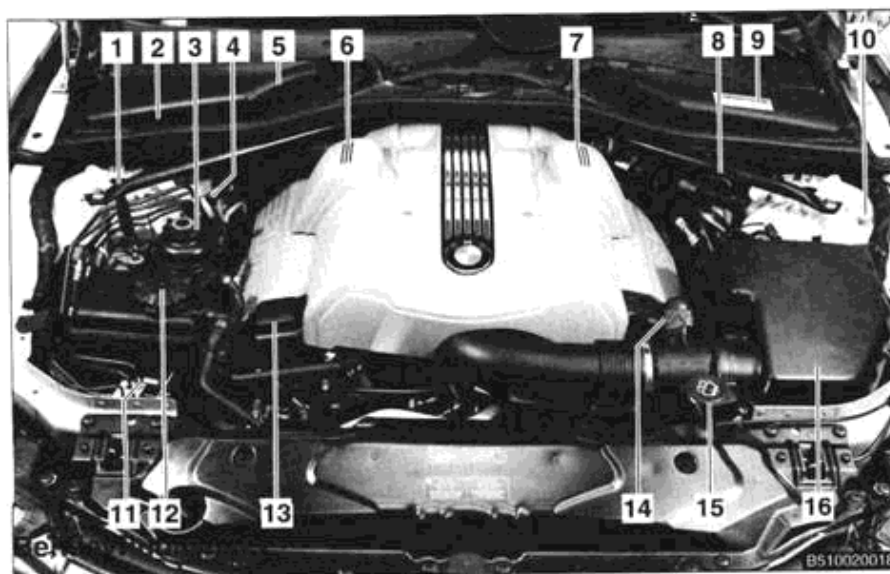
020-20 Maintenance

N52 engine compartment



1. Hood alarm switch
2. Strut tower brace
3. Cabin microfilter, right (under cover)
4. A/C refrigerant port
5. Oil filler cap
6. Battery B+ junction
7. Brake fluid reservoir (under cabin microfilter housing)
8. Power steering fluid reservoir
9. Ground lug
10. ABS / DSC control module
11. Coolant reservoir cap
12. Valvetronic motor (under cover)
13. Oil filter housing
14. Engine oil cooler
15. Alternator (Generator)
16. Mass air flow sensor
17. Windshield washer reservoir cap
18. Intake air filter housing

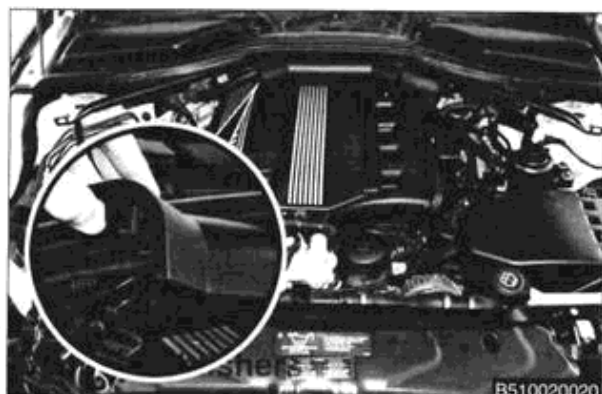
N62 engine compartment



1. Strut tower brace
2. Hood alarm switch
3. Power steering fluid reservoir
4. A/C refrigerant port
5. Cabin microfilter, right (under cover)
6. Valvetronic motor, right (under cover)
7. Valvetronic motor, left (under cover)
8. Battery B+ junction
9. Brake fluid reservoir (under cabin microfilter housing)
10. Ground lug
11. ABS / DSC control module
12. Coolant reservoir cap
13. Oil filler cap
14. Mass air flow sensor
15. Windshield washer reservoir cap
16. Intake air filter housing

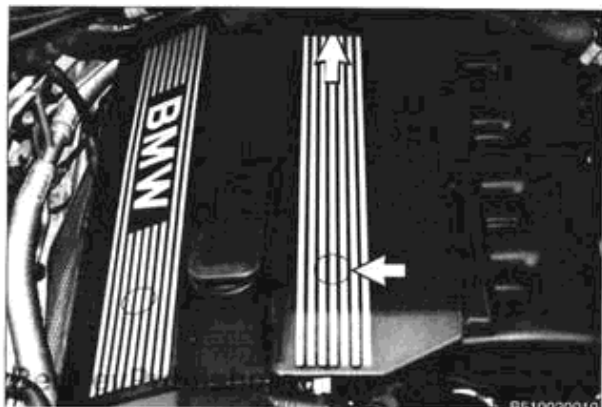
Engine upper covers (M54 engine), removing

- Open engine hood.
- Remove cabin microfilter housings. See **Cabin microfilter housing, removing** in this repair group.
- Unfasten wire harness duct from strut tower brace:
 - Unclip front of wiring harness cover and slide up and off.
 - Remove rivets (left and right side) holding cable ducting to strut tower brace and unclip ducting from brace.



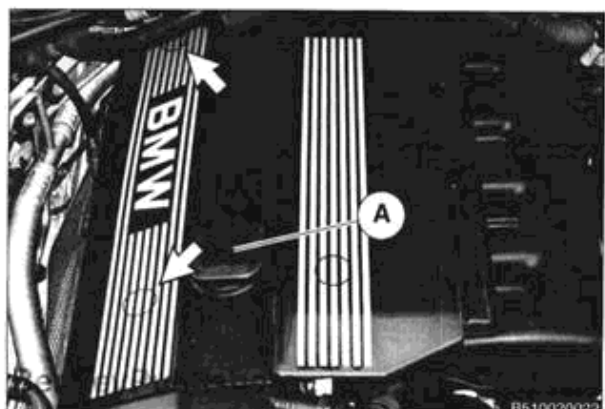
B510020020

- Remove cover above fuel injectors:
 - Remove plastic trim covers (**arrows**).
 - Remove cover hold down bolts beneath covers and remove cover.



B510020010

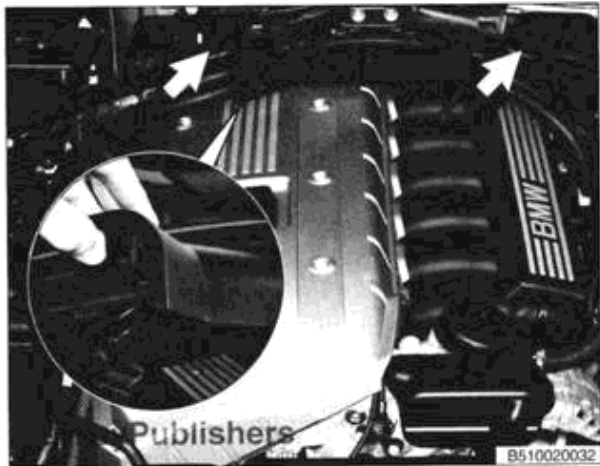
- Remove cover above ignition coils:
 - Remove oil filter cap (**A**).
 - Remove plastic trim covers (**arrows**).
 - Remove cover hold down bolts beneath covers and remove cover.
 - Reinstall oil filter cap to cylinder head cover.



B510020022

020-22 Maintenance

Engine upper cover (N52 / N54 engines), removing



Engine upper cover (N52 / N54 engines), removing

- Open engine hood.
- Remove cabin microfilter housings. See **Cabin microfilter housing, removing** in this repair group.
- Unfasten wire harness duct from strut tower brace:
 - Unclip front of wiring harness cover and slide up and off (**inset**).
 - Remove rivets (**arrows**) holding cable ducting to strut tower brace and unclip ducting from brace.



- Remove cover fasteners (**arrows**) and lift up cover.
 - N52 engine with metallic cover shown, N52K and N54 engines similar.



Engine upper covers (N62 / N62TU engines), removing

- N62 engine: Remove cover fasteners (**arrows**) and lift off upper cover.

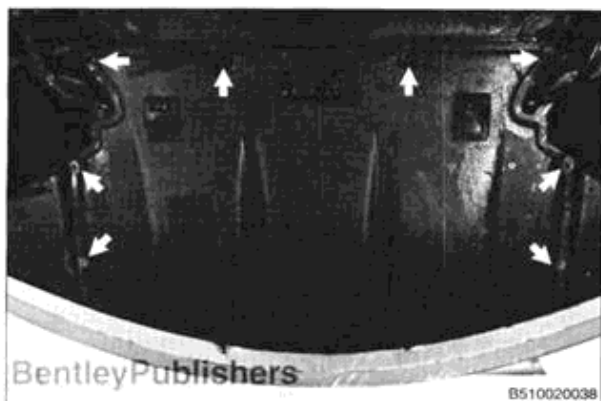


- N62 TU engine: Remove cover fasteners (**arrows**) and lift off upper cover.

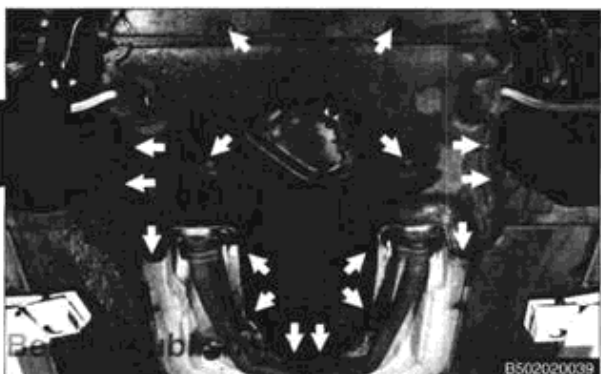


- Unclip side cover from grommets on valve cover and remove. When installing, make sure pins on cover fully engage grommets in valve cover (**arrows**). If necessary, use a small amount of lubricant to ease installation.

Engine lower covers (splash shields), removing



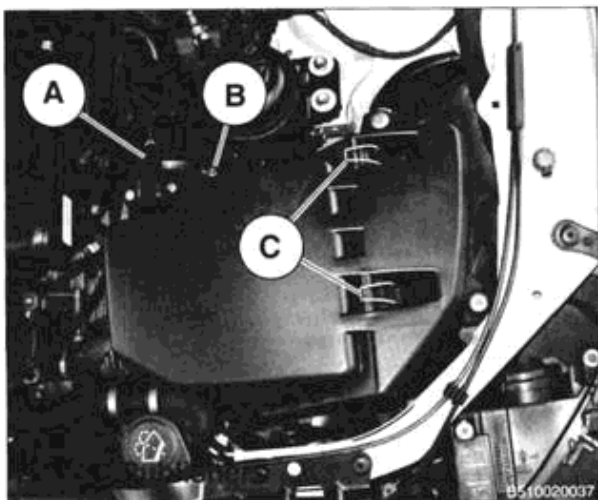
- Engine splash shield: Unscrew fasteners (**arrows**) and lower rear of cover and pull out of bumper cover.



- Transmission splash shield: Unscrew fasteners (**arrows**). Rotate cover around lug to remove.

