



3.33 Undo the bolt (arrowed) securing the intercooler right-hand charge air pipe upper mounting to the radiator

right-hand charge air pipe upper mounting to the radiator (see illustration).

34 Undo the bolt each side securing the intercooler left-hand and right-hand charge air pipe lower mountings to the radiator (see illustrations).

35 Release the clamp and disconnect the bottom hose from the radiator.

36 On models with air conditioning, undo the two bolts securing the receiver-dryer to the right-hand side of the radiator (see illustration).

37 Undo the bolt each side securing the intercooler upper mounting brackets to the radiator (see illustration). Carefully lift up or remove the plastic panels on each side of the radiator for improved access, if necessary. Suitably secure the intercooler to the upper body panel using cable-ties or similar, to retain it in place when the radiator is removed.

38 On models with automatic transmission, detach the protective ring (where fitted) over the fluid cooler pipe unions at the radiator. Using a small screwdriver, release the quick-release fitting retaining lugs and disconnect the fitting from the radiator. Suitably cover the open unions after disconnection.

39 Check that all hoses, and connections are released from the radiator in the engine compartment, then engage the help of an assistant to support the radiator.

40 Remove the two bolts securing the radiator left-hand and right-hand mounting brackets to the subframe and carefully lower the radiator down and out from under the car (see illustration 3.16). Disengage the



3.36 On models with air conditioning, undo the two bolts (arrowed) securing the receiver-dryer to the radiator



3.34a Undo the bolt (arrowed) securing the intercooler left-hand ...

intercooler lower mounting lugs from the radiator as the radiator is lowered.

### Inspection

41 If the radiator has been removed due to suspected blockage, reverse-flush it as described in Chapter 1A or 1B.

42 Clean dirt and debris from the radiator fins, using an airline (in which case, wear eye protection) or a soft brush.

**Caution: Be careful, as the fins are easily damaged, and are sharp.**

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

44 A leaking radiator must be referred to a specialist for permanent repair. Do not attempt to weld or solder a leaking radiator.

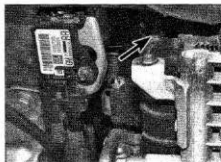
45 In an emergency, minor leaks from the radiator can be cured by using a suitable radiator sealant (in accordance with its manufacturer's instructions) with the radiator fitted in the vehicle.

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

### Refitting

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

- Ensure that the intercooler or condenser (as applicable) lower mountings are correctly engaged with the radiator when refitting.
- Ensure that all hoses are correctly reconnected, and their retaining clips securely tightened.



3.37 Undo the bolt (arrowed) each side securing the intercooler upper mounting brackets to the radiator



3.34b ... and right-hand charge air pipe lower mountings to the radiator

c) On completion, refill the cooling system as described in Chapter 1A or 1B.

d) On models with automatic transmission, check and if necessary top-up the automatic transmission fluid level with reference to the 'Automatic transmission fluid - draining and refilling' procedures contained in Chapter 7B.

### 4 Thermostat - removal and refitting

#### Removal

##### 1.8 litre Z18XE petrol engine models

- The thermostat is located on the front right-hand side of the cylinder head, and is integral with its housing.
  - Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).
  - Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the plastic cover from the top of the engine.
  - Drain the cooling system as described in Chapter 1A.
  - Loosen the clips and disconnect the top hose and throttle housing coolant hose from the thermostat housing.
  - Disconnect the wiring connector from the coolant temperature sensor on the housing.
  - Unbolt and remove the housing from the cylinder head, then remove the gasket. Thoroughly clean the contact surfaces of the housing and cylinder head.
- ##### 1.8 litre Z18XER petrol engine models
- The thermostat is located in a housing attached to the left-hand side of the cylinder head, and is integral with the housing cover.
  - Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).
  - Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).
  - Drain the cooling system as described in Chapter 1A.
  - Undo the retaining nut and detach the

wiring harness bracket from the thermostat housing.

