

# RENAULT

**N.T. 3175A**

---

**XXXX**

---

## **FAULT FINDING COOLING CIRCUIT**

---

**77 11 293 182**

**NOVEMBER 1999**

**EDITION ANGLAISE**

---

"The repair methods given by the manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes introduced by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

All copyright is reserved by Renault.

Reproduction or translation, in part or in full, of this document or use of the service part reference numbering system is forbidden without the prior written authority of Renault.

© RENAULT 1999

---

# Contents

	Pages
<b>19</b> <b>COOLING CIRCUIT</b>	
Purpose and components	19-1
Diagram	19-2
List of equipment	19-3
Preliminary test	19-4
Fault finding - Customer complaints	19-5
Fault finding - Fault charts	19-7

---

All internal combustion engines produce energy and this takes the following form:

- some of this energy provides the mechanical power to drive the engine,
- some of this energy takes the form of heat and this escapes via the exhaust or heats the engine coolant. Some of this heat is used to heat the passenger compartment. However, the coolant heat must be dissipated to ensure that the engine operates at the correct temperature.

To achieve this, liquid is used for the cooling system.

Coolant is circulated in (or around) the components that need to be cooled. This coolant absorbs heat when it is in contact with the hot parts of the engine and is then pumped into the radiator. Here it cools down before it is pumped back to the engine.

The cooling circuit, which must be completely sealed to operate properly, consists of the following main components:

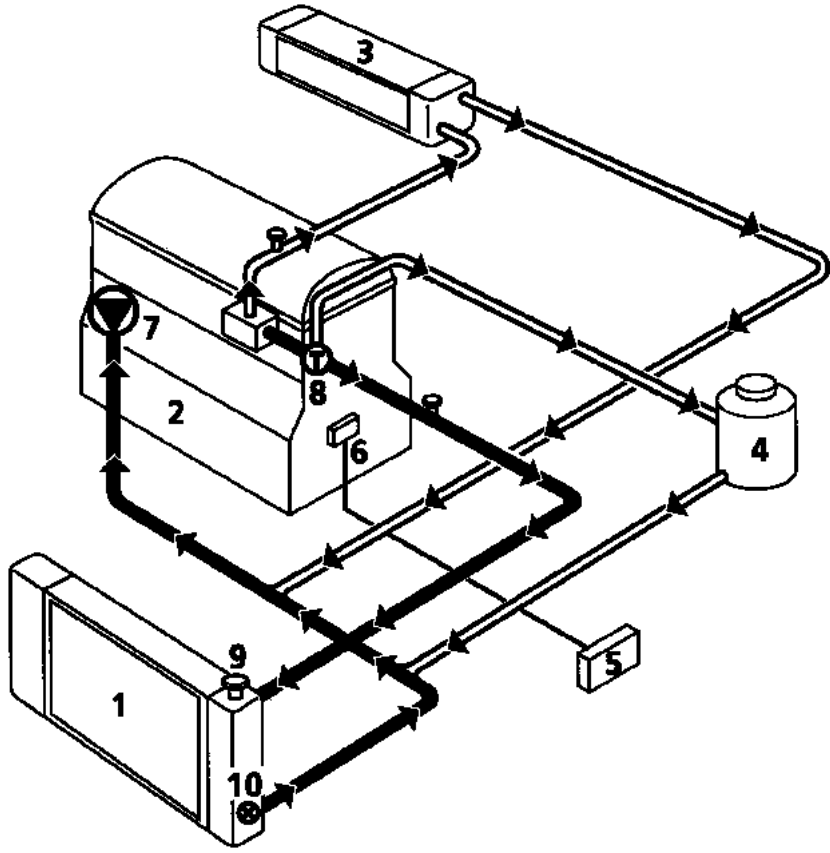
- the engine block and cylinder head,
- a radiator with fan,
- temperature sensors (thermostat, temperature switch),
- coolant pump,
- expansion bottle,
- hoses,
- bleed screw (if the vehicle is equipped with one),
- a heater matrix,
- coolant,
- and various other components depending on any changes made to the vehicle...

The central coolant temperature management system (GCTE system) was introduced when computers were fitted to vehicles. This system processes the information received by one single temperature sensor mounted on the engine block. In conjunction with the injection computer, this sensor operates the engine cooling fan at normal or high speeds and also controls the coolant temperature warning light on the instrument panel. When a vehicle is brought in for repair, it must be ascertained whether or not the vehicle is equipped with this system. To do this, check whether there is a temperature switch at the bottom of the radiator. If this switch is fitted, the vehicle is not equipped with a central coolant temperature management system.

The cooling circuit fitted with a valve that protects the overpressure system. The colour of this valve indicates its rating value (in bars) :

Colour of valve	Valve rating (in bars)
White	0.8
Brown	1.2
Blue	1.6

When undertaking fault finding on a vehicle with a fault, you will need to pressurize the cooling system. Apply pressure of **0.1 bar** below the rated pressure. If you are still unable to trace the leak after applying this pressure, remove this valve to enable you to obtain pressure of **2 bars**, increasing the pressure in stages.



- 1 - Main radiator and fan
- 2 - Engine block
- 3 - Heater matrix
- 4 - Expansion bottle
- 5 - Injection computer\*
- 6 - Temperature sensor\*
- 7 - Water pump
- 8 - Thermostat
- 9 - Bleed screw
- 10 - Temperature switch\*

\* Presence depends on version

Below is a list of equipment approved and specified by Renault. This list is not exhaustive.  
 (Source: catalogue "Tooling" 1999 - "Special tooling" 1999)

Equipment	Function
150 W bulb for detecting leaks	To detect signs of coolant (fluorescence).
Cooling system tester kit (Ms. 554-07)	With the cooling system pressurized, to check it for leaks.
Equipment for checking the cooling circuit and cylinder head gasket	To check the cooling system for leaks under pressure, detect internal leaks and check the thermostat.
Leak detector for CO <sub>2</sub>	To detect internal leaks.
Cylinder head test equipment	To detect leaks between the cooling circuit and oil lines.

When a vehicle is brought into the workshop with a fault, carry out the following checks before starting the fault finding procedure:

– Check:

- and note (mark with a line) the level of coolant in the bottle and its colour,
- the condition and tension of the belt driving the water pump,
- that neither the fan, the radiator nor the radiator grille are obstructed by any object which may affect the free flow of air,
- that there is no sign of a leak in the engine compartment.

