



Workshop Manual

Rolls-Royce & Bentley motor cars

Rolls-Royce Silver Spirit

Rolls-Royce Silver Spur

Rolls-Royce Corniche

Rolls-Royce Corniche II

Bentley Eight

Bentley Mulsanne

Bentley Mulsanne S

Bentley Turbo R

Bentley Continental

**Cars built from vehicle
identification number (VIN)
SCBZS0T03HCX20001
to
SCBZD00A2KCH29290
inclusive**

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Engine cooling system

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Issue record sheet

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Introduction

The sealed cooling system comprises a pressurized expansion bottle, a radiator, and a pump. Also, various passages and pipes convey the coolant around the system (see fig. L2-1).

A mixture containing equal amounts of approved coolant/anti-freeze and water should be used in the system at all times.

The coolant mixture in the system should always be maintained at the correct level and this must be checked at the intervals specified in the Service Schedule Manual, TSD 4702.

The coolant level can be checked at the translucent expansion bottle. The correct level should be between the MAX and MIN marks on the bottle. If a full check is to be carried out refer to page L3-3.

The cooling system is pressurized and the correct pressure is maintained by the expansion bottle pressure cap. **Removal of the pressure cap while the engine and radiator are still hot requires extreme care.**

The coolant pump is situated at the front of the

engine and is driven from the crankshaft by twin matched 'Vee' belts.

Coolant from the bottom of the radiator is pumped via transfer pipes and crankcase passages directly onto the outside of the 'wet' type engine cylinder liners and then into the cylinder heads. From the cylinder heads the coolant travels along transfer pipes and then flows past the thermostat to the top of the radiator.

When the engine is cold the thermostat is closed. Therefore, the coolant by-passes the radiator matrix and is recirculated through the engine to reduce the warm-up period. Once normal operating temperature is attained, the thermostat opens and the coolant is directed to the radiator.

The temperature of the coolant is registered on the gauge situated on the facia. Whenever the ignition is on, a transmitter situated in the thermostat housing signals the coolant temperature to the gauge.

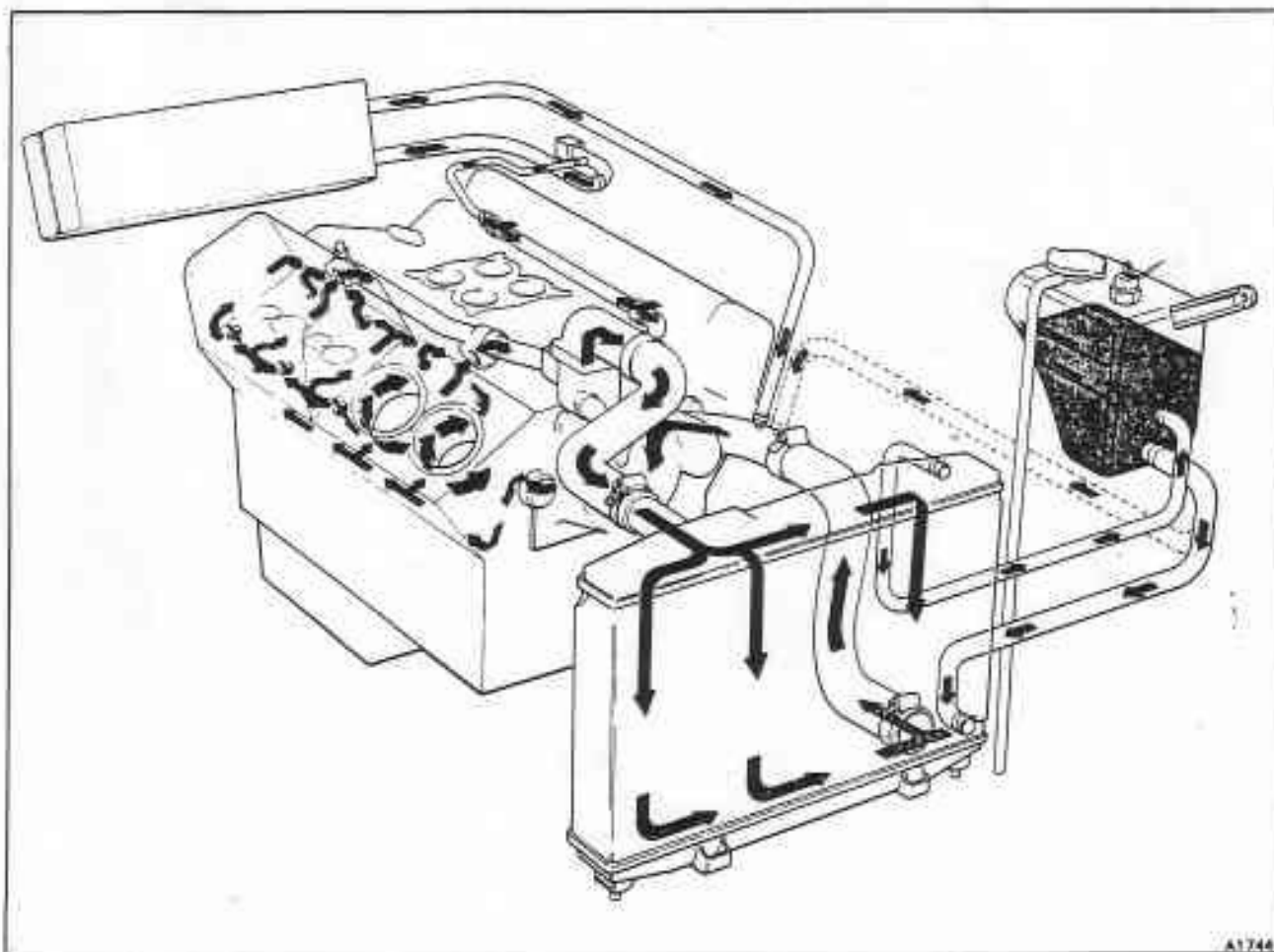


Fig. L2-1 Diagrammatic view of the cooling system Dotted line – 1989 model year cars



Coolant

The cooling system should contain a 50% mixture of an approved coolant/anti-freeze and water. This mixture not only provides frost protection down to a temperature of -37°C (-35°F), but it also prevents corrosion of the cooling passages.

Refer to the Service Schedule Manual, TSD 4702, to obtain the specified service intervals for renewing the coolant, fitting a new thermostat, and reverse flushing the system.

Except in an emergency, water must not be used to either fill or top-up the cooling system. If a situation

does arise where water is used, the coolant mixture must be corrected as soon as possible, otherwise corrosion damage will occur to the engine coolant passages.

Coolant/anti-freeze

The trade name of the coolant/anti-freeze is ICI 007/400F (obtainable under a Rolls-Royce and Bentley label) and should be used all year round. Do not mix ICI 007/400F or top-up with any other brand of coolant/anti-freeze.

