






# Chapter 3

## Cooling, heating and air conditioning systems

### Contents

Air conditioning system check	See Chapter 1	Cooling system electrical switches and sensors - removal and refitting	7
Air conditioning system - general information and precautions	10	Cooling system hoses - disconnection and renewal	2
Antifreeze - general information	3	General information and precautions	1
Auxiliary drivebelt check and renewal	See Chapter 1	Heater assembly - removal, dismantling, reassembly and refitting	9
Coolant level check	See "Weekly checks"	Radiator - removal and refitting	5
Coolant pump - removal and refitting	8	Radiator cooling fan - removal and refitting	6
Cooling system - draining	See Chapter 1	Thermostat - removal, testing and refitting	4
Cooling system - filling	See Chapter 1		
Cooling system - flushing	See Chapter 1		

### Degrees of difficulty

<b>Easy</b> , suitable for novice with little experience 	<b>Fairly easy</b> , suitable for beginner with some experience 	<b>Fairly difficult</b> , suitable for competent DIY mechanic 	<b>Difficult</b> , suitable for experienced DIY mechanic 	<b>Very difficult</b> , suitable for expert DIY or professional 
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### Specifications

#### General

System type	Pressurised with expansion tank/bottle and front-mounted radiator, electric cooling fan, coolant pump and thermostat
Pressure cap setting	0.8 or 1.0 bar (according to engine)

#### Thermostat

Start-to-open temperature:	
XV, XW and XY series engines	79° to 82°C
XU series engines	82°C
TU9 series, TU3 series and TU1 series (Van) engines	88°C
TU1 series (except Van) engines	83°C
Fully-open temperature:	
XU, XV, XW and XY series engines	93°C
TU9 series, TU3 series and TU1 series (Van) engines	102°C
TU1 series (except Van) engines	96°C

#### Torque wrench settings

	Nm	lbf ft
Coolant pump attachments:		
XV, XW, and XY series engines	13	10
XU series engines	15	11
TU series engines:		
Housing inlet elbow (aluminium block engines)	8	6
Housing bolts (aluminium block engines):		
Small bolts	30	22
Large bolts	50	37
Coolant pump bolts (cast-iron block engines):	15	11

### 1 General information and precautions

The cooling system is of pressurised type incorporating an expansion bottle or expansion tank according to model. The system includes a front-mounted cross-flow radiator, thermostatic controlled electric cooling fan, coolant pump and thermostat. The car interior heater matrix is incorporated into the coolant circuit with the interior air supply and distribution being controlled by air flaps.

On XU and TU Series engines the coolant pump is driven by the engine timing belt, but on all other engines it is driven by the auxiliary (alternator) drivebelt.

The cooling system functions in the following way. After a cold start the thermostat valve is shut and coolant circulation is restricted to the engine and heater matrix. When the coolant reaches the normal engine operating temperature the thermostat starts to open and coolant circulation also flows through the radiator. The engine temperature is then controlled by the thermostat and the electric cooling fan located on the front of the radiator.

Air conditioning is available as an option on certain models and is described in Section 10.

#### Precautions



**Warning:** Do not attempt to remove the expansion tank filler cap, or to disturb any part of the cooling system, while it or the engine is hot, as there is a very great risk of scalding. If the expansion tank filler cap must be removed before the engine and radiator have fully cooled down (even though this is not recommended) the pressure in the cooling system must first be released. Cover the cap with a thick layer of cloth, to avoid scalding, and slowly unscrew the filler cap until a hissing sound can be heard. When the hissing has stopped, showing that pressure is released, slowly unscrew the filler cap further until it can be removed; if more hissing sounds are heard, wait until they have stopped before unscrewing the cap completely. At all times, keep well away from the filler opening.

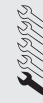


**Warning:** Do not allow antifreeze to come in contact with your skin, or with the painted surfaces of the vehicle. Rinse off spills immediately with plenty of water. Never leave antifreeze lying around in an open container, or in a puddle in the driveway or on the garage floor. Children and pets are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



**Warning:** Refer to Section 10 for precautions to be observed when working on vehicles equipped with air conditioning.

### 2 Cooling system hoses - disconnection and renewal



**Note:** Refer to the warnings given in Section 1 of this Chapter before proceeding. Hoses should only be disconnected once the engine has cooled sufficiently to avoid scalding.

