

FUEL SYSTEM

GROUP 04

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(*) 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

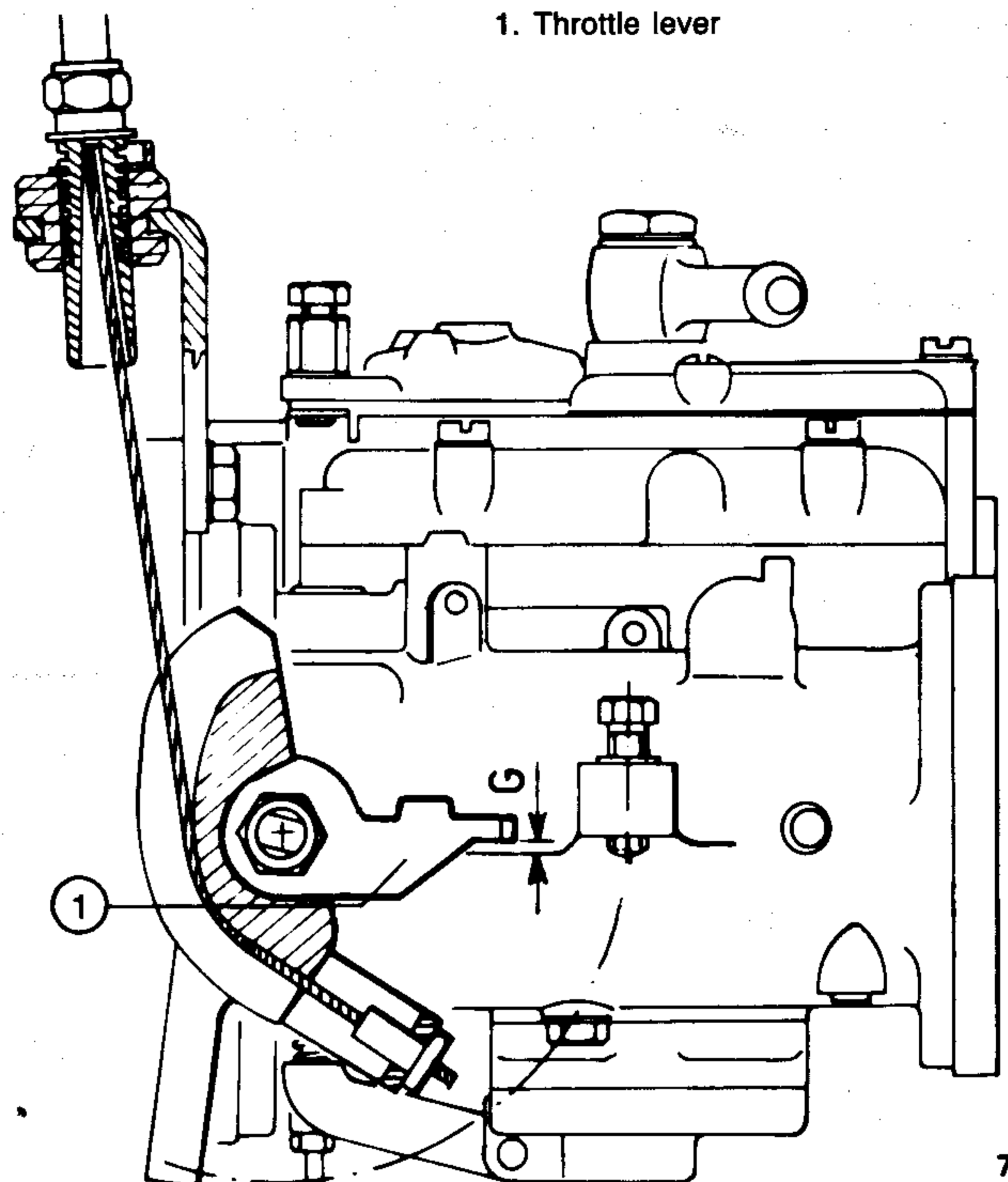
1.6 1.8 2.0

- Check that flexible shafting does not bind in its conduit.
- 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).

- 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.