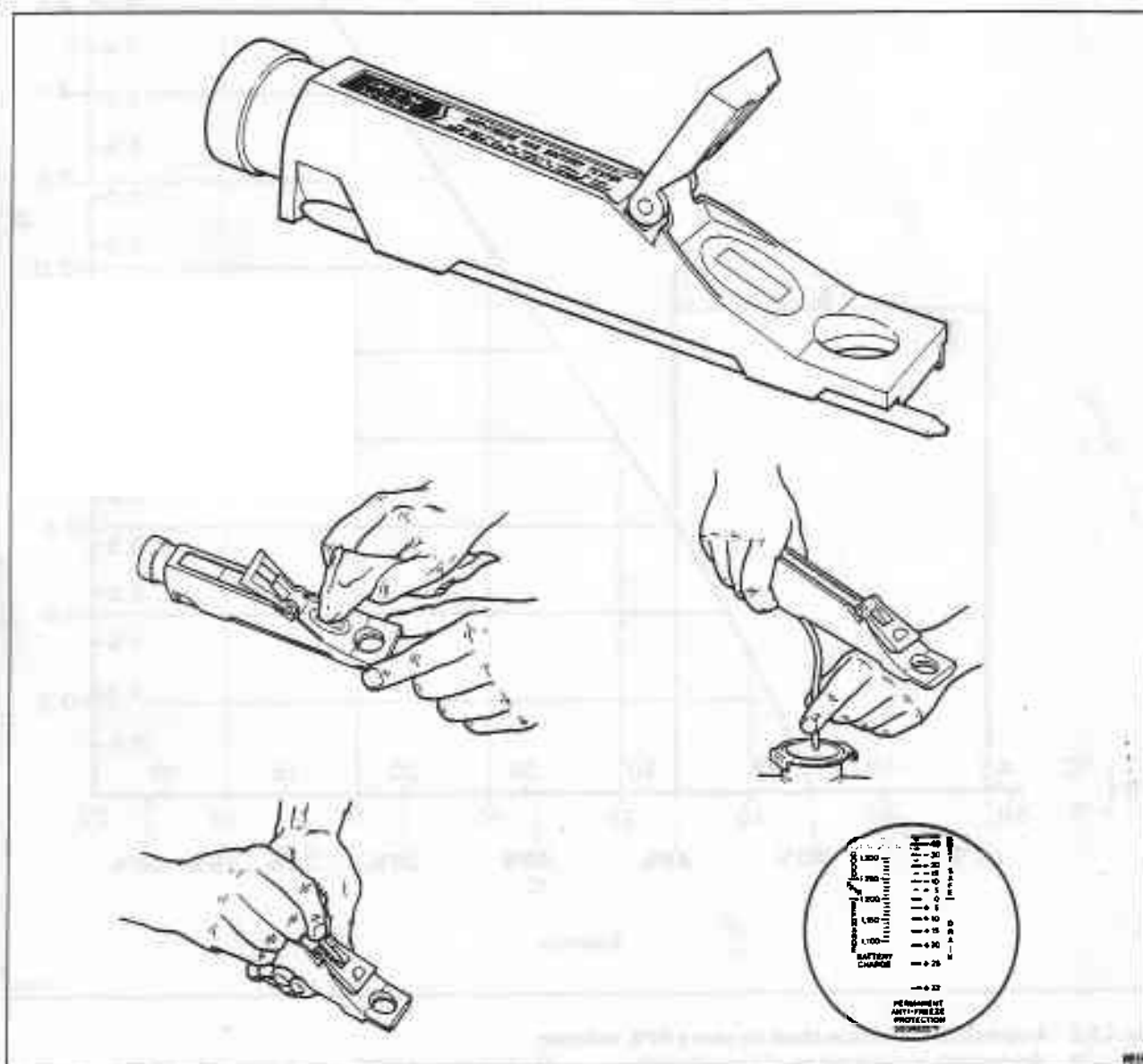


Fig. L3-1 Checking the anti-freeze concentration

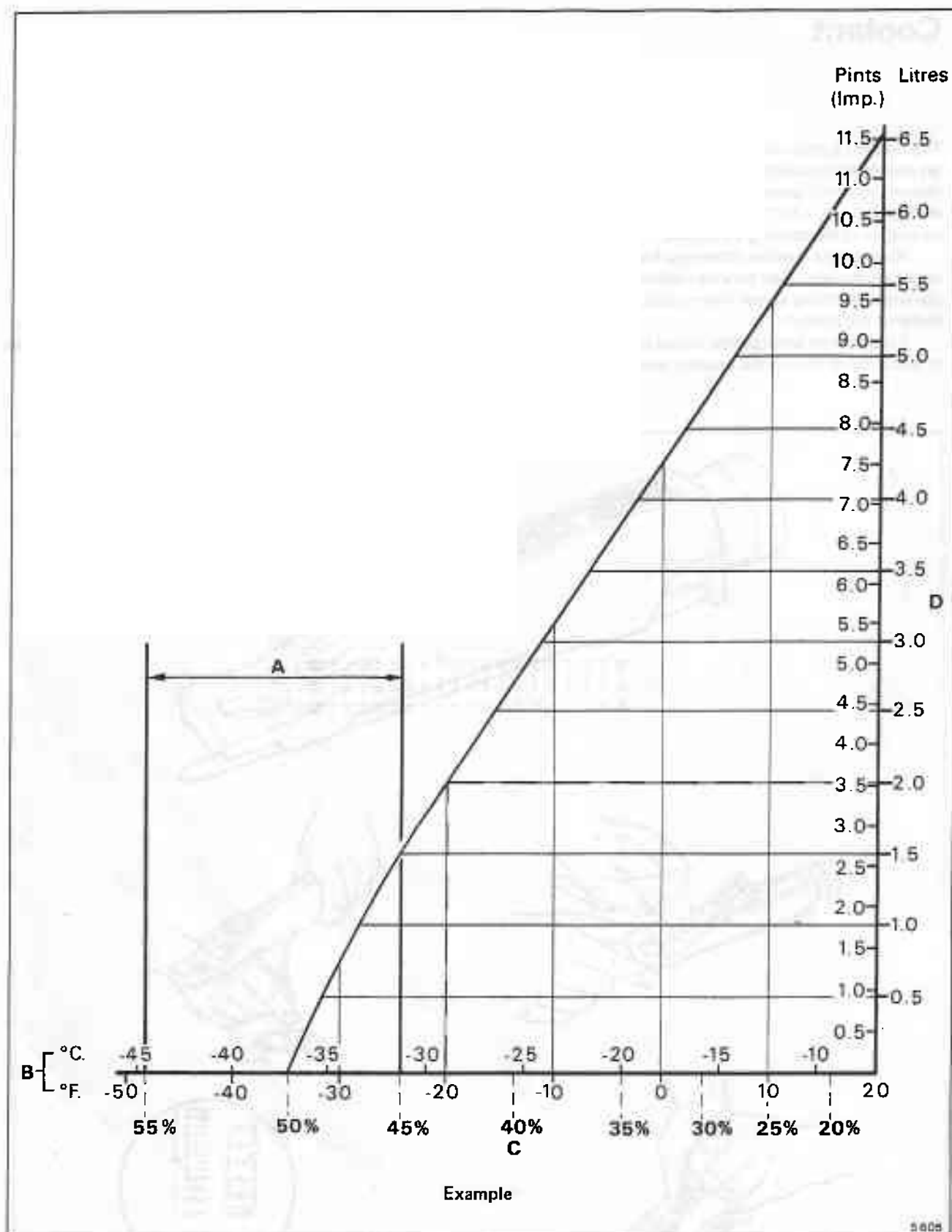


Fig. L3-2 Anti-freeze correction chart to give a 50% solution

- A Acceptable service range of concentration
- B Freezing point of coolant
- C Percentage concentration

- D Volume of 100% anti-freeze to be added to maintain a 50% solution after removal of the same volume of old coolant first



Anti-freeze concentration – To check

If the strength of the coolant requires increasing, sufficient coolant should be drained from the radiator and replaced with undiluted anti-freeze. Afterwards run the engine until normal operating temperature is attained and the anti-freeze has become thoroughly mixed with the coolant. Stop the engine and again check the concentration in the expansion bottle.

