Spider
Gtv

VOLUME II

REPAIR INSTRUCTIONS

Alfa Romeo

PA497200000006

9-1996

UPDATE CARD

Spider
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INSTRUCTIONS

UPDATE CARD				
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			SUBST.	ADDED
6 (9/1996)	Spider-Gtv	-	Frontespice	
10 (11/1999)	Spider-Gtv	50	Index I-II	
6 (9/1996)	Spider-Gtv	50	6 to 7	
6 (9/1996)	Spider-Gtv	50	10	
3 (3/1995)	Spider-Gtv	50	34	
6 (9/1996)	Spider-Gtv	50	37	
8 (3/1998)	Spider-Gtv	50		47 to 54
9 (9/1998)	Spider-Gtv	50	55	
9 (9/1998)	Spider-Gtv	50		56 to 64
10 (11/1999)	Spider-Gtv	50		64/1 to 64/2
9 (9/1998)	Spider-Gtv	50		65 to 101
12 (11/2000)	**Spider-Gtv**	**70**	**Index I-II**	
11 (7/2000)	Spider-Gtv	70	III-IV	
6 (9/1996)	Spider-Gtv	70	9	
12 (11/2000)	**Spider-Gtv**	**70**	**10**	
12 (11/2000)	**Spider-Gtv**	**70**	**10/1 to 10/3**	
6 (9/1996)	Spider-Gtv	70		10/4 to 10/10
12 (11/2000)	**Spider-Gtv**	**70**	**11 to 12**	
12 (11/2000)	**Spider-Gtv**	**70**		**12/1 to 12/2**
9 (9/1998)	Spider-Gtv	70	24	
10 (11/1999)	Gtv	70		32/1 to 32/20
9 (9/1998)	Spider-Gtv	70	35	
9 (9/1998)	Spider-Gtv	70	37 to 38	
9 (9/1998)	Spider-Gtv	70		38/1 to 38/4
9 (9/1998)	Spider-Gtv	70	40 to 46	
9 (9/1998)	Spider-Gtv	70		46/1 to 46/2
9 (9/1998)	Spider-Gtv	70	56	
9 (9/1998)	Spider-Gtv	70	85	
3 (3/1995)	Spider-Gtv	70	96	
5 (12/1995)	Spider-Gtv	70		99/1 to 99/11
9 (9/1998)	Spider-Gtv	70	99/12	
5 (12/1995)	Spider-Gtv	70		99/13 to 99/22
11 (7/2000)	Spider-Gtv	70		99/23 to 99/38
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
2 (2/1995)	Spider-Gtv	70		126 to 153
6 (9/1996)	Spider-Gtv	70	154	
2 (2/1995)	Spider-Gtv	70		155 to 246
3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
6 (9/1996)	Gtv 3.0V6	-	Index	
6 (9/1996)	Gtv 3.0V6	50		1 to 3

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3 (3/1995)	Spider-Gtv	50	34	
6 (9/1996)	Spider-Gtv	50	37	
8 (3/1998)	Spider-Gtv	50		47 to 54
9 (9/1998)	Spider-Gtv	50	55	
9 (9/1998)	Spider-Gtv	50		56 to 64
10 (11/1999)	Spider-Gtv	50		64/1 to 64/2
9 (9/1998)	Spider-Gtv	50		65 to 101
11 (7/2000)	**Spider-Gtv**	**70**	**Index I-VI**	
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
6 (9/1996)	Spider-Gtv	70	11 to 12	
9 (9/1998)	Spider-Gtv	70	24	
10 (11/1999)	Spider-Gtv	70		32/1 to 32/20
9 (9/1998)	Spider-Gtv	70	35	
9 (9/1998)	Spider-Gtv	70	37 to 38	
9 (9/1998)	Spider-Gtv	70		38/1 to 38/4
9 (9/1998)	Spider-Gtv	70	40 to 46	
9 (9/1998)	Spider-Gtv	70		46/1 to 46/2
9 (9/1998)	Spider-Gtv	70	56	
9 (9/1998)	Spider-Gtv	70	85	
3 (3/1995)	Spider-Gtv	70	96	
5 (12/1995)	Spider-Gtv	70		99/1 to 99/11
9 (9/1998)	Spider-Gtv	70	99/12	
5 (12/1995)	Spider-Gtv	70		99/13 to 99/22
11 (7/2000)	**Spider-Gtv**	**70**		**99/23 to 99/38**
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
2 (2/1995)	Spider-Gtv	70		126 to 153
6 (9/1996)	Spider-Gtv	70	154	
2 (2/1995)	Spider-Gtv	70		155 to 246
3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
6 (9/1996)	Gtv 3.0V6	-	Index	
6 (9/1996)	Gtv 3.0V6	50		1 to 3

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6 (9/1996)	Spider-Gtv	50	37	
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9 (9/1998)	Spider-Gtv	50	55	
9 (9/1998)	Spider-Gtv	50		56 to 64
10 (11/1999)	**Spider-Gtv**	**50**		**64/1 to 64/2**
9 (9/1998)	Spider-Gtv	50		65 to 101
10 (11/1999)	**Spider-Gtv**	**70**	**Index I-II**	
10 (11/1999)	**Spider-Gtv**	**70**		**Index III**
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
6 (9/1996)	Spider-Gtv	70	11 to 12	
9 (9/1998)	Spider-Gtv	70	24	
10 (11/1999)	**Spider-Gtv**	**70**		**32/1 to 32/20**
9 (9/1998)	Spider-Gtv	70	35	
9 (9/1998)	Spider-Gtv	70	37 to 38	
9 (9/1998)	Spider-Gtv	70		38/1 to 38/4
9 (9/1998)	Spider-Gtv	70	40 to 46	
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9 (9/1998)	Spider-Gtv	70	56	
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9 (9/1998)	Spider-Gtv	70	99/12	
5 (12/1995)	Spider-Gtv	70		99/13 to 99/22
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
2 (2/1995)	Spider-Gtv	70		126 to 153
6 (9/1996)	Spider-Gtv	70	154	
2 (2/1995)	Spider-Gtv	70		155 to 246
3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
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3 (3/1995)	Spider-Gtv	50	34	
6 (9/1996)	Spider-Gtv	50	37	
8 (3/1998)	Spider-Gtv	50		47 to 54
9 (9/1998)	Spider-Gtv	50	55	
9 (9/1998)	Spider-Gtv	50		56 to 101
9 (9/1998)	Spider-Gtv	70	Index	
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
6 (9/1996)	Spider-Gtv	70	11 to 12	
9 (9/1998)	Spider-Gtv	70	24	
9 (9/1998)	Spider-Gtv	70	35	
9 (9/1998)	Spider-Gtv	70	37 to 38	
9 (9/1998)	Spider-Gtv	70		38/1 to 38/4
9 (9/1998)	Spider-Gtv	70	40 to 46	
9 (9/1998)	Spider-Gtv	70		46/1 to 46/2
9 (9/1998)	Spider-Gtv	70	56	
9 (9/1998)	Spider-Gtv	70	85	
3 (3/1995)	Spider-Gtv	70	96	
5 (12/1995)	Spider-Gtv	70		99/1 to 99/11
9 (9/1998)	Spider-Gtv	70	99/12	
5 (12/1995)	Spider-Gtv	70		99/13 to 99/22
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
2 (2/1995)	Spider-Gtv	70		126 to 153
6 (9/1996)	Spider-Gtv	70	154	
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3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
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3 (3/1995)	Spider-Gtv	50	34	
6 (9/1996)	Spider-Gtv	50	37	
8 (3/1998)	Spider-Gtv	50		47 to 55
6 (9/1996)	Spider-Gtv	70	Index I	
6 (9/1996)	Spider-Gtv	70	Index II	
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
6 (9/1996)	Spider-Gtv	70	11 to 12	
3 (3/1995)	Spider-Gtv	70	44 to 45	
3 (3/1995)	Spider-Gtv	70	96	
5 (12/1995)	Spider-Gtv	70		99/1 to 99/22
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
2 (2/1995)	Spider-Gtv	70		126 to 153
6 (9/1996)	Spider-Gtv	70	154	
2 (2/1995)	Spider-Gtv	70		155 to 246
3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
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3 (3/1995)	Spider-Gtv	70	40 to 45	
3 (3/1995)	Spider-Gtv	70	96	
2 (2/1995)	Spider-Gtv	70		126 to 264
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4 (5/1995)	Spider-Gtv	70	Index II	
3 (3/1995)	Spider-Gtv	70	44 to 45	
3 (3/1995)	Spider-Gtv	70	96	
4 (5/1995)	Spider-Gtv	70		99/1 to 99/5
2 (2/1995)	Spider-Gtv	70		126 to 246
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6 (9/1996)	Spider-Gtv	50	37	
6 (9/1996)	Spider-Gtv	70	I	
6 (9/1996)	Spider-Gtv	70	II	
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
6 (9/1996)	Spider-Gtv	70	11 to 12	
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3 (3/1995)	Gtv V6 TB	-		
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6 (9/1996)	Spider-Gtv	70	Index II	
6 (9/1996)	Spider-Gtv	70	9 to 10	
6 (9/1996)	Spider-Gtv	70		10/1 to 10/10
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3 (3/1995)	Spider-Gtv	70	96	
5 (12/1995)	Spider-Gtv	70		99/1 to 99/22
7 (4/1997)	Spider-Gtv	70	100	
7 (4/1997)	Spider-Gtv	70	116	
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6 (9/1996)	Spider-Gtv	70	154	
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3 (3/1995)	Gtv V6 TB	-	Index	
3 (3/1995)	Gtv V6 TB	50		1 to 8
6 (9/1996)	Gtv 3.0V6	-	Index	
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INTRODUCTION

The "Spider-Gtv - Repair Instructions" Manual is composed of three volumes as follows:

Volume I
- Technical Data;
- Engines;
- Mechanical Groups.

Volume II
- Heating-Ventilation;
- Bodywork.

Volume III
- Electric system;
- Electrical system diagnosis.

For overhauling engines and mechanical groups refere to the following manuals:

– PA493600000000 REPAIR INSTRUCTIONS - ENGINE OVERHAUL.

– PA494200000000 REPAIR INSTRUCTIONS - OVERHAULING MECHANICAL GROUPS.

In order to facilitate consultation, the structure of the manual mirrors the functional groups already defined for the "Repair Flat-rate Manual" in use by Alfa Romeo Authorized Service Network.

The characteristic data and the tables for vehicles identification are contained in the "Technical Data" at the beginning of Volume I.

The "Model identification" tables should be consulted before carrying out repair work in order to identify the model of the vehicle, the engine size and the groups which form the vehicle.

How to use this manual

The aim of this manual is to supply the Alfa Romeo Service Personnel with a tool enabling them to rapidly identify faults and to render the corrective interventions precise and efficient.

The manual shows the procedures relative to the removal and refitting and dismontling operations and the checks relative to the various groups forming the vehicle.

The procedures are illustrated in detail as are the procedures for using the tools. An appropriate symbology and explanatory texts next to the fundamental technical drawings make a complete and rapid consultation of the manual possible.

The procedures illustrate complete component disassembly procedures and should only be carried out in their entirety when absolutely unavoidable. The procedures for "assembly" and "refitting" are normally obtained by reversing the procedure followed for disassembly or removal in reverse and only the reassembly procedures which are significantly different are illustrated.

For information relative to the electrical systems onboard the vehicle refer to section 55 "ELECTRIC SYSTEM" and to the successive 55 "ELECTRIC SYSTEM DIAGNOSIS" which gives the wiring diagrams and the description of each function, the connector tables, the location of the components, the tables for fault diagnosis and the technical data for checking the components.

All the information contained in this manual is updaded at the time of publication.

Alfa Romeo reserves the right to make any modifications to its products that it deems necessary without warning. However the technical information and updates to this manual will be supplied as soon as possible.

Symbology

A specific symbology has been used in this manual to permit a rapid identification of the main technical information supplied.

The list of symbols is given below.


removal/disassembly


refitting/re-assembly

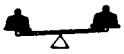

tighten to the torque


caulk nut


adjustment/regulation


visual check


lubricate


weight difference


angular value

pressure


temperature


brake system air purge


surfaces to be treated


interference


play


intake


exhaust


Lubricate only with engine oil


left-hand thread


torque for tightening in oil


engine r.p.m.


ovalization


taper


eccentricity


flatness


diameter


linear dimension


parallelism


service with grease


heating temperature


seal


service with engine oil


grease


CAUTION!


WARNING!

Warnings for the operator

All the operations must be carried out with the greatest care to prevent damage occurring to the vehicle or persons.

- The use of Alfa Romeo specific tools are indicated for some procedures. These tools must be used to ensure safety and to avoid damaging parts involved in the procedure.
- To free parts which are solidly stuck together, tap with an aluminium or lead mallet if the parts are of metal. Use a wooden or resin mallet for light alloy parts.
- When dismantling ensure parts are marked correctly if required.
- When refitting lubricate the parts, if necessary, to prevent seizing and binding during the initial period of operation.
- Using adhesive paper or clean rags cover those parts of the engine which, following disassembly, present openings which may allow dust or foreign material to enter.
- When refitting, the tightening torques and adjustment data must be respected.
- When substituting the main component(s) the seal rings, oil seals, flexible washers, safety plates, self-locking nuts and all worn parts must also be replaced.
- Avoid marking the internal coverings in the passenger compartment.

Substitution of groups or disconnected parts must be carried out using original spare parts only. Only in this way can the suitability and perfect operation of each organ be guaranteed.

- The words **CAUTION** and **WARNING** accompany those procedures where particular care should be taken to prevent damage occurring to people or vehicle parts.

CAUTION:
used when insufficient care could cause damage to people

WARNING:
used when insufficient care could cause damage to the vehicle or its component parts.

- The safety regulations applied to workshops should be respected. Where necessary the manual also lists the specific precautions to be taken to prevent dangerous situations from arising.

When using chemical products follow the safety indications given on the safety cards which the supplier is obliged to deliver to the user (in Italy in compliance with D.M. n.46/1992).

NOTE:
It is possible that for certain subjects were not completed in time for printing.
However these subjects are given and highlighted in the indices of the single groups.
It is the duty of the Technical Services to supply documentation regarding these subjects as soon as possible through updates or "Technical Bulletins".

AUXILIARY ORGANS 50

INDEX

HEATING AND VENTILATION

AUTOMATIC CLIMATE CONTROL

INDEX

HEATING AND VENTILATION

DESCRIPTION

GENERAL

The manually-operated air conditioner completely handles the air admitted into the car: in fact it cools the air in summer, but also carries out other functions such as dehumidifying and recirculation.

The system can be subdivided into two sections:
- group comprising the air flow and distribution unit;
- closed loop cooling system.

N.B.:

The SPIDER and GTV cars are fitted with a variable displacement/flow rate compressor which "follows" the load required by the system without continuous engagement/disengagement of the compressor joint. The changes in the flow rate of the refrigerant according to the pressures makes it possible to compensate for the change in the number of revolutions of the compressor (linked to engine rpm) to adapt the amount of "cold" produced according to the requirements of the system.

REFRIGERANT FLUID: R134a

For the above-mentioned air conditioning system **ecological fluid R134a** is used which does not contain chlorofluorocarbons (CFCs), one of the chemical substances that causes the reduction of the ozone layer in the atmosphere.

The systems working with R134a are clearly distinguished by the wording "R134a" on the main components.

- **The R134a refrigerant fluid cannot be mixed with the Freon R12 used in the air conditioners of previous cars; therefore never use Freon R12 under any circumstance whatsoever for conditioners with R134a.**
- **All the components of the system for the use of R134a are specific and NOT INTERCHANGEABLE with those of the previous cars with R12.**
- **The emptying/recovery station is especially for R13a fluid.**
- **The compressor lubricating oil is also specific and differs from the one used for the systems with Freon R12.**

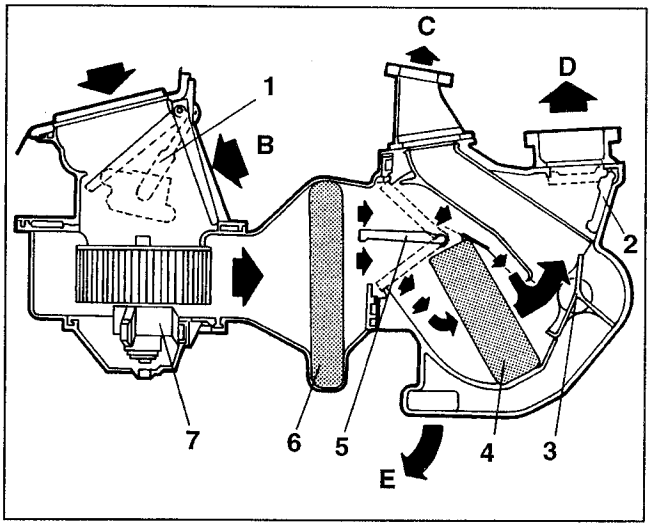
AIR FLOW AND DISTRIBUTION UNIT

OPERATING LAYOUT

The flow of outside air (A) is ducted towards the inside of the car passing through the motorised adjustment flap (1), the fan (7) and the evaporator (6) where, if the air conditioner is not cut out, it is cooled and dehumidified.

NOTE: If the recirculation function is activated, the flow of air (B) leads directly from the passenger compartment.

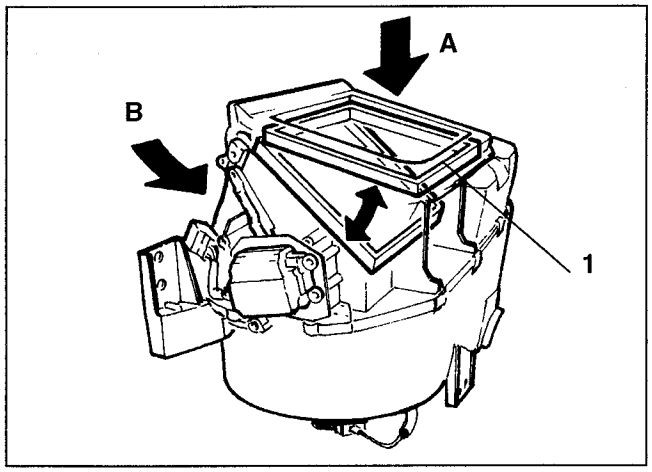
Depending on the position of the mixing port (5), the flow of air leading from the evaporator (6) is ducted completely to the distribution vents (2 and 3) - cold air - or it partially or totally reaches the heater radiator (4) - warm air - and then passes through it to the distribution ports (2 and 3). Depending on the position of the upper distribution port (2) and the lower port (3), the flow of air is directed to the various vents and outlets.



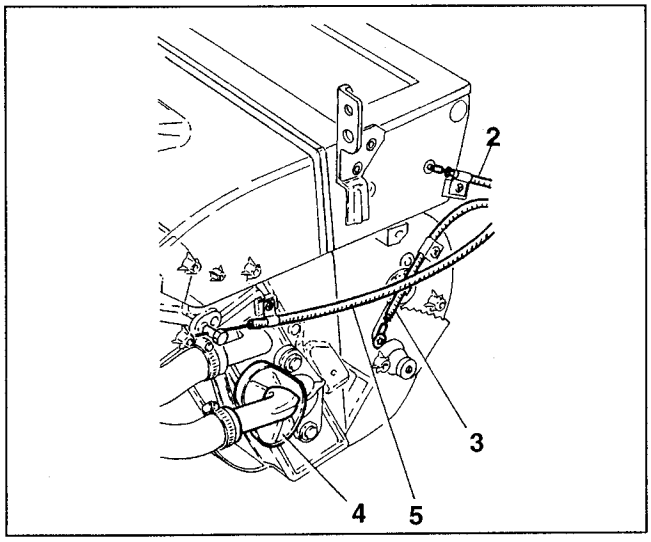
1. *Outside air flow adjustment and recirculation flap*
2. *Upper distribution port*
3. *Lower distribution port*
4. *Heater radiator*
5. *Mixing port*
6. *Evaporator*
7. *Fan*

A. *Outside air flow*
B. *Recirculation air flow*
C. *Flow of air leaving the windscreen vents*
D. *Flow of air leaving the front, centre and side outlets*
E. *Flow of air leaving the lower vents*

The flap (1) is controlled via a linkage by an electric motor fastened on the outside of the duct.



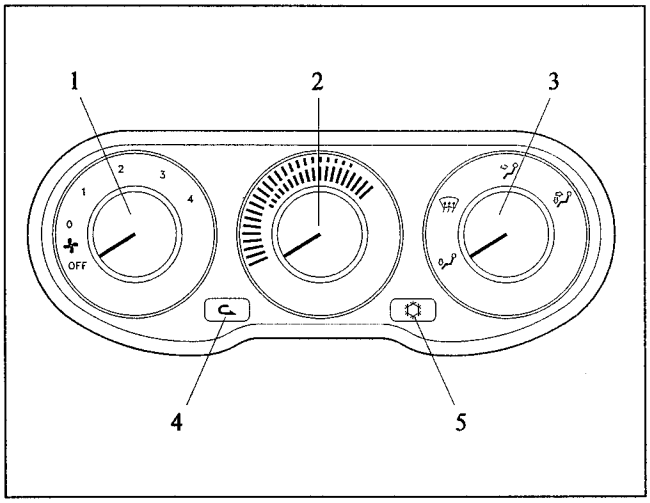
On the left-hand side of the heater-distributor unit, three bowden cables are connected which suitably direct the lower air distribution port (3) the upper port (2) and the mixing port (5) and control the position of the cock fitted on the inlet duct of the heater radiator (4).



Control panel

The control panel comprises three knobs and two pushbuttons:

- the lefthand knob (1) controls the flow of air:
  - OFF: air inlet shut off
  - 0: inlet of outside air without fan (dynamic air) (NOTE: if the compressor is engaged, the fan is operated at the first speed).
  - from 1 to 4: a switch is operated which turns on the fan through a four-speed regulator.
- the centre knob (2) controls the mixing port between warm air (red) and cold air (blue); if it is turned completely to the left, it closes a special cock and shuts off the heater;
- the righthand knob (3) adjusts the air flow distribution acting on the distribution ports sending air to the passenger compartment in the directions shown on the ideograms;
- the special pushbutton (4) operates the "recirculation" function;
- Pushbutton (5) turns on the cooling system which produces cold and dehumidified air.



"RECIRCULATION" FUNCTION

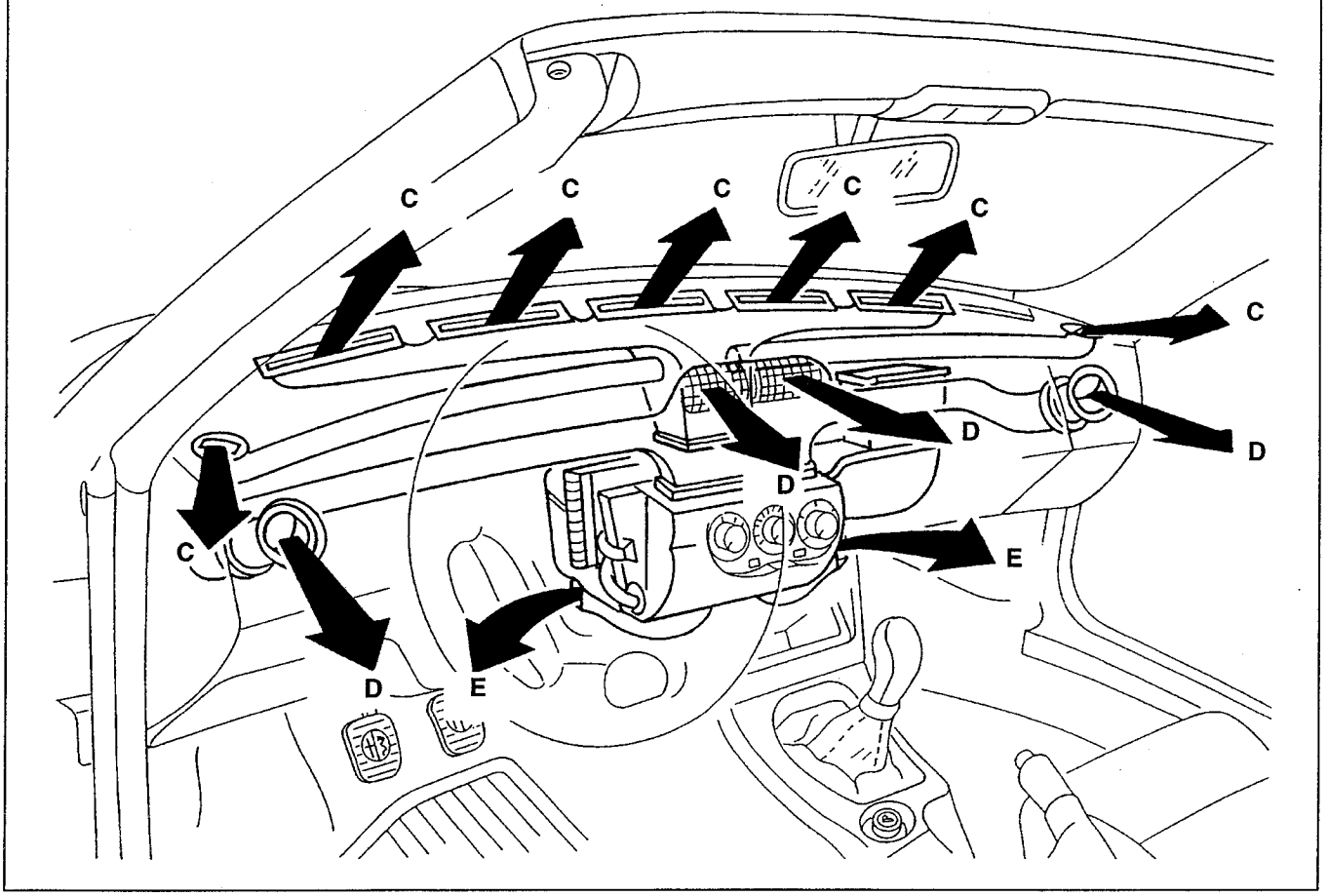
The recirculation function makes it possible to withdraw the air to be treated from inside the passenger compartment, thereby shutting off the flow of air from outside which under certain circumstances might be unwanted: bad smells, smoke, unventilated tunnels, etc..

Recirculation is also useful during prolonged use of the air conditioner: when the outside temperature is high and the inside temperature has stabilized at satisfactory values, the recirculation system "saves" the conditioning system.

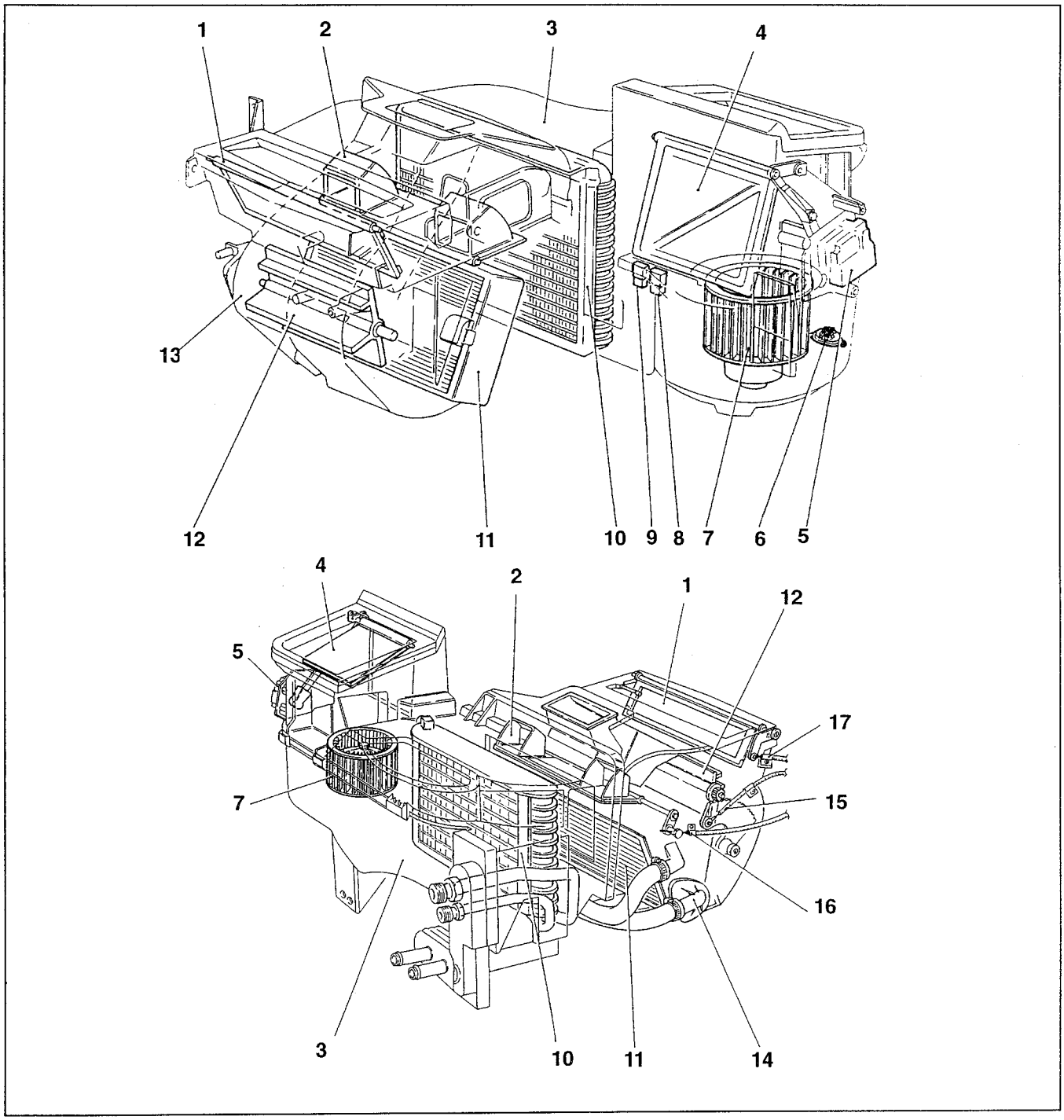
NOTE: As a change of air is necessary, the recirculation system should not be left engaged for too long.