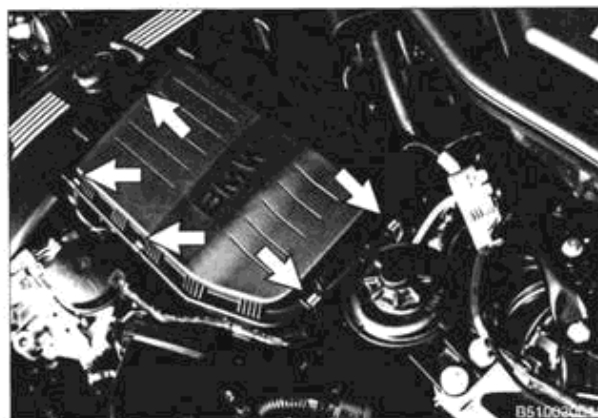
AIR FILTER SERVICE

Air filter element, replacing (6-cylinder engines)



M54 / N52 engines :

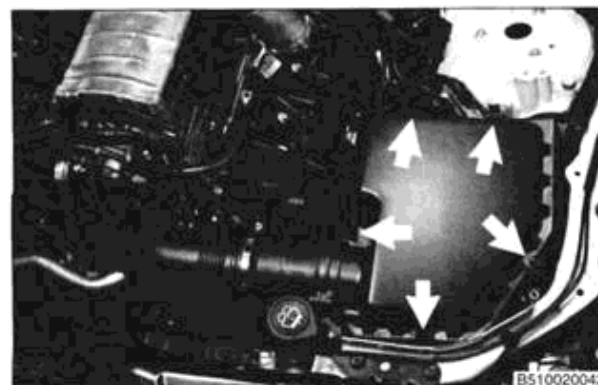
- Disconnect connector from mass air flow sensor (A).
- Loosen hose clamp (B) at mass air flow sensor and disconnect intake pipe from air cleaner housing.
- Unclip spring clamps (C).
- Lift off upper section of air filter housing.
- Lift out air filter element and discard.
- Thoroughly clean filter housing and install new element.
- Installation is reverse of removal



N54 engines :

- Unclip spring clamps (arrows).
- Lift off upper section of air filter housing.
- Lift out air filter element and discard.
- Thoroughly clean filter housing and install new element.
- Installation is reverse of removal

Air filter element, replacing (V8 engines)



N62 / N62 TU engines:

- Unclip spring clamps (arrows).
- Carefully lift up upper section of air filter housing and lift out air filter element and discard.
- Thoroughly clean filter housing and install new element.
- Installation is reverse of removal

BATTERY SERVICE

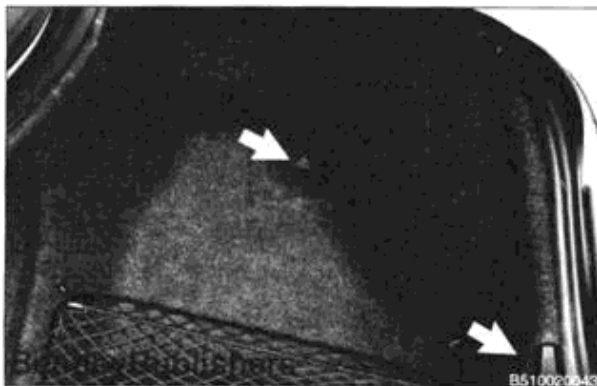
Battery removal is described in **121 Battery, Starter, Alternator**.

Be sure to reinitialize electrical systems and reset vehicle readiness anytime the battery is disconnected. See **121 Battery, Starter, Alternator**.

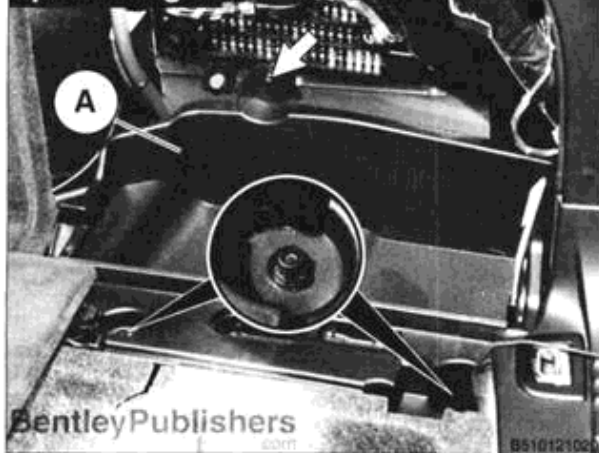
Access to battery

The battery is in right rear of trunk or cargo compartment.

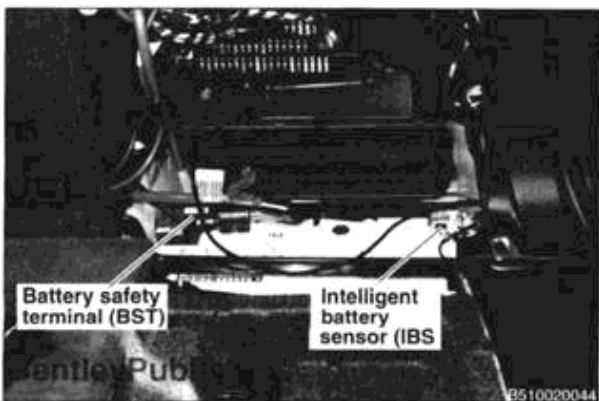
- Working in trunk, twist plastic fasteners 90° in right side panel and remove fasteners (**arrows**). Raise floor mat together with cover beneath it. Pull panel out from lower right corner.



Sports Wagon



- Battery access is similar on Sports Wagon models. Remove cargo compartment floor panel. See **513 Interior Trim**. After removing right side panel, remove screw (**arrow**) securing plastic storage shelf (**A**). Remove plastic storage shelf fasteners (**inset**) and remove plastic storage shelf.



- Battery terminals are fitted with battery safety terminal (BST) and intelligent battery sensor (IBS).

WARNING—

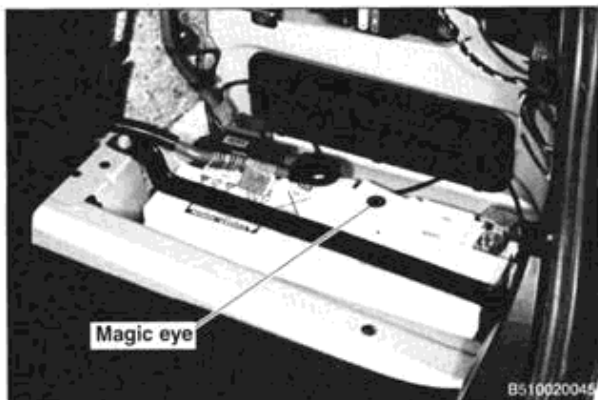
- The BST is an explosive device. Handle with care. Do not pry on the BST to remove the battery terminal.
- Batteries give off explosive hydrogen gas during charging. Keep sparks, lighted matches and open flame away from the top of the battery.
- Battery acid (electrolyte) can cause severe burns. Flush contact area with water, then seek medical attention.

CAUTION—

- The IBS is a delicate electronic device handle gently. Do not pry on the IBS to remove the battery terminal.
- The battery is held in place by a hold-down bracket and bolt. A secure battery hold-down is important in order to prevent vibrations and road shock from damaging the battery.

020-26 Maintenance

Battery, checking



Battery, checking

The original equipment BMW battery is equipped with built-in hydrometer "magic eye".

➤ Battery condition is determined by magic eye color:

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

See **121 Battery, Starter, Alternator** for additional topics:

- Battery removal and installation
- Replacement battery registration
- Battery reconnection notes

CAUTION—

- Do not charge battery with conventional charger. Use vehicle power supply device for recharging.

BRAKE SERVICE

Routine maintenance of the brake system includes 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.

WARNING—

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

Note that brake fluid level and brake pad thickness are monitored and replacement intervals recommended by condition based service (CBS) system. See **Condition Based Service (CBS)** in this repair group.

Brake fluid level, checking

The brake fluid reservoir is located on the driver's side near the base of the windshield underneath the cabin microfilter housing.

WARNING—

- Brake fluid is poisonous. Do not ingest. Wash thoroughly with soap and water if it comes into contact with skin.

- Working in engine bay, remove left (driver's side) cabin microfilter housing to access brake fluid reservoir. See **Cabin air microfilter housing, removing** in this repair group.

CAUTION—

- Use only new, previously unopened brake fluid conforming to DOT 4.
- Do not let brake fluid come in contact with paint. Wash immediately with soap and water.
- Brake fluid absorbs moisture from the air. Store in an airtight container.
- Do not use DOT 5 (silicone) brake fluid.
- Do not fill brake fluid above **MAX** in fluid reservoir.
- Do not mix mineral oil products such as gasoline or engine oil with brake fluid. Mineral oil damages rubber seals in the brake system.
- Dispose of brake fluid as a hazardous waste.



- Check that fluid level is between **MIN** and **MAX** marks molded on brake fluid reservoir. Fluid level drops slightly as brake pad material wears.

Brake fluid application

BMW preferred fluid	Low viscosity DOT 4 brake fluid
Low viscosity DOT 4 brake fluid may be used in all E60 vehicles. DOT 4 and low viscosity DOT 4 brake fluid can be mixed.	

Brake fluid absorbs moisture easily. This affects brake performance and reliability. To eliminate moisture, BMW recommends replacing the brake fluid 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.

See **340 Brakes** for brake fluid flushing and bleeding.

Brake pad and rotor wear, checking

Disc brakes are fitted at all four wheels. Although the brakes are equipped with a brake pad warning system, the system only monitors one wheel per axle. Check brake pad thickness whenever wheels are off or brake work is being done.

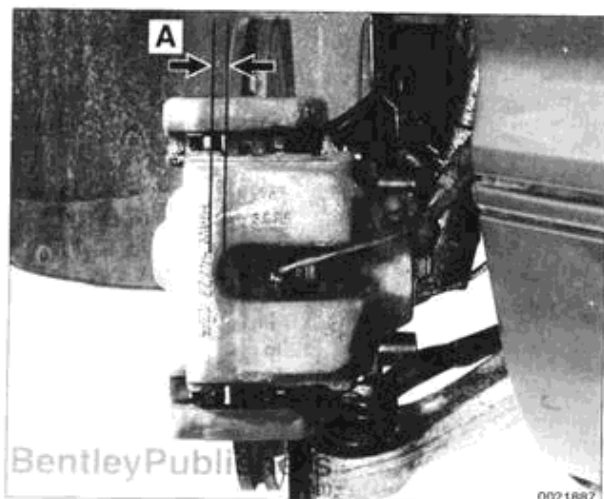
- Disc brake pad wear can be checked through opening in caliper:

- Remove road wheel
- Measure distance (**A**) of brake pad "ear" to brake rotor. Compare to specification below.

Brake pad lining minimum thickness

Dimension A	3.0 mm (0.12 in)
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Unbolt caliper from caliper carrier to properly inspect. See **340 Brakes** for additional techniques for checking brakes and for brake pad, rotor and caliper replacement procedures.



020-28 Maintenance

Parking brake, checking

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. See **340 Brakes** for parking brake adjustment procedure.

The parking brake may lose some of its effectiveness if it is not used frequently. This is due to rust build-up on the parking brake drum. To remove rust, apply the parking brake just until it begins to grip, then pull the lever up one more stop (click). Drive the vehicle approximately 400 meters (1,300 ft.) and release the brake.

