

# ENGINE COOLING SYSTEM

## GROUP 07

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6 cylinders Alfa 90 2.0 6V iniezione Alfa 90 2.5 iniezione

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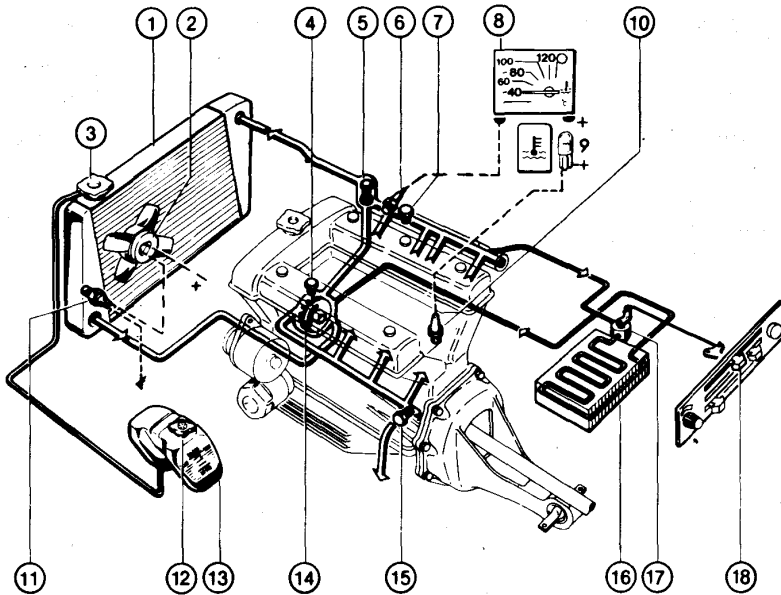
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# ENGINE COOLING SYSTEM

## COOLING SYSTEM

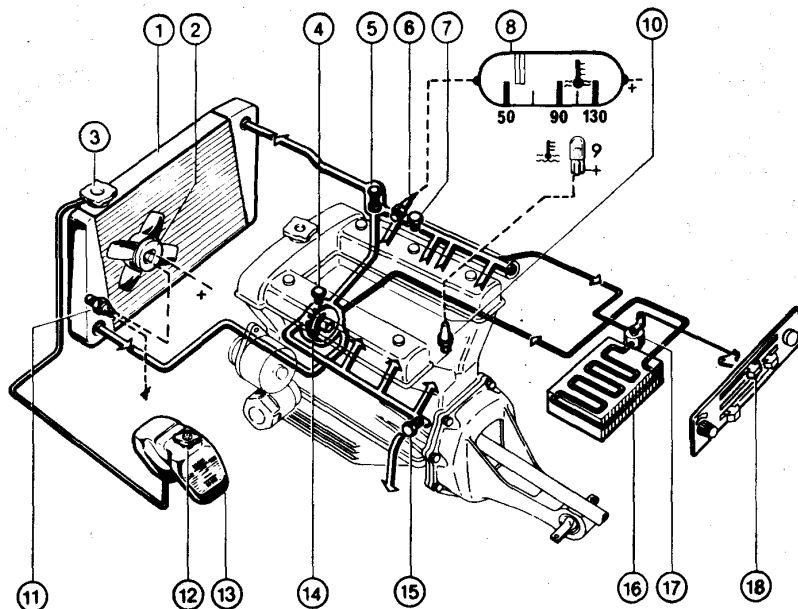
4 cylinders 1.6 1.8 2.0 2.0 Iniezione

ALFETTA Engines 1600 (016.00) - 1800 (016.78) - 2000 (016.55)



1. Radiator
2. Cooling fan
3. Radiator cap
4. Pump vent screw
5. Thermostat
6. Temp. gauge sending unit
7. Manifold vent screw
8. Water temp. gauge
9. High water temp. indicator
10. High water temp. indicator sending unit
11. Fan temp. switch
12. Expansion tank cap
13. Expansion tank
14. Water pump
15. Engine block water drain
16. Heater
17. Heater cock
18. Heater cock control

GIULIETTA Engines 1600 (016.00) - 1800 (016.78) - 2000 (016.55)



## ENGINE COOLING SYSTEM

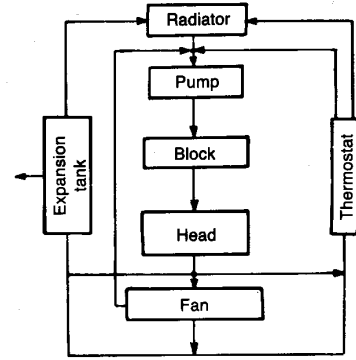
### GENERAL DESCRIPTION

1.6 1.8 2.0 2.0 Iniezione

Forced-feed water cooling system incorporates centrifugal pump U-belt driven from engine crankshaft.

Thermostat on water manifold controls engine temperature and permits speedy warm-up after starting from cold. To this end thermostat valve will only open when temperature approximates 80°C (176°F). In addition to ram effect, radiator cooling is helped by an electric fan activated by radiator mounted temperature switch.

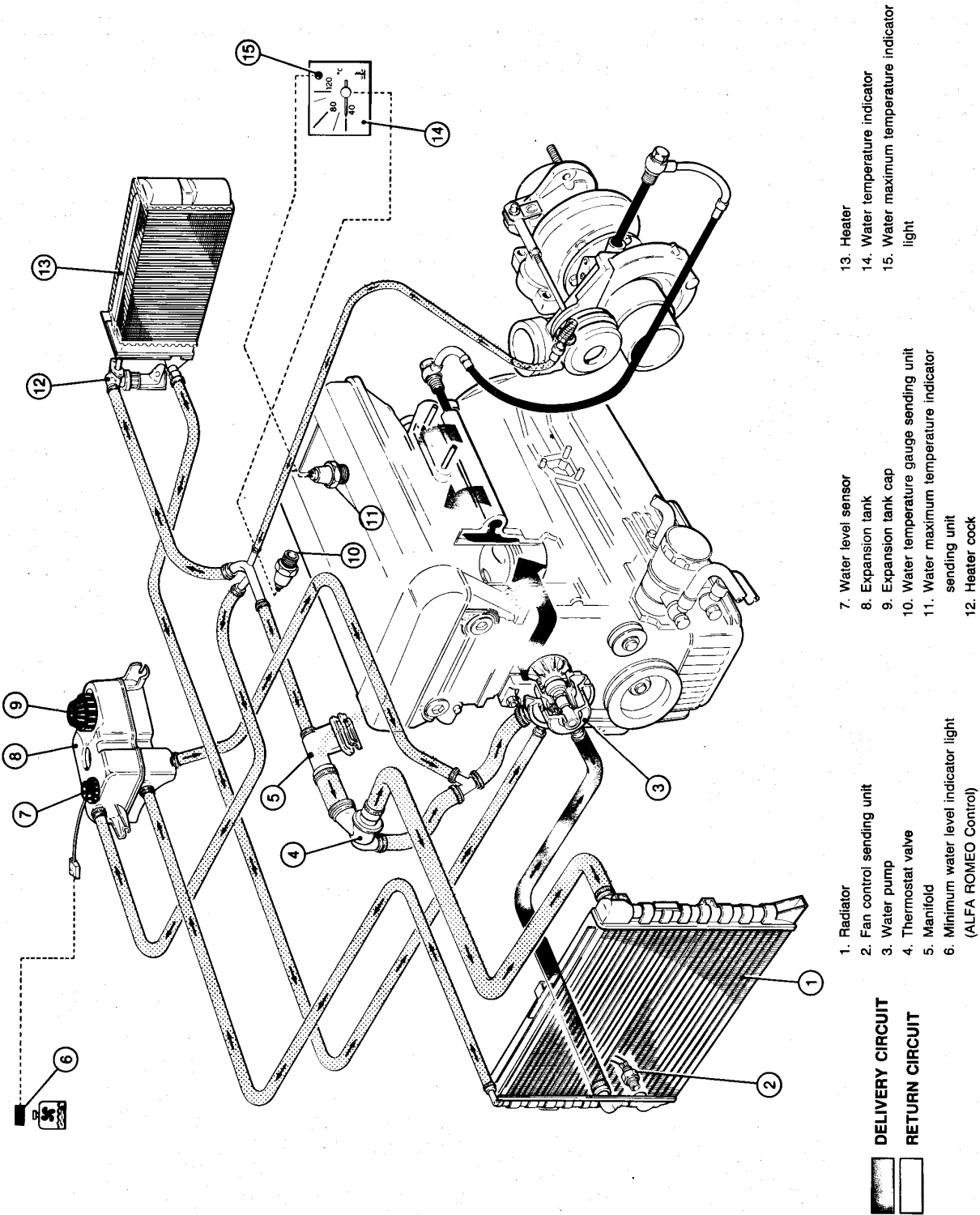
A water temp. gauge sending unit located on supply manifold is connected to a dashboard mounted water temp. gauge. Moreover, a high water temp. indicator sending unit on cylinder head is connected to a dashboard mounted high water temp. indicator which lights up when the system temperature exceeds 105°C (221°F).