Traces of coolant:

on the ground	CHART 1
in the engine compartment	CHART 1
in the passenger compartment	CHART 2

Smoke:

from the exhaust (white smoke when engine is hot)	CHART 3
in the engine compartment	CHART 1
in the passenger compartment	CHART 2

Coolant temperature indicator or warning light:

Temperature warning light:	
The warning light illuminates steadily when driving.	CHART 4
The warning light illuminates intermittently when driving.	CHART 5
Needle indicating coolant temperature:	
The needle enters in the red area when driving	CHART 4
The needle indicates that the engine is overheating immediately after the engine has been started	CHART 5
The needle fluctuates when driving	CHART 5

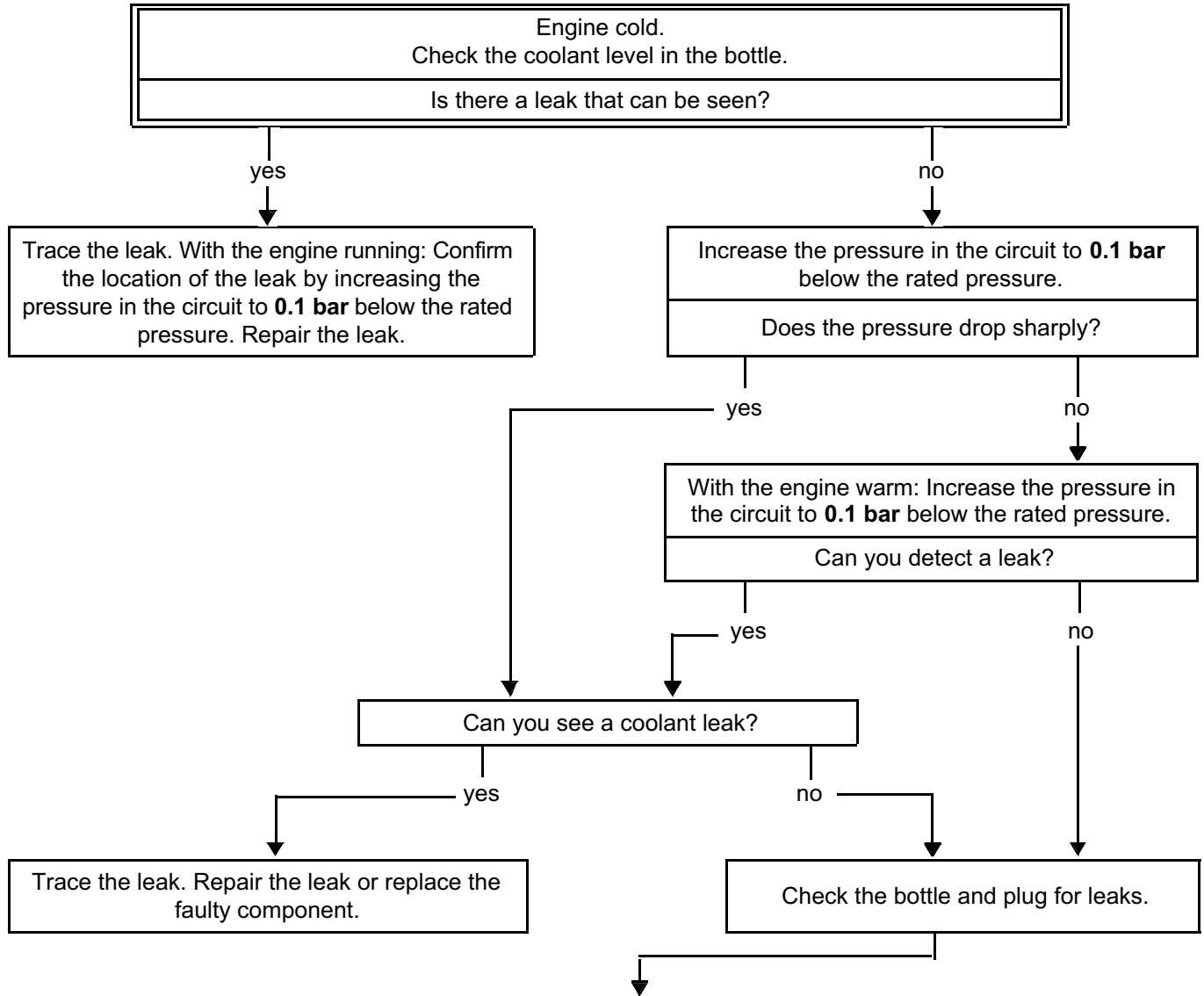
Others:

There is a bubbling noise under the dashboard	CHART 6
The coolant level in the bottle is dropping	CHART 1
The liquid in the bottle has changed colour	NT 2675 A
The heating in the vehicle does not work	CHART 7
Greasy mist on the inside of the windscreen	CHART 2



<b>CHART 1</b>	<ul style="list-style-type: none"> <li>- TRACES OF COOLANT ON THE GROUND</li> <li>- TRACES OF COOLANT IN THE ENGINE COMPARTMENT</li> <li>- SMOKE IN THE ENGINE COMPARTMENT</li> <li>- THE COOLANT LEVEL IN THE BOTTLE DROPS</li> </ul>
----------------	--

<b>NOTES</b>	<p>Make sure that the liquid really is coolant. Ask the customer if he has topped up the coolant level before bringing the vehicle for repair.</p>
--------------	--



The probable cause of the smoke is coolant escaping. This may be caused by:

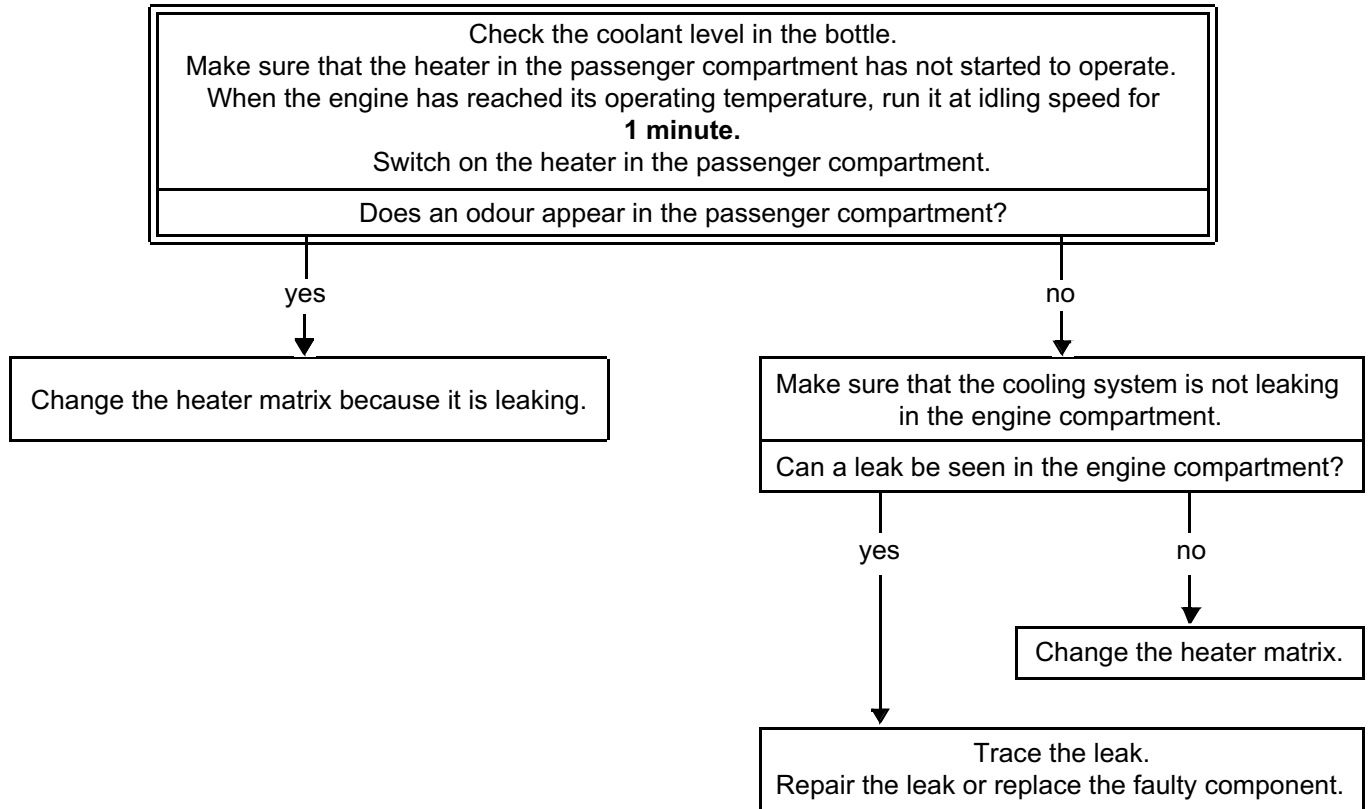
- a jammed cooling fan:
  - activate the cooling fan control on vehicles equipped with the central coolant temperature management system,
  - if the vehicle is not equipped with the central coolant temperature management system, short circuit the temperature switch to start the cooling fan.

If the cooling fan does not start up, change the fan motor.

- faulty temperature control. Apply the T2 test procedure.
- a faulty pump. Make sure it is operating properly.

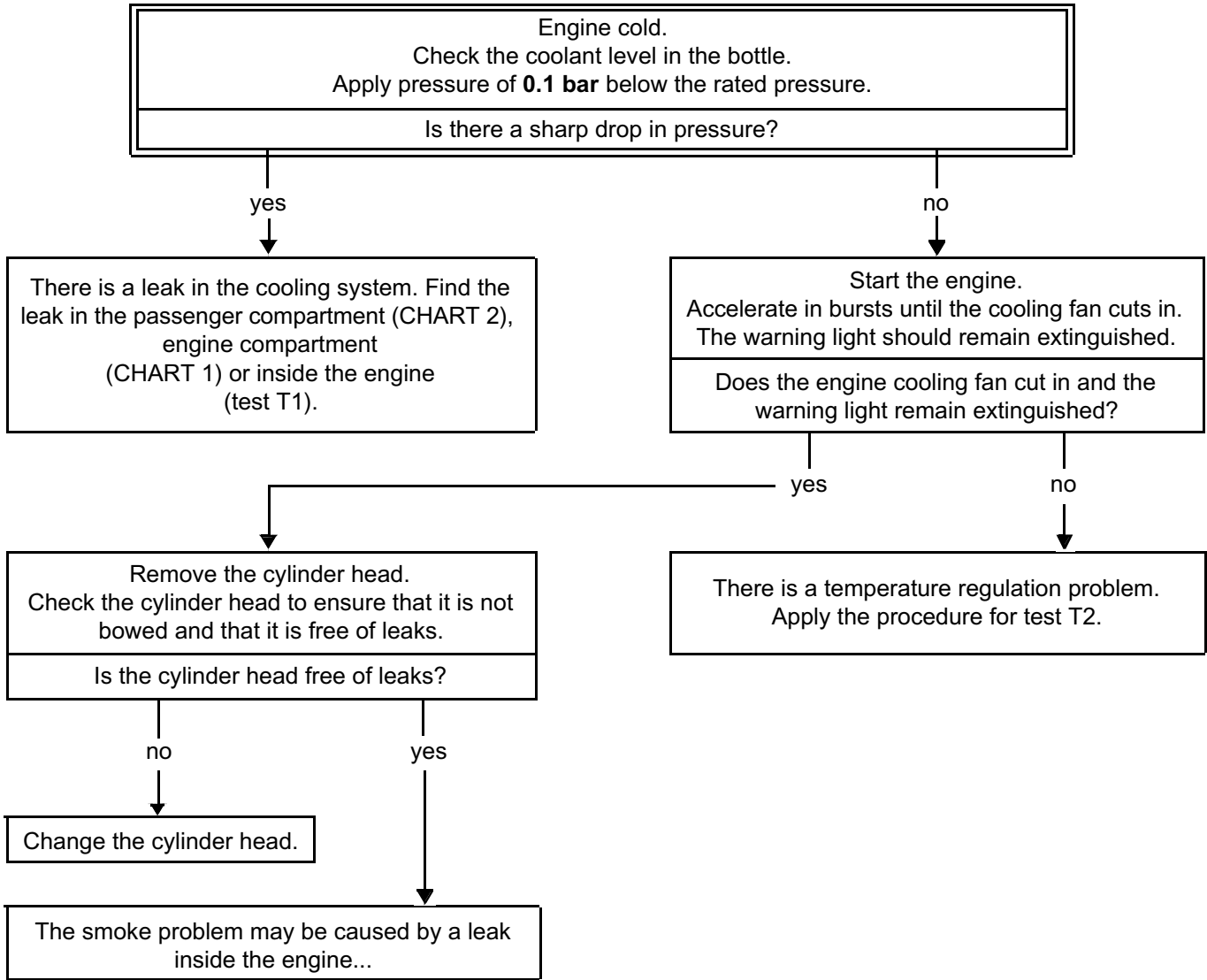
<b>CHART 2</b>	<ul style="list-style-type: none"><li>- TRACES OF COOLANT IN THE PASSENGER COMPARTMENT</li><li>- SMOKE IN THE PASSENGER COMPARTMENT</li><li>- GREASY MIST ON THE INSIDE OF THE WINDSCREEN</li></ul>
----------------	---