1 If the checks described in Chapter 1 reveal a faulty hose, it must be renewed as follows.

2 First drain the cooling system (Chapter 1); if the antifreeze is not due for renewal, the drained coolant may be re-used, if it is collected in a clean container.

#### Models with conventional hose connections

3 To disconnect any hose, use a pair of pliers to release the spring clamps (or a screwdriver to slacken screw-type clamps), then move them along the hose clear of the union. Carefully work the hose off its stubs. The hoses can be removed with relative ease when new - on an older vehicle, they may have stuck.

4 If a hose proves to be difficult to remove, try to release it by rotating it on its unions before attempting to work it off. Gently prise the end of the hose with a blunt instrument (such as a flat-bladed screwdriver), but do not apply too much force, and take care not to damage the pipe stubs or hoses. Note in particular that the radiator hose unions are fragile; do not use excessive force when attempting to remove the hoses.



**HiNT** If all else fails, cut the hose with a sharp knife, then slit it so that it can be peeled off in two pieces. Although this may prove expensive if the hose is otherwise undamaged, it is preferable to buying a new radiator.

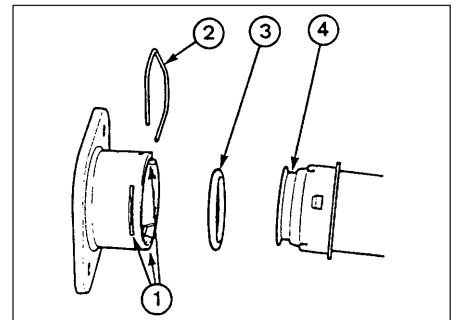
5 When refitting a hose, first slide the clamps onto the hose, then engage the hose with its unions. Work the hose into position, then check that the hose is settled correctly and is properly routed. Slide each clip along the hose until it is behind the union flared end, before tightening it securely.



**HiNT** If the hose is stiff, use a little soapy water as a lubricant, or soften the hose by soaking it in hot water. Do not use oil or grease, which may attack the rubber.

#### Models with CONRAD "click-on" radiator hose connections

6 Some TU3FM engine models may be fitted with pre-production "click-on" radiator hose connections. These fittings were only fitted to a limited number of vehicles, and have now been discontinued in favour of conventional hose clips.



2.7 CONRAD "click-on" type radiator hose connection

- 1 Radiator fitting
- 2 Retaining clip
- 3 O-ring
- 4 Hose end fitting

7 The hose end fitting is retained by a large circlip, which must be extracted before pulling the hose out (see illustration).

8 When refitting, first fit the circlip into the radiator fitting, placing the flat part in position first, and bringing the ends into position one at a time.

9 Ensure that the O-ring is in good condition, and securely located in the hose end fitting. It should not be necessary to lubricate the O-ring to fit it, but if any form of lubrication is used, the radiator must be refilled with fresh coolant, to avoid contamination.

10 Align the hose end fitting with the three lugs in the radiator connection, push firmly into place, and check that the hose is secure by pulling back on it.

#### All models

11 Refill the system with coolant (see Chapter 1).

12 Check carefully for leaks as soon as possible after disturbing any part of the cooling system.

### 3 Antifreeze - general information

**Note:** Refer to the warnings given in Section 1 of this Chapter before proceeding.

1 The cooling system should be filled with a water/ethylene glycol-based antifreeze solution, of a strength which will prevent freezing down to at least  $-25^{\circ}\text{C}$ , or lower if the local climate requires it. Antifreeze also provides protection against corrosion, and increases the coolant boiling point. As with all engines of aluminium construction, the corrosion protection properties of the antifreeze are critical. Only a top quality antifreeze should be used in the system and should never be mixed with different antifreeze types.

2 The cooling system should be maintained according to the schedule described in Chapter 1. If antifreeze is used that is not to Peugeot's specification, old or contaminated

coolant mixtures are likely to cause damage, and encourage the formation of corrosion and scale in the system.

