






Chapter 3

Cooling, heating and ventilation systems

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Degrees of difficulty

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

General

Expansion tank relief valve opening pressure	0.98 bar
Coolant pump impeller-to-casing clearance (1.6 litre engine only)	0.3 to 1.1 mm

Thermostat

Opening temperature:

1.2 litre engine:	
Starts to open	81 to 85°C
Fully open	103°C
1.4 litre engine:	
Starts to open	81 to 85°C
Fully open	101 to 105°C
1.6 litre engine:	
Starts to open	81 to 85°C
Fully open	99 to 103°C
1.8 litre engine:	
Starts to open	81 to 85°C
Fully open	98 to 102°C

Maximum thermostat lift (approximate):

1.2 litre engine	9.5 mm
1.4 litre engine	9.5 mm
1.6 litre engine	9.5 mm
1.8 litre engine	≥ 7.5 mm

Electric cooling fan thermostswitch

Note: 1.6 litre models manufactured from April 1998-on are not fitted with a thermostswitch because the electric cooling fan is switched on by the control unit.

Models without air conditioning:

Cut-in temperature	90 to 94°C
Cut-out temperature	85 to 89°C

Models with air conditioning:

Cut-in temperature:	
1st stage	90 to 94°C
2nd stage	95 to 99°C
Cut-out temperature:	
1st stage	85 to 89°C
2nd stage	90 to 94°C

Coolant temperature sensor

Temperature:	Resistance (approx)
0°	6000 ohms
20°	2300 ohms
40°	1000 ohms
60°	550 ohms
80°	300 ohms
100°	180 ohms
120°	100 ohms

Torque wrench settings

	Nm	lbf ft
Air conditioning compressor bracket to cylinder block	50	37
Coolant pump:		
M8 bolt	25	18
M8 nut with flange	20	15
Coolant temperature sensor:		
M12	25	18
M14	30	22
M16	34	25
Inlet pipe to cylinder head:		
M6 bolt on 1.4 and 1.8 litre models	9	7
M8 bolt on 1.4 and 1.6 litre models	25	18
Thermostat to cylinder head:		
M8 bolt	25	18
M8 nut	20	15
Timing belt guard brackets (1.8 litre engine)	9	7

1 General information and precautions**General information**

The engine cooling/interior heating system is of pressurised type, comprising a coolant pump, a crossflow radiator, a coolant expansion tank, an electric cooling fan, a thermostat, heater matrix, and all associated hoses and switches. On 1.2 litre models, the coolant pump is driven by the toothed timing belt. On 1.4 litre models, the coolant pump is driven off the back of the timing belt. On 1.6 litre models the coolant pump is driven by the auxiliary drivebelt from the crankshaft pulley. On 1.8 litre models, the coolant pump is driven off the back of the timing belt.

The system functions as follows. The coolant pump circulates cold water around the cylinder block and head passages, through the heater matrix, returning it to the pump. On certain engines it also circulates it through the inlet manifold and throttle body.

When the engine is cold, the thermostat remains closed and prevents coolant from circulating through the radiator. When the coolant reaches a predetermined temperature, the thermostat opens, and the coolant passes through the top hose to the radiator. As the coolant circulates through the radiator, it is cooled by the in-rush of air when the car is in forward motion. The airflow is supplemented by the action of the electric cooling fan, when necessary. From the bottom of the radiator the coolant is returned to the coolant pump, and the cycle is repeated.

When the engine reaches normal operating temperature, the coolant expands, and some of it is displaced into the expansion tank. Coolant collects in the tank, and is returned to the radiator when the system cools. On 1.2 litre models without air conditioning, all 1.4 litre models, and 1.6 litre models with manual transmission, the expansion tank is integrated into the side of the radiator. On 1.2 litre models with air conditioning, 1.6 litre models with automatic transmission, and 1.8 litre models, a separate expansion tank is located on the right-hand side of the engine compartment.

The electric cooling fan mounted on the rear of the radiator is controlled by a thermostatic switch except on 1.6 litre models manufactured from April 1998-on. At a predetermined coolant temperature, the switch/sensor actuates the fan to provide additional airflow through the radiator. The switch cuts the electrical supply to the fan when the coolant temperature has dropped below a preset threshold (see Specifications). On 1.6 litre models manufactured from April 1998-on, the electric cooling fan is switched on by the control unit.

Precautions

Warning: Do not attempt to remove the expansion tank pressure cap, or to disturb any part of the cooling system, while the engine is hot, as there is a high risk of scalding. If the expansion tank pressure cap must be removed before the engine and radiator have fully cooled (even though this is not recommended), the pressure in the cooling system must first be relieved. Cover the cap with a thick layer of cloth, to avoid scalding, and slowly unscrew the

pressure cap until a hissing sound is heard. When the hissing stops, indicating that the pressure has reduced, slowly unscrew the pressure cap 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 your face well away from the pressure cap opening, and protect your hands.



Warning: Do not allow antifreeze to come into 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 can be fatal if ingested.



Warning: If the engine is hot, the electric cooling fan may start rotating even if the engine and ignition are switched off. Be careful to keep your hands, hair, and any loose clothing well clear when working in the engine compartment.



Warning: Refer to Section 10 for precautions to be observed when working on models 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, Section 9,

reveal a faulty hose, it must be renewed as described in the following paragraphs.

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

3 To disconnect a hose, use a screwdriver to slacken the clips, then move them along the hose, clear of the relevant inlet/outlet. Carefully work the hose free. The hoses can be removed with relative ease when new - on an older car, they may have stuck.

4 If a hose proves to be difficult to remove, try to release it by twisting its ends before attempting to free it. 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 inlet stub is fragile; do not use excessive force when attempting to remove the hose. 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. Check first, however, that a new hose is readily available.

5 When fitting a hose, first slide the clips onto the hose, then ease the hose into position.



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.

6 Ensure the hose is correctly routed, then slide each clip back along the hose until it passes over the end of the relevant inlet/outlet, before tightening the clip securely.

7 Refill the cooling system with reference to Chapter 1.

8 Check thoroughly for leaks as soon as possible after disturbing any part of the cooling system.

3 Radiator - removal, inspection and refitting

Removal

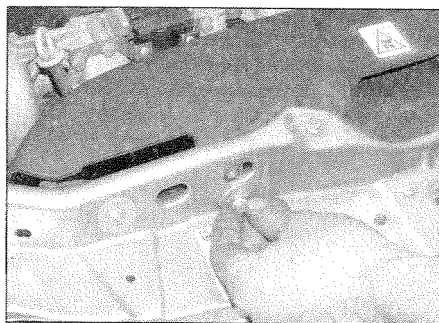
Note: If leakage is the reason for removing the radiator, bear in mind that minor leaks can often be cured using proprietary radiator sealing compound, with the radiator in situ.

