4 Fluid level checks (every 250 miles or weekly)

1 Fluids are an essential part of the lubrication, cooling, brake and windshield washer systems. Because the fluids gradually become depleted and/or contaminated during normal operation of the vehicle, they must be periodically replenished. See *Recommended lubricants and fluids* in this Chapter's Specifications before adding fluid to any of the following components. **Note:** *The vehicle must be on level ground when fluid levels are checked.*

Engine oil

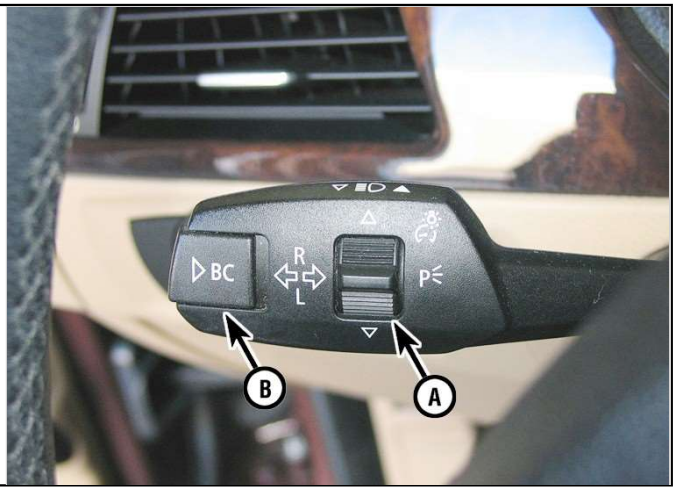
2 Frequent oil and filter changes are the most important preventative maintenance work which can be undertaken by the DIY owner. As engine oil ages, it becomes diluted and contaminated, which leads to premature engine wear. **Note:** *These engines do not have an oil-level dipstick. The oil level is checked by using the Condition-Based Service (CBS) of the iDrive (CID) and (CIC) systems on later models. If the level or temperature of the oil is out of range, a warning symbol will appear on the instrument panel.*

3 There are two ways to check the oil level, static "engine not running" and dynamic "engine running.

Static test "engine not running"

4 Turn the key to the "ON" position, but do not start the engine. Toggle the lever to the right of the square button Up or Down to scroll through the information display icons on the instrument cluster. Once the "OIL" icon is displayed, press the square button on the left end of the turn signal arm **(see illustration)** . The system will check to make sure there is enough oil to safely start the engine. **Note:** *On models equipped with CID system, use the iDrive controller on the center console and follow the on screen menu to check the engine oil. On 2009 and later models, use the CIC system controller on the center console and follow the on screen menu.*

4.4 Toggle the lever (A) on the turn signal arm, until the "OIL" icon is displayed on the instrument cluster, then press the square button (B) to activate the Condition Based Service (CBS) system



Dynamic test "engine running"

Note:
Always start with the static test before trying to do the dynamic test.

5 Start the engine and allow the engine to fully warm up. With the engine running, toggle the lever to the right of the square button Up or Down to scroll through the information display icons on the instrument cluster until the "OIL" icon is displayed, press the square button on the left end of the turn signal arm **(see illustration 4.4)** .

6 Once the square button is pressed the system can take up to 5 minutes to give a reading. The readings include "OK" (no action required), "1, 2, 3-quarts" (add oil), "MAX" (overfilled) and "INACTIVE" (defective oil level sensor) **(see illustration)** .

4.6 Oil level indicator icon display in the instrument cluster

7 To add oil, remove the filler cap from the valve cover **(see illustration)** . After adding oil, wait a few minutes to allow the level to stabilize, then check the level again. Add more oil if required. Install the filler cap and tighten it by hand only.

