GROUP 04

CONTENTS

4 cylinders 1.6 1.8 2.0

4 cylinders 2.0 iniezione

CONTENTS (Contd)

4 cylinders 2.0 Iniezione

4 cylinders Alfa 75 1.8 turbo

CONTENTS (Contd)

6 cylinders Alfa 90 2.5 iniezione

6 cylinders Alfa 75 2.5 6V iniezione

6 cylinders GTV 6 2.5

CONTENTS (Contd)

6 cylinders Alfa 90 2.0 6V iniezione

(*) Refer to: Workshop Manual Alfa 90 - GROUP 00

(**) Refer to 1.6 - 1.8 - 2.0 EXHAUST SYSTEM

(•) Refer to: Workshop Manual Alfa 90 2.0 6V iniezione - GROUP 00

(••) Refer to: 6 cylinders Alfa 90 2.5 iniezione - GROUP 04 - Exhaust System

ACCELERATOR LINKAGE ADJUSTMENT

1.6 1.8 2.0

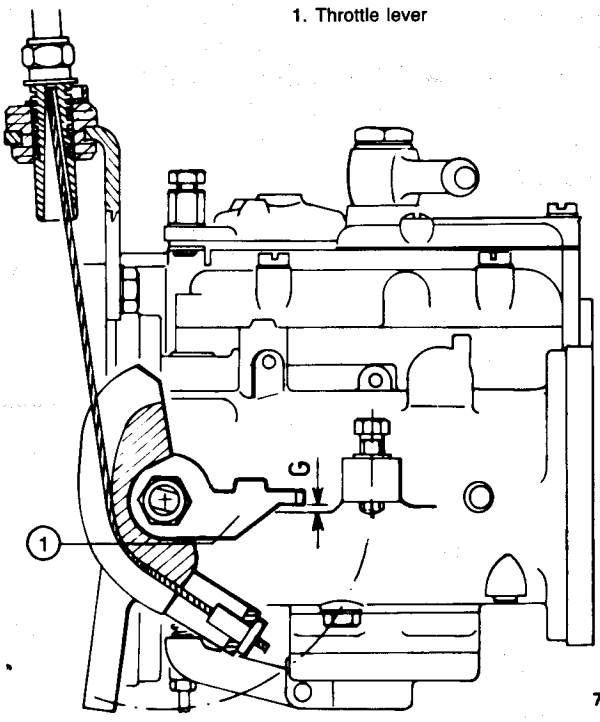
a. Check that flexible shafting does not bind in its conduit.

b. With the accelerator pedal fully depressed check distance «G» from throttle lever pivot (1) to stop.

Pivot pin to stop clearance:
Gap «G» = 1 to 2 mm
(0.04 to 0.08 in).

c. To adjust work from the car interior proceeding as follows:

— Back off locknut on accelerator pedal stop screw.
— Adjust stop screw to obtain the specified clearance.
— Tighten locknut.



1. Throttle lever

75-18

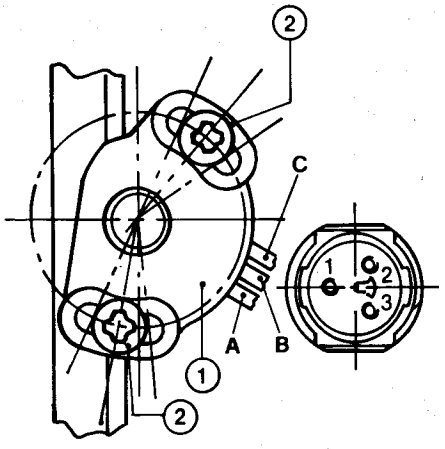
LOAD SENSOR ADJUSTMENT

Alfa 90 1.8 2.0

Alfa 75 1.6 1.8 2.0

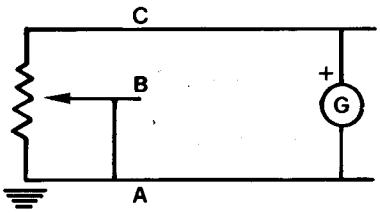
a. Supply load sensor (1) at 4.9±0.05 V through terminals 1 and 3.
b. Keep throttle shaft on rear carburetter against stop in idle position.
c. Turn sensor (1) to obtain a 4±0.1 V output measured across terminals 1 and 2.
d. Tighten load sensor capscrews (2) to the specified torque.

CAUTION:
When tightening capscrews (2) ensure that output voltage is not altered by possible load sensor rotation.



1. Load sensor
2. Capscrews

Connections diagram



Cables	Terminals	Colours
A	1	Orange
B	2	Green
C	3	Black

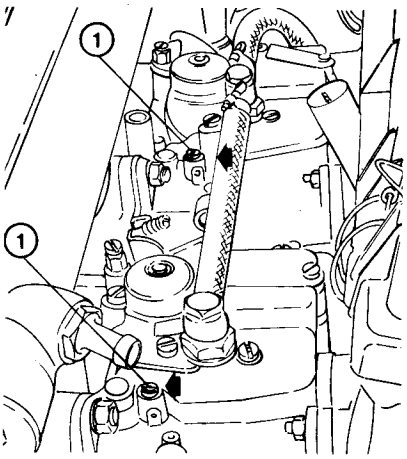
(T) : **Tightening torque**
Load sensor capscrews
11 to 18 Nm
(1.17 to 1.8 kgm
8.1 to 13.3 ft.lb)

ON VEHICLE ACCELERATING PUMP OUTPUT TEST

1.6 1.8 2.0

With the carburetter on vehicle, and preferably with the engine cold, check the accelerating pump as follows:

a. Remove four capscrews (1) and lift out the accelerating pump jets from the respective venturi.



1. Jet capscrews

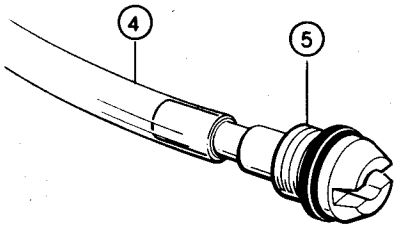
b. Screw four tester rods (1) into jet holes according to type of carburetter.

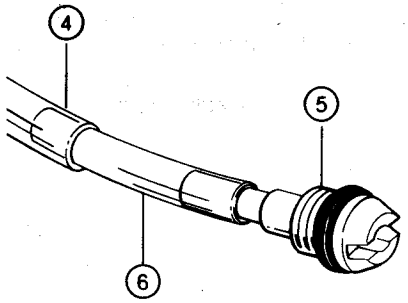
Horizontal carburetter tester:	
Weber:	**C.4.0124**
Solex:	**C.4.0123**
Dellorto:	**C.4.0125**

c. Install four supports (2) complete with respective graduated test tubes (3) on top of four rods (1).

d. Connect four plastic hoses (4) to the ends of the four rods (1).

e. Connect free ends of plastic hoses (4) to the respective accelerating pump jets (5), previously removed.

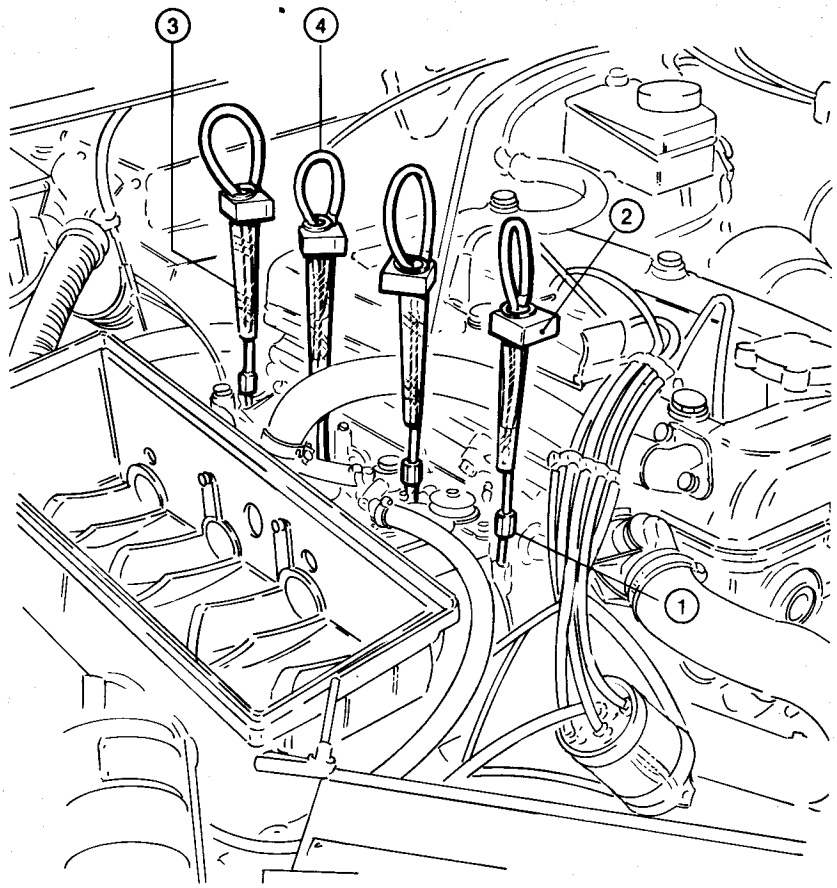




NOTE:
For SOLEX carburetters insert a reducing tube (6) between jet and plastic hose.

f. Place four pump jets (5) inside the respective graduated test tubes (3).

g. To ensure that the carburetter chamber is filled turn the engine over for a few seconds through the starter.



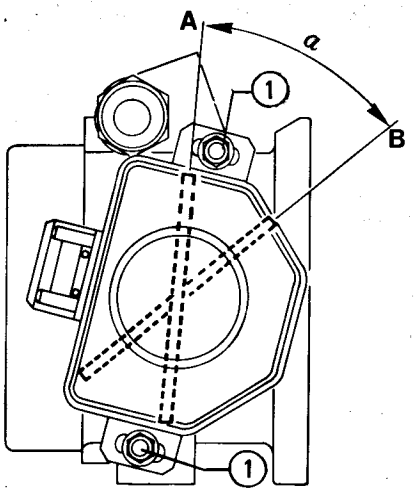
1. Rods
2. Supports
3. Graduated test tubes
4. Plastic hoses
5. Accelerating pump jets
6. Reducing tube

2. If not so, loosen screws (1) and rotate switch until contact (~ **0** Ω resistance) between terminals 2 and 18 is obtained, with throttle fully closed; retighten the screws.

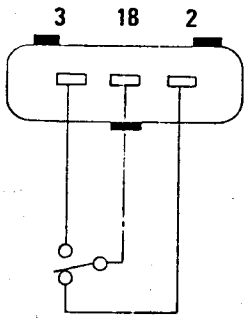
3. Rotate throttle by **72°** and verify that the full load contact closes, by measuring the following resistances with a tester on male connector:

- **0** Ω resistance (approx.) must be measured between terminals 3 and 18, when accelerator throttle is open by an angle of $\alpha \simeq 72°$.

4. If the values measured are not those prescribed check accelerator control, or replace switch.



1 Screws securing switch to throttle body
2 Idle r.p.m. terminal (corresponding to position A: throttle closed)



3 Peak r.p.m. terminal (corresponding to position B: throttle open)

EXHAUST SYSTEM

Refer to: 1.6 1.8 2.0 "Exhaust system".