**13** Disconnect the thermostat wiring connector.

**14** Release the clips and disconnect the radiator hose from the thermostat cover.

**15** Unscrew the four bolts and remove the thermostat cover from the housing.

**16** Thoroughly clean the housing and cover contact surfaces.

## 2.2 litre petrol engine models

**17** The thermostat is located on the left-hand rear of the cylinder head, over the transmission.

**18** Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).

**19** Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).

**20** Drain the cooling system as described in Chapter 1A.

**21** Release the clip and disconnect the top hose from the thermostat cover.

**22** Unscrew the bolts and remove the cover from the thermostat housing (see illustration).

**23** Lift the thermostat from the housing (see illustration). Remove the seal from the rim of the thermostat and discard it. Obtain a new one. Clean the contact surfaces of the cover and housing.

## Diesel engine models

**24** The thermostat is located on the left-hand end of the cylinder head, and is integral with the housing.

**25** Remove the plastic cover over the top of the engine.

**26** Remove the battery and battery box as described in Chapter 5A.

**27** Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).

**28** Drain the cooling system as described in Chapter 1B.

**29** Release the two retaining clips and disconnect the charge air hose from the throttle housing, and intercooler charge air pipe (see illustration).

**30** Release the clips and disconnect the hoses from the thermostat housing.

**31** Disconnect the coolant temperature sensor wiring connector.

**32** Unscrew the nut and release the coolant pipes from the stud at the base of the thermostat housing.

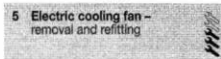
**33** Unbolt the thermostat housing from the cylinder head. Clean away all traces of gasket from the housing and cylinder head.

## Refitting

**34** Refitting is a reversal of removal, but fit a new gasket/seal (where applicable) and tighten the mounting bolts to the specified torque. Refill the cooling system as described in the relevant Part of Chapter 1.



**4.22** Removing the thermostat housing cover



**5** Electric cooling fan – removal and refitting



**Warning:** If the engine is hot, the cooling fan may start up at any time. Take extra precautions when working in the vicinity of the fan.

## Removal

### 1.8 litre Z18XE petrol engine models

**1** Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).

**2** Remove the plastic cover over the top of the engine.

**3** Unclip the radiator hose and detach the plastic panel at the front of the battery box.

**4** Pull out the locking bar and disconnect the wiring harness connector from the cooling fan module at the side of the fan housing. Free the wiring harness from the cable-ties.

**5** Firmly apply the handbrake, then jack up the front of the car and support it securely on axle stands (see *Jacking and vehicle support*).

**6** Release the four retaining clips and detach the front bumper lower panel from the subframe.

**7** Unscrew the two bolts securing the fan housing to the radiator; one at each upper corner of the housing.

**8** Carefully lift the fan housing upwards to disengage it from the lower guides on the radiator, and remove the housing from the engine compartment.

**9** To remove the fan motor, disconnect the wiring connector and unclip the wiring harness from the fan housing. Undo the three retaining bolts and remove the fan from the housing.

**10** To remove the cooling fan module, undo the retaining screw and unclip the unit from the fan housing.

### 1.8 litre Z18XER petrol engine models

**11** Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).

**12** Remove the air cleaner assembly as described in Chapter 4A.

**13** Undo the bolt securing the resonator to the front upper crossmember. Depress the



**4.23** Removing the thermostat from the housing

three retaining lugs and push the resonator rearward. Using a screwdriver, release the locking clip and remove the resonator.

**14** Release the retaining clips and detach the coolant hoses from the fan housing.

**15** Disconnect the cooling fan harness at the connector on the side of the fan housing.

**16** Unscrew the two bolts securing the fan housing to the radiator; one at each upper corner of the housing.

**17** Carefully lift the fan housing upwards to disengage it from the lower guides on the radiator, and remove the housing from the engine compartment.

**18** To remove the fan motor, undo the bolt securing the wiring connector to the fan housing, then unclip the wiring. Undo the three retaining bolts and remove the fan from the housing.