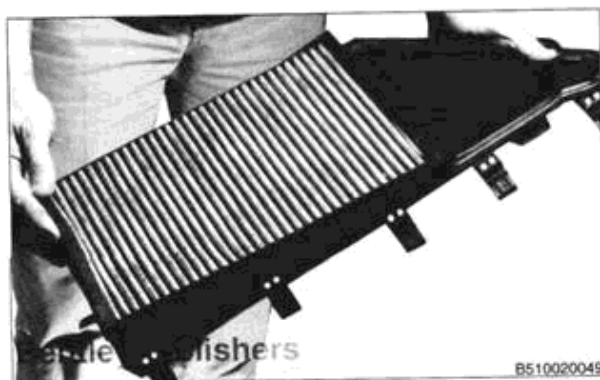
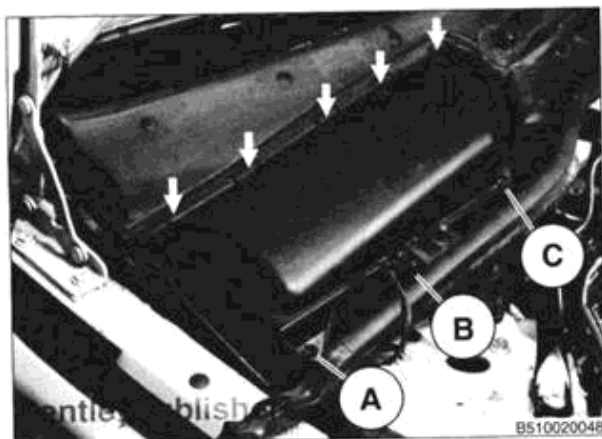
CABIN AIR MICROFILTER

The cabin air microfilters filter out dust and pollen from the passenger compartment. There are two filter elements, located at the rear of the engine compartment, left and right sides.

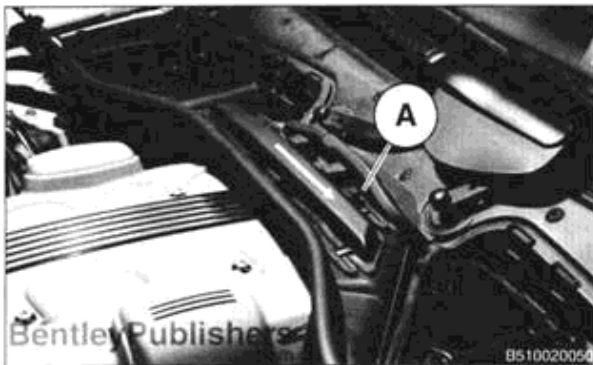
Cabin air microfilters, replacing

- Open engine hood.
- Remove microfilter cover:
 - Turn quick-release fastener (A) approx. 90° counterclockwise.
 - Right side filter: disconnect harness connector at hood alarm contact switch (B).
 - Pry filter cover spring clip off cover (C).
 - Remove microfilter cover by lifting up and out of rear clips (arrows).
- Unclip filter element from cover and replace.
- Installation is reverse of removal. Make sure filter is correctly seated in cover prior to installation.

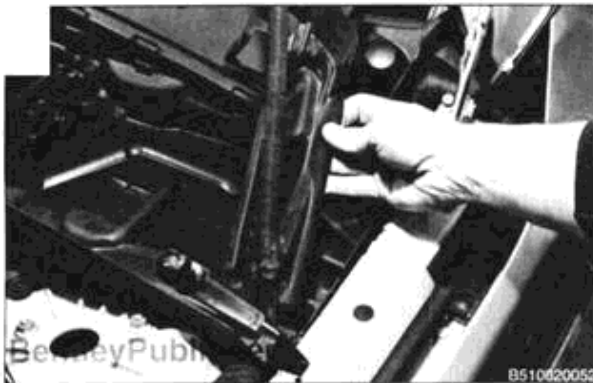
Clean filter housing using a disinfectant whenever the filter is replaced. If necessary, remove housing for a thorough cleaning. See **Cabin air microfilter housing, removing**.



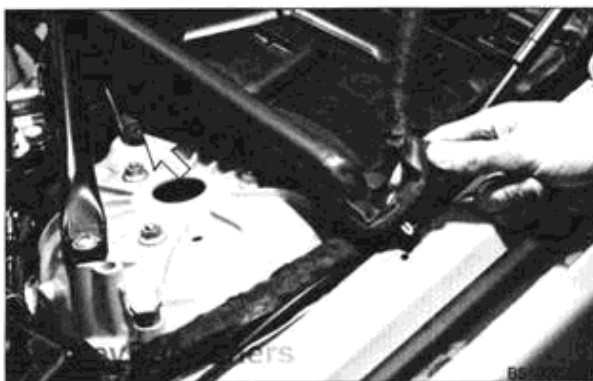
Cabin air microfilter housing, removing



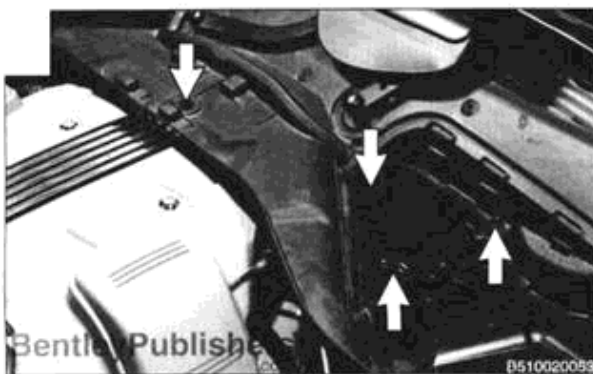
- Open engine hood.
- Remove cabin filters together with covers. See **Cabin air filters, replacing**.
- Remove center trim from housings. Press down on locking clip (A) and slide off in direction of arrow.



- Peel out rubber gutter trim pieces from left and right sides.



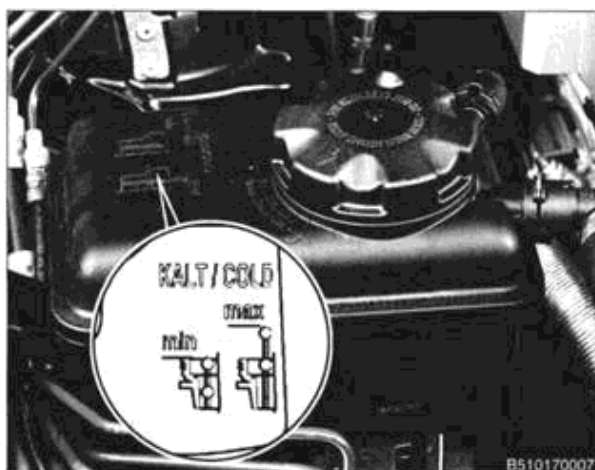
- Unclip left and right ends and peel off bulkhead weather stripping. Remove housing fastener (arrow).



- Working at left (driver's side) housing, turn quick-release fasteners (arrows) approx. 90° counterclockwise to unlock.
- Lift out left cabin air filter housing working from center of engine compartment.
- Remove right housing using instructions for left housing removal.
- Installation is reverse of removal. Install right (passenger side) housing first.

020-30 Maintenance

Coolant level, checking



COOLING SYSTEM SERVICE

Antifreeze raises the boiling point and lowers the freezing point of coolant. BMW recommends engine coolant that is a 50 / 50 mixture of distilled water and ethylene glycol-based antifreeze.

Routine cooling system maintenance consists of maintaining the coolant level and inspecting hoses.

For additional cooling system information and repair procedures, see **170 Radiator and Cooling System**.

Coolant level, checking

WARNING—

- Allow cooling system to cool before opening or draining the cooling system.

- With engine fully cooled off, open radiator expansion tank cap. Note that **arrows** on cap and tank line up when cap clicks into fully closed position.

- Float in expansion tank indicates coolant level when cold.
 - When upper mark on float (**MIN**) is level with top of filler neck, coolant is at minimum allowable level.
 - When lower mark on float (**MAX**) is level with top of filler neck, coolant is at maximum level.
- Top off coolant if necessary.

CAUTION—

- Use only BMW approved phosphate-free, nitrite-free and amino-free antifreeze when filling the cooling system.

Antifreeze concentration, checking

- Use a coolant hydrometer to determine antifreeze concentration.

Coolant mixture recommendations	
Concentration	Cold protection
50% antifreeze	-35°C (-31°F)
60% antifreeze	-40°C (-40°F)

Do not use a higher concentration of antifreeze than a 60% mixture, as the heat transfer quality of the coolant decreases with higher antifreeze concentrations.

Cooling system hoses, inspecting

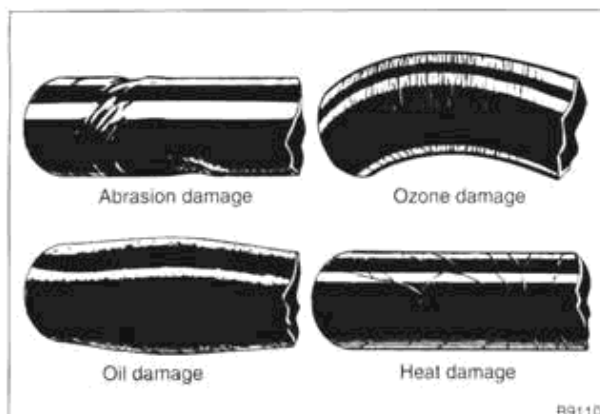
Inspect hoses by first checking that all connections are tight and dry. Coolant seepage indicates that either the hose clamp is loose, the hose is damaged, or the connection is dirty or corroded. Dried coolant has a chalky appearance.

Check hose condition by a visual and tactile inspection, making sure it is firm and springy. Replace hoses that exhibit conditions noted below. (Illustration courtesy of Gates Rubber Company, Inc.)

- Leakage: Dripping, moisture, or seepage near clamps or connectors.

CAUTION—

- When installing or reinstalling coolant hoses, use clamps specified by BMW.



- Electromechanical degradation: Difficult to see, but detectable by squeezing hose and feeling for cracks, weak areas, and voids.
- Oil damage: Soft and spongy to touch, visible bulges and swelling.
- Abrasion damage: Wear, abrasion, or scuffing, often due to contact with components in engine compartment.
- Heat damage: Internal and external damage, generally due to high under hood temperatures or overheating. Internal heat damage is often indicated by swelling with external damage marked by hardened and cracked areas.
- Ozone damage: Small, parallel cracks in outer layers, but without hardening. Due to exposure to atmospheric conditions.

- As a preventative measure, replace coolant hoses every 4 years.

ELECTRICAL SERVICE

See the following repair groups for detailed information on vehicle electrics:

- **121 Battery, Starter, Alternator** for engine electrical components
- **600 Electrical System—General** for basic electrical troubleshooting information
- **ECL Electrical Component Locations** for fuse, relay and control module information
- **ELE Electrical Wiring Diagrams** for detailed electrical schematics.

020-32 Maintenance

Accessory belt, replacing (M54, N52)

ENGINE ACCESSORY BELT SERVICE

The accessory belt and pulleys transfer power from the engine crankshaft to the alternator, A/C compressor and power steering pump. Note that engine cooling fan is electric. On 2006 and later 6-cylinder engines, the coolant pump is also electric.

Inspect belt with engine OFF. If belt shows signs of wear, cracking, glazing, or missing sections, replace immediately. To reduce the chance of belt failure while driving, replace belt every four years.

When the belt is replaced with a new one, store the old one in the trunk for emergency use.

If accessory belt, power steering pump pulley or front axle carrier are found to be damaged, replace these parts as well as the left engine mount with updated parts.