SERVICE DATA AND SPECIFICATIONS

TECHNICAL DATA

SUPPLY AND INJECTION SYSTEM COMPONENTS

Component		ALFA ROMEO Std. Number	Type
Main fuel pump		116.46.04.021.00	BOSCH 0.580.464.020
Fuel pressure regulator		195.00.32.045.00	BOSCH 0.280.160.213
Electroinjectors	Pre-modification	116.85.11.300.00 (1)	BOSCH 0.280.150.128
	Post-modificaion	195.26.11.300.01 (2)	BOSCH 0.280.150.707
Air flow gauge	Pre-modification	195.00.11.013.00	BOSCH 0.281.202.045
	Post-modification	195.26.11.013.00	BOSCH 0.280.202.078
Control unit	Pre-modification	195.00.11.042.00	BOSCH 0.261.200.044
	Post-modification	161.10.11.042.00	BOSCH 0.261.200.063

(1) Black nozzle
(2) Yellow nozzle

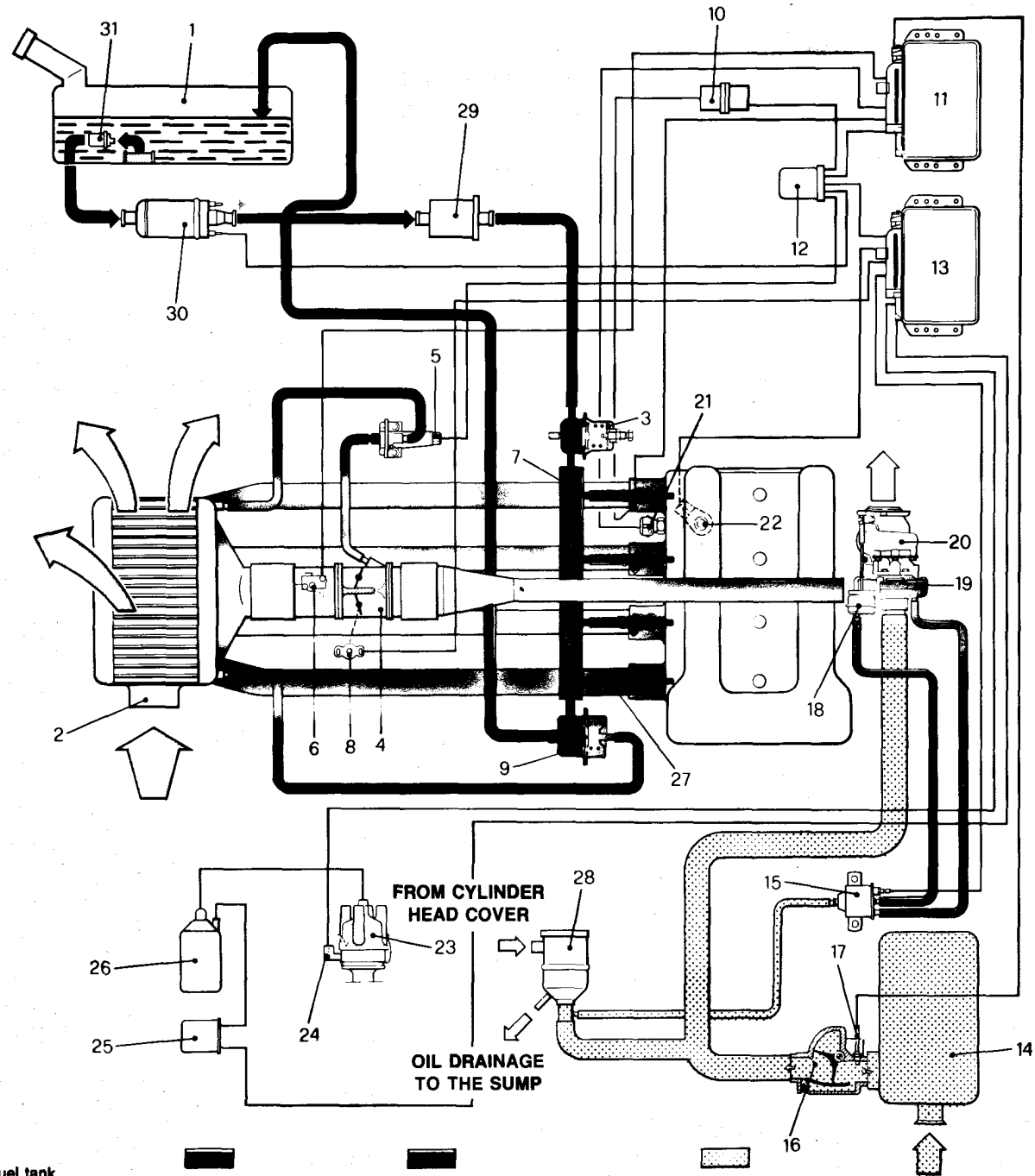
FUEL TANK

Data	Measurement unit	
	litres	(Imp.gall)
Overall capacity	49	10.78
Reserve	8	1.76

DESCRIPTION

Alfa 75 1.8 turbo

FUEL SUPPLY SYSTEM DIAGRAM (LE2 JETRONIC AND EZ 201K TURBO)



1. Fuel tank
2. Intercooler
3. Hammering damper
4. Throttle body
5. Auxiliary air valve
6. Minimum cutout switch
7. Fuel distributor manifold
8. Throttle position sending unit
9. Fuel pressure regulator
10. Electro-injector resistances
11. Fuel supply ECU
12. Speedometer relay
13. Ignition ECU
14. Air filter
15. Supercharging pressure regulation solenoid valve
16. Air flow gauge
17. Intake air temperature sensor
18. Waste-gate valve
19. Compressor
20. Turbine
21. Coolant temperature sensor
22. Knock sensor
23. Ignition distributor
24. HALL effect sensor
25. Power module
26. Ignition coil
27. Electroinjectors
28. Oil vapour sedimenter
29. Fuel filter
30. Main fuel pump
31. Auxiliary fuel pump

GENERAL DESCRIPTION

The fuel is supplied, by means of the two electric pumps (30) and (31) from tank (1) to the electroinjectors (27) through hammering damper (3).
Pressure regulator (9) regulates the fuel pressure in fuel distributor manifold (7) excluding to the intercooler (2) air intake pressure in order to maintain the difference between the fuel pressure and the pressure in the intake manifold constant.
When the feul pressure exceeds the maximum pressure set (3 bar; 43.50 psi) the pressure regulator causes the return of the excess fuel to the tank. The quantity of fuel injected therefore depends exclusively on injection time (which is determined by injection control unit (11) on the basis of the quantity of intake air), its temperature and the temperature of the engine.

The quantity of intake air and its temperature are measured, respectively, by air flow gauge (16) and sensor (17), while the temperature of the engine is measured by sensor (21).
From air flow gauge (16) the air enters compressor (19), where it is compressed, and then throttle body (4) composed of two throttles mechanically connected so that when the accelerator is depressed the second throttle begins opening after the first has rotated about 40°.
The degree of opening of the throttles is measured by throttle position sending unit (8) which sends the relative signal to ignition ECU (13).
A minimum cutout switch (6) is also fitted on the throttle body. When this switch is activated by the release of the accelerator pedal it sends a signal to injection control unit (11) which cuts off the supply of fuel to the electroinjectors.

From the throttle body the compressed intake air, before entering the cylinders, passes through intercooler (2) where it is cooled to reduce the possibility of spark knock is detected by knock sensor (22) which sends a signal to ignition ECU (13) which corrects the spark advance (towards a delay) until the knock is eliminated. If this correction of the advance does not solve the problem the ignition ECU, will, by means of supercharging pressure regulation solenoid valve (15) regulate waste-gate valve (18) in order to reduce the supercharging pressure.

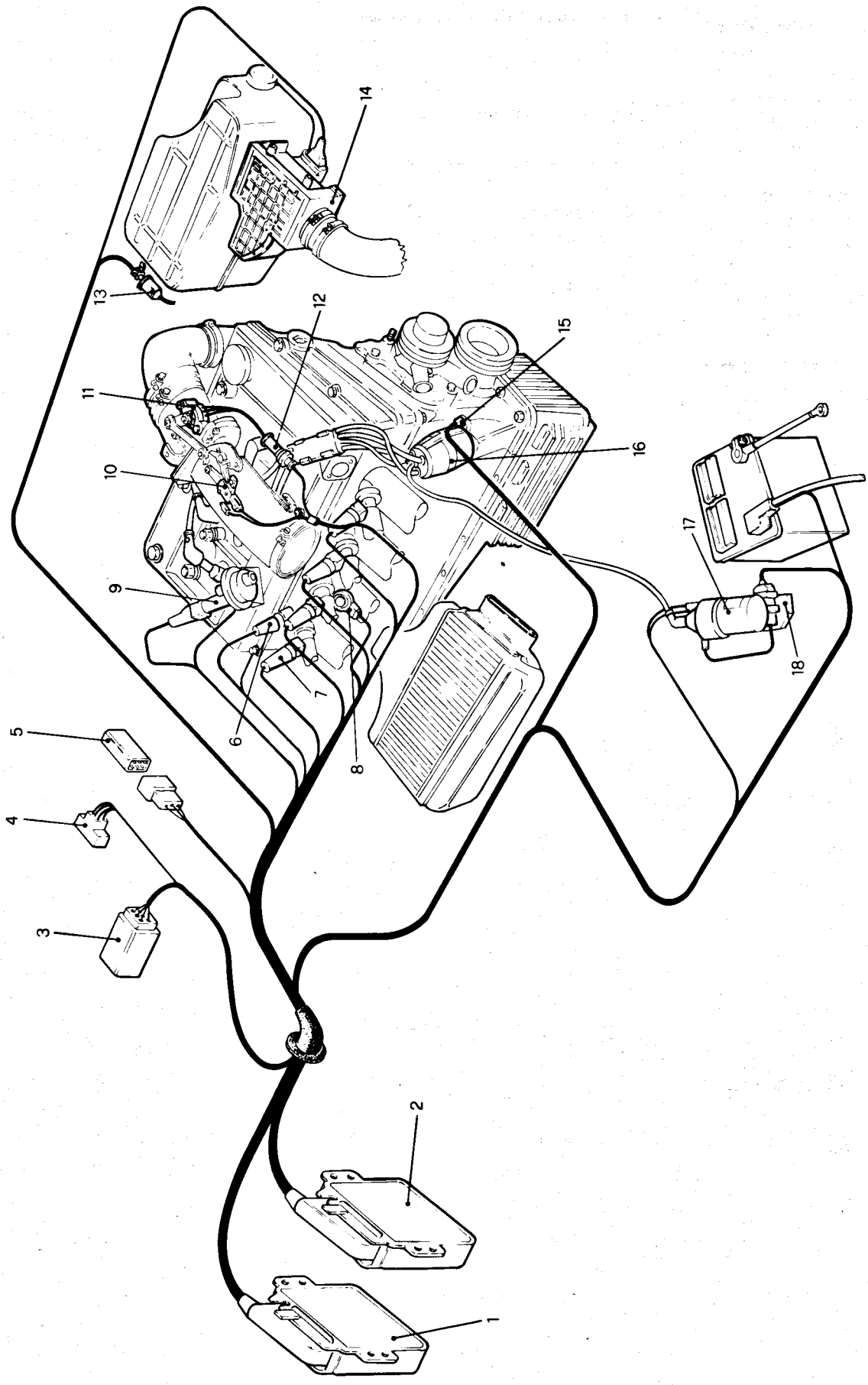
In normal operating conditions the supercharging pressure is regulated by the ignition ECU on the basis of the throttle opening signal from throttle position sending unit (8), the rpm signal provided by the Hall effect sensor (24) on the ignition distributor (23) and engine efficiency.

Engine starting is controlled by speedometer relay (12), injection control unit (11) and ignition ECU (13).
The speedometer relay, receiving the impulse from starting block, is energized and supplies the ECUs, petrol pump and electroinjectors.

After the completion of the starting operation the relay is maintained energized by the feed voltage from ignition coil (26) and by the engine rpm signal from the ignition control unit.
Should there fail to be one of these signals the speedometer relay will be de-energized, thus cutting off the power to the fuel supply system.

During running with a cold engine a greater quantity of mixture is supplied for combustion.
This increased quantity is determined by auxiliary air valve (5) located on bypass of the throttle body (4) which progressively closes with the increase of the engine temperature.

WIRING AND MAIN COMPONENTS OF COMBINED LE2 JETRONIC AND EZ 201K TURBO SYSTEM

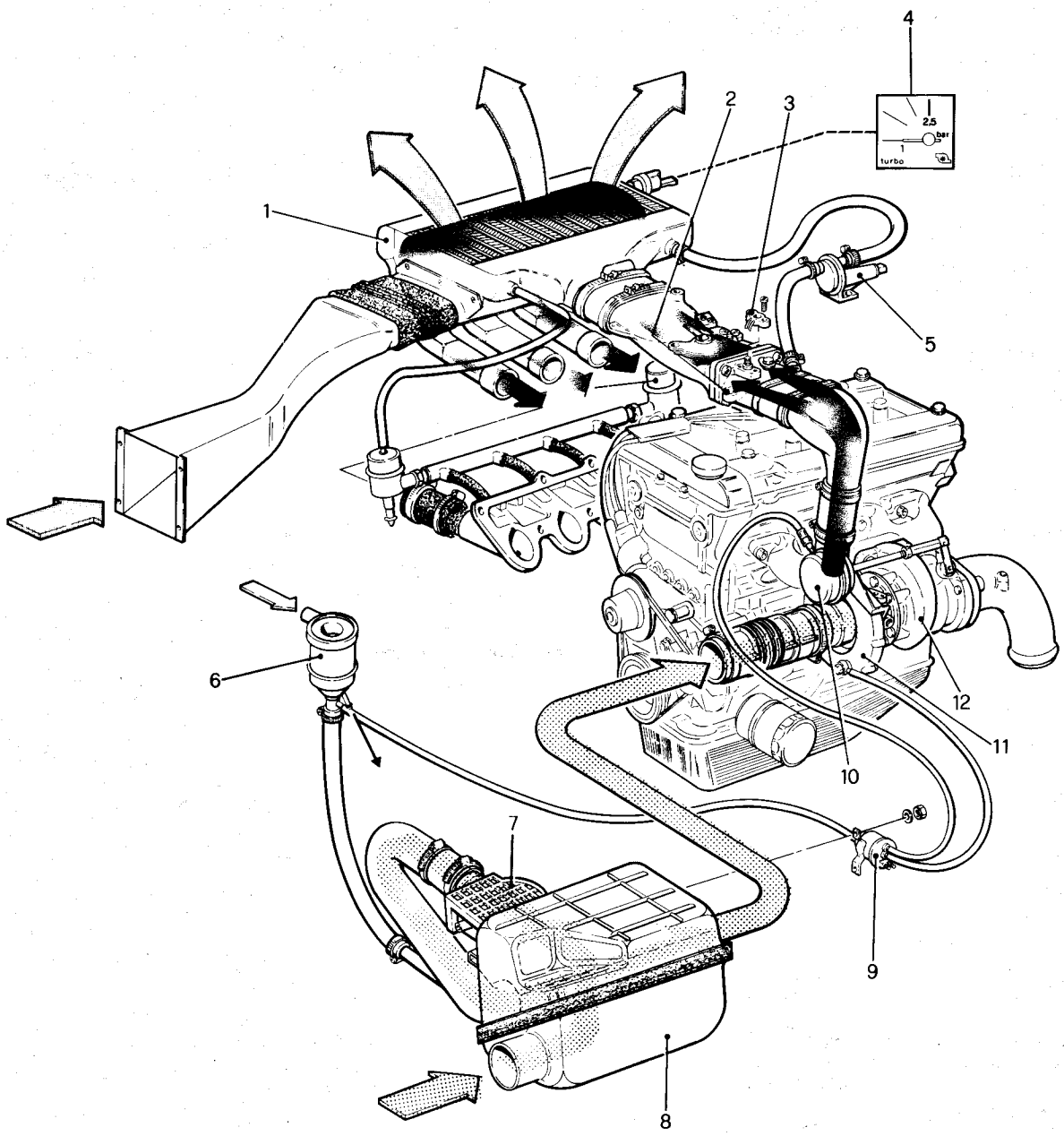


1. Injection control unit
2. Ignition ECU
3. Speedometer relay
4. Body wiring junction
5. Elektroinjector resistances
6. Coolant temperature sensor
7. Electroinjectors
8. Knock sensor
9. Auxiliary air valve
10. Fuel cut-off switch
11. Throttle position sending unit
12. Throttle position sending unit connector
13. Supercharging pressure regulator solenoid valve
14. Air flow gauge
15. Hall effect sensor
16. Ignition distributor
17. Ignition coil
18. Power module