LOAD SENSOR ADJUSTMENT

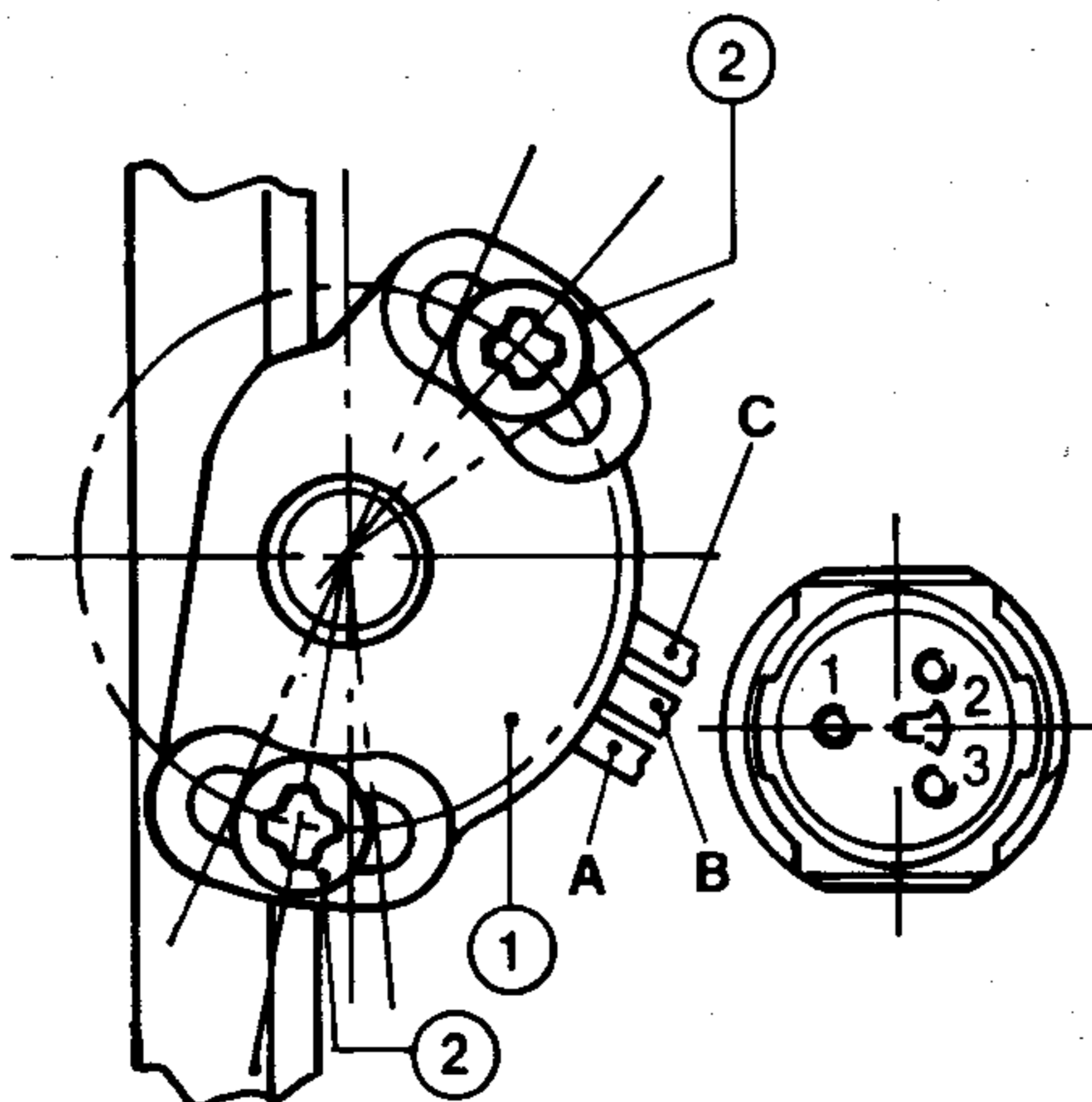
Alfa 90 1.8 2.0

Alfa 75 1.6 1.8 2.0

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

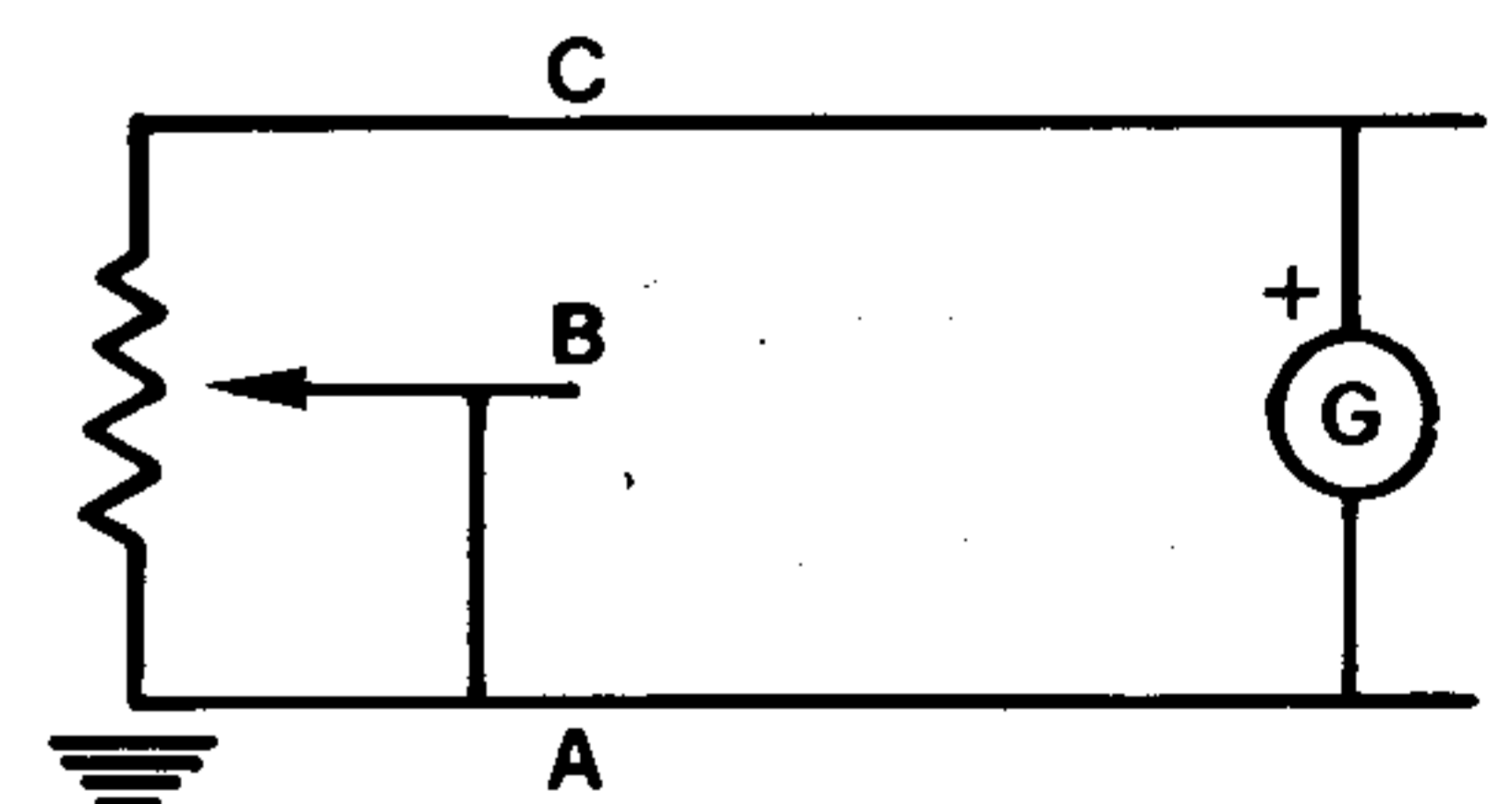
CAUTION:

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



- Load sensor
- Capscrews

Connections diagram



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

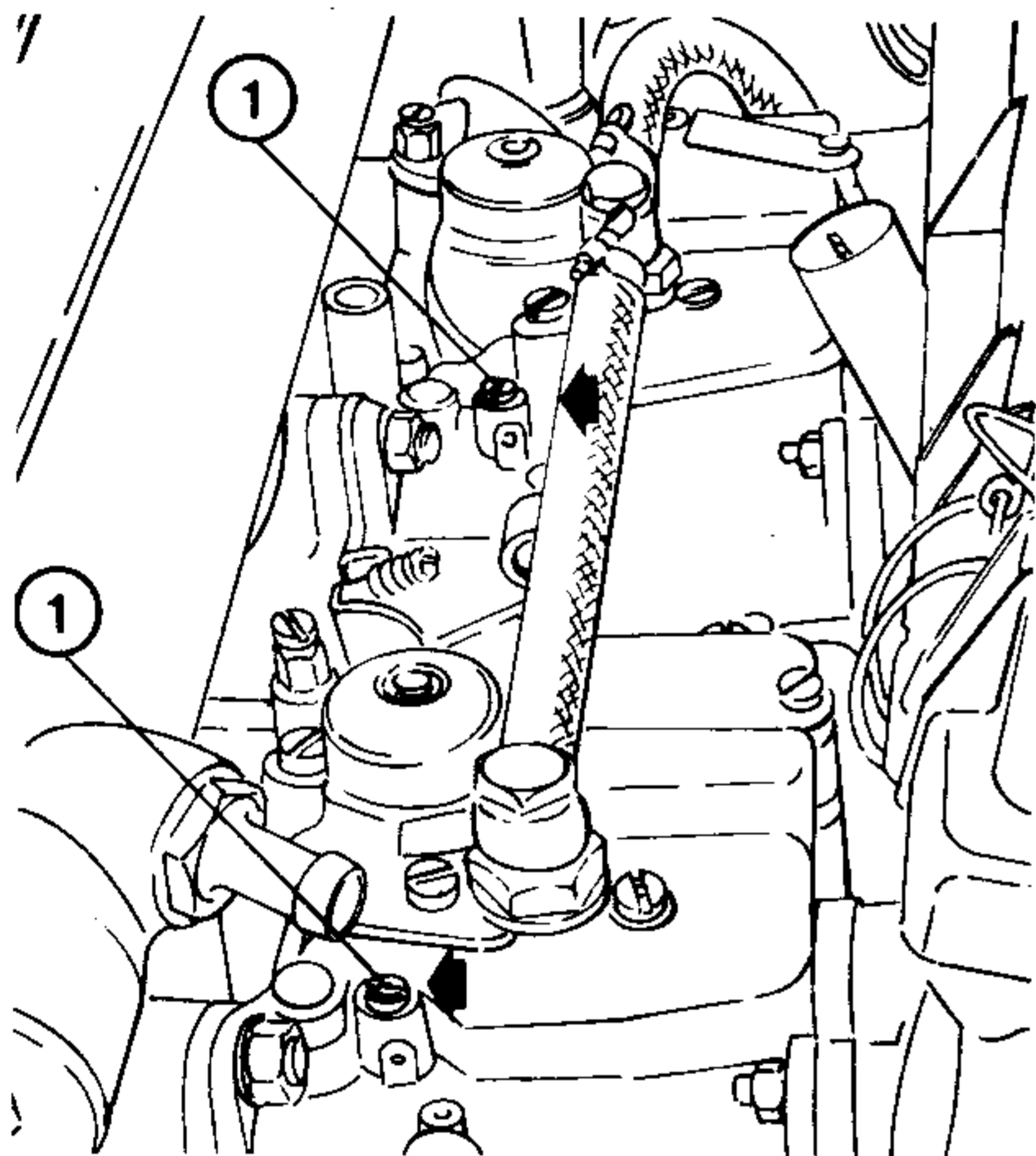
T : Tightening torque
Load sensor capscrews
 11 to 18 Nm
 (1.17 to 1.8 kgm
 8.1 to 13.3 ft.lb)

ON VEHICLE ACCELERATING PUMP OUTPUT TEST

1.6 1.8 2.0

With the carburettor 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 carburettor.