4.7 Remove the valve cover oil filler cap

Engine coolant

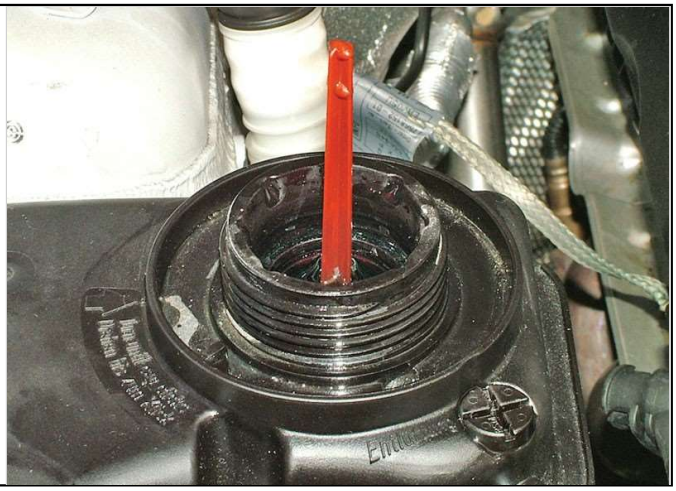
Warning:
Do not allow antifreeze to come in contact with your skin or painted surfaces of the vehicle. Flush contaminated areas immediately with plenty of water. Don't store new coolant or leave old coolant lying around where it's accessible to children or pets - they're attracted by its sweet smell. Ingestion of even a small amount of coolant can be fatal! Wipe up garage floor and drip pan spills immediately. Keep antifreeze containers covered and repair cooling system leaks as soon as they're noticed.

8 All vehicles covered by this manual are equipped with a pressurized coolant recovery system. A plastic expansion tank located at the front of the engine compartment is connected by a hose to the radiator **(see illustration).** As the engine heats up during operation, the expanding coolant fills the tank.

4.8 Coolant recovery tank - do not remove the cap when the system is hot

9 The coolant level in the tank should be checked regularly. **Warning:** *Do not remove the expansion tank cap to check the coolant level when the engine is warm!* The level in the tank varies with the temperature of the engine. When the engine is cold, remove the cap and inspect the float in the expansion tank. If the MAX mark on the float is level with the top of the threads on the tank filler neck, the coolant level is full, do not add coolant. If the MIN mark on the float is level with the top of the threads on the tank filler neck, remove the cap from the tank and add a 50/50 mixture of ethylene glycol based antifreeze and demineralized water **(see illustration).**

4.9 A float device in the coolant reservoir indicates the level of coolant - information on the tank describes proper level



10 Drive the vehicle, let the engine cool completely then recheck the coolant level. Don't use rust inhibitors or additives. If only a small amount of coolant is required to bring the system up to the proper level, water can be used. However, repeated additions of water will dilute the antifreeze and water solution. In order to maintain the proper ratio of antifreeze and water, always top up the coolant level with the correct mixture. An empty plastic milk jug or bleach bottle makes an excellent container for mixing coolant.

11 If the coolant level drops consistently, there may be a leak in the system. Inspect the radiator, hoses, filler cap, drain plugs and water pump (see Section 9). If no leaks are noted, have the expansion tank cap pressure tested by a service station.

12 If you have to remove the expansion tank cap, wait until the engine has cooled completely, then wrap a thick cloth around the cap and unscrew it slowly, stopping if you hear a hissing noise. If coolant or steam escapes, let the engine cool down longer, then remove the cap.

13 Check the condition of the coolant as well. It should be relatively clear. If it's brown or rust colored, the system should be drained, flushed and refilled. Even if the coolant appears to be normal, the corrosion inhibitors wear out, so it must be replaced at the specified intervals.

Brake and clutch fluid

14 The brake master cylinder is mounted on the front of the power booster unit in the engine compartment. The hydraulic clutch master cylinder used on manual transmission vehicles is located next to the brake master cylinder.

15 The brake master cylinder and the clutch master cylinder share a common reservoir. To check the fluid level of either system, release the clips and pull up the plastic cover in the left-rear corner of the engine compartment and look at the MAX and MIN marks on the brake fluid reservoir **(see illustration)** . The fluid level can also be checked with the CBS display on the instrument panel.

4.15 Open the cover over the brake fluid reservoir to check the fluid level

16 If the level is low, wipe the top of the reservoir cover with a clean rag to prevent contamination of the brake system before lifting the cover.