# COOLING SYSTEM

4 cylinders **1.8 turbo**

Vehicle **Alfa 75 1.8 turbo** engine 061.34



- 1. Radiator
- 2. Fan control sending unit
- 3. Water pump
- 4. Thermostat valve
- 5. Manifold
- 6. Minimum water level indicator light (ALFA ROMEO Control)
- 7. Water level sensor
- 8. Expansion tank
- 9. Expansion tank cap
- 10. Water temperature gauge sending unit
- 11. Water maximum temperature indicator sending unit
- 12. Heater cock
- 13. Heater
- 14. Water temperature indicator
- 15. Water maximum temperature indicator light

**DELIVERY CIRCUIT**  
**RETURN CIRCUIT**

## ENGINE COOLING SYSTEM

### GENERAL DESCRIPTION

#### 1.8 turbo

The cooling circuit is of the sealed type with circulation by means of a centrifugal pump operated by the crankshaft through a V-belt.

Rotation of water pump (3) creates a vacuum in the return circuit which draws the liquid coming from the cylinder group

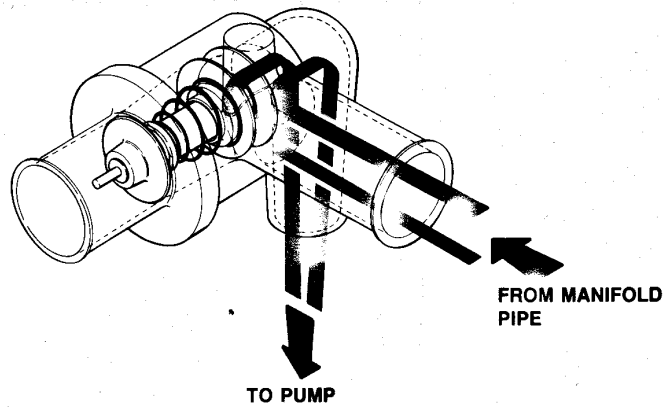
through manifold pipe (5) or from radiator-heater (13) when control cock (12) is open (circulation of the liquid in the radiator-heater).

At the outlet of manifold pipe (5) there is a thermostat (4) whose function is to ensure that the engine reaches normal running temperature in a short time and subsequently ensure that it is kept in the optimal temperature range.

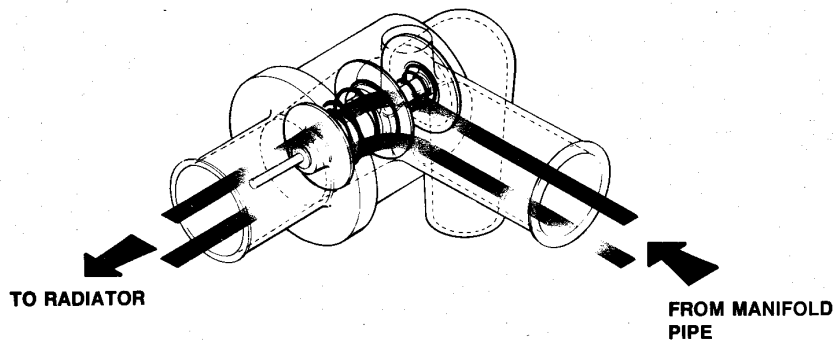
Until the engine temperature reaches 81 to 85°C (178 to 185°F) the thermostat valve remains closed, diverting the liquid directly towards pump (3).

At higher temperatures the opening of the thermostat valve permits the passage of the liquid to the radiator (1).

### THERMOSTAT VALVE CLOSED



### THERMOSTAT VALVE OPEN



The radiator, in addition to the dynamic air, is also cooled by an electric fan activated by thermal contact (2) whenever the temperature of the lower part of the

radiator reaches about 88°C (190°F). The circulation of the water in the radiator (13) is governed by cock (12), opened by the heater control knob. Connected to the delivery duct there is

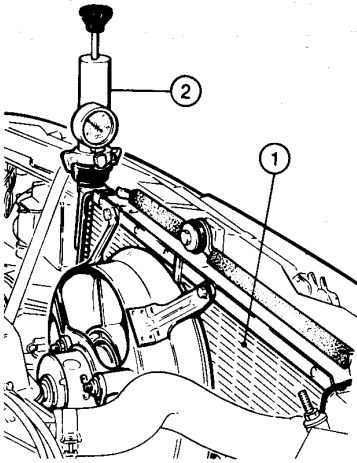
also a pipe to cool the oil circulating in the turbocharger.

**LEAKAGE TEST**

**Alfetta** **Giulietta**

- a. Remove pressurized radiator cap ①.
- b. Apply tester to filler neck.
- c. Pressurize system and check on gauge ② that pressure reaches and stays at the specified rating.
- d. If the system does not hold the specified pressure, check radiator for leakage. If necessary, remove radiator and test as directed under «Radiator».

**Coolant system leakage test pressure**  
**107.9 kPa**  
 (1.0 bar or 1.1 kg/cm<sup>2</sup>, 15.6 psi)

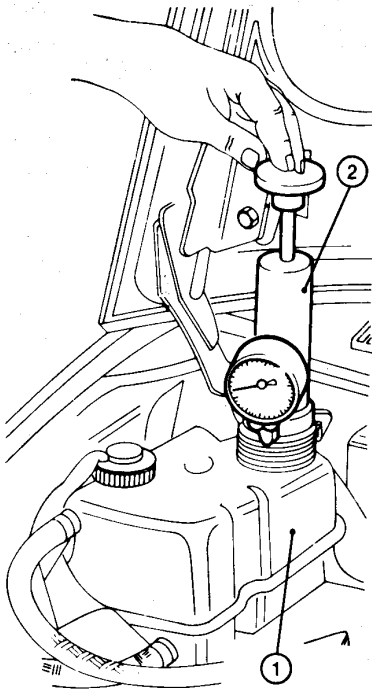


1. Radiator  
 2. Tester

**GTV 2.0** **Alfa 75** **Alfa 90**

- a. Unscrew pressurized cap from the expansion tank ①.
  - b. Screw on instrument ② for the testing on the hydraulic system onto the filler neck of the expansion tank.
  - c. Pressurize the system and check on gauge that the pressure is maintained at the required level.
  - d. If the pressure is not maintained check the circuit for leaks from sleeves or radiator.
- If necessary, proceed with radiator removal as directed under «Radiator».