AIR FLOWS IN THE PASSENGER COMPARTMENT

Position of knob	Flows (see fig.)
	E
	D
	D+E
	C



LOCATION OF COMPONENTS ON THE DUCTING/DISTRIBUTION UNIT



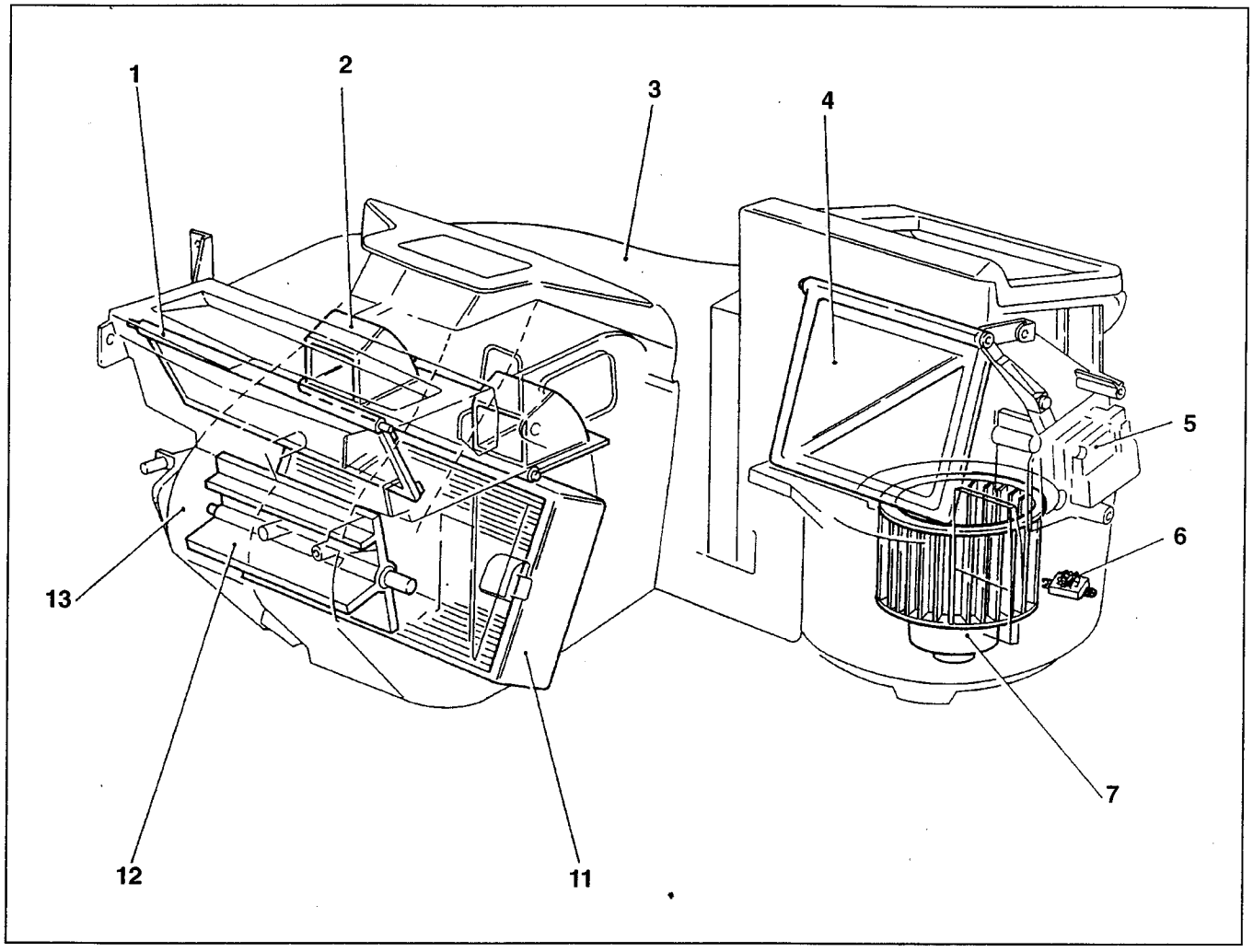
1. *Upper distribution port*
2. *Mixing port*
3. *Duct*
4. *Outside and recirculation air adjustment port*
5. *Outside and recirculation air adjustment port control motor*
6. *Fan resistance*
7. *Fan*
8. *Fan 1st speed relay*
9. *Fan relay*
10. *Evaporator*
11. *Heater radiator*
12. *Lower distribution port*
13. *Heater-distributor unit*
14. *Radiator adjustment cock*
15. *Lower distribution port control cable*
16. *Mixing port control cable*
17. *Upper distribution port control cable*

NOTE:

Differences for version with heater

- the evaporator is not present;
- the wiring is specific: the two relays are not present (for further details see Group 55 - ELECTRIC SYSTEM DIAGNOSIS);
- The front box differs in shape (upper and lower);
- the fan resistance differs in shape and ohm rating (for further details see Group 55 - ELECTRIC SYSTEM DIAGNOSIS);

N.B. In the servicing procedures described, reference will be made to the version with air conditioner: for the version with heater omit the operations referring to the components that are not installed on the car!!!



AIR CONDITIONING CIRCUIT

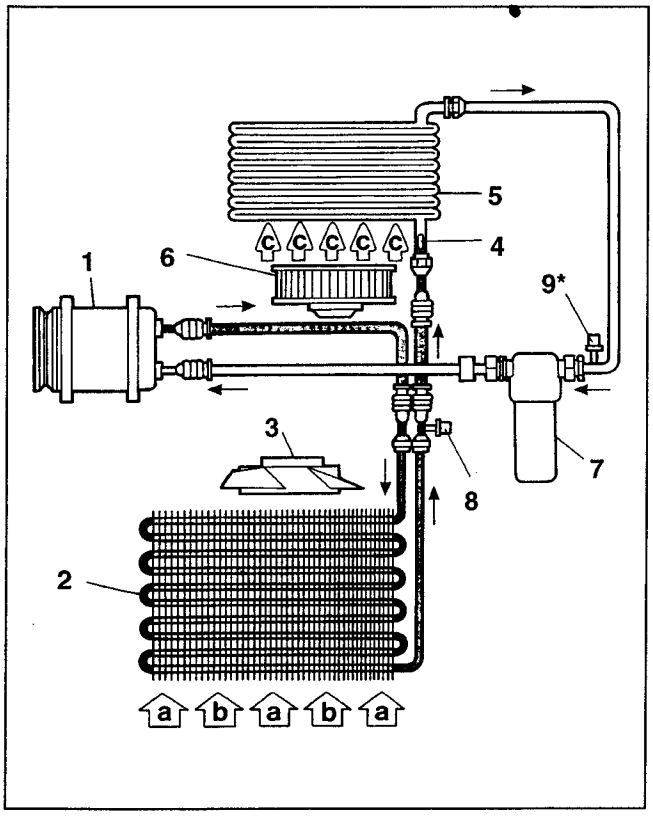
This circuit is shown schematically below and mainly comprises the following components:
- a **compressor** fitted on the engine, which compresses the refrigerant fluid from the evaporator outlet;
- a **condenser**, fitted in front of the engine refrigerant fluid radiator;
- an **evaporator**, located in the ducting unit;
- a **drier filter**.

The above-mentioned parts are connected to one another by suitable pipes. On the pipe connecting the condenser to the evaporator there is a **three-level pressure switch** which acts as a system control and safety device, protecting the circuit against over and underpressures.

For the **2.0 T.S. 16V** engine also an **antifrost pressure switch** is installed - before the drier filter - which prevents excessively low pressures in the circuit that might "freeze" the evaporator and block the system.

From chassis no. 6023007 a 4-level pressure switch is used.

An **expansion valve** is inserted on the high pressure line.



High pressure circuit

Low pressure circuit

1. *Compressor*
2. *Condenser*
3. *Condenser fan*
4. *Expansion valve*
5. *Evaporator*
6. *Evaporator fan*
7. *Drier filter*
8. *Three/four levels pressure switch*
9. *Antifrost pressure switch*
   (*)2.0 T.S. 16v only

a. Flow of air for cooling the condenser: leading from the front grille when the car is on the move.

b. Flow of air for cooling the condenser: caused by the fan (3) when the car is at a standstill or travelling at low speed

c Flow of air for the evaporator: caused by the fan (5) fitted in the ducting-distributor unit.

OPERATING PRINCIPLE

The purpose of the air conditioner is to cool and dehumidify the air directed to the passenger compartment.
It works according to a common cooling cycle in the circuit of the - FREON R134a - fluid in which the changes of state (from liquid to gas and vice-versa) are exploited to absorb and release heat.

During operation, two levels of pressure are created in the circuit which are maintained on one side by the compressor and on the other side by an expansion valve at the evaporator inlet.

Two needle valves are fitted on the pipes for draining and refilling the system: one on the high pressure side and the other on the low pressure side.

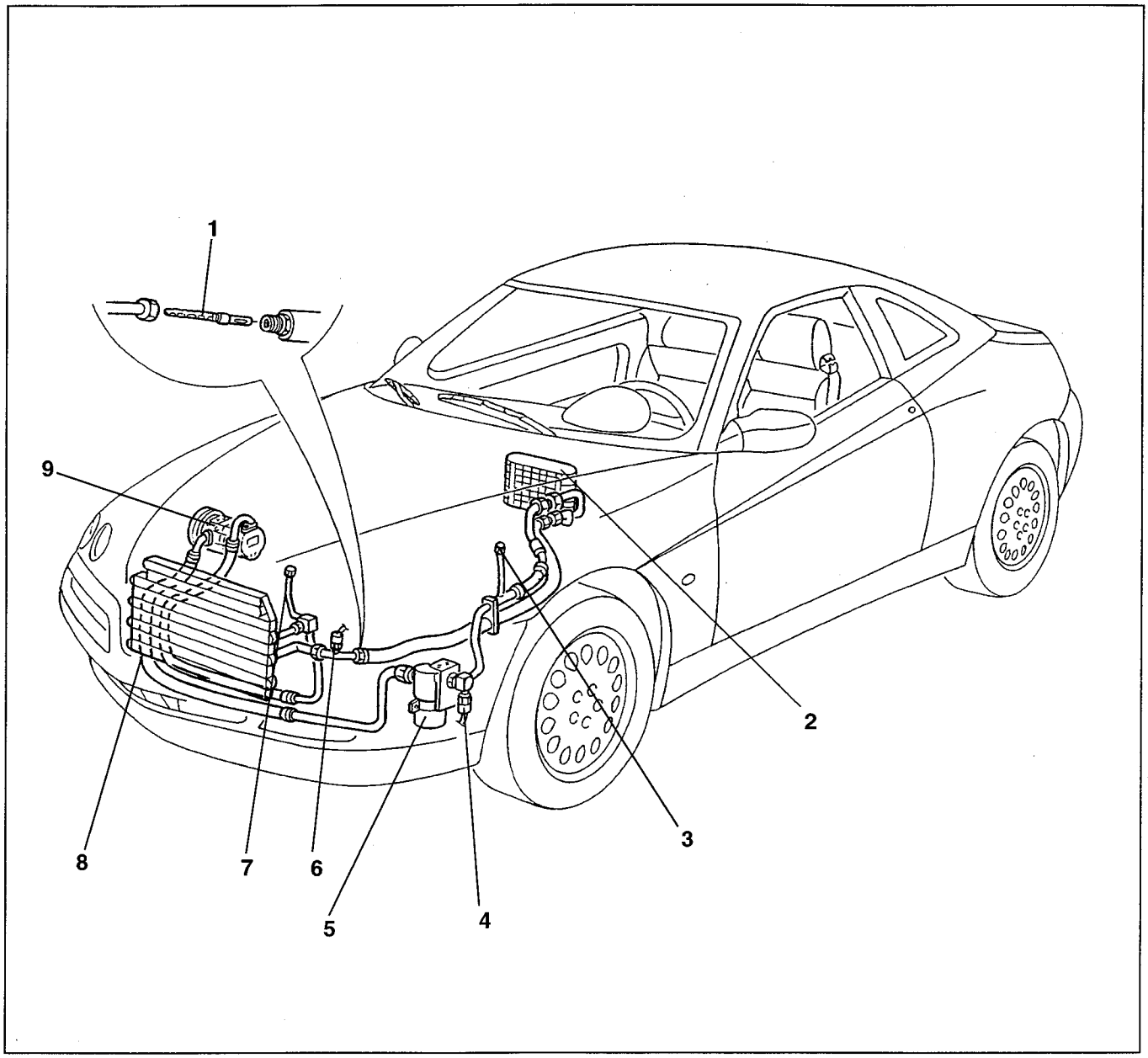
The refrigerant fluid leaves the compressor as a gas at high pressure and high temperature. It then enters the condenser where it is cooled and comes out as a liquid.

The expansion valve, at the evaporator inlet lowers the pressure of the fluid thus also its temperature. The fluid, still in liquid form, enters the evaporator where it is vapourised, absorbing heat from the air pushed against its fins by the fan. The air in contact with the cold walls of the evaporator loses a high percentage of humidity which condenses and is drained off outside the car through a special drainage tube.

This way the air admitted inside the car is colder and less humid.

The fluid in a gaseous state leaves the evaporator and then passes through the drier filter which absorbs any water particles, which, if allowed to continue in the cycle could freeze and block the expansion valve, thereby reducing or nullifying the efficiency of the cycle; lastly, it returns to the compressor to resume the cycle.

LOCATION OF COMPONENTS



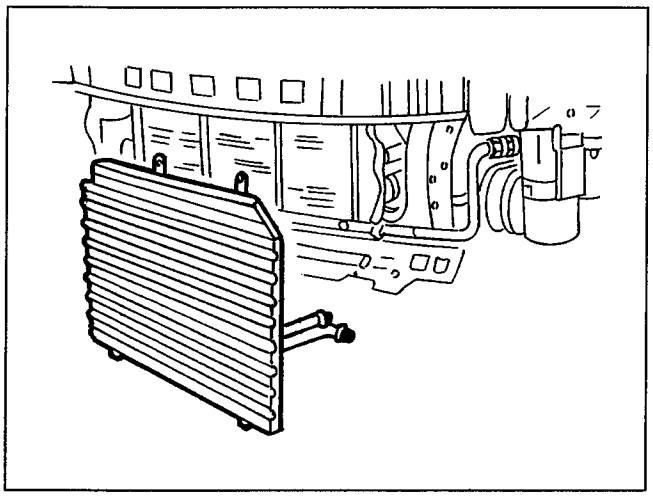
1. *Expansion valve*
2. *Evaporator*
3. *Needle valve on low pressure pipe*
4. *Antifrost pressure switch (engine 2.0 T.S.16v only)*
5. *Drier filter*
6. *Three/four levels pressure switch*
7. *Needle valve on high pressure pipe*
8. *Condenser*
9. *Compressor*

DESCRIPTION OF THE MAIN COMPONENTS OF THE SYSTEM

CONDENSER

The condenser is a heat exchanged former of copper or aluminium pipes with aluminium fins which increase the thermal exchange surface; it is fitted in front of the engine coolant fluid radiator.

The refrigerant fluid enters the condenser coils as a gas and turns into a liquid (at the average temperature of 60°C). An insufficient thermal exchange in the condenser, in addition to increasing the pressure in the system, does not cause complete condensation of the refrigerant fluid; therefore still gaseous fluid would reach the expansion valve which would considerably reduce the cooling capability of the system.
The condenser is surrounded by the air produced as the car travels forwards or when it is at a standstill or moving slowly in a queue, by the air produced by the special fan (the same used by the engine radiator).



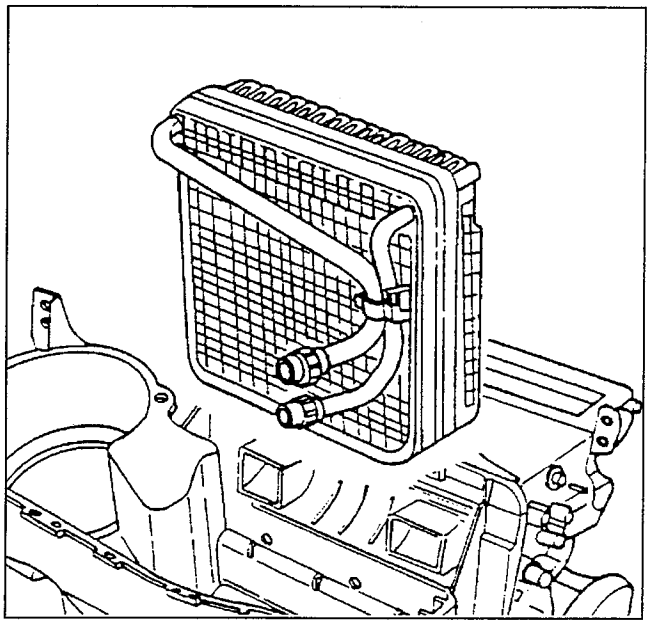
NOTE:

If during operation a high temperature is noted downstream of the condenser, resulting in the disengagement of the compressor, due to the three-level pressure switch, this means that there is lack of condensation; therefore the following operations should be carried out:

- Check that the three-level pressure switch is working properly; change it if necessary.
- If the pressure switch is working properly check that the outside of the condenser is not clogged; if so, remove all the impurities and straighten any buckled or bent fins to allow the cooling air to circulate freely through the condenser.

EVAPORATOR

The evaporator is the second heat exchanger of the system, and it comprises an aluminium structure with plates and aluminium fins which increase the thermal exchange surface; it is located in the ducting/distributor unit.
The evaporator inlet and outlet ducts are welded to the assembly of blade plates which form the thermal exchange area. The evaporator is treated chemically for protection against corrosion.
It represents the cooling element of the system and can be crossed by air leading from the passenger compartment of the car (recirculation), or by air coming from outside to necessarily change the air in the passenger compartment.
As the outside or recirculation air that passes through the evaporator is at all events higher in temperature than the freon fluid at low pressure and temperature inside, it causes the freon to evaporate into a gas (still at low pressure).
At the same time, the air around the evaporator fins is cooled and dehumidified. The humidity that condenses on the evaporator fins is cooled and dehumidified. The humidity that condenses on the evaporator fins is collected and drained off outside the car.



DRIER FILTER

The drier filter, shown schematically below, is connected by a pipe to the outlet duct of the evaporator from which it receives the refrigerant mostly in gas form but with a minimal amount of liquid, plus lubricating/antifreeze oil.

The drier accumulator carries out different functions. Firstly, it separates the liquid refrigerant from the gas refrigerant.

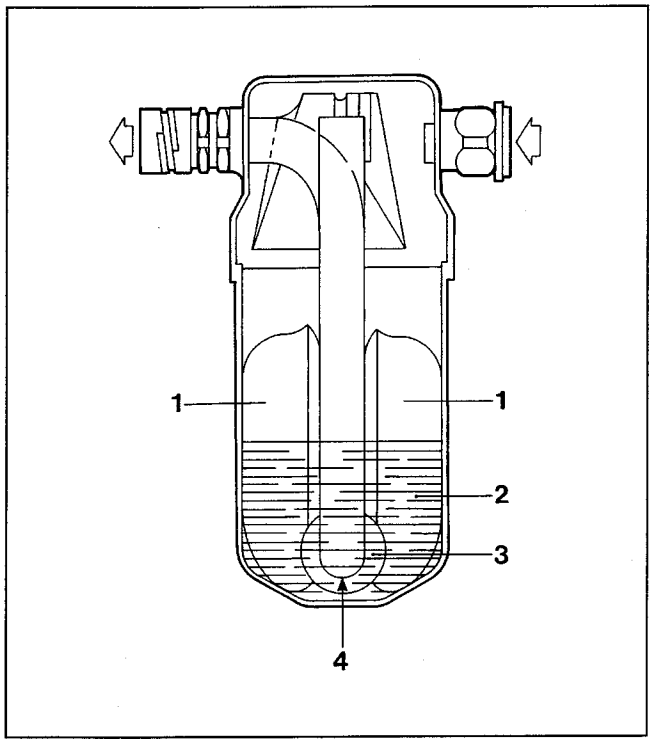
It also acts as a reserve in which most of the refrigerant fluid (in liquid form) gathers when the system is operating.

It also has a drier function by the two bags of SILICA-GEL contained in the lower section of the accumulator which dry any particles of damp present in the system.

NOTE:

For this reason, these components should be carefully stored in dry places, plugged completely until the time of installation.

In the lower part of the shaped pipe, which is located inside the accumulator and communicates with its outlet union, there is a hole which serves for the return of the lubricating/antifreeze oil to the compressor. On this shaped tube, in correspondence of the hole for the oil, a metal mesh filter ring has been fitted.



1. *SILICAGEL bags*
2. *Cooling fluid in liquid form*
3. *Filter*
4. *Hole for oil return to compressor*

NOTE:

In the system for the 2.0 T.S. 16v engine with NIP-PONDENSO compressor, the drier filter is supplied as spare with a certain amount of lubricating oil (see paragraph on "TOPPING UP THE COMPRESSOR OIL LEVEL).

The filter should be changed only when the expansion valve is clogged or when the evaporator is failing due to corrosion inside, or when the actual accumulator is leaking.

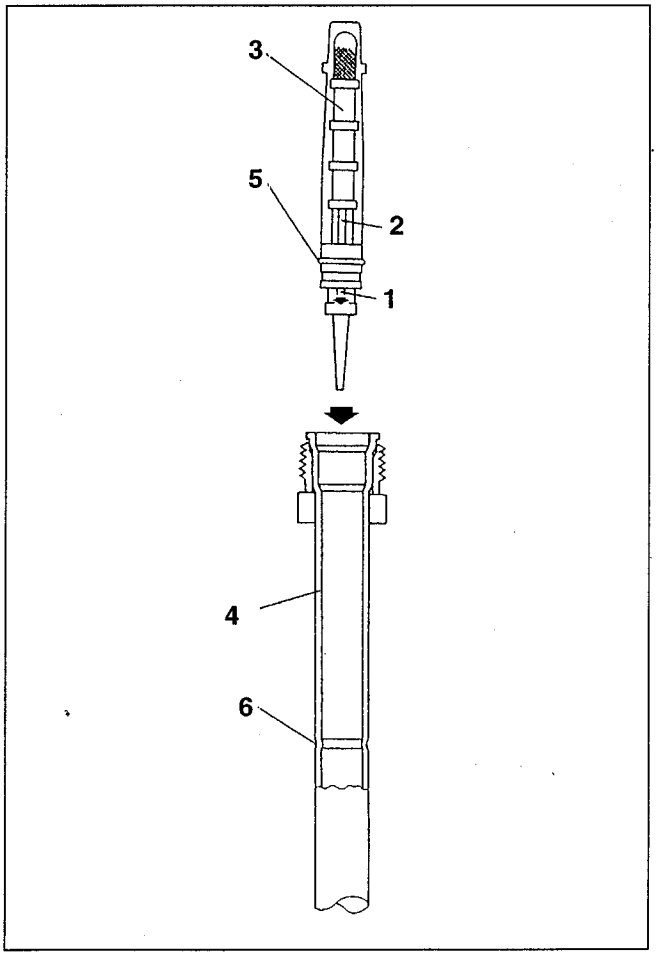
There is no need to change the filter if for some reason (eg. crash) it has been buckled, unless it leaks.

EXPANSION VALVE

The expansion valve which may be more appropriately defined as an exansion tube or orifice, is inserted in the evaporator inlet duct.

The valve, illustrated below, is cylindrical in shape and made from plastic except for the inside of the tube which is metal. The initial and final parts of the valve are made of a very fine net with minute meshes and they act as filters, while the inside diameter of the tube is suitably calibrated for each specific engine and each car in order to allow the necessary volume of refrigerant fluid to pass through when the compressor is operating.

On the outside of the tube there is a rubber ring which seals the inner surface of the evaporator inlet duct.



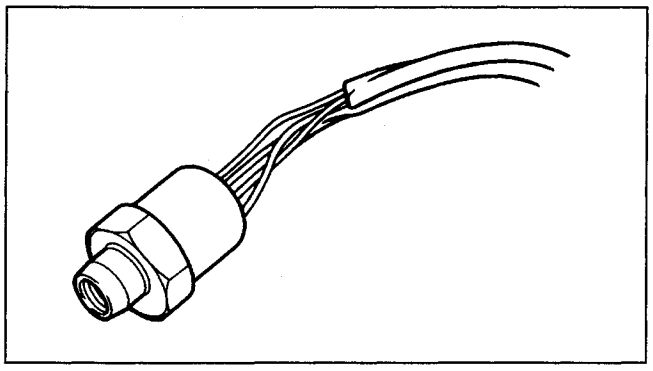
1. *Arrow showing the direction of assembly*
2. *Expansion tube*
3. *Inlet filter net*
4. *Inlet duct*
5. *Seal ring*
6. *Retainer roll*

The expansion tube separates the high pressure side of the system from the low pressure side: downstream of it the high pressure refrigerant in liquid form leading from the condenser expands, lowering the presure and temperature without changing its state. When the compressor is disengaged the refrigerant in the system on the high pressure side, flows towards the expansion tube, until the two pressures are levelled; this reduces the torque required for re-starting the compressor.

THREE-LEVEL PRESSURE SWITCH

This controls the safety and correct operation of the circuit:

- it turns on the radiator fan when necessary (eg. if the car is at a standstill) thereby preventing an increase in the pressure of the condenser (operation at appr. 15 bar);
- it stops the compressor, de-energizing the electromagnetic joint if the pressure reaches very high, thus dangerous, rates (over appr. 28 bar) or excessively low levels (below appr. 2.5 bar) to ensure that the system always works correctly.



4-LEVEL PRESSURE SWITCH

(For the 2.0 T.S. 16v engine it replaces the three-level one from chassis no. 6023907).

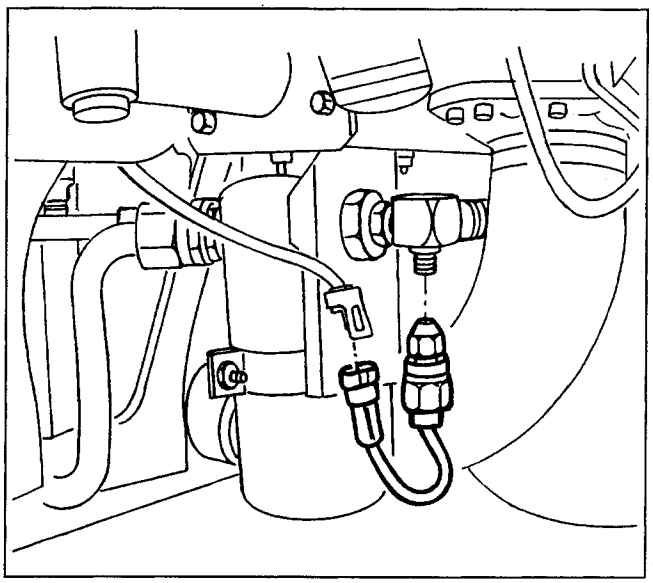
Like the previous type, it controls the safety of the circuit engaging the radiator fan at two speeds with 2 cut- in levels: at 15 bar appr. 1st speed, 20 bar appr. 2nd speed.