**3** Before adding antifreeze, check all hoses and hose connections, because antifreeze tends to leak through very small openings. Engines don't normally consume coolant, so if the level goes down, find the cause and correct it.

**4** Ideally, a 50% mixture of antifreeze and clean soft water (by volume) should be used to maintain maximum protection against freezing and corrosion. Mix the required quantity in a clean container and then fill the system as described in Chapter 1, and "Weekly checks". Save any surplus mixture for topping-up.

#### 4 Thermostat - removal, testing and refitting



**Note:** Refer to the warnings given in Section 1 of this Chapter before proceeding.

##### Removal

- 1** The thermostat housing is located on the cylinder head adjacent to the distributor.
- 2** Drain the cooling system as described in Chapter 1.
- 3** Disconnect the radiator top hose from the thermostat housing. Where necessary for access, also remove the air inlet duct from the air cleaner.
- 4** Unscrew and remove the two thermostat housing cover bolts and remove the cover.



**5.2** Undo the bolts (arrowed) on each side and lift off the front crossmember



**5.4a** Disconnect the thermo-switch (arrowed) . . .



**4.4** Removing the thermostat housing cover on XV, XW and XY series engines

This may need a little persuasion with a wooden or plastic-faced hammer (see illustration).

**5** Remove the thermostat. If it is stuck, do not lever it out under its bridge piece, but cut around its edge with a sharp knife.

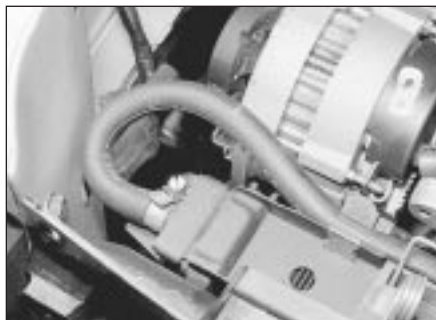
**6** Remove the rubber ring(s) and clean the mating faces of the housing and cover.

##### Testing

**7** If the thermostat is suspected of being faulty, suspend it in a container of water which is being heated. Using a thermometer, check that the thermostat starts to open at the specified temperature and is fully open also at the specified temperature.

**8** Remove the thermostat from the water and allow it to cool. The valve plate should close smoothly.

**9** If the unit fails to operate as described or is stuck open or shut, renew it with one of similar temperature rating (see illustration).



**5.3** Expansion tank vent hose connection on the radiator



**5.4b** . . . and low coolant level sensor wiring



**4.9** Thermostat temperature rating (arrowed) stamped on base

##### Refitting

**10** Refitting is a reversal of removal but use new rubber sealing ring(s). Refill the cooling system as described in Chapter 1 on completion.

#### 5 Radiator - removal and refitting



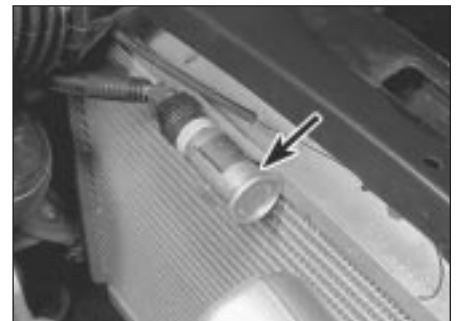
**Note:** Refer to the warnings given in Section 1 of this Chapter before proceeding.



**If leakage is the reason for wanting to remove the radiator, bear in mind that minor leaks can often be cured using a radiator sealant with the radiator in situ.**

##### Removal

- 1** Drain the cooling system, as described in Chapter 1.
- 2** Remove the front grille (see Chapter 11) then unbolt the engine compartment front crossmember (see illustration).
- 3** Disconnect the top and bottom hoses from the radiator and, where applicable, disconnect and unclip the vent hose for the expansion tank (see illustration).
- 4** Disconnect the wiring from the cooling fan, the thermo-switch and, where applicable, the low level sensor. On TU series engines, remove the cooling fan relay from the clip on the top of the radiator (see illustrations).