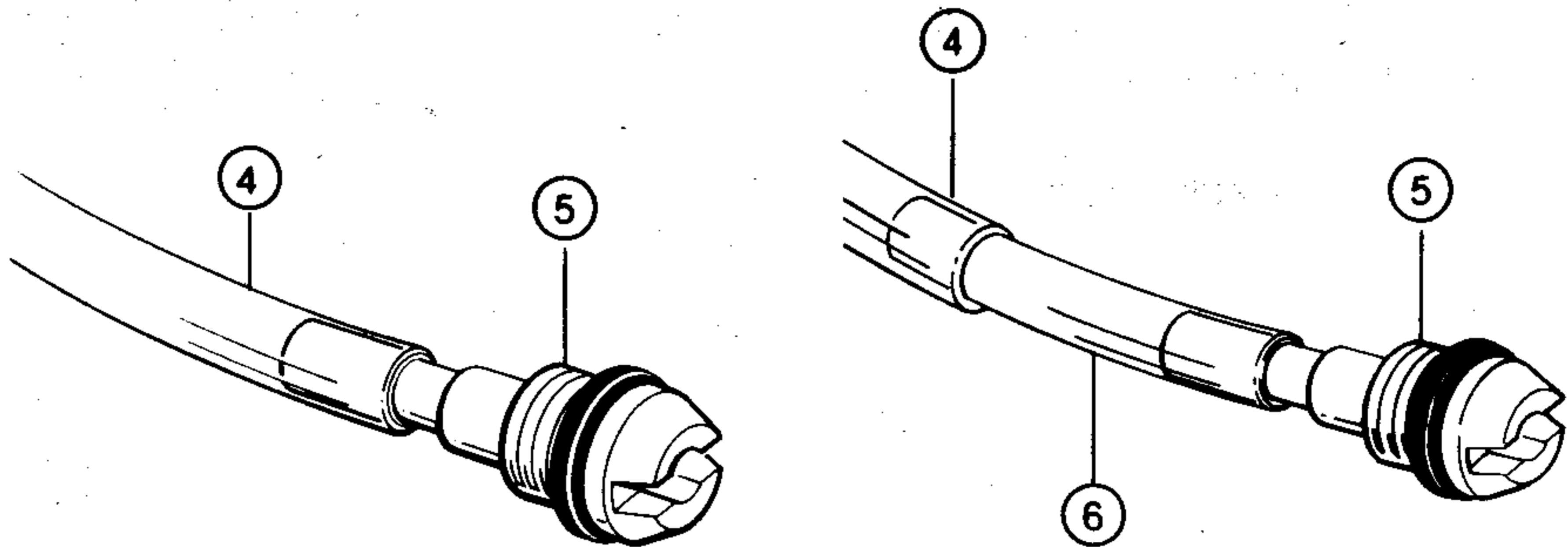
Horizontal carburettor tester:

- 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.

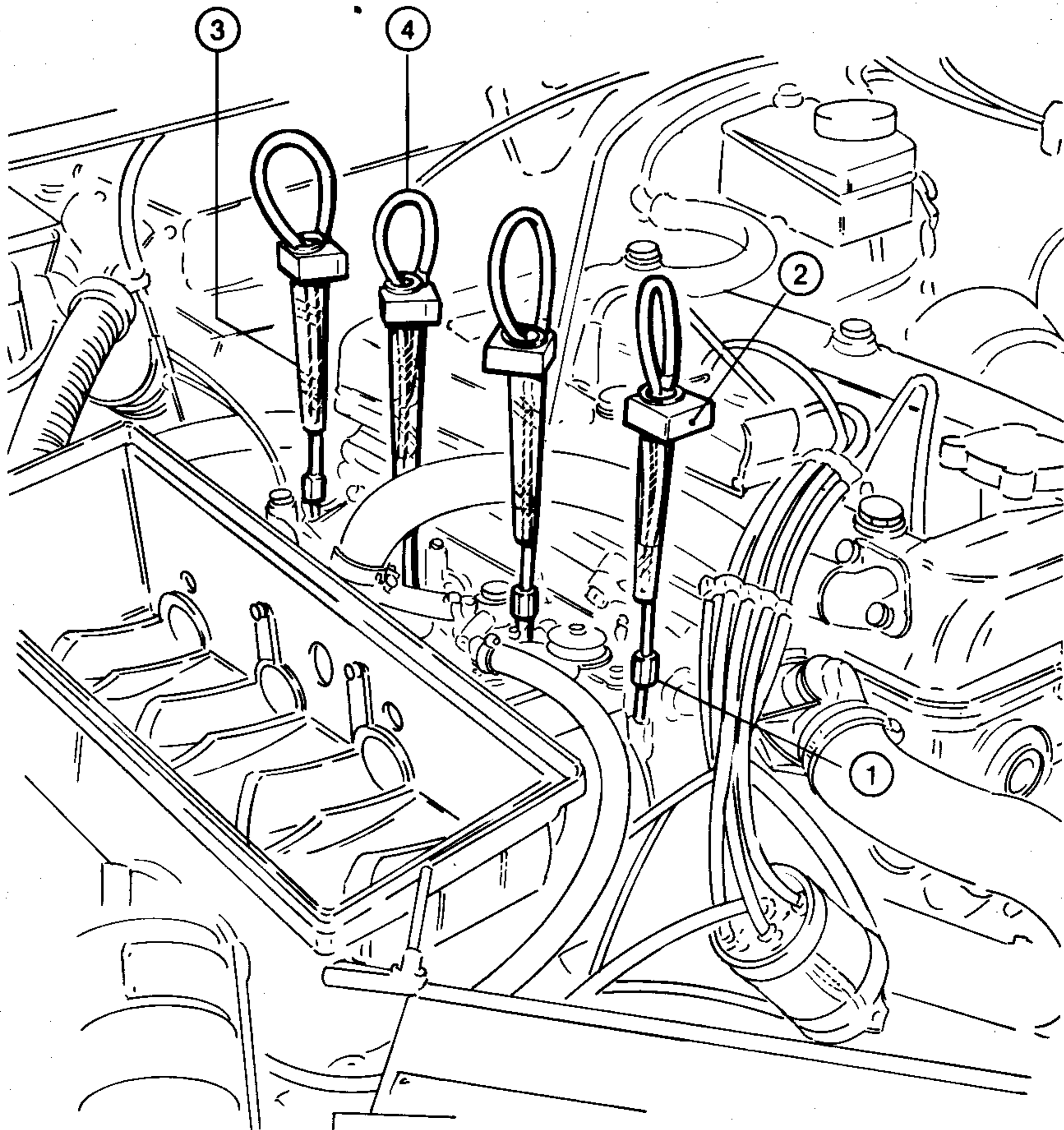


NOTE:

For SOLEX carburettors 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 carburettor 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