IMPORTANT GENERAL INFORMATION

- **Never disconnect the battery while the engine is running or with the ignition on (position 2) as this would cause serious and irreversible damage to the electrical and electronic components of the ECUs of the system.**
- Never start the engine unless the battery terminals are fully tightened.
- Never start the engine by fast battery charging.
- Always disconnect the battery completely from the system before recharging.
- Never start the engine if electrical connections are incorrect or if components have been removed from their seats.
- Never ground the high/low voltage parts or break connections while the engine is running.
- Remove the electronic control units if vehicle is to be furnace-painted at temperatures higher than 80°C (176°F).
- In the event of installation or ancillary equipment, always disconnect the electronic control units in order to carry out the functional test of ancillary equipment itself with ECUs disconnected.
  Never connect other devices to ECU wiring.
- Before beginning work on the various components of the system check for disconnected connectors, loose clamps or cut or visibly obstructed tubes.
- Never connect the plug to the ECU leads (or disconnect it) with ignition on.
- Never ground the high/low voltage cables for test purposes.
- Verify that shielded wire connectors are correctly secured.
- Verify the efficiency of the ignition system and the spark plugs and check that the timing cover is not wet or cracked. Check that the cables between coil and distributor and between distributor and spark plugs are correctly connected and that the insulation reveals no trace of burning or abrasion.
- When replacing fuses disconnect the power supply (disconnect the contact).
  If a fuse burns repeatedly seek the cause of the short circuit.
  Never replace a fuse with a piece of cable.
  A burnt fuse must be replaced with another of the same amperage.

AIR SUPPLY AND SUPERCHARGING SYSTEM



1. Intercooler
2. Throttle body
3. Throttle position sending unit
4. Supercharging pressure gauge
5. Auxiliary air valve
6. Oil vapour sedimenter
7. Air flow gauge
8. Air filter
9. Supercharging pressure regulation solenoid valve
10. Waste-gate valve
11. Compressor
12. Turbine

OUTSIDE AIR

COMPRESSED AIR

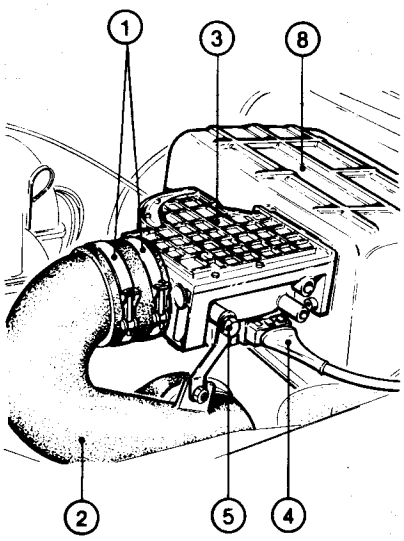
AIR FILTER

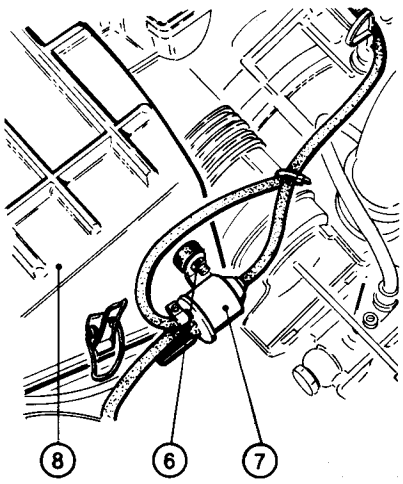
REMOVAL

Remove air filter unit operating as follows:

1. Slacken clamp (1) and detach sleeve (2) from air flow gauge (3).
2. Detach connector (4) from air flow gauge (3) and remove securing bolt (5).
3. Remove nuts (6) and solenoid valve (7) from air filter cover (8).
4. Release the five clips securing the cover and remove it together with air flow gauge.

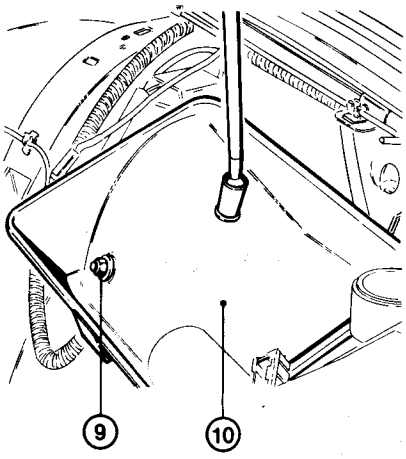
Remove filtering element.





1. Clamps
2. Air duct
3. Air flow gauge
4. Air flow gauge connector
5. Air duct securing bolt
6. Solenoid valve securing nuts
7. Supercharging pressure regulation solenoid valve
8. Air filter cover

5. If required, unscrew the screws (9) securing air filter container (10) to body and remove.



9. Container securing nuts
10. Air filter container

CHECKS AND INSPECTIONS

1. Thoroughly clean the filtering element by blowing low-pressure compressed air through it.

Replace the filtering element if required.

INSTALLATION

Install air filter by reversing the order of removal.

NOTE:
Position the filtering element on air filter container, complying with the mark indicating upper part (on filtering element upper side).

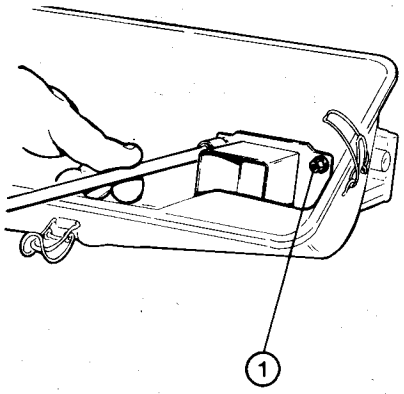
AIR FLOW GAUGE

ELECTRICAL TESTS

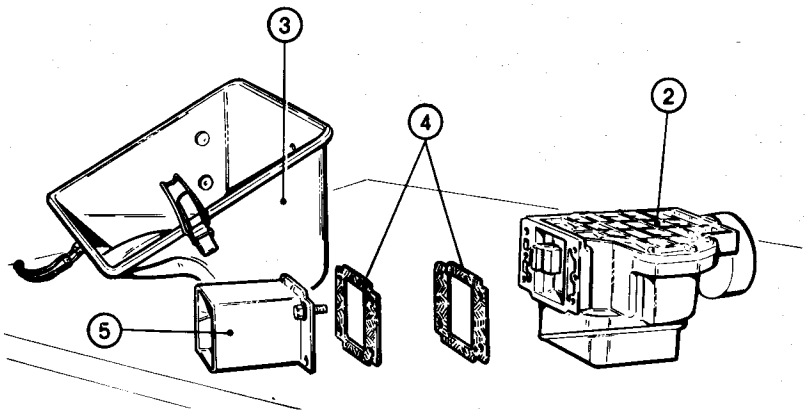
Refer to «Electrical Tests».

REMOVAL

1. Remove air filter unit (see «Air Filter — Removal»).
2. Unscrew the four screws (1) securing the air flow gauge (2) to the filter cover (3).
3. Remove air flow gauge (2) with relative gaskets (4) and inlet flange (5) from the filter cover.



1. Air flow gauge securing screws
2. Air flow gauge
3. Air filter cover
4. Gaskets
5. Inlet flange



CHECKS AND INSPECTIONS

Press the floating blade of the air flow gauge and check that it rotates without sticking, that there are no impediments up to stop position, and that there is no scoring or traces of dirt.
If necessary, clean the internal surfaces of the air flow gauge with a clean, dry cloth.

INSTALLATION

1. Install the air flow gauge by reversing the order of removal; replace gaskets.

CAUTION:
Pay particular attention to the tightening of the unions in order to prevent local air inlets.

2. After installation check (and adjust if necessary) the exhaust CO percentage (refer to: «Settings and Adjustments»).

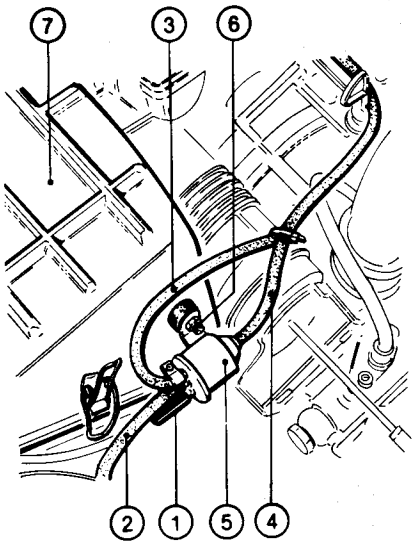
SUPERCHARGING PRESSURE REGULATION SOLENOID VALVE

ELECTRICAL TESTS

Refer to: «Electrical Tests».

REMOVAL

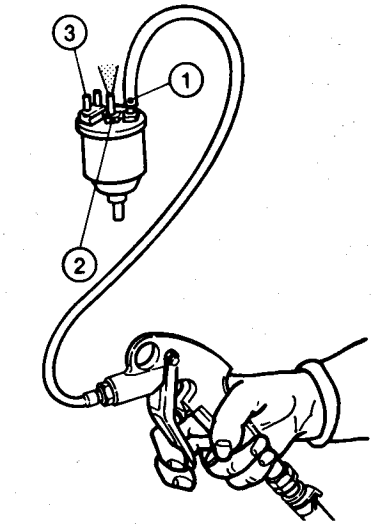
1. Disconnect connector (1).
2. Disconnect hoses (2), (3) and (4) from solenoid valve (5).
3. Remove nuts (6) and then the solenoid valve from air filter cover (7).

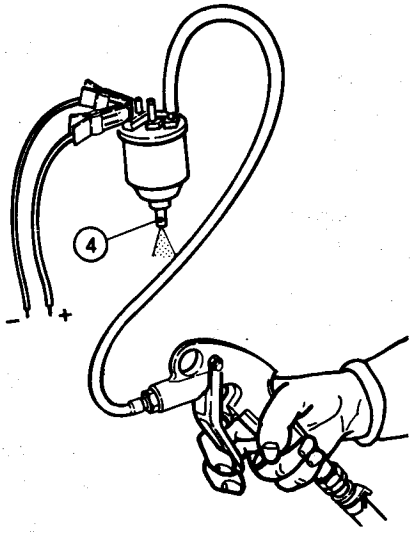


1. Solenoid valve connector
2. Pressure intake hose from compressor
3. Waste-gate valve connecting hose
4. Oil vapour sedimenter connecting hose
5. Solenoid valve
6. Solenoid valve retaining nuts
7. Air filter cover

CHECKS AND INSPECTIONS

1. Pass compressed air (the pressure must not be excessive so as not to damage the solenoid valve) through inlet (1) and check that the air comes out outlet (2).
2. Apply a voltage of 12 V to connector (3) and check that air comes out outlet (4).





1. Waste-gate valve connection
2. Pressure intake from compressor
3. Solenoid valve connector
4. Oil vapour sedimenter connection

INSTALLATION

Install the supercharging pressure regulation solenoid valve by reversing the order of removal.

CAUTION:
When re-connecting the hoses take care that they are in exactly the same positions (it is especially important that the waste-gate valve be connected to the blue connector of the solenoid valve).