1 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

2 Drain the cooling system as described in Chapter 1.

1.2 litre models

3 Loosen the clips and disconnect the top and bottom coolant hoses from the radiator.



3.11a Unscrew the mounting bolts ...

4 On the rear of the radiator, disconnect the wiring plugs leading to the electric cooling fan. The plugs are located on the cowl.

5 Unbolt the air inlet duct from the engine compartment front crossmember, and also disconnect it from the air cleaner.

6 On models with air conditioning, release the clip and disconnect the expansion tank purge hose from the top right-hand side of the radiator.

7 Remove the electric cooling fan assembly from the rear of the radiator with reference to Section 5.

8 On models with air conditioning, unscrew and remove the bolts securing the radiator to the air conditioning condenser and front valance.

1.4 litre models

9 Loosen the clips and disconnect the top and bottom coolant hoses from the radiator.

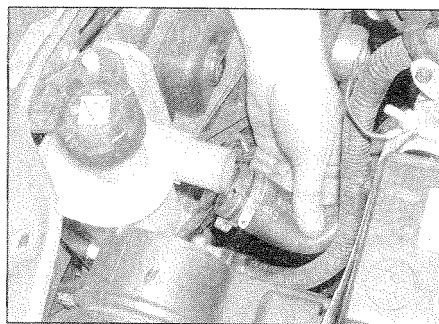
10 On the rear of the radiator, disconnect the wiring plug leading to the electric cooling fan. The plug is located on the cowl.

1.6 litre models

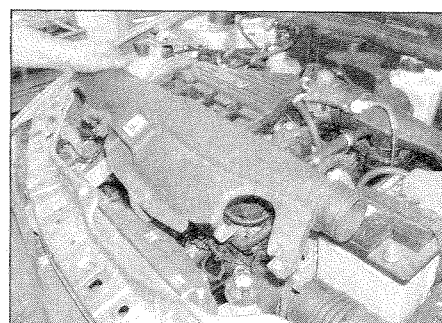
11 Unscrew the mounting bolts on the engine compartment front crossmember, and remove the air inlet shroud from over the radiator (see *illustrations*).

12 Loosen the clips and disconnect the top and bottom coolant hoses from the radiator (see *illustrations*).

13 On models with automatic transmission and/or air conditioning, release the clip and disconnect the expansion tank purge hose from the top of the radiator.



3.12a Disconnecting the top ...



3.11b ... and remove the air inlet shroud from over the radiator

14 If necessary for additional working room, remove the electric cooling fan assembly from the rear of the radiator with reference to Section 5.

15 On models with air conditioning, unscrew and remove the bolts securing the radiator to the air conditioning condenser and front valance.

1.8 litre models

16 Loosen the clips and disconnect the top and bottom coolant hoses from the radiator.

17 Unscrew the mounting bolts on the engine compartment front crossmember, and remove the air inlet shroud from over the radiator.

18 Remove the electric cooling fan assembly from the rear of the radiator with reference to Section 5.

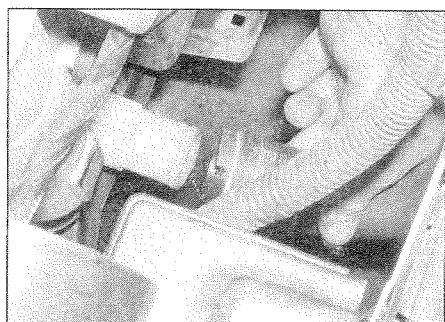
19 Release the clip and disconnect the expansion tank purge hose from the top of the radiator.

20 Unscrew and remove the upper bolts securing the air conditioning condenser to the front of the radiator. Loosen only the condenser lower mounting bolts.

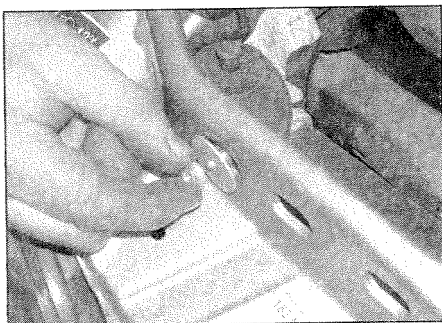
All models

21 Unscrew and remove the two radiator upper mounting nuts located on the engine compartment front crossmember. Remove the upper mounting brackets and rubbers from the top of the radiator (see *illustrations*).

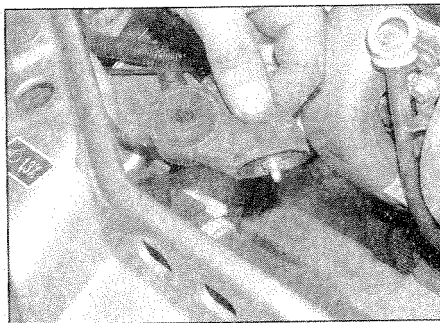
22 Carefully lift the radiator (together with the electric fan unit where applicable) from the lower mounting rubbers in the engine compartment, taking care not to damage the radiator fins as they are easily dented (see *illustrations*).



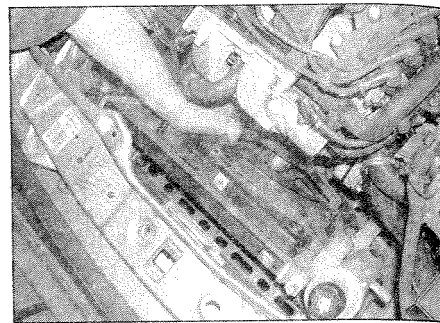
3.12b ... and bottom hoses from the radiator



3.21a Unscrew the mounting nuts ...



3.21b ... and remove the upper mounting brackets and rubbers



3.22a Removing the radiator from the engine compartment

23 With the radiator on the bench, disconnect the wiring from the thermostwitch where fitted. As applicable, unscrew the bolts and remove the electric fan unit from the radiator, and unbolt the lower front air duct from the radiator. Remove the lower mounting rubbers (see illustration).

Inspection

24 If the radiator has been removed due to suspected blockage, it may be flushed out as described in Chapter 1, Section 31. Clean dirt and debris from the radiator fins, using an air line (in which case, wear eye protection) or a soft brush. Be careful, as the fins are sharp, and can also be easily damaged.

25 If necessary, a radiator specialist can perform a 'flow test' on the radiator, to establish whether an internal blockage exists.