An acceptable level of anti-freeze concentration is between 45% and 55%. Therefore, as a hydrometer may be inaccurate where readings above 40% are expected, it is recommended that a refractometer (see fig. L3-1) is used in the following manner.

1. Lift the plastic cover on the refractometer (tester) to expose both the measuring window and bottom of the plastic cover.
2. Thoroughly clean both exposed surfaces with clean water and then wipe them dry with a clean soft cloth.
3. Carry out the usual workshop safety precautions.
4. Raise the bonnet and remove the expansion bottle cap.
5. Release the tip of the clear plastic tube from the tester and insert it into the coolant in the expansion bottle.
6. Press and then release the bulb on the end of the plastic tube. This will draw a small quantity of coolant into the tube.
7. Withdraw the test equipment and bend the end of the plastic tube around the tester so that the tip of the tube can be inserted into the cover plate opening.
8. Press the bulb on the end of the plastic tube and eject a few drops of coolant onto the measuring surface.
9. Point the tester towards the light and look into the eye piece.

Do not open the plastic cover when taking a reading. Evaporation of water from the fluid sample being tested can affect the reading.

10. The anti-freeze protection reading is at the point where the dividing line between light and dark (edge of shadow) crosses the scale. The anti-freeze reading is on the right-hand scale.

Note The tester temperature scale is reversed from a standard thermometer. Below zero readings are on the upper half of the scale.

11. If the temperature reading is higher (further down on the scale) than -31°C (-24°F) it will be necessary to refer to figure L3-2 and add the appropriate amount of anti-freeze to the system.

Example

A tester reading of -29°C (-20°F) is equal to an anti-freeze concentration of 43% and is outside the service limits. Follow the line upwards until the angled line is reached, then trace the horizontal line to the scale on the right-hand side of the graph to find that 2 litres (3.5 Imp pt, 4.2 US pt) of coolant should be removed from a full system and replaced with undiluted anti-freeze.

Once the additional concentrated anti-freeze has mixed with the existing coolant the percentage concentration will be 50%.

12. After adding undiluted anti-freeze, allow the engine to operate normally for a few days before carrying out further checks to determine the percentage of anti-freeze concentration. This will allow time for the anti-freeze to be thoroughly mixed with the existing coolant.

The anti-freeze concentration should be checked in both the expansion bottle and the radiator as approximately 0,28 litres (0.5 Imp pt, 0.6 US pt) is transferred to and from the expansion bottle each time the engine is warmed-up and then left to cool. **Failure to allow the new anti-freeze to circulate properly will result in a false reading.**

Note If a refractometer is not available and a hydrometer has to be used a scale reading of between 1,06 and 1,07 should be obtained, with the coolant at room temperature, for the mixture to be correct.

Coolant level – To check and top-up

Warning The cooling system becomes pressurized during engine running. Therefore, extreme care should be taken when removing the pressure cap from an engine that is warm or at normal running temperature.

Routine check

To check the coolant level outside a normal service schedule and when no cooling/heating system fault is reported or suspected, proceed as follows.

1. If the engine is hot ensure that the coolant level in the translucent expansion bottle is at the MAX mark. Top-up if necessary and replace the expansion bottle cap.
2. If the engine is cold ensure that the coolant level in the translucent expansion bottle is half-way between the MIN and MAX marks. Top-up if necessary and replace the expansion bottle cap.
3. If the coolant level in the expansion bottle is either below the MIN mark or there is no coolant in the expansion bottle, carry out the Full check procedure.

Full check

To check the coolant level during a service schedule and/or when a cooling/heating system fault is reported or suspected, proceed as follows.

1. Carry out the usual workshop safety precautions.
2. Check the coolant level in the translucent expansion bottle and if the level is low or the bottle is empty, allow the engine to cool. Then, remove the pressure cap from the expansion bottle.

To remove the cap, turn it slowly anti-clockwise until a check position is reached. Wait for any pressure in the system to be exhausted, then continue to turn the cap until it is released.

3. Fill the expansion bottle to the MAX level mark with the approved coolant mixture.
4. Disconnect the radiator to expansion bottle hose from the radiator and hold the hose above the level of the radiator top tank.
5. Remove the bleed plug from the top of the radiator, by unscrewing it anti-clockwise.



6. Using a small funnel or a suitable size hose, add the approved coolant mixture to the radiator through the bleed plug aperture until coolant flows from the radiator stub pipe.
7. Reconnect the hose to the stub pipe.
8. Fit the radiator bleed plug.
9. Start and run the engine. Then, turn the air conditioning system function control fully clockwise to the defrost position. This procedure opens the heater system water tap.
10. Run the engine for a minimum of 10 minutes with the pressure cap still removed. After 5 minutes, check that warm air is passing from the windscreen demister outlets.
11. Top-up the expansion bottle as necessary to ensure that the coolant in the bottle does not fall below the MIN level mark.
12. Switch off the ignition
13. Top-up the expansion bottle with the approved coolant mixture to approximately midway between the MAX and MIN level marks on the bottle.
14. Fit the pressure cap to the expansion bottle.

Cooling system – To drain

1. Carry out the usual workshop safety precautions.
2. Place a clean container beneath the radiator drain plug.
3. Remove the radiator drain plug.
4. Raise the bonnet and remove the expansion bottle pressure cap, allowing the coolant to drain into the container.
5. To complete the draining procedure, unscrew the crankcase drain plug(s).

Cars prior to 1989 model year, have one on either side of the crankcase.

1989 model year cars, have one on 'B' bank side only (see fig. L3-3).

Note To drain 'B' bank, it will be necessary to remove the engine dipstick tube assembly, to gain access to the drain plug. Then, it is important to plug the dipstick union to prevent water entering the engine oil sump.

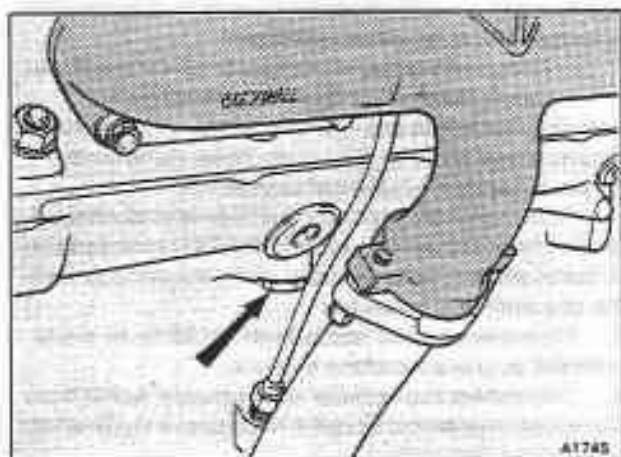


Fig. L3-3 Crankcase coolant drain plug

Cooling system – To fill

Warning The following procedure must be carried out exactly as described. Incorrect filling will create air locks within the engine and cause irreparable damage due to resultant overheating.