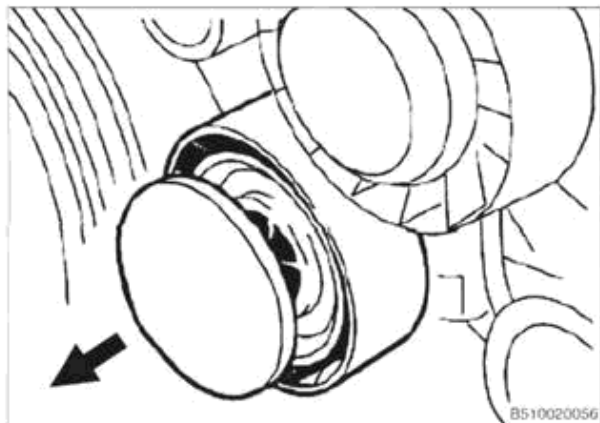
CAUTION—

- To avoid electrochemical corrosion to engine components made of aluminum-magnesium alloy, do not use steel fasteners. Use aluminum fasteners only.
- For reliable identification, test fasteners for aluminum composition with magnet.
- Replace aluminum bolts each time they are loosened.
- Follow torque instructions, including angle of rotation specifications, when installing aluminum fasteners.

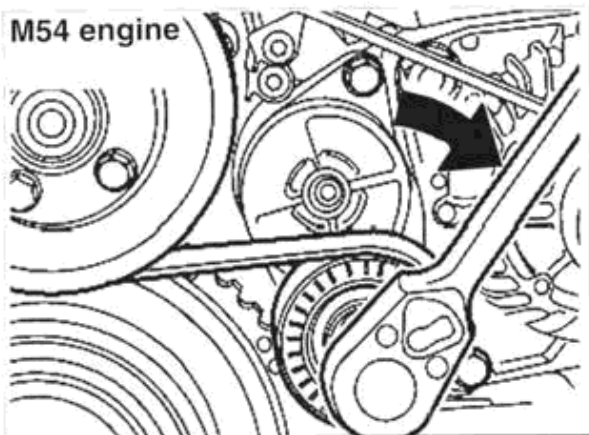
Accessory belt, replacing (M54, N52)

If planning to reinstall old belt, be sure to mark direction of rotation. If replacing the belt, keep the old belt for emergency use.

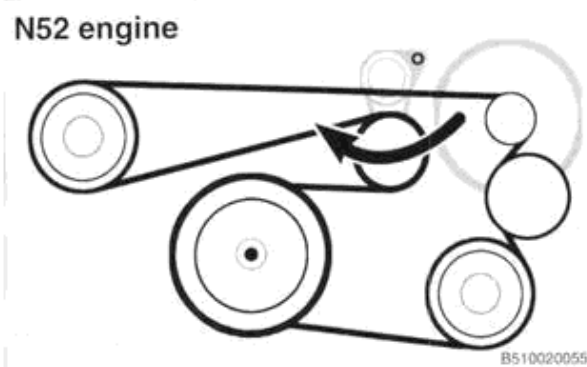
- Open engine hood.
- For additional clearance, remove radiator cooling fan cowl with integral fan. See **170 Radiator and Cooling System**.
- **M54 engine:** Remove A/C compressor belt. See **A/C belt, replacing (M54 engine)** in this repair group.
- **M54 engine:** pry cover from tensioner.



M54 engine



N52 engine



B510020055

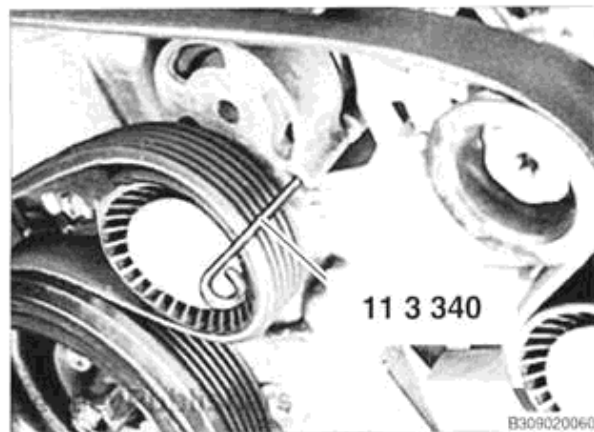
- Use Torx socket to rotate belt tensioner clockwise (**arrow**). This releases belt tension.

- If applicable, lock tensioner in released position using appropriate diameter pin (BMW special tool 11 3 340).

WARNING —

- Observe care when working with tensioner. Personal injury could result if tensioner springs back into position uncontrolled.

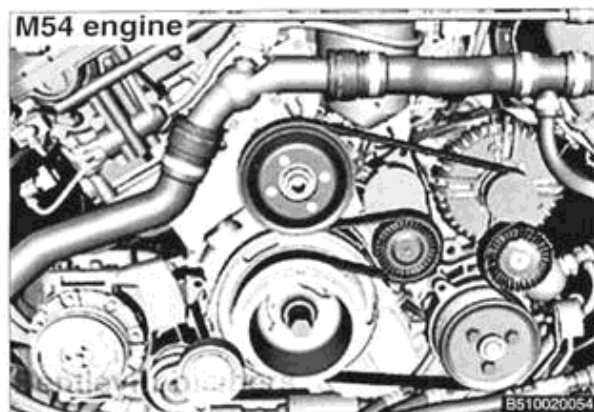
- Work belt off pulleys and remove.



11 3 340

B309020060

M54 engine

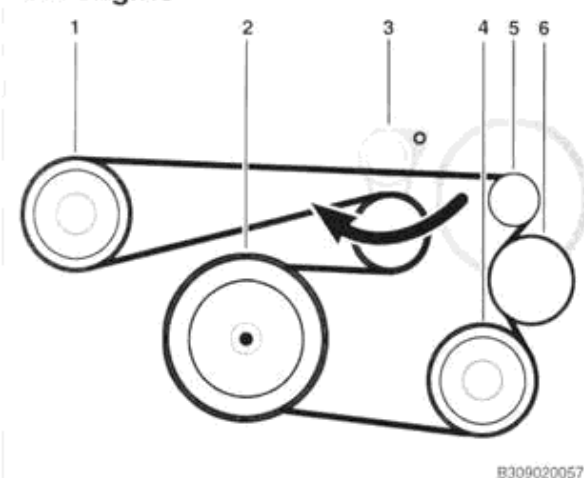


B510020054

- **M54 engine:** Install belt using accompanying diagram as guide. If reinstalling used belt, follow direction-of-rotation mark made previously.

Accessory belt, replacing (N54)

N52 engine



◀ **N52 engine:** Install belt using accompanying diagram as guide. If reinstalling used belt, follow direction-of-rotation mark made previously.

1. A/C compressor pulley
2. Vibration damper (crankshaft pulley)
3. Tensioner pulley
4. Power steering pump pulley
5. Alternator pulley
6. Idler pulley

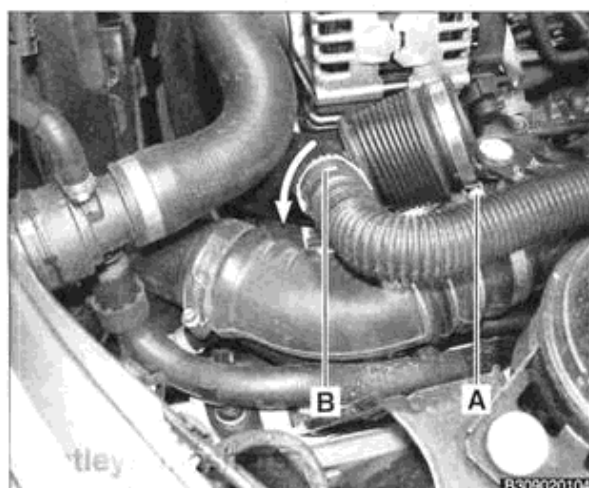
- Release tensioner.
- The remainder of installation is reverse of removal. Run engine and check for proper belt installation.

Accessory belt, replacing (N54)

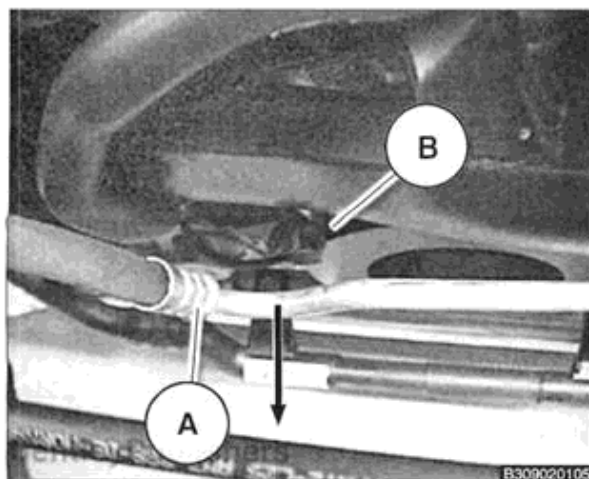
- Open engine hood.
- For additional clearance, remove radiator cooling fan cowl with integral fan. See **170 Radiator and Cooling System**.
- Remove engine splash shield. See **Engine lower covers (splash shields), removing** in this repair group.
- If planning to reinstall old belt, be sure to mark direction of rotation.

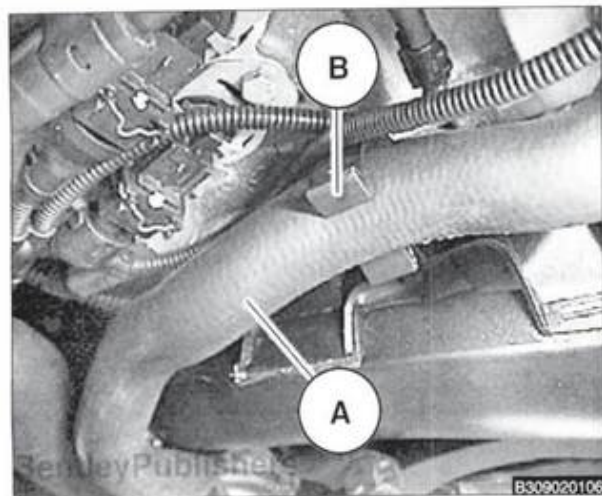
◀ Working at left side of engine compartment:

- Loosen hose clamp **A** and detach air duct from air filter housing.
- Rotate quick-release clamp **B** 90° on boost pressure duct. Separate air ducts.

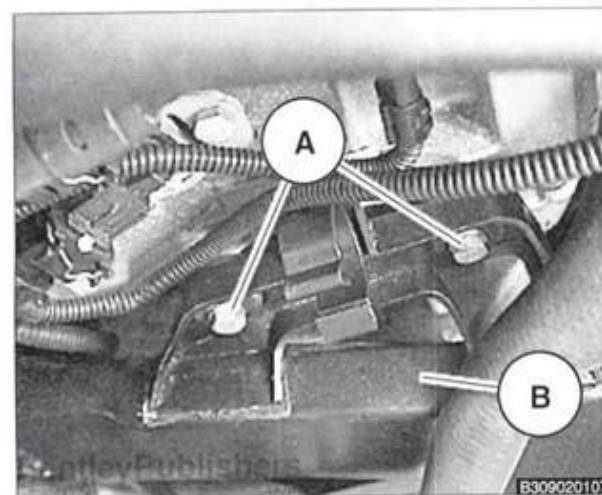


◀ Working underneath radiator, unclip line **A** from clip **B** in direction of arrow.