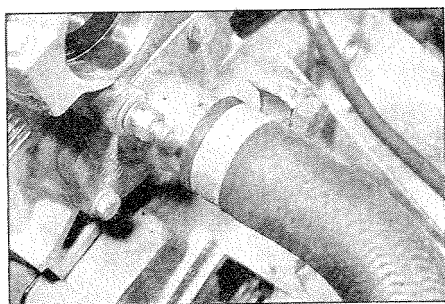
26 A leaking radiator must be referred to a specialist for permanent repair. **Note:** *In an emergency, minor leaks from the radiator can often be cured by using a suitable radiator sealing compound, in accordance with its manufacturer's instructions, with the radiator in situ.*

27 If the radiator is to be sent for repair or is to be renewed, remove all hoses and, where applicable, the cooling fan thermostwitch.

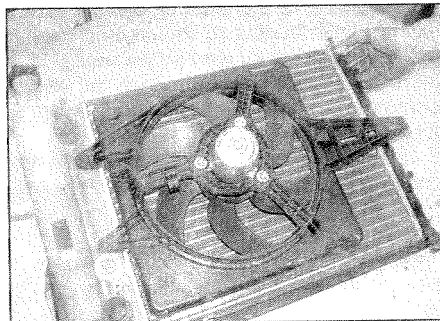
28 Inspect the radiator mounting rubbers, and renew them if necessary.

Refitting

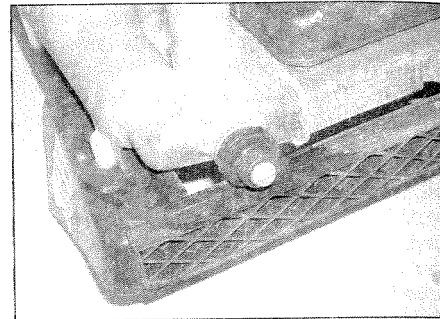
29 Refitting is a reversal of removal, but securely tighten the radiator mounting bolts and hose clips. On completion, refill the cooling system as described in Chapter 1.



4.4 Thermostat housing and top hose - distributor removed for clarity (1.2 litre models)



3.22b Radiator and electric fan unit removed from the car



3.23 One of the radiator bottom mounting rubbers

4 Thermostat - removal, testing and refitting

General

1 The thermostat housing is bolted to the left hand end of the cylinder head. The thermostat itself cannot be separated from the housing and can only be renewed as a complete assembly.

Removal

2 Drain the cooling system as described in Chapter 1.

3 For improved access, remove the battery as described in Chapter 5A.

1.2 litre models

4 Loosen the clip and disconnect the radiator top hose from the thermostat housing on the

left-hand end of the cylinder head (see illustration).

5 Unscrew the mounting bolts and remove the thermostat housing from the cylinder head (see illustration). Recover the gasket.

1.4, 1.6 and 1.8 litre models

6 Loosen the clip and disconnect the radiator top hose from the thermostat housing on the left-hand end of the cylinder head, below the ignition coil.

7 Loosen the clip and disconnect the throttle body coolant hose from the rear of the thermostat housing. Also disconnect the bypass hose from the bottom of the housing.

8 Disconnect the wiring from the temperature sender(s) on the thermostat housing.

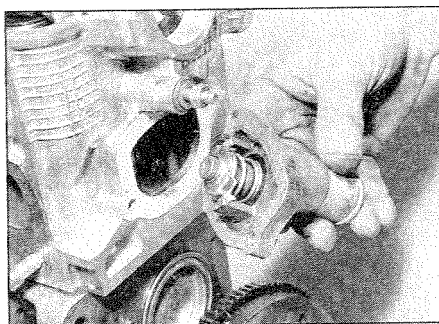
9 Unscrew the mounting bolts and remove the thermostat housing from the cylinder head. Recover the gasket/O-ring.

Testing

10 A rough test of the thermostat may be made by suspending it with a piece of string in a container full of water. Heat the water to bring it to the boil - the thermostat must open by the time the water boils. If not, renew the complete thermostat/housing assembly.

11 If a thermometer is available, the precise opening temperature of the thermostat may be determined; compare with the figures given in the *Specifications*. The opening temperature should also be marked on the thermostat housing.

13 Note that a thermostat which fails to close completely as the water cools must also be renewed.



4.5 Removing the thermostat housing (1.2 litre models)

Refitting

14 Ensure that the cylinder head and thermostat housing mating surfaces are completely clean and free from all traces of the old gasket material.

15 Locate a new gasket in position on the cylinder head, then fit the thermostat housing and insert retaining bolts, tightening them securely.

16 The remaining procedure is a reversal of removal, but refill the cooling system as described in Chapter 1.

5 Electric cooling fan - testing, removal and refitting



Testing

1 Detailed fault diagnosis should be carried out by a FIAT dealer using dedicated test equipment, but basic diagnosis can be carried out as follows. Note that on models equipped with air conditioning, two fans are fitted together with a two-speed control unit.

2 If the fan does not appear to work, run the engine until normal operating temperature is reached, then allow it to idle. The fan should cut in just before the temperature gauge needle enters the red section. If not, switch off the ignition and disconnect the cooling fan motor wiring connector.

3 The motor can be tested by disconnecting it from the wiring loom, and connecting a 12-volt supply and an earth wire directly to it. The motor should operate - if not, the motor, or the motor wiring, is faulty.

4 If the motor operates when tested as described, the fault must lie in the engine wiring harness or the temperature sensor. The temperature sensor/switch can be tested as described in Section 6. Any further fault diagnosis should be referred to a suitably-equipped FIAT dealer - **do not** attempt to test the electronic control unit.

Removal

5 Make sure that the ignition switch is turned off, and that the engine is cold.

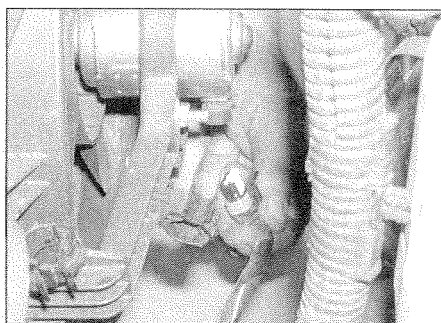


Warning: The electric fan could start to operate if the engine is hot, even if the ignition is switched off.

6 On 1.6 and 1.8 litre models, unscrew the bolts and remove the inlet air duct from over the radiator.

7 Disconnect the electric cooling fan wiring from the loom and where necessary from the thermoswitch (see illustration).

8 On 1.8 litre models, improved access to the lower mounting bolts may be gained by raising the front of the vehicle. Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the splash shield from under the engine compartment.



5.7 Disconnecting the wiring from the electric cooling fan unit on the radiator

9 Support the electric cooling fan assembly, then unscrew the bolts securing it to the rear of the radiator. Carefully lift the assembly from the engine compartment, taking care not to damage the radiator cooling fins.