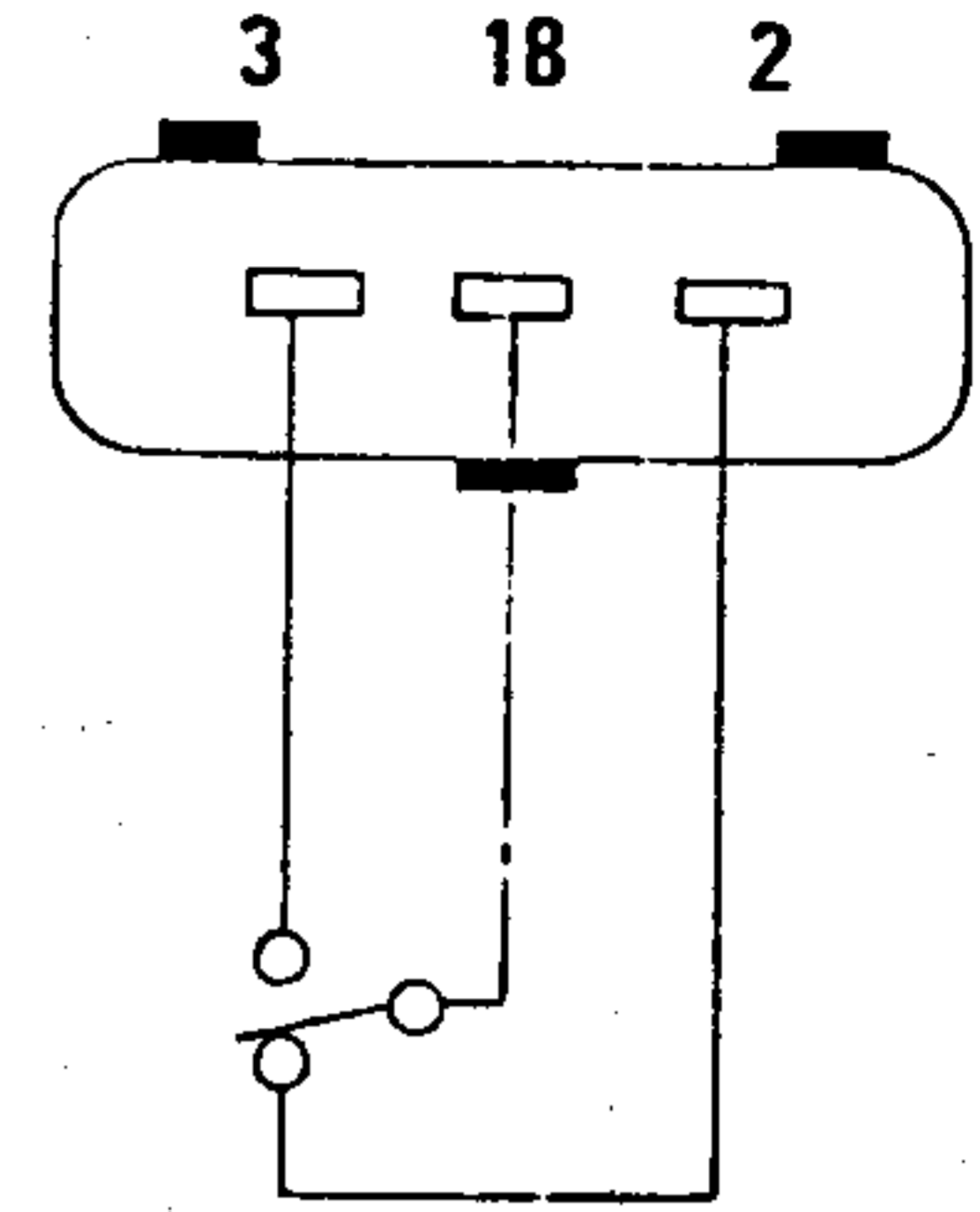
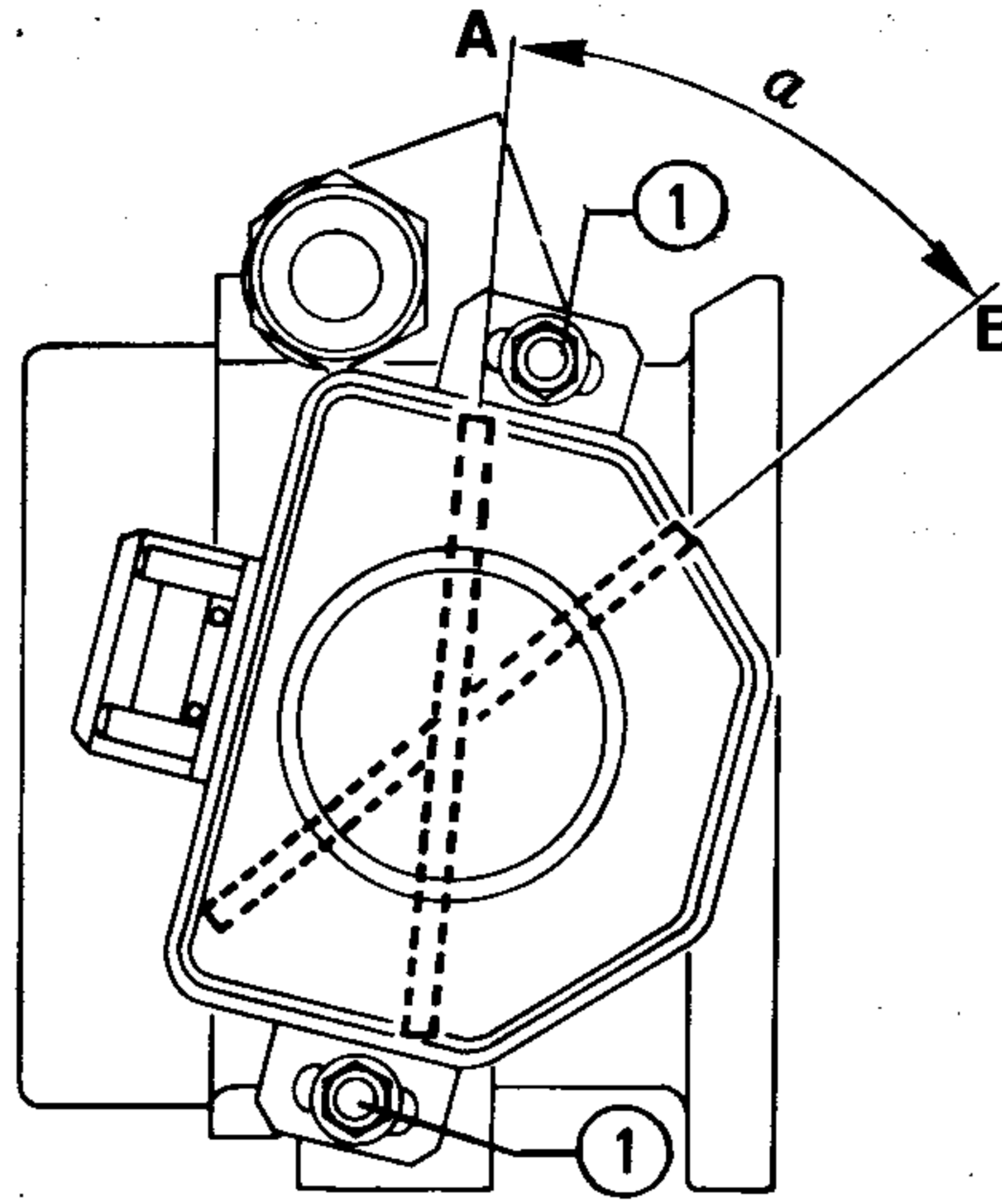
FUEL SYSTEM

2. If not so, loosen screws ① and rotate switch until contact ($\sim 0 \Omega$ resistance) between terminals 2 and 18 is obtained, with throttle fully closed; re-tighten 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:

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

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: **16** **18** **20** "Exhaust system".