**5.4c** On TU series engines, remove the cooling fan relay (arrowed)

## 3•4 Cooling, heating and air conditioning systems

5 Disconnect the top mountings, as applicable, then lift the radiator, complete with cooling fan, from the car - taking care not to damage the matrix (see illustration). The base of the radiator incorporates pins which locate in rubber mountings.

6 If necessary separate the cooling fan, with reference to Section 6.

### Refitting

7 Refitting is a reversal of removal; fill the cooling system as described in Chapter 1 on completion.



5.5 Disconnect the top mountings and lift out the radiator

### 6 Radiator cooling fan - removal and refitting



### Removal

The radiator cooling fan may be removed with the radiator, as described in the preceding Section, and then separated. Alternatively it may be unbolted or unclipped (as applicable) from the radiator after having removed the front grille and crossmember, and disconnected the wiring. The motor can be unbolted from the frame and then the fan removed from the motor (see illustrations). No spare parts are available for the motor.

### Refitting

Refitting is a reversal of removal.



6.1a Radiator cooling fan retaining clip



6.1b Radiator cooling fan to frame mounting bolts

### 7 Cooling system electrical switches and sensors - removal and refitting



### Radiator cooling fan thermostwitch

#### Removal

1 The thermostatically controlled switch for the cooling fan is screwed into the radiator side tank.

2 Drain the cooling system as described in Chapter 1.

3 Disconnect the switch wiring and unscrew the switch from its location.

#### Refitting

4 Refitting is a reversal of removal, but use a new sealing washer if necessary. Fill the cooling system as described in Chapter 1 on completion.

### Coolant temperature sensor

#### Removal

5 The coolant temperature sensor may be located in the left-hand end of the cylinder head, on or beneath the thermostat housing, or below the distributor, according to engine type (see illustration). On some engines, two sensors may be fitted, one for the temperature gauge and another for the engine management system. Testing should be carried out by an auto-electrician or by substitution with a known good unit.



7.5 Coolant temperature sensor location on XV, XW and XY series engines

6 Partially drain the cooling system (see Chapter 1) to below the level of the sensor unit.

7 Disconnect the wiring from the sensor and unscrew it from its location.

### Refitting

8 Screw in the new unit, using a smear of sealant on the threads or a new sealing washer, as applicable. Reconnect the wiring.

9 Top-up the coolant level (see Chapter 1 and "Weekly checks").

### Coolant level sensor

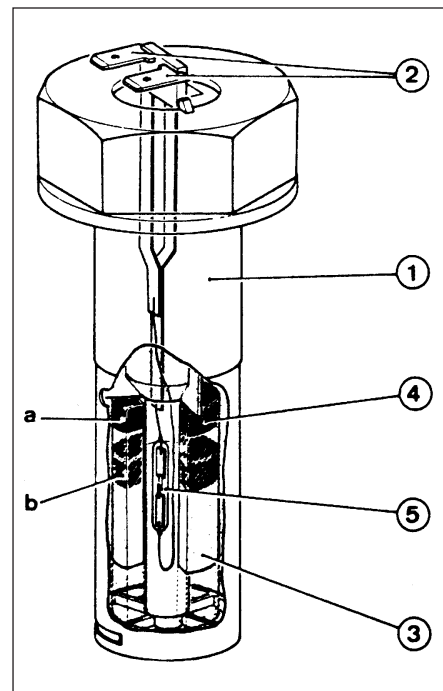
#### Removal

10 The coolant level sensor is located in the radiator right-hand side tank on XV, XW and XY series engines and in the expansion tank on all other engines (see illustration). The switch is float-operated and actuates a warning lamp in the event of a low coolant level.

11 The sensor is removed by unscrewing it from its location after disconnecting the wiring.

#### Refitting

12 Refitting is a reversal of removal using a new sealing washer where necessary.



7.10 Cutaway diagram of the coolant level sensor

- |                        |                |
|------------------------|----------------|
| 1 Body                 | 3 Float        |
| 2 Terminal connections | 4 Magnet       |
|                        | 5 Reed contact |

a Off position (float lifts magnet above reed contact)

b On position (magnet field switches on reed contact)



8.2 Radiator and heater hose connections on the coolant pump - XV, XW and XY series engines



8.3a Undo the mounting bolts . . .