AUXILIARY AIR VALVE

CHECKS AND INSPECTIONS

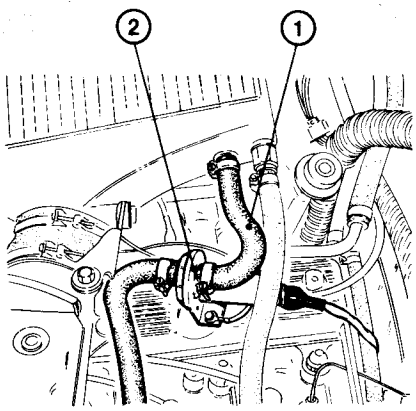
1. Valve opening check

a. Make sure that the engine is cold, then start it and throttle (several times) outlet hose (1) of valve (2).

b. Verify that engine r.p.m. decreases, and that this decrease is more and more gradual (at an ambient temperature of **20°C (68°F)** the r.p.m. decrease is no longer evident after about **3 min.**).

2. Valve closing check

With the engine at normal running temperature, throttle outlet hose (1) of the solenoid valve and verify that engine r.p.m. does not decrease.

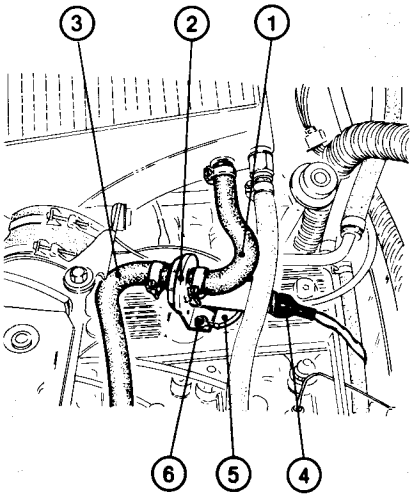


1. Air outlet hose
2. Auxiliary air valve

3. Check of valve electrical continuity
Refer to: «Electrical Tests».

REPLACEMENT

1. Detach connector (4).
2. Loosen clamps and detach hoses (1) and (3) from valve (2).
3. Unscrew screws (6) and remove valve (2) from timing system cover, disconnecting ground cables (5).



1. Air outlet hose
2. Auxiliary air valve
3. Air inlet hose
4. Valve connector
5. Ground cables
6. Screw securing valve to timing system cover

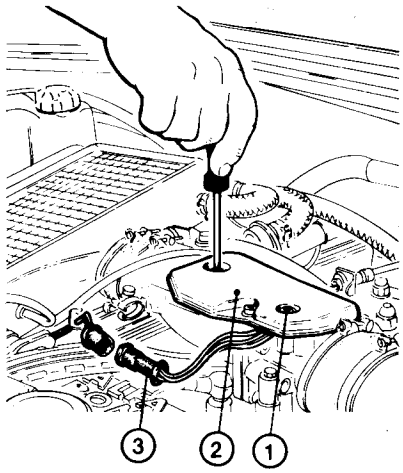
4. Position the new valve on the timing system cover and secure it together with the ground cables, using new washers. Reconnect both inlet and outlet air hoses and make the electrical connection.

THROTTLE BODY

REMOVAL

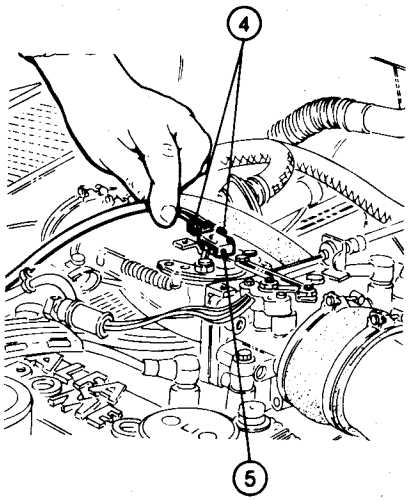
Remove throttle body assembly in the following manner:

1. Detach the negative terminal from the battery.
2. Unscrew retaining screws (1), remove protective cover (2) and detach connector (3).



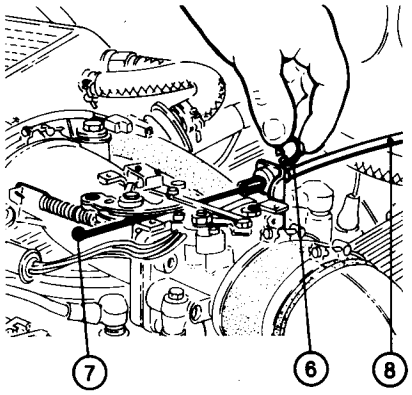
1. Cover retaining screws
2. Protective cover
3. Sending unit connector

3. Detach cables (4) from minimum cutout switch (5).



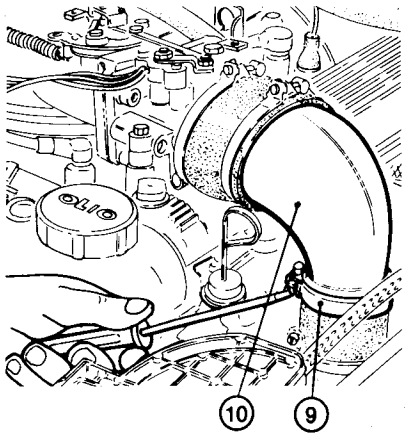
4. Minimum cutout switch feed cables
5. Minimum cutout switch

4. Remove stop ring (6), detach accelerator control cable (7) and release sheath (8) from bracket.



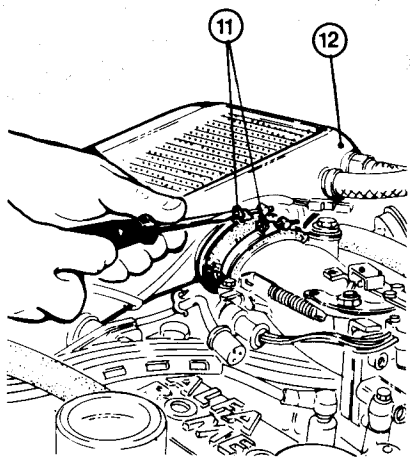
6. Stop ring
7. Accelerator cable
8. Sheath

5. Loosen clamp (9) securing throttle body union (10) to turbocharger.



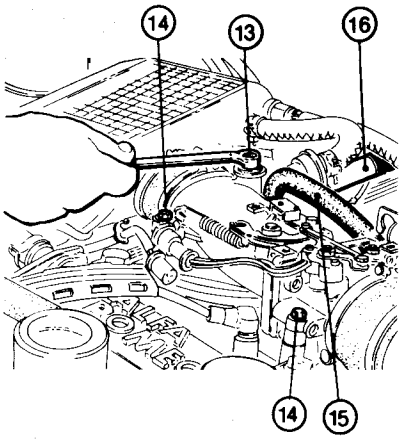
9. Clamp
10. Union

6. Loosen clamps (11) securing throttle body to intercooler (12).



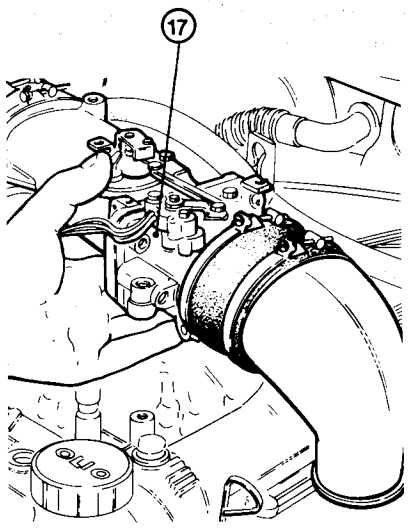
11. Clamps
12. Intercooler

7. Unscrew the screw (13) and screws (14) securing the throttle body to the timing system cover.
8. Detach hose (15) from auxiliary air valve (16).



13. Intercooler retaining screw
14. Throttle body retaining screws
15. Auxiliary air hose
16. Auxiliary air valve

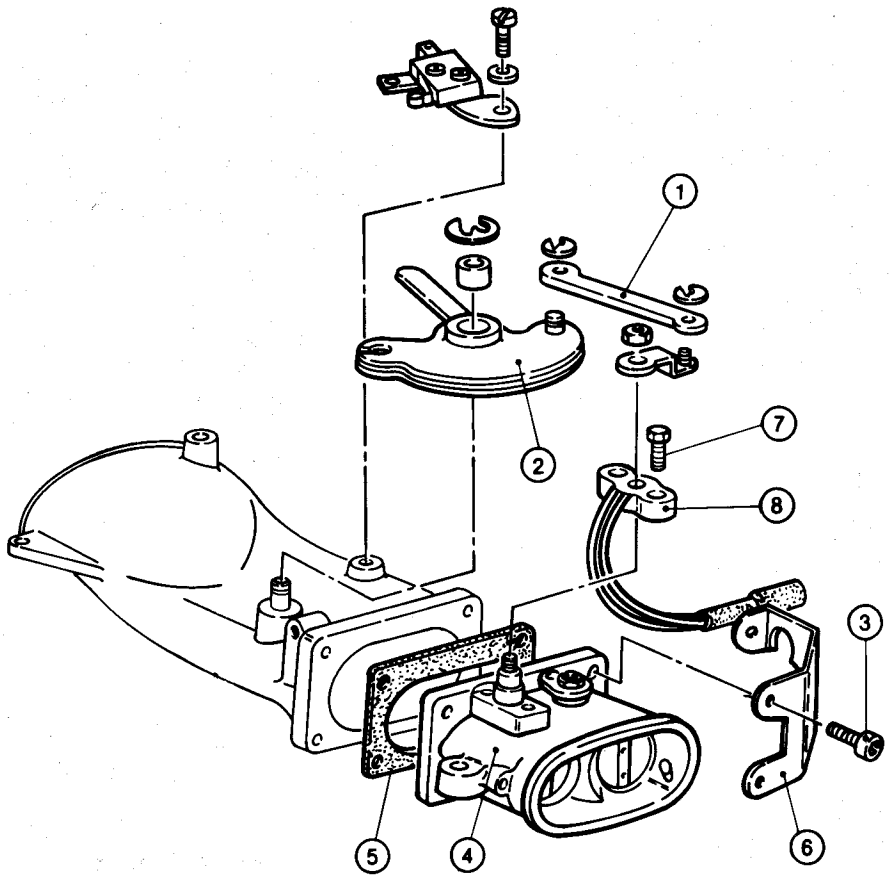
9. Remove throttle body (17) complete.



17. Throttle body

CAUTION:
- **Never tamper with throttle body adjustment.**
- **Plug the turbocharger delivery duct and intercooler intake to prevent the entrance of foreign matter.**

Throttle body disassembly
1. Remove throttle body complete with union connecting turbocharger and rubber sleeve connecting intercooler.
2. Detach tie rod (1) from cam (2).
3. Remove the four retaining screws (3), withdraw throttle body (4) and retrieve gasket (5) and bracket (6).
4. Unscrew the two screws (7) and remove throttle sending unit (8).



1. Tie rod
2. Cam
3. Throttle body retaining screws
4. Throttle body
5. Gasket
6. Accelerator cable support bracket
7. Sending unit retaining screws
8. Sending unit

Throttle body assembly
Carry out the installation by reversing the order of removal.
Check gasket (5), replacing it if necessary and adjust throttle position sending unit (8) (refer to: «Settings and Adjustments»).

INSTALLATION

Carry out installation of the complete throttle body by reversing the order of removal, taking care to restore the electrical connections correctly and fully tighten the clamps on the supercharging air intake.
If necessary, set the throttle body (refer to: «Settings and Adjustments»).

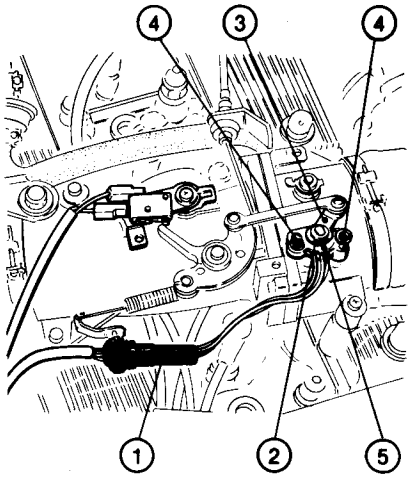
THROTTLE POSITION SENDING UNIT

ELECTRICAL TESTS

Refer to: «Electrical Tests».

REPLACEMENT

1. Detach connector (1).
2. Remove nut (2) and withdraw tie rod (3).
3. Remove screws (4) and throttle position sending unit (5).



1. Connector
2. Tie rod retaining nut
3. Tie rod
4. Sending unit retaining screws
5. Sending unit

4. Install a new throttle position sending unit and register it (refer to paragraph: «Settings and Adjustments»).

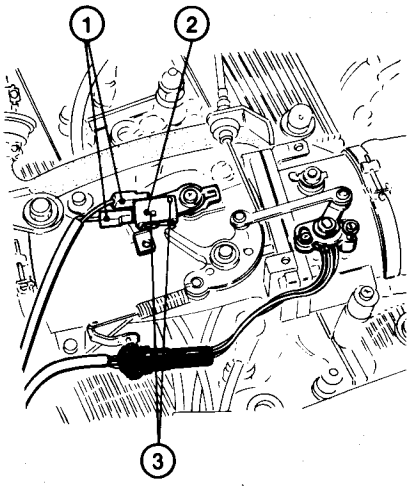
MINIMUM CUTOUT SWITCH

ELECTRICAL TESTS

Refer to: «Electrical Tests».