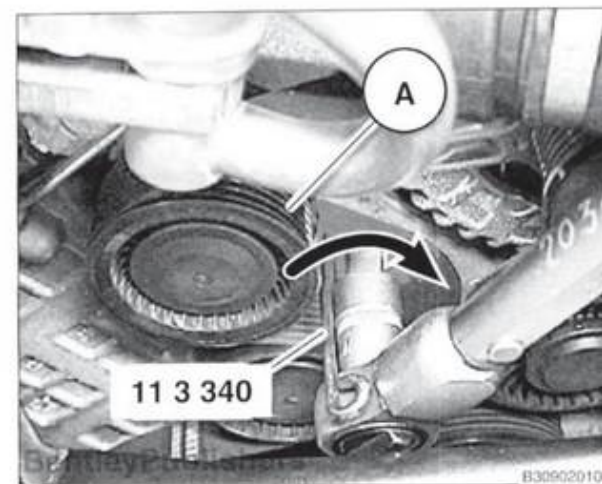




- ◀ Working at top front of cylinder head, disconnect coolant hose **A** from bracket **B**.



- ◀ Remove air duct bracket mounting bolts (**A**) at front of engine. Fold air duct (**B**) down without disconnecting or removing.



- ◀ Use Torx socket to rotate belt tensioner (**A**) clockwise (**arrow**). This releases belt tension.

- Lock tensioner in released position using appropriate diameter pin (BMW special tool 11 3 340).

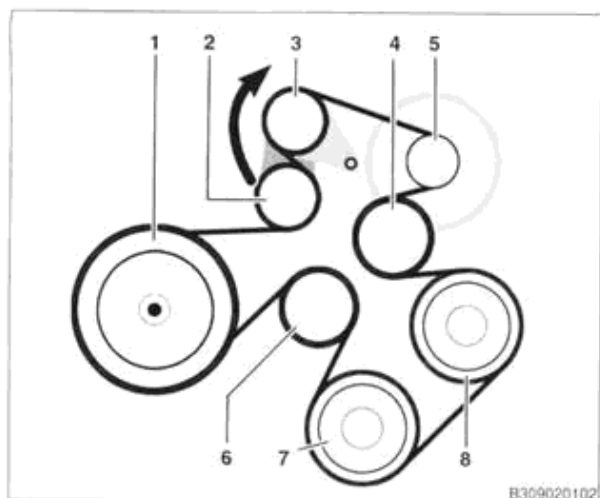
WARNING—

- Observe care when working with tensioner. Personal injury could result if tensioner springs back into position uncontrolled.

- Work belt off pulleys and remove.

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Accessory belt, replacing (V8 engines)



Install belt using accompanying diagram as guide. If reinstalling used belt, follow direction-of-rotation mark made previously.

1. Vibration damper (crankshaft pulley)
2. Tensioner pulley
3. Tensioner-idler pulley
4. Idler pulley
5. Alternator pulley
6. Idler pulley
7. Power steering pump pulley
8. A/C compressor pulley

— Release tensioner.

— The remainder of installation is reverse of removal. Run engine and check for proper belt installation.

Accessory belt, replacing (V8 engines)

If planning to reinstall old belt, be sure to mark direction of rotation. If replacing the belt, keep the old belt for emergency use.

— Open engine hood.

— For additional clearance, remove radiator cooling fan cowl with integral fan. See **170 Radiator and Cooling System**.

Use Torx socket (T60) to rotate belt tensioner fully clockwise (arrow). This releases belt tension.

— With tensioner in fully released position, insert lock or appropriate diameter pin (BMW special tool 11 3 340) into bore in bottom of tensioner.

WARNING —

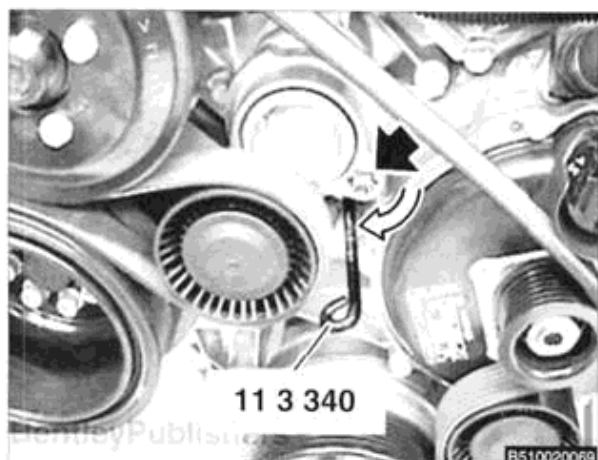
- Observe care when working with tensioner. Personal injury could result if tensioner springs back into position uncontrolled.

— Work belt off pulleys and remove.

Install belt using accompanying illustration as a guide. If reinstalling used belt, follow direction-of-rotation mark made previously.

— Release tensioner.

— The remainder of installation is reverse of removal. Run engine and check for proper belt installation.

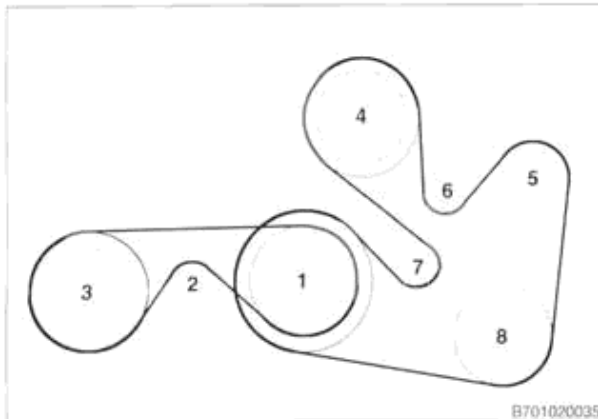


A/C belt, replacing (M54 engine)

Two belts are used to drive engine accessories:

- Outer (front) belt: A/C compressor
- Inner (rear) belt: Alternator, coolant pump, steering pump

- If planning to reinstall old belt(s), be sure to mark direction of rotation.



➤ M54 engine accessory belts

1. Crankshaft pulley
2. A/C belt tensioner
3. A/C compressor pulley
4. Coolant pump pulley
5. Alternator pulley
6. Accessory belt tensioner
7. Idler pulley
8. Power steering pump pulley



➤ To remove A/C compressor belt:

- Use hex head (A) or Torx socket to rotate A/C belt tensioner in direction of **arrow**.
- Slip belt off pulleys and remove belt.
- Check belt for cracks and coolant or oil residue. Replace if necessary.

— To reinstall A/C compressor belt:

- Rotate A/C belt tensioner in direction of **arrow**.
- Route belt over pulleys and release tensioner.

- When reinstalling belt, check that it is correctly positioned on pulleys. If reinstalling old belt, pay attention to direction of rotation marks made previously.

Tightening torques

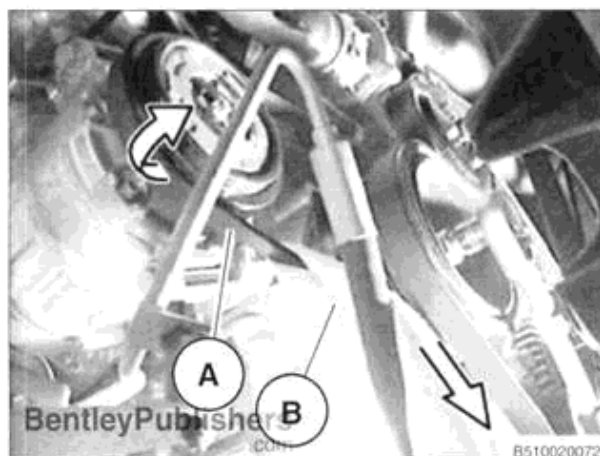
Fan clutch to coolant pump (left- hand thread)	
• With BMW tool 11 5 040	30 Nm (22 ft-lb)
• Without BMW tool 11 5 040	40 Nm (29 ft-lb)

A/C belt, replacing (V8 engine)

Two belts are used to drive engine accessories:

- Outer (rear) belt: Alternator, coolant pump, steering pump
- Inner (front) belt: A/C compressor

- If planning to reinstall old belt, be sure to mark direction of rotation. If replacing the belt, keep the old belt for emergency use.
- Open engine hood.
- Remove accessory belt. See **Accessory belt, replacing (V8 engines)** in this repair group.
- Remove engine splash shield. See **Engine lower covers (splash shields), removing**, in this repair group.
- Rotate engine at crankshaft bolt using socket in direction of engine rotation. At the same time, pull off A/C belt (A) using clean rag (B) in direction of arrow.



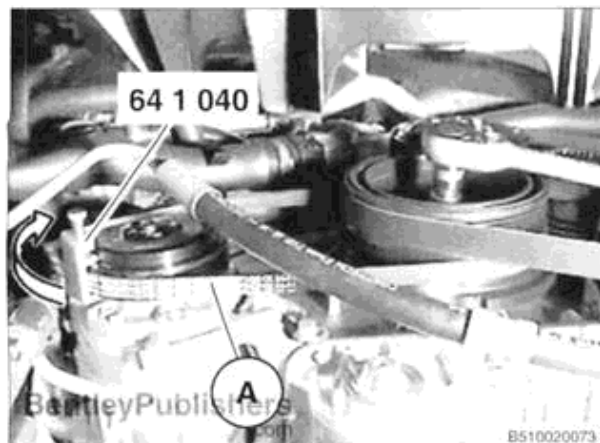
- Place belt in position and clamp belt to pulley with clamp (BMW special tool 64 1 040).



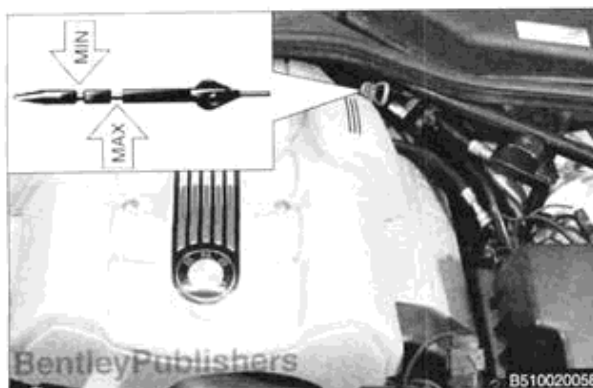
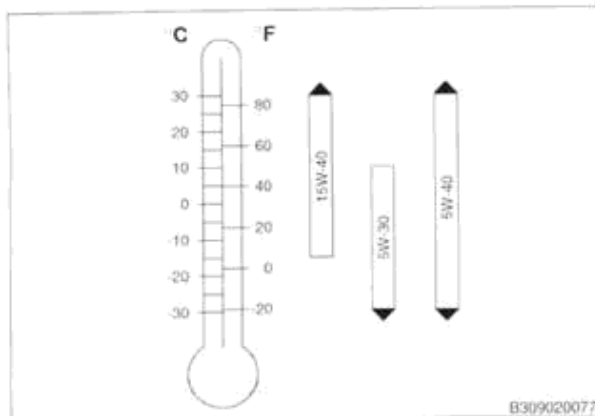
- Rotate engine at crankshaft bolt using socket in direction of engine rotation until A/C belt is fully seated on pulley. Remove BMW special tool 64 1 040.
- If reinstalling used belt, follow direction-of-rotation mark made previously.

CAUTION—

- If belt is contaminated with hydraulic fluid, do not reinstall. Install new belt.



- The remainder of installation is reverse of removal. Run engine and check for proper belt installation.



ENGINE OIL SERVICE

CAUTION—

- Use BMW specified oil to top off engine between oil changes.
- Do not use engine oil additives.

BMW high performance synthetic oil is recommended for use in the cars covered by this manual.