<b>NOTES</b>	Make sure that the liquid really is coolant. Ask the customer if he has topped up the coolant level before bringing the vehicle for repair.
--------------	--



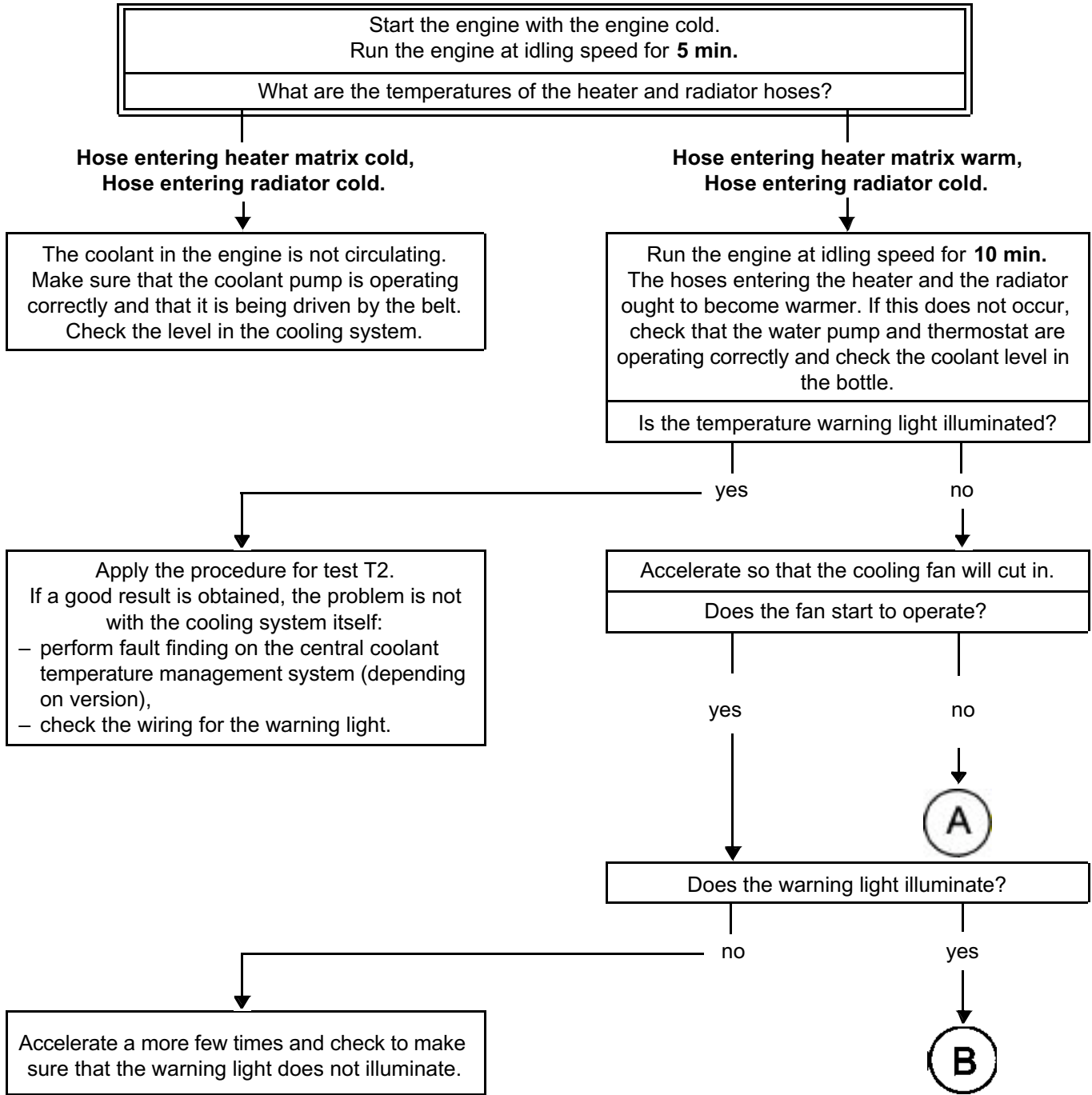
**CHART 3** – SMOKE FROM THE EXHAUST (WHITE SMOKE, WHEN THE ENGINE IS HOT)

**NOTES** Ask the customer if he has topped up the coolant level before bringing the vehicle for repair.



<b>CHART 4</b>	<ul style="list-style-type: none"> <li>- THE WARNING LIGHT ILLUMINATES STEADILY WHEN DRIVING.</li> <li>- THE NEEDLE ENTERS THE RED AREA WHEN DRIVING.</li> </ul>
----------------	--

<b>NOTES</b>	Ask the customer about situations when the fault appears.
--------------	---



**CHART 4**  
 (continued)

A



- For vehicles not equipped with the central coolant temperature management system:
  - Disconnect the temperature switch and short circuit it to start the two fan speeds (normal and fast).
- For vehicles equipped with the central coolant temperature management system :
  - Activate the control mode for the two fan speeds (normal and fast) via your fault finding equipment.

In both cases the two fan speeds should be heard to operate. If this does not occur:

- if one of the two speeds does not operate, check the wiring for the engine cooling fan,
- if the fan does not operate, change the cooling fan unit.



The fan operates normally.

- For vehicles not equipped with the central coolant temperature management system:
  - change the temperature switch.
- For vehicles equipped with the central coolant temperature management system:
  - check the temperature sensor,
  - perform the fault finding procedure on the injection computer.

B



- For vehicles not equipped with the central coolant temperature management system:
  - Disconnect the temperature switch and short circuit it so that cooling fan fast speed cuts in.
- For vehicles equipped with the central coolant temperature management system:
  - Activate the fast speed command mode via your fault finding tool.

In both cases, the fast speed of the cooling fan must be heard to cut in.

If this does not occur, check, that neither the radiator, the fan nor the radiator grille are obstructed by any object which may affect the free flow of air. Check the wiring for the fan..