MINIMUM PRESSURE SWITCH (ANTIFROST)

(ONLY FOR 2.0 T.S. 16v ENGINE)

The task of the minimum pressure switch is to de-energize the electromagnetic joint of the compressor pulley when the pressure in the accumulator) reaches appr. 1.8 bar, in order to maintain the cold required but to prevent the evaporator from freezing.

It also has the task of protecting the compressor disconnecting the electromagnetic joint from its pulley, when the pressure of the refrigerant falls to very low levels in the event of a leak.



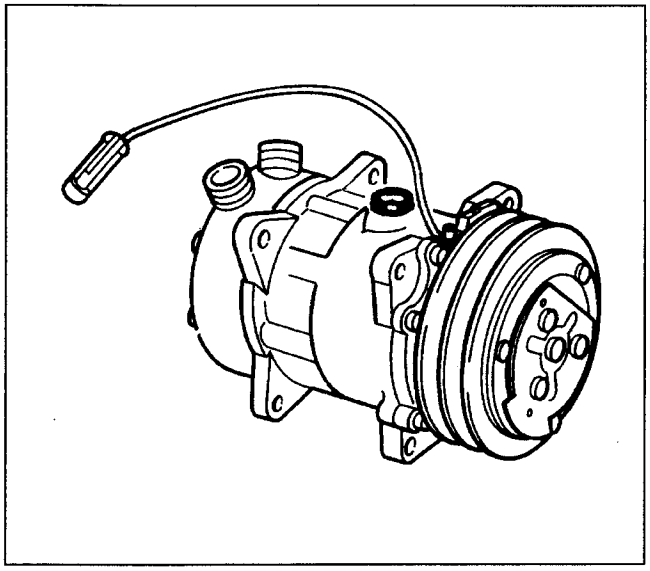
NOTE:
Due to the particular configuration of the compressor fitted on the **3.0 V6 engine** (SANDEN compresor with variable displacement) the minimum pressure switch is not used as the compressor reduces its own load to such a point as never to bring the system into critical low pressure conditions that would need the intervention of this pressure switch.

COMPRESSOR - 3.0 V6 Engine

The compressor fitted on the 3.0 6-cylinder engine is a **SANDEN SD7V16 compressor with variable displacement.**

Following the changes in load needed by the system the compressor processes the fluid through a cylinder displacement which starting from the maximum of 161.3 cm^3/rev, is gradually reduced to 10.4 cm^3/rev.

The compressor is of the reciprocating piston type: the change in the displacement is carried out by the sloping of the connecting rod holder plate which changes the stroke of the pistons: the movement of the plate is activated according to the balance of the pressure upstream and downstream of the compressor. A low inlet pressure involves shuttering of the compressor (reduced displacement) whereas a high pressure involves operation at maximum power (maximum displacement).



Composition and operation

The SD7V16 compressor shown in the diagram below comprises seven pistons (2) with their connecting rods (3) fastened on a connecting rod holder plate (4). The rotary motion of the plate (4), keyed onto the shaft (5) supplies the reciprocating motion to the pistons.

A different sloping of the plate enables the changing of the cylinder displacement; the maximum slope (as in the diagram) for the maximum displacement; sloping nil (vertical position) for the minimum displacement, almost zero.

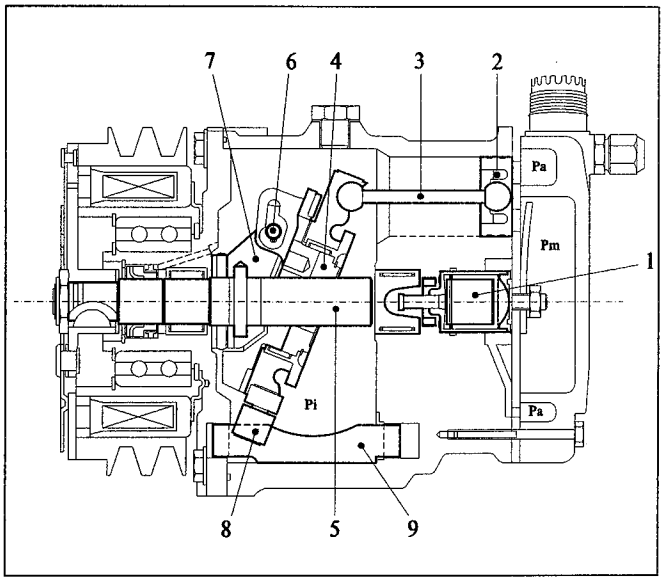
The plate (4) rotates around pin (6) pivoted on the arm (7) of the shaft (5).

The movement of the plate (4) in relation to the shaft (5) takes place through a suitable groove in low resistance material.

The bottom of the plate (4) runs on a guide (9) through a slide (8) made from low friction material.

The diaphragm valve (1) controls adjustment of the flow rate in relation to the difference between Pa (intake pressure) and Pi (pressure inside the compressor).

N.B. the solution adopted for this compressor always keeps the inside pressure Pi constant, with advantages in terms of ease of adjustment, noiseless and smooth operation.



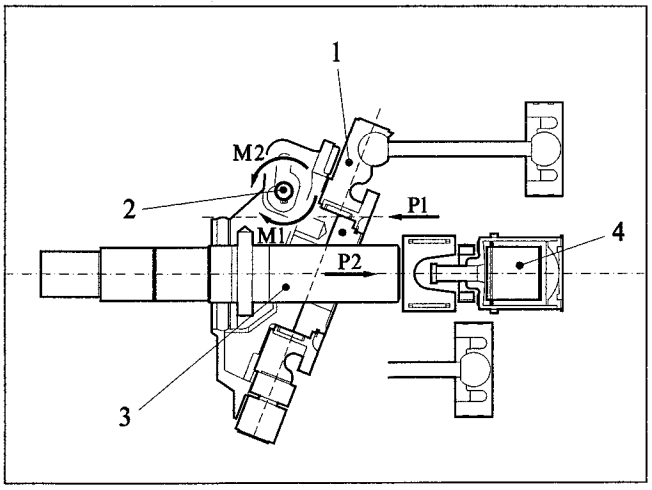
Pa: intake pressure
Pi: pressure inside compressor
Pm: delivery pressure

Displacement control

The displacement is changed by the different sloping of the connecting rod holder plate (1), which takes place by changing the balance of the pressures - thus of the forces - acting on the plate itself.

This balance is changed by the opening of the diaphragm valve (4) according to the following logic:

- with high intake pressure (Pa) the valve (4) stays shut; the main action on the plate (1) pivoted in (2) is by the reaction forces of the pistons P1, which cause a clockwise movement M1 applied at the fulcrum of the plate, which remains in the most inclined position.
- if the Pa falls, the difference in the pressure at the diaphragm opens the valve (1); this generates a thrust pressure on the shaft (3) which involves a resulting P2 which causes a counterclockwise movement M2 which tends to turn the plate (4) towards a more vertical position, i.e. a gradual reduction of the displacement.

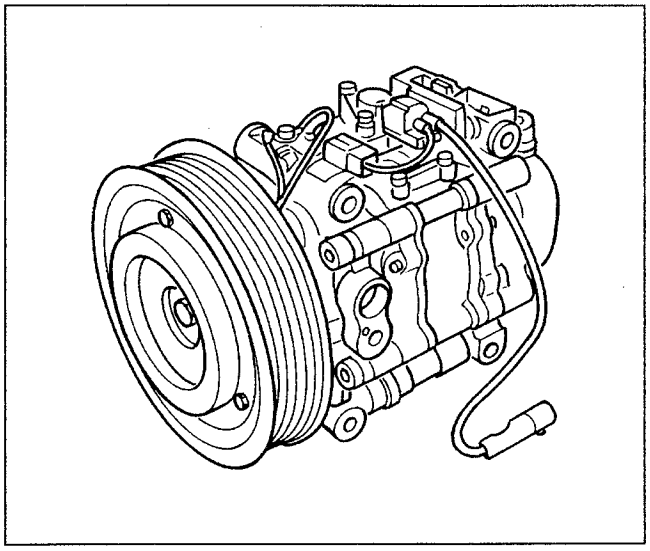


COMPRESSOR - 2.0 T.S. 16v Engine

This compressor is a NIPPONDENSO TV14SC with variable displacement: the change in this parameter is carried out automatically by the compressor in relation to the load (difference in the pressure up and downstream of it): a special valve controls the opening of a by-pass which shuts off part of the fluid from the compression stroke; the displacement can be reduced to 17% of the maximum rate.

Adjustment takes place on the inlet pressure:

- **a low inlet pressure will make the system reduce the displacement.** This happens for instance when the cooling cycle is working in the best conditions : high engine rpm (and of the compressor), high thermal exchange at the condenser etc.; (without a compressor with this variable configuration the compressor would cut in and out continuously);
- **a high inlet pressure**, on the other hand, **increases the displacement** to its maximum value. This happens for instance with low engine rpm and high requirements for "cold".



Composition and operation

The compressor consists of a body (1) in which a chamber (2) has been made. Four blades (3) turn inside this chamber pulled by a hub (4) whose axis of rotation does not coincide with the chamber's theoretical axis. The particular geometry of the chamber is such that as the blades turn they always contact the inner surface of the chamber: this means that differences in the compartments between one blade and the next can be obtained during rotation.

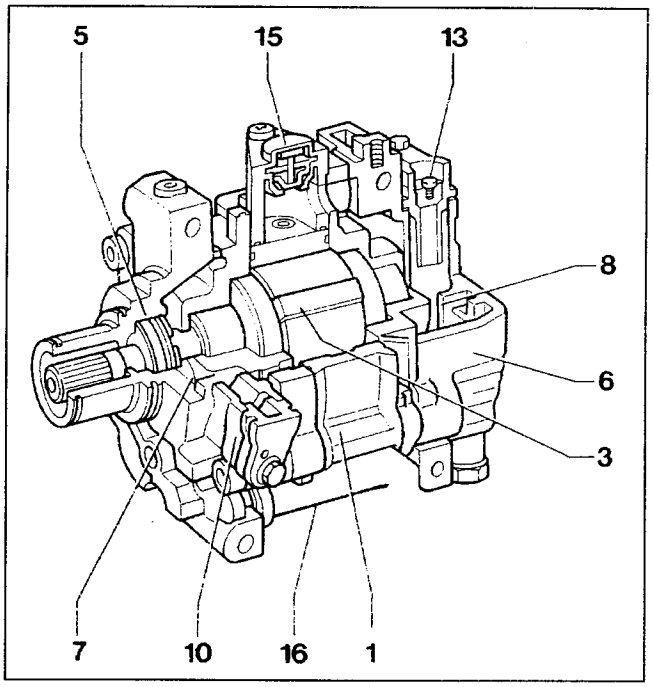
Two covers, front (5) and rear (6) are fastened to the compressor body (1) to form an intake or low pressure chamber (7) and a high pressure chamber (8) respectively. The gas taken in through union (10) on cover (5) passes through the low pressure chamber (7) and slot (11) on the body (1).

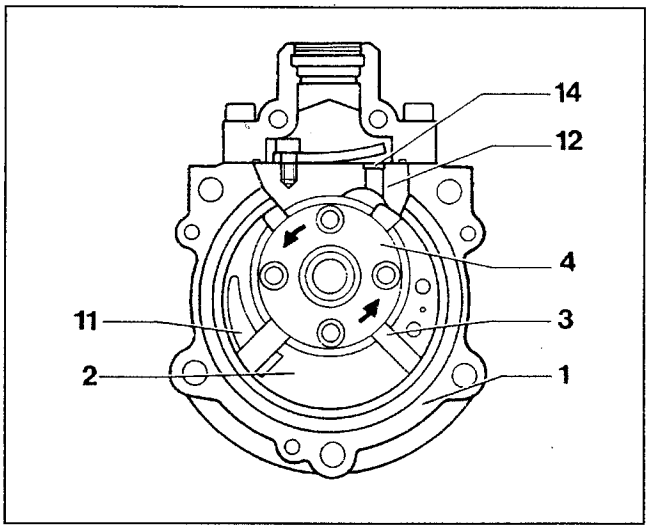
The gas is then compressed and pushed through the duct (12) in the high pressure chamber (8) and sent to the system via union (13). The reed valve (14) prevents the high pressure gas from returning to the compressor.

On the top section of the body there is a temperature sensitive contact (15) connected in series to an electromagnetic joint. When the tmperature reaches dangerous limits (over 160°C), this contact (15) cuts out the compressor: it activates it again if the temperature falls below 140°C.

This way operation is prevented under dangerous conditions such as lack of fluid or oil.

The pressure regulator (16) in the lower section of the compressor serves to adjust the flow rate of the fluid in the compressor, as described on the next page.





Flow rate control

The flow rate control is obtained through a pneumatic mechanism incorporated in the compressor, which by-passes part of the gas in the compression phase, at the intake, i.e. in the low pressure chamber.

When activated, this system **makes it possible to reduce the compressor flow rate gradually and continuously to appr. 17% of the total capacity.**

The mechanism comprises the piston (A) which can run in the cylinder (C) countered by the spring (B).

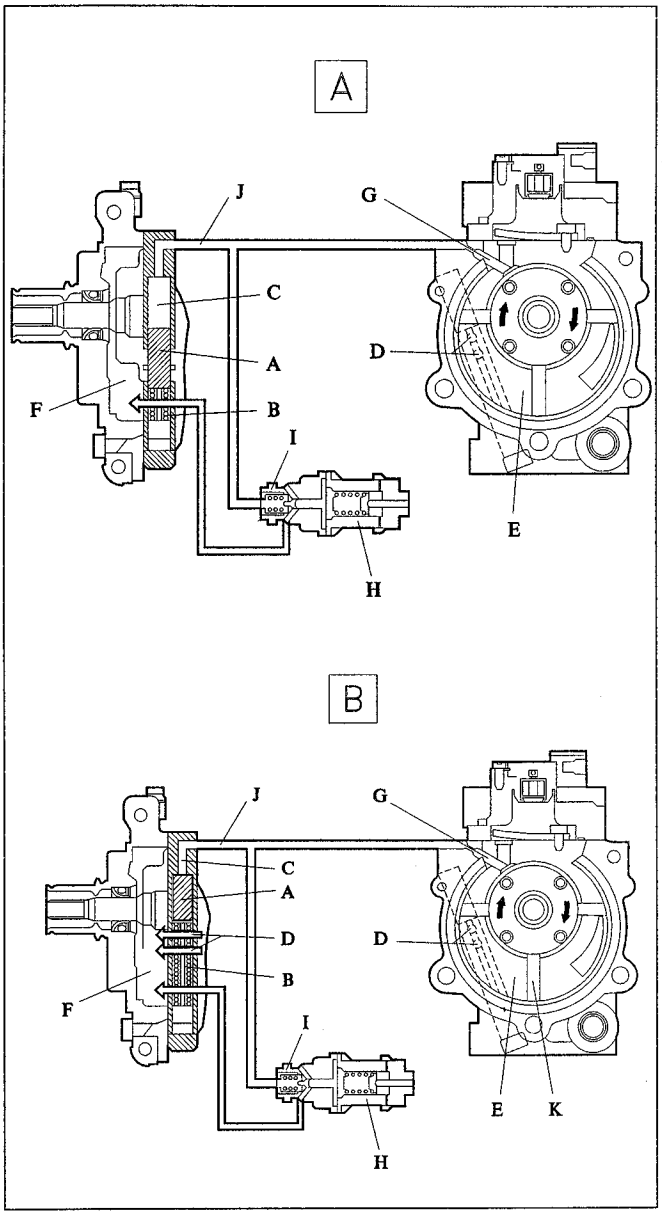
When the piston is positioned as shown in figure A, it cuts off holes (D) which connect compartment (E) - in which the gas begins to be compressed - with the low pressure chamber (F). Conversely, when the piston (A) is in the position shown in Figure B, the holes (D) connect the two chambers.

The piston is operated by a small amount of the pressurised gas withdrawn from duct (J) which communicates with the calibrated hole (G).

The pressure regulator (H) is adjusted by the difference in pressure between intake - chamber (F) - and delivery: when the intake pressure is high valve (I) is closed, and the pressure of the gas acts on piston (A) taking it to the position of figure A. Holes (D) are cut off and by-passing does not take place. This starts off compression of the gas in chamber (E) as described.

When the intake pressure falls, the regulator (H) opens the valve (I) allowing the pressurised gas in duct (J) and in cylinder (C), to discharge into the low pressure chamber (F). Becasue of, piston (A) is pushed by the spring (B) allowing the by-pass holes (D) to open.

This way, part of the gas in chamber (E) - start of compression - can flow into the low pressure chamber (F), until blade (K) has covered the holes (D); this reduces the amount of gas in chamber (E) resulting in the reduction of the compressor flow rate.

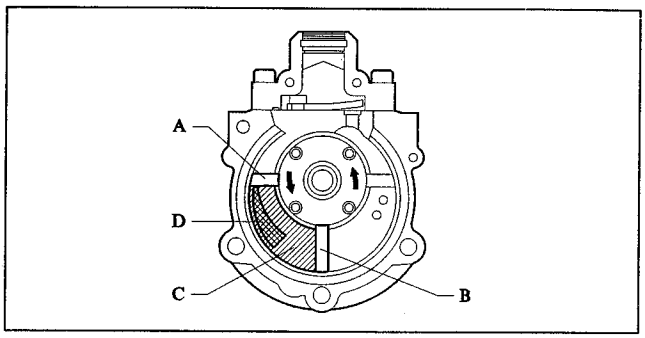


A - Normal operation

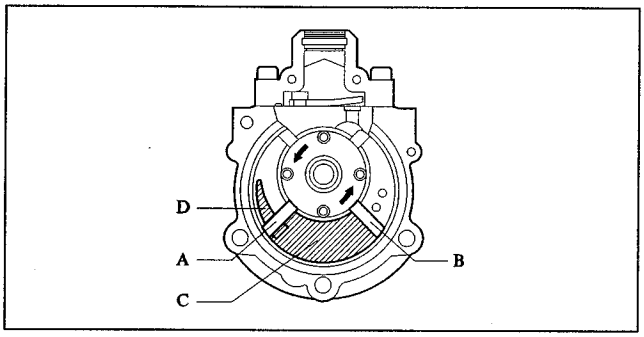
(100% Capacity - by-pass closed)

Intake

The gas is taken in through the inlet slot (D) as compartment (C) gradually expands between blades (A) and (B): This is the beginning of the intake phase.

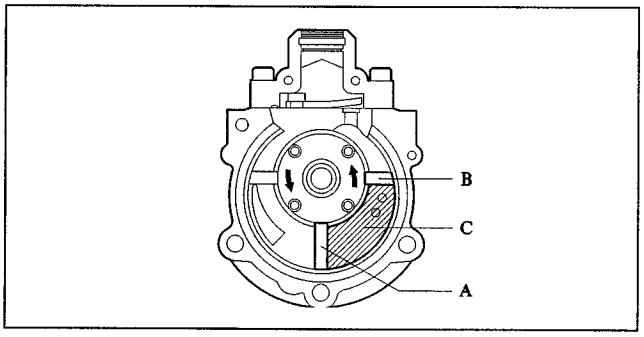


The new position of blades (A) and (B) gives compartment (C) Its maximum volume. Blade (A) cuts compartment (C) off from slot (D) thereby completing the intake phase.



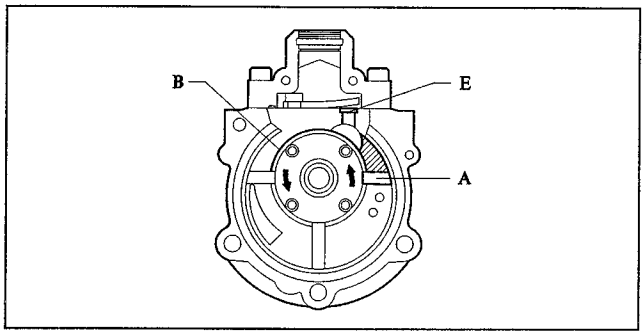
Compression

The volume of compartment (C) is reduced and the gas pressure increases. This begins the compression phase.

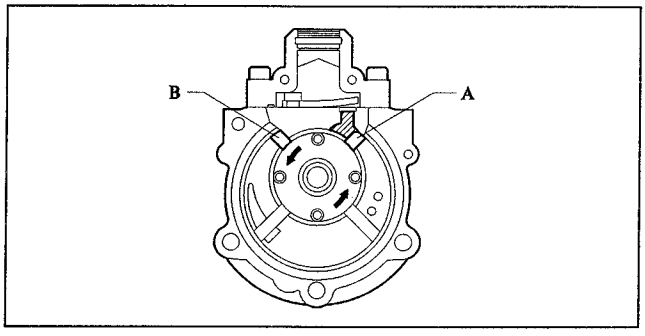


Discharge

The pressure of the gas increases further until the reed valve (E) opens: this precise instant ends the compression phase and begins the discharge phase.



When blades (A) and (B) reach the position illustrated the discharge phase ends.

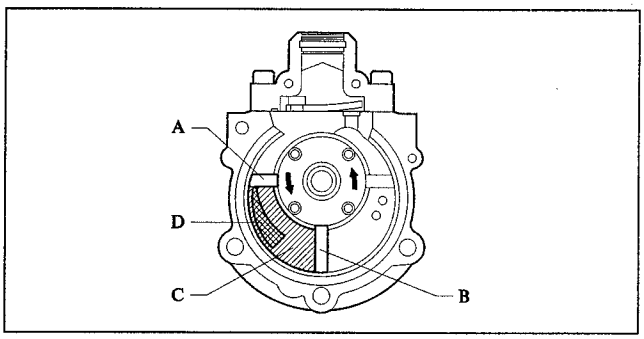


B - Operation with reduction of the flow rate

(Down to 17% of flow rate - by-pass open)

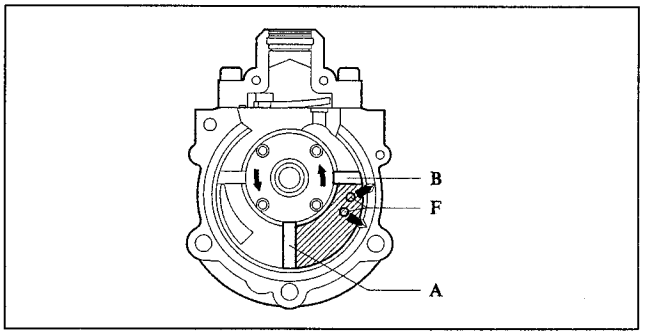
Intake

The gas is taken in through the inlet slot (D) as compartment (C) gradually expands between blades (A) and (B): This is the beginning of the intake phase.



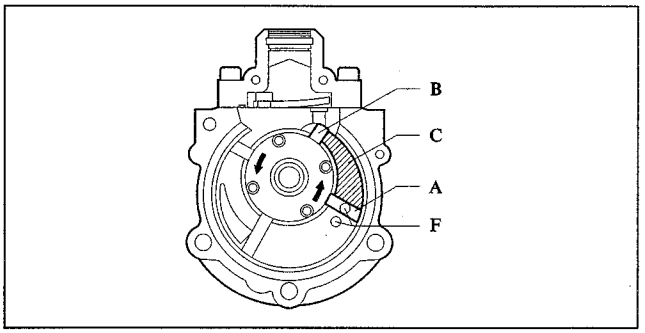
By-pass

If holes (F) are open part of the gas flows out: the compression stage does not start yet.



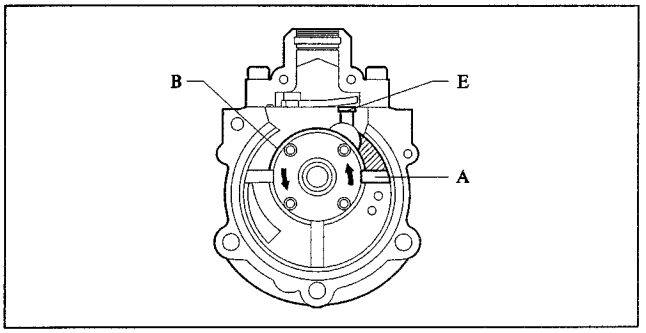
Compression

Once holes (F), have closed, compartment (C) reduces the volume decreasing the pressure of the remaining gas (down to a minimum of 17% of the total): the compression phase begins.



Discharge

The pressure of the gas increases further until the reed valve (E) opens: this precise instant ends the compression phase and begins the discharge phase.



LUBRICATION

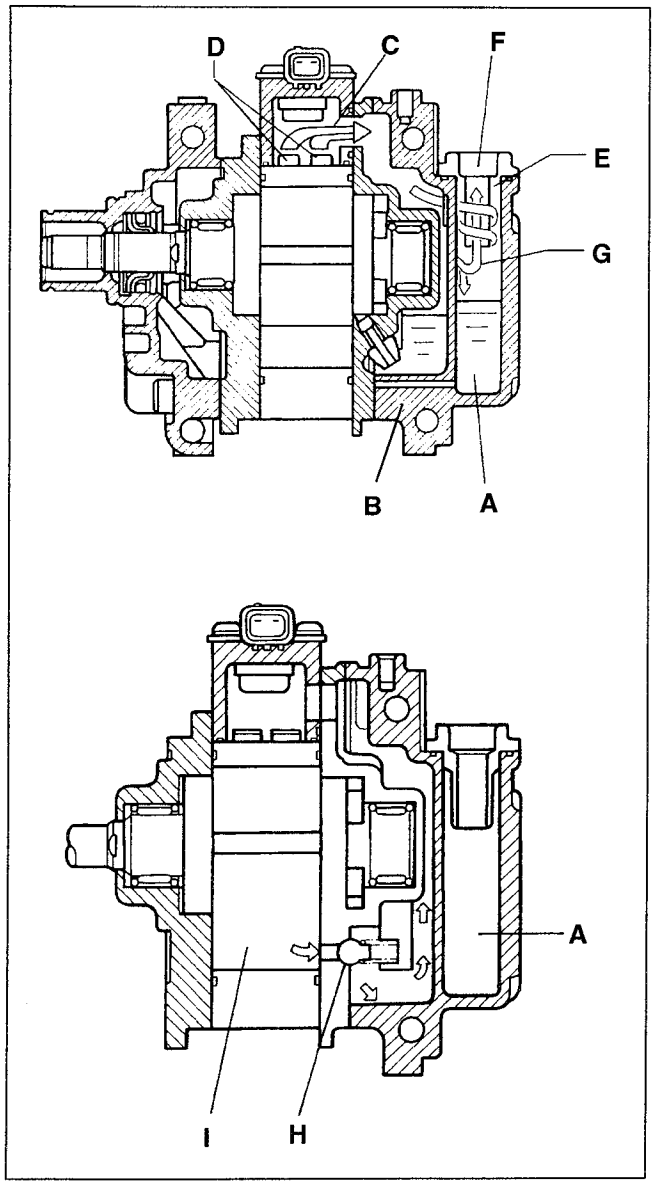
The lubricating oil is contained in the high pressure chamber (A). When the compressor is operating the high pressure in the chamber pushes the oil through the calibrated hole (B) to the moving parts of the compressor.

The oil mixed with gas (C) is pushed through the reed valves (D) into the high pressure chamber.

A separator (E) installed in the gas outlet union separates the gas from the oil which drops to the bottom of the chamber (A) while the gas escapes through union (F).

This device keeps the amount of oil in the system to the minimum and consequently increases the thermal yield.

The compressor is also fitted with two safety valves (H) which release any overpressure occurring in the compression chamber (I).



Compressor engagement/disengagement strategy

The compressor is engaged by the electromagnetic joint controlled by the electronic injection management system of the engine: indeed the compressor absorbs quite an amount of power to the disadvantage of overall engine output, and in certain instances this must be avoided:

- at idle speed the engine must adapt its own rpm taking into account this increase of absorbed power;
- when the engine is started or when high load is required, the compressor is cut out to leave all the available power to the engine.

M3.7 injection system (3.0 V6 engine)

The injection system control unit carries out the following strategies:

- it adapts the engine idle speed each time the compressor is engaged; if the idle speed drops below 700 rpm, the compressor is disengaged;
- if high power (high throttle opening speed, starting from below 3500 rpm) or full load is needed, or the engine temperature is high (over 117°C), it momentaneously cuts off the compressor;
- when the engine is started it does not enable the compressor to cut in until normal operating conditions have been reached.