Refitting

10 Refitting is a reversal of removal.

6 Cooling fan thermoswitch - testing, removal and refitting



Note: 1.6 litre models manufactured from April 1998-on are not fitted with a thermoswitch because the electric cooling fan is switched on by the control unit.

Testing

1 Where fitted, the switch is threaded into the lower left hand corner of the radiator.

2 The switch can be tested by removing it, and checking that the switching action occurs at the correct temperature (heat the sensor in a container of water, and monitor the temperature with a thermometer).

3 There should be no continuity between the switch terminals until the specified cooling fan cut-in temperature is reached, when continuity (and zero resistance) should exist between the terminals.

Removal

4 Make sure that the ignition switch is turned off, and that the engine is cold.



Warning: The electric fan could start to operate if the engine is hot, even if the ignition is switched off.

5 Drain the cooling system as described in Chapter 1.

6 Disconnect the wiring from the thermoswitch.

7 Carefully unscrew the sensor and, where applicable, recover the sealing ring.

Refitting

8 If the thermoswitch was originally fitted using sealing compound, clean the sensor threads thoroughly, and coat them with fresh sealing compound. If the thermoswitch was originally fitted using a sealing ring, locate a

new sealing ring on the sensor. Screw the thermoswitch into the radiator and tighten securely.

9 Reconnect the wiring.

10 Reconnect the battery negative (earth) lead (see *Disconnecting the battery*).

11 Refill the cooling system as described in Chapter 1.

7 Coolant temperature sensor - testing, removal and refitting



Testing

1 The coolant temperature sensor is located on the thermostat housing on the left-hand side of the cylinder head.

2 The sensor is a thermistor - an electronic component whose electrical resistance decreases at a predetermined rate as its temperature rises. The fuel injection/engine management ECU supplies the sensor with a set voltage, and by measuring the current flowing in the sensor circuit, it determines the engine temperature.

3 If the sensor circuit should fail to provide adequate information, the ECU back-up facility will override the sensor signal. In this event, the ECU assumes a predetermined setting which will allow the fuel injection/engine management system to run, albeit at reduced efficiency. When this occurs, the engine warning light on the instrument panel will come on, and the advice of a FIAT dealer should be sought.

4 The sensor can be tested by removing it, and checking that its resistance is correct at different temperatures (see Specifications). Heat the sensor in a container of water, and monitor the temperature and resistance using a thermometer and ohmmeter.

Caution: Do not attempt to test the ECU circuit. This must be entrusted to a FIAT dealer using special diagnostic equipment.

Removal

5 Drain the cooling system as described in Chapter 1. Alternatively, if a new sensor has already been obtained, it is possible to fit the new unit immediately after removing the old one. If this method is used, make sure that the engine is cold, then release any remaining pressure in the cooling system by removing the expansion tank filler cap and refitting it.

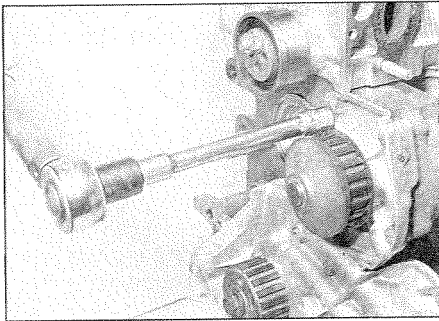
6 If necessary for improved access, remove the battery as described in Chapter 5A.

7 Disconnect the wiring from the sensor. Where necessary, remove the rubber boot from the top of the sensor and disconnect the fly lead/terminal.

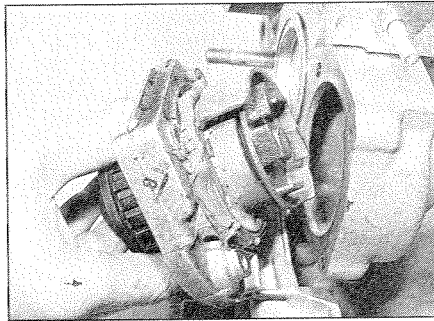
8 Unscrew the sensor and, where applicable, recover the sealing ring.

Refitting

9 Screw the sensor into the thermostat housing (together with a new sealing ring



8.5a Unscrew the securing bolts . . .



8.5b . . . and withdraw the coolant pump
(1.2 litre models)

where applicable) and tighten to the specified torque. The manufacturers recommend applying anaerobic sealant to the tapered threads of the sensor before refitting it.

10 Reconnect the wiring, and where removed, refit the battery as described in Chapter 5A.

11 Refill the cooling system as described in Chapter 1.

8 Coolant pump - removal, inspection and refitting

Removal

1.2 litre models

1 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

2 Drain the cooling system as described in Chapter 1.

3 Remove the auxiliary drivebelt(s) as described in Chapter 1.

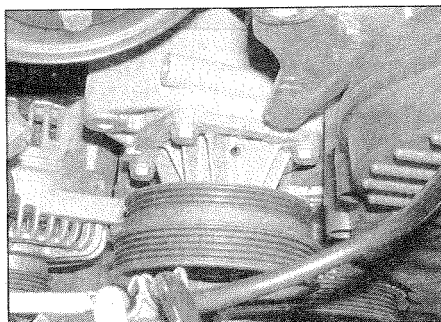
4 Remove the timing belt as described in Chapter 2A.

5 Unscrew the mounting bolts/nuts, and withdraw the coolant pump from the cylinder block casting (see *illustrations*). If the pump is stuck, tap it gently using a soft-faced mallet to release the sealing compound.

1.4 litre models

6 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

7 Drain the cooling system as described in Chapter 1.



8.25 Coolant pump location
(1.6 litre models)

8 Remove the auxiliary drivebelt as described in Chapter 1.

9 Remove the timing belt as described in Chapter 2B.

10 Remove the camshaft sprocket as described in Chapter 2B, Section 5.

11 Unscrew the mounting bolts, and withdraw the coolant pump from the cylinder head. Recover the O-ring seal.

1.6 litre models

Note: The coolant pump is mounted on a housing, which is bolted to the engine. A new pump may be supplied with a new housing, but removing the pump AND housing is quite difficult, and involves more dismantling than simply unbolting the pump from the housing. Both methods are described below.

12 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

13 Drain the cooling system as described in Chapter 1.

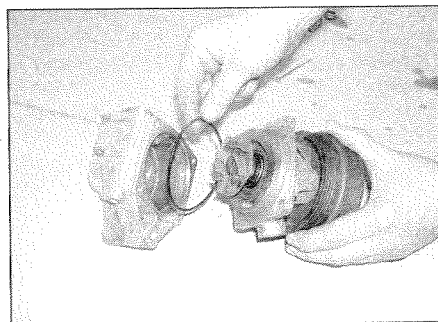
14 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the front right-hand side roadwheel.