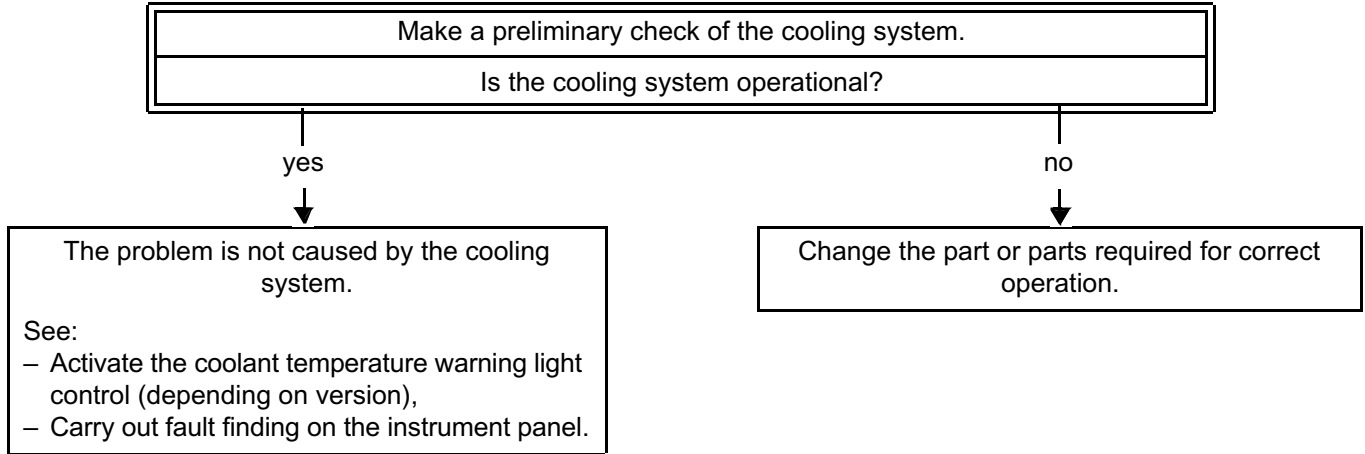
If the wiring is correct, test temperature regulation.



If the test does not identify a problem, the problem of the coolant temperature warning light illuminating is not caused by the cooling system.

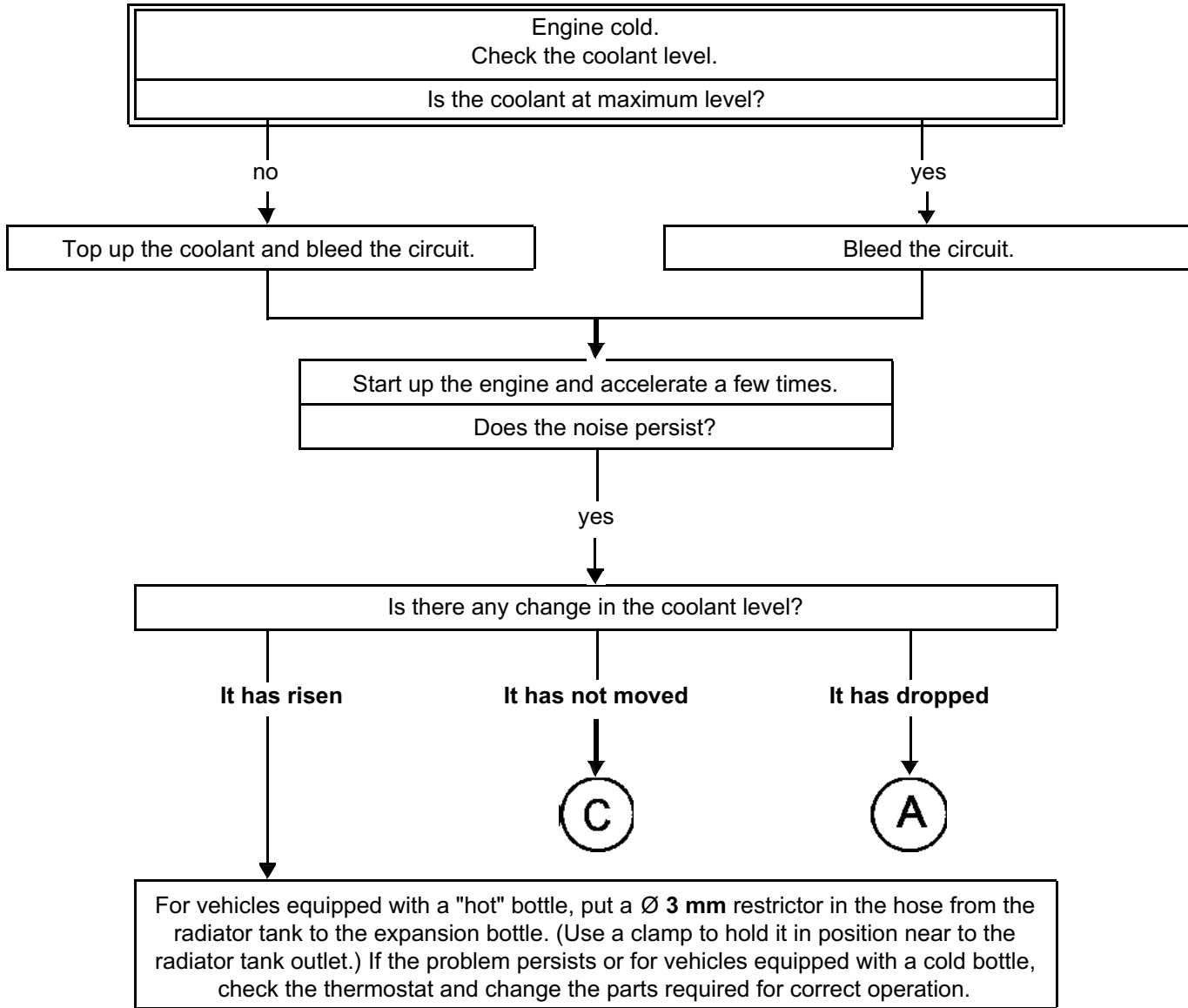
- Check the wiring on the instrument panel.
- Test the central coolant temperature management system.

<b>CHART 5</b>	<ul style="list-style-type: none"><li>- THE WARNING LIGHT ILLUMINATES INTERMITTENTLY WHEN DRIVING.</li><li>- THE NEEDLE INDICATES THAT THE SYSTEM IS OVERHEATING IMMEDIATELY AFTER THE ENGINE HAS BEEN STARTED.</li><li>- THE NEEDLE FLUCTUATES WHEN DRIVING.</li></ul>
----------------	---



**CHART 6**                      **THERE IS A BUBBLING NOISE UNDER THE DASHBOARD.**

**NOTES**                      Ask the customer if he has topped up the coolant level before bringing the vehicle for repair.