1. Carry out the usual workshop safety precautions.
2. Ensure that the crankcase drain plug(s) are fitted and tightened.
3. Ensure that the radiator drain plug is fitted.
4. Raise the bonnet and remove the expansion bottle pressure cap.
5. Fill the expansion bottle to the MAX level mark.
6. Disconnect the radiator to expansion bottle hose from the radiator, and hold the hose above the level of the radiator top tank.
7. Remove the bleed plug from the top of the radiator, by unscrewing it anti-clockwise.
8. Using a small funnel or a suitable size hose, fill the system using the correct coolant/anti-freeze and water mixture. Pour the mixture into the system slowly to avoid air locks.
9. When coolant flows from the radiator stub pipe, reconnect the hose.
10. Fit the radiator bleed plug.
11. Start and run the engine. Then, turn the air conditioning system function control fully clockwise to the defrost position. This procedure opens the heater system water tap.
12. Run the engine for a minimum of 10 minutes with the pressure cap still removed. After 5 minutes, check that warm air is passing from the demister outlets.
13. Top-up the expansion bottle as necessary to ensure that the coolant in the bottle does not fall below the MIN level mark.
14. Switch off the ignition.
15. Top-up the expansion bottle with the approved coolant mixture to approximately midway between the MAX and MIN level marks on the bottle.
16. Fit the pressure cap to the expansion bottle.

Cooling system – To flush

Under no circumstances should a strong alkaline compound or detergent be used to clean the cooling system. Such compounds have a detrimental chemical action on aluminium alloys.

1. Drain the coolant (see Cooling system – To drain).
- Radiator**
2. Remove the radiator top and bottom hoses.
3. Connect a waste pipe to the top connection on the radiator.
4. Apply mains water through the bottom connection to reverse flush the radiator until the water runs clear.
5. Examine the top and bottom radiator hoses and renew any that show signs of deterioration.
6. Turn off the water supply, disconnect the connections to the radiator and fit the top and bottom hoses.
- Engine**
7. Remove the top and bottom hoses connecting the radiator to the engine.



8. Unscrew and remove the crankcase drain plug(s).
Cars prior to 1989 model year, have one on either side of the crankcase.

1989 model year cars, have one on 'B' bank side only (see fig. L3-3).

Note To drain 'B' bank, it will be necessary to remove the engine dipstick tube assembly, to gain access to the drain plug. Then, it is important to plug the dipstick union to prevent water entering the engine oil sump.

9. Remove the thermostat (see Section L5) and again fit the outlet cover.

10. Produce a suitable adapter to fit into the cylinder block drain plug aperture and connect via a hose to the mains water supply.

11. Turn on the water and reverse flush the coolant passages until the water runs clear.

12. Repeat the operation to the drain plug aperture on the other side of the crankcase (if fitted).

13. Remove the flushing equipment.

14. Fit the drain plug(s), thermostat, and cover. Use a new thermostat cover gasket.

15. Examine all coolant hoses and renew any that show signs of deterioration.

Heater matrix

16. To flush the heater system, detach the matrix feed hose at the water tap and the return hose at the coolant pump connection.

17. Connect a waste pipe to the feed hose connection and a water main connection to the return connection.

18. Turn on the water and reverse flush the matrix until the water runs clear.

19. Turn off the water and remove the flushing equipment.

20. Examine all heater system hoses and renew any that show signs of deterioration.

Radiator assembly and expansion bottle

The radiator assembly and expansion bottle are mounted in the engine compartment, at the front of the car (see fig. L4-2).

Radiator assembly

This assembly is situated between the front of the engine and the radiator grille.

On cars other than Corniche/Continental, the bottom of the radiator is located in rubber mounts by two pegs and at the top by two clamping blocks.

On Corniche/Continental cars, the bottom of the radiator is located in rubber mounts by two pegs and at the top by two clips which attach to the top deflector panel.

Rubber hoses connect the inlet and outlet pipes of the radiator with their respective connections on the engine. Also, dependent on the model year of the car, either one or two rubber hoses connect to the expansion bottle. Worm drive clips are used to retain all the hoses.

Two transmission oil cooler pipes connect into the radiator bottom tank (see fig. L4-1).

Situated in the radiator are two plugs, a bleed/filler plug in the top tank and a drain plug in the bottom tank.

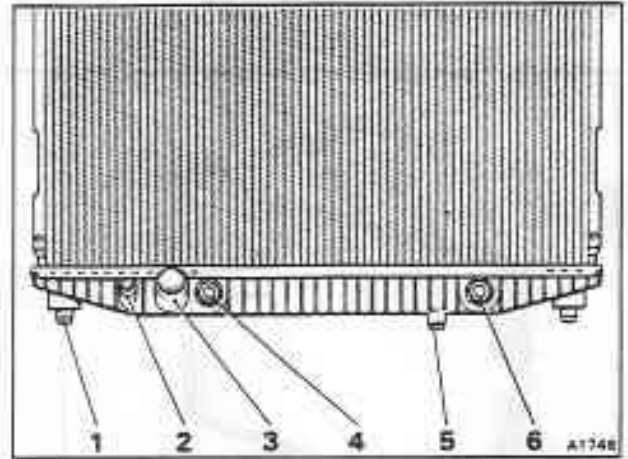


Fig. L4-1 Bottom of radiator assembly

- 1 Lower mount location peg (2)
- 2 Feed pipe connection from expansion bottle
– Cars prior to 1989 model year
- 3 Bottom hose outlet to engine
- 4 Oil connection to transmission
- 5 Drain plug
- 6 Oil connection from transmission

Radiator assembly – To remove and fit

1. Carry out the usual workshop safety precautions.
2. Remove the bonnet if necessary (see Chapter S).
3. Drain the coolant (see Section L3).
4. Slacken the worm drive clips securing the top hose to the thermostat outlet elbow and to the radiator. Free the joints and withdraw the hose. Blank the open connections.
5. Slacken the worm drive clips securing the bottom hose to the coolant pump and to the radiator. Free the joints and withdraw the hose. Blank the open connections.
6. Slacken the worm drive clip(s) securing the hose(s) from the expansion bottle to the radiator. Free the joint(s) and withdraw the hose(s).
7. Remove the two setscrews and clips which attach the air bleed hose to the top left-hand side of the radiator.
8. Unscrew the two pipe union connections from the bottom of the radiator (see fig. L4-1). One pipe conveys oil from the transmission to the radiator where it is cooled in a separate matrix within the base of the radiator. The other pipe returns the cooled oil to the transmission. Allow any transmission fluid that drains out to run into a clean container. Blank the open connections.
9. Secure a sheet of foam rubber to the radiator matrix inside the fan cowl. This will afford protection to the matrix when the fan assembly is withdrawn.
10. Unscrew the fan coupling from the coolant pump

spindle, noting that it has a left-hand thread (see fig. L4-3).