### 2.2 litre petrol engine models

**19** Remove the battery and battery box as described in Chapter 5A.

**20** Undo the retaining bolt and unclip the air intake resonator from above the radiator.

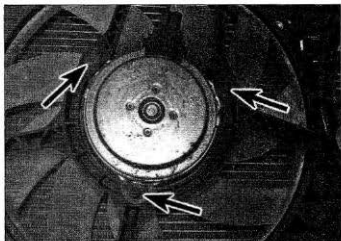
**21** Pull out the locking bar and disconnect the wiring harness connector from the cooling fan module at the top of the fan housing. Free the wiring harness from the cable-ties.

**22** Unscrew the two bolts securing the fan housing to the radiator; one at each upper corner of the housing.

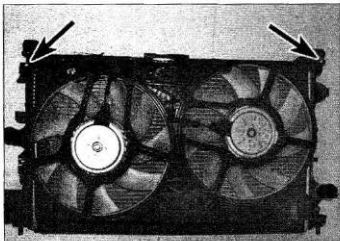
**23** Carefully lift the fan housing upwards to disengage it from the lower guides on the radiator, and remove the housing from the engine compartment.



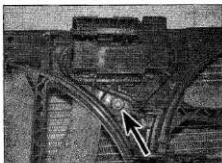
**4.29** Disconnect the charge air hose from the throttle housing, and intercooler charge air pipe



5.24 Undo the three retaining bolts (arrowed) and remove the fan from the housing



5.27 Unscrew the two retaining bolts (arrowed) and lift the fan housing from the lower guides on the radiator



5.29 Undo the retaining screw (arrowed) and unclip the cooling fan module from the fan housing

24 To remove the fan motor(s), disconnect the wiring connector at the relevant motor and unclip the wiring harness from the fan housing. Undo the three retaining bolts and remove the fan from the housing (see illustration).

25 To remove the cooling fan module, undo the retaining screw and unclip the unit from the fan housing.

#### Diesel engine models

26 Remove the radiator as described in Section 3.

27 Unscrew the two retaining bolts and lift

the fan housing from the lower guides on the radiator (see illustration).

28 To remove the fan motor(s), disconnect the wiring connector at the relevant motor and unclip the wiring harness from the fan housing. Undo the three retaining bolts and remove the fan from the housing (see illustration 5.24).

29 To remove the cooling fan module, undo the retaining screw and unclip the unit from the fan housing (see illustration).

#### Refitting

30 Refitting is a reversal of removal.

#### 6 Coolant temperature sensor - testing, removal and refitting

#### Testing

1 Testing of the coolant temperature sensor must be entrusted to a Vauxhall/Opel dealer, who will have the necessary specialist diagnostic equipment.

#### Removal

2 Partially drain the cooling system with reference to Chapter 1A or 1B. Alternatively, it is possible to change the sensor quickly with

minimal loss of coolant by first releasing any pressure from the cooling system. With the engine cold, temporarily remove the expansion tank cap.

3 Where fitted, remove the plastic cover over the top of the engine.

#### 1.8 litre Z18XE petrol engine models

4 The coolant temperature sensor is located on the thermostat housing on the right-hand end of the cylinder head.

5 Disconnect the wiring connector, then unscrew and remove the sensor from the thermostat housing. If the cooling system has not been drained, either insert the new sensor or fit a blanking plug to prevent further loss of coolant.

#### 1.8 litre Z18XER petrol engine models

6 The coolant temperature sensor is located in the thermostat housing at the left-hand end of the cylinder head (see illustration).

7 Disconnect the wiring connector, then unlock the retaining clamp and remove the sensor from the thermostat housing. If the cooling system has not been drained, either insert the new sensor or fit a blanking plug to prevent further loss of coolant.

#### 2.2 litre petrol engine models

8 The coolant temperature sensor is located on the thermostat housing at the left-hand end of the cylinder head (see illustration).

9 Disconnect the wiring connector, then unscrew and remove the sensor from the thermostat housing. If the cooling system has not been drained, either insert the new sensor or fit a blanking plug to prevent further loss of coolant.