8.3b . . . withdraw the pump from the cylinder block . . .



8.3c . . . and recover the O-ring - arrowed (XV, XW and XY series engines)

## 8 Coolant pump - removal and refitting



**Note:** Refer to the warnings given in Section 1 of this Chapter before proceeding.

### XV, XW, and XY series engines

#### Removal

- 1 Drain the cooling system and remove the auxiliary drivebelt as described in Chapter 1.
- 2 Disconnect the radiator bottom hose, heater return hose, and inlet manifold return hose from the coolant pump (see illustration). For better access, remove the air cleaner and inlet cowl, with reference to the relevant Part of Chapter 4.
- 3 Unscrew the mounting bolts and remove the coolant pump from the cylinder block. Remove the O-ring (see illustrations).
- 4 If the coolant pump is worn, noisy or leaks coolant it must be renewed, as repair is not possible. However, if either of the half casings is individually damaged it may be renewed, together with the central gasket.

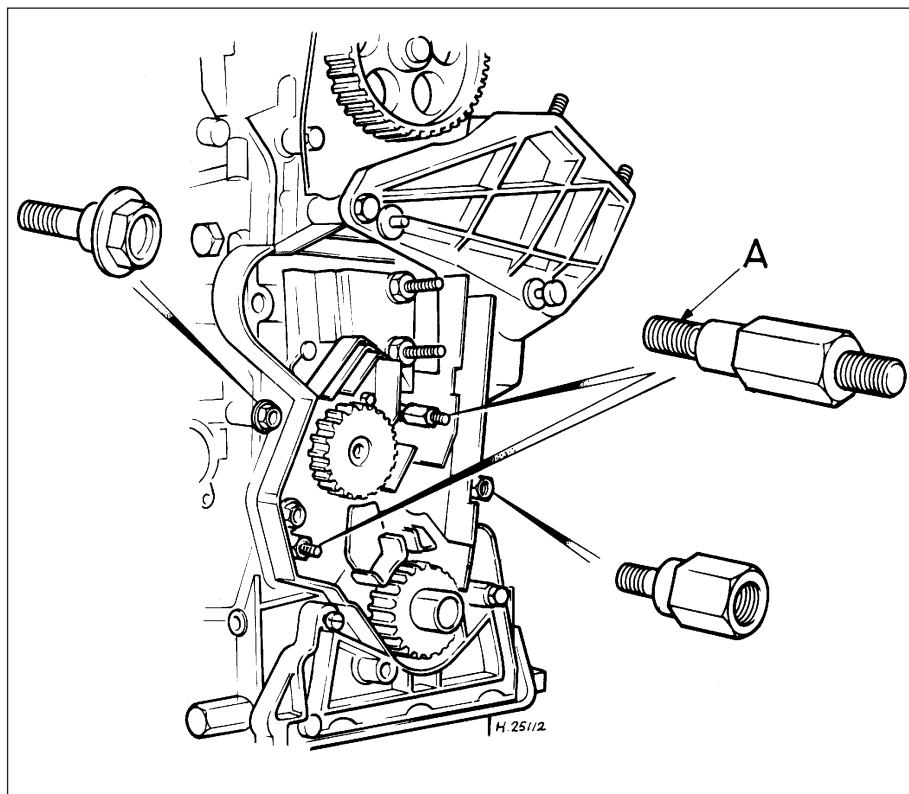
#### Refitting

- 5 Refitting is a reversal of removal, bearing in mind the following points:
  - a) Renew the pump O-ring.
  - b) Refit the auxiliary drivebelt and refill the cooling system as described in Chapter 1.