Engine oil specification

BMW high performance synthetic
SAE 5W - 30 or 5W - 40

API rating SM
or higher

Engine oil, checking level

2004 - 2005 models:

- Check oil level with car on level surface, after engine has been stopped for at least a few minutes.
- Pull out dipstick and wipe it clean. Reinsert dipstick fully and then withdraw it again.
- Oil level is correct if it is between two marks at end of dipstick.
- On 6-cylinder engines, red-handled dipstick is at front left of engine.

2006 - 2010 models: There is no dipstick. Engine oil level and other oil characteristics are monitored electronically by the oil condition sensor (OZS) and displayed via the center dashboard display when called up through the iDrive system. See **119 Engine Lubrication** for detail of OZS operation.

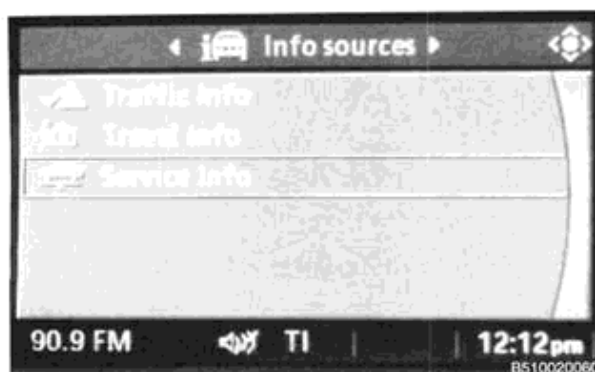
On 2006 and later 6-cylinder engines, the dipstick was eliminated. 2006 and later V8 engines have dipsticks throughout the production range, but oil level can also be checked through iDrive check control as described below.

Monitoring engine oil level electronically ensures that the oil does not reach critically low levels. Overfilling the engine with oil can cause leaks; a corresponding warning is therefore given.

— 2006 - 2009 models

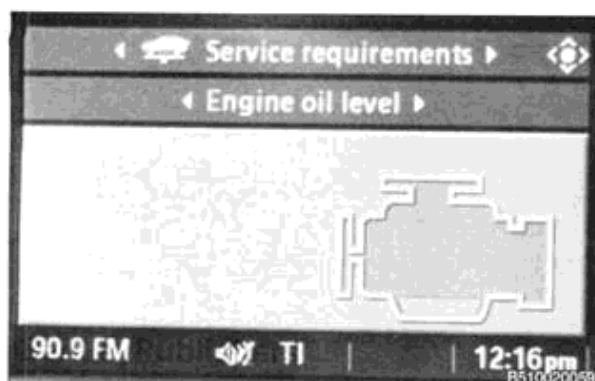
- Start engine.
- Press down on iDrive **MENU** button to open start menu. Select **Info sources**.

Press down on iDrive controller, then select **Service Info**.



020-40 Maintenance

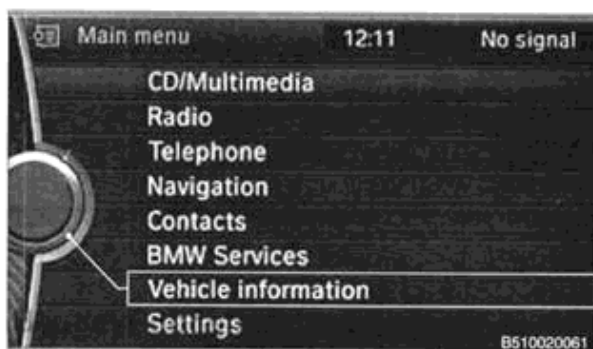
Engine oil, checking level



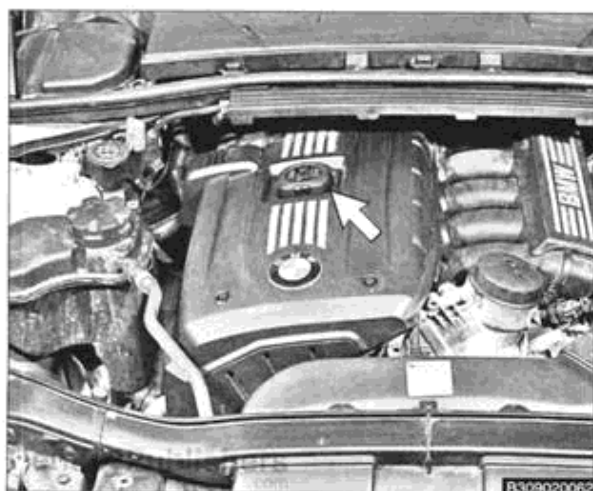
- Turn controller until **Service requirements** is selected and press controller. Change to upper field on screen if necessary.
- Turn controller until **Engine oil level** is selected and press controller. Change to second field on screen if necessary. Measurement normally takes about 3 minutes if the vehicle is at a standstill on a level surface, or about 5 minutes if the vehicle is underway.
- One of the following messages is displayed
Engine oil level O.K.
No measured value available: Updating engine oil level measurement...
Engine oil level at the minimum! Refill with 1 quart of engine oil.
Engine oil level too high. Have this checked immediately.
Please observe recalculated service interval for engine oil.

— To check oil level on **2010 models**:

- Start engine.



- Using iDrive controller, select **Vehicle Information** through main menu.
- Select **Vehicle status** and then select **Engine oil level**. Measurement normally takes about 3 minutes if the vehicle is at a standstill on a level surface, or about 5 minutes if the vehicle is underway.
- One of the following messages is displayed
Engine oil level OK
Measurement not possible as this time
Measuring engine oil level...
Engine oil level below minimum. Add 1 quart!
Engine oil level too high! Have this checked.
Measurement inactive. Have this checked

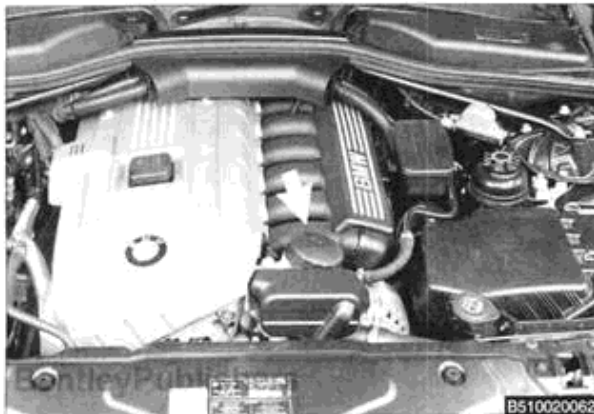


- If oil level is low, add oil at oil filler (**arrow**). Use correct viscosity and grade oil.

Engine oil and filter, changing (6-cylinder)

CAUTION—

- When changing the oil, make sure the engine oil drain plug is started and torqued using hand-tools. Power tools can strip the threads of the plug and the oil pan.



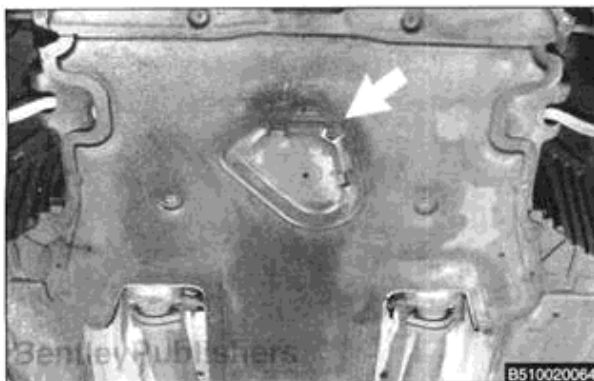
A complete oil change requires new oil, a new filter insert kit and a new drain plug sealing washer. Run engine for a few minutes to warm engine oil. Switch engine OFF.

- Use oil filter wrench to loosen and remove oil filter housing cover (arrow). Remove filter cartridge and discard O-ring.

- Raise vehicle and support safely.

WARNING—

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



- Working underneath engine sump, open service door in engine splash shield (arrow) to expose drain plug.

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

WARNING—

- 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 torque

Engine oil drain plug to oil pan	25 Nm (18 ft-lb)
----------------------------------	------------------

- Lubricate and install new oil filter O-ring and new filter cartridge in oil filter housing cover. Install and tighten housing cover.

Tightening torque

Cover to oil filter housing	25 Nm (18 ft-lb)
-----------------------------	------------------

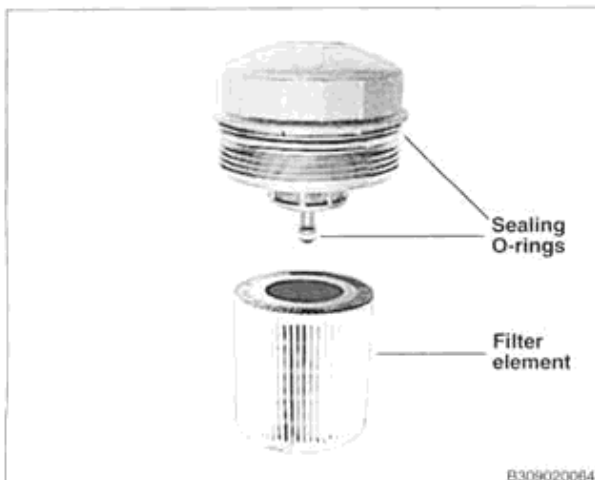
- Refill crankcase with oil. Oil capacity is listed in **Table a**.

Table a. Engine oil capacity (6-cylinder)

Engine	Approx. capacity (incl. oil filter)
6-cylinder: M54, N52, N54	6.5 liters (6.9 US qt)

- Start engine and check that oil pressure warning light immediately goes out. Check for any leaks.

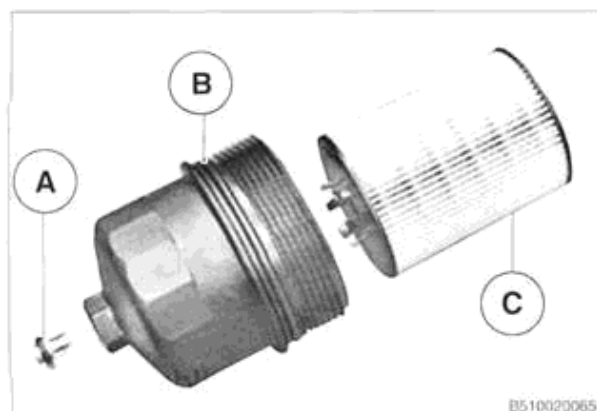
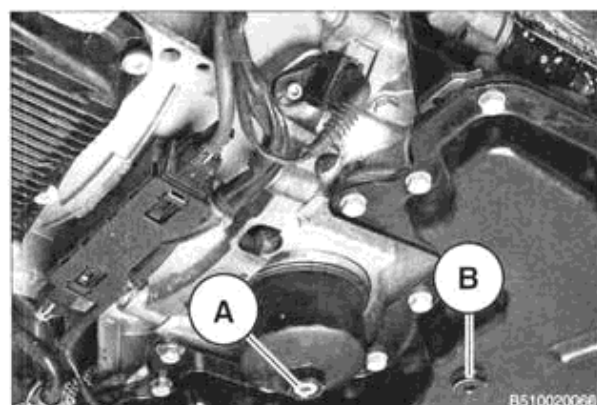
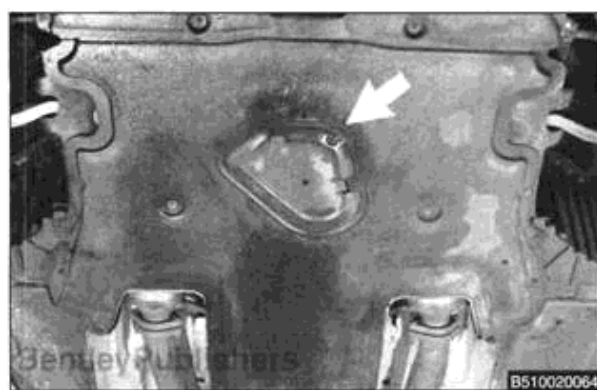
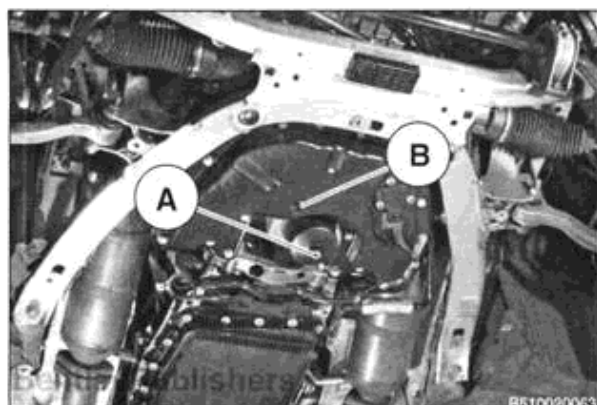
- Check for correct oil level. See **Engine oil, checking level**, in this repair group.