REPLACEMENT

1. Detach connectors (1) from switch (2).
2. Remove the two screws (3) and remove the switch



1. Switch connectors
2. Minimum cutout switch
3. Switch retaining screw

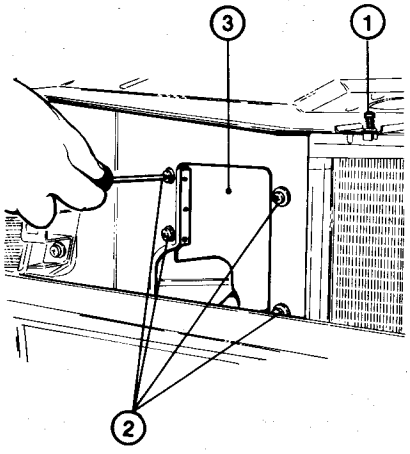
3. Fit a new switch and set it (refer to: «Setting and Adjustments»).

INTERCOOLER

REMOVAL

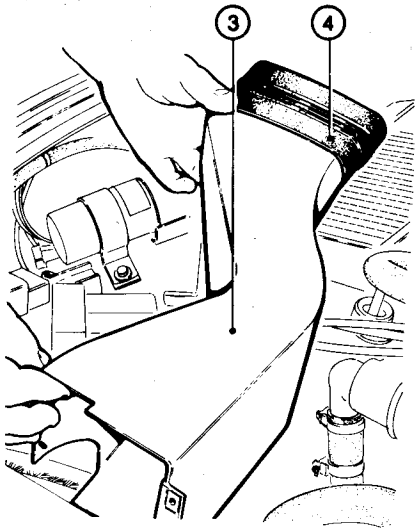
Remove the intercooler in the following way:

1. Disconnect battery terminals.
2. Unscrew screw (1) and remove front mask.
3. Unscrew and remove the four screws (2) securing air intake duct (3) to the body front panel and remove the bolt securing the duct to the battery bracket.



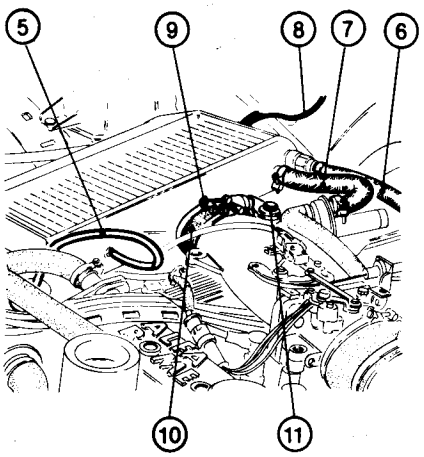
1. Mask retaining screw
2. Duct retaining screws
3. Air intake duct

4. Then remove duct (3) together with sleeve (4).



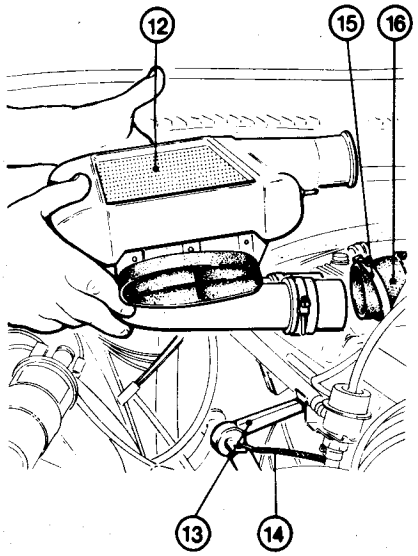
3. Air intake duct
4. Sleeve

5. Detach the following hoses and wires from the intercooler:
   - Pressure intake hose (5).
   - Servobrake vacuum line (6).
   - Auxiliary air hose (7).
   - Supercharging pressure sender cable (8).
6. Loosen clamp (9) securing supercharging air intake rubber sleeve (10).
7. Remove screw (11) securing reinforcing bracket.



5. Pressure regulator pressure intake
6. Servobrake vacuum intake hose
7. Auxiliary air valve
8. Supercharging pressure sender cable
9. Clamp
10. Sleeve
11. Screw

8. Unscrew the two securing screws and disconnect intercooler (12) from support bracket (13), paying attention to ground cable (14) secured to one of the two screws.
9. Loosen clamps (15) securing intercooler to rubber connectors (16) of the air intake manifold and remove intercooler (12).



12. Intercooler
13. Intercooler support bracket
14. Ground cable
15. Clamp
16. Rubber connector

CHECKS AND INSPECTIONS

1. Clean the intercooler thoroughly by blowing compressed air over the finning.

INSTALLATION

Proceed with the installation of the intercooler by reversing the order of removal, paying particular attention to the following:

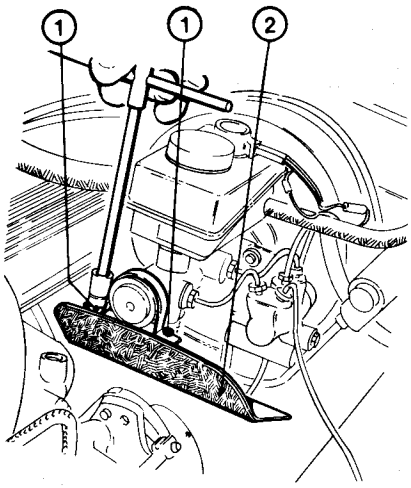
- Clamps (15) securing rubber connectors (16) to intercooler must be tightened to prevent the leakage of supercharged air.
- Re-connect the ground cable (14) to one of the screws securing the intercooler to bracket (13).

TURBOCHARGER

REMOVAL

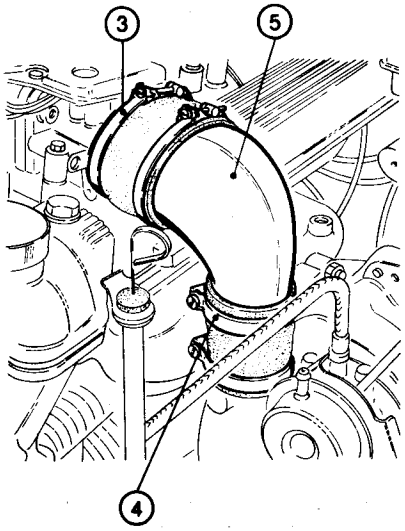
Proceed with the removal of the turbocharger as follows:

1. Remove the air filter together with the air flow gauge (with relative air intake ducts and filter casing) (see paragraph «Air filter — Removal»).
2. Unscrew the three bolts (1) and remove thermal shield (2).



1. Thermal shield securing screws
2. Thermal shield

3. Loosen clamps (3) and (4) and remove throttle body union (5).

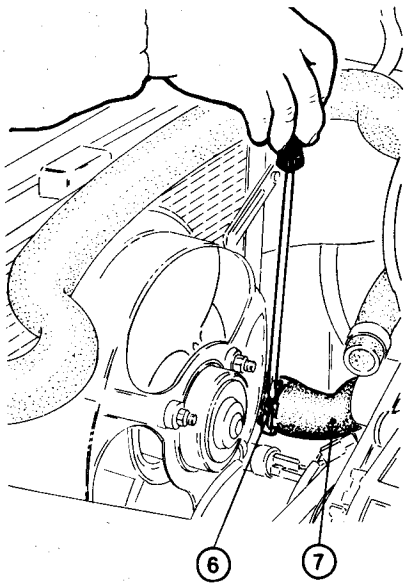


3. Clamp
4. Clamp
5. Throttle body union

CAUTION:
Plug turbocompressor openings to prevent the entry of foreign matter which could damage the rotors.

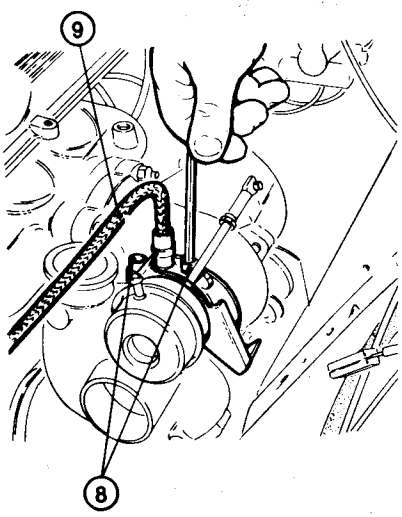
4. Loosen clamp (6) and disconnect sleeve (7) from the radiator.

NOTE:
Place a suitable container under the vehicle to collect coolant.



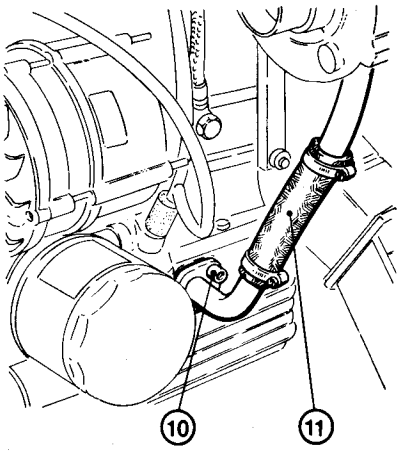
6. Clamp
7. Radiator water drain sleeve

5. Remove the two screws (8) and disconnect hose (9) from the connector on the turbocharger. Remove the gasket.



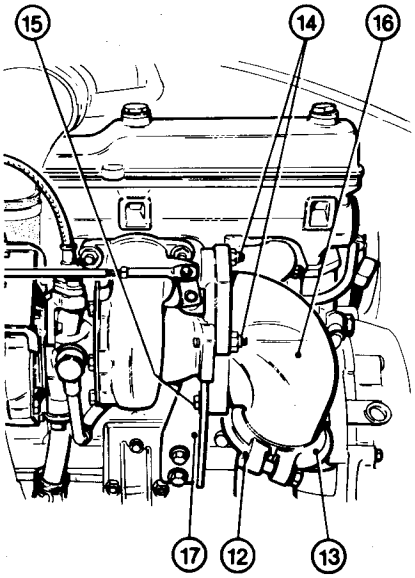
8. Screws
9. Turbocharger oil delivery hose

6. Remove the two screws (10) and disconnect hose (11) from the union on the oil sump.
Remove the gasket.



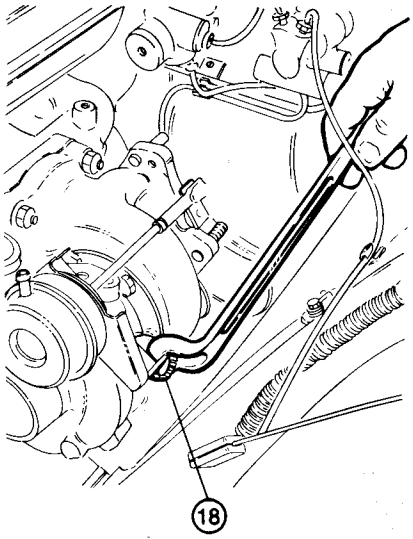
10. Screws
11. Oil-to-sump return hose

7. Unscrew the two bolts (12) and remove collar (13).
8. Unscrew the two nuts (14) and the two bolts (15) securing the turbocharger exhaust gas union (16) to lower support bracket (17).
Remove union (16) and the interposed gasket.



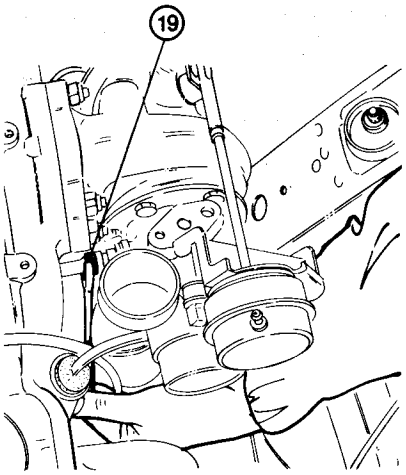
12. Bolts
13. Exhaust pipe retaining collar
14. Nuts
15. Bolts
16. Turbocharger exhaust gas union
17. Union support bracket

9. Remove bolt (18) and disconnect coolant-to-turbocharger delivery hose.



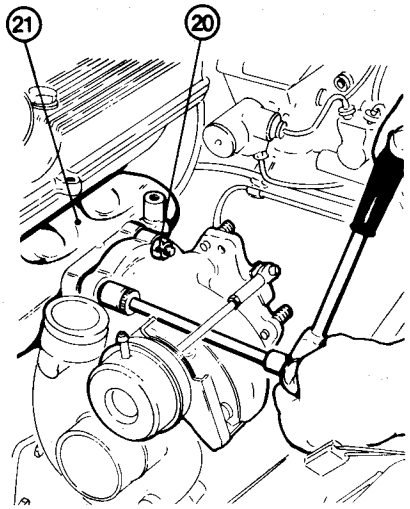
18. Coolant delivery hose securing bolt

10. Loosen nut (19) and disconnect coolant return hose from turbocharger.



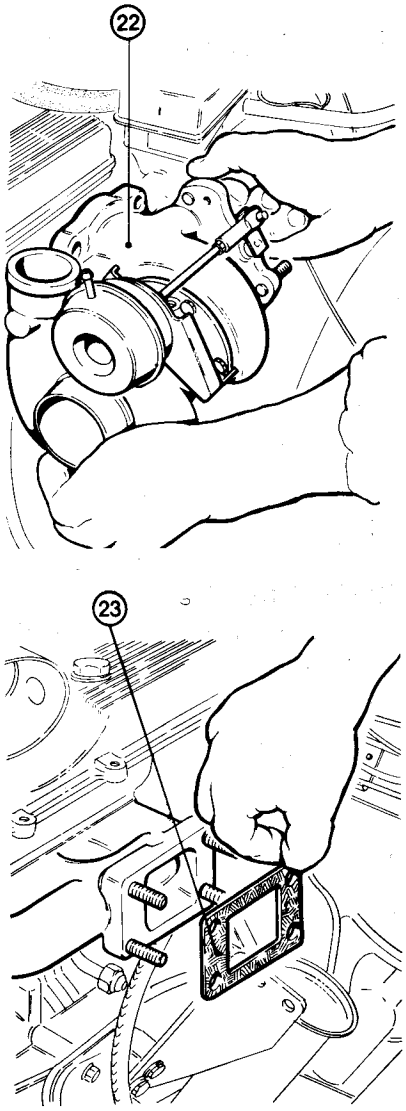
19. Nut retaining coolant return hose

11. Unscrew the four nuts (20) retaining the turbocharger to the exhaust manifold (21).



20. Turbocharger retaining nuts
21. Exhaust manifold

12. Withdraw the turbocharger group (22) from the exhaust manifold studs and retrieve the interposed gasket (23).



22. Turbocharger
23. Gasket

CHECKS AND INSPECTIONS

1. Check all the hoses and check that there are no cracks in the manifold and that the mating surfaces of the flanges are sound.
2. Check that the turbocharger shaft turns freely and that the play of the rotor is not excessive and that they do not touch the outer casing.
3. Visually check the integrity of the blading of the turbine and compressor.