### XU series engines

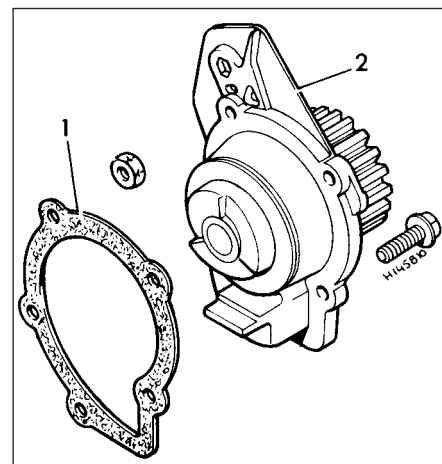
#### Removal

- 6 Drain the cooling system (Chapter 1).
- 7 Remove the timing belt and tensioner, as described in Chapter 2B.
- 8 Remove the plastic shield, noting the locations of the different types of bolt (see illustration).
- 9 Unscrew the five mounting bolts and remove the coolant pump from the cylinder block. Remove the gasket (see illustration).



8.8 Timing belt inner plastic shield and special bolt locations on early XU series engines

Apply sealant to bolt threads A



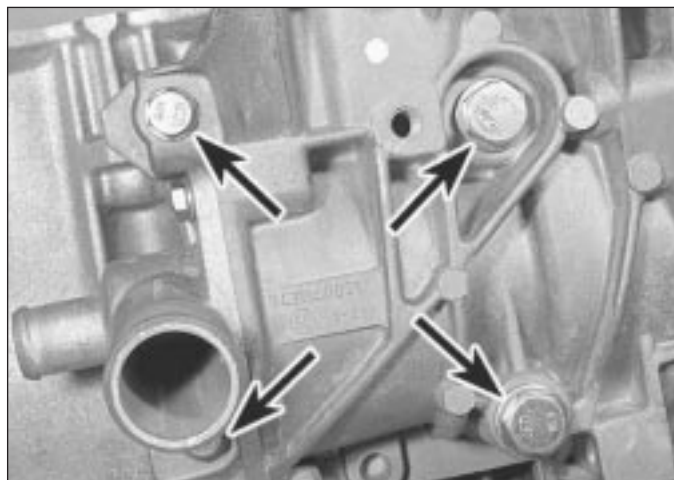
8.9 Coolant pump assembly fitted to XU series engines

1 Gasket

2 Coolant pump



8.17a On TU series aluminium block engines, disconnect the hoses (arrowed) from the coolant pump housing



8.17b . . . then undo the bolts (arrowed) and remove the housing from the block

10 If the coolant pump is worn, noisy or leaks coolant it must be renewed, as repair is not possible.

**Refitting**

11 Refitting is a reversal of removal, bearing in mind the following points:

- a) Thoroughly clean the mating faces and use a new gasket.
- c) Refit and tension the timing belt as described in Chapter 2B.
- d) Refill the cooling system (Chapter 1).

**TU series aluminium block engines**

**Removal**

- 12 Drain the cooling system as described in Chapter 1.
- 13 Remove the timing belt as described in Chapter 2C.
- 14 Unscrew the nut from the right-hand engine mounting.
- 15 Using a trolley jack and block of wood, lift the right-hand side of the engine as far as possible.
- 16 Unscrew the nuts and remove the engine mounting bracket from the coolant pump housing.
- 17 Disconnect the hoses from the housing, then unbolt the housing from the block.

Remove the O-ring seal (see illustrations).

18 Unbolt the coolant pump from the housing, and remove the O-ring (see illustrations). If necessary, similarly remove the inlet elbow.

19 If the coolant pump is worn, noisy or leaks coolant it must be renewed, as repair is not possible.

**Refitting**

20 Refitting is a reversal of removal, bearing in mind the following points:

- a) Renew the O-rings.
- b) Make sure that the housing-to-block location dowels are in position.
- c) Refit and tension the timing belt as described in Chapter 2C.
- d) Refill the cooling system as described in Chapter 1.

**TU series cast-iron block engines**

**Removal**

- 21 Drain the cooling system as described in Chapter 1.
- 22 Remove the timing belt as described in Chapter 2C.
- 23 Unscrew the two securing bolts, and withdraw the coolant pump from the cylinder block (see illustration). Recover the O-ring.
- 24 If the coolant pump is worn, noisy or leaks

coolant it must be renewed, as repair is not possible.