11. Withdraw the fan assembly.
12. On cars other than Corniche/Continental, remove the radiator clamping block setscrews. Collect the plates.

On Corniche/Continental cars, remove the setscrews securing the radiator top mounting clips. Collect the washers and clips.

Support the radiator assembly as the top mounts are removed.

13. Lift the radiator assembly from the bottom mounts.
14. Immediately the radiator is removed, secure blanks to the inlet and outlet connections and half fill the radiator with coolant.
15. Fit the assembly by reversing the procedure given for removal.

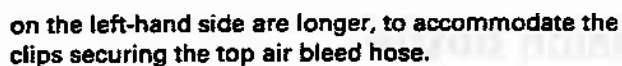
Note the special torque tightening figures (see Section L7), and the torque spanner RH 9747 necessary for securing the fan coupling.

16. Check and adjust the transmission oil level (see Chapter T).

Radiator assembly – To dismantle and assemble

1. Remove the setscrews securing the fan cowl to the radiator. Collect the washers and withdraw both the upper and lower halves of the cowl.

Note that on four door cars the top two setscrews



2. Upon assembly, inspect the foam rubber strips secured to the edges of the fan cowl; renew if necessary.

3. Fit the two halves of the fan cowl (see fig. L4-4), ensuring that on four door cars the clip on each half of

the cowl engages in the bracket on the radiator.

4. Ensure that the two hose securing clips are fitted to the top two setscrews on the left-hand side (four door cars only).

5. Screw in the setscrews until the cowl faces about the radiator, then tighten each setscrew between a half and a full turn.



Fig. L4-2 Radiator and expansion bottle Inset – Fan cowl (Two door cars) Dotted line – 1989 model year cars

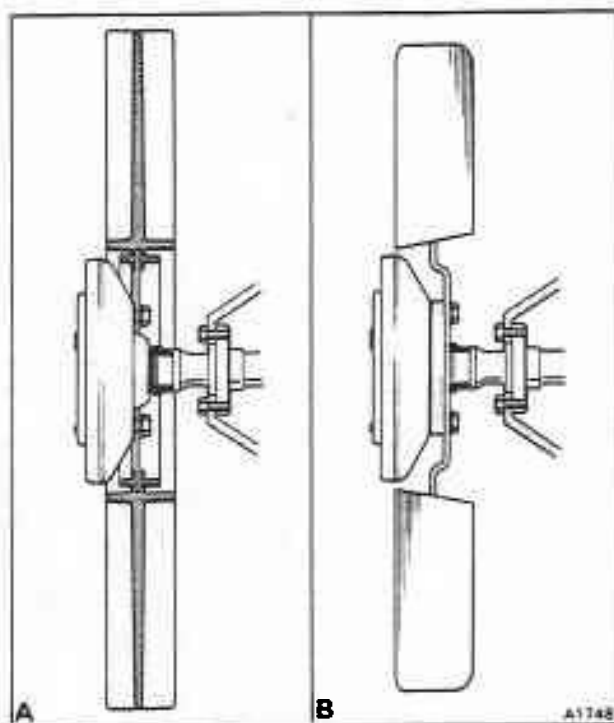


Fig. L4-3 Fan assembly retention

- A Four door cars
- B Two door cars

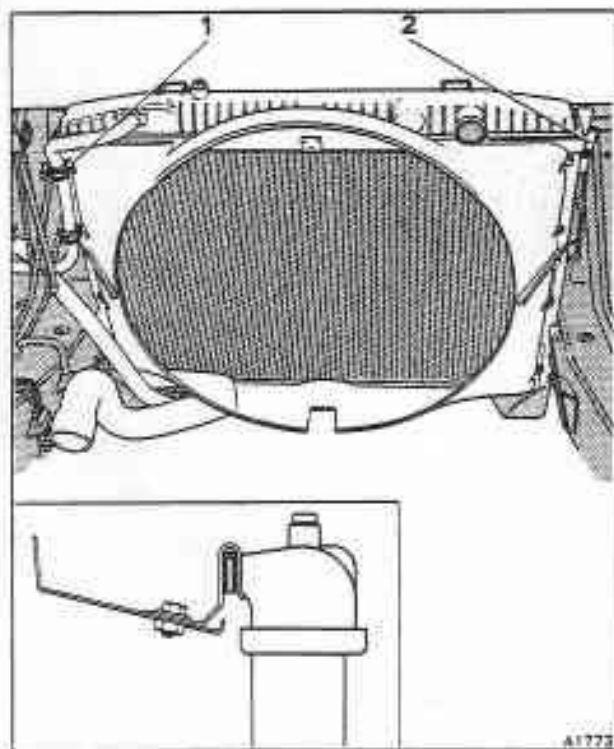


Fig. L4-4 Mounting points for radiator and fan cowl

- 1 Fan cowl retaining setscrews
- 2 Radiator top mount
- Inset – Radiator top mounts (Two door cars)

Radiator – To reverse flush Refer to Section L3 – Coolant.

Expansion bottle

The plastic expansion bottle is situated on the left-hand valance, forward of the wheel arch.

The bottle is fitted with a pressure cap that operates as both a pressure and vacuum relief valve. The valve controls the pressure in the system to 1,03 bar (15 lbf/in²). In addition, the vacuum relief valve opens up to 0,1 bar (1.45 lbf/in²) below atmospheric pressure.

The coolant level indicator float switch is positioned in the top of the bottle.

Cars prior to 1989 model year

The bottle has two connections to the radiator, a feed pipe to the bottom tank and an air bleed pipe to the top tank. Also, an overflow pipe connection to atmosphere.

1989 model year cars

The bottle has a feed pipe to the coolant pump elbow and an air bleed pipe to the top tank of the radiator. Also, an overflow pipe connection to atmosphere.

Expansion bottle – To remove and fit

1. Unscrew the worm drive clips securing the hoses to the expansion bottle. Free the joints and withdraw the hoses. Blank the open ends of the hoses to prevent coolant draining from the radiator. Drain the coolant from the bottle into a clean container.
2. Disconnect the electrical leads from the coolant level indicator switch.
3. Support the expansion bottle and remove the mounting setscrews. Collect the washers.
Withdraw the expansion bottle.
4. Fit the expansion bottle by reversing the procedure for removal, noting the coolant topping-up procedure given in Section L3.

Cooling system booster fans

Twin booster fans are located between the radiator grille and the refrigeration condenser. They are switched from either engine coolant temperature, or from refrigerant pressure.

The booster fans are electrically operated assemblies. For additional information refer to Electrical Manuals, TSD 4701 (prior to 1989 model year) or TSD 4848 (1989 model year).



Thermostat housing assembly

The thermostat housing is situated at the forward end of the induction manifold (see fig. L5-1). It is connected to the induction manifold by transfer pipes.

All cars are fitted with the same thermostat housing. However, various thermostat outlet elbows can be fitted, dependent upon the specification of the vehicle.