INSTALLATION

Proceed with the installation of the turbocharger by reversing the order of removal, paying particular attention to the following:

- Replace the gaskets mentioned in «Removal».
- Replace the self-locking nuts securing the turbine to the exhaust manifold, the turbine to the exhaust union, the bolts securing the turbine to the support and the bolts securing the exhaust union to the exhaust pipe.
- Tighten the following to the prescribed torques:

— Nuts retaining turbocharger to exhaust manifold (1).
— Nuts retaining turbo exhaust union to turbine (2).

(T) : **Tightening torque**
38 to 47 N·m
(3.9 to 4.8 kg·m
28.02 to 34.66 ft·lb)

— Bolts securing turbocharger exhaust union to exhaust pipe (3).
— Nuts securing exhaust manifold to cylinder head (4).
— Bolts securing turbocharger lower support to engine block (5).
— Bolts securing turbocharger to lower support (6).
— Bolts securing oil delivery hose to turbocharger (7).

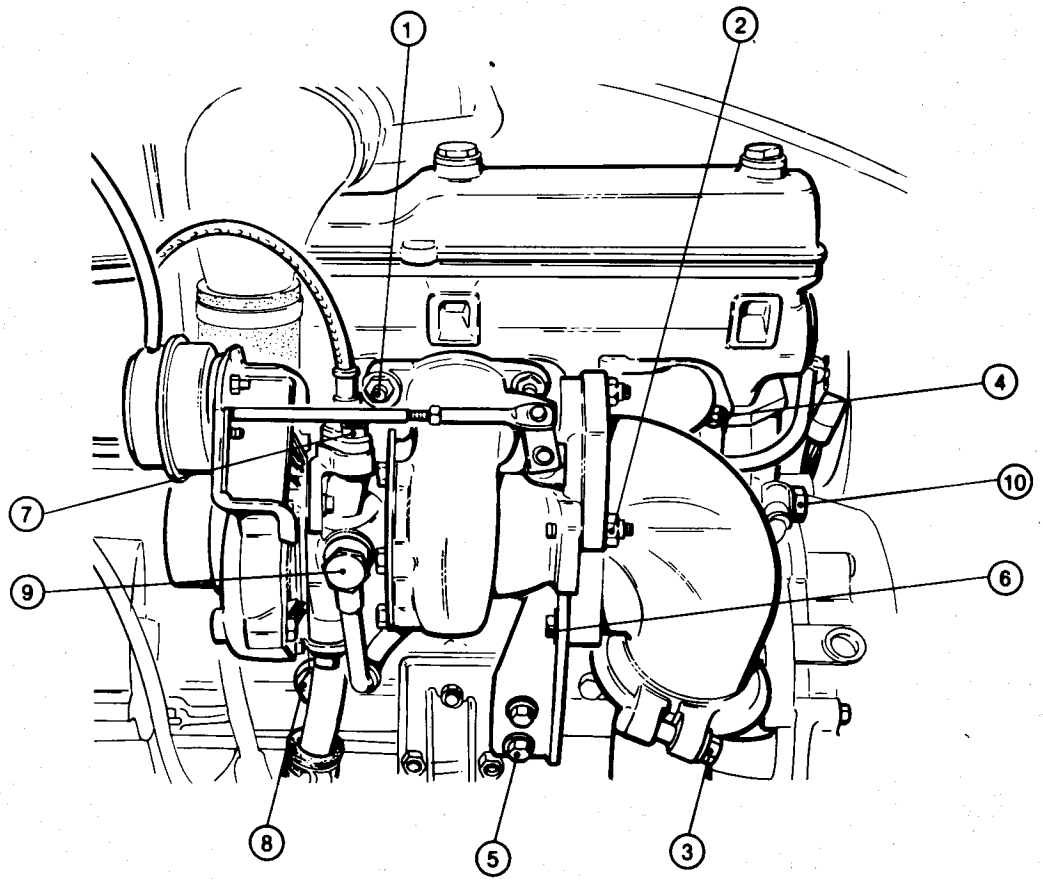
(T) : **Tightening torque**
19 to 24 N·m
(1.9 to 2.4 kg·m
14.01 to 17.70 ft·lb)

— Bolt securing oil delivery hose to engine block (8).

(T) : **Tightening torque**
40 to 50 N·m
(4.0 to 5.0 kg·m
29.50 to 36.90 ft·lb)

— Bolt securing water delivery hose union to turbocompressor (9).
— Bolt securing water delivery hose union to engine block (10).

(T) : **Tightening torque**
50 to 62 N·m
(5.0 to 6.2 kg·m
36.90 to 45.73 ft·lb)



1. Nuts securing turbocharger to exhaust manifold
2. Nuts securing turbocharger exhaust union to turbine
3. Bolts securing turbocharger exhaust union to exhaust pipe
4. Nuts securing exhaust manifold to cylinder head
5. Bolts securing turbocompressor lower support to engine block
6. Bolts securing turbocharger to lower support
7. Bolts securing oil delivery hose to turbocharger
8. Bolts securing oil delivery hose union to engine block
9. Bolt securing water delivery hose union to turbocharger
10. Bolt securing water delivery hose union to engine block

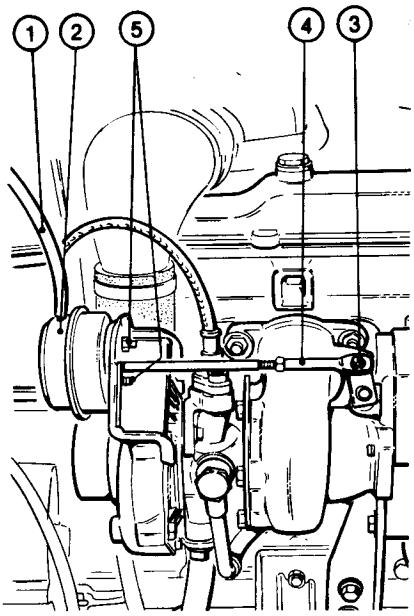
WASTE-GATE VALVE

CHECKS AND INSPECTIONS

Consult the paragraph: «Settings and Adjustments».

REMOVAL

1. Detach hose (1) from waste-gate valve (2).
2. Remove snap ring (3) and detach control stem (4).
3. Unscrew the two retaining screws (5) and remove waste-gate valve (2).



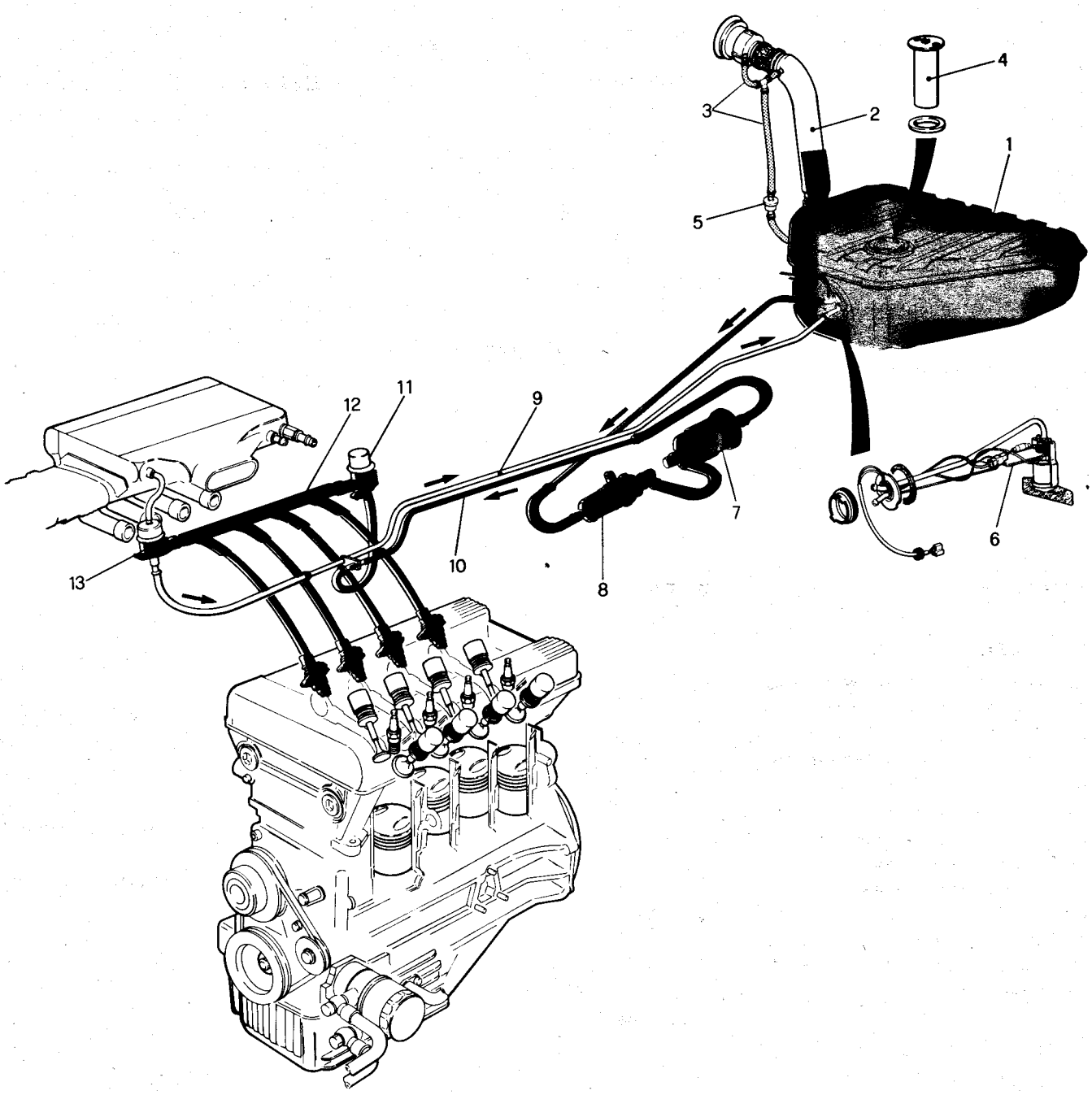
1. Hose connecting waste-gate to supercharging pressure regulation solenoid valve
2. Waste-gate valve
3. Snap ring
4. Waste-gate valve control stem
5. Nuts

INSTALLATION

Proceed with the installation of the waste-gate valve by reversing the order of removal.

If necessary adjust as prescribed in the paragraph «Settings and Adjustments».

FUEL SUPPLY SYSTEM



FUEL DELIVERY CIRCUIT

FUEL RETURN CIRCUIT

1. Tank
2. Filler
3. Fill-up breather hose
4. Fuel level gauge
5. Check valve
6. Submerged pump
7. Filter
8. Main pump
9. Fuel return piping
10. Fuel delivery piping
11. Hammering damper
12. Fuel distributor manifold
13. Fuel pressure regulator

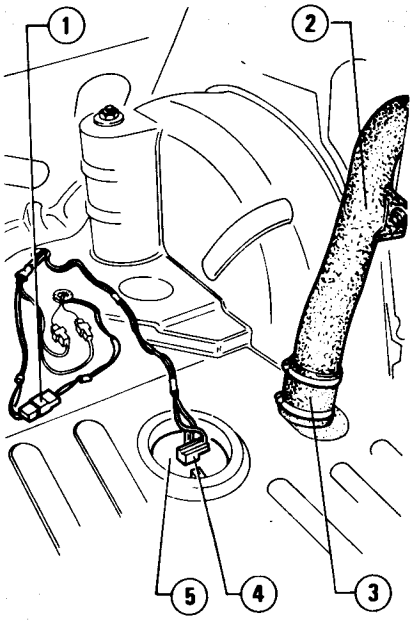
WARNING:
Strictly follow the below indications before replacing the fuel system components:
a. Ensure that the workshop is correctly equipped to enable operations to be performed safely (fire extinguishers, etc.).
b. Detach the battery ground cable.
c. Pour the fuel drawn from the tank into a suitable container fitted with safety cover.