M2.10.3 injection system (2.0 T.S. 16v engine)

The injection system control unit carries out the following strategies:

- it adapts the engine idle speed each time the compressor is engaged; if the idle speed drops below 700 rpm, the compressor is disengaged;
- in the event of the need for high power (high speed - above 6000 rpm - full load - max. throttle opening), it momentaneously disengages the compressor;
- when the engine is started it does not enable the compressor to cut in until normal operating conditions have been reached.
  NOTE: remember that the NIPPONDENSO TV14SC compressor with which this version is fitted automatically prevents the compressor from operating if the temperature of the refrigerant fluid inside the compressor exceeds 160°C.

OPERATING PROCEDURES

GENERAL PRECAUTIONS FOR WORK ON THE CLIMATE CONTROL UNIT

- **Before carrying out any maintenance and repair work it is advisable to disconnect the battery negative terminal.**
- **Before dismantling the system it must be drained recovering the coolant fluid.**
- **During the operations, when the system components are disconnected, suitable plug the disconnected fittings to prevent moisture and purities from getting into the system.**
- **When re-installing the pipe fittings change the O- rings on them.**
- **Lubricate the pipe fitting threads with the specified antifreeze oil and tighten the fittings to the specified torque.**

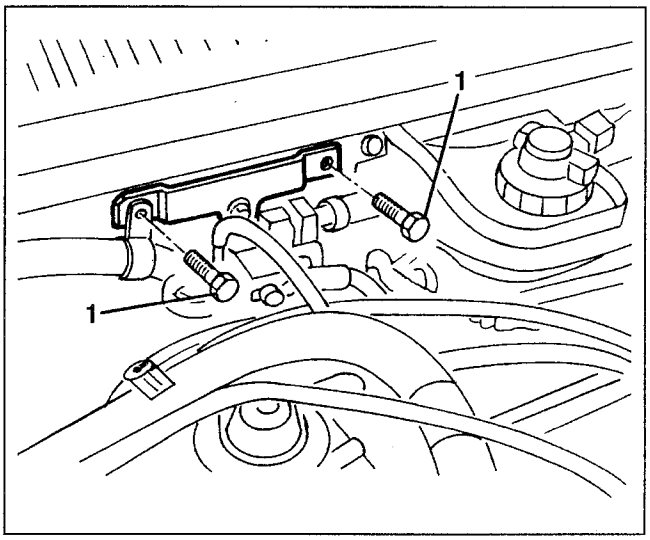
DUCTING/DISTRIBUTOR UNIT

REMOVAL

- Disconnect the battery negative terminal.
- Remove the dashboard (see GROUP 70).
- Drain the coolant fluid.

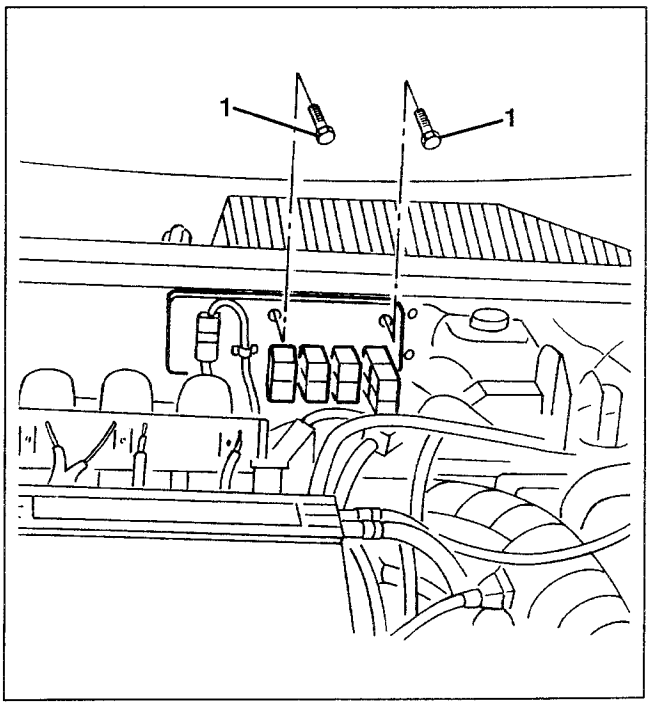
Only engine 3.0 V6

1. Working in the engine compartment, slacken the two screws and disconnect the EGR solenoid valve bracket from the services tray partition.

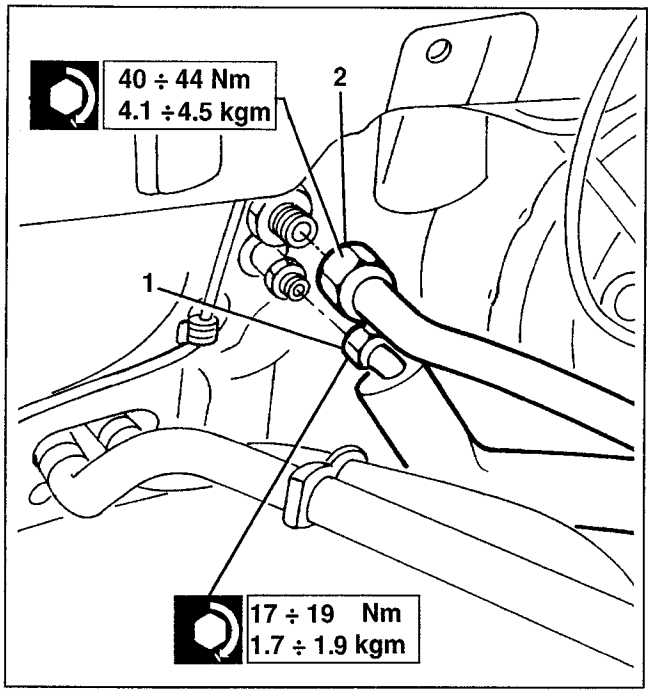


Only engine 2.0 T.S. 16v

1. Working in the engine compartment, slacken the two screws and disconnect the bracket fastening the injection relays and fuses.

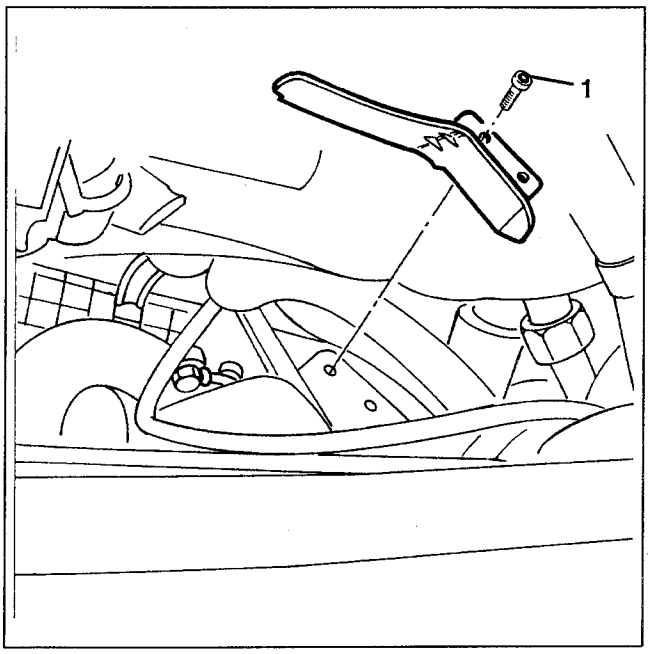


1. Using wrenches 1.822.111.000 and 1.822.113.000 disconnect the pipe from the evaporator to the condenser.
2. Using wrenches 1.822.112.000 and 1.822.115.000 disconnect the pipe from the evaporator to the drier filter.



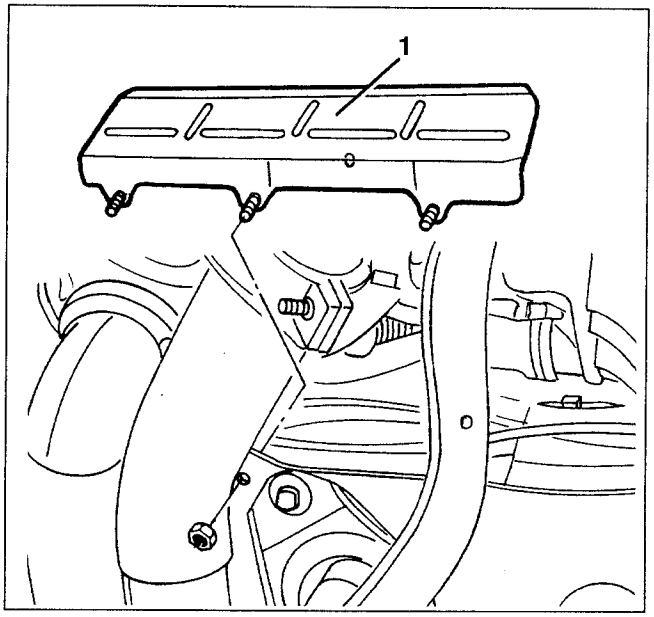
3.0 V6 Engine only

1. Remove the heat shield between the exhaust and services tray partition.

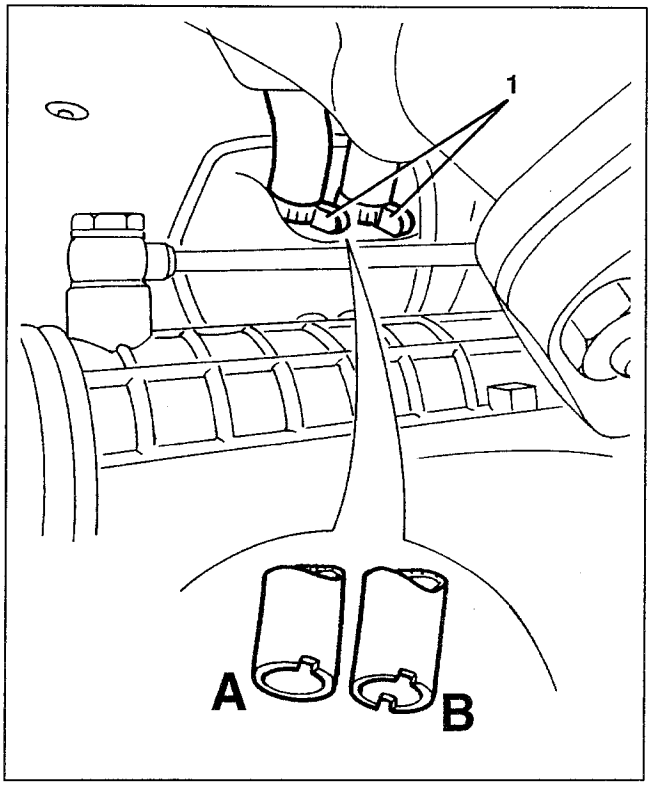


3.0 V6 Engine only

1. Raise the car and remove the power steering heat shield.



1. Open the clamps and disconnect the two engine coolant delivery and return pipes in the heater: N.B. recover the fluid.

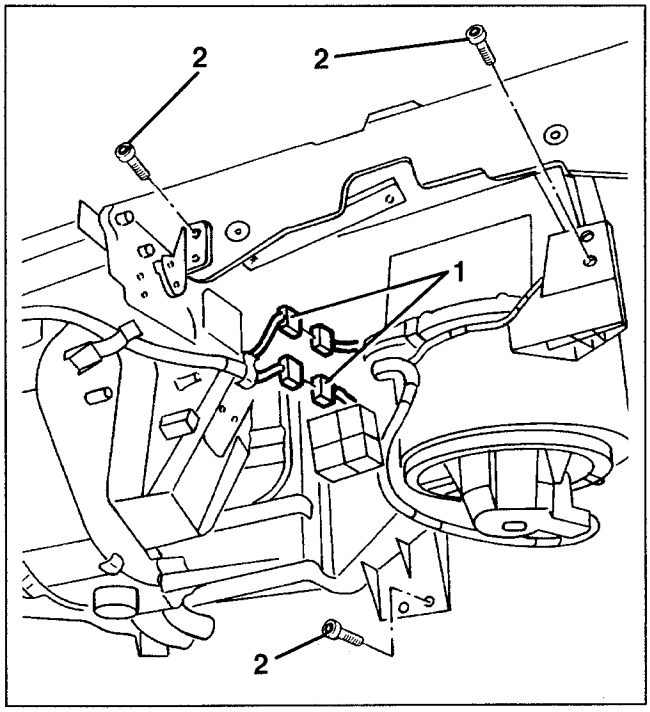


NOTE: The two pipes are distinguished by one notch (A) and two notches (B) so that it is impossible to invert them.

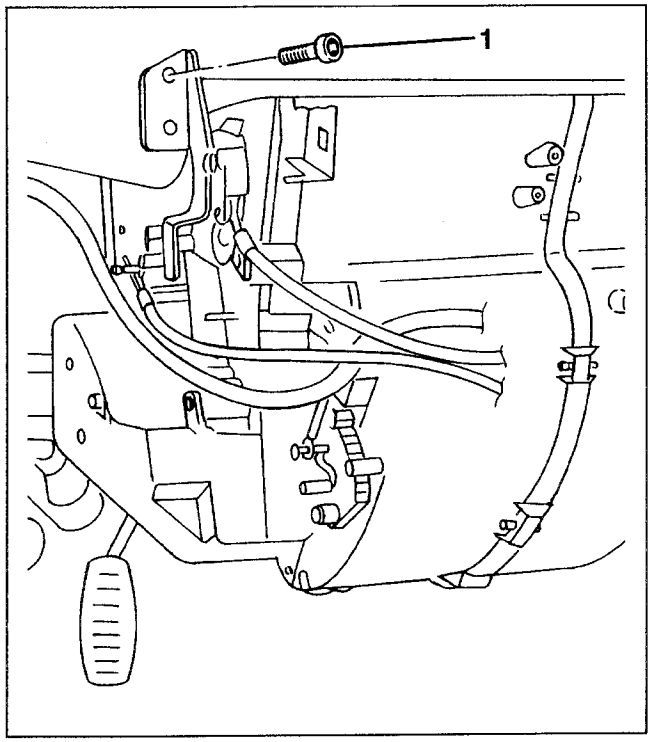
Use screw clamps when refitting.

N.B.: In the **VERSIONS WITH HEATER** work directly from below disconnecting the engine coolant delivery and return pipes.

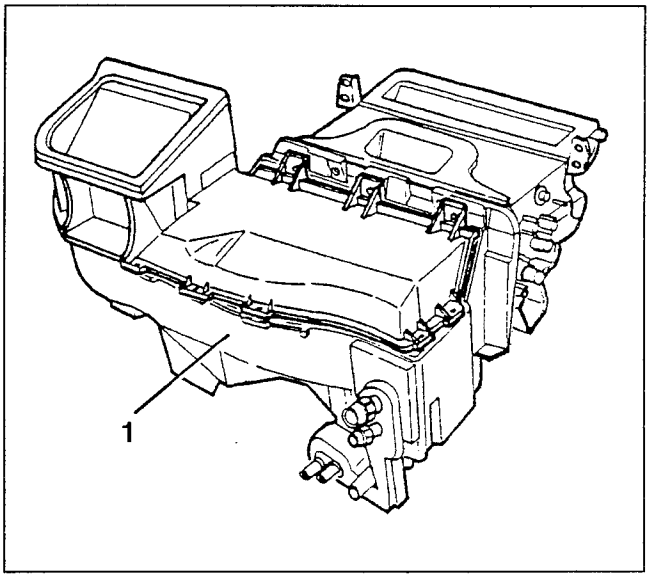
1. Disconnect the two electrical connections of the climate control unit (connections between the unit and the dashboard wiring).
2. Slacken the three screws fastening the climate control unit on the right-hand side.



1. Slacken the screw fastening the climate control unit on the left-hand side.



1. Remove the climate control unit.

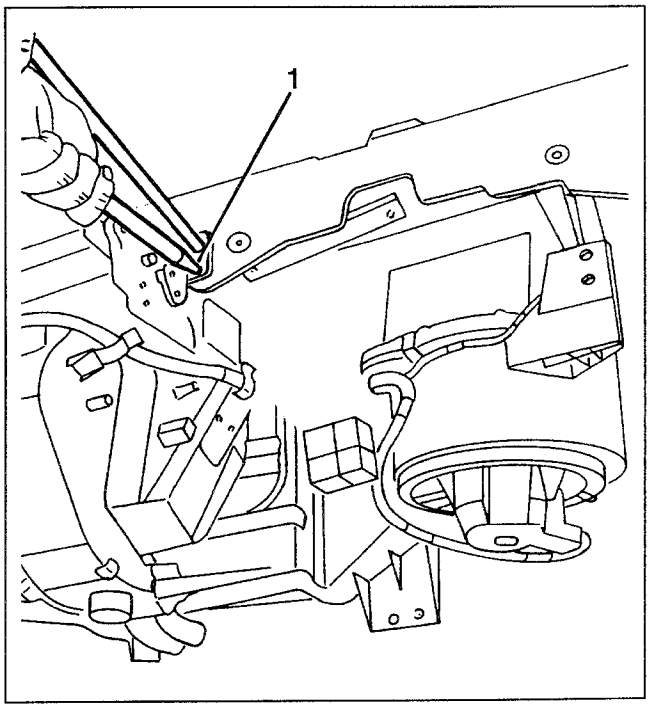


REFITTING

Refit the climate control unit reversing the sequence followed for removal and adhering to the following instructions:

- Coat the mouth of the heater pipes, water drain pipes and freon pipes with vaseline.
- Assemble the unit making sure that the above pipes are inserted correctly in the holes.

1. Using two special centering pins, positioned as illustrated, centre the position of the unit before fastening it.



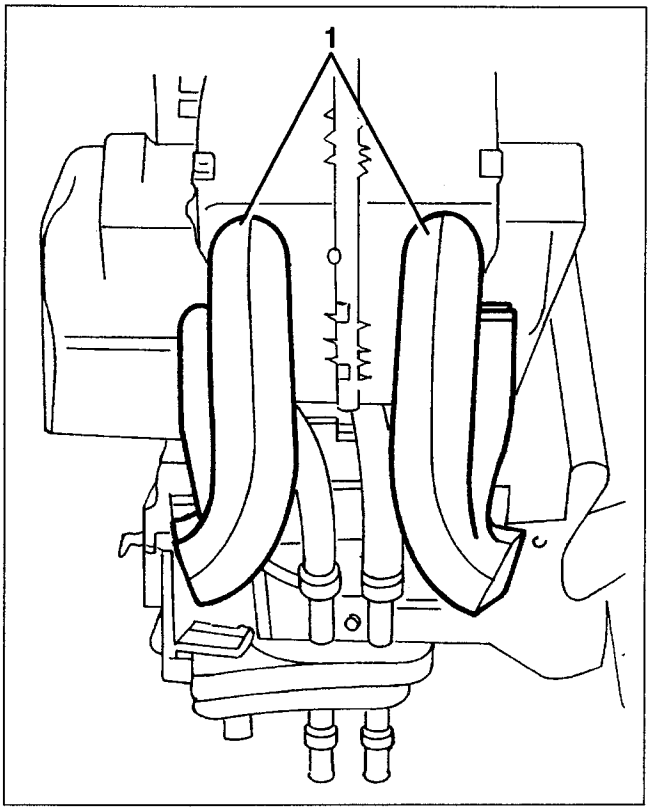
DIS-ASSEMBLY

NOTE: The following procedure should be followed to disassemble the unit when changing single components.

Some parts however, may be changed without removing the unit, as described in the following paragraphs.

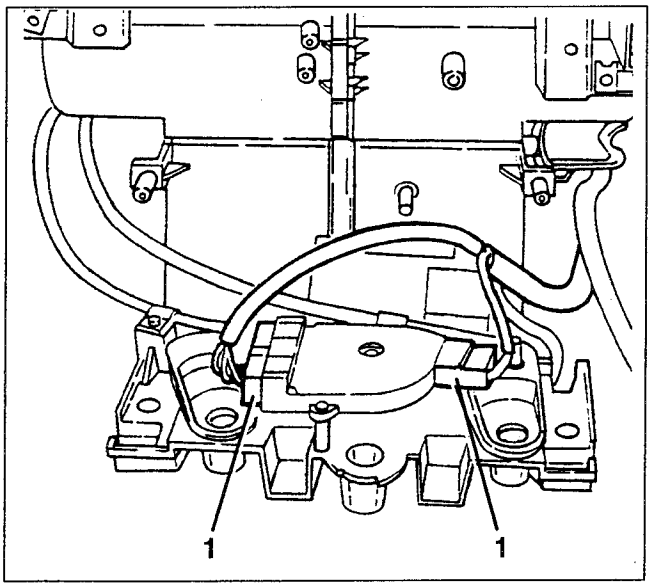
Air duct

1. Remove the two lower air ducts.

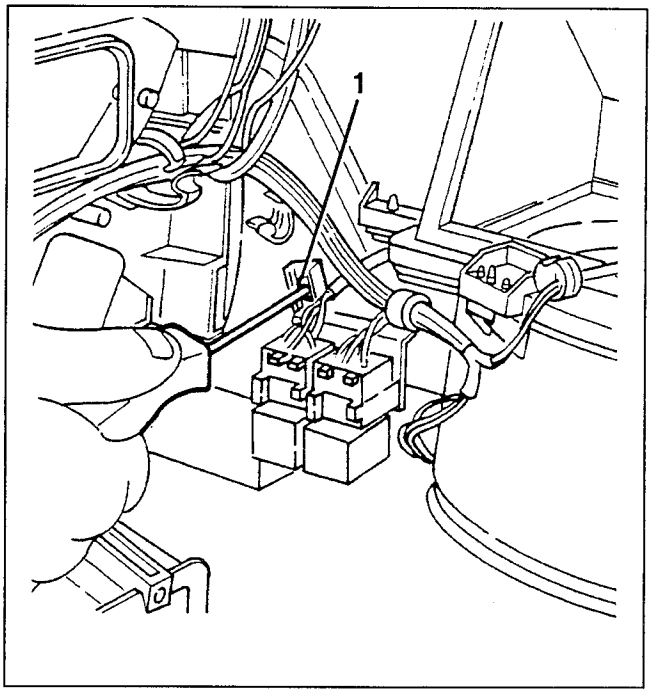


Wiring

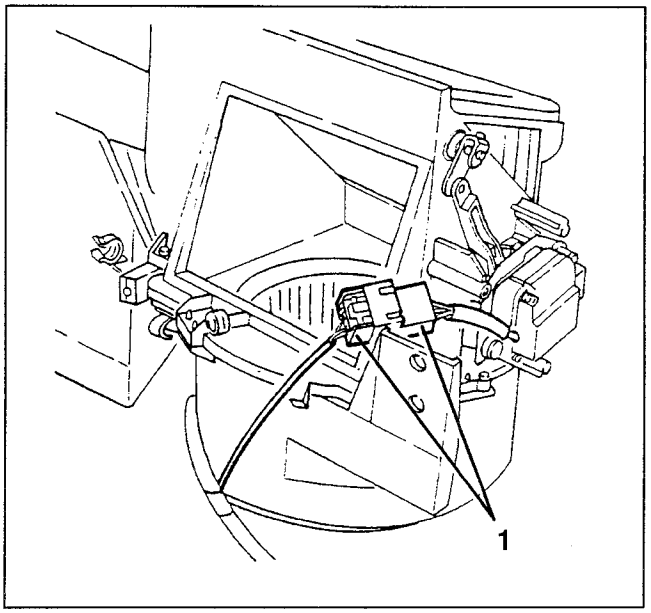
1. Disconnect the two electrical connections from the climate controls



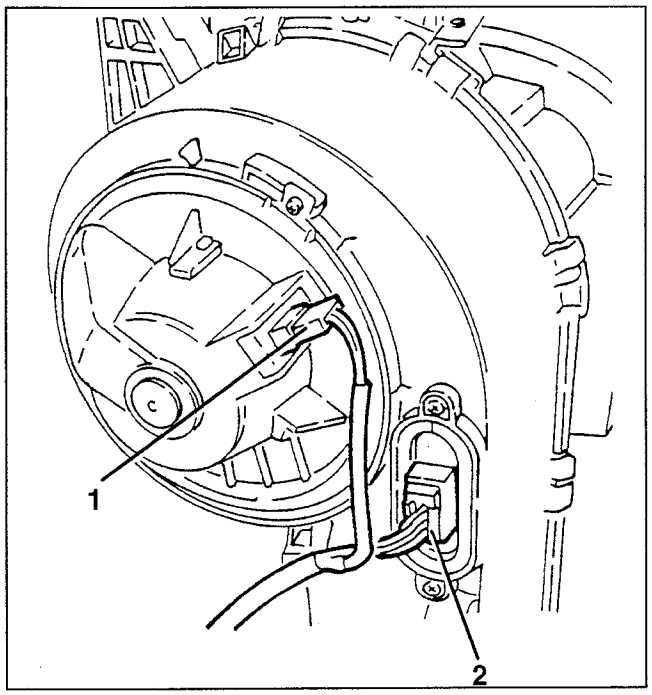
1. Slacken the screw fastening the relay support bracket



1. Disconnect the electrical connection of the recirculation control motor

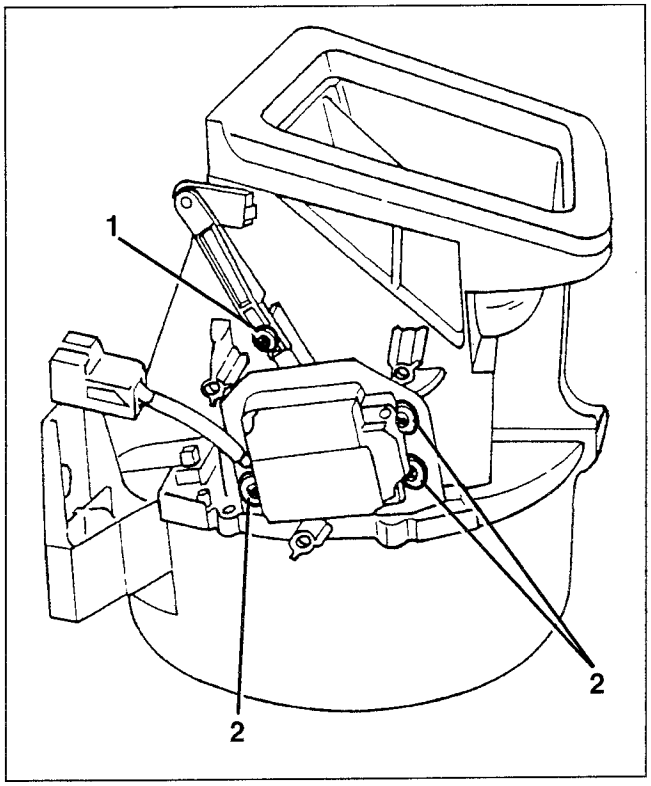


1. Disconnect the electrical connection from the fan.
2. Disconnect the electrical connection from the fan resistance then remove the wiring, releasing it from the clamps.

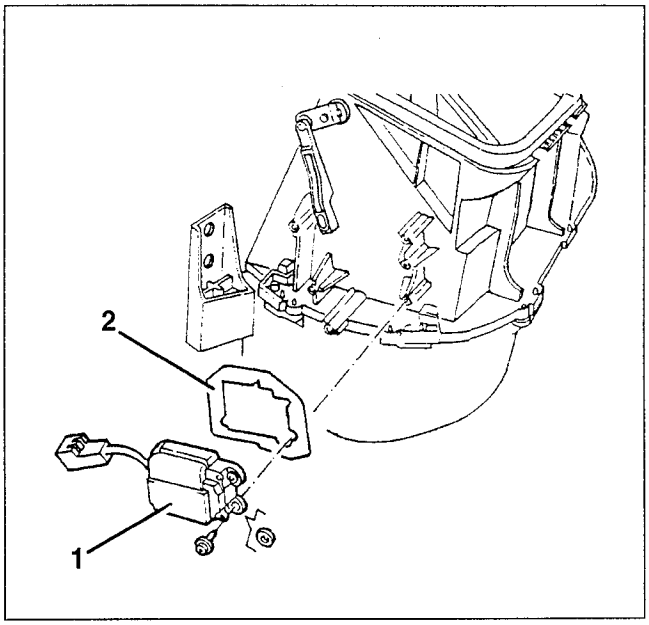


Recirculation control motor

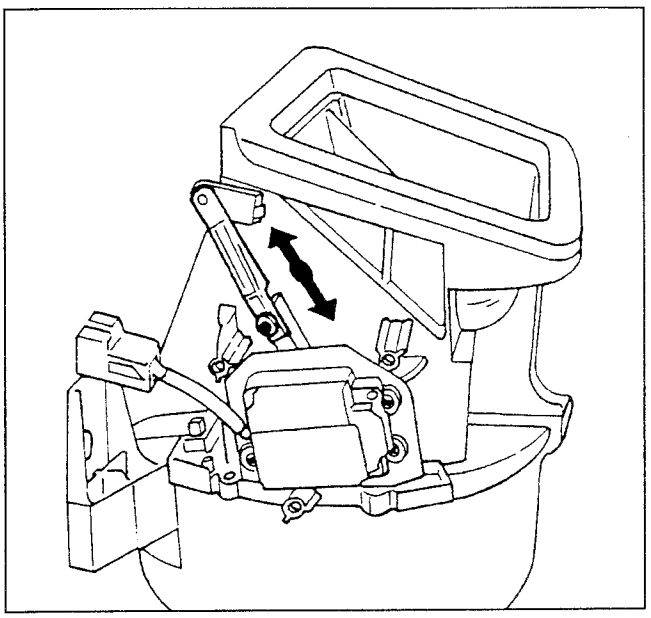
1. Slacken the screw fastening the recirculation control motor tierod.
2. Slacken the three screws fastening the recirculation control motor.