FUEL 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

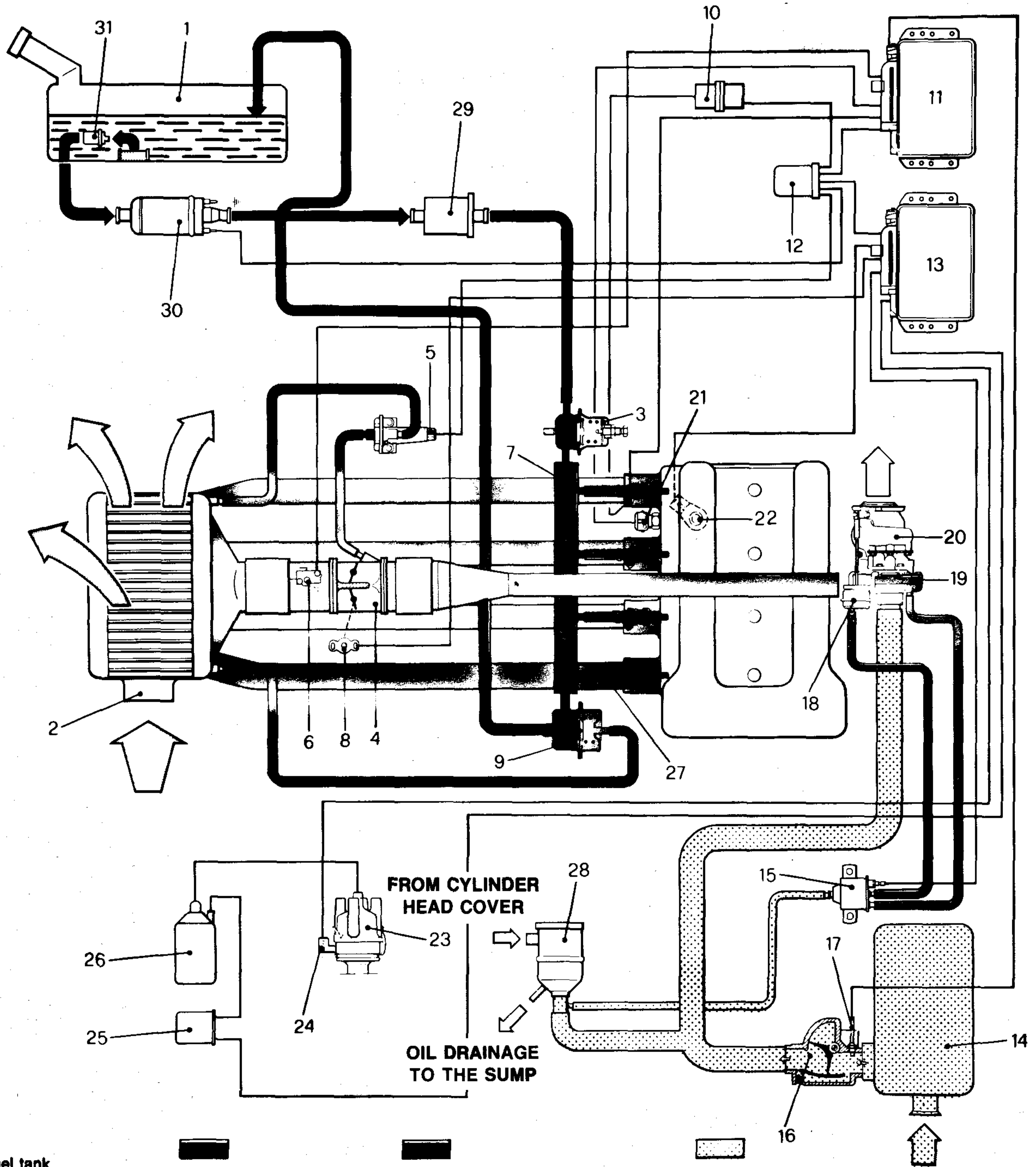
FUEL TANK

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

- 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 fuel 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.

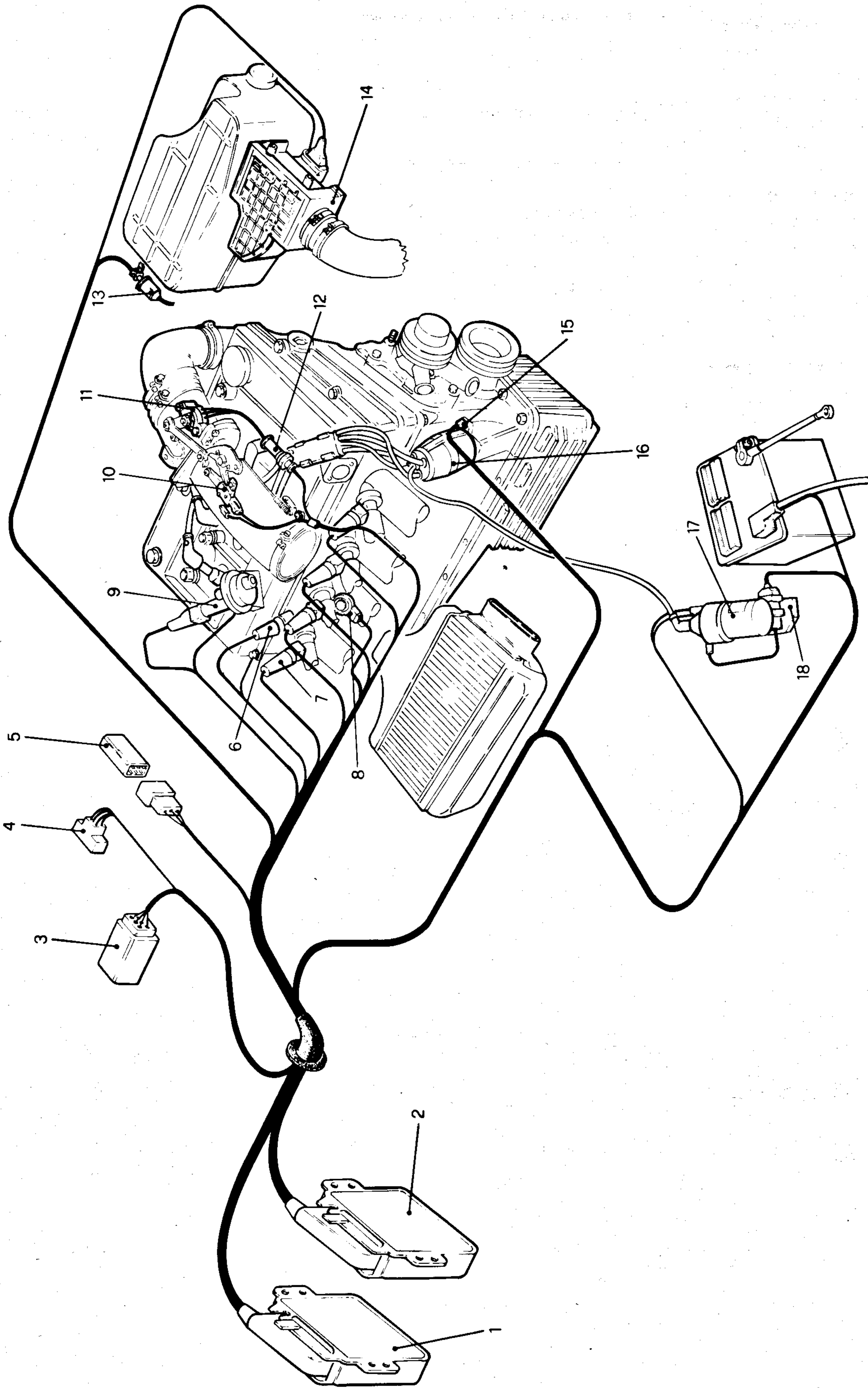
Should there fail to be one of these signals the speedometer relay will be de-energized, thus cutting off the power to the fuel supply system.