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020-42 Maintenance

Engine oil and filter, changing (V8)



Engine oil and filter, changing (V8)

CAUTION—

- When changing the oil, make sure the engine oil drain plug is started and torqued using hand-tools. Power tools can strip the threads of the plug and the oil pan.

- On V8 engines, the oil filter is in the bottom of the engine (A) and the engine oil drain plug is in the center of the oil pan (B).

A complete oil change requires new oil, a new filter insert kit and a new drain plug O-ring. Run engine for a few minutes to warm engine oil. Switch engine OFF.

- Open engine hood and remove oil filler cap. Store in safe place.
- Raise vehicle and support safely.

WARNING—

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

- Working underneath engine sump, open service door (arrow) in engine splash shield to expose filter cover.

- Place drain pan under oil drain plug. Use 6mm allen wrench to loosen drain plug (A) from oil filter cover. Remove plug by hand and let oil drain into pan. Remove oil pan drain plug (B) and let oil drain into pan.

WARNING—

- 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. Use gloves to protect your hands.

- When oil flow has diminished to an occasional drip, use an oil filter wrench to loosen and remove the oil filter cover.
- Remove filter cartridge and pick off and discard large O-ring from cover.
- Lubricate and install new oil filter O-ring (B) and new filter cartridge (C) in oil filter housing cover. Install and tighten cover.

Tightening torque

Oil filter cover to oil sump	25 Nm (18 ft-lb)
------------------------------	------------------

- Reinstall drain plug (A) with a new O-ring and torque plug.

Tightening torque

Engine oil drain plug to oil pan	10 Nm (89 in-lb)
----------------------------------	------------------

- Refill crankcase with oil. Oil capacity is listed in **Table b**.

Table b. Engine oil capacity (V8)

Engine	Approx. capacity (incl. oil filter)
V8: M62, M62 TU	8.0 liters (8.5 US qt)

- Start engine and check that oil pressure warning light immediately goes out. Check for any leaks.
- Check for correct oil level. See **Engine oil, checking level**, given earlier.

FUEL FILTER

Models covered by this manual are equipped with a life-time fuel filter with no specified replacement interval.

The filter is located in left lobe of the fuel tank, integral with the fuel level sender and fuel pressure regulator. It is available as a replacement part from BMW. See **160 Fuel Tank and Fuel Pump**.

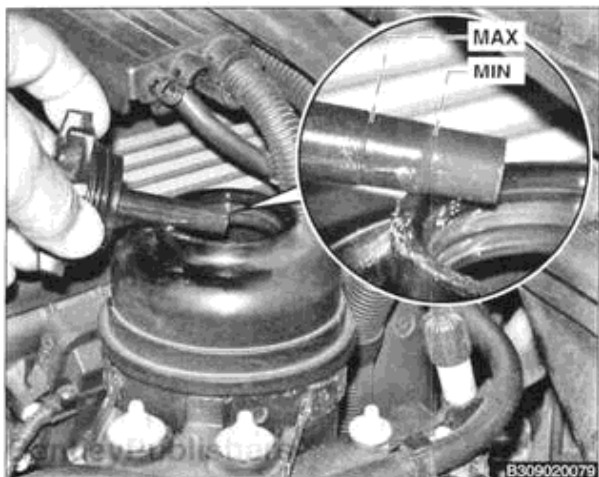
POWER STEERING FLUID SERVICE

Power steering fluid, checking level

- ◀ The power steering system is permanently filled with either CHF or ATF hydraulic fluid. Routinely adding fluid is not required unless the system is leaking.

CAUTION—

- Power steering reservoir cap is marked with the type of fluid being used— ATF or CHF. Do not mix.



- ◀ To check power steering fluid level in fluid reservoir:
 - Park vehicle 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, add fluid to reservoir to bring level up.
- Hand-tighten reservoir cap.

See **320 Steering and Wheel Alignment** for power steering system bleeding.



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SPARK PLUG SERVICE

All E60 5 Series engines use a coil-over-spark plug configuration, with one ignition coil above each spark plug.

- ⚠ Turbocharged (N54) engine spark plugs are particular to that engine. A special thin-walled 12-point spark plug socket, BMW part no. 83 30 0 495 560, is needed for servicing these spark plugs.

Table c. Spark plugs (100k mile change interval)

Manufacturer	Bosch	NGK
M54	FGR7DQP	BKR6EQUP
N52 engine	FR7NPP332	ILZFR6D11
N54 engine (turbo)	ZGR6STE2	not available
N62 / N62TU	FGR7DQP	BKR6EQUP

Check for correct applications with authorized BMW dealer parts department.

Spark plugs, replacing

WARNING —

- To avoid personal injury, be sure the engine is cold before beginning work in the engine compartment.

- Remove ignition coil covers. See **Engine upper covers, removing** in this repair group.
- Remove ignition coil. See **120 Ignition System**.

- ⚠ Unlock (**curved arrow**) ignition coil connector. Pull (**straight arrow**) connector off coil.



B3091200013

- ⚠ Slide rod-shaped ignition coil straight out of spark plug hole.

CAUTION —

- Do not allow fuel or oil to contact the ignition coils. Fuel or oil residue can cause a breakdown in the electrical resistance of silicone used in production, resulting in ignition coil failure.

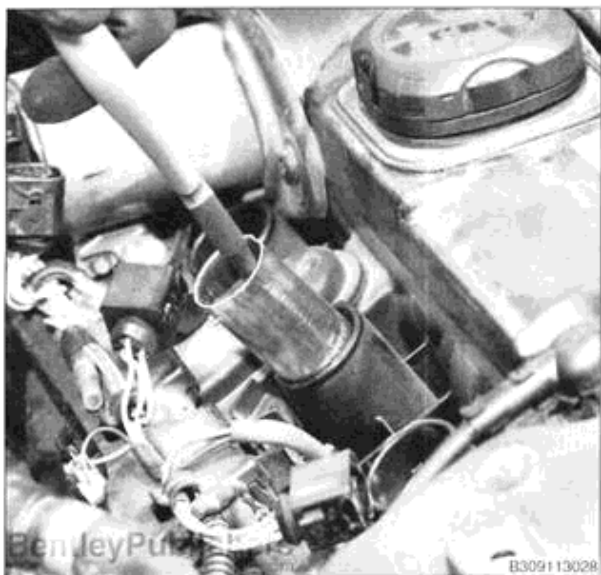


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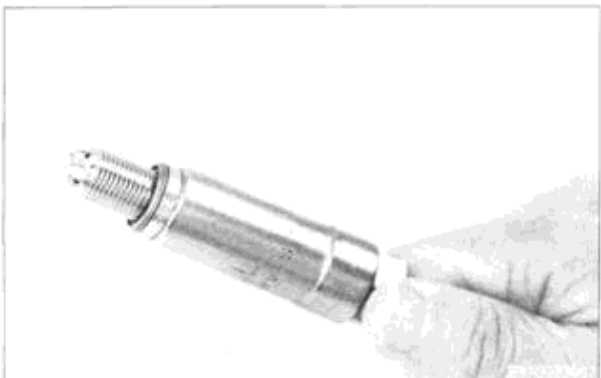


Remove spark plugs:

- **N52 engine:** Use thin-walled spark plug socket.
- **N54 (turbo) engine:** Use special 12-point spark plug socket.



- ⚠ **N52 engine:** if thin-walled spark plug socket is not available, carefully remove slotted ignition coil sleeves from cylinder head cover holes, then remove spark plugs.



- ⚠ Inspect spark plug electrodes. Light grey indicates normal combustion.

- 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.
 - **N52 engine:** reinsert or replace slotted ignition coil sleeves, if removed.
 - Carefully insert ignition coils in spark plug wells and reattach electrical connectors. Be sure to reattach all removed grounds

Tightening torque

Spark plug to cylinder head	23 ± 3 Nm (18 ± 2 ft-lb)
-----------------------------	--------------------------

OTHER MECHANICAL MAINTENANCE

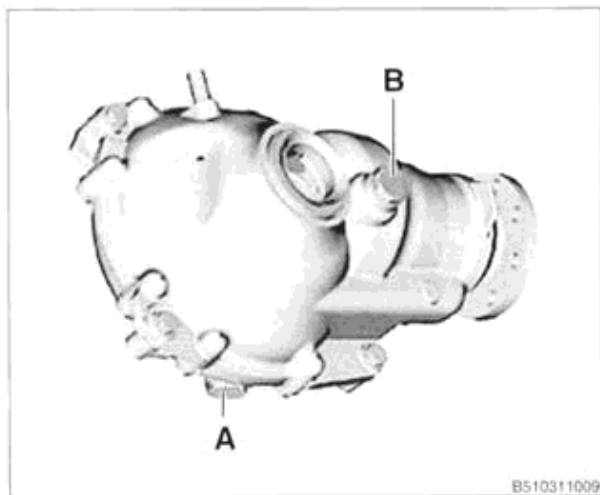
Differential oil level, checking

The front (if applicable) and rear differentials are filled with lifetime oil that ordinarily does not need to be changed. 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.



Front differential:

- Remove engine splash shield. See **Engine lower covers (splash shields), removing** in this repair group.
- Remove front reinforcement plate. See **310 Front Suspension**.
- Check oil at fill plug (arrow).



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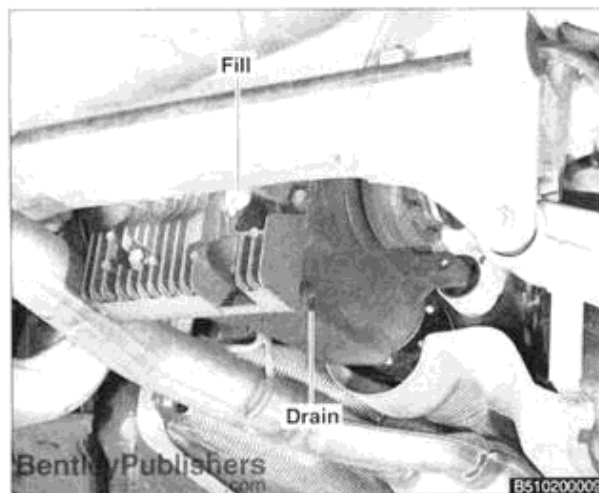
Rear differential: Check oil level at fill plug (arrow).