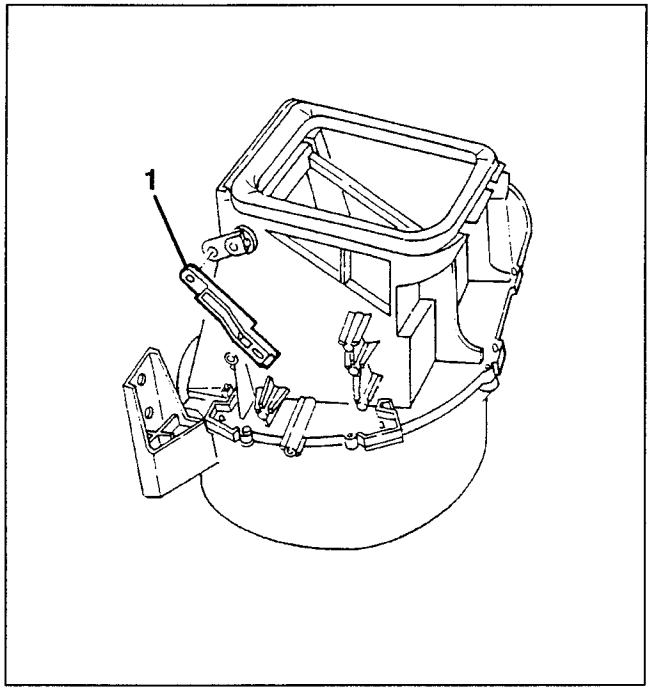
1. Remove the recirculation control motor complete with grommets on the fastening holes.
2. Retrieve the rear plate.



When refitting adjust opening/closing of the outside air/recirculation port working on the tierod as illustrated.

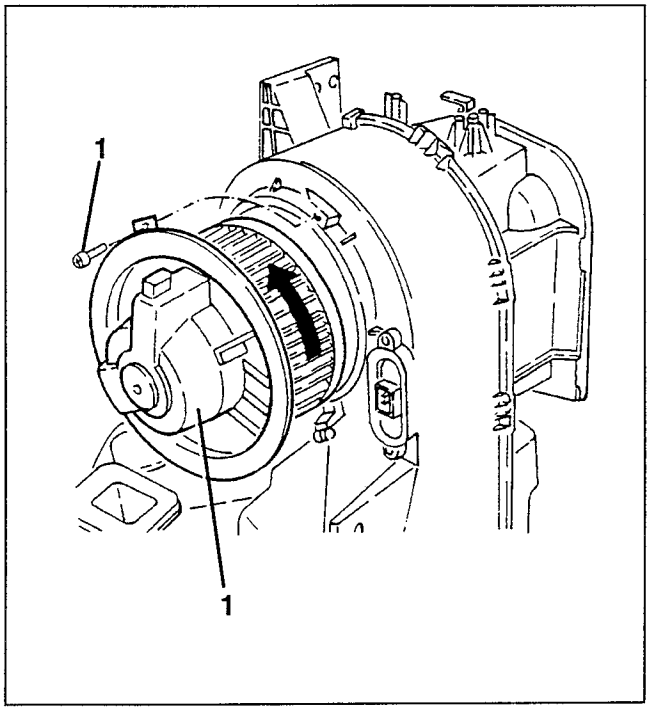


1. Remove the outside air/recirculation port tierod.

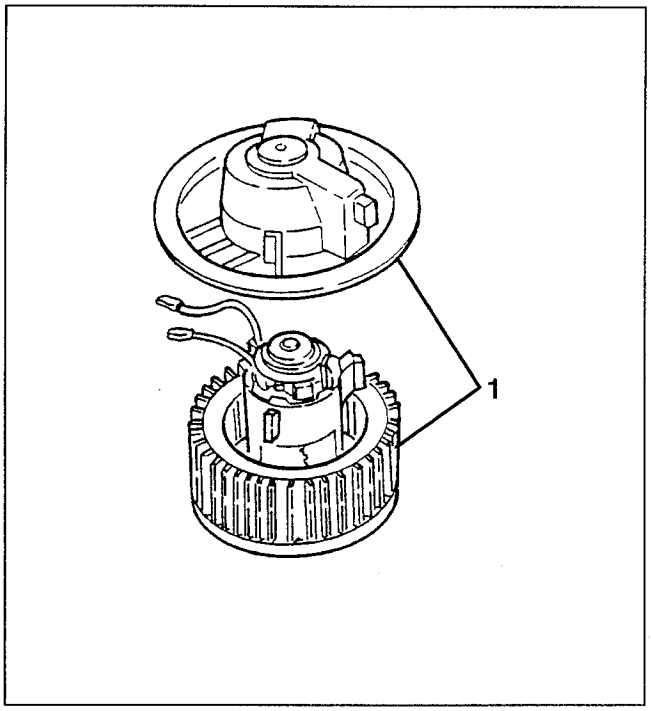


Fan

1. Slacken the screw fastening the fan, turn it as illustrated, then remove it.

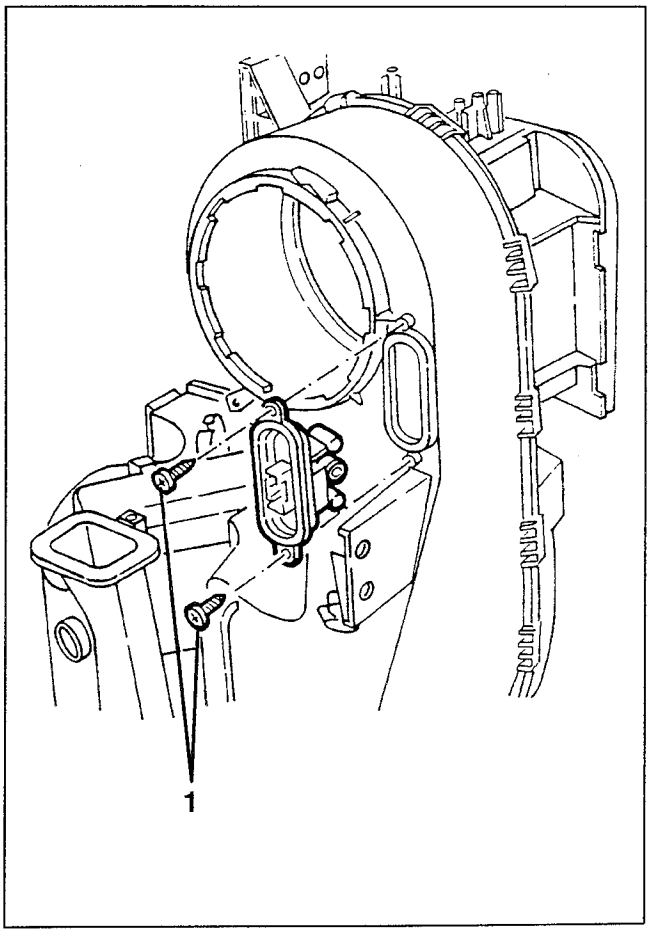


1. Separate the fan from the cover releasing it from the three rubber fasteners and withdrawing the two electrical cables.



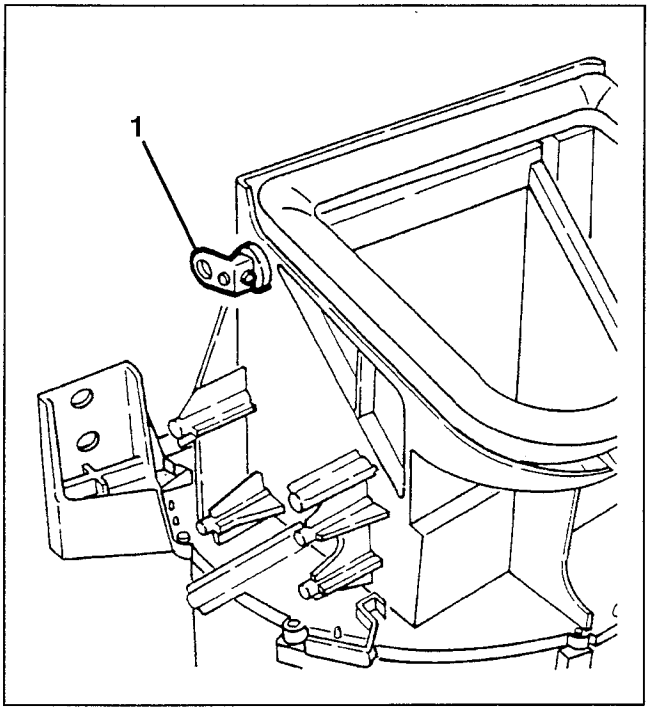
Fan resistance

1. Slacken the two fastening screws and remove the fan resistance.

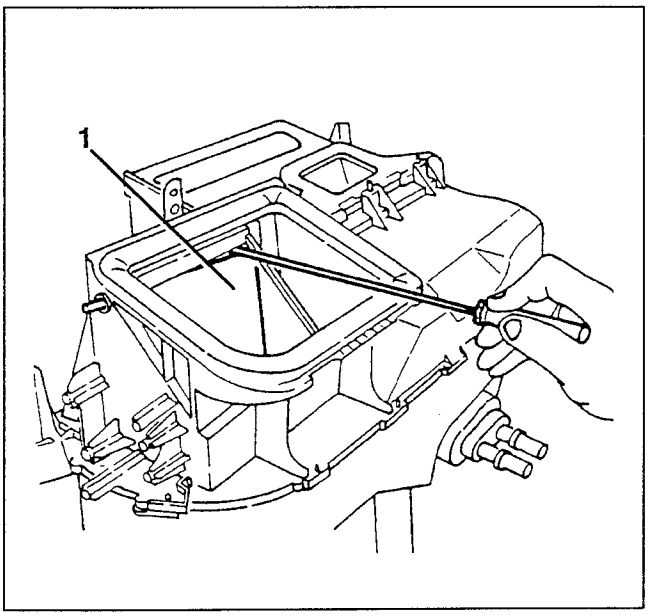


Outside air port

1. Slacken the fastening screw and remove the catch of the outside air/recirculation port control tierod.

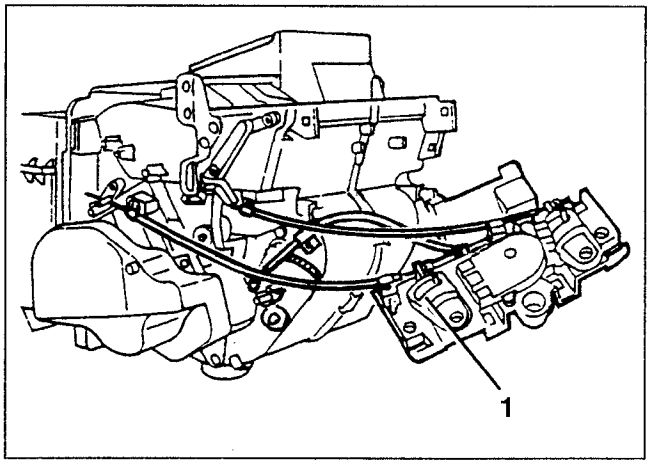


1. Release the outside air/recirculation port from the two fastening clamps and remove it.



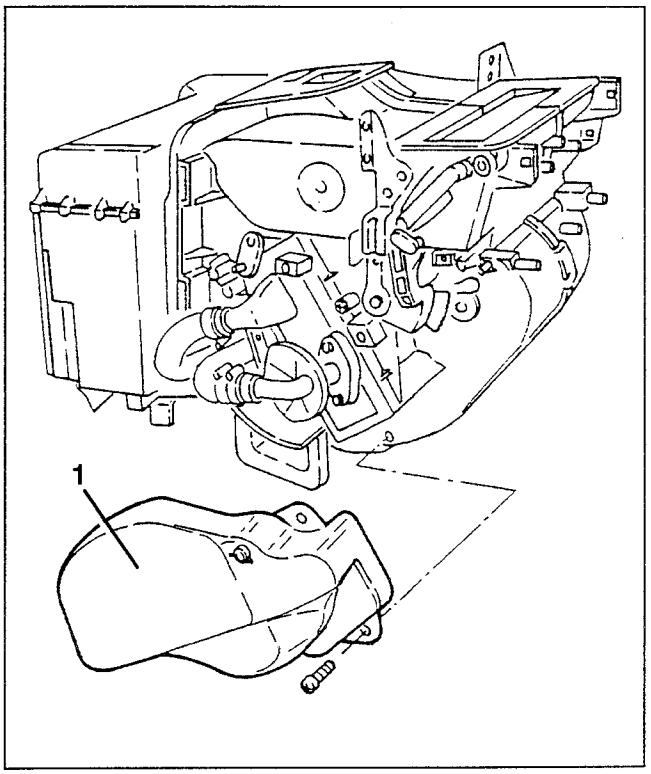
Set of controls

1. Disconnect the three bowden cables from the climate control unit, then remove it complete with the set of controls.

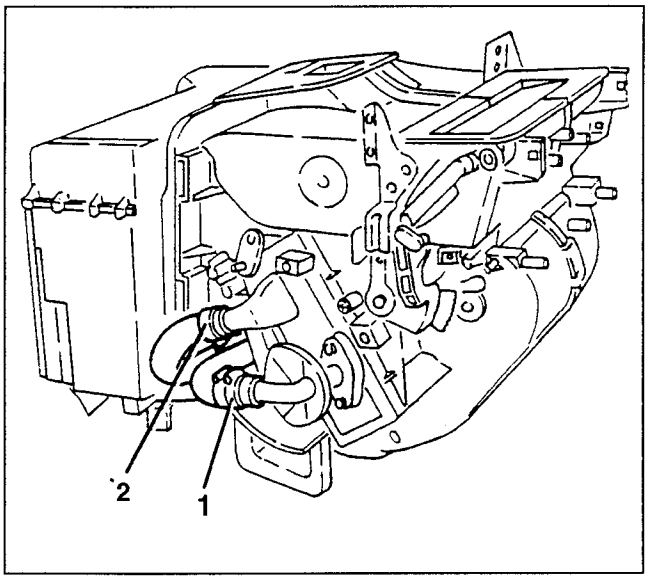


Heater radiator

1. Slacken the two fastening screws and remove the water pipes cover from the radiator.

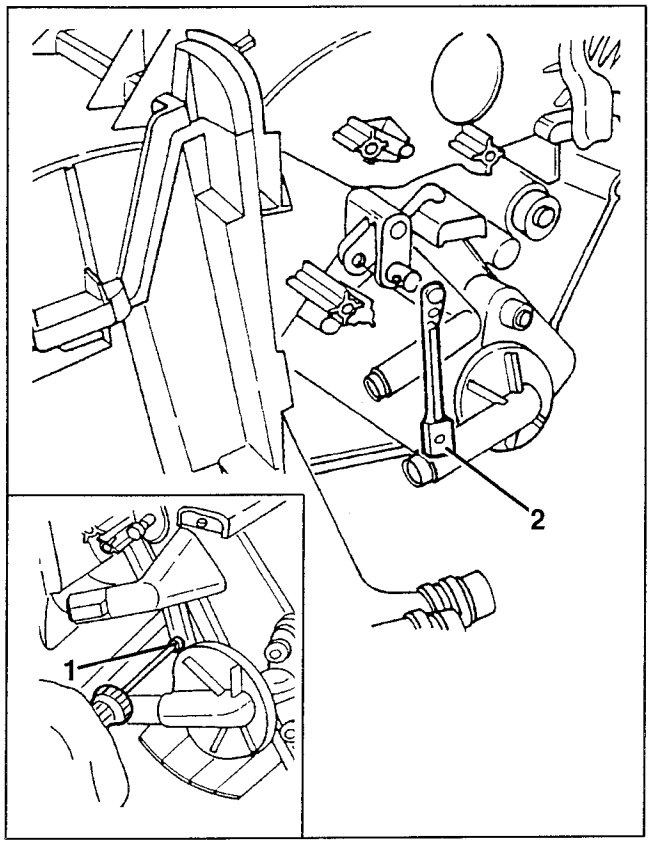


1. Open the clamp and disconnect the water inlet pipe from the tap.
2. Open the clamp and disconnect the water outlet pipe.

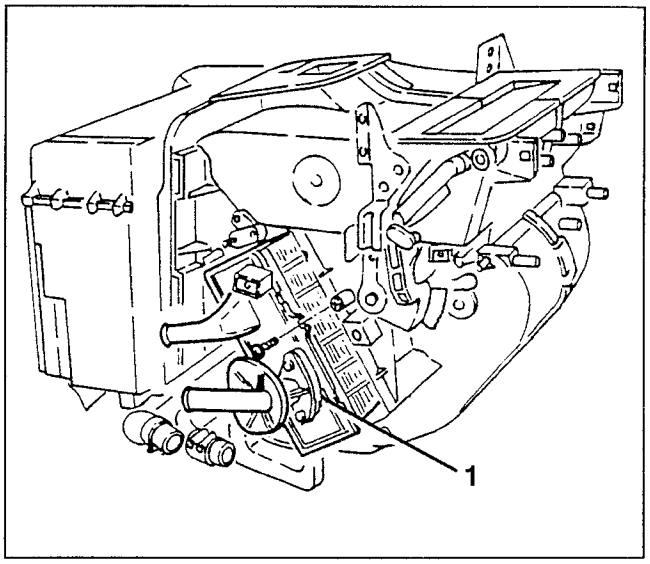


When refitting use screw clamps.

1. Slacken the screw fastening the radiator water inlet tap control tierod.
2. Disconnect and remove the tierod.

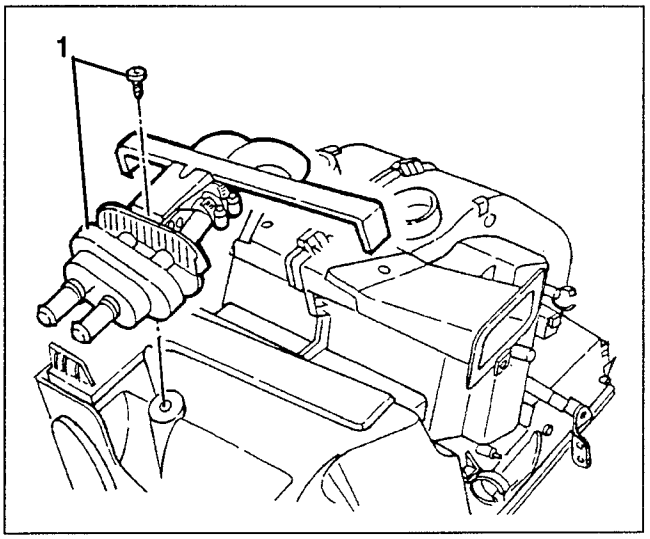


1. Slacken the two fastening screws and remove the radiator.

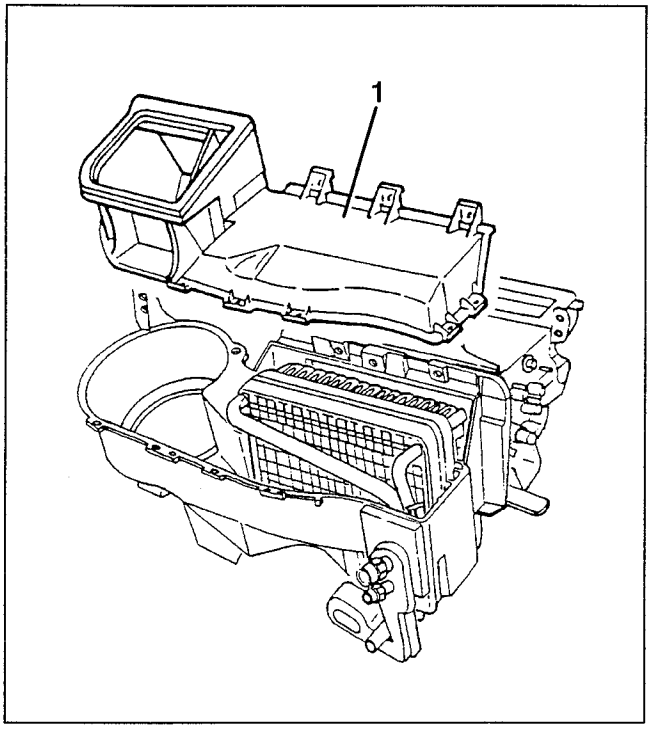


Evaporator

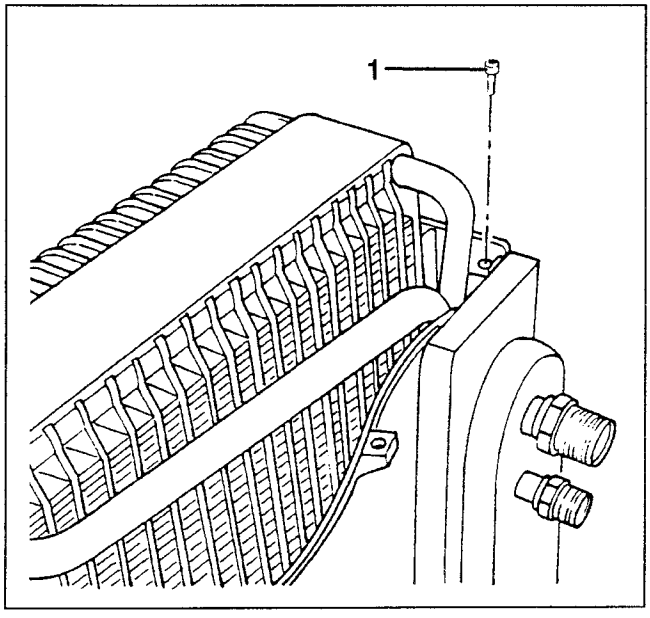
1. Slacken the fastening screw and remove the coolant fluid delivery and return pipes.



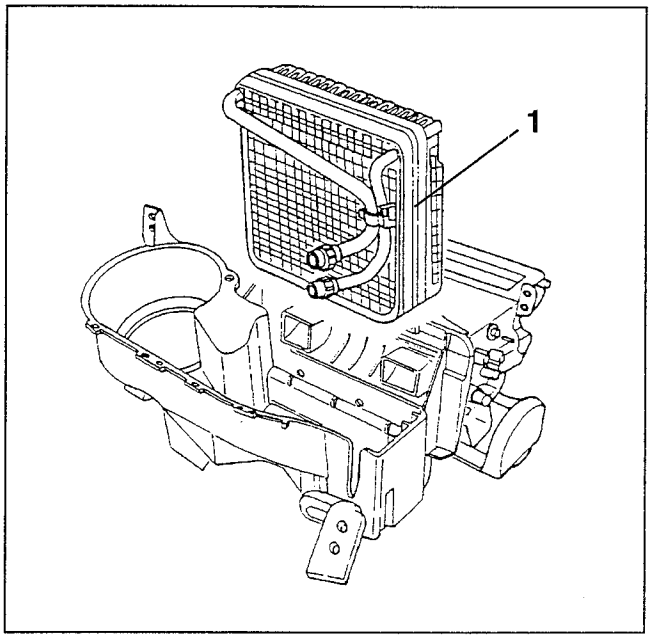
1. Slacken the fastening screws and remove the heater upper half casing releasing it from the fastening clamps.



1. Slacken the screw fastening the evaporator.

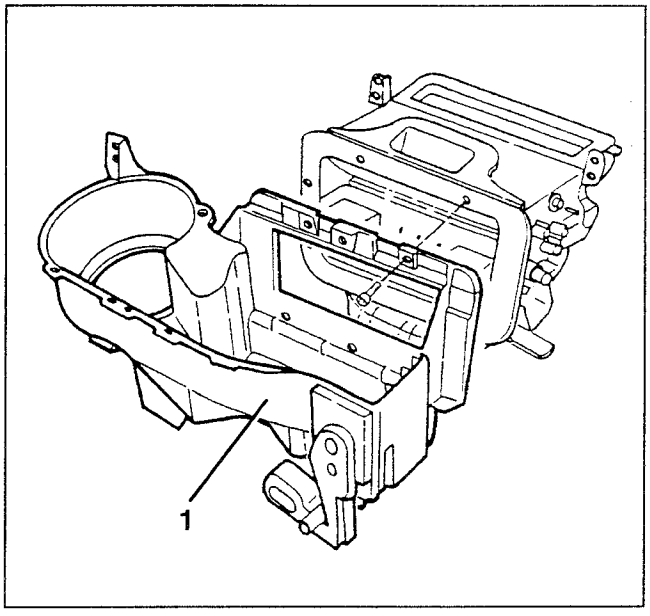


1. Remove the evaporator prising the pipes from the seals.

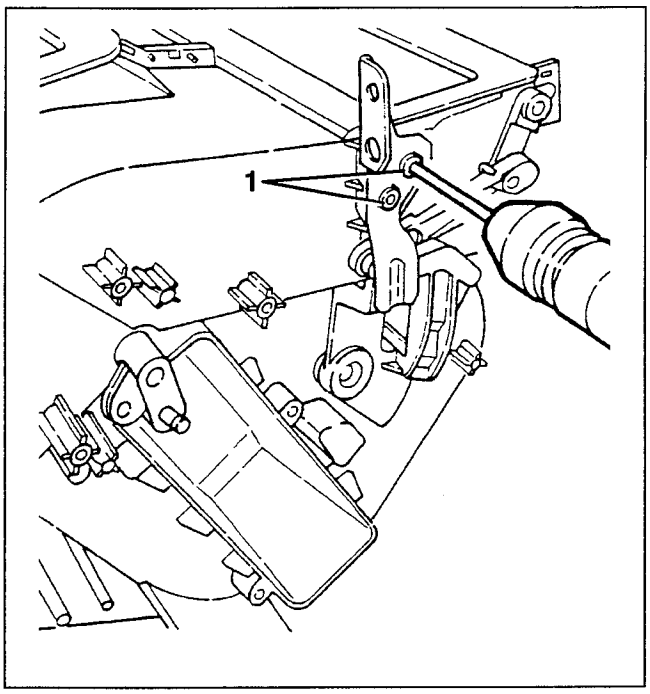


Lower distrubution port

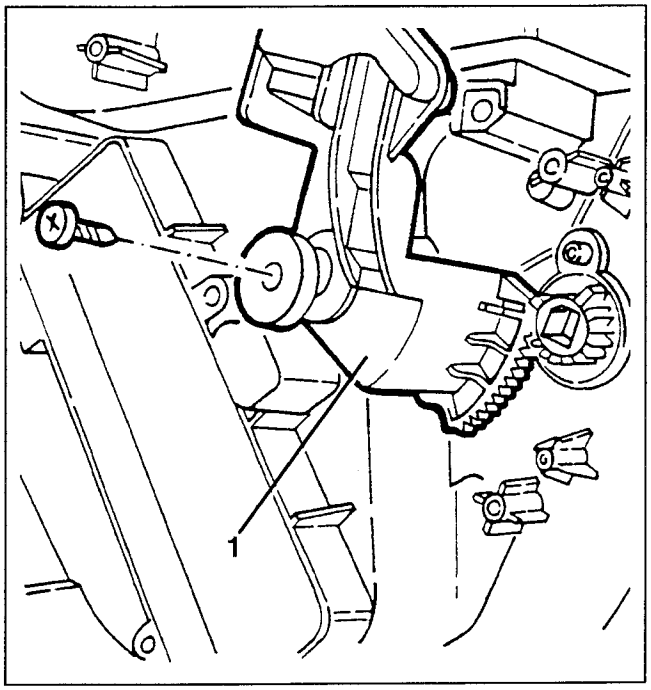
1. Slacken the fastening screws and remove the lower heater half casing releasing it from the fastening clamps.