CAUTION:
After having reassembled the fuel system components, verify system tightness when at 4 bar (58 psi) pressure.

FUEL TANK

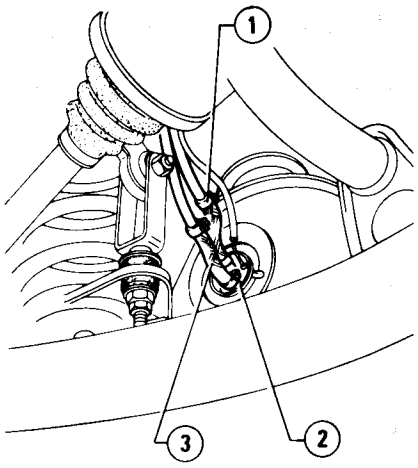
REMOVAL

1. Set vehicle on a lift; remove filler plug and suck fuel from tank by means of a suitable pump.
2. Remove lower trim of luggage compartment, move side trim (right-hand side), and remove the fuel level gauge cover.
3. Detach connectors (1) and (4), then extract connector (1) from the related cable-raceway withdrawing it from under the vehicle.
4. Loosen the clamp and detach sleeve (3) from tank without damaging the rubber gasket underneath.



1. Submerged pump supply connector
2. Fuel filler
3. Sleeve connecting filler to tank
4. Fuel level gauge connector
5. Fuel level gauge

5. Raise vehicle on lift, and disconnect hoses (1) and (3) from flange (2).



1. Fuel return hose
2. Submerged pump flange
3. Fuel delivery hose

6. Support tank by means of a column lift, unscrew the three screws which secure tank to body and remove.
7. Disassemble tank, if required.

CHECKS AND INSPECTIONS

Check for cracks or deformations in the tank; replace if required.

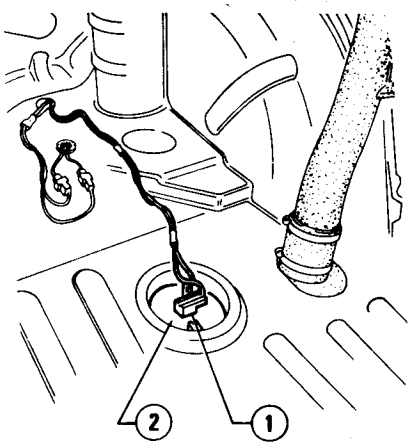
INSTALLATION

1. Install tank on vehicle by reversing the order of removal, verifying that the rubber gasket between tank and luggage compartment floor is correctly positioned in correspondance with filler.

FUEL LEVEL GAUGE

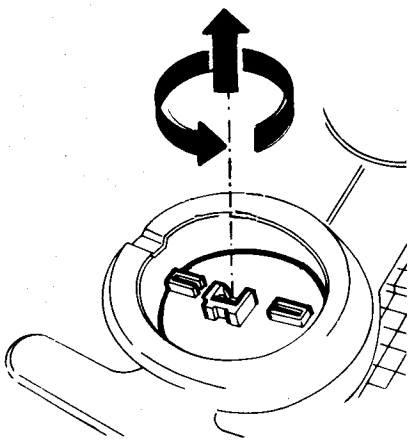
REPLACEMENT

1. Remove the luggage compartment floor trim.
2. Remove cover of fuel level gauge (2) and detach connector (1).

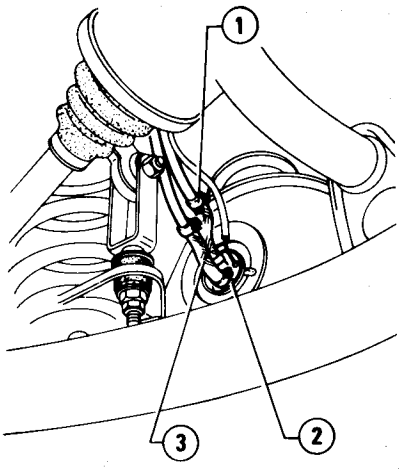


1. Fuel level gauge connector
2. Fuel level gauge

3. By means of a suitable tool, rotate fuel level gauge counterclockwise; then withdraw it from tank together with the related gasket.

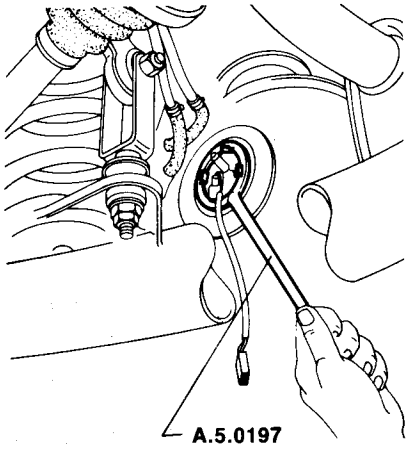


4. Replace gasket before installing the fuel level gauge on tank.



1. Fuel return hose
2. Submerged pump flange
3. Fuel delivery hose

4. By means of tool **A.5.0197** rotate the submerged pump flange counterclockwise, then withdraw the unit from tank, together with the related gasket.



5. **Replace** gasket before installing the submerged pump unit; reinstall it by means of tool **A.5.0197**.

AUXILIARY FUEL PUMP AND GRID FILTER

REPLACEMENT

1. Set vehicle on lift; remove filler cap and suck fuel from tank by means of a suitable pump.
2. Lift the luggage compartment floor trim, detach the submerged pump supply connector, and extract it from the related cable raceway withdrawing it from under the vehicle.
3. Raise vehicle by means of the lift, then detach hoses (1) and (3) from flange (2).

FUEL PIPING

STACCO

CAUTION:
Disconnect fuel system piping only when strictly required.

1. Set vehicle on lift.
2. Remove filler plug and, by means of a suitable pump, suck fuel from the tank.
3. Loosen the clamps which secure the ends of the hoses to be removed.

CAUTION:
When disassembling, plug both pipes and hoses so as to prevent dust or impurities from entering.

4. To remove the piping located on the floor inside the passenger compartment, remove the floor trim on the right-hand side.

CHECKS AND INSPECTIONS

1. Check for porosity and deterioration of hoses; replace the faulty ones.
2. Check for oxidation, clogging and dents of pipes.

INSTALLATION

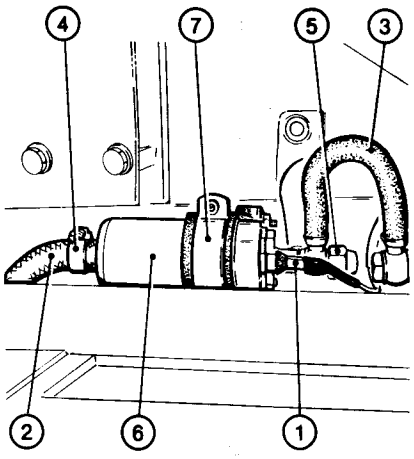
Carefully install piping by reversing the order of removal and complying with the following.

CAUTION:
a. Carefully install clamps on system joints.
Do not tighten clamps excessively so as to prevent damaging piping.
b. Do not bend or twist pipes when installing them on vehicle.
c. The piping inside the vehicle must be inserted into the related pipe-raceway up to the red reference strips marked on each pipe/hose.
d. Start the engine and check for leaks from joints.

MAIN FUEL PUMP

REPLACEMENT

1. Set vehicle on a garage lift and disconnect the battery negative terminal.
2. Working from under the vehicle, disconnect pump supply cables (1).
3. Throttle hoses (2) and (3), remove clamp (4), unscrew union (5) and then detach hoses (2) and (3) from pump (6).
4. Loosen clamp (7) and remove pump (6).



1. Pump supply cables
2. Fuel inlet hose to pump
3. Fuel outlet hose from pump
4. Clamp
5. Union
6. Fuel pump
7. Pump clamp

5. Install the new fuel pump by reversing the order of removal, paying special attention to the following:

- The pump is supplied by spares in a sealed package, filled with protective oil and with unions plugged.
  It is not necessary to empty it when installing.
- Take care not to invert the supply cable connections (1).
- Lock the following to the prescribed torque:

— Union (5) of pump fuel outlet hose.

(T) : **Tightening torque**
10 to 16 N·m
(1.02 to 1.6 kg·m
7.37 to 11.80 ft·lb)

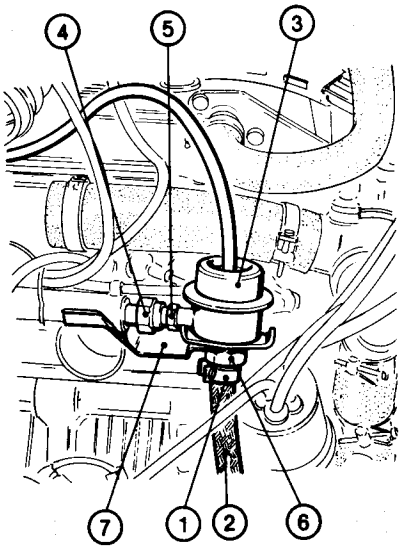
— Pump support clamp retaining nut (7).

(T) : **Tightening torque**
1.9 to 2.4 N·m
(0.19 to 0.24 kg·m
1.40 to 1.77 ft·lb)

FUEL PRESSURE REGULATOR

REPLACEMENT

1. Remove intercooler (see paragraph «Intercooler — Removal»).
2. Guarding against the possibility of fuel escaping, loosen clamp (1) and disconnect hose (2) from pressure regulator (3) and plug hose.
3. Unscrew union (4), applying a second spanner to checking nut (5).
4. Unscrew nut (6) securing the pressure regulator to bracket (7), retrieve the washer under it and remove regulator.



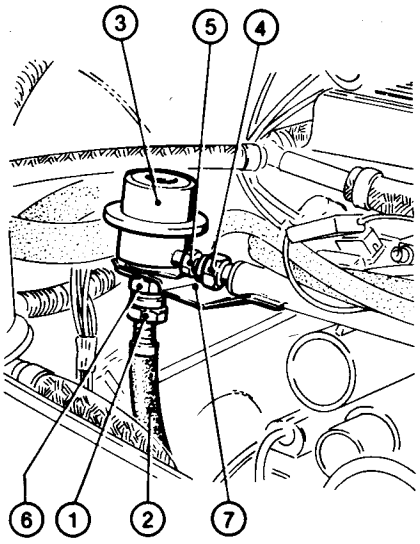
1. Clamp
2. Fuel return hose
3. Pressure regulator
4. Union
5. Checking nut
6. Regulator retaining nut
7. Support bracket

5. Assemble a new pressure regulator by proceeding in the opposite order to removal.
6. Assemble the intercooler (see paragraph «Intercooler — Installation»).

HAMMERING DAMPER

REPLACEMENT

1. Remove intercooler (see paragraph «Intercooler — Removal»).
2. Taking precautions against fuel escape, loosen union (1), disconnect hose (2) from hammering damper (3) and plug hose.
3. Unscrew union (4) applying a second spanner to checking nut (5).
4. Unscrew nut (6) securing hammering damper to bracket (7), retrieve the washer under it and remove damper.



1. Fuel delivery hose union
2. Fuel delivery hose
3. Hammering damper
4. Union
5. Checking nut
6. Damper securing nut
7. Support bracket

5. Assemble a new hammering damper by proceeding in the opposite order to removal.
6. Assemble intercooler (see paragraph «Intercooler — Installation»).

ELECTROINJECTORS

CHECKS AND INSPECTIONS

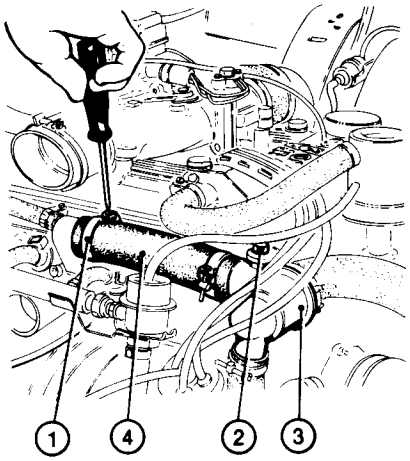
1. Electrical tests
Refer to: «Electrical Tests».

2. Check of electroinjectors opening
a. Measurement of exhaust CO emission (see paragraph «Settings and Adjustments»).
b. Detach electroinjector connectors one at a time, check the CO percentage each time, a verify that value is constant at each check.
c. If not so, identify the faulty electroinjector and replace it (see paragraph «Replacement»).
d. However, a visual confirmation of electroinjectors functioning can be obtained by comparing the spark plug electrodes colour:
— Black colour indicates a too rich mixture.
— Light colour indicates a too lean mixture.

