25 Coolant replacement

Cooling system draining

Warning:
Wait until the engine is cold before starting this procedure. Do not allow antifreeze to come in contact with your skin, or with the painted surfaces of the car. Rinse off spills immediately with plenty of water. Never leave antifreeze lying around in an open container, or in a puddle in the driveway or on the garage floor. Children and pets are attracted by its sweet smell, but antifreeze can be fatal if ingested.

1 With the engine completely cold, cover the expansion tank cap with a rag, and slowly turn the cap counterclockwise to relieve the pressure in the cooling system (a hissing sound may be heard). Wait until all pressure in the system is released, then continue to turn the cap until it can be removed.

2 Unscrew the bleed screw from the top of the hose coupling above the expansion tank **(see illustration).**

25.2 Unscrew the bleed screw

3 Raise the front of the vehicle and support it securely on jackstands. Remove the retaining screws/clips and remove the splash shield from beneath the engine **(see illustration)** .

25.3 Engine splash shield fasteners

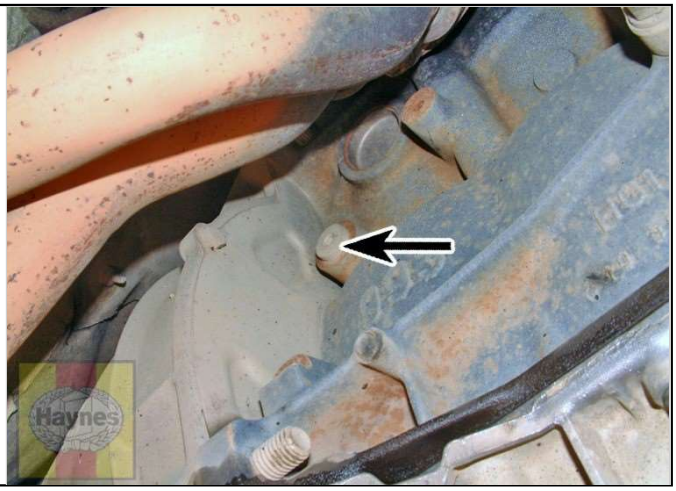
4 Position a suitable container beneath the drain plugs on the base of the radiator and the expansion tank. Unscrew the drain plugs and allow the coolant to drain into the container **(see illustrations).**

25.4a Open the expansion tank drain plug . . .

25.4b . . . and the radiator drain plug

5 To fully drain the system, also unscrew the coolant drain plug from the right-hand side of the cylinder block and allow the remainder of the coolant to drain into the container **(see illustration).**

25.5 The cylinder block drain plug is located on the right-hand side



6 If the coolant has been drained for a reason other than replacement, then provided it is clean and less than two years old, it can be re-used, though this is not recommended.

7 Once all the coolant has drained, install the bleed screw and the radiator drain plug; tighten both of them securely. Install a new gasket to the block drain plug and tighten it to the torque listed in this Chapter's Specifications .

Cooling system flushing

8 If coolant replacement has been neglected, or if the antifreeze mixture has become diluted, then in time, the cooling system may gradually lose efficiency, as the coolant passages become restricted due to rust, scale deposits, and other sediment. To restore cooling system efficiency, flush the cooling system.

9 The radiator should be flushed independently of the engine, to avoid unnecessary contamination.

Radiator flushing

10 To flush the radiator, disconnect the top and bottom hoses and any other relevant hoses from the radiator, with reference to Chapter 3 .

11 Insert a garden hose into the radiator top inlet. Direct a flow of clean water through the radiator, and continue flushing until clean water emerges from the radiator bottom outlet.

12 If after a reasonable period, the water still does not run clear, the radiator can be flushed with a good proprietary cooling system cleaning agent. It is important that their manufacturer's instructions are followed carefully. If the contamination is particularly bad, insert the hose in the radiator bottom outlet, and reverse-flush the radiator.

Engine flushing

13 Fill the cooling system with clean water, following the *Refilling* procedure (see Step 17).

14 Start the engine and allow it to reach normal operating temperature, then rev up the engine a few times.

15 Turn the engine off and allow it to cool completely, then drain the system as described earlier.

16 Repeat Steps 13 through 15 until the water being drained is free of contaminants.

Cooling system filling

17 Before attempting to fill the cooling system, make sure that all hoses and clamps are in good condition, and that the clamps are tight and the radiator and cylinder block drain plugs are securely tightened. Note that an antifreeze mixture must be used all year round, to prevent corrosion of the engine components (see following sub-Section).

18 Loosen the bleed screw on the upper radiator hose coupling **(see illustration 25.2).**

19 Turn on the ignition, and set the heater control to maximum temperature, with the fan speed set to low. This opens the heating valves.

20 Remove the expansion tank filler cap. Fill the system by slowly pouring the coolant into the expansion tank to prevent airlocks from forming.

21 If the coolant is being replaced, begin by pouring in a couple of liters of water, followed by the correct quantity of antifreeze, then top-up with more water. **Note** *: Use of a large clean bucket to pre-mix the coolant with the correct amount of water is best.*

22 As soon as coolant free from air bubbles emerges from the bleed screw, tighten the screw securely.

23 Once the level in the expansion tank starts to rise, squeeze the radiator top and bottom hoses to help expel any trapped air in the system. Once all the air is expelled, top-up the coolant level to the MAX mark and install the expansion tank cap.

24 Start the engine and run it until it reaches normal operating temperature, then stop the engine and allow it to cool.

25 Check for leaks, particularly around disturbed components. Check the coolant level in the expansion tank, and top-up if necessary. Note that the system must be cold before an accurate level is indicated in the expansion tank. If the expansion tank cap is removed while the engine is still warm, cover the cap with a thick cloth, and unscrew the cap slowly to gradually relieve the system pressure (a hissing sound will normally be heard). Wait until all pressure remaining in the system is released, then continue to turn the cap until it can be removed.

Antifreeze mixture

26 The antifreeze should always be replaced at the specified intervals. This is necessary not only to maintain the antifreeze properties, but also to prevent corrosion which would otherwise occur as the corrosion inhibitors

become progressively less effective.

27 Always use a long-life ethylene-glycol based antifreeze which is suitable for use in mixed-metal cooling systems. The correct quantity of antifreeze is indicated in the Specifications at the beginning of the Chapter.

28 Before adding antifreeze, the cooling system should be completely drained, preferably flushed, and all hoses checked for condition and security.

29 After filling with antifreeze, a label should be attached to the expansion tank, stating the type and concentration of antifreeze used, and the date installed. Any subsequent topping-up should be made with the same type and concentration of antifreeze.

30 Do not use engine antifreeze in the windshield washer system because it will damage the paint; use a product labeled specifically for the windshield washer systems.