**Coolant system leakage test pressure**  
**107.9 kPa**  
 (1.08 bar; 1.1 kg/cm<sup>2</sup>; 15.6 psi)

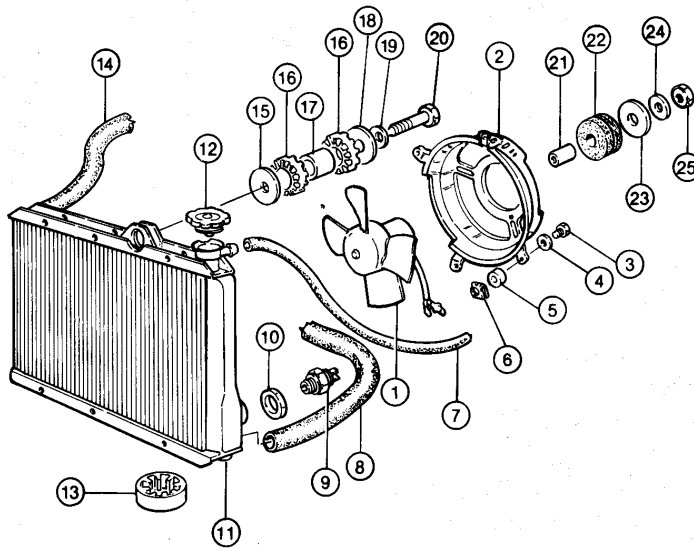


1. Expansion tank  
 2. Tester

# RADIATOR

ALFETTA - GIULIETTA - GTV

1.6 1.8 2.0 2.0 iniezione



- 1. Fan
- 2. Air scoop
- 3. Capscrew
- 4. Washer
- 5. Spacer
- 6. Retainer
- 7. Supply hose  
(expansion tank to radiator)
- 8. Outlet hose

- 9. Temp. switch
- 10. Seal
- 11. Radiator
- 12. Radiator cap
- 13. Cushion pad
- 14. Hose  
(thermostat to radiator)
- 15. Washer
- 16. Cushion pads

- 17. Spacer
- 18. Washer
- 19. Washer
- 20. Capscrew
- 21. Spacer
- 22. Cushion pad
- 23. Washer
- 24. Washer
- 25. Nut

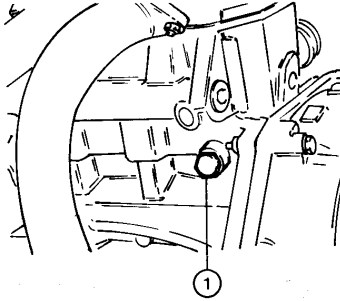
## ENGINE COOLING SYSTEM

### REMOVAL

a. Place a container of adequate capacity under the vehicle for coolant draining.

If the engine is warm proceed with care to prevent scalding.

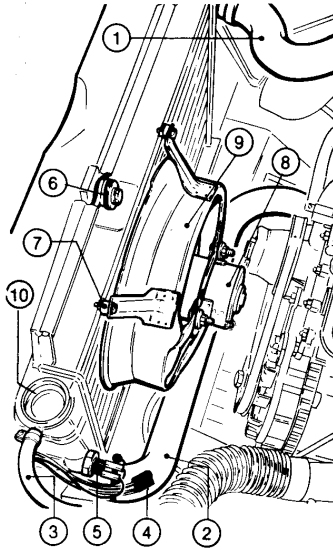
b. Remove plug (1) from engine block and allow to drain completely.



1. Plug

c. Drain radiator as follows:

- slacken hose clip and disconnect radiator outlet hose (2);
- slacken hose clip and disconnect radiator inlet hose (1);
- slacken hose clip and disconnect supply hose (3) from radiator;
- to facilitate draining remove cap from filler (10) and open heater cocks.



1. Water inlet hose (thermostat-radiator)
2. Water outlet hose (radiator-engine)
3. Supply hose
4. Fan connection
5. Temp. switch
6. Radiator capscrew
7. Fan capscrew
8. Fan
9. Air scoop
10. Filler neck

- d. Disconnect electrical leads from fan (4) and temp. switch (5).
- e. Back off capscrews (6) and remove interposed radiator washers.
- f. Lift radiator clear of engine compartment and take off radiator cushion pads.
- g. Back off four capscrews (7) with interposed washers and remove fan (8) with attached air scoops (9).

### LEAKAGE TEST

- a. Plug radiator inlet and outlet ports.
- b. Dip radiator in a water tank, admit compressed air to radiator through supply hose, pressurize to 98.1 to 107.9 kPa (0.9 to 1.0 bar or 1 to 1.1 kg/cm<sup>2</sup>, 14.2 to 15.6 psi) and check for leakage.
- c. If leakage is detected, wire brush the affected area and deoxidize using «cured» hydrochloric acid (zinc chloride).
- d. Tin solder the affected area.
- e. Repeat leakage test as directed in para b. and recoat radiator using black synthetic enamel.

If leakage is detected on radiators fitted with tank seals, replace radiator without hesitation.

f. Install radiator in engine compartment (see: «Radiator - Removal and Installation»), fill the system and check for leakage.

## FAN TEMPERATURE SWITCH

1.6 1.8 2.0 2.0 Iniezione

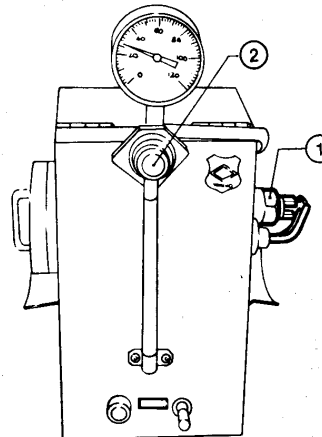
1.8 turbo

### OPERATION TEST

Test temp. switch as follows:

- a. Back off and remove switch from engine.
- b. Install switch (1) on thermostat tester.
- c. Pour water in bowl and turn on switch to heat the water.

- d. When indicator bulb (2) lights up check that tester temperature is equal to specified switch calibration setting (88 to 92°C, 190 to 198°F).



1. Temperature switch
2. Indicator bulb



## PRESSURIZED CAP

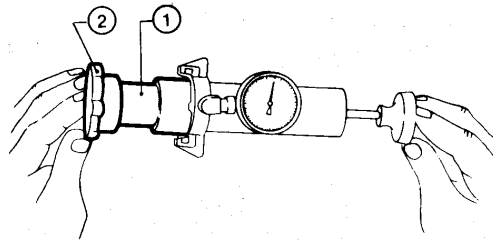
1.6 1.8 2.0 2.0 iniezione

1.8 turbo

### LEAKAGE TEST

- Fasten connector (1) to tester and insert in pressurized cap (2).
- Apply pressure and check on tester that upon reaching the specified pressure setting the unload valve cracks off.

Cap pressure setting:  
68.6 kPa (0.69 bar; 0.7 kg/cm<sup>2</sup>, 10 psi)



- Connector
- Cap setting

## WATER PUMP

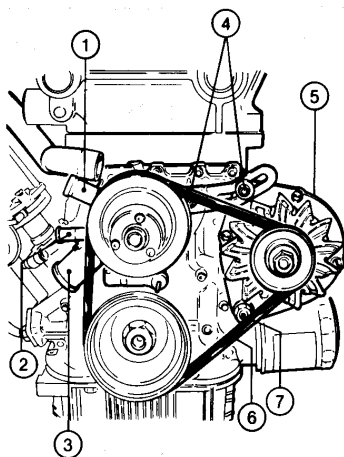
1.6 1.8 2.0 2.0 iniezione

1.8 turbo

### REMOVAL

Prior to removing water pump take off radiator as directed under «Radiator - Removal».

- Slacken hose clips and disconnect supply hose (1), remove adapters (2) and (3) and heater water return hose and radiator water return hose.



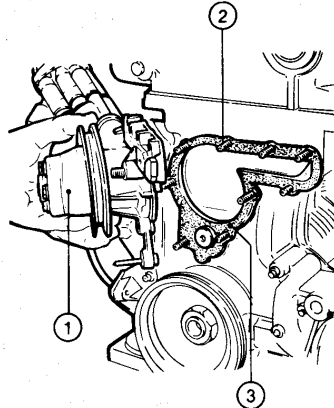
- Water supply hose
- Heater water return adapter
- Radiator water return hose
- Alternator capscrews
- Alternator
- Drive belt
- Bolt

- Back off nuts (4) retaining alternator (5), move the latter to loosen drive belt (6) and take off belt. Remove nuts (4).
- Back off and remove nine nuts and washers retaining water pump (1) to studs (2) on engine block.
- Remove water pump (1) and associated gasket (3).

### INSPECTION

The water pump cannot be overhauled. If defective the water pump should be replaced without hesitation.

- Check pump body and impeller; if they are found to be badly rusted or corroded, replace without hesitation.
- Check impeller for radial and end play. If undue play is detected replace the pump.