A number of electrical switches are fitted into the thermostat housing dependent upon the specification of the vehicle. For service details of these switches refer to Electrical Manuals, TSD 4701 (prior to 1989 model year) or TSD 4848 (1989 model year).

Thermostat

The engine cooling system incorporates a wax element thermostat (see fig. L5-2). When the engine is started from cold the thermostat is in the closed position. This reduces the engine warm-up time by recirculating the coolant leaving the engine back to the coolant pump, thus by-passing the radiator. As the coolant approaches its normal working temperature the thermostat opens and allows the engine coolant to flow through the radiator. When the thermostat is in the fully open position it closes the by-pass circuit.

On top of the thermostat is the bridge piece and into this is secured the fixed piston rod.

The valve assembly containing the wax capsule seat, is on the underside of the top flange. It is biased in this position by a spring and retained by a 'U' piece.

A second outer 'U' piece (by-pass valve) loaded by a light poundage spring, is fitted to the bottom of the thermostat to operate the by-pass circuit.

The top flange incorporates a vent hole containing a jiggle pin. This vent allows air to escape when the cooling system is being filled. When the system is operating the jiggle pin rises to close the vent.

Also situated around the top flange are fusible plugs. These plugs melt at approximately 124°C (255°F) and provide vent holes for the coolant, in the event of the thermostat not opening, to control the coolant temperature.

The thermostat operates when the coolant temperature approaches between 85°C and 89°C (185°F and 192°F). At this point the wax in the capsule changes its state and expands rapidly. The expansion compresses the rubber sleeve forcing it off the end of the tapered piston rod. As the sleeve is an integral part of the main valve assembly, this movement is transmitted to the valve moving it downwards off its seat. A small quantity of warm coolant is then allowed to pass between the valve and its seat to the radiator matrix, where it is cooled.

Further rises in engine coolant temperature cause a progressive opening of the main valve until a temperature of between 99°C and 102°C (210°F) and

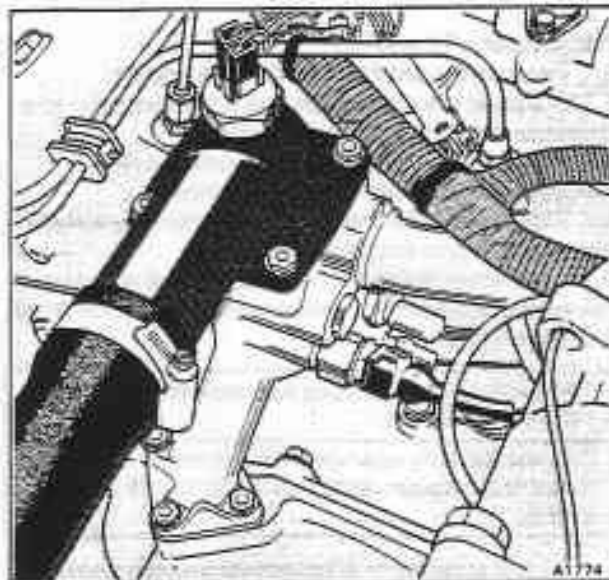


Fig. L5-1 Thermostat housing assembly

215°F) is attained. At these temperatures the main valve is fully open (maximum travel 14,27 mm (0.562 in)).

When the main valve assembly has opened 10 mm (0.375 in), the by-pass valve on the base of the thermostat assembly will have moved under spring pressure sufficiently to close the coolant by-pass circuit and all coolant is then directed to the radiator matrix.

A decrease in engine temperature will cause the wax in the capsule to contract and, due to spring pressure, close the main valve and also open the by-pass circuit.

The thermostat main valve assembly, being sensitive to the temperature of the surrounding coolant, controls the flow of coolant to the radiator matrix to suit the requirements of the engine.

At the service intervals quoted in the Service Schedule Manual, TSD 4702, a new thermostat should be fitted.

Do not attempt to adjust the thermostat.

Thermostat – To remove

1. Carry out the usual workshop safety precautions.
2. Drain approximately half the radiator coolant into a clean container (see Section L3).
3. Disconnect the electrical connection from the thermostat outlet elbow.
4. Remove the setscrews securing the outlet elbow to the thermostat housing. Collect the washers.
5. Free the joint and lift off the thermostat cover.
6. Lift the thermostat out of the housing.



Thermostat – To fit

Fit the thermostat by reversing the procedure given for removal, noting the following.

1. Ensure that the joint faces are clean.
2. Always use a new gasket.
3. Fill the cooling system as described in Section L3.

Thermostat – To test

1. Remove the thermostat from the engine.
2. Suspend the thermostat and a thermometer in a container filled with engine coolant.
3. Ensure that neither the thermostat nor the thermometer are touching the container.
4. Slowly heat the coolant, stirring continuously to ensure a uniform temperature.
5. Note when the thermostat opens and compare the temperature with the information contained in the following table.

Thermostat starts to open between 80°C and 89°C (176°F and 192°F).
--

Thermostat fully open (maximum travel 14,27 mm (0.562 in)) between 99°C and 102°C (210°F and 215°F).
--

Do not attempt to adjust the thermostat setting.

If its operation is suspect, fit a new unit.

6. Allow the test equipment to cool and remove the thermostat.
7. Examine the condition of the fusible plugs situated around the top of the thermostat body (see fig. L5-2). Ensure that they are intact and in good condition.

Thermostat housing – To remove and fit

1. Carry out the usual workshop safety precautions.
2. Drain the coolant (see Section L3).
3. Disconnect the electrical connections from the various switches in the thermostat housing and outlet elbow. Label each connection to facilitate assembly.
4. Slacken the worm drive clip securing the rubber outlet hose. Free the joint and withdraw the hose.
5. Remove the three setscrews retaining the thermostat by-pass pipe to the coolant pump.
6. Remove the setscrew and retaining plate securing 'B' bank water transfer pipe to the thermostat housing.
7. Unscrew the setscrews securing the water transfer pipes to the inlet manifold.
8. Free the joints and manoeuvre the thermostat housing away from the water transfer pipes. Slight resistance may be encountered when withdrawing the housing due to the rubber sealing rings situated on the transfer pipes.
9. Fit the thermostat housing by reversing the procedure given for removal, noting that new gaskets and sealing rings must be used.
10. Fill the cooling system as described in Section L3.

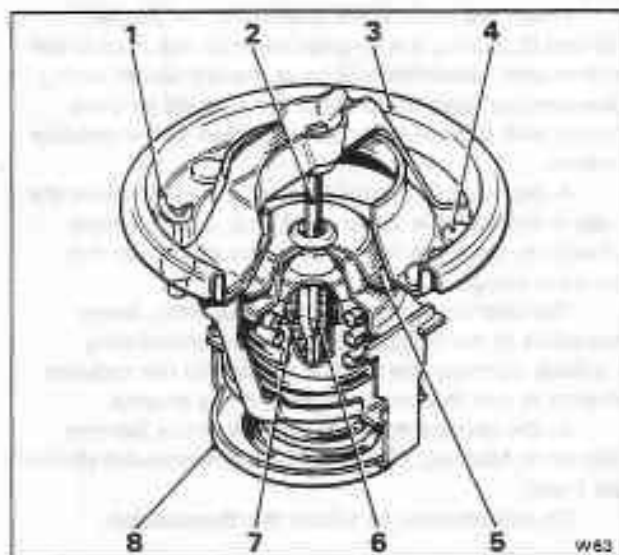


Fig. L5-2 Thermostat

- 1 Jiggle pin
- 2 Tapered piston rod
- 3 Top flange
- 4 Fusible plug
- 5 Main valve
- 6 Rubber sleeve
- 7 Wax filled element
- 8 By-pass valve

Coolant pump

The coolant pump is situated at the front of the engine and is belt driven from the crankshaft pulley.