1. Using drill remove the two rivets fastening the unit support bracket.

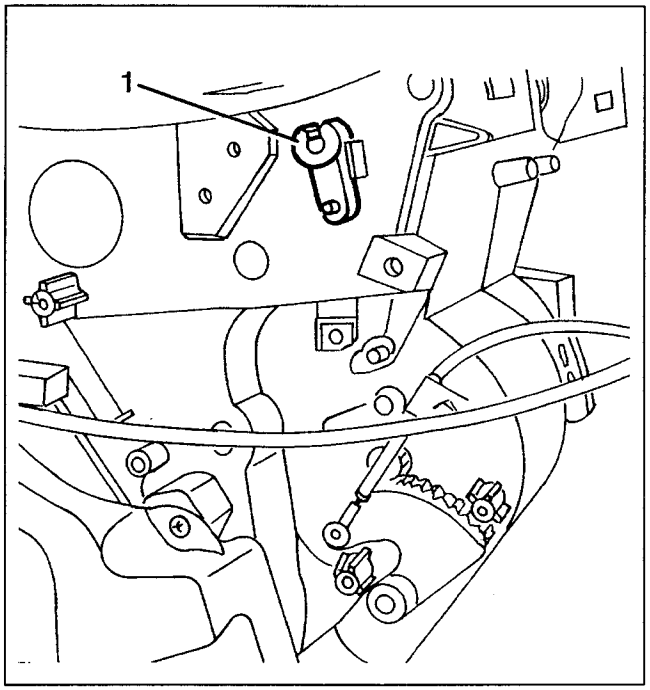


1. Slacken the fastening screw and remove the control leverism of the lower air distribution port.

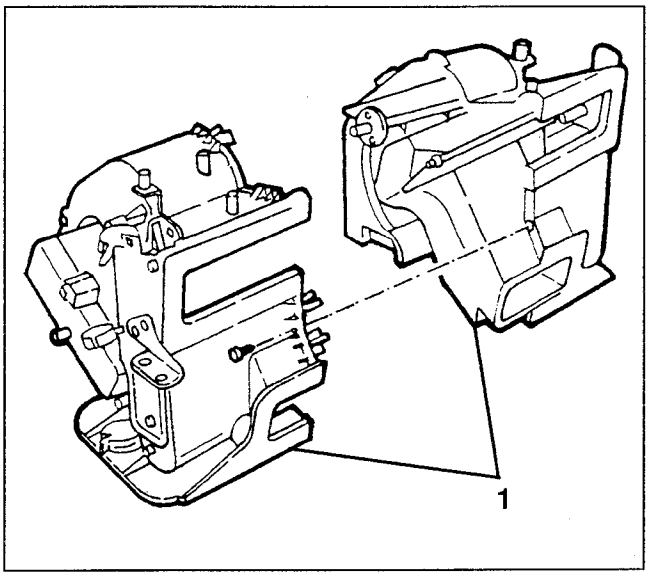


When refitting the leverism make the two notches stamped on the gears coincide.

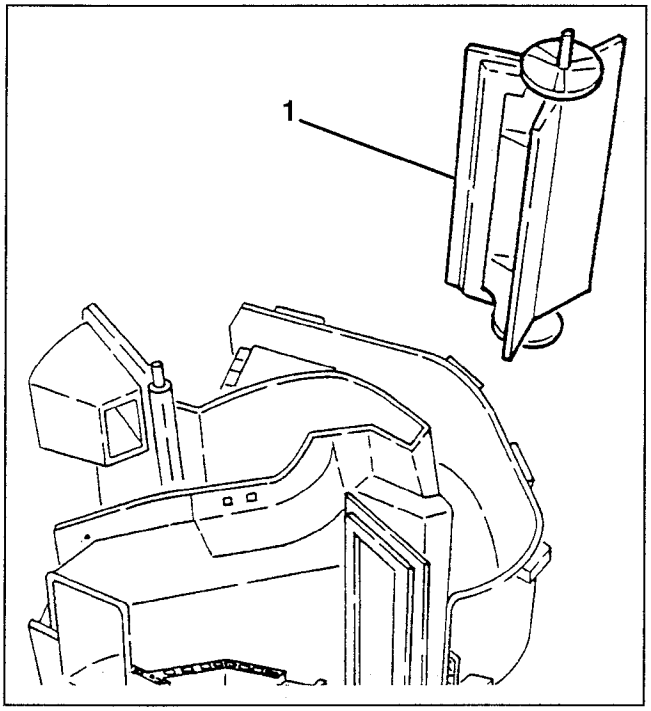
1. Release and remove the control leverism of the upper air distribution port.



1 Slacken the fastening screws and split the two half casings releasing the fastening clamps.

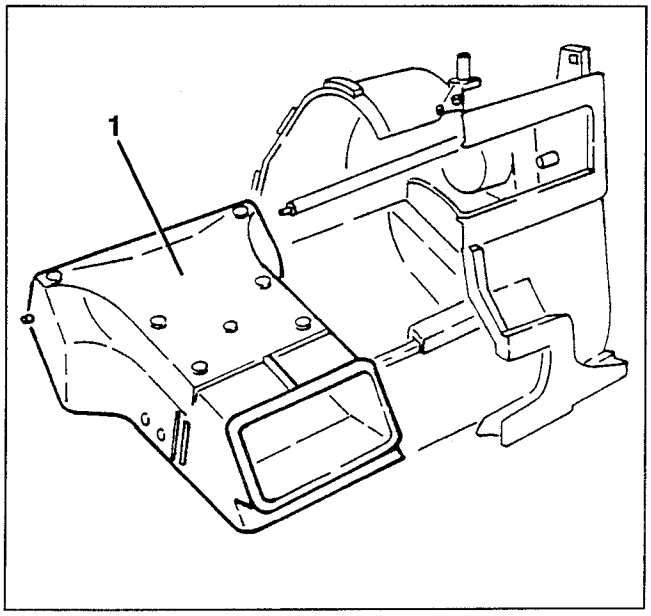


1. Withdraw and remove the lower distribution port.

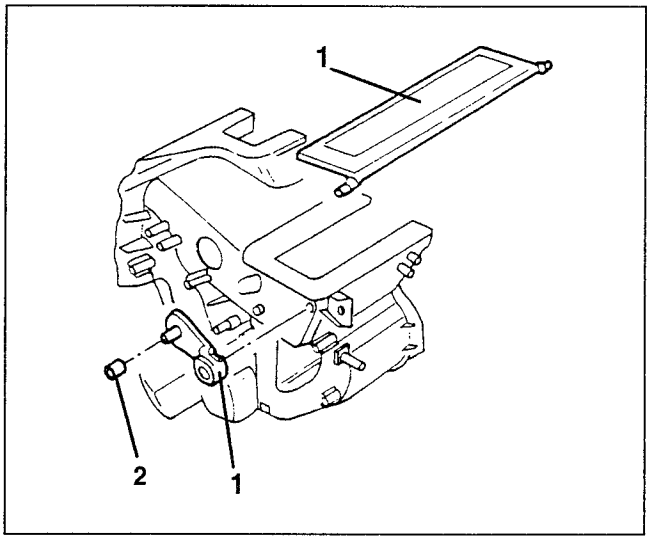


Upper distribution port

1. Withdraw and remove the air duct.

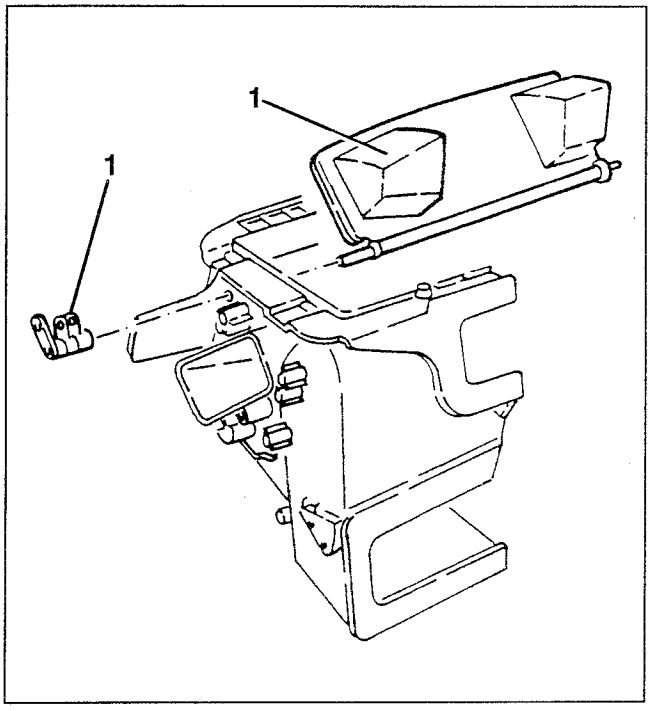


1. Remove the fastening leverism and retrieve the upper distribution port.
2. Retrieve the spacer.



Mixing port

1. Remove the fastening leverism and retrieve the air mixing port.

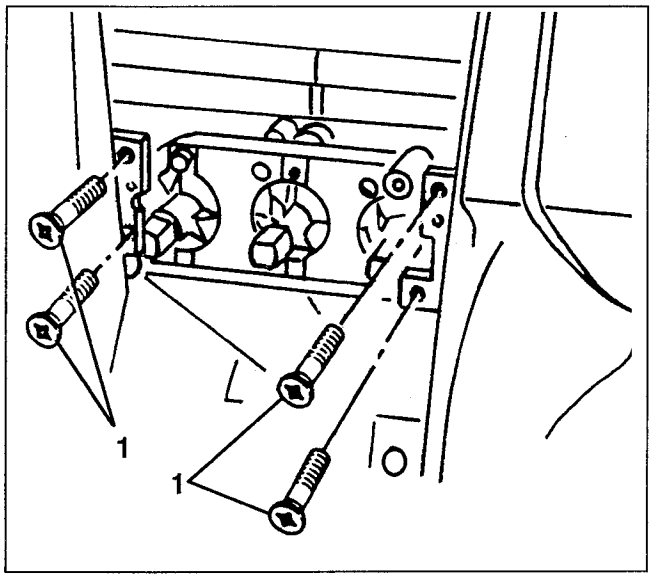


ON-VEHICLE OPERATIONS

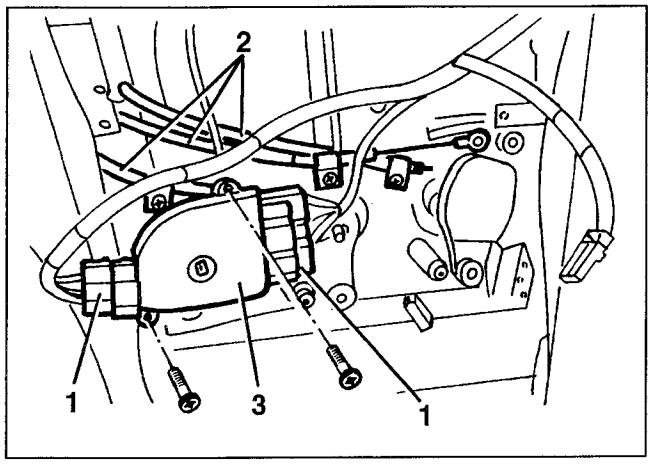
CLIMATE CONTROL UNIT CONTROLS

Removal and Refitting

– Disconnect the negative terminal from the battery
– Remove the centre console (see GROUP 70).
1. Slacken the four fastening crews and remove the controls.

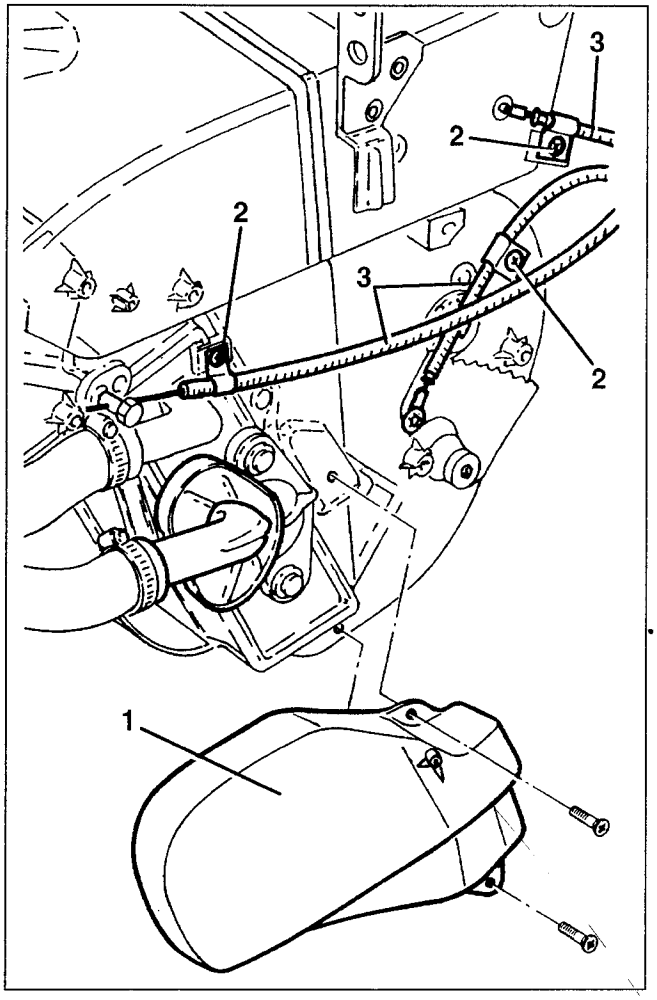


1. Disconnect the two electrical connections.
2. Release the three bowden cables loosening the fastening clamps and rimoving the end ring fastening washers.
3. Slacken the two fastening screws and remove the climate control fan speed switch.

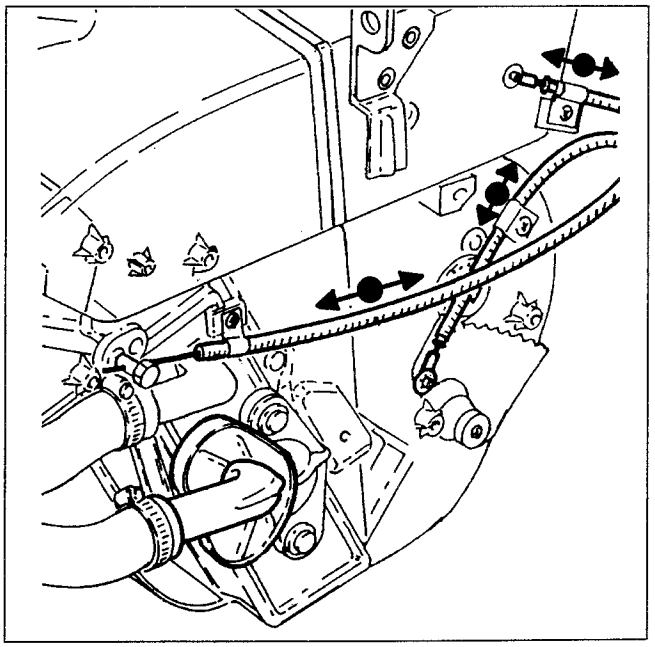


If necessary remove the three bowden cables of the mixing and distribution ports:

1. Slacken the two fastening screws and remove the side cover.
2. Slacken the cable fastening clamps.
3. Remove the bowden cables.



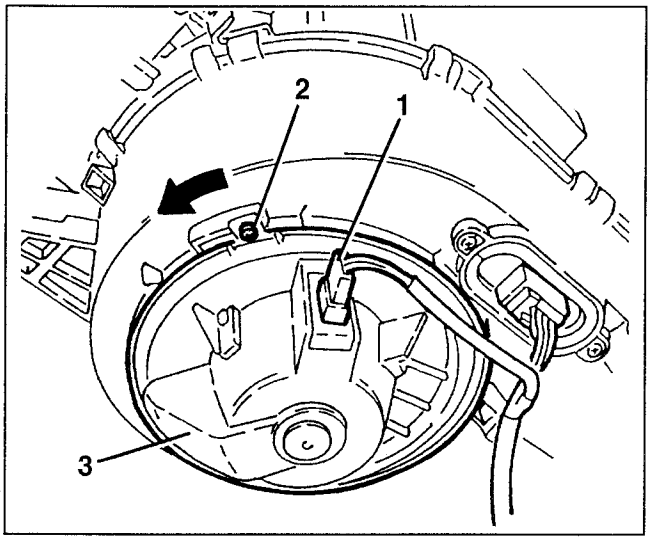
Refit the bowden cables adjusting them as illustrated before fastening them from the radiator side.



FAN

Removal and Refitting

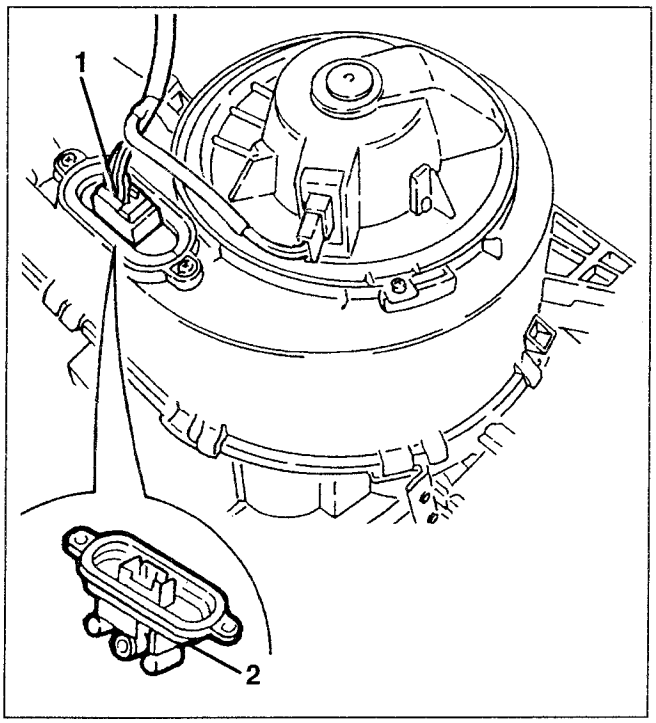
– Disconnect the battery negative terminal.
1. Disconnect the electrical connection.
2. Remove the safety screw and raise the tab.
3. Turn the fan as illustrated and remove it.



FAN RESISTANCE

Removal and Refitting

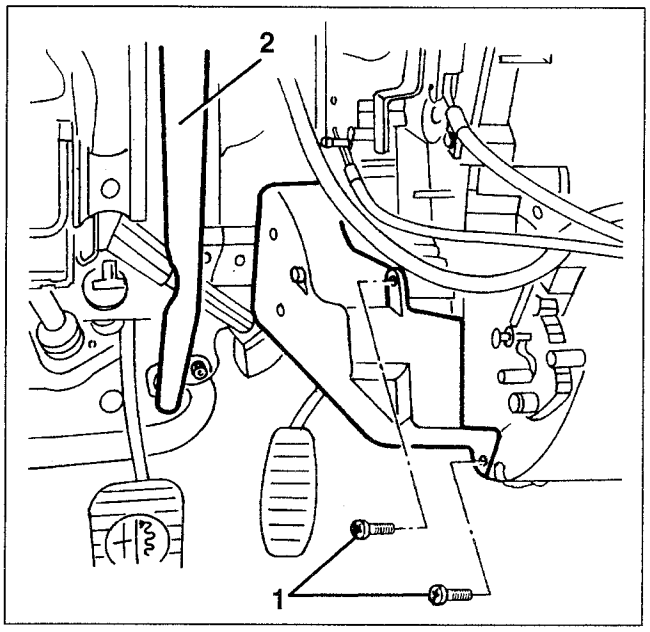
– Disconnect the battery negative terminal.
1. Disconnect the electrical connection from the fan resistance.
2. Slacken the two fastening screws and remove the fan resistance.



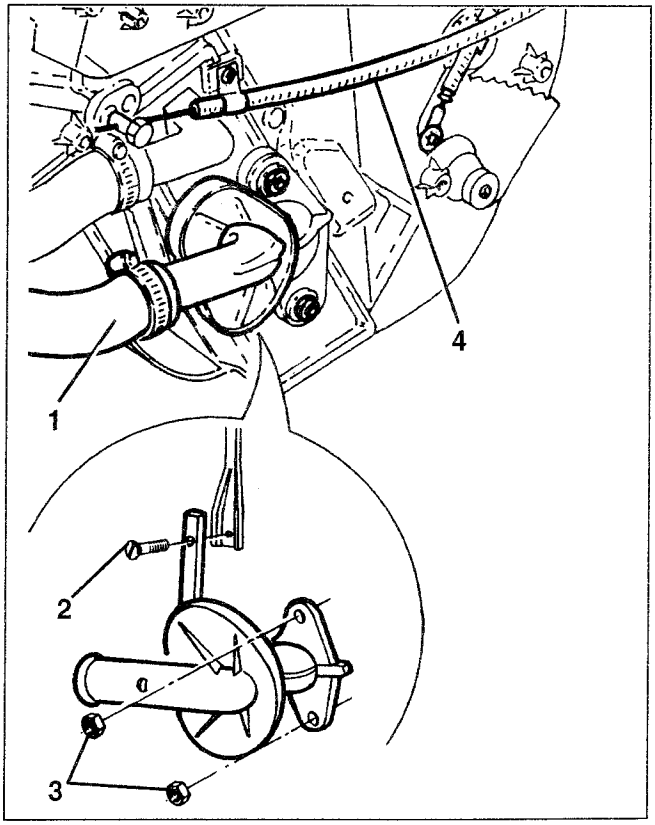
RADIATOR AND HEATER

Removal and Refitting

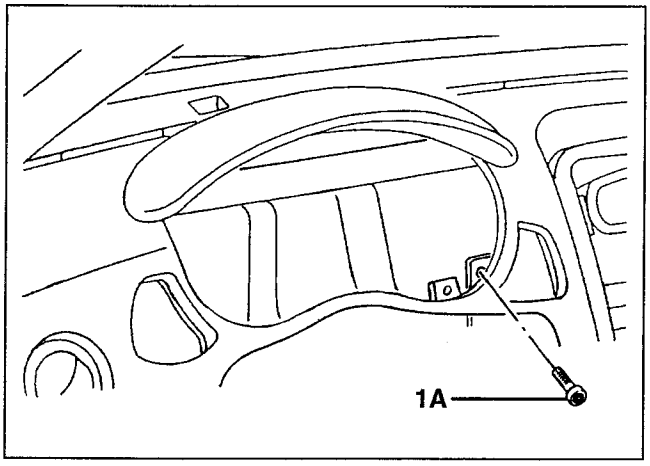
1. Remove the side cover, slackening the two fastening screws.
2. Remove the steering reaction rod.

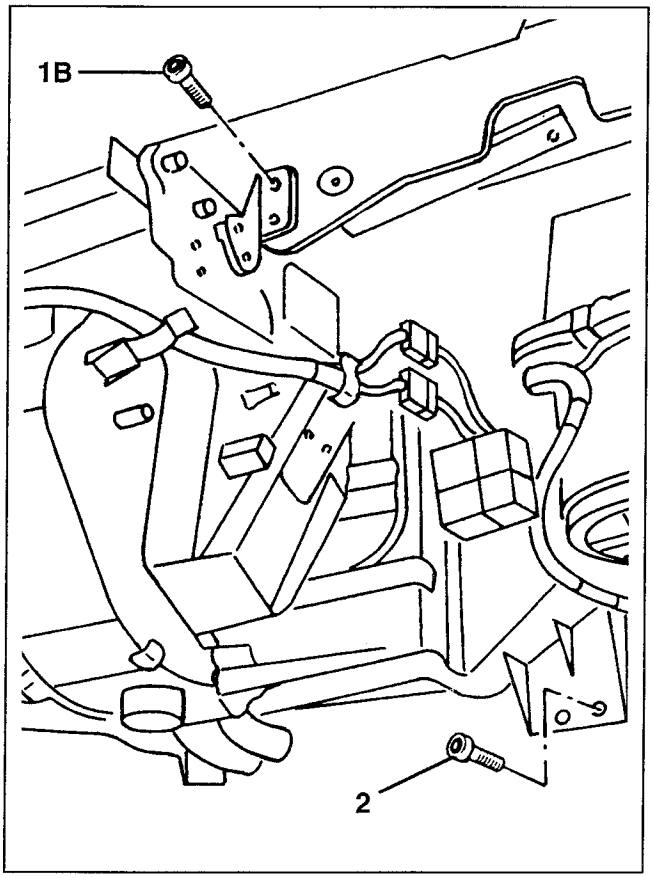


1. Disconnect the pipe from the water inlet tap and retrieve it.
2. Slacken the screw fastening the tierod.
3. Slacken the two tap fastening nuts, then remove it.
4. Disconnect the bowden cable.

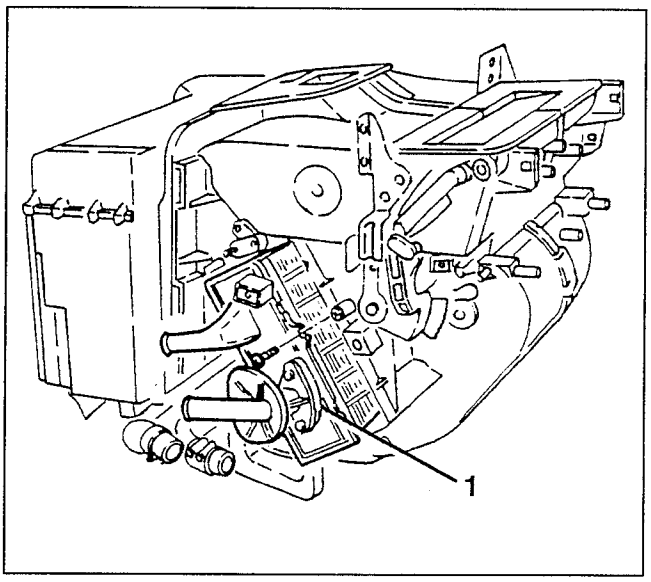


– Remove the instrument cluster (see GROUP 55).
– Remove the glove box (see GROUP 70).
1. Slacken the two upper centre fastening screws from the distributor unit working from the cluster housing (A) and from the box (B).
2. Slacken the lower screw.





1. Slacken the two fastening screws and remove the radiator after slightly lowering the whole unit.
(If necessary also lower the fusebox after slackening the upper fastening screw).

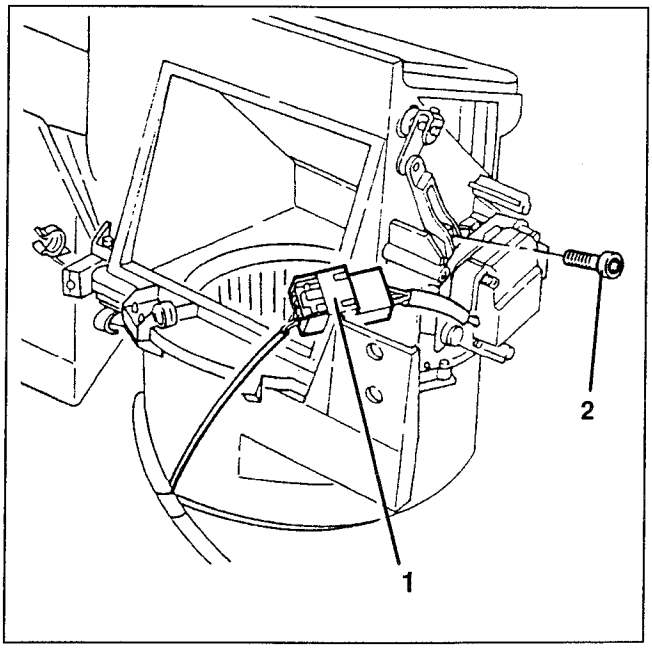


RECIRCULATION PORT CONTROL MOTOR

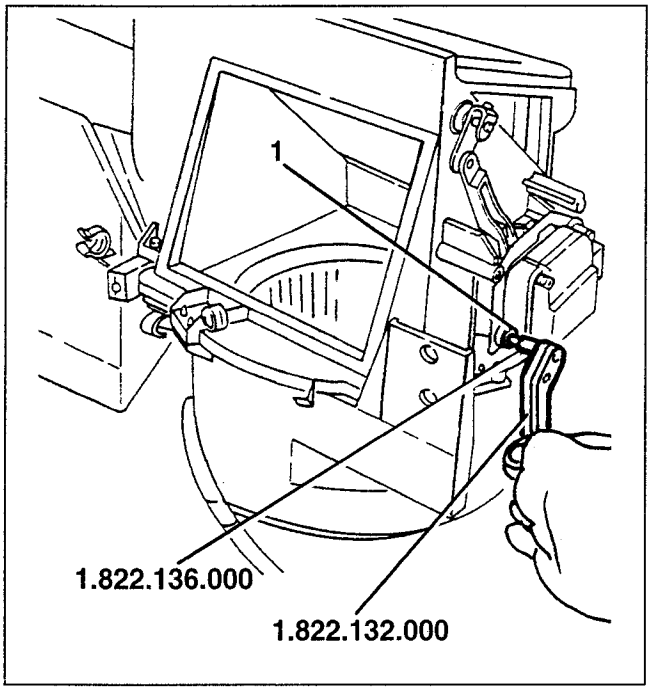
Removal and Refitting

– Disconnect the battery negative terminal.
– Remove the dashboard (see GROUP 70).
– Remove the injection control unit (N.B. without disconnecting it from the wiring) (see GROUP 55).
– Slacken the four screws fastening the ducting/distribution unit; move the unit back to gain access to the motor.