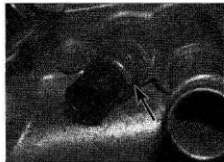
#### Diesel engine models

10 The coolant temperature sensor is located on the thermostat housing on the left-hand end of the cylinder head (see illustration).

11 Slacken the two retaining clips and disconnect the upper charge air hose from the throttle housing, and intercooler left-hand charge air pipe.



6.6 Coolant temperature sensor location (arrowed) - 1.8 litre Z18XER petrol engine models



6.8 Coolant temperature sensor located on the thermostat housing - 2.2 litre petrol engine models

12 Disconnect the wiring connector, then unscrew and remove the sensor from the thermostat housing. If the cooling system has not been drained, either insert the new sensor or fit a blanking plug to prevent further loss of coolant.

### Refitting

13 Fit the new sensor using a reversal of the removal procedure, but tighten the sensor to the specified torque and refill the cooling system with reference to Chapter 1A or 1B.

## 7 Coolant pump - removal and refitting

### Removal

1 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Chapter).

2 Where fitted, remove the plastic cover over the top of the engine.

#### 1.8 litre Z18XE petrol engine models

3 Drain the cooling system as described in Chapter 1A.

4 Remove the timing belt as described in Chapter 2A. **Note:** *The timing belt must not come into contact with coolant.*

5 Unscrew and remove the three coolant pump securing bolts (see illustration).

6 Withdraw the coolant pump from the cylinder block, noting that it may be necessary to tap the pump lightly with a soft-faced mallet to free it from the cylinder block.

7 Recover the pump sealing ring, and discard it; a new one must be used on refitting.

8 Note that it is not possible to overhaul the pump. If it is faulty, the unit must be renewed complete.

#### 1.8 litre Z18XER petrol engine models

9 Remove the air cleaner assembly and air intake ducts as described in Chapter 4A.

10 Slacken the three coolant pump pulley retaining bolts.

11 Remove the auxiliary drivebelt as described in Chapter 1A.

12 Drain the cooling system as described in Chapter 1A.

13 Unscrew the previously-slackened coolant pump pulley retaining bolts and remove the pulley from the pump flange.

14 Undo the five retaining bolts and remove the pump from the oil pump housing.

15 Note that it is not possible to overhaul the pump. If it is faulty, the unit must be renewed complete.

#### 2.2 litre petrol engine models

16 Remove the air cleaner assembly and air intake ducts as described in Chapter 4A.

17 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).

18 Disconnect the two oxygen sensor wiring connectors at the right-hand end of the cylinder head. Unclip the wiring harness from the support bracket.

19 Undo the nut and bolt and remove the right-hand engine lifting eye from the cylinder head.

20 Unbolt the heat shield from the exhaust manifold.

21 Drain the cooling system as described in Chapter 1A. Refit and tighten the coolant pump drain plug on completion.

22 Loosen the clip and disconnect the hose from the thermostat housing cover. Also disconnect the heater hoses from the thermostat housing and heater matrix. Remove the hoses.

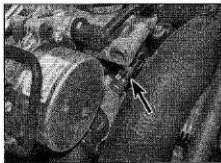
23 Unclip the coolant temperature sensor wiring from the thermostat housing cover, then disconnect the wiring from the sensor.

24 Unscrew and remove the coolant temperature sensor from the thermostat housing.

25 Unscrew the bolts and remove the thermostat housing and coolant pipe from the cylinder block and coolant pump. Note the lower bolt is a stud bolt, and note the location of the O-ring seal in the pump housing (see illustrations).

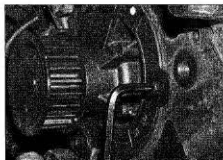
26 Unbolt the coolant pump drive sprocket access cover from the timing cover on the right-hand side of the engine (see illustration).