**Refitting**

25 Refitting is a reversal of removal, bearing in mind the following points.

- a) Renew the pump O-ring.
- b) Refit and tension the timing belt, as described in Chapter 2C.
- c) Refill the cooling system (Chapter 1).

**9 Heater assembly - removal, dismantling, reassembly and refitting**



**Removal**

- 1 Remove the facia panel, as described in Chapter 11. On later models this procedure also covers removal of the vents and control panel. If further dismantling is necessary proceed as follows.
- 2 Disconnect the lower air vents.
- 3 Note the position of the wiring loom and switches then remove the clips and move the wiring clear. Lower the fuse board with reference to Chapter 12.
- 4 Drain the cooling system as described in Chapter 1, and disconnect the heater hoses on the bulkhead in the engine compartment.



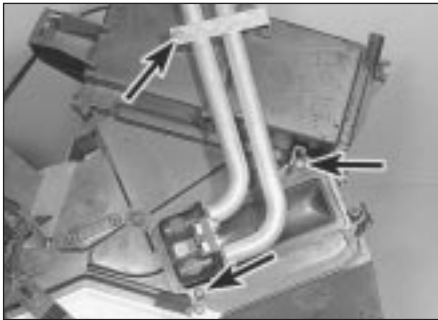
8.18a With the housing removed, undo the bolts and remove the coolant pump . . .



8.18b . . . then recover the O-ring seal (arrowed)



8.23 Coolant pump securing bolt (arrowed) on TU series cast iron block engines



9.6a Remove the heater matrix mounting screws and pipe clip (arrowed) . . .



9.6b . . . then withdraw the matrix from the heater casing



9.7 Removing the heater blower motor

5 Unscrew the heater assembly mounting nuts and withdraw it from the car.

**Dismantling**

6 To remove the matrix, disconnect the pipe clip and unscrew the mounting screws then slide the matrix from the casing (see illustrations). If necessary the pipes can be removed by unscrewing the flange screws. Use water from a hose to clean both the inside and outside of accumulated debris.