3. Check of electroinjector tightness
a. Detach the electroinjector-fuel distributor manifold unit operating as indicated in «Replacement», keeping the fuel supply system connected.
b. Detach electroinjector connectors.
c. Operate starter and check for fuel leaks from electroinjectors; if leaks are present, replace the faulty electroinjector.

REMOVAL

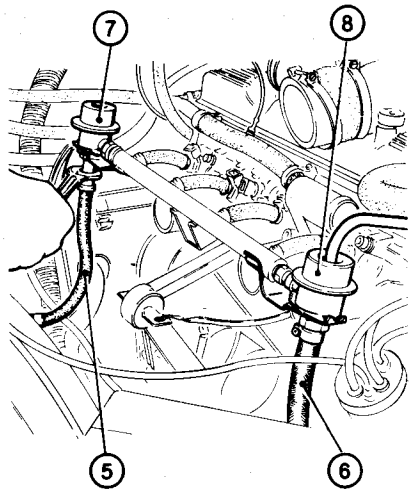
1. Remove intercooler (see paragraph «Intercooler — Removal»).
2. Place a suitable container under the vehicle and drain engine coolant system.
3. Detach supply connectors from electroinjectors, from water temperature sensor and sender, and from oil level sensor. Remove clamps securing the electrical wiring to the fuel distributor manifold.
4. Loosen clamp (1), remove screw (2) securing thermostatic cup (3) and then disconnect sleeve (4).



1. Clamp
2. Screw
3. Thermostatic cup
4. Sleeve

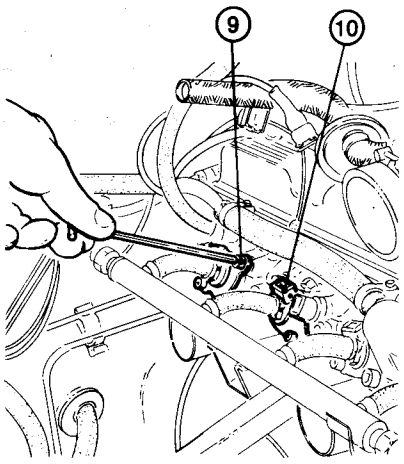
5. Detach hoses (5) and (6) from hammering damper (7) and pressure regulator (8) respectively.

WARNING:
When detaching hose (5) operate carefully as residual pressure in the fuel system may cause fuel to escape.



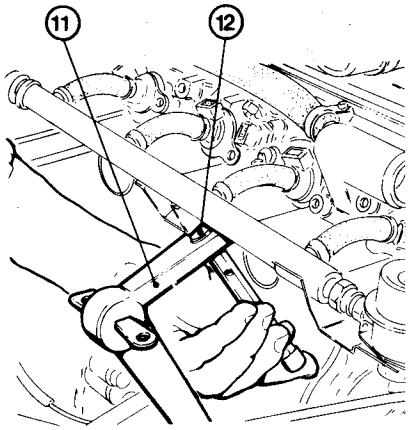
5. Fuel delivery hose
6. Fuel return hose
7. Hammering damper
8. Pressure regulator

6. Remove the eight screws (9) securing electroinjectors (10) to fuel intake manifold.



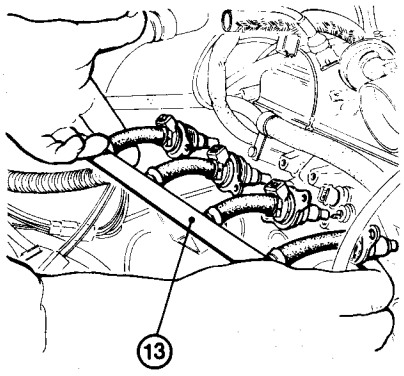
9. Electroinjector retaining screws
10. Elettroinjectors

7. Unscrew nut on bracket (11) and retrieve silentblock (12).



11. Intercooler support bracket and fuel distributor manifold
12. Silentblock

8. Remove fuel distributor manifold (13) complete with electroinjectors.

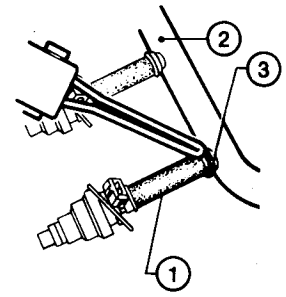


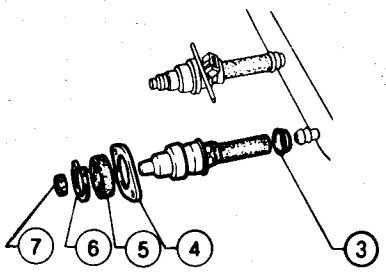
13. Fuel distributor manifold with electroinjectors

REPLACEMENT

CAUTION:
Before replacing an electroinjector, take note of connector position on electroinjector so that it can be correctly repositioned when installing the new electroinjector.

1. Cut hose (1) using a welder, detach it from fuel distributor manifold (2) and recover bush (3).





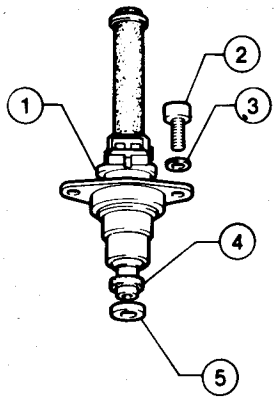
1. Electroinjector supply hose
2. Fuel distributor manifold
3. Bush
4. Flange
5. Rubber gasket
6. Seeger ring
7. O-ring

2. Install a **new** electroinjector fitting bush and supply hose on fuel distributor manifold until it strikes against bush itself.

CAUTION:
Electroinjector must be fitted on fuel distributor manifold with the related connector towards cylinder heads.
To fit the electroinjector, it is recommended to wet the related rubber hose with fuel. However, for this operations never use grease or vaseline.

INSTALLATION

1. Replace O-ring (4).
2. Install electroinjectors into the related seats, taking care to position seal ring (5) correctly.



1. Flange
2. Electroinjector securing screw
3. Washer
4. O-ring
5. Seal ring

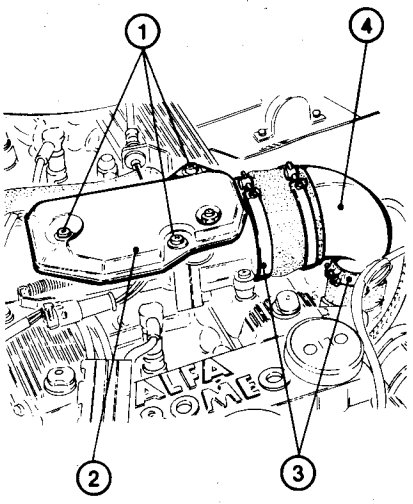
3. Install the other components by reversing the order of removal, complying with the following indications:
- Restore coolant correct level.
- Check the exhaust CO percentage; adjust if necessary (see paragraph «Setting and Adjustments»).

SETTINGS AND ADJUSTMENTS

SETTING OF THROTTLE BODY (Check with Flowmeter)

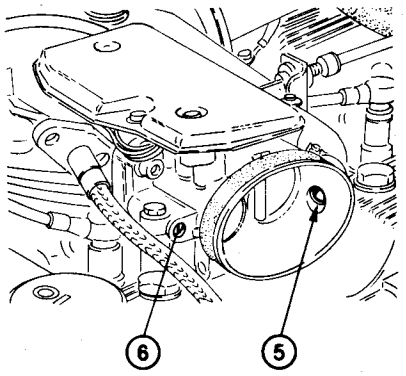
Check the tightness of the throttle body discs as follows:

1. Remove the three screws (1) and remove protective cover (2). Then loosen clamps (3) and detach union (4) from throttle body.



1. Cover retaining screws
2. Protective cover
3. Union retaining clamps
4. Throttle body union

2. Stop the hole of the auxiliary air valve supply duct hole (5) and check that there is no leakage through idle r.p.m. adjustment screw (6) (which must be fully tightened).

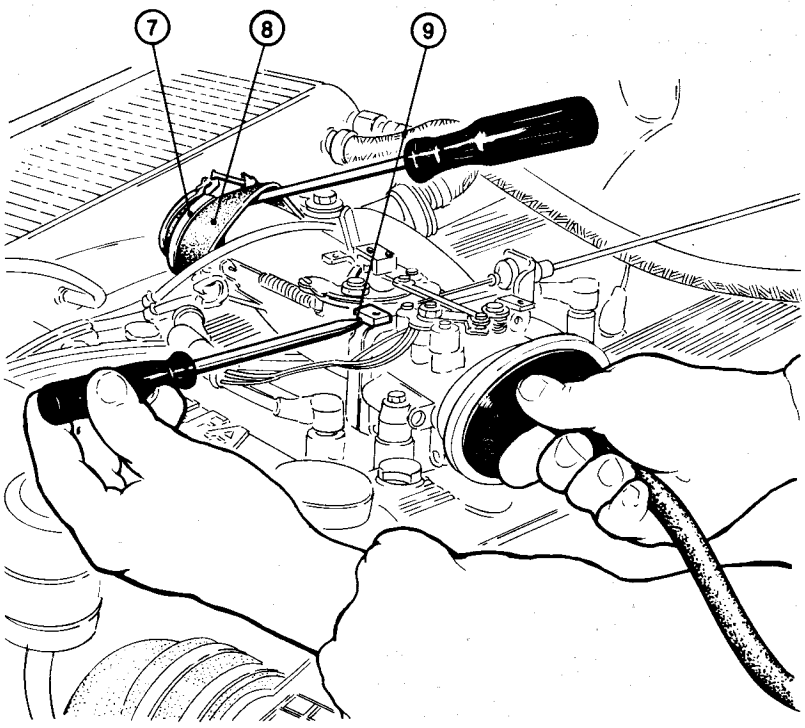


5. Auxiliary air valve supply duct hole
6. Idle r.p.m. adjustment screw

3. Loosen clamp (7) and place a suitable tool in sleeve (8) to permit air to escape during the flowmeter check.
4. Rest the flowmeter tap **C.2.0055** on throttle body inlet.
5. Measure the air flow through throttle and verify that it is within prescribed values.

Air flow from accelerator throttle in closed position (Solex flowmeter): 350 on scale N

6. If the flowmeter does not show this value adjust screw (9) until it is obtained.



7. Clamp
8. Sleeve
9. Primary throttle regulation screw

7. Install the components detached by reversing the order of removal.
8. Adjust idle r.p.m. (see paragraph «Check and Adjustment of Idle r.p.m.»).

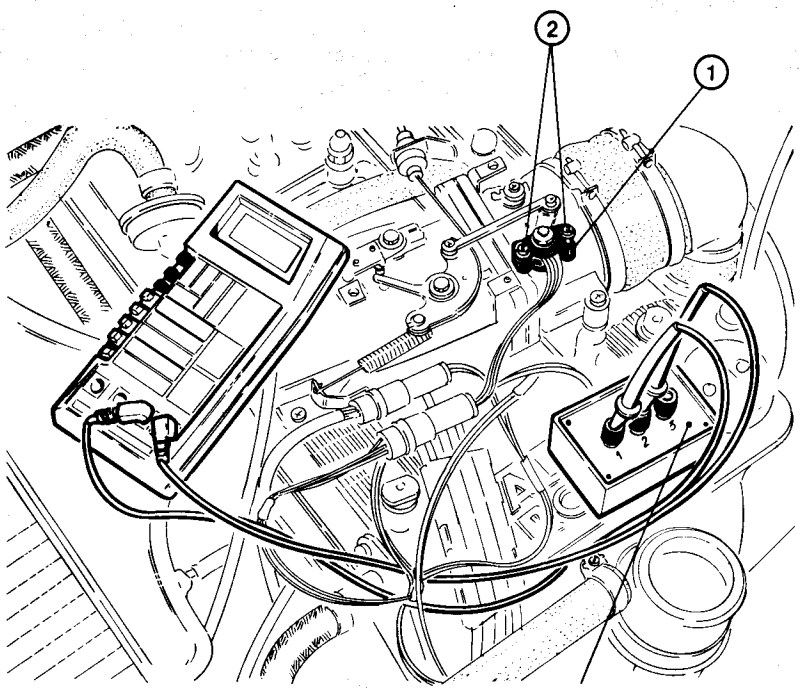
THROTTLE POSITION SENDING UNIT ADJUSTMENT

NOTE:
Before adjusting the throttle position sending unit ensure that the throttle body is correctly adjusted (see paragraph «Setting of Throttle Body»).

1. Disconnect the connector (multi-pin) from the ignition control unit (located inside the vehicle on the front right wheelhouse) and connect it to interface **C.1.0134**.
2. Working from inside the engine compartment, remove protective cover detach the throttle position sending unit connector and connect it to adjustment device **C.1.0131**.
3. Take a 2 V FSR multimeter and insert the black prod in bush no. 1 of adjustment device **C.1.0131** and red prod in bush no. 2.
4. Insert the ignition key and check that the multimeter indicates

1050 to 1100 mV

5. If the prescribed value is not obtained adjust throttle position sending unit (1) by loosening retaining screws (2) and rotating it until a reading of 1050 to 1100 mV is obtained on the multimeter.
6. Then lock the sending unit, take out the ignition key, disconnect the test instrument and fit the protective cover.



C.1.0131

1. Throttle position sending unit
2. Sending unit retaining screws