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.

FUEL SYSTEM

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

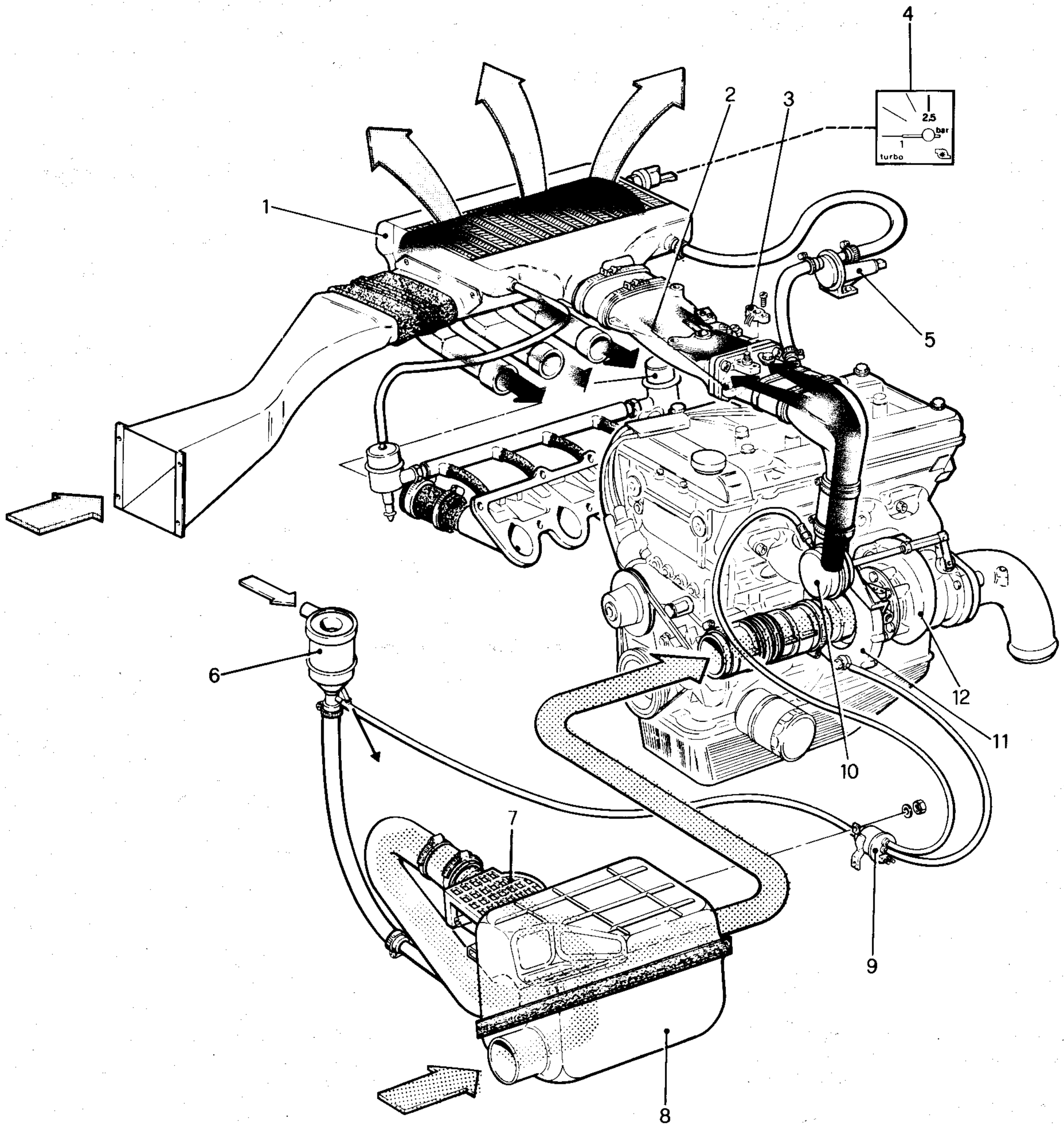


- | | | |
|--------------------------------|---|--------------------------|
| 1. Injection control unit | 8. Knock sensor | 14. Air flow gauge |
| 2. Ignition ECU | 9. Auxiliary air valve | 15. Hall effect sensor |
| 3. Speedometer relay | 10. Fuel cut-off switch | 16. Ignition distributor |
| 4. Body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

IMPORTANT GENERAL INFORMATION

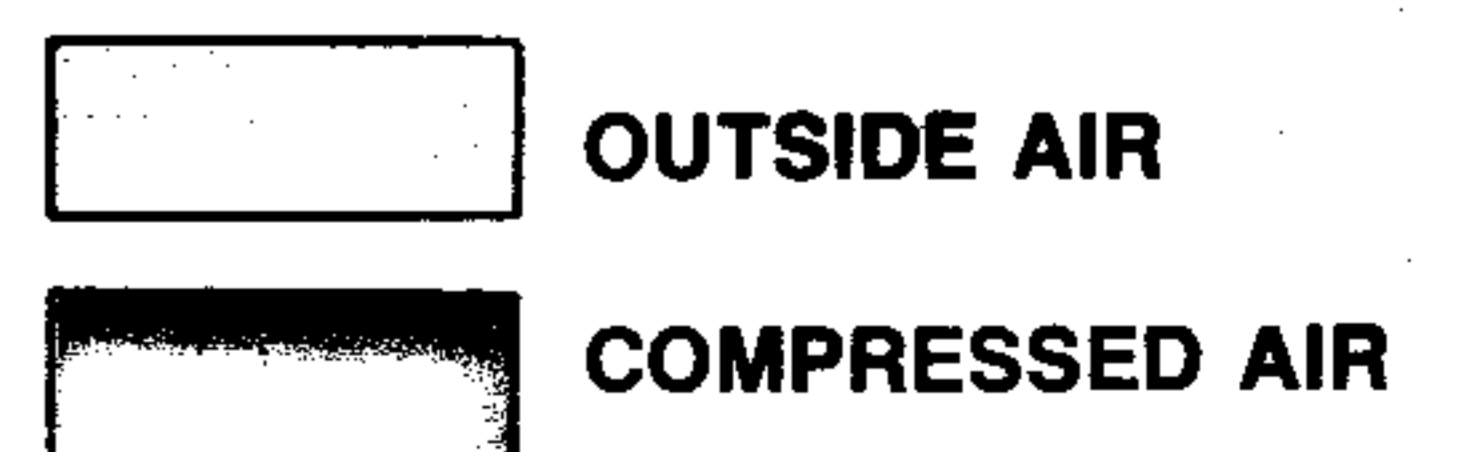
- **Never disconnect the battery while the engine is running or with the ignition on (position 2) as this would cause serious and irreversible damage to the electrical and electronic components of the ECUs of the system.**
- Never start the engine unless the battery terminals are fully tightened.
- Never 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