7 To remove the heater blower, unscrew the mounting screws and lift the unit from the casing (see illustration).

8 If necessary remove the heater control panel and cable.

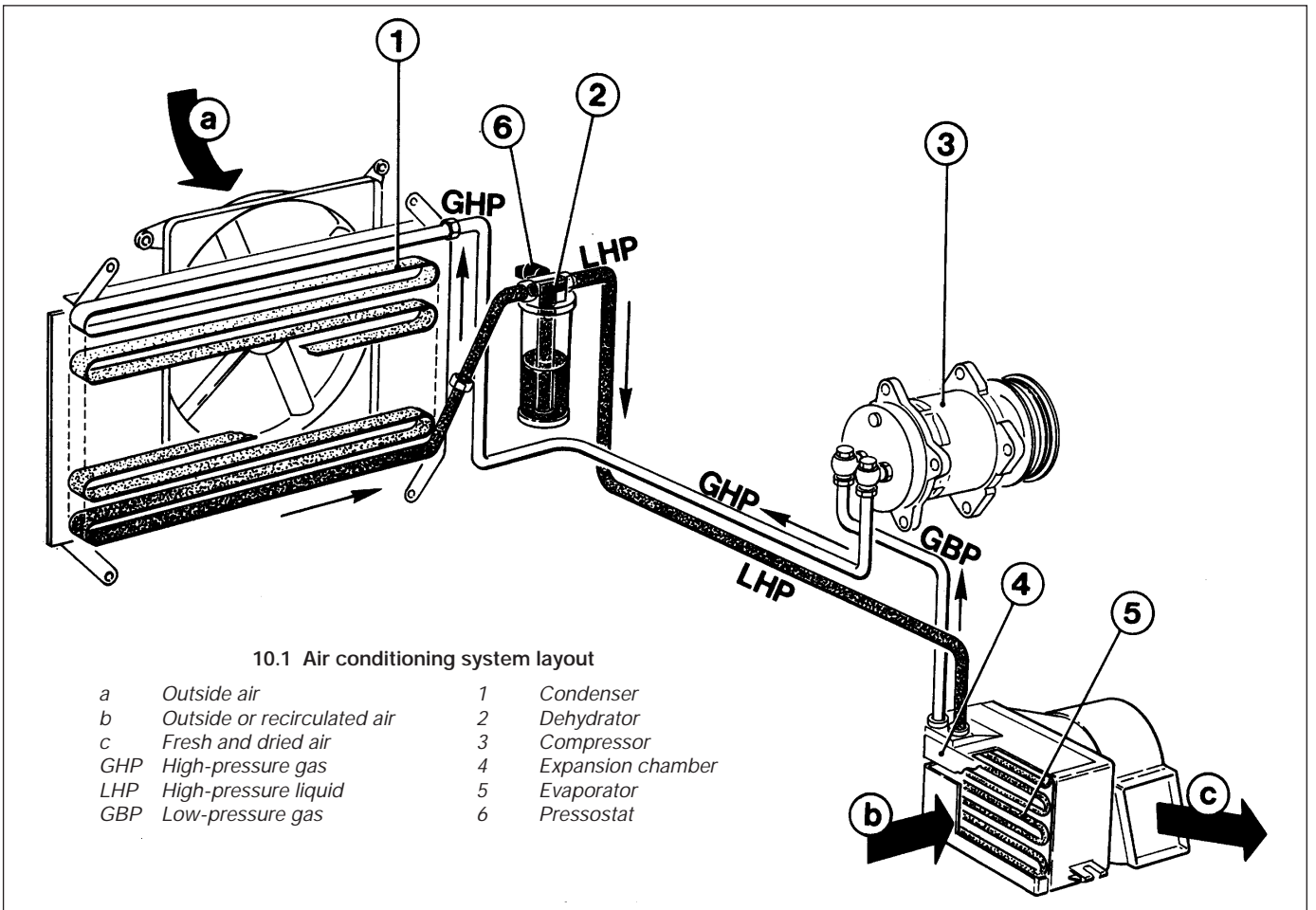
**Reassembly and refitting**

9 Reassembly and refitting is a reversal of removal and dismantling, but fill the cooling system as described in Chapter 1 on completion.

**10 Air conditioning system - general information and precautions**

**General information**

1 Air conditioning is available as an option on later models. In conjunction with the heater, the system enables any reasonable air temperature to be achieved inside the car. It also reduces the humidity of the incoming air, aiding demisting even when cooling is not required (see illustration).



## 3•8 Cooling, heating and air conditioning systems

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2 The refrigeration side of the air conditioning system functions in a similar way to a domestic refrigerator. A compressor, belt-driven from the crankshaft pulley, draws refrigerant in its gaseous phase from an evaporator. The compound refrigerant passes through a condenser where it loses heat and enters its liquid phase. After dehydration the refrigerant returns to the evaporator where it absorbs heat from air passing over the evaporator fins. The refrigerant becomes a gas again and the cycle is repeated.

3 Various subsidiary controls and sensors protect the system against excessive temperature and pressures. Additionally, engine idle speed is increased when the system is in use to compensate for the additional load imposed by the compressor.

### **Precautions**

4 When an air conditioning system is fitted, it is necessary to observe special precautions whenever dealing with any part of the system, or its associated components. If for any reason the system must be discharged, entrust this task to your Peugeot dealer or air conditioning specialist.



***Warning: The refrigeration circuit may contain a liquid refrigerant (Freon), and it is therefore dangerous to disconnect any part of the system without specialised knowledge and equipment.***

5 The refrigerant is potentially dangerous, and should only be handled by qualified persons. If it is splashed onto the skin, it can

cause frostbite. It is not itself poisonous, but in the presence of a naked flame (including a cigarette) it forms a poisonous gas. Uncontrolled discharging of the refrigerant is dangerous, and potentially damaging to the environment.

6 Components of the air conditioning system may obstruct work being undertaken in other areas on or around the engine. In many instances, it may be possible to unbolt and move these components aside, within the limits of their flexible connecting pipes, to gain the necessary access. Apart from this, complete removal and refitting or fault diagnosis, of any air conditioning system components, must be left to a specialist.