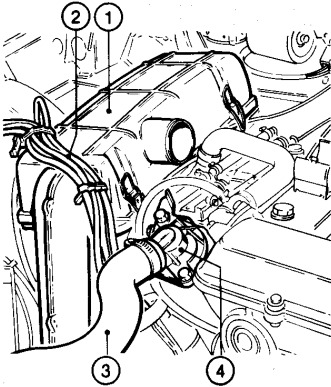
- Water pump
- Studs
- Gasket

## THERMOSTAT

1.6 1.8 2.0 2.0 (iniezione)

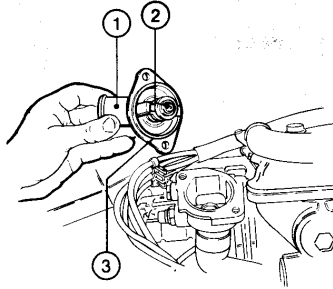
### REMOVAL

- Remove hose connecting warm air intake to air cleaner (1).
- Disconnect HT leads (2) from spark plugs.
- Drain coolant until level is down to the bottom of thermostat chamber.



- Air cleaner
- HT leads
- Water outlet hose
- Thermostat cover

- Slacken hose clip and disconnect hose (3) between thermostat cover (4) and radiator.
- Back off two screws and remove cover (1) with attached thermostat (2) and sealing ring (3).



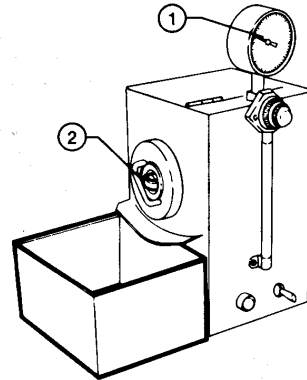
- Thermostat cover
- Thermostat
- Sealing ring

### INSPECTION

Check thermostat as follows:

- Install thermostat (2) on tester.

- Pour water in bowl and energize tester to heat the water.



- Temperature gauge
- Thermostat

- Check that thermostat opening temperature indicated by the gauge (1) is 81° to 85°C (178° to 185°F).
- Also check that at 95°C (203°F) thermostat is fully open and that valve travel is 7.5 mm (0.30 in) min.
- If the above requirements are not met replace the thermostat.

### INSTALLATION

For installation reverse the removal sequence as applicable.

### THERMOSTAT

- Install thermostat with cover in the associated housing with interposed sealing ring and tighten the two capscrews to the specified torque.

**T** : Tightening torque  
**Thermostat cover capscrews**  
 10 to 16 Nm  
 (1 to 1.6 kgm  
 7.4 to 11.8 ft.lb)

Position thermostat with arrow pointing toward the direction of water flow.

### WATER PUMP

- Install water pump with a new gasket on front cover and tighten retaining nuts to the specified torque.

**T** : Tightening torque  
**Water pump nuts**  
 14 to 22 Nm  
 (1.36 to 2.25 kgm  
 10.3 to 16.2 ft.lb)

- Install water pump and alternator drive belt reversing the removal sequence.
- Connect hose to water pump and tighten hose clips.
- Tension water pump/alternator drive belt correctly.
- For belt tension adjustment see Group 00 - Engine Maintenance.

### TEMPERATURE SWITCH

- To install reverse the removal sequence.
- After installation, fill cooling system (see: Cooling System Filling) and run engine to warm up coolant (84° to 88°C, 183° to 190°F) anche check for fan cut-in.

**T** : Tightening torque  
**Fan control switch**  
 (wet with anti-seize compound)  
 20 to 25 Nm  
 (2 to 2.5 kgm  
 14.8 to 18.4 ft.lb)

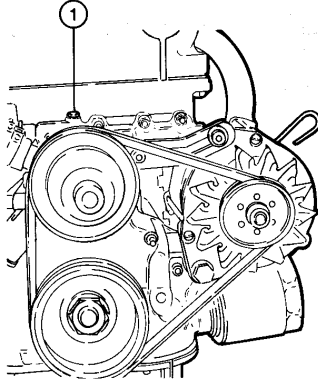
### RADIATOR

For radiator installation reverse the removal sequence.

## ENGINE COOLING SYSTEM

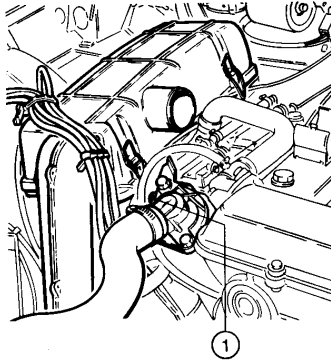
### COOLING SYSTEM FILLING

- Fill cooling system using the coolant indicated under «Inspection Specifications».
- Remove vent screw ① on water pump.



1. Vent screw

- Remove vent screw ① on supply manifold.



1. Vent screw

- Pour coolant through radiator filler until coolant flows out of water pump vent hole. Install vent screw on water pump.

- Resume pouring until coolant flows out of vent hole in supply manifold.
- Start engine and run at idle speed until all air remaining in engine has been expelled. Stop engine.
- Install vent screw on supply manifold.
- Top up radiator and install radiator cap.
- Fill expansion tank up to max. level shown on tank itself and install expansion tank cap.
- Start engine and run for a few minutes ensuring no loss of coolant takes place.

## INSPECTION SPECIFICATIONS

1.6 1.8 2.0 2.0 Iniezione

1.8 turbo

### CHECKS AND ADJUSTMENTS

#### DRIVE BELT

Load 78.4 N (8 kgm, 17.6 lb)  
Yield 15 mm (0.6 in)

#### THERMOSTAT

##### TEMPERATURE

- Initial opening 81 to 85°C (178 to 185°F)
- Fully open 95°C (203°F)
- Bulb travel ≥ 7.5 mm (0.3 in)

#### RADIATOR

Leakage test pressure 107.9 kPa  
(1.0 bar; 1.1 kg/cm<sup>2</sup>, 15.6 psi)

#### PRESSURIZED CAP

Calibration pressure 68.6 kPa  
(0.69 bar; 0.7 kg/cm<sup>2</sup>, 10 psi)

#### FAN

Cut-in temperature 84 to 88°C  
(183 to 190°F)

#### GENERAL

##### COOLANT

Summer			
Water	liters (Imp.Gal)	8 (1.75)	
Winter			
Min. temp.	°C (°F)	-20 (-4)	-35 (-22)
Antifreeze liquid	liters (Imp.Gal)	3 (0.66)	4 (0.88)
Part No. 3681-69956			
Distilled water	liters (Imp.Gal)	5 (1.1)	4 (0.88)
Antifreeze mixture	liters (Imp.Gal)	8 (1.75)	—
Part No. 3681-69958			

#### CAUTION:

Antifreeze reacts with paint. Keep away from bodywork.

#### NOTES:

- For increased protection from -20°C to -35°C (-4 to -22°F) without emptying system, drain off part of the mixture from radiator and expansion tank and replace using an equal volume of antifreeze liquid Part No. 3681-69956 to be poured in radiator and expansion tank in the following proportion:

- radiator 1.66 liters (0.4 Imp.Gal)
- expansion tank 0.34 liters (0.6 pints)

- On vehicles incorporating pressurized cooling system, after replacing low water level indicator sending unit located in tank, fully tighten retaining cap to prevent water leakage.

## ENGINE COOLING SYSTEM

### COOLING SYSTEM DESCALER

NALCO: 1006

INTERPROIND: Jal Auto

Part No. 3681-69955

### FLUIDS AND LUBRICANTS

Description	Type	Recommended product		Quantity
Radiator fan switch thread	Antiseize	R. GORI: Never Seez	Part No. 3671-69850	As necessary

### SEALANTS

Description	Type	Recommended product		Quantity
Cooling system leak preventer	Powder	AREXONS	Part No. 3522-00101	8 g (0.3 oz.)

Alternative product: ALUMASEAL.