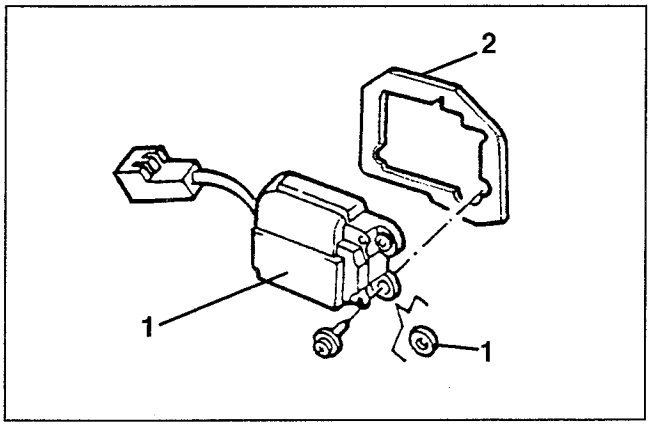
1. Disconnect the electrical connection of the motor.
2. Release the rod from the joint after slackening the fastening screw.



1. Slacken the three cross-slot screws fastening the motor using wrench no. 1.822.132.000 with the insert of set no. 1.822.136.000

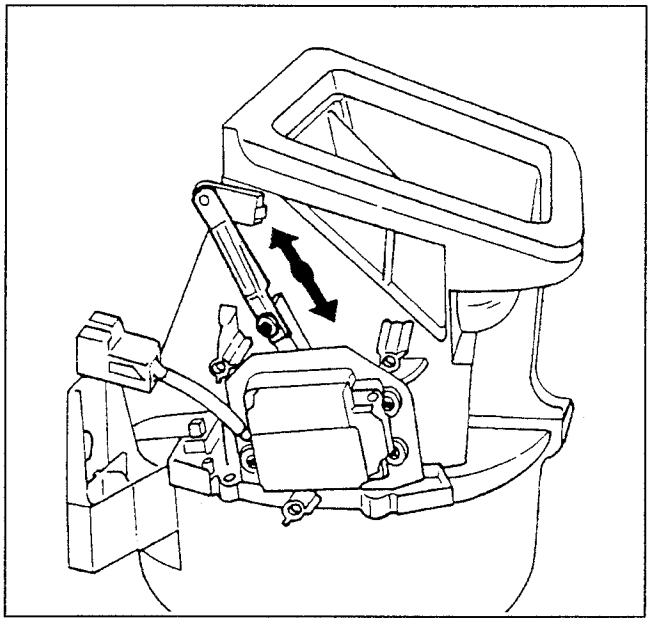


1. Remove the outside air/recirculation port control motor complete with grommets on the fastening holes.
2. Retrieve the rear plate.



When refitting, replace the cross-slot screws fastening the motor with Allen screws to be tightened using wrench no. 1.822.132.000 and insert of set no. 1.822.136.000.

When refitting check:
- **the correct positioning of the grommets in the motor fastening holes;**
- **the correct closing of the outside air/recirculation port through the control button, if necessary adjust the position of the port working on the control tierod as illustrated.**

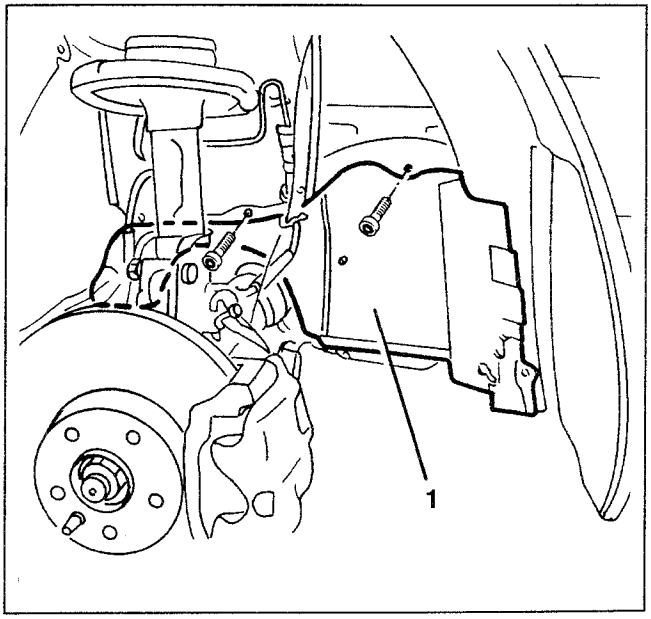


COMPRESSOR (3.0 V6 Engine)

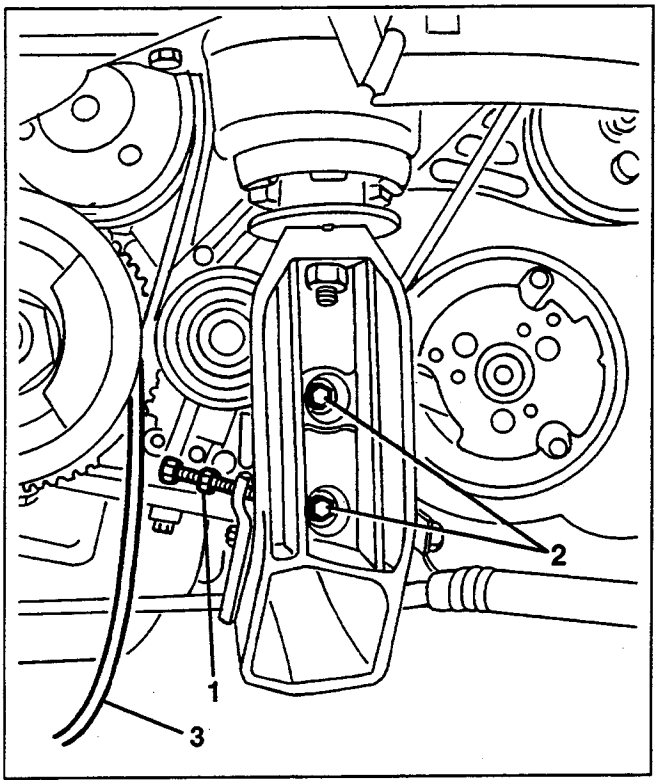
Removal

- Disconnect the battery negative terminal.
- Drain the coolant fluid.
- Remove the front bumper (see GROUP 70).
- With the car on a lift, remove the right front wheel.

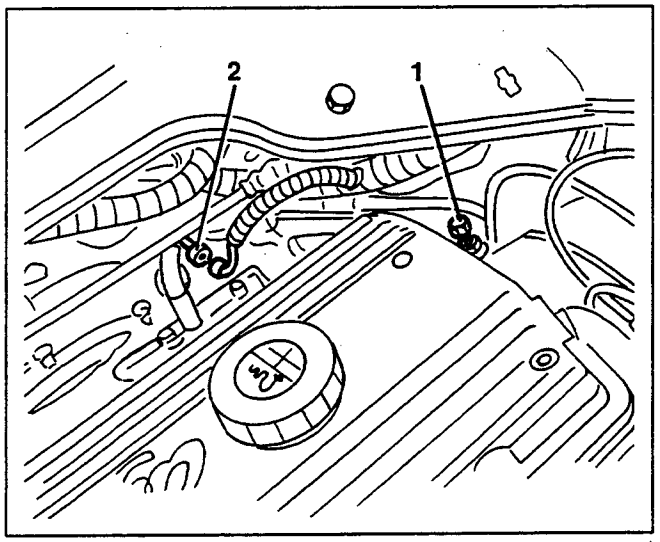
1. Remove the engine bulkhead.



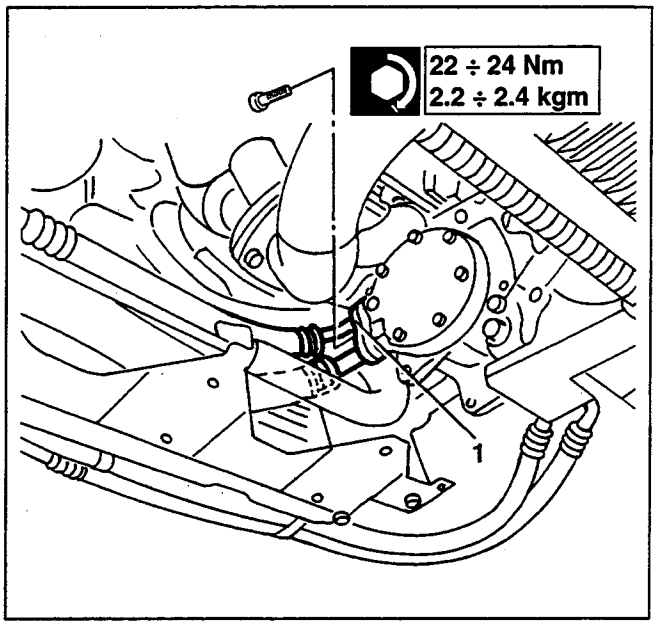
1. Slacken the adjustment locknut of the belt tensioner guide pulley.
2. Through the engine mount holes, slacken the two screws fastening the belt tensioner guide pulley.
3. Remove the compressor drive belt.



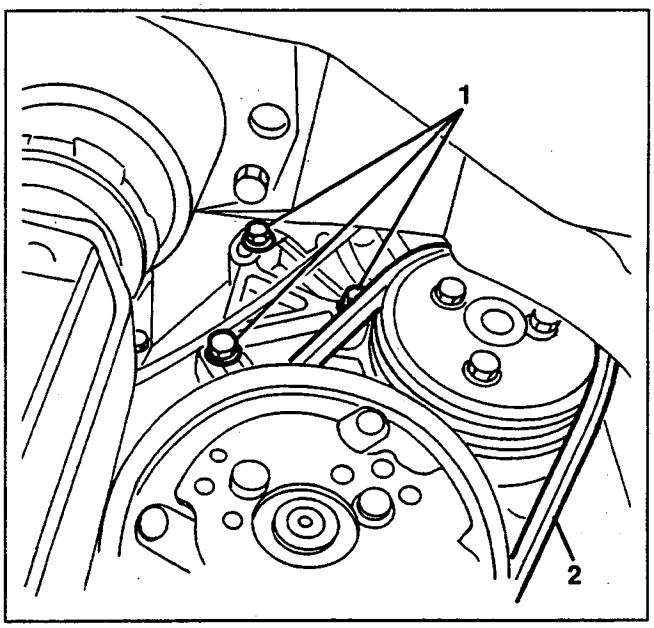
1. Working from the engine compartment, slacken the power steering pump belt adjustment locknut.
2. Disconnect the electrical connection of the compressor.



1. Working from under the car; disconnect the two compressor intake and delivery pipes after slackening the bracket fastening the pipes.

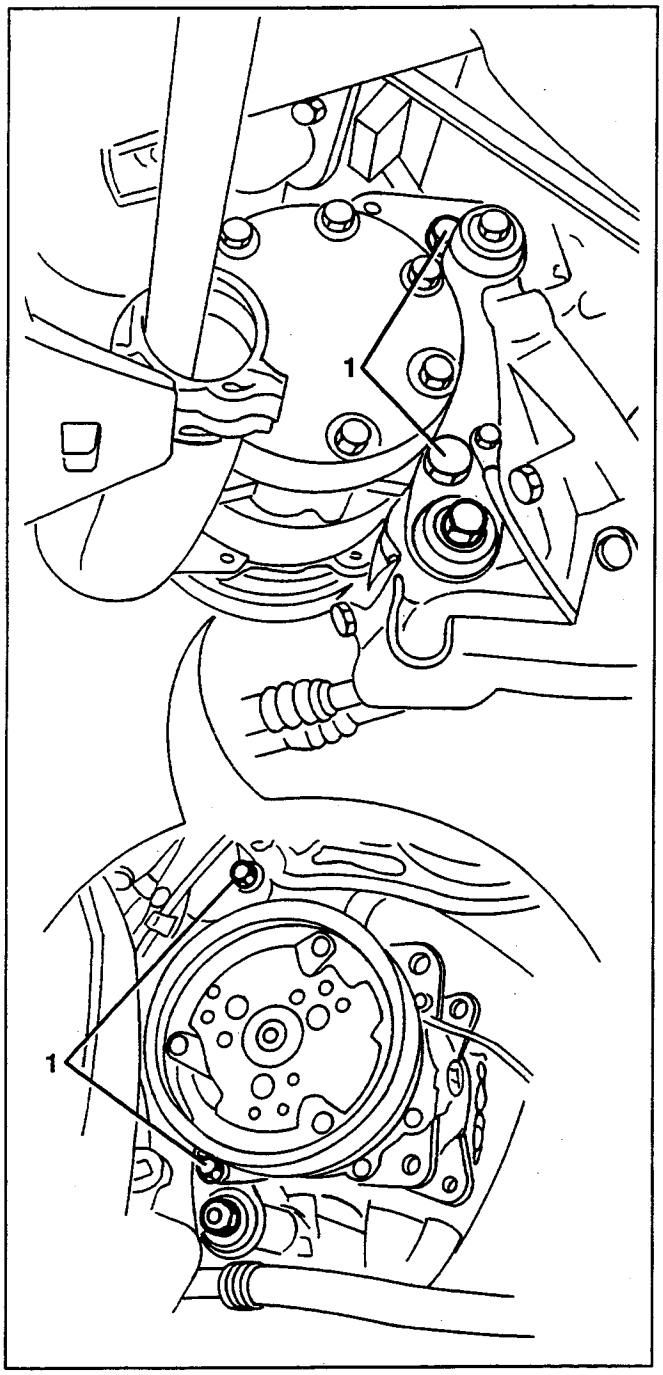


1. Slacken the screws fastening the power steering pump bracket
2. Remove the power steering pump belt.



– Raise the power steering pump up as far as possible and lock it in this position to facilitate removal of the compressor.

1. Slacken the four screws (two per side) and remove the compressor.



Refitting

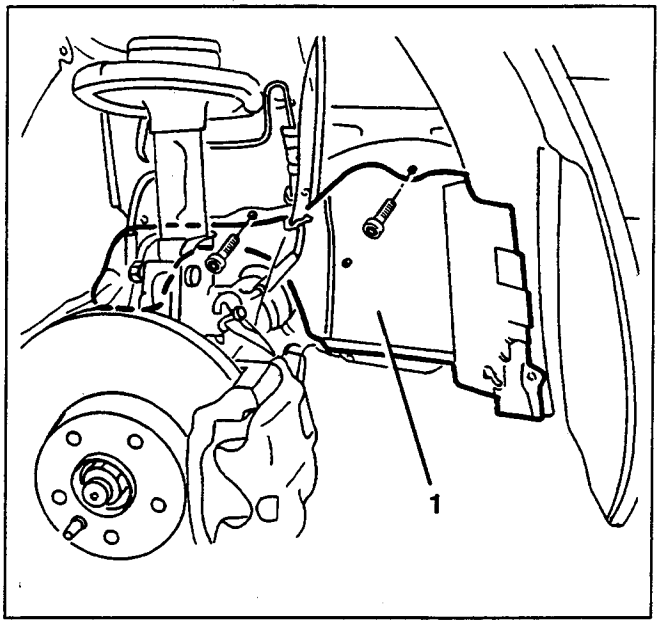
- **Tension the power steering pump belt and compressor drive belt (see GROUP 00).**
- **Lubricate the fittings with the specified oil.**
- **Tighten to the specified torque where applicable**

COMPRESSOR (2.0 T.S. 16v Engine)

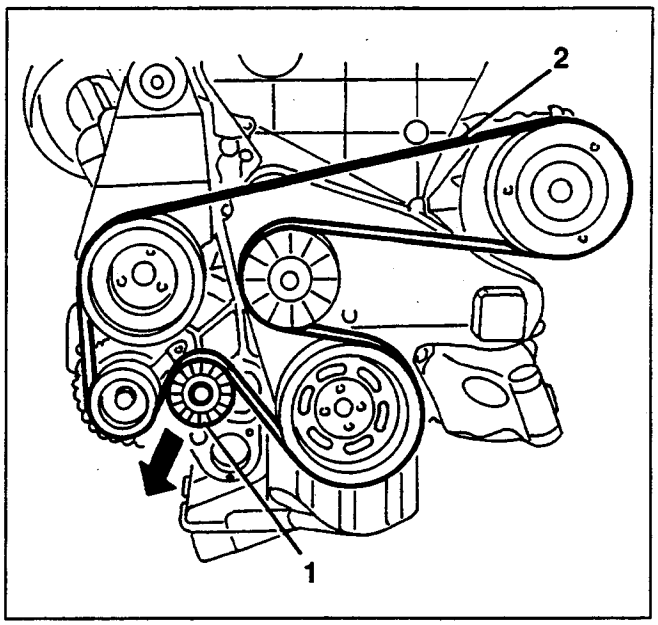
Removal

- Disconnect the battery negative terminal.
- Drain the coolant fluid.
- With the car on a lift, remove the right front wheel.

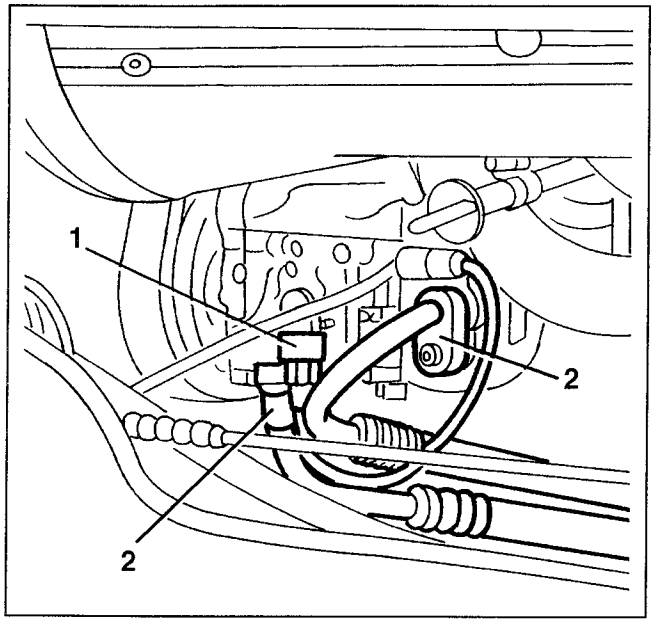
1. Remove the engine bulkhead.



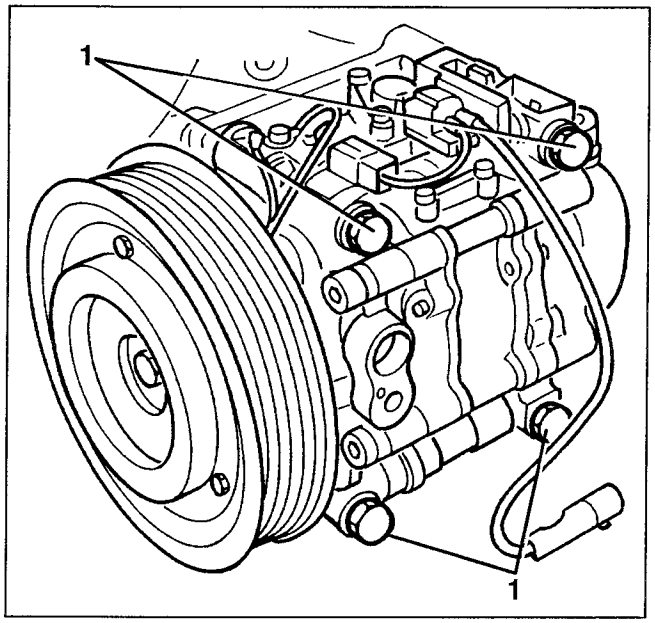
1. Lower the belt tensioner guide pulley loosening it slightly.
2. Remove the belt.



1. Working in the engine compartment disconnect the compressor electrical connection.
2. Disconnect the two pipes from the compressor.



1. Slacken the four fastening screws and remove the compressor, withdrawing it from the top.



Refitting

- Tension the belt (see GROUP 00).
- Lubricate the fittings with the specified oil.
- Tighten to the specified torque where applicable.

NOTE: The compressor is supplied spare pressurized with nitroogen to prevent moisture and impurities from getting in; therefore, upon assembly it is necessary to remove the inlet and outlet fitting plugs slowly and with the compressor positioned absolutely as illustrated (with the cover facing upwards).

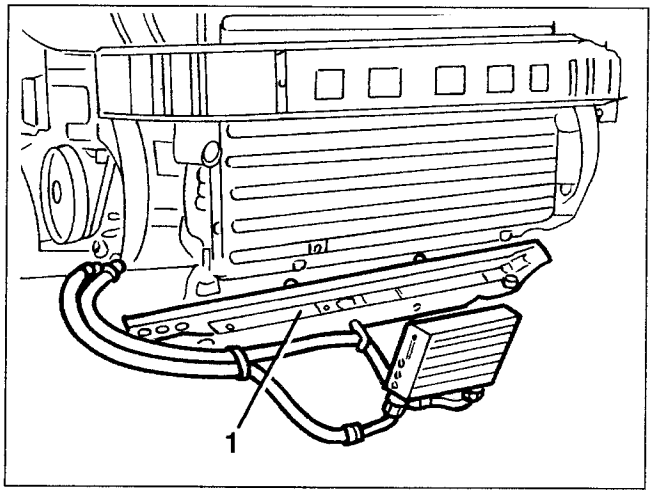
CONDENSER

Removal

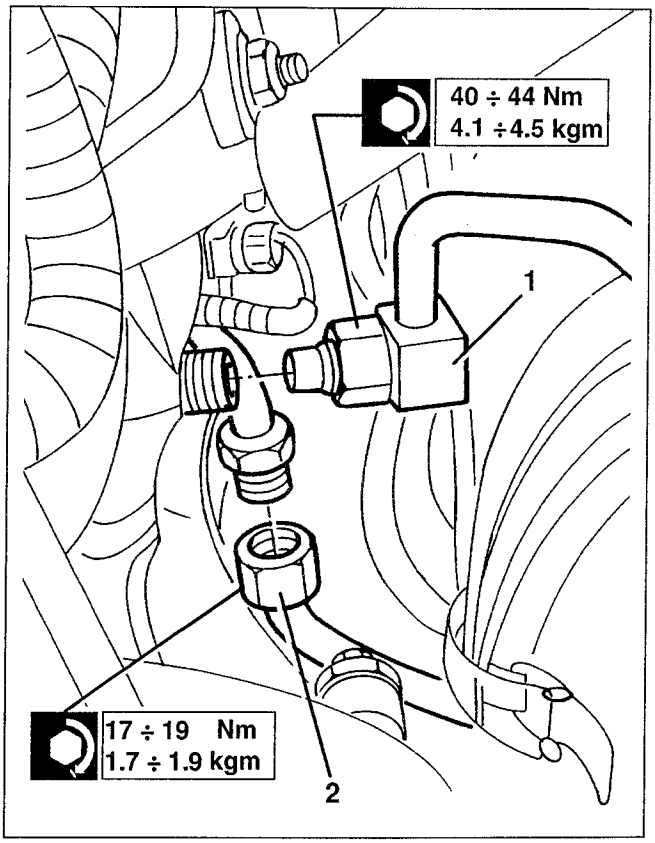
- Drain the coolant fluid;
- Set the car on a lift.
- Remove the front bumper (see GROUP 70).

Only for engine 3.0 V6

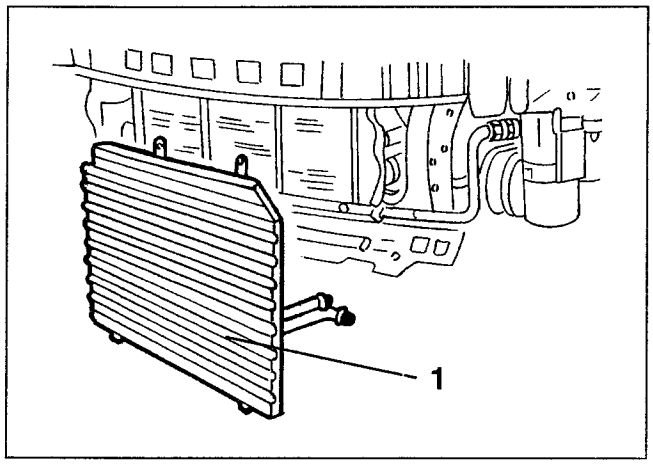
1. Remove the screws fastening the oil exchanger support bracket and lower it without disconnecting the pipes.



1. Disconnect the coolant fluid pipe leading to the compressor
2. Disconnect the pipe leading to the evaporator.



1. Slacken the fastening screws and remove the condenser withdrawing it from below.



Refitting

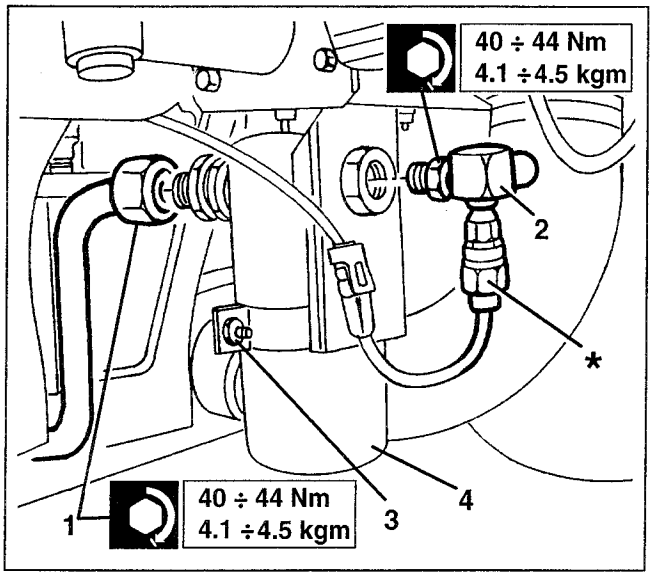
- Take care not to damage the condenser thermal exchange fins.
- Lubricate the fittings with the specified oil and tighten them to the specified torque.

DRIER FILTER

Removal

- Drain the coolant fluid.
- Set the car on a lift.
- Remove the front bumper (see GROUP 70).

1. Disconnect the pipe leading from the compressor.
2. Disconnect the pipe leading from the evaporator.
3. Slacken the fastening clamp.
4. Remove the filter.



(*) only present on engine 2.0 T.S. 16v

Refitting

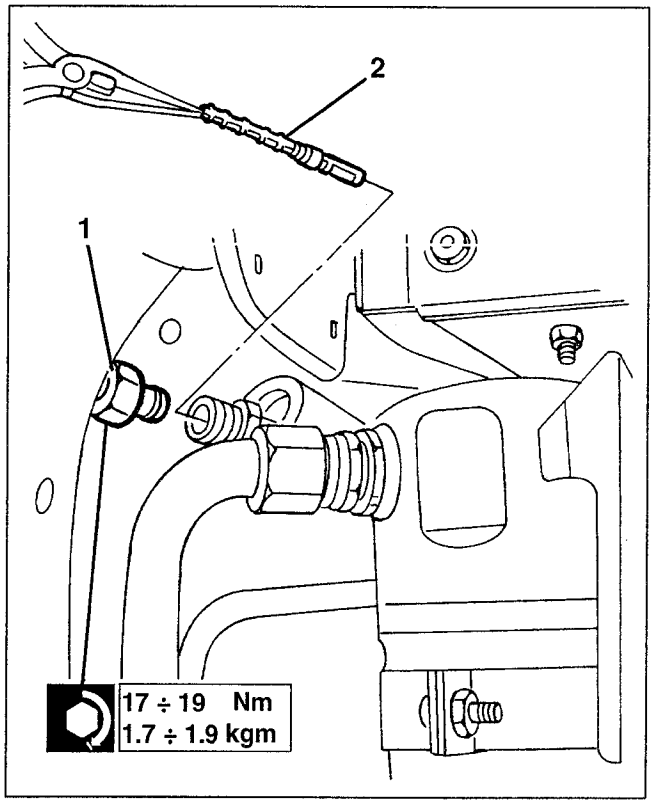
- Lubricate the fittings with the specified oil.
- Tighten the fittings to the specified torque.