17 Add only the specified brake fluid to the reservoir (refer to *Recommended lubricants and fluids* in this Chapter's Specifications or to your owner's manual). Mixing different types of brake fluid can damage the system. Fill the brake master cylinder reservoir only to the MAX line. **Warning:** *Use caution when filling the reservoir - brake fluid can harm your eyes and damage painted surfaces. Do not use brake fluid that is more than one year old or has been left open. Brake fluid absorbs moisture from the air. Excess moisture can cause a dangerous loss of braking.*

18 While the reservoir cap is removed, inspect the master cylinder reservoir for contamination. If deposits, dirt particles or water droplets are present, the system should be drained and refilled.

19 After filling the reservoir to the proper level, make sure the lid is properly seated to prevent fluid leakage.

20 The fluid in the brake master cylinder will drop slightly as the brake pads at each wheel wear down during normal operation. If the master cylinder requires repeated replenishing to keep it at the proper level, this is an indication of leakage in the brake or clutch system, which should be corrected immediately. If the brake system shows an indication of leakage, check all brake lines and connections, along with the calipers, wheel cylinders and booster (see Section 13 for more information). If the hydraulic clutch system shows an indication of leakage, check all clutch lines and connections, along with the clutch release cylinder (see Chapter 8 for more information).

21 If, upon checking the brake or clutch master cylinder fluid level, you discover the reservoir empty or nearly empty, the systems should be bled (see Chapters 8 and 9).

Windshield washer fluid

22 Fluid for the windshield washer system is stored in a plastic reservoir located at the right rear corner of the engine compartment **(see illustration)** .

4.22 Use only fluid designated for the purpose when filling the windshield washer tank

23 In milder climates, plain water can be used in the reservoir, but it should be kept no more than 2/3 full to allow for expansion if the water freezes. In colder climates, use windshield washer system antifreeze, available at any auto parts store, to lower the freezing point of the fluid. Mix the antifreeze with water in accordance with the manufacturer's directions on the container. **Caution:** *Do not use cooling system antifreeze - it will damage the vehicle's paint.*

Power steering fluid

24 Check the power steering fluid level periodically to avoid steering system problems, such as damage to the pump. **Caution:** *DO NOT hold* the steering *wheel against either stop (extreme left or right turn) for more than five seconds. If you do, the power steering pump could be damaged.*

25 The power steering reservoir, located at the left-rear corner of the engine compartment has a dipstick in the cap **(see illustration)** . There are two types of fluid for this reservoir - the color and label of the cap indicates the type to use for your vehicle.

4.25 Power steering fluid reservoir

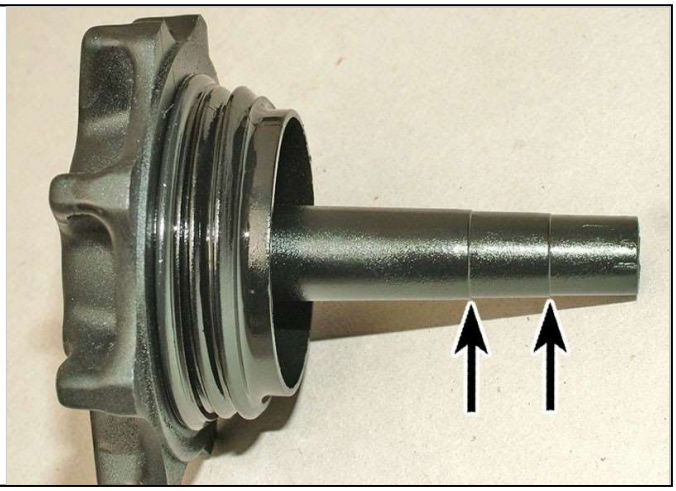
26 Park the vehicle on level ground and apply the parking brake.

27 Run the engine until it has reached normal operating temperature. With the engine at idle, turn the steering wheel back and forth about 10 times to get any air out of the steering system. Shut the engine off with the

wheels in the straight-ahead position.

28 Note the fluid level on the cap/dipstick. It should be between the two marks **(see illustration).**

4.28 The fluid level is indicated on the marked dipstick attached to the cap



29 Add small amounts of fluid until the level is correct. **Caution:** *Do not overfill the reservoir. If too much fluid is added, remove the excess with a clean syringe or suction pump.*

30 Check the power steering hoses and connections for leaks and wear.