### TIGHTENING TORQUES

Description	Unit of measure		
	Nm	kgm	ft.lb
Sending unit, water temp. gauge	34 to 39	3.5 to 4	25.1 to 28.8
Nuts, water pump to front cover	14 to 22	1.36 to 2.25	10.3 to 16.2
Capscrews, thermostat cover	10 to 16	1 to 1.6	7.4 to 11.8
Temp. switch (1), radiator fan (wet, antiseize, see above)	20 to 25	2 to 2.5	14.8 to 18.4
Sending unit, high water temp. indicator	20 to 25	2 to 2.5	14.8 to 18.4

(1) For guidance only (using standard wrench)

## TROUBLESHOOTING

1.6 1.8 2.0 2.0 **iniezione**

1.8 **turbo**

Defect	Possible Cause	Remedy
Water leakage	<ul style="list-style-type: none"> <li>• Radiator damaged</li> <li>• Hose leakage</li> <li>• Hose clips loose or failed</li> <li>• Thermostat leakage</li> <li>• Cylinder head gasket damaged</li> <li>• Cylinder head capscrew loose</li> </ul>	Repair or replace radiator Replace hoses Tighten or replace hose clips Replace gasket and/or thermostat Replace. Check for oil contamination Tighten to correct torque

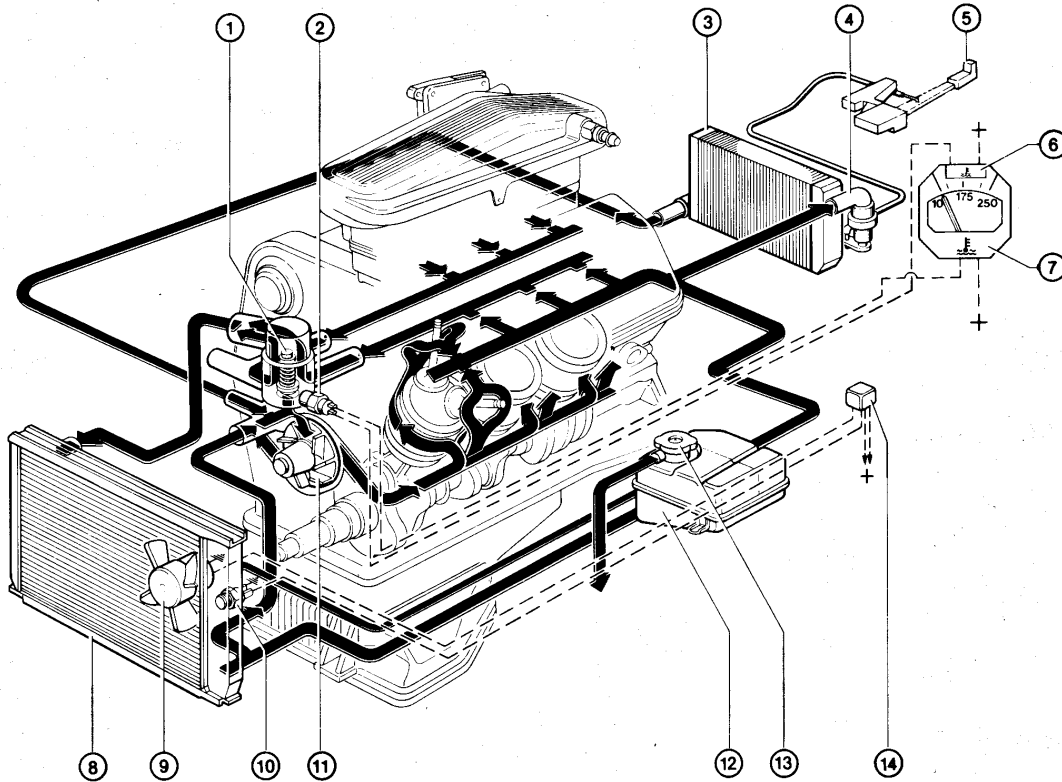
## ENGINE COOLING SYSTEM

Defect	Possible Cause	Remedy
Low water flow	<ul style="list-style-type: none"><li>• Line obstruction</li><li>• Low coolant level</li><li>• Defective water pump</li><li>• Alternator/water pump drive belt loose</li></ul>	Check lines and clean system Top up to correct level Replace water pump Adjust belt tension
Corrosion and scale		Replace coolant at the specified time intervals; for use follow instructions printed on product containers
Overheating	<ul style="list-style-type: none"><li>• Failed thermostat</li><li>• Scaled or dirty radiator</li><li>• Incorrect ignition timing</li><li>• Insufficient lubrication</li><li>• Water pump failure</li><li>• Low coolant level</li></ul>	Replace thermostat Clean internally using special descaler specified. For use follow instructions printed on product containers Adjust timing Top up oil level Replace water pump Top up and check system for leakage

# COOLING SYSTEM

6 cylinders **GTV 6 2.5**

## GENERAL DESCRIPTION



- 1. Thermostat
- 2. Bulb for coolant temperature indicator and max water temperature warning lamp
- 3. Heater
- 4. Heater cock
- 5. Heater control
- 6. Max coolant temperature warning lamp
- 7. Coolant temperature indicator

- 8. Radiator
- 9. Electric fan
- 10. Electric fan control bulb
- 11. Water pump
- 12. Header tank
- 13. Header tank cap
- 14. Electric fan control relay

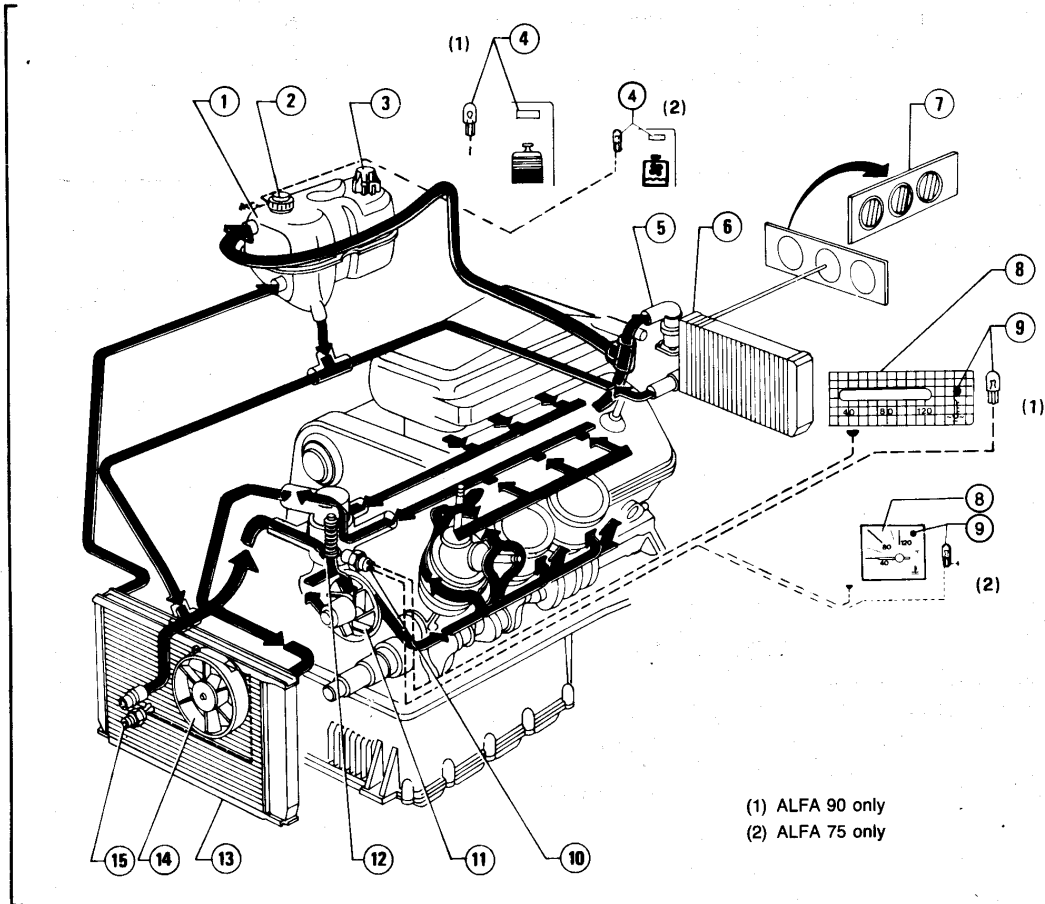
# COOLING SYSTEM

6 cylinders **Alfa 90 2.0** iniezione

6 cylinders **Alfa 90 2.5** iniezione

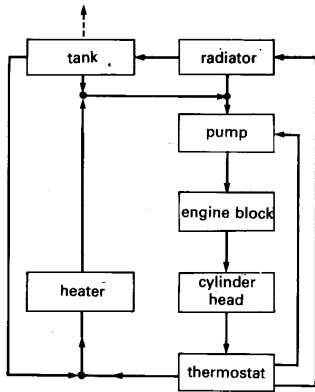
6 cylinders **Alfa 75 2.5** iniezione

## GENERAL DESCRIPTION



- 1 Header tank
- 2 Coolant level sensor
- 3 Pressurized cap
- 4 Min coolant level warning lamp (ALFA ROMEO Control)
- 5 Heater cock
- 6 Heater
- 7 Heater control
- 8 Coolant temperature indicator
- 9 Max coolant temperature warning lamp
- 10 Bulb for coolant temperature indicator and max water temp. warning lamp
- 11 Water pump
- 12 Thermostat
- 13 Radiator
- 14 Electric fan
- 15 Electric fan control thermal switch

## ENGINE COOLING SYSTEM



Cooling system is of the sealed type, with forced circulation by centrifugal pump belt - driven by crankshaft. A thermostat permits the engine to be brought quickly at the normal running temperature and kept at the optimal values; thermostat opens when coolant reaches  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ) approx. In addition to the air ram effect, the radiator is also cooled by an electric fan controlled by a thermal switch located on radiator.