**CHART 6**  
(continued)

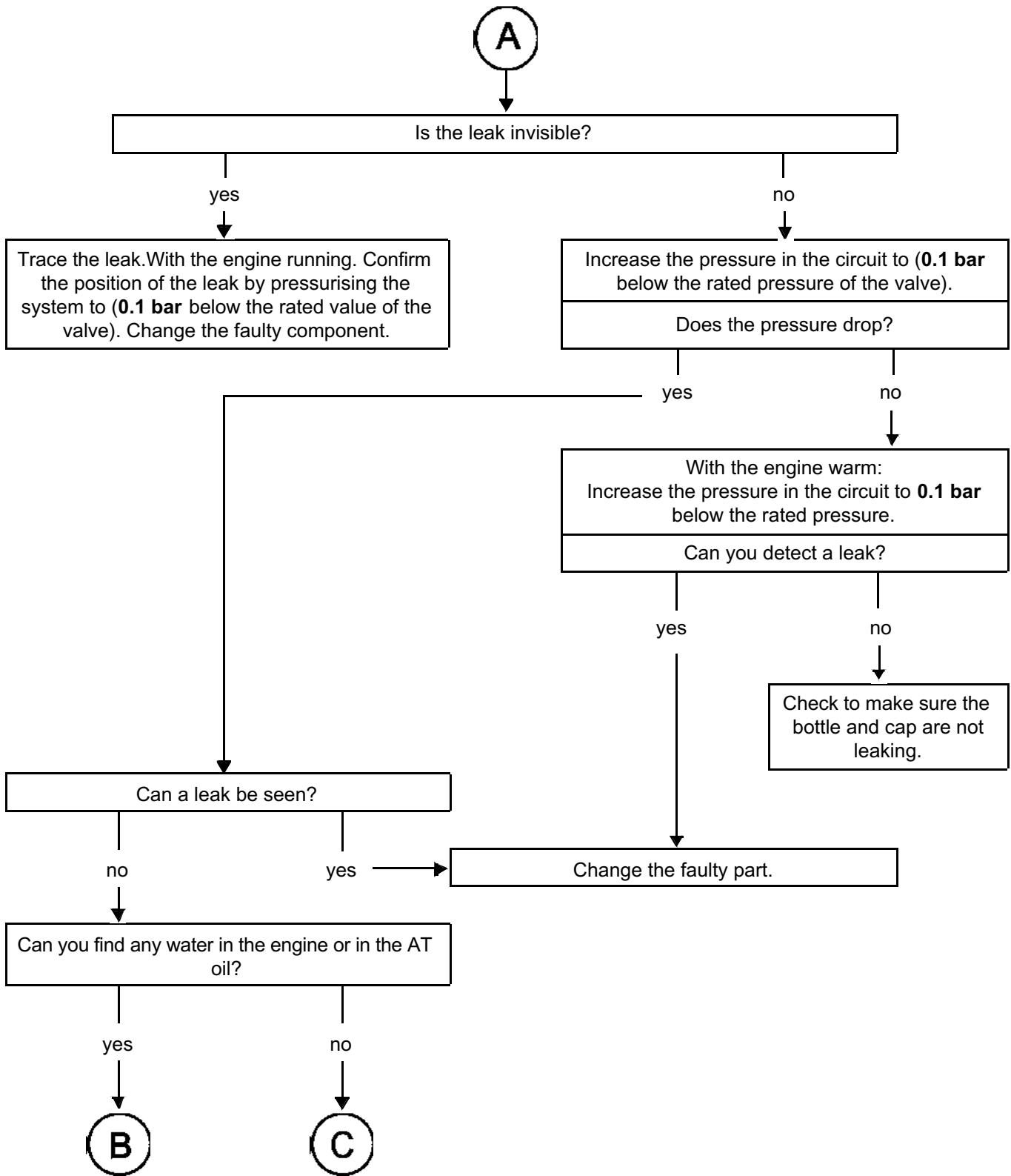
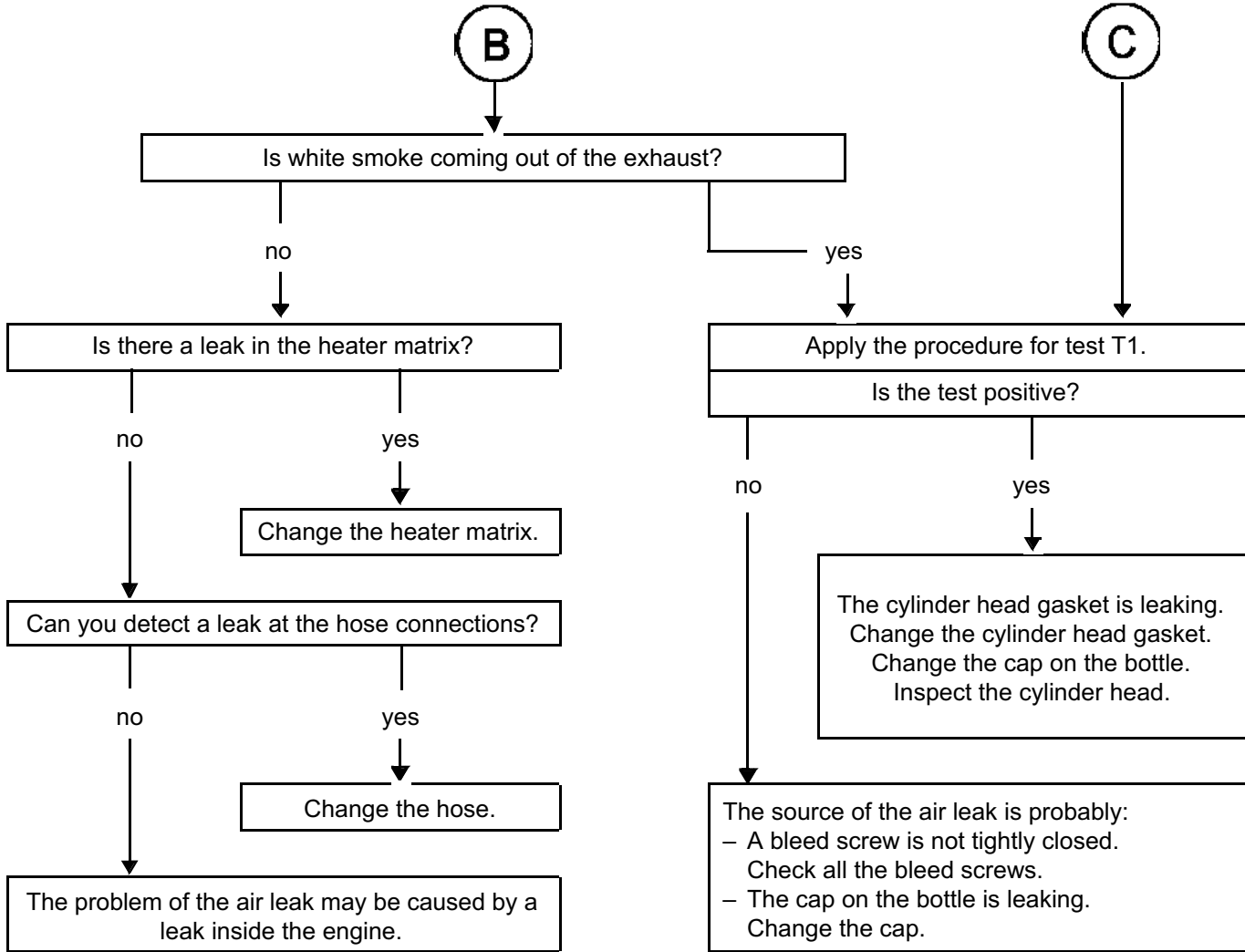