15 Undo the fastenings and remove the wheel arch liner from under the front wing.

16 Remove the auxiliary drivebelt as described in Chapter 1, then unbolt and completely remove the drivebelt tensioner assembly. Loosen the alternator lower mounting bolt.

17 Where fitted, remove the alternator cooling hose from the right-hand side of the engine compartment.

18 On early models, unbolt the fuel supply



8.26 Separating the coolant pump from its housing (1.6 litre models)

and return hose bracket from the inlet manifold, then loosen the union nuts and disconnect the fuel lines for access to the power steering pump.

19 Unbolt the power steering pump drivebelt guard from the pump.

20 Loosen the power steering pump pivot and adjustment nuts, then back off the adjustment bolt and release the drivebelt. Completely remove the mounting nuts and position the power steering pump to one side. **Do not** disconnect the hydraulic lines from the pump.

Method 1 - pump and housing removal

21 Unbolt the heat shrouds from the exhaust manifold and downpipe.

22 Unbolt and remove the alternator upper mounting bracket, noting that one of the bolts secures the coolant pump housing.

23 Loosen the alternator lower mounting bolt and swivel the alternator backwards to provide access to the coolant pump.

24 Unscrew the bolts securing the coolant pipe to the rear of the coolant pump, and free the pipe. Access to the bolt nearest the back of the engine is particularly difficult - in the workshop, we had to use a socket and very long extension bar. Recover the O-ring seal from the end of the coolant pipe.

25 Unscrew the remaining three bolts securing the coolant pump housing to the cylinder block, and withdraw the assembly. Recover the gasket (see *illustration*).

26 Note that a new coolant pump may be supplied together with the housing - however, it is possible to obtain the pump-to-housing O-ring seal separately. Unscrew the four bolts and separate the pump from its housing (see *illustration*).

Method 2 - pump removal from housing

27 Remove the alternator upper mounting bolt, then loosen the alternator lower mounting bolt and swivel the alternator backwards to provide access to the coolant pump.

28 Remove the four bolts securing the coolant pump to the housing, and withdraw the pump. Recover the large O-ring seal, and discard it - a new seal must be used when refitting.

1.8 litre models

29 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

30 Drain the cooling system as described in Chapter 1.

31 Remove the auxiliary drivebelt as described in Chapter 1.

32 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the right-hand front roadwheel.

33 Undo the fastenings and remove the wheel arch liner from under the front wing.

34 Remove the timing belt as described in Chapter 2D.

35 Remove the inlet (rear) camshaft sprocket as described in Chapter 2D, Section 5.

36 Unbolt and remove the timing belt guard brackets from over the coolant pump. One is located on the rear of the engine and the other is located below the exhaust camshaft sprocket.

37 Unscrew the mounting bolts and withdraw the coolant pump from the cylinder head. Recover the O-ring seal.

Inspection

38 Check the pump body and impeller for signs of excessive corrosion. Turn the impeller, and check for stiffness due to corrosion, or roughness due to excessive end play.

39 On 1.6 litre engines, check the clearance between the pump impeller and the casing. Either use vernier calipers to calculate the clearance, or use a feeler blade inserted through the aperture at the rear of the pump housing. If the clearance is different to that given in the *Specifications*, the pump must be renewed.

Refitting

40 Commence refitting by thoroughly cleaning the mating faces of the pump and cylinder block/head/housing.

1.2 litre models

41 Apply a continuous bead of sealant (liquid gasket) to the cylinder block mating face of the pump (see illustration).

42 Locate the pump in the cylinder block casting and insert the mounting bolts/nuts. Progressively tighten them to the specified torque.

43 Refit the timing belt as described in Chapter 2A.

44 Refit the auxiliary drivebelt(s) as described in Chapter 1.

45 Refill the cooling system as described in Chapter 1.

46 Reconnect the battery negative (earth) lead (see *Disconnecting the battery*).

1.4 litre models

47 Locate a new O-ring seal on the coolant pump, then locate it on the cylinder head and insert the mounting bolts. Progressively tighten the bolts to the specified torque.

48 Refit the camshaft sprocket as described in Chapter 2B, Section 5.

49 Refit the timing belt as described in Chapter 2B.

50 Refit the auxiliary drivebelt as described in Chapter 1.

51 Refill the cooling system as described in Chapter 1.

52 Reconnect the battery negative (earth) lead (see *Disconnecting the battery*).

1.6 litre models

Method 1

53 Locate the coolant pump in its housing together with a new O-ring. Insert the bolts and tighten them securely.

54 Locate the pump housing on the cylinder block together with a new gasket, then refit the three shorter bolts and tighten them to the specified torque.

55 Locate the coolant pipe on the rear of the coolant pump together with a new O-ring seal, insert the bolts and tighten them securely.

56 Refit the alternator upper mounting bracket and tighten the bolts securely.

57 Refit the heat shrouds to the exhaust manifold and downpipe, and tighten the bolts.

Method 2

58 Locate the coolant pump in its housing together with a new O-ring. Insert the bolts and tighten them securely.

59 Refit the alternator upper mounting bolt, tightening it securely.

All methods

60 Refit the power steering pump and tension the drivebelt with reference to Chapters 10 and 1. Refit the drivebelt guard and tighten the bolts.

61 On early models, reconnect the fuel lines and tighten the union nuts. Refit the hose bracket to the inlet manifold and tighten the bolts.

62 Where applicable, refit the alternator cooling hose to the right-hand side of the engine compartment.

63 Refit the drivebelt tensioner, and tension the alternator drivebelt with reference to Chapter 1.

64 Refit the wheel arch liner under the right-hand front wing, then refit the roadwheel and lower the vehicle to the ground.

65 Refill the cooling system as described in Chapter 1.

66 Reconnect the battery negative (earth) lead (see *Disconnecting the battery*).

1.8 litre models

67 Locate the coolant pump on the cylinder head together with a new O-ring seal. Insert the bolts and tighten them to the specified torque.

68 Refit the timing belt guard brackets and tighten the bolts to the specified torque.

69 Refit the inlet camshaft sprocket as described in Chapter 2D, Section 5.

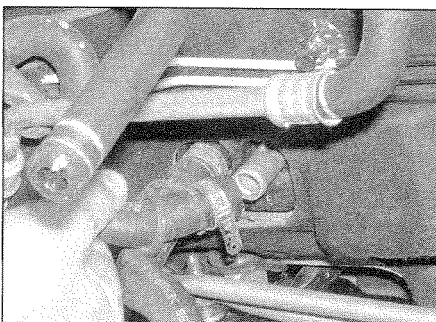
70 Refit the timing belt as described in Chapter 2D.