27 Vauxhall/Opel technicians use a special tool (KM-J-43651) to hold the sprocket



6.10 Coolant temperature sensor (arrowed) located on the thermostat housing - diesel engine models

stationary while the coolant pump is being removed. The tool consists of a flanged tube which is bolted to the sprocket and also to the timing housing, with holes to allow removal of the coolant pump bolts. It is possible to fabricate a simple home-made tool from a length of flat metal bar using two threaded rods screwed into the sprocket. First unscrew one of the pump mounting bolts from the sprocket taking care not to drop it into the timing case, then bolt the tool into position to hold the sprocket. With the tool in position, unscrew the two remaining bolts from the sprocket (see illustrations). To prevent losing any of the bolts, temporarily place a cloth rag beneath the sprocket in the timing case.



7.5 Unscrew and remove the three coolant pump securing bolts - 1.8 litre Z18XE petrol engine models



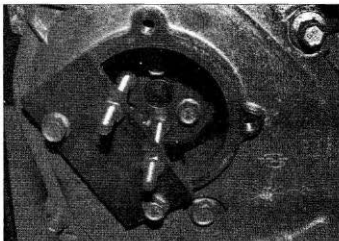
7.25a Thermostat housing retaining bolts - 2.2 litre petrol engine models



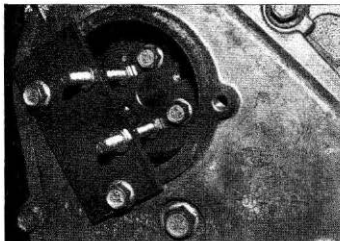
7.25b Removing the coolant pipe from the pump housing - 2.2 litre petrol engine models



7.26 Coolant pump drive sprocket access cover (arrowed) - 2.2 litre petrol engine models



7.27a Home-made tool holding the coolant pump drive sprocket stationary - 2.2 litre petrol engine models



7.27b Unscrew the two remaining bolts securing the coolant pump to the sprocket - 2.2 litre petrol engine models

28 Unscrew the pump mounting bolts noting that if you are using the Vauxhall/Opel tool, one of the bolts cannot be removed completely. There are two bolts at the front and two at the rear. Remove the pump from the timing housing and withdraw upwards from the engine (see illustrations).

29 Recover the pump sealing ring, and discard it; a new one must be used on refitting.

30 Note that it is not possible to overhaul the pump. If it is faulty, the unit must be renewed complete.

#### Diesel engine models

31 Drain the cooling system as described in Chapter 1B.

32 Remove the timing belt as described in Chapter 2C or 2D as applicable. **Note:** The timing belt must not come into contact with coolant.

33 Unscrew and remove the three coolant pump securing bolts (see illustration).

34 Withdraw the coolant pump from the cylinder block, noting that it may be necessary to tap the pump lightly with a soft-faced mallet to free it from the cylinder block (see illustration).

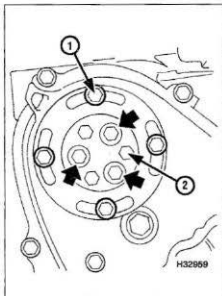
35 Recover the pump sealing ring, and discard it; a new one must be used on refitting.

36 Note that it is not possible to overhaul the pump. If it is faulty, the unit must be renewed complete.

#### Refitting

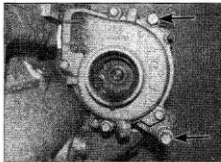
##### 1.8 litre Z18XE petrol engine models

37 Ensure that the pump and cylinder block mating surfaces are clean and dry, and apply a smear of silicone grease to the pump mating surface in the cylinder block.

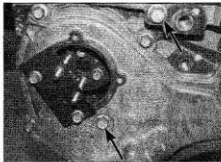


7.27c Vauxhall tool KM-J-43651 retaining the coolant pump sprocket while the pump is being removed - 2.2 litre petrol engine models

1 Bolts holding the tool to the timing housing  
2 Bolts holding the sprocket to the tool  
Arrows indicate pump mounting bolts



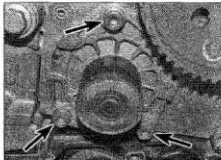
7.28a Unscrew the rear bolts ...



7.28b ... and the front bolts ...



7.28c ... and withdraw the coolant pump from the timing housing - 2.2 litre petrol engine models



7.33 Undo the coolant pump retaining bolts (arrowed) ...