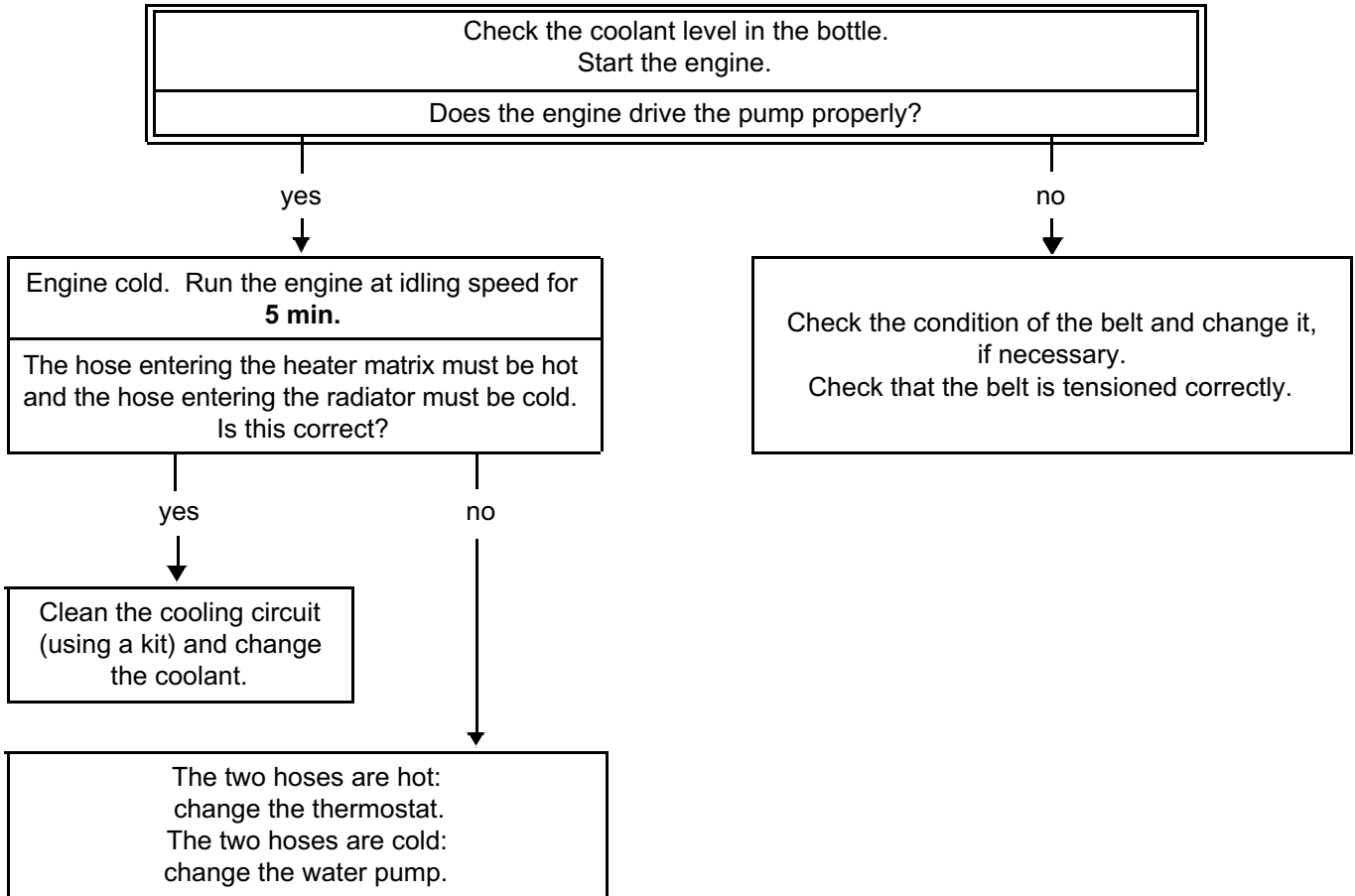


CHART 6  
(continued)



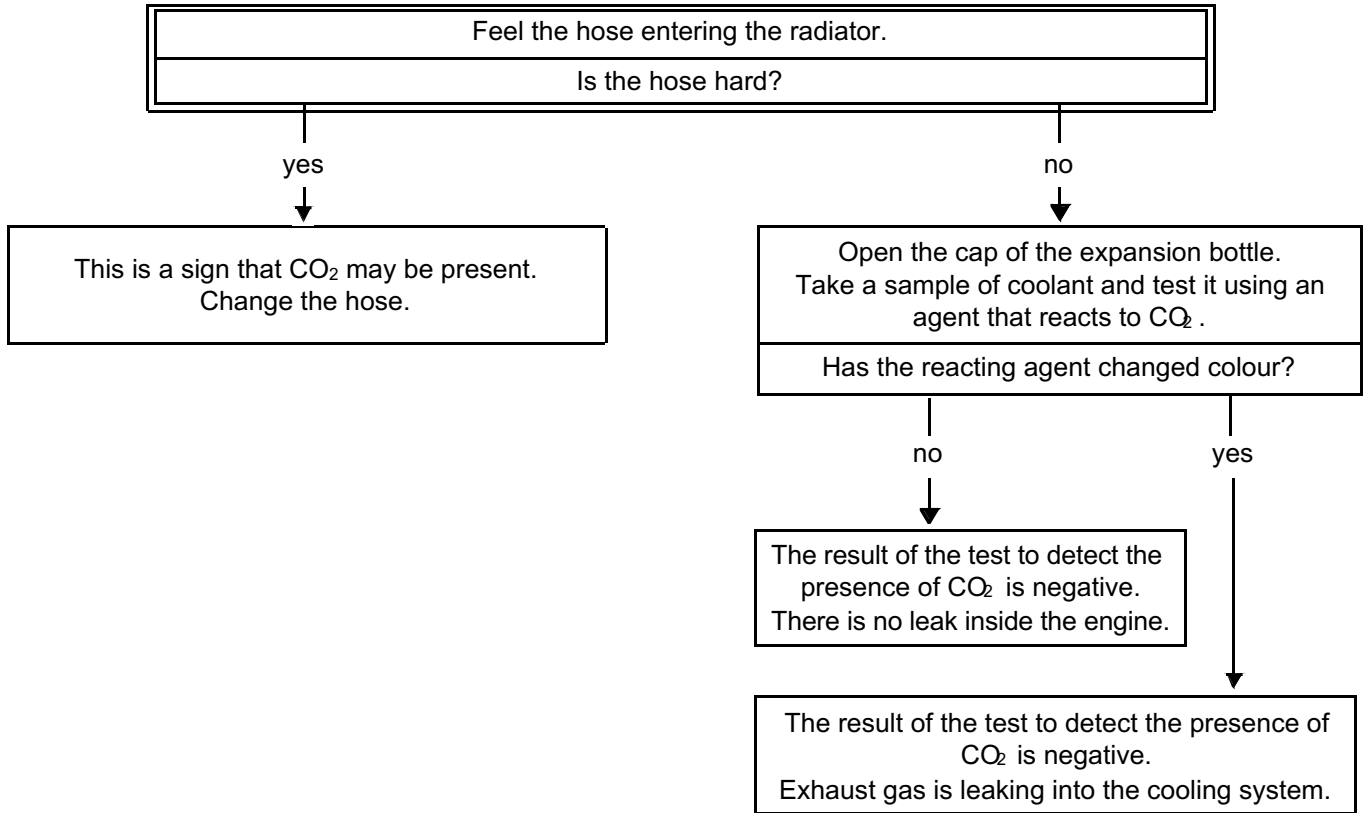
<b>CHART 7</b>	<b>THE HEATING IN THE VEHICLE DOES NOT WORK.</b>
----------------	--