The pump draws coolant from the bottom tank of the radiator assembly and pumps it via the coolant galleries in the crankcase to circulate directly onto the outside of the cylinders liners. The coolant then circulates through galleries in the top of the crankcase, via the cylinder heads and transfer pipes to the thermostat housing.

Dependent upon the temperature in the thermostat housing, the coolant either by-passes the radiator (because the thermostat is closed) and recirculates through the engine, or passes through the thermostat to be cooled in the radiator assembly.

The coolant pump is fitted to the engine as an individual component. When either overhaul or maintenance work becomes necessary it is not

essential to remove the complete assembly, the pump body can remain fitted to the engine and all moving parts withdrawn as a sub-assembly (see fig. L6-1).

If the coolant pump requires overhaul it is recommended that a service replacement unit is fitted.

However, if this is not possible for any reason the existing assembly can be overhauled.

Impeller and bearing assembly – To remove
(see fig. L6-1)

1. Drive the car onto a ramp and carry out the usual workshop safety precautions.
2. Raise the ramp to a convenient working height.
3. Drain the coolant (see Section L3).
4. Secure a piece of foam rubber inside the fan cowl to protect the radiator matrix.

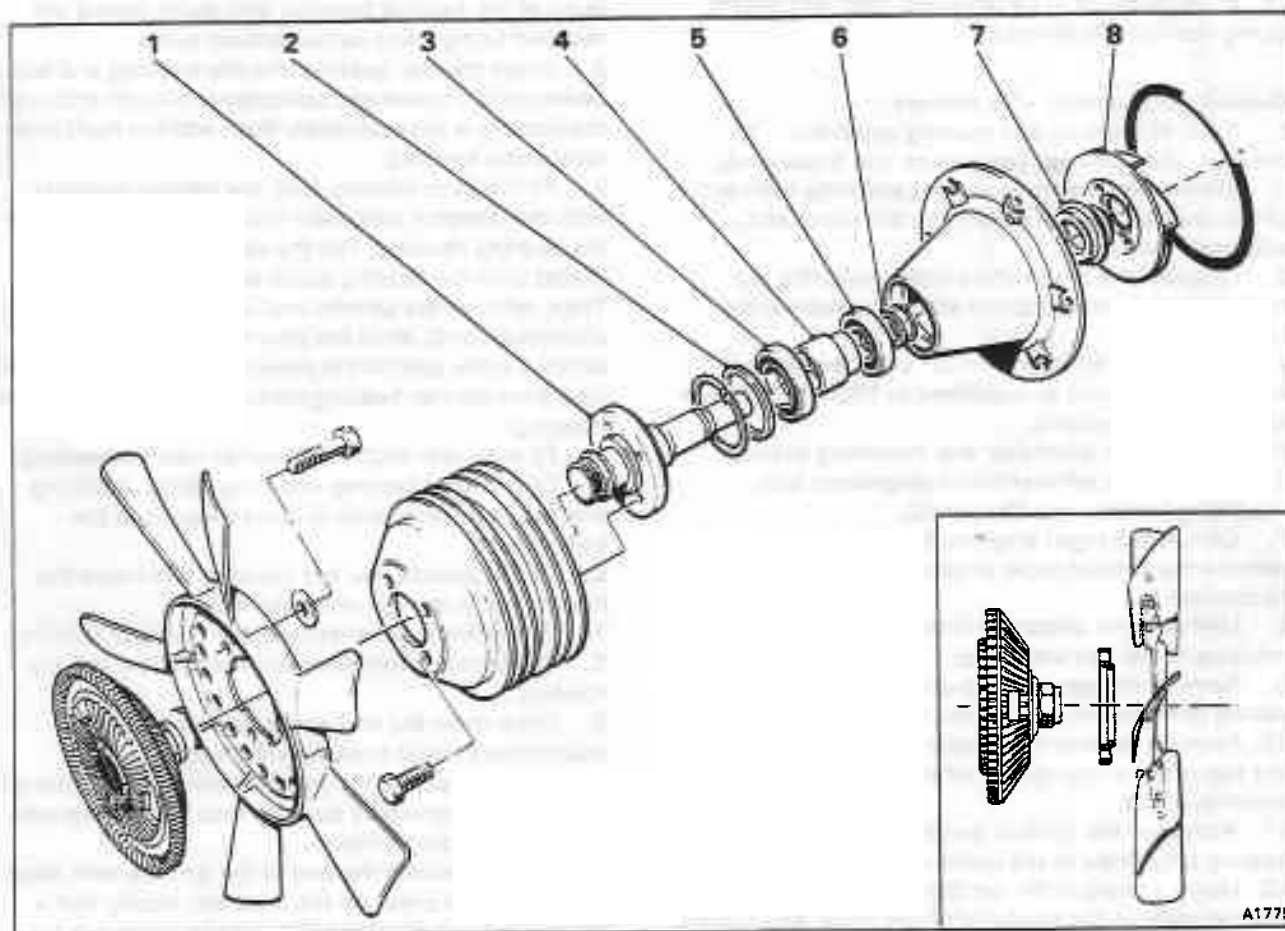


Fig. L6-1 Coolant pump

- | | |
|---------------------------|---------------------------|
| 1 Spindle | 5 Rear bearing |
| 2 Abutment washer (outer) | 6 Abutment washer (inner) |
| 3 Front bearing | 7 Pump seal |
| 4 Distance piece | 8 Impeller |

Inset – Corniche/Continental cars only



5. Unscrew the fan coupling from the spindle, noting that it has a left-hand thread.

6. Withdraw the fan assembly and lift it upwards past the refrigeration pump.

Note With the exception of Corniche/Continental cars, a plastic type engine cooling fan is fitted. Corniche/Continental cars have an aluminium type engine cooling fan and a spacing washer fitted between the fan and coupling.

7. Slacken, but do not remove the setscrews securing the coolant pump pulley.

8. Release the tension of the drive belts. Remove the belts.

9. Carefully ease the coolant pump pulley forward to reveal the bearing housing setscrews.

10. Remove the setscrews that secure the bearing housing to the coolant pump casing.

11. Withdraw the bearing housing containing all the moving parts.

At this stage of the removal procedure it is possible to remove the pulley assembly from the spindle spigot.

12. Remove and discard the rubber 'O' ring from the pump casing.

13. If the casing is to be removed, refer to Coolant pump casing – To remove.

Coolant pump casing – To remove

1. Refer to Impeller and bearing assembly – To remove, and carry out Operations 1 to 8 inclusive.

2. Slacken the worm drive clips securing both ends of the radiator bottom hose. Free the joints and withdraw the hose.

3. Unscrew the worm drive clip(s) securing the hose(s) to the coolant pump elbow. Withdraw the hose(s).

4. If the car is fitted with an air injection pump it should be removed as described in TSD 4737, Engine Management Systems.