71 Refit the wheel arch liner under the front wing and tighten the fastenings.

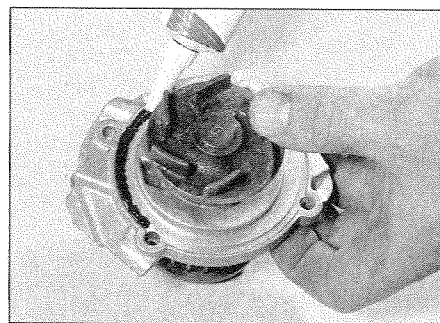
72 Refit the right-hand front roadwheel.

73 Refit the auxiliary drivebelt as described in Chapter 1.

74 Refill the cooling system as described in Chapter 1.



9.4 Disconnecting the heater hoses from the heater matrix supply and return stubs



8.41 Apply a continuous bead of sealant (liquid gasket) to the pump mating face (1.2 litre models)

75 Reconnect the battery negative (earth) lead (see *Disconnecting the battery*).

9 Heater/ventilation components - removal and refitting

Complete heater assembly (models without air conditioning)



Warning: On models fitted with air conditioning, do not attempt to remove the evaporator, which is located between the heater blower motor and the heater matrix. Removal of the evaporator entails disconnection of refrigerant lines, and this work should be entrusted to a FIAT dealer or refrigeration engineer.

Removal

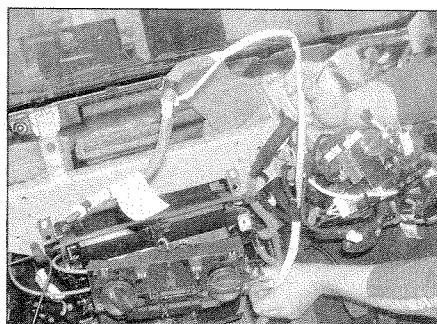
1 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

2 Drain the cooling system as described in Chapter 1.

3 Remove the fascia and centre console as described in Chapter 11.

4 At the rear of the engine compartment, loosen the clips and disconnect the heater hoses from the heater matrix supply and return stubs (see illustration).

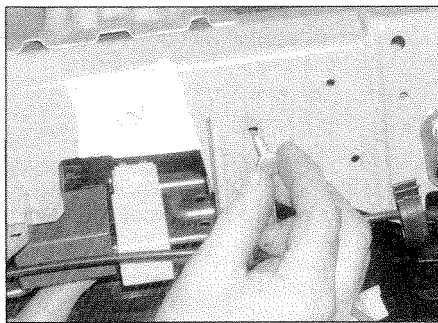
5 Inside the vehicle, release the airbag wiring from the retainers on the bulkhead (see illustration). Note the position of the wiring to ensure correct refitting.



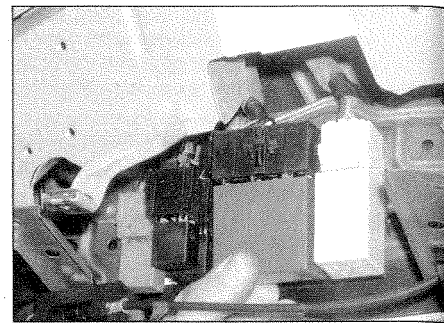
9.5 Releasing the airbag wiring from the retainers



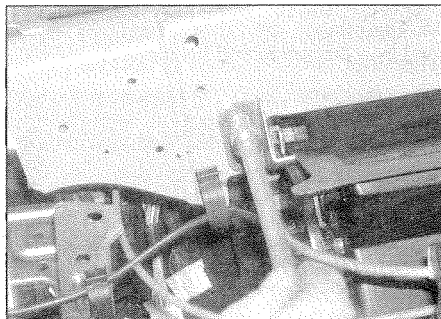
9.7 Disconnect the wiring near the heater motor



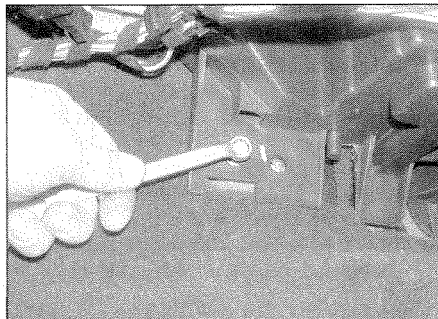
9.9a Undo the support bracket screws . . .



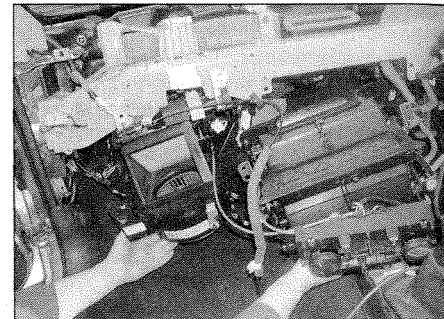
9.9b . . . and move the relays to one side



9.9c Heater upper mounting bolt



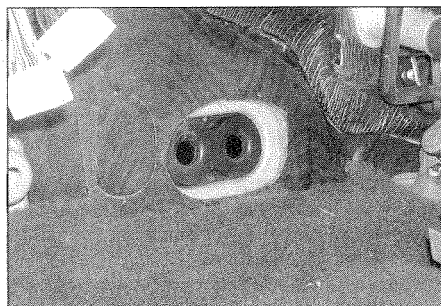
9.9d Heater lower mounting bolt



9.9e Removing the heater assembly from inside the car

6 Disconnect the wiring at the plug located next to the clutch pedal.

7 Disconnect the wiring at the plug located next to the heater blower motor on the left-hand side of the heater assembly (see illustration).



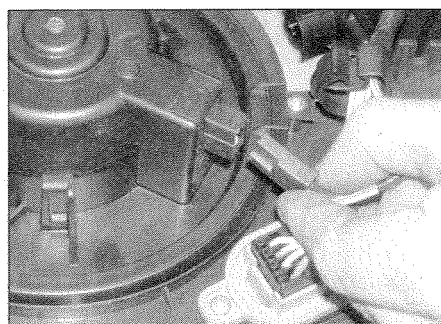
9.10 Bulkhead rubber grommet for the heater matrix pipes

8 Place some cloth rags on the passenger floor to absorb any spilt coolant.

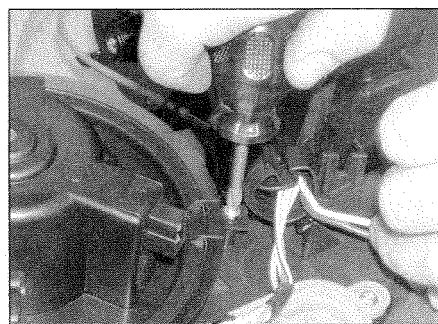
9 Unscrew the mounting bolts and withdraw the complete heater assembly, including the heater controls and the blower motor. There are five bolts accessible from the top of the assembly, and two accessible under the left-hand side. For access to the left-hand bolts, move the relays to one side. Remove the assembly from the vehicle (see illustrations).