The system is fitted with a coolant temperature sensor which supplies the max temperature indicator and warning lamp, on cluster.

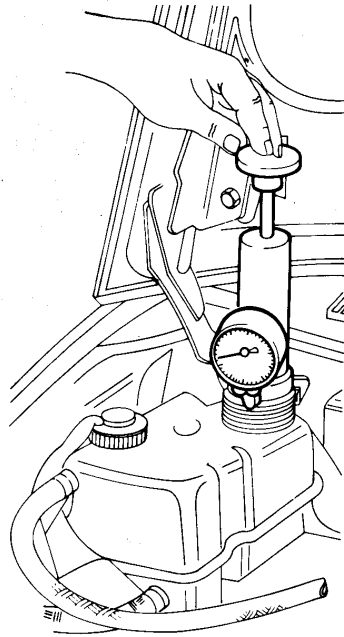
The warning lamp illuminates when coolant temperature exceeds  $105^{\circ}\text{C}$  ( $221^{\circ}\text{F}$ ).

A sensor, on header tank provides an indication (through "ALFA ROMEO Control") whenever coolant level in the tank goes below the min value.

## HYDRAULIC SYSTEM TIGHTNESS TEST

1. Unscrew the header tank pressurized cap.
2. Screw tester on header tank union.
3. Pressurize the system and verify, on tester, that pressure remains within the prescribed value.

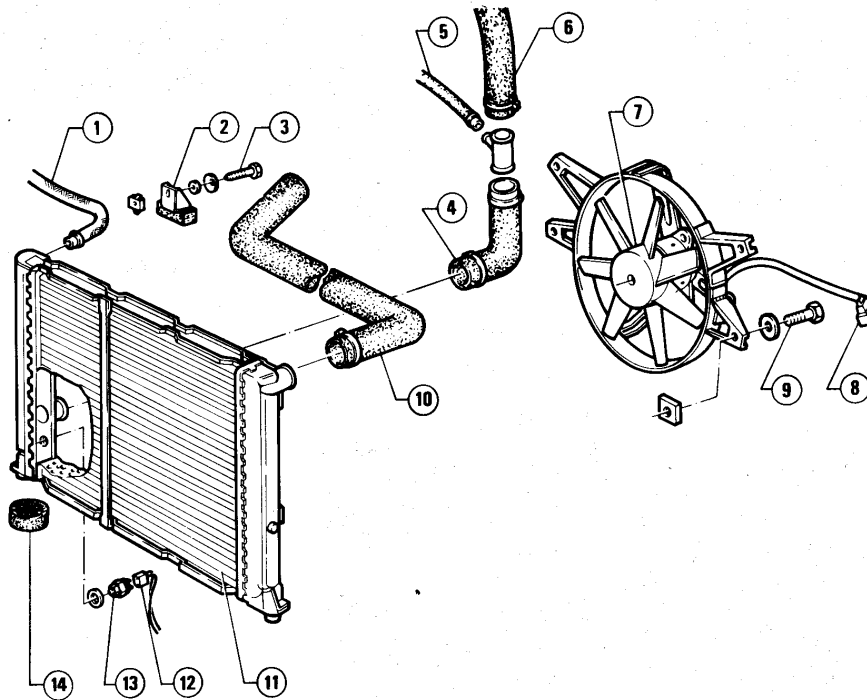
**Cooling system check pressure**  
 $107.9\text{ KPa}$  ( $1.08\text{ bar}$ ;  $1.1\text{ Kg/cm}^2$ ;  $15.64\text{ psi}$ )





# RADIATOR

Alfa 90 Alfa 75



1. Radiator breather hose
2. Bracket
3. Screw securing radiator to body
4. Coolant outlet sleeve from radiator
5. Return hose to heater

6. Coolant-to pump delivery sleeve
7. Electric fan
8. Connector for electric fan supply cable
9. Screw securing electric fan to radiator
10. Coolant-to radiator delivery sleeve

11. Radiator
12. Connector for electric fan control cables
13. Electric fan control thermal switch
14. Rubber pad

## REMOVAL

Alfa 90 Alfa 75

1. Disconnect battery.
2. Disconnect sleeve (8) from radiator; drain and recover coolant.

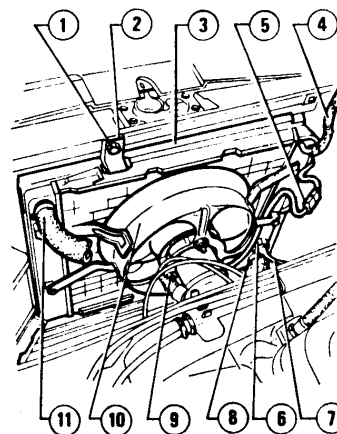
### WARNING:

Take the utmost care when draining coolant with hot engine, to avoid being burned.

3. Detach sleeve (11) and hose (4) from radiator.
4. Detach connector (5) of electric fan supply cables, and connector (7) from thermal switch (6).

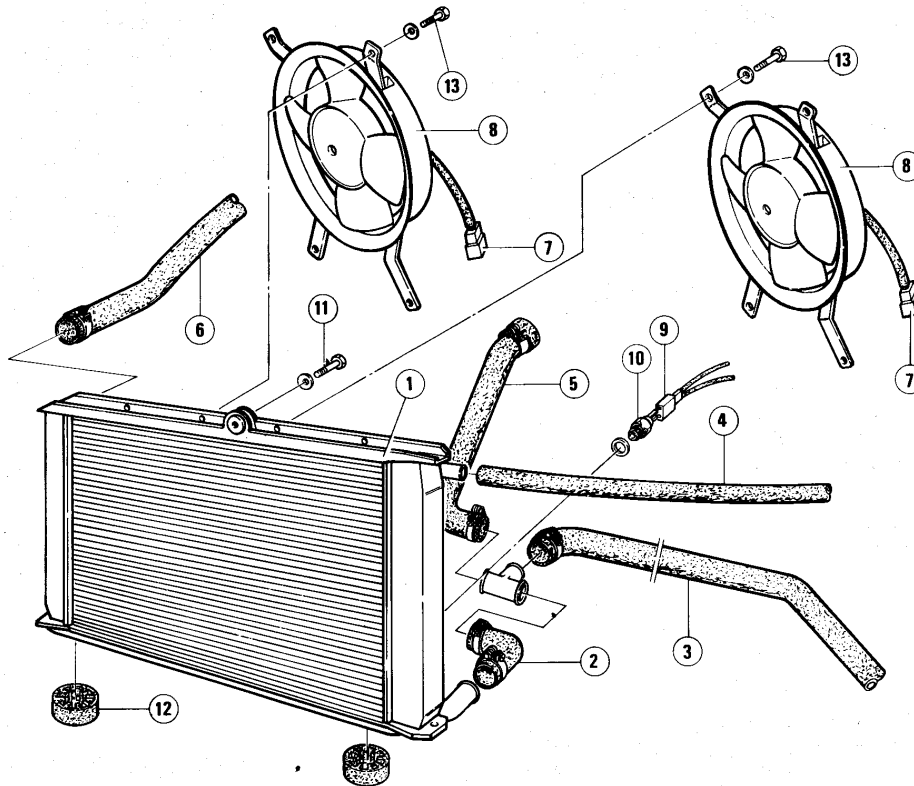
5. Unscrew screw (1) which secured radiator to body; remove radiator from engine compartment, and withdraw rubber pads.
6. If required, unscrew screws (9) and remove electric fan (10).