EXPANSION VALVE

Removal

- Drain the coolant fluid.
- Set the car on a lift.
- Remove the front bumper (see GROUP 70).

1. Slacken the connection nut and gain access to the valve.
2. Withdraw the valve with a pincer taking care not to damage it.



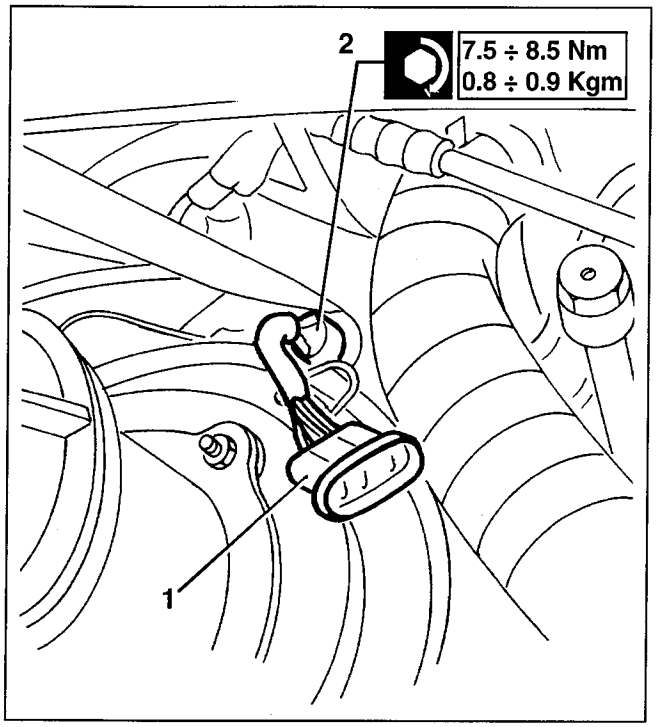
Refitting

- Lubricate the fittings with the specified oil.
- Tighten to the specified torque.

THREE/FOUR LEVELS PRESSURE SWITCH

Removal and Refitting

– Disconnect the battery negative terminal.
1. Disconnect the pressure switch connector.
2. Using a suitable wrench remove the pressure switch.

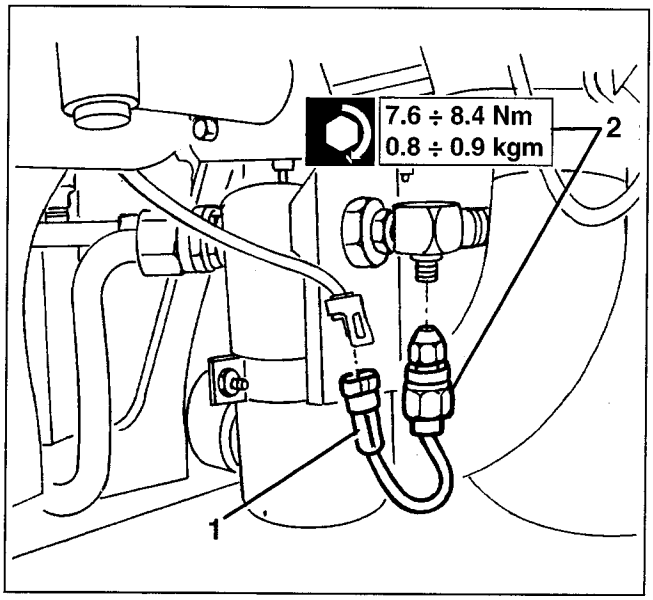


NOTE: Due to the presence of a non-return valve, the pressure switch can be removed without having to drain the coolant fluid, like any other component of the conditioning system.

DEFROSTING PRESSURE SWITCH

Removal and Refitting

– Disconnect the battery negative terminal.
– Set the car on a lift.
– Remove the front bumper (see GROUP 70).
1. Disconnect the pressure switch connector.
2. Slacken the pressure switch and remove it.



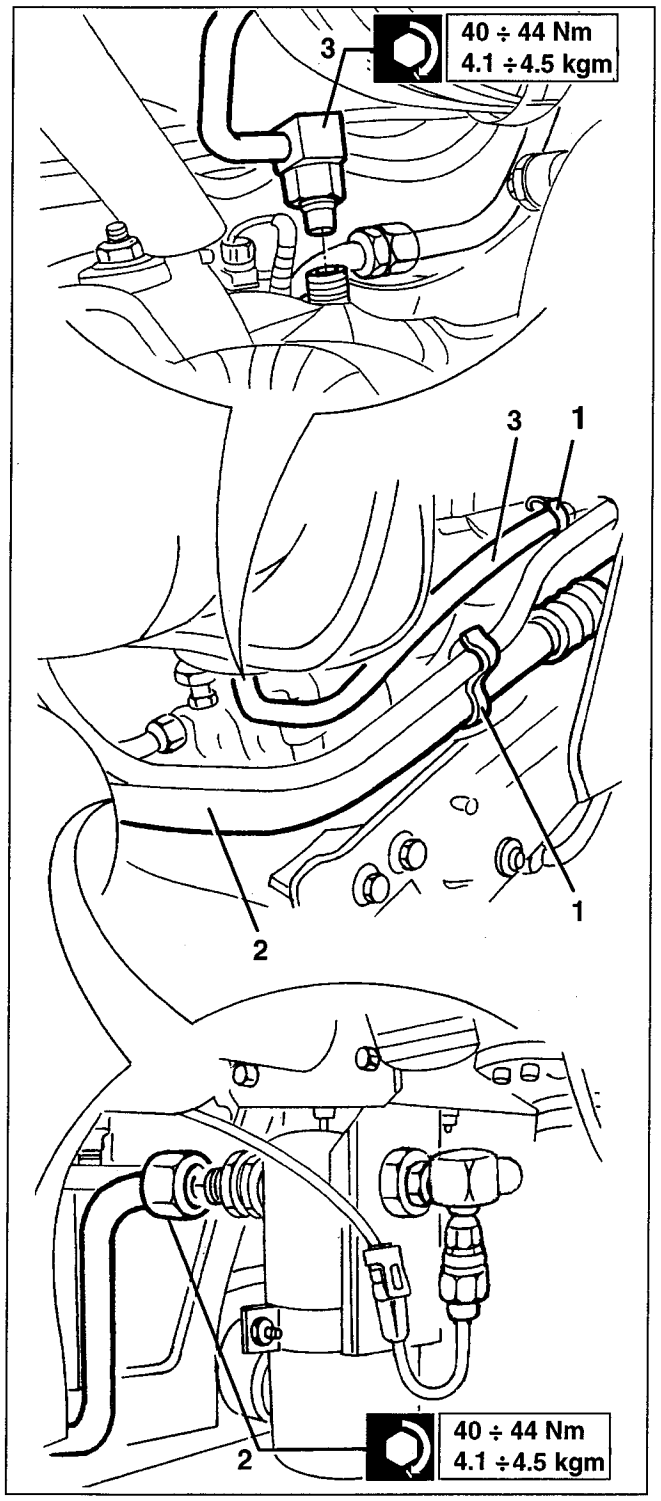
NOTE: Due to the presence of a non-return valve, the pressure switch can be removed without having to drain the coolant fluid, like any other component of the conditioning system.

COMPRESSOR PIPES

Removal

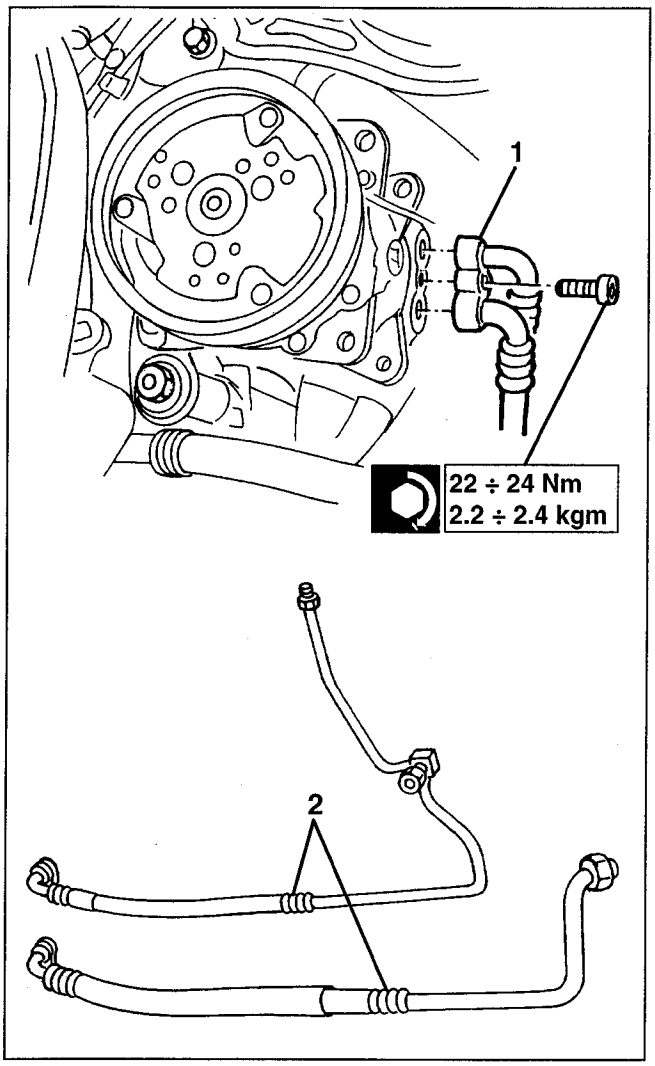
- Drain the coolant fluid.
- Set the car on a lift.
- Remove the front bumper (see GROUP 70).

1. Slacken the clamps fastening the pipes to the radiator bracket.
2. Disconnect the low pressure pipe from the drier filter.
3. Disconnect the high pressure pipe from the condenser.



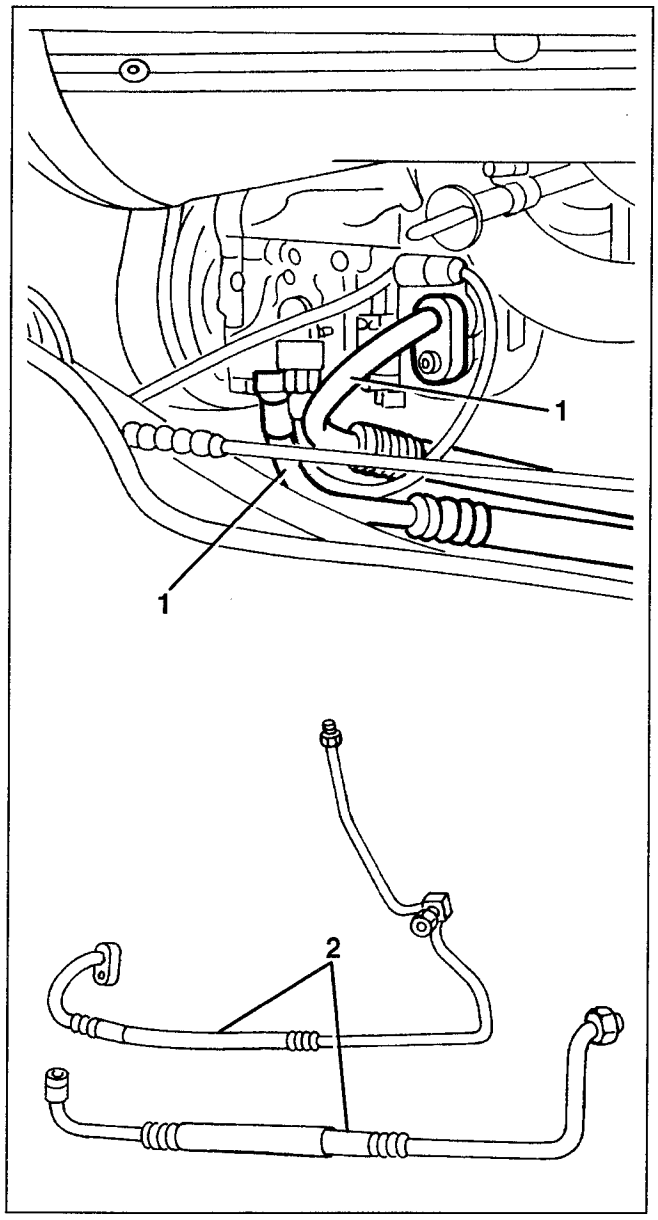
Engine 3.0 V6

1. Slacken the clamp fastening the pipes to the compressor loosening the centre fastening screw.
2. Remove the two pipes from below.



Engine 2.0 T.S. 16v

1. Disconnect the pipes.
2. Remove the two compressor pipes.



Refitting

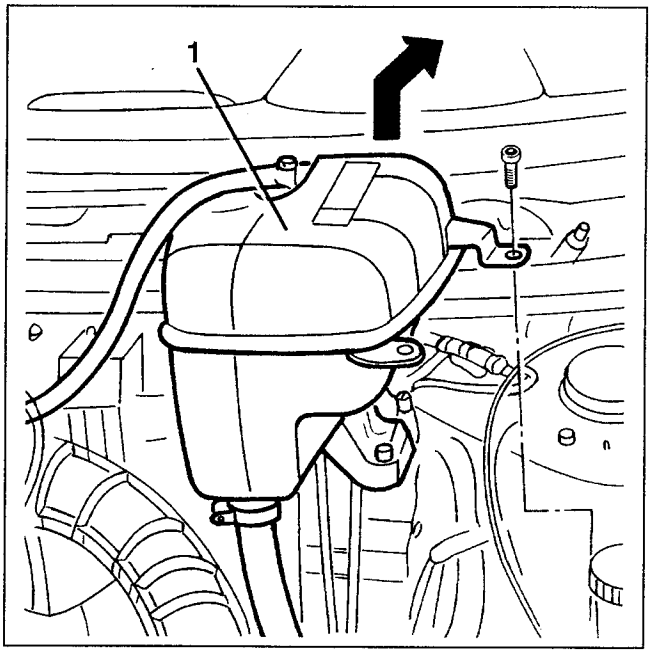
- Lubricate the fittings with the specified oil and tighten them to the specified torque.

EVAPORATOR PIPES

Removal

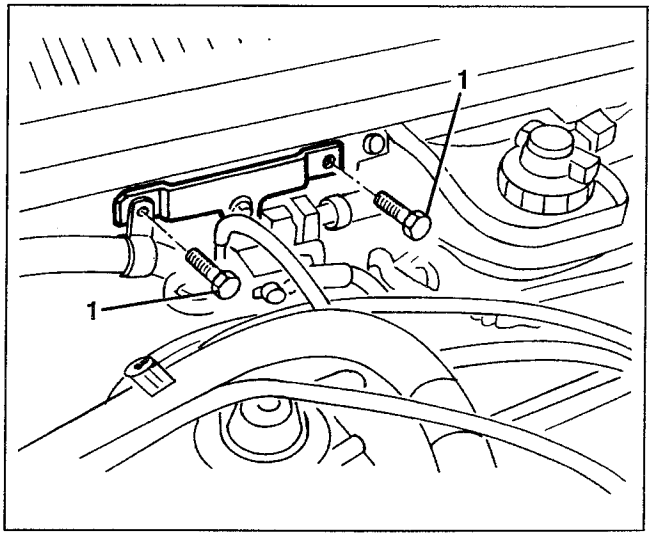
- Disconnect the battery negative terminal.
- Remove the front bumper (see GROUP 70).
- Drain the coolant fluid.
- Remove air cleaner with its support (see GROUP 10).

1. Disconnect the engine cooling circuit reservoir from the frame and move it. **N.B.** this operation does not required draining the engine coolant fluid (for further details see Group 10).



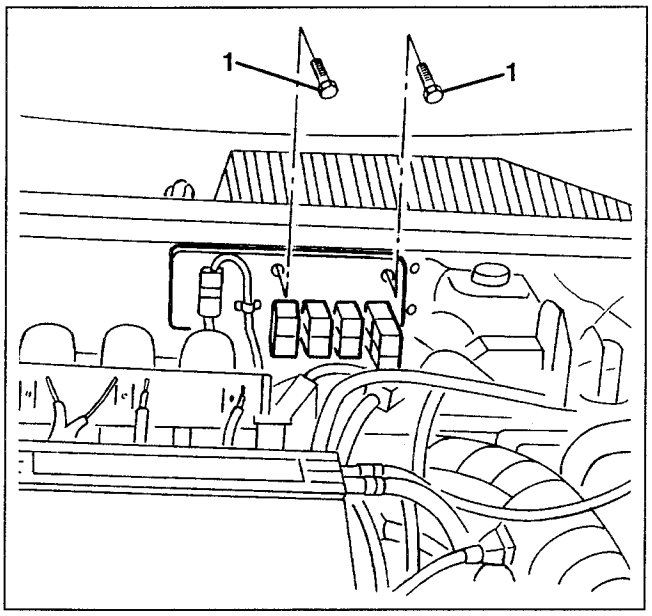
3.0 V6 Engine only

1. Working in the engine compartment, slacken the two screws and disconnect the EGR solenoid valve bracket from the services tray partition.

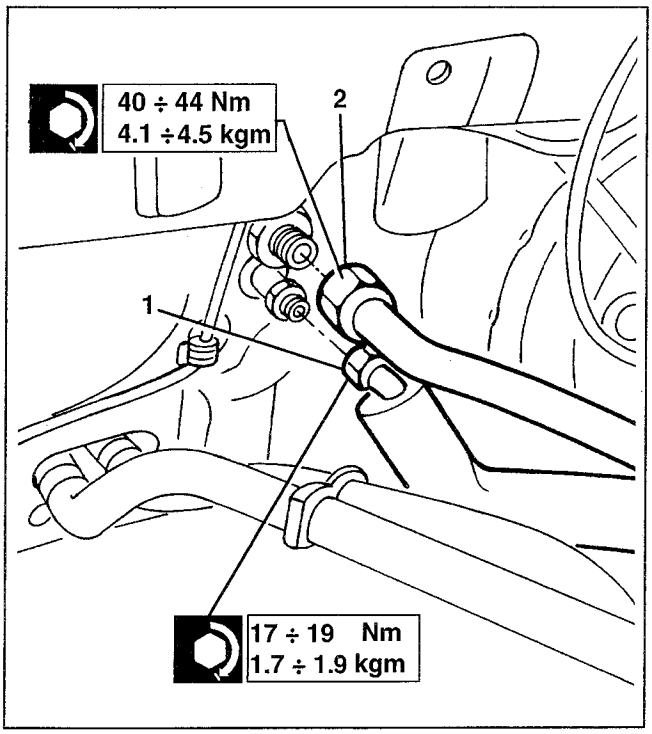


Only engine 2.0 T.S. 16v

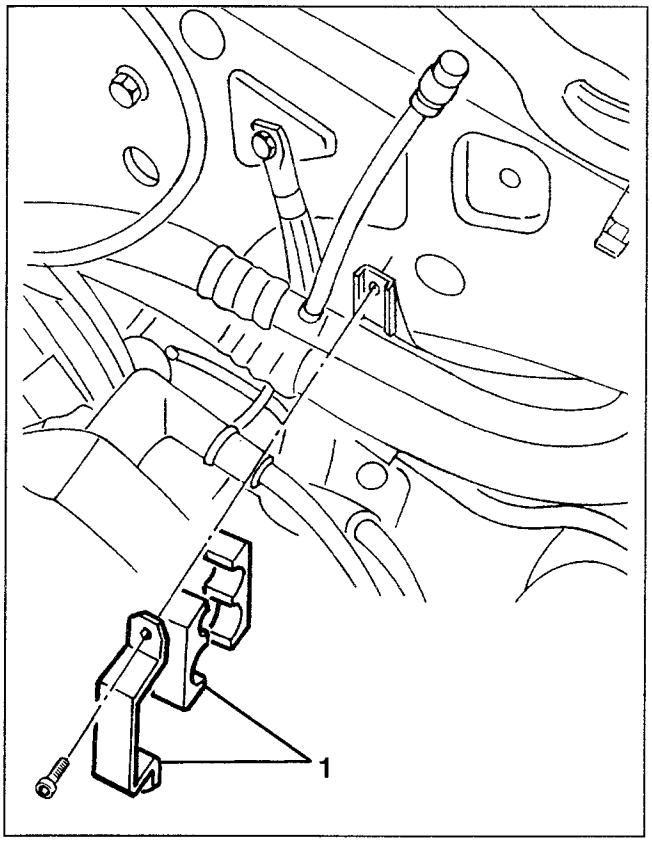
1. Working in the engine compartment, slacken the two screws and disconnect the bracket fastening the injection relays and fuses.



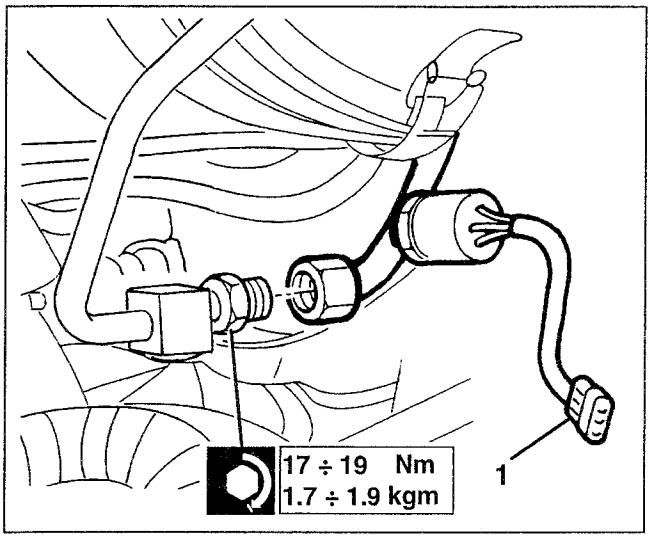
1. Using wrenches 1.822.111.000 and 1.822.113.000 disconnect the pipe from the evaporator to the condenser.
2. Using wrenches 1.822.112.000 and 1.822.115.000 disconnect the pipe from the evaporator to the drier filter.



1. Remove the clamp fastening the pipes to the side panel.



1. Disconnect the three-level pressure switch connection. If necessary remove the pressure switch.
2. Disconnect the pipe from the condenser.

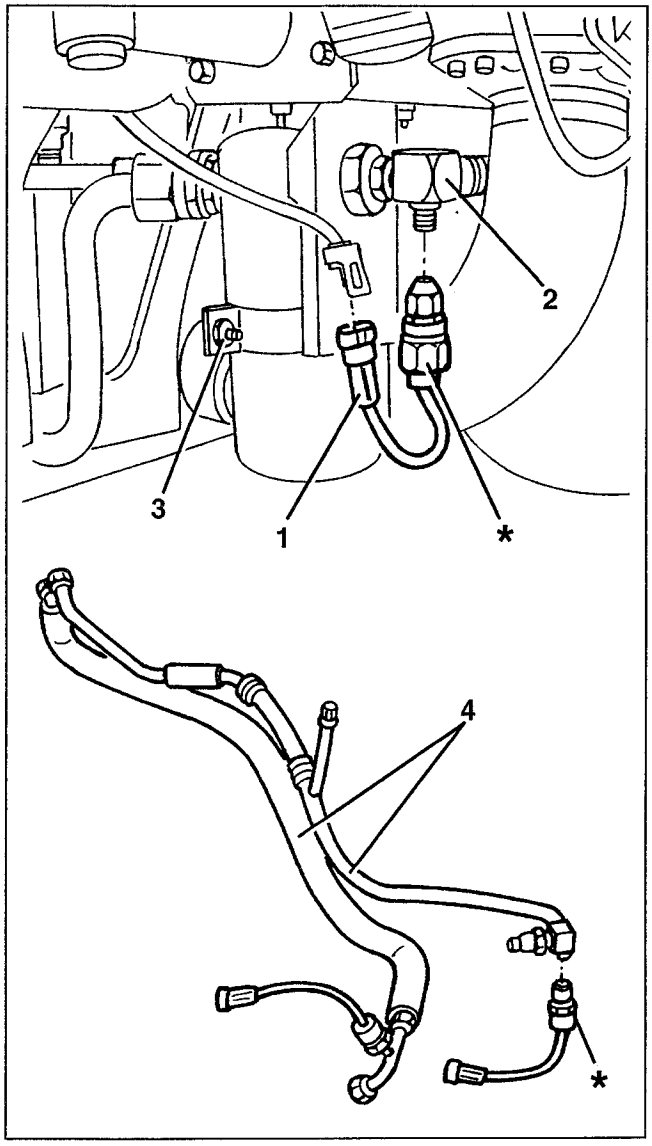


1. Only engine 2.0 T.S. 16v: disconnect the connection of the defrosting pressure switch. If necessary remove the pressure switch.

2. Disconnect the pipe from the drier filter.

3. Slightly lower the filter removing the bracket fastening screws.

4. Remove the two pipes withdrawing them from below.



(*) Present only on engine 2.0 T.S. 16v

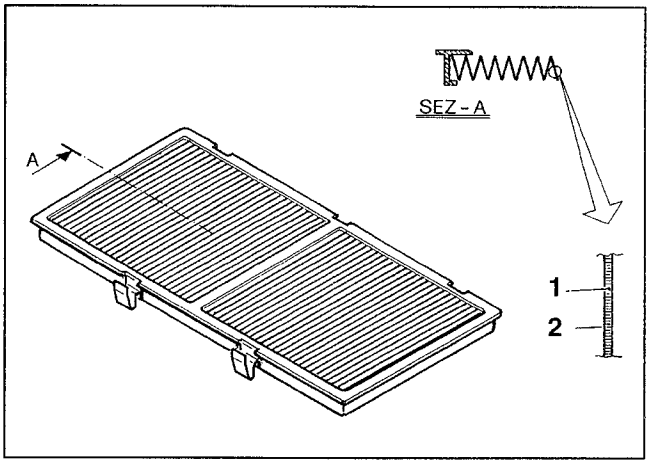
Refitting

– Lubricate the fittings with the specified oil and tighten them to the specified torque.

POLLEN FILTER

The climate control system can be fitted (upon request) with a special dust/pollen filter made from polyester on the outside and electrostatically charged polycarbonate fibres on the inside (see figure).

This filter has the specific capability of combining the mechanical air filtering with an electrostatic effect so that the outside air admitted to the passenger compartment is purified and free of contaminants such as dust, pollen, etc.



Filter cross section

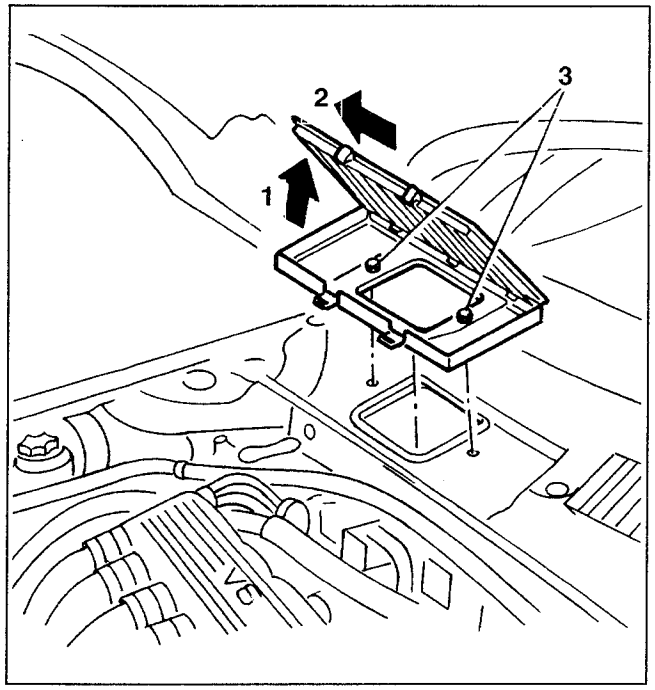
1. *Polycarbonate fibres*
2. *Polyester fibres (non woven fabric)*

N.B.:
The conditions of the filtering element should be checked once a year, preferably at the beginning of summer.
It should be checked more frequently if the car is habitually used in the city or dusty areas.

REPLACEMENT

The failure to change the filter or its incorrect installation may considerably reduce the effectiveness of the climate control unit.

– Remove the air inlet grille (see GR.70).
1. Raise the filtering element which is held in place by two catches.
2. Remove the filtering element, complete with frame; remove the element from the frame and replace it with a new one.
3. If it is necessary to remove the filtering element housing, slacken the two screws fastening it to the panel below.



EMPTYING AND RECHARGING THE SYSTEM

N.B.
Only use the special station for emptying and recharging R134a fluid **1.826.004.000**.