Refitting

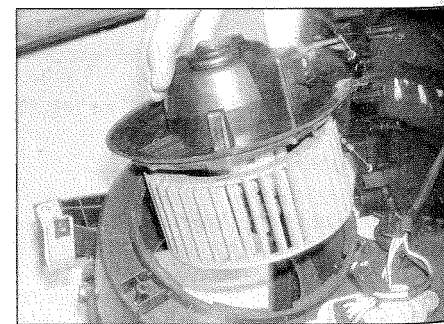
10 Refitting is a reversal of removal, with reference to Chapter 11 and 1 for the refitting of the facia and refilling of the cooling system. Check that the bulkhead rubber grommet (see illustration) is in good condition before refitting the heater. Make sure that all wiring and cables are routed as noted during dismantling.



9.12 Disconnect the wiring . . .



9.13a . . . then undo the mounting screw . . .



9.13b . . . and remove the heater blower motor (heater removed for clarity)

Heater blower motor

Removal

11 The heater blower motor is located below the left-hand side of the facia. First make sure that the ignition and heater controls are switched off. For improved access, remove the glovebox as described in Chapter 11.

12 Disconnect the wiring from the blower motor (see illustration).

13 Undo the mounting screw and lower the blower motor from the housing (see illustrations).

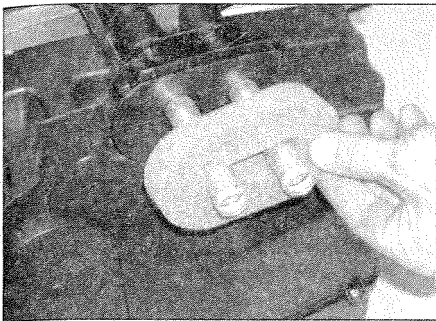
Refitting

14 Refitting is a reversal of removal.

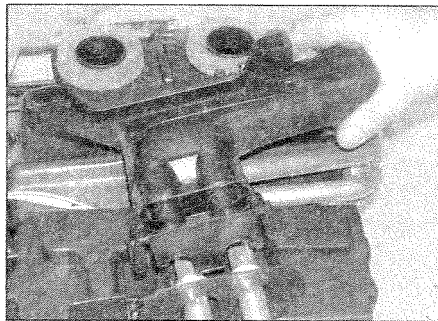
Heater matrix

Removal

15 Remove the complete heater assembly as described earlier in this Section.



9.16a Remove the sealing packing ...



9.16b ... then remove the pipe support ...



9.16c ... and matrix end cover

16 Unscrew the bolt and remove the pipe support from the heater body. Also remove the sealing packing and the matrix end cover (see illustrations).

17 Identify the two pipes for position, then

undo the screw and remove the holding plate. Ease the pipes from the matrix and recover the O-ring seals (see illustrations).

18 Undo the securing screw and withdraw the matrix from the heater body taking care

not to damage the delicate fins (see illustration).

Refitting

19 Refitting is a reversal of removal.

Heater blower motor resistor

Removal

20 The resistor is located at the bottom of the heater casing, behind the blower motor.

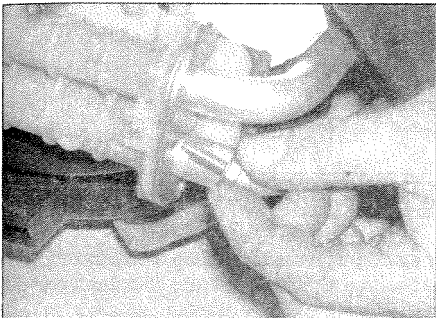
21 For improved access, remove the blower motor as described in the previous sub-Section.

22 Disconnect the wiring plug from the resistor (see illustration).

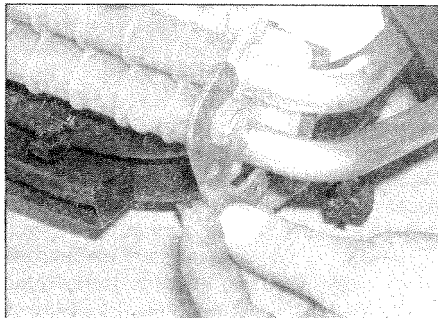
23 Remove the securing screws, and withdraw the resistor (see illustrations).

Refitting

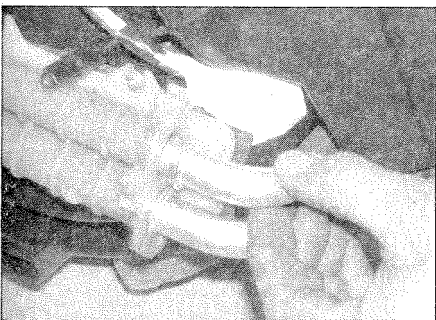
24 Refitting is a reversal of removal.



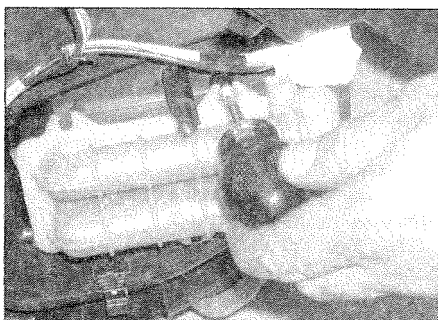
9.17a Undo the screw ...



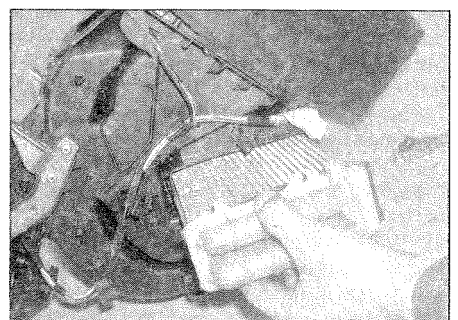
9.17b ... and remove the plate ...



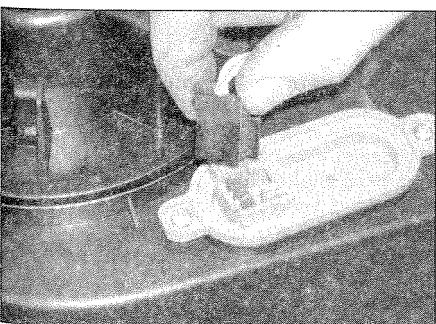
9.17c ... then remove the pipes



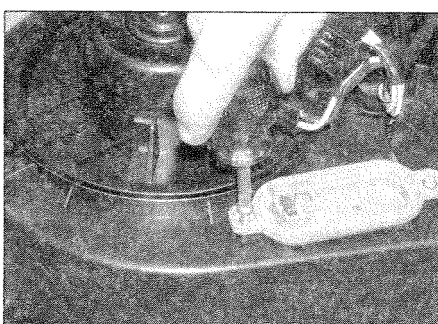
9.18a Undo the screw ...