1. Radiator securing screw
2. Bracket
3. Radiator
4. Breather hose
5. Electric fan supply cables connector
6. Thermal switch
7. Connector
8. Sleeve
9. Electric fan securing screw
10. Electric fan
11. Sleeve



# RADIATOR

GTV 6 2.5



- 1. Radiator
- 2. Coolant outlet sleeve from radiator
- 3. Radiator filling sleeve
- 4. Radiator breather hose
- 5. Coolant return sleeve

- 6. Coolant delivery hose
- 7. Connector for electric fan supply cable
- 8. Electric fans
- 9. Connector for electric fan control cable
- 10. Electric fan control thermal switch

- 11. Screw securing radiator to body
- 12. Rubber pad
- 13. Screws securing electric fan to radiator

## REMOVAL

GTV 6 2.5

- Place a suitable container under the vehicle to collect the coolant.

### WARNING:

Take the utmost care when draining coolant with hot engine to avoid burns.

- Remove sleeve (2) from radiator (1) and drain coolant.
- Disconnect hose (4) and sleeve (6) from the radiator.
- Disconnect connector (7) of electric fan supply cables (8) and connector (9) from thermal switch (10).

- Unscrew screw (11) which secures radiator to body; remove radiator from engine compartment and withdraw rubber pads (12).
- If necessary, unscrew screws (13) and remove the electric fans.

## INSTALLATION

Alfa 90 Alfa 75 GTV 6 2.5

- Carry out installation by reversing the order of removal; then carry out refilling, operating as follows:
  - Remove header tank cap, and refill cooling system with the liquid prescribed.

### Cooling system refill

Min. external temperature °C (°F)	-20 (-4)	-35 (-31)
	l (imp.gall)	
Concentrated antifreeze std. No. 3681-69956	3.6 (0.79) (1)	5 (1.10) (1)
	4.2 (0.92) (2)	6 (1.32) (2)
Dilution distilled water	6.4 (1.41) (1)	5 (1.10) (1)
	7.8 (1.71) (2)	6 (1.32) (2)
Antifreeze ready to use std. No. 3681-69958	10 (2.20) (1)	—
	12 (2.64) (2)	—

- (1) For vehicle Alfa 90 and Alfa 75
- (2) For vehicle GTV 6 2.5

## ENGINE COOLING SYSTEM

### Alfa 90 Alfa 75

To increase the antifreeze protection from  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) to  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ ) without draining the whole system, replace **2.5 litres (0.55 Imp.gall)** mixture with as many litres of specific concentrated antifreeze.

### GTV 6 2.5

To increase the antifreeze protection from  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) to  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ ) without draining the whole system, replace **2.9 litres (0.63 Imp.gall)** mixture with as many litres of specific concentrated antifreeze.

#### CAUTION:

**Products harmful to paint.  
Avoid contact with painted surfaces.**

- b. Start the engine, run it to the normal running temperature so as to allow coolant to flow in the system, and operate on heater control, in order to open the cock of radiator core liquid.
- c. On cold engine, top-up the system up to the max level marked on header tank.

## LEAKAGE TEST

1. Remove radiator from vehicle as described in «Removal and Installation».
2. Close the radiator liquid inlet/outlet union.
3. Immerse radiator into a tank; previously fitted with water, and identify any leaks by blowing compressed air from radiator breather hose, until reaching pressure

**107.9 kPa  
(1.08 bar; 1.1 kg/cm<sup>2</sup>; 15.64 psi)**

4. If leaks are present, replace radiator operating as described in «Removal and Installation».

## ELECTRIC FAN CONTROL THERMAL SWITCH

### REPLACEMENT

1. Drain and recover coolant.
2. Detach connectors from thermal switch on radiator.
3. Unscrew thermal switch and remove it from radiator.
4. Lubricate thermal switch threading with **Anti-seize E. GORI: Never Seez**, then screw it on taking care to interpose a new

gasket; then tighten it to the prescribed torque.

**T** : Tightening torque  
Thermal switch for electric fan control on radiator  
**20 to 25 N·m  
(2 to 2.5 kg·m  
14.5 to 18.1 ft·lb)**

5. Restore liquid level in the cooling system.
6. Start the engine and warm it up until coolant reaches a temperature within **84 to 88°C (183.2 to 190.4°F)**.
7. Verify that, at this temperature, thermal switch enables electric fan.

## PRESSURIZED CAP

### LEAKAGE TEST

Refer to: 4 cylinders

**1.6 1.8 2.0 2.0** iniezione

#### Pressurized cap setting pressure

**88.3 to 107.9 kPa  
(0.88 to 1.08 bar)  
(0.9 to 1.1 kg/cm<sup>2</sup>)  
(12.8 to 15.64 psi)**

# WATER PUMP

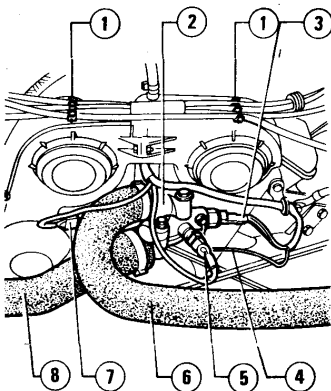
## REMOVAL

1. Detach the battery negative terminal.
  2. Detach connectors (3), (5) and (7) from thermostat unit (2), then disconnect ground cable (4).
  3. Disconnect sleeve (8) from radiator and drain coolant; disconnect sleeves (6) and (8) from thermostat unit.
- GTV 6 2.5:** Disconnect sleeve (9) from the thermostat unit.

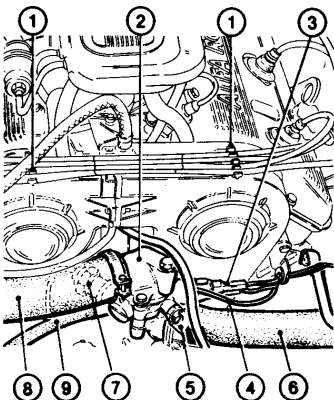
### Recover coolant.

4. Release the spark plug supply cables from fasteners (1) on timing case covers.

Alfa 90 Alfa 75



GTV 6 2.5



1. Fasteners
2. Thermostat unit
3. Connectors for indicator and coolant temperature warning lamp (for cluster)
4. Ground cable
5. Connector for coolant temperature sender cable (for ECU)
6. Outlet sleeve from thermostat unit
7. Connector for cold starting thermal switch
8. Inlet sleeve to thermostat unit
9. Sleeve supplying liquid to heater (GTV 6 2.5)

5. Loosen and remove the drive belts of the following components:

- air conditioner compressor (if present)
- power steering pump
- water/alternator pump

6. Remove distributor covers and disconnect the related cap; remove the covers on timing case.

7. Engage the 5th speed, move vehicle forwards so as to rotate crankshaft in the running direction, until notch P (marked on engine pulley) is aligned with the reference pin (piston of first cylinder in the expansion stroke).

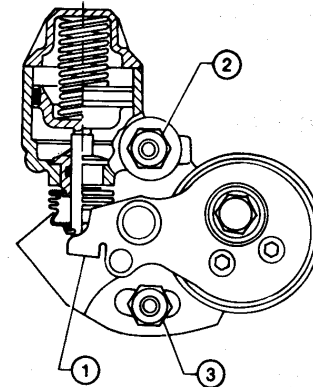
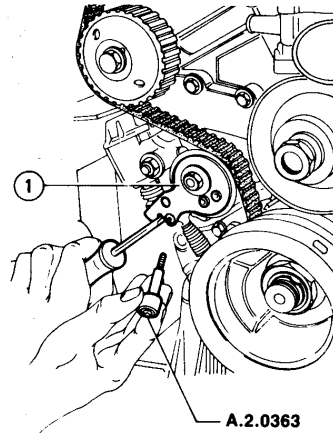
If engine is timed, the notches on camshaft pulleys are aligned with the references on timing cases.

In addition, the middle of distributor rotor arm must be towards the first cylinder.

8. Unscrew the screws which secure timing cases; separate these last and remove them by releasing the fuel return hose and ECU cables from brackets.