<b>NOTES</b>	Ask the customer if he has topped up the coolant level before bringing the vehicle for repair. Check that both the heater fan and the air intake circuit are operating correctly.
--------------	---



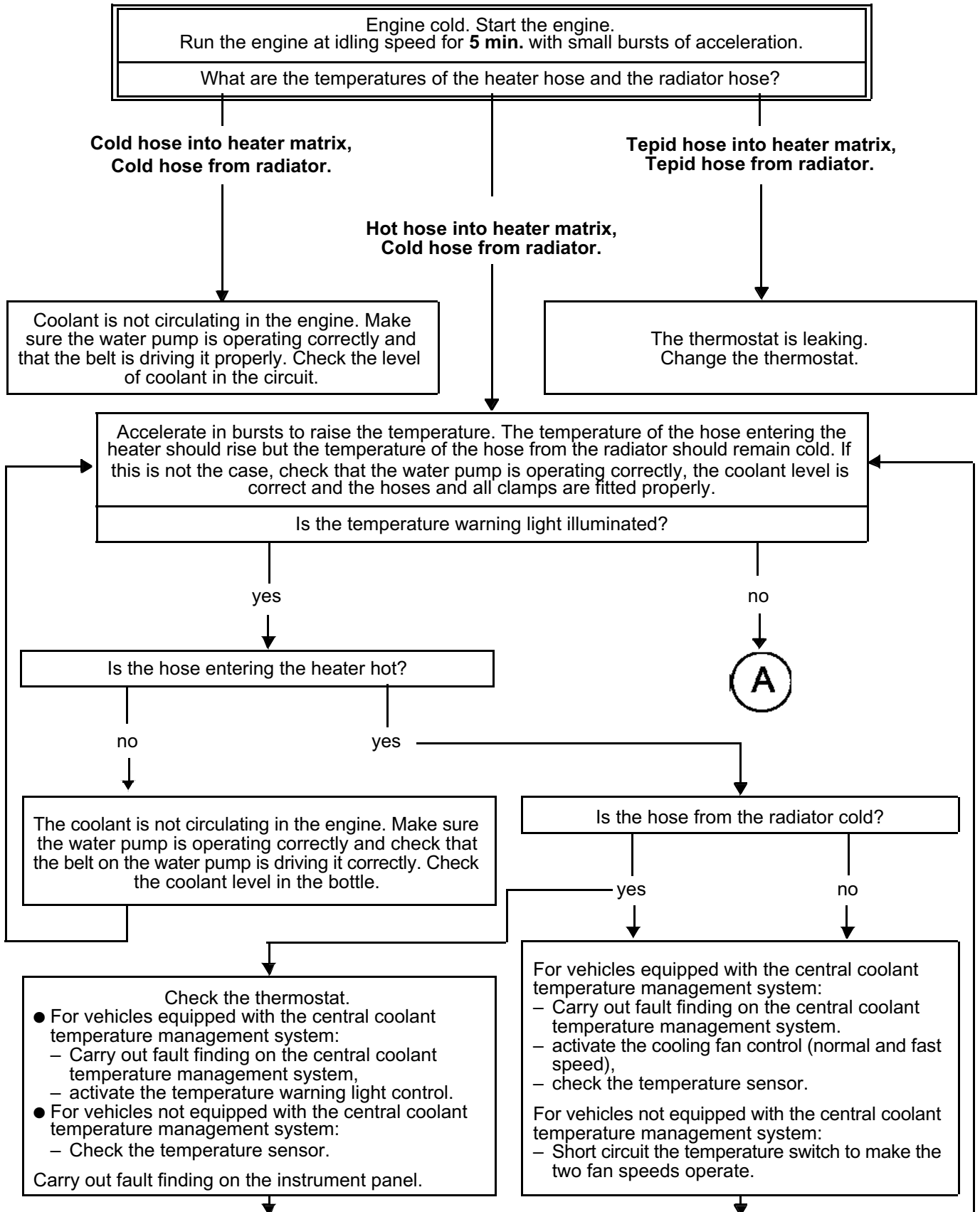
T 1	TEST TO DETECT CO <sub>2</sub> IN THE COOLING CIRCUIT
-----	---

<b>NOTES</b>	Engine has not been running for at least 5 hours.
--------------	---



T 2

TEMPERATURE REGULATION TEST



T 2  
(continued)

A

Accelerate in short bursts until the cooling fan cuts in.  
The instrument panel display should remain extinguished.

Does the fan start to operate?

yes

The result of the regulation test is good.

no

- For vehicles not equipped with the central coolant temperature management system:
  - Disconnect the temperature switch and short circuit it to make the two speeds (normal and fast) of the fan operate.
- For vehicles equipped with the central coolant temperature management system:
  - Activate the control mode of the two speeds (normal and fast) for the cooling fan using the diagnostic equipment.

In both cases, you must listen to hear the two fan speeds cut in.

If this does not happen:

- if one of the two speeds does not operate, check the wiring for the fan,
- if the fan will not operate, change the cooling fan assembly.