5. Remove the alternator and mounting bracket.

6. Remove the refrigeration compressor and mounting bracket (see Chapter C).

7. On turbocharged engines, it will be necessary to remove the turbocharger exhaust outlet pipe and heatshield.

8. Unscrew the setscrews retaining the thermostat housing to the coolant pump.

9. Remove the setscrews that secure the pump casing to the crankcase. Collect the washers.

10. Remove the two remaining setscrews situated at the top of the pump casing which are fitted from the crankcase side.

11. Withdraw the coolant pump casing and the sealing strip fitted to the lower edge.

12. Using a sharp knife, cut the paper gasket across the top edge of the crankshaft front cover and discard this portion of the gasket.

Coolant pump – To dismantle

1. Remove the impeller and bearing assembly from the coolant pump casing (refer to Impeller and bearing assembly – To remove).

2. Withdraw the impeller from the pump shaft using the special extractor RH 7098.

3. Remove the rear circlip from the spindle and tap out the spindle from the housing using a mallet and aluminium drift. Turn the housing over and remove the circlip retaining the front bearing. Then, tap out both the front and rear bearings, together with the distance piece, and abutment washers. Discard the pump seal.

Coolant pump – To inspect

1. Examine the spindle for wear and damage.

2. Examine the bearings for free movement and the inner bores for wear and damage.

Normally if the coolant pump is faulty a service exchange unit should be fitted. If this is not available, proceed as follows.

Coolant pump – To assemble (see fig. L6-1)

It is essential to keep all parts clean during the assembly procedure.

1. Before commencing to assemble the coolant pump, ensure that any damage marks on the joint faces of the bearing housing and pump casing are rectified using a fine carborundum stone.

2. Insert the rear bearing into the housing and tap down using a mallet and suitable aluminium drift until the bearing is approximately flush with the front inner face of the housing.

3. Fit the front bearing onto the spindle together with the distance piece and insert the assembly into the bearing housing. Tap the spindle gently with a mallet until the bearing starts squarely into its bore. Then, remove the spindle and using a mallet and aluminium drift, drive the bearing into the housing until it locates against the shoulder. This operation will also drive the rear bearing the correct distance into the housing.

4. Fit the outer abutment washer into the housing.

5. Fit the front bearing retaining circlip, ensuring that the chamfered side is fitted away from the bearing.

6. Fit the spindle into the housing and invert the housing onto the spindle front face.

7. Fit the inner abutment washer onto the spindle.

8. Fit the rear circlip securing the spindle into the housing.

9. Wipe clean the end of the spindle and the counterbore in the housing with a clean cloth. Lubricate the end of the spindle with clean engine oil. Then, tap the pressure balance seal onto the spindle and into the counterbore.

10. Again lubricate the end of the spindle with clean engine oil and press on the impeller, noting that a minimum load of 363 kgf (800 lbf) should be required. This ensures that the correct interference fit exists between the mating faces.

11. Using feeler gauges, ensure that the gap between the face of the bearing housing and the impeller is between 1,143 mm and 1,219 mm (0.045 in and 0.048 in).



12. Spin the assembly to ensure that the shaft rotates freely.

Coolant pump – To fit

Fit the coolant pump to the engine by reversing the removal procedure, noting the following.

1. If the casing has been removed from the crankcase, ensure that the joint faces are free from burrs. Any burrs should be removed using a fine carborundum stone.
2. Obtain a new gasket and modify it to suit the crankcase to coolant pump joint faces.
3. Tighten all bolts to the standard torque figures given in Chapter P.
4. Tighten the drive belts as detailed in Chapter E.
5. Fill the system with coolant as described in Section L3.
6. Upon completion of the assembly procedure start the engine and immediately check for coolant system leaks. If satisfactory, run the engine until normal operating temperature is attained and again, check the coolant system for leaks.



Special torque tightening figures

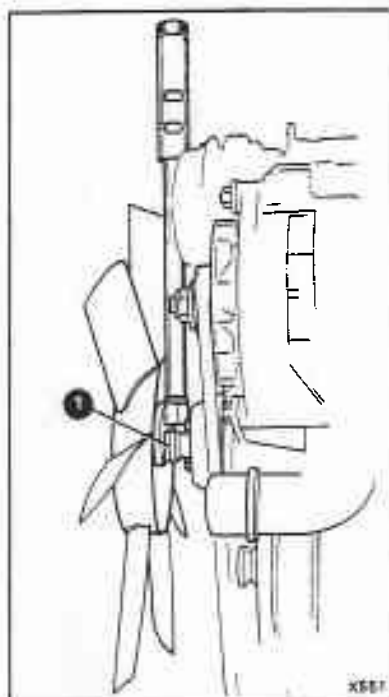
Introduction

This section contains the special torque tightening figures applicable to Chapter L.

For standard torque tightening figures refer to Chapter P.

Components used during manufacture of the vehicle have different thread formations (Metric, UNF, UNC, etc.). Therefore, when fitting nuts, bolts, and setscrews it is important to ensure that the correct type and size of thread formation is used.

Section L4



Ref.	Component	Nm	kgf m	lbf ft
1	Fan coupling retention (L.H. thread)	48-54	5-5,5	35-40



Workshop tools

RH 7098	Extractor – Coolant pump impeller
RH 9747	Torque spanner – Fan coupling
RH 9982	Duo-Chek – Anti-freeze/Battery tester

Anti-freeze and summer coolant

Applicable to

All Rolls-Royce and Bentley motor cars prior to vehicle identification number (VIN) SCBZSOTO3HCX20001

Introduction

This Product Support Information Sheet has been issued to outline the correct procedure when refilling/replenishing the cooling system with ICI 007/400F anti-freeze and summer coolant. The original issue of Product Support Information Sheet L1 should be destroyed.

Description

ICI 007/400F anti-freeze and summer coolant has been introduced on all cars from and including vehicle identification number (VIN) SCBZSOT03HCX20001 and will be supplied for all replacement purposes.

Prestone UT 184 coolant which was previously used has been replaced by ICI 007/400F coolant.

Prestone UT 184 can be identified by its green colour whilst the new ICI coolant is coloured blue.

Although it is generally accepted that coolants should not be mixed, the new ICI coolant can be mixed with Preston UT 184, if the need arises.

Warning:
Mixing with any other types of coolant is not recommended. If there is any doubt as to what type of coolant is present, it will be necessary to flush the system completely (see Chapter L of the relevant Workshop Manual) before refilling with ICI 007/400F.

Whenever a system is refilled with ICI 007/400F, a coolant warning label (part number UE 70988) must be fitted to the radiator or expansion tank in a prominent position.

Parts affected

Displaced part number	Description	Quantity	New part number
UB 33058L5	ICI 007/400F anti-freeze	5 litres	UE 70936L5
UB 33058L205	ICI 007/400F anti-freeze	205 litres	UE 70936L210
	Coolant warning label	1	UE 70988

Hil/MT