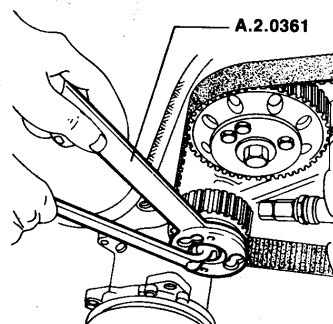
9. Lift belt tightener arm (1) and insert pin A.2.0363 into the arm hose, so as to keep arm itself lifted.

10. Unscrew nuts (2) and (3), so as to loosen the timing system drive belt; then remove both belt and tightener.



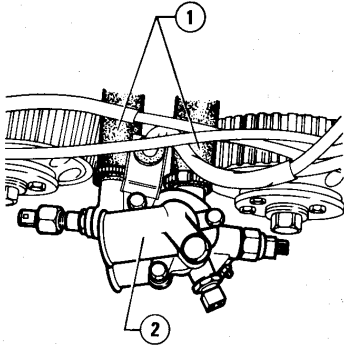
1. Belt tightener arm
2. Nut
3. Nut

11. By means of tool A.2.0361, unscrew the screw which secures distributor drive pulley; remove pulley.



12. Loosen clamps of hoses (1) and detach these last from thermostat unit (2).

# ENGINE COOLING SYSTEM



1 Coolant return hoses from heads  
2 Thermostat unit

13. Unscrew the screws which secure pump body to engine block; then remove pump together with thermostat unit.

14. If required, operating at bench, unscrew the four screws which secure pump body to thermostat unit and separate them.

## CHECKS AND INSPECTIONS

1. Thoroughly clean pump body and the related mating surfaces.

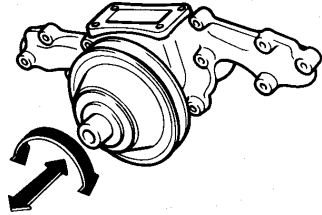
## REMOVAL

1. Drain and recover coolant, up to lower edge of thermostat housing.
2. Detach sleeve ① from thermostat ③.
3. Unscrew the three securing screws of thermostat, then remove it together with gasket and bracket ②.

### CAUTION:

Take care not to detach lower gasket between thermostat intermediate spacer and thermostat housing.

2. Check pump body and impeller; in the event of serious oxidation signs replace pump.
3. Verify that there is no excessive play in the rotation and axial movement of impeller.



## INSTALLATION

Install pump by reversing the order of removal, complying with the following indications.

- Thoroughly clean the mating surfaces between pump body, engine block and thermostat unit; interpose new gaskets.
- Tighten to the prescribed torque:

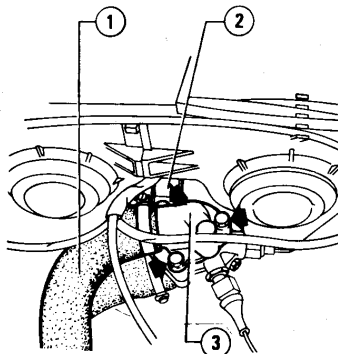
### Ⓡ: Tightening torques

Screws securing pump body to engine block

8.1 to 9.3 N·m

(0.83 to 0.95 Kg·m; 6 to 6.9 fl·lb)

## THERMOSTAT



1 Coolant - to radiator delivery sleeve  
2 ECU wiring support bracket  
3 Thermostat

## CHECKS AND INSPECTIONS

By means of suitable equipment, verify that:

- Thermostat opens when coolant temperature is between 81 to 85° C (177.8 to 185° F)

- Carry out timing system adjustment, fit timing system belt and restore correct tensioning (refer to: **Alfa 90** WORKSHOP MANUAL - Group 00 - Engine Maintenance - Engine main Mechanical unit - Check of Timing System and Drive Belt Tensioning).
- Restore correct tensioning of drive belts related to pump of coolant and alternator, and pump of power steering and air conditioner compressor (if present) (refer to **Alfa 90** WORKSHOP MANUAL - Group 00 - Engine Maintenance - Engine Main Mechanical Unit. Checking Good Conditions, Replacing and Adjusting Drive Belts of Alternator, Air Conditioner Compressor, Power Steering Pump).
- Restore coolant level
- Start the engine, run it to the normal running temperature and check for leaks from system.

- When coolant temperature reaches 95° C (203° F) thermostat opens fully, also verify that, when in this conditions, the thermostat movement is greater or equal to 7,5 mm (0.295 in).

If not so, replace thermostat.

## INSTALLATION

1. Clean the mating surfaces of thermostat.
2. Position thermostat on intermediate spacer, interposing a new gasket; reconnect the sleeve for coolant delivery to radiator.
3. Restore coolant level.

## INSPECTION AND SPECIFICATIONS

## CHECK AND ADJUSTMENTS

Refer to: 4 cylinders «Checks and Adjustments».

## GENERAL

## COOLANT

Min. external temperature	°C (°F)	—20	—35
		(—4)	(—31)
l (Imp.gall)			
Concentrated antifreeze std. No. 3681-69956	3.6 (0.79) (1)	5 (1.10) (1)	
	4.2 (0.92) (2)	6 (1.32) (2)	
Dilution distilled water	6.4 (1.41) (1)	5 (1.10) (1)	
	7.8 (1.71) (2)	6 (1.32) (2)	
Antifreeze ready to use std. No. 3681-69958	10 (2.20) (1)	—	
	12 (2.64) (2)	—	

(1) For vehicle Alfa 90 and Alfa 75  
(2) For vehicle GTV 6 2.5

## CAUTION:

**Alfa 90** **Alfa 75**

a. To increase the antifreeze protection from —20°C (—4°F) to —35°C (—31°F), without draining the whole system, replace part of mixture with as many litres of concentrated antifreeze (2.5 litres; 0.55 Imp.gall).

**GTV 6 2.5**

a. To increase the antifreeze protection from —20° (—4°F) to —35°C (—31°F),

without draining the whole system, replace part of mixture with as many litres of concentrated antifreeze (2.9 litres; 0.63 Imp.gall)

b. If the coolant level sensor is to be replaced, take care, when reassembling, to tighten cap thoroughly so as to ensure tightness.

## WARNING:

Products harmful to paint. Avoid contact with painted surfaces.

## FLUIDS AND LUBRICANTS

Application	Type	Name	Q.ty
Threading of electric fan control thermal switch on radiator	Anti-seize	R. GORI: Never Seez Std. No. 3671-69850	As required
Threading of coolant temperature sender, engine temperature sensor and thermo - time switch			

## SEALANT AND FIXING AGENTS

Application	Type	Name	Q.ty
Coaling system sealant	Sealing powder	AREXONS Std. No. 3522-00101	30 g (1.058 oz)

In alternative ALUMASEAL can be used.

## ENGINE COOLING SYSTEM

### TIGHTENING TORQUES

Item	Measurement unit	N·m	Kg·m	ft·lb
Coolant temperature sender on thermostat housing (1)		20 to 25	2 to 2.5	14.5 to 18.1
Electric fan control thermal switch on radiator (1)		20 to 25	2 to 2.5	14.5 to 18.1
Engine temperature sensor on thermostat casing (1)		15	1.5	10.8
Thermo-time switch on thermostat housing (1)		29	3	21.7
Screws securing pump body to engine block		8.1 to 9.3	0.83 to 0.95	6 to 6.9

(1) With anti-seize R. GORI: Never Seez

### TROUBLE DIAGNOSIS AND CORRECTIVE ACTION

Condition	Probable cause	Corrective action
Coolant leakage	<ul style="list-style-type: none"> <li>• Radiator damaged</li> <li>• Leaks in system couplings</li> <li>• Loose or broken clamps.</li> <li>• Leakages from thermostat</li> <li>• Damaged cylinder head gasket</li> <li>• Loose cylinder head tightening screws</li> </ul>	<p>Replace radiator</p> <p>Replace</p> <p>Tighten or replace</p> <p>Replace gasket or thermostat</p> <p>Replace. Check engine oil for contamination</p> <p>Restore correct tightening</p>
Poor circulation of coolant	<ul style="list-style-type: none"> <li>• Pipes obstructed</li> <li>• Insufficient coolant</li> <li>• Inoperative coolant pump</li> <li>• Coolant pump and alternator driving belt loosen</li> </ul>	<p>Check pipes and clean system</p> <p>Top up</p> <p>Replace</p> <p>Adjust</p>