- All: Check lubricant level with vehicle level:
 - Use 14 mm or 17 mm Allen socket to remove filler plug.
 - Level is correct when fluid just reaches edge of filler hole.
 - If necessary, top up fluid.
 - Replace filler plug sealing ring.
 - Install and tighten oil filler plug when oil level is correct.

Tightening torque

Fill / drain plug to rear differential housing:	
• Plug with sealing O-ring (replace O-ring)	65 Nm (48 ft-lb)
• Plug without sealing O-ring (replace plug)	60 Nm (44 ft-lb)

See also **311 Front Axle Differential** or **331 Rear Axle Differential**.



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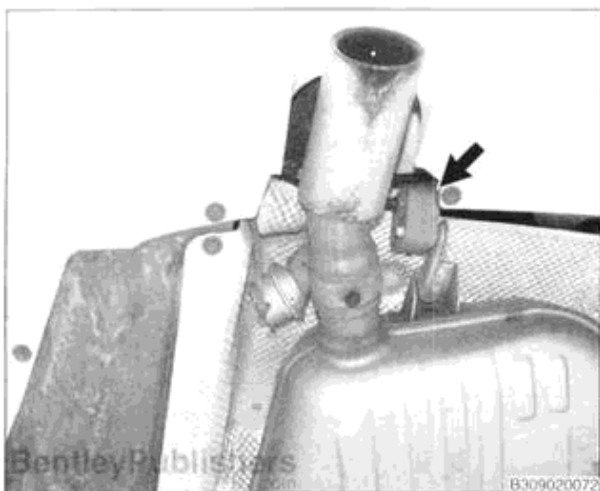


Drive axle joint (CV joint) boots, inspecting

- Inspect CV joint protective boot (**arrow**) for cracks and damage. If the rubber boot fails, water and dirt that enter the joint quickly damage it.

Areas where leaks are most likely to occur are around drive shaft and drive axle mounting flanges.

CV boot replacement is covered in **331 Rear Axle Differential**.



Exhaust system, inspecting

Exhaust system life varies widely according to driving habits and environmental conditions. If short-distance driving predominates, moisture and condensation in the system does not fully dry out. This leads to early corrosion damage and more frequent replacement.

Scheduled maintenance of the exhaust system is limited to inspection.

- Check to see that hangers (**arrow**) are in place and properly supporting the system and that parts of the exhaust system do not contact the body.

- Check for restrictions due to dents or kinks.
- Check for weakness or perforation due to rust.

See **180 Exhaust System**.

Fuel tank and fuel lines, inspecting

- Inspect fuel tank and fuel lines for damage or leaks.
- Check for fuel leaks in engine compartment or fuel odors in passenger compartment.
- Check for evaporative emissions hoses that may have become disconnected. Check carefully at charcoal canister and leakage diagnosis pump. See **130 Fuel Injection** and **160 Fuel Tank and Fuel Pump** for component locations and additional information.

Idle speed

Idle speed is electronically adaptive and not adjustable.

Oxygen sensors

Replacement of oxygen sensors at specified intervals ensures that the engine and emission control system continue to operate as designed. Extending the replacement interval may void the emission control warranty coverage. Oxygen sensor replacement is covered in **180 Exhaust System**.

Suspension and steering, inspecting

Check suspension and steering moving parts for wear and excessive play. Inspect ball joint and tie-rod rubber seals and boots for cracks or tears that allow the entry of dirt and water.

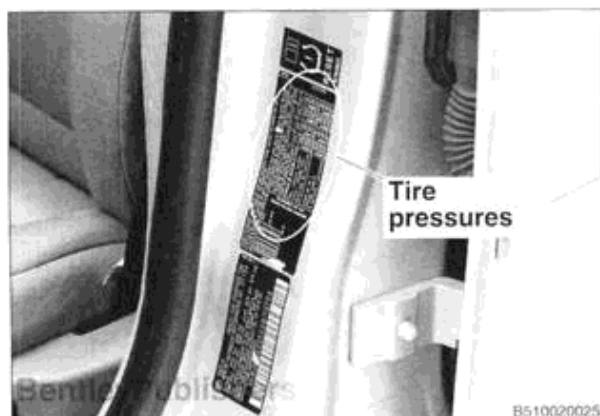
See also:

- **310 Front Suspension.**
- **311 Front Axle Differential**
- **320 Steering and Wheel Alignment**
- **330 Rear Suspension**
- **331 Rear Axle Differential**

Tires, checking inflation pressure

Correct tire pressures are important to handling and stability, fuel economy, and tire wear. Tire pressure changes with temperature. Check tire pressures often during seasonal temperature changes.

- ◀ Correct inflation pressures can be found on driver door pillar. Note that tire pressure specifications are higher when the vehicle is more heavily loaded.



WARNING —

- *Do not inflate any tire to a pressure higher than 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

Due to the vehicle's suspension design, BMW does not recommend tire rotation. Rotating used or worn tires may adversely affect road handling and tire grip.

Transmission service

Automatic and manual transmissions are filled with lifetime lubrication. No oil change is required for the entire service life of these transmissions. If repairs have to be made to the transmission or transmission oil cooler, use only the approved lifetime lube oil.

Transmission fluid, automatic

The automatic transmission is not equipped with a dipstick. Checking ATF level includes measuring and maintaining a specified ATF temperature during the checking procedure.

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

Transmission fluid, manual

The manual transmissions is filled with a special lifetime fluid. For manual transmission fluid checking and replacement procedures, see **230 Manual Transmission**.

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**.

BODY AND INTERIOR MAINTENANCE**Body, hinges, locks, lubricating**

- Lubricate door locks and lock cylinders with an oil that contains graphite.
- Lubricate body and door hinges, hood latch and door check rods with SAE 30 or SAE 40 engine oil.
- Lubricate seat runners with multipurpose grease.
- Lubricate door weather-strips with silicone spray or talcum powder.
- Lubricate engine hood release and hood release cable with spray grease.

CAUTION—

- Do not apply oil to rubber parts.
- Use an absolute minimum of winter lock deicer spray. Alcohol in deicer washes grease out of lock assemblies and may cause locks to corrode internally or to 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.

- Wash with a mixture of lukewarm water and vehicle wash product.
- Rinse using plenty of clear water.
- Wipe body dry with a soft cloth towel or chamois to prevent water-spotting.

CAUTION—

- Do not wash the vehicle 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 the finish.

Interior care

- Remove dirt spots on upholstery with lukewarm soapy water or dry foam cleaner.
- Use spot remover for grease and oil spots. Do not pour cleaning liquid directly on carpet or fabric. Dampen clean cloth and rub carefully, starting at edge of the spot and working inward.

WARNING —

- *Do not use gasoline, naphtha, or other flammable substances.*

Leather upholstery and trim

- Clean leather upholstery and trim periodically.
- Use slightly damp cotton or wool cloth to get rid of dirt in creases and pores that can cause brittleness and premature aging.
- On heavily soiled areas, use a mild detergent (such as Woolite®) or a specially formulated leather cleaner.
- Dry trim and upholstery completely using a soft cloth. Regular use of a good quality leather conditioner reduces drying and cracking of leather.

Seat belts

Dirt and other abrasive particles damage seat belt webbing.

- To clean seat belts, use a mild soap solution.

WARNING —

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

- Inspect condition of belt webbing and function of retractor mechanisms.

Special cleaning

- Remove tar and insect spots with a bug and tar remover. Do not use gasoline, kerosene, nail polish remover, or other unsuitable solvents.

A bit of baking soda dissolved in the wash water facilitates removal. This method can also be used to remove tree sap spots.

Underbody visual inspection

- Inspect the following for leaks or damage:

- Engine
- Transmission
- Fuel system
- Cooling and heating systems
- Brake system
- Exhaust system

A small amount of dampness is considered normal in some cases, especially around axle and pulley seals since the leaking fluid helps the seal work properly. On the other hand, expensive repairs can be avoided by prompt repair of minor fluid leaks. Judgement and experience are required to distinguish among the different kinds of fluid leaks.

- Inspect underside of vehicle for damage caused by normal wear and tear or by driving over road debris. Whenever vehicle is raised on a lift, inspect underbody, wheel wells and sill or rocker panels for damage to underbody sealants and coatings. Also inspect after major repairs to vehicle systems.
- Repair damage or defects found. Only use wax-based or tar-based anti-corrosion compounds as specified. Do not use oil-based anti-corrosion sprays due to possible incompatibility with factory applied protection.

Washing chassis

- Periodically wash underside of vehicle, especially in winter, to help prevent accumulation of road salt and rust.

The best time to wash the underside is just after the vehicle has been driven in wet conditions. Spray the chassis with a powerful jet of water. Commercial or self-service vehicle 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 vehicle 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. Do not apply wax to black trim pieces, rubber, or other plastic parts.

Windshield wiper blade maintenance

Common problems with 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 vehicle wash wax. Clean the blades using soapy water. If cleaning the blades does not cure the problem, replace them. BMW recommends replacing the wiper blades twice a year, before and after the cold season.

020-52 Maintenance

Check Control

- Check tension spring that forces wiper against glass. Replace wiper arm if spring tension is 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 nonabrasive 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.

Wiper blade replacement is covered in **611 Wipers and Washers**.

CHECK CONTROL

- Check Control monitors vehicle functions and alerts the driver to malfunctions using indicator and warning lights in a variety of colors in the instrument cluster. In some circumstances, acoustic signals as well as text messages are given.

ⓘ indicates that Check Control messages are stored.



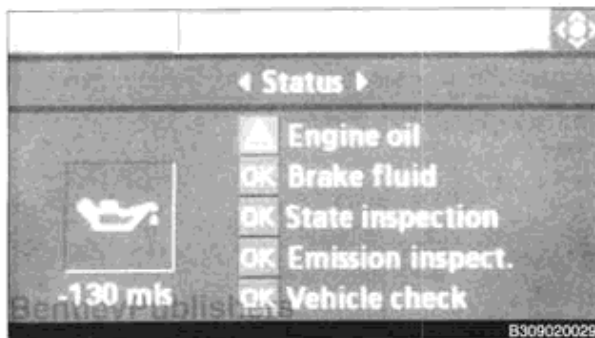
- To view Check Control messages in central dashboard display: Press down iDrive controller to bring up **Info sources | Settings** menu.

NOTE—

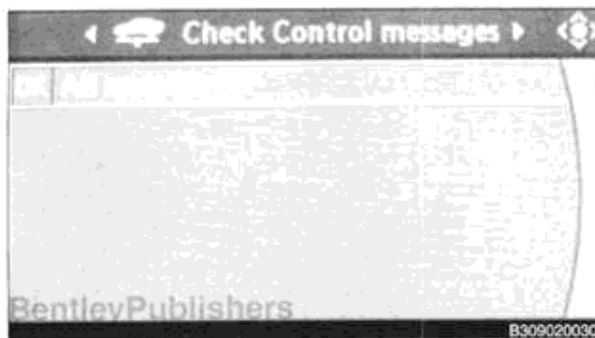
- Central dashboard display menus vary slightly on 2010 models.



- Pull back iDrive controller to enter middle screen, then rotate controller to **Service Info**.



- Press down controller to enter **Service Info** (or **Service requirements**) submenu.
- Rotate controller to **Check Control** messages.



- Press down controller to enter **Check Control** messages.