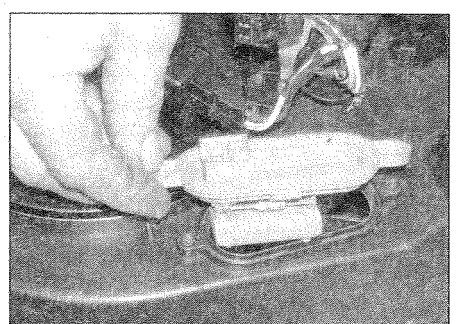
9.18b ... and withdraw the matrix from the heater body



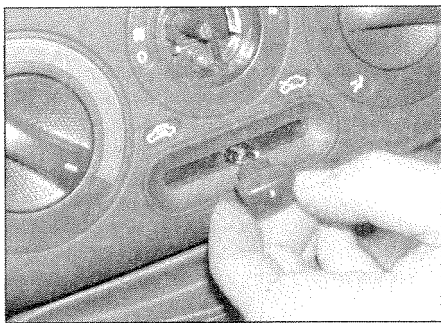
9.22 Disconnect the wiring ...



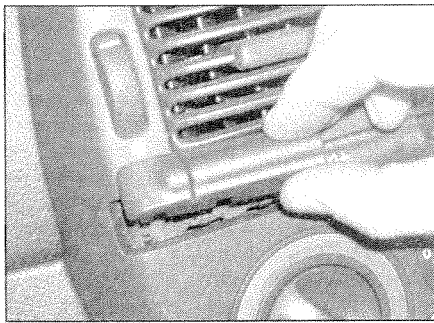
9.23a ... then remove the securing screws ...



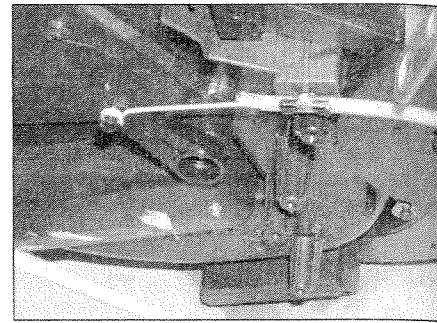
9.23b ... and withdraw the blower motor resistor (heater removed for clarity)



9.29 Removing the fresh air control knob



9.30 Prise out the small covers from each end of the facia switches



9.36a Control cable on the side of the heater

Heater control panel

Removal

25 Disconnect the battery negative (earth) lead (see *Disconnecting the battery*).

26 Remove the radio/cassette player as described in Chapter 12.

27 Remove the glovebox as described in Chapter 11.

28 Open the ashtray, then unscrew the heater control panel surround mounting screws. There are two in the ashtray aperture and two more above the radio position.

29 Carefully pull off the heater ventilation centre control knob, using a pair of pliers and a piece of card to protect the knob. Unscrew the panel mounting screw located beneath it. Also pull off the fresh air control knob (see illustration).

30 Using a small screwdriver, carefully prise out the small covers from each end of the facia switches located above the heater control knobs (see illustration). Also, prise out the cover at the centre of the switches noting that on some models the alarm system warning light is located in this position.

31 Undo the screws and withdraw the switch panel from the front of the facia. Disconnect the wiring and remove the switches from the facia.

32 Withdraw the heater control panel surround from the facia and disconnect the wiring from the hazard warning switch.

33 With the ashtray closed, undo the lower mounting screws, then open the ashtray lid and unscrew the upper mounting screws. Withdraw the ashtray from the facia and disconnect the wiring from the cigar lighter.

34 Undo the screws securing the heater controls to the facia. There are four screws.

35 Working in the front footwells, remove the inner trim panels for access to the heater body.

36 Identify the heater control cables for position, then disconnect them and withdraw the heater control panel from the facia (see illustrations).

Refitting

37 Refitting is a reversal of removal.

10 Air conditioning system - general information and precautions

General information

Air conditioning is available as an option on certain models. It enables the temperature of incoming air to be lowered, and also dehumidifies the air, which allows rapid demisting and increased comfort.

The cooling side of the system works in the same way as a domestic refrigerator. Refrigerant gas is drawn into a belt-driven compressor where the increase in pressure causes the refrigerant gas to turn to liquid. It then passes through a condenser mounted on the front of the radiator, where it is cooled. The liquid then passes through an expansion valve to an evaporator, where it changes from liquid under high pressure to gas under low pressure. This change is accompanied by a drop in temperature, which cools the evaporator and hence the air passing over it. The refrigerant returns to the compressor, and the cycle begins again.

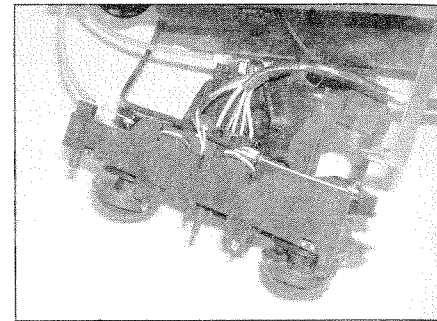
The air blown through the evaporator passes to the air distribution unit where it is mixed, if required, with hot air blown through the heater matrix to achieve the desired temperature in the passenger compartment.

The heating side of the system works in the same way as on models without air conditioning (see Section 9).

The system is electronically-controlled. Any problems with the system should be referred to a FIAT dealer.

Precautions

With an air conditioning system, it is necessary to observe special precautions whenever dealing with any part of the system, or its associated components. If for any



9.36b Heater control panel

reason the system must be disconnected, it is essential that you entrust this task to your FIAT dealer or a refrigeration engineer.

Warning: The refrigeration circuit contains a liquid refrigerant, and it is dangerous to disconnect any part of the system without specialised knowledge and equipment.

11 Air conditioning components - removal and refitting

Warning: Do not attempt to open the refrigerant circuit. Refer to the precautions given in Section 10.

The only operation which can be carried out easily without discharging the refrigerant is the renewal of the compressor drivebelt - this procedure is described in Chapter 1, Section 2. All other operations must be referred to a FIAT dealer or an air conditioning specialist.

If necessary for access to other components, the compressor can easily be unbolted and moved aside, without disconnecting its flexible hoses, after removing the drivebelt. Access is gained by jacking up the front of the vehicle and supporting it on axle stands (see *Jacking and vehicle support*), then removing the wheel arch liner.