FUEL SYSTEM

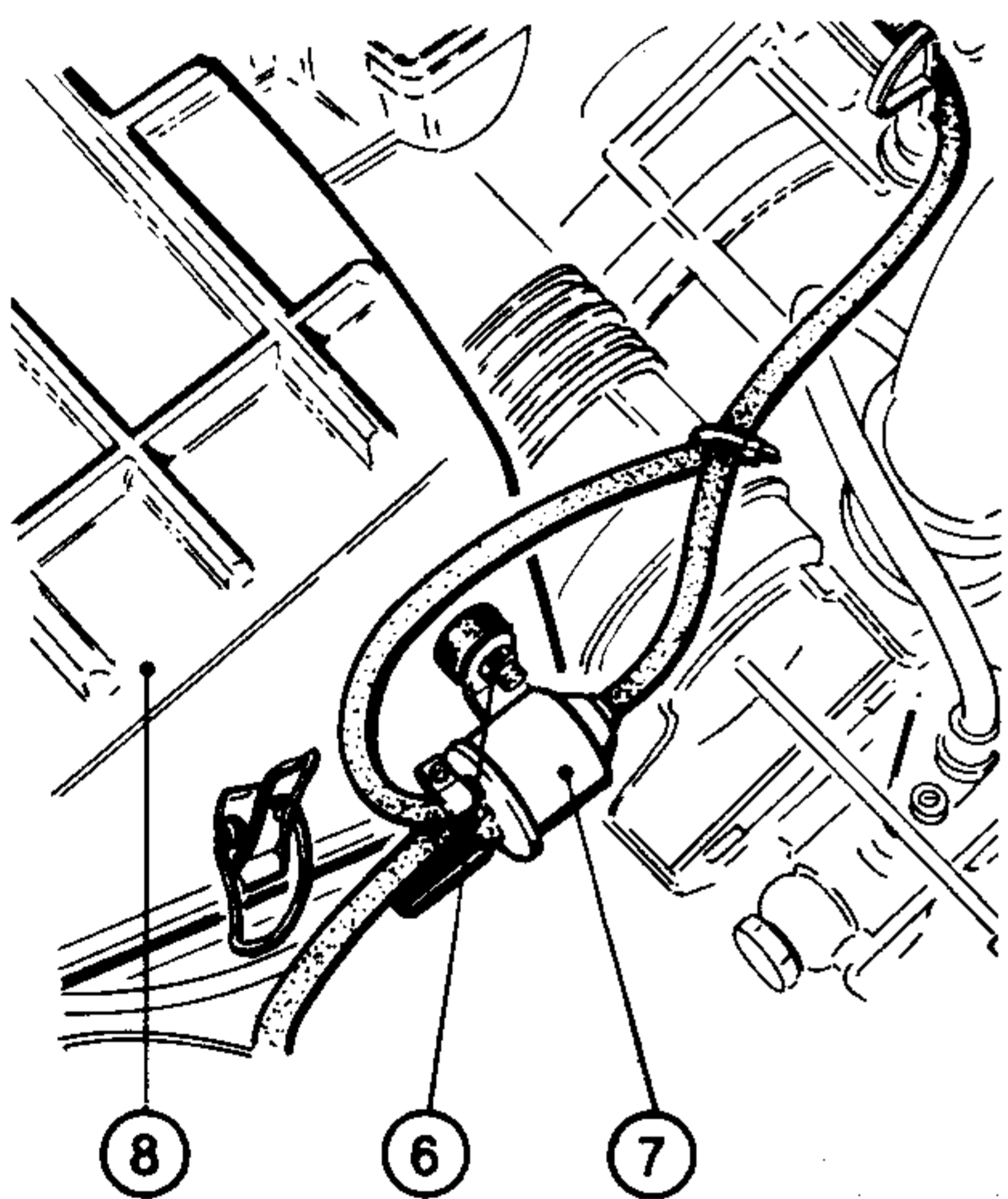
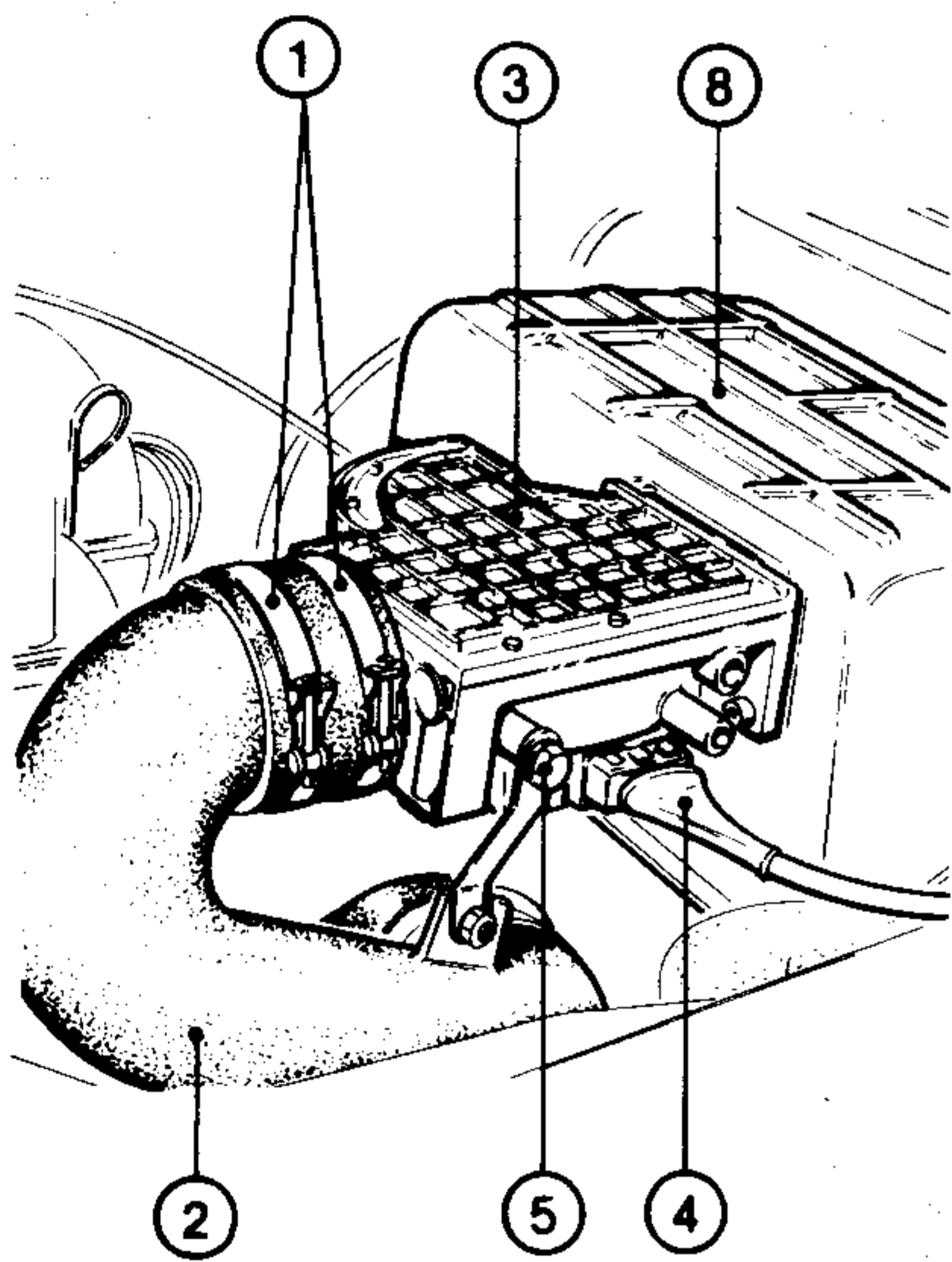
AIR FILTER

REMOVAL

Remove air filter unit operating as follows:

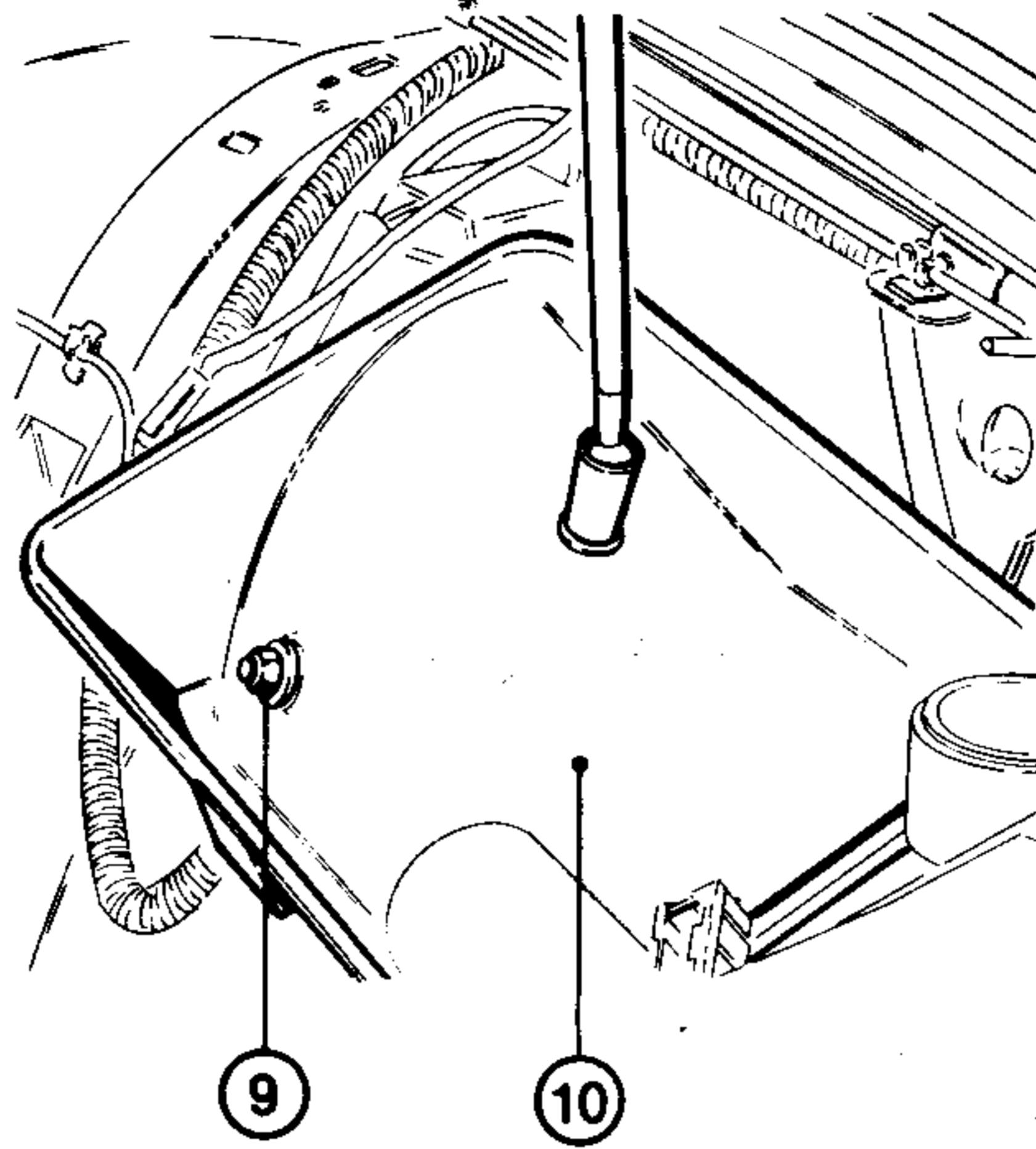
1. Slacken clamp (1) and detach sleeve (2) from air flow gauge (3).
2. Detach connector (4) from air flow gauge (3) and remove securing bolt (5).
3. Remove nuts (6) and solenoid valve (7) from air filter cover (8).
4. Release the five clips securing the cover and remove it together with air flow gauge.

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.



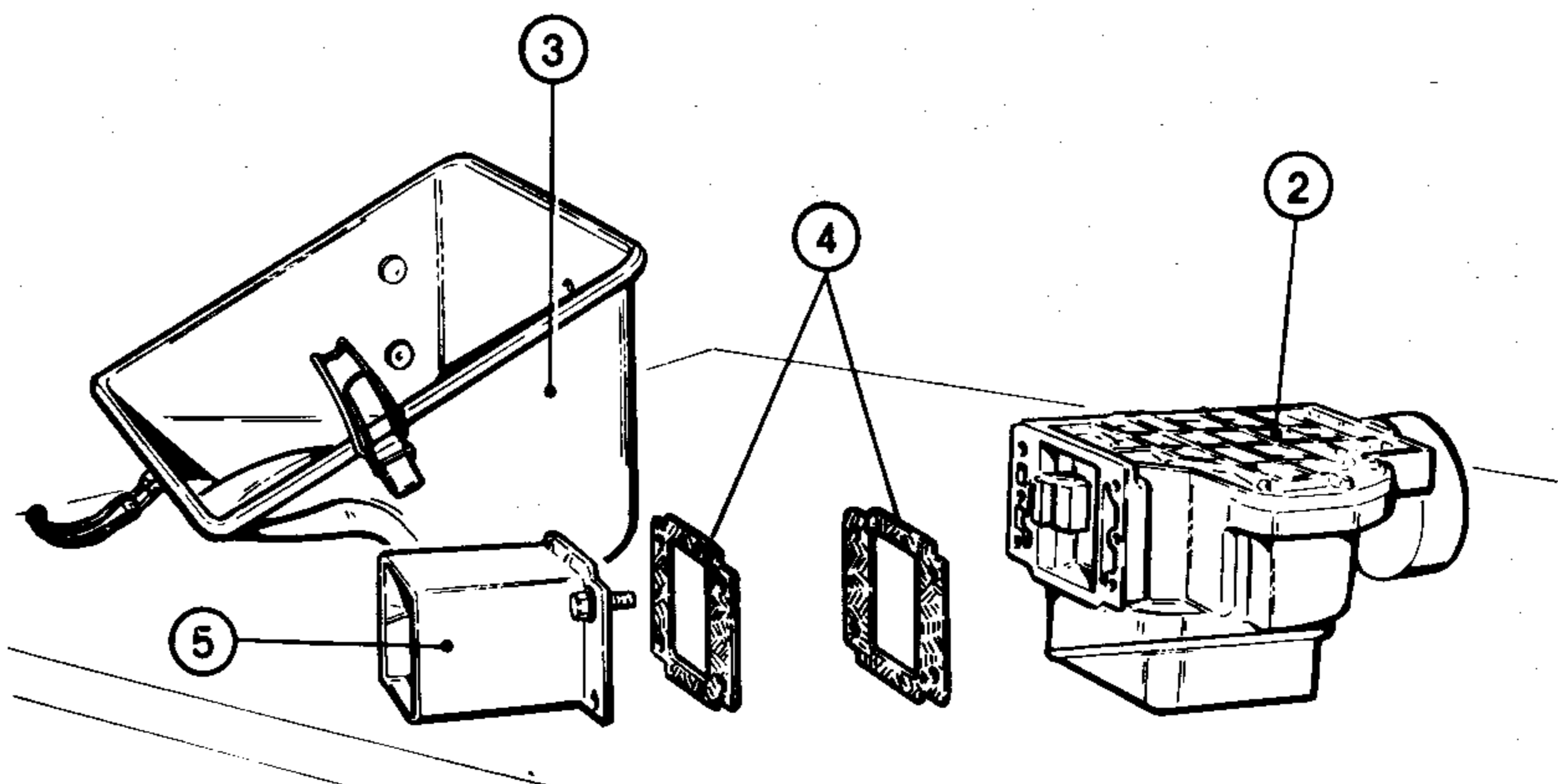
9. Container securing nuts
10. Air filter container

CHECKS AND INSPECTIONS

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

Replace the filtering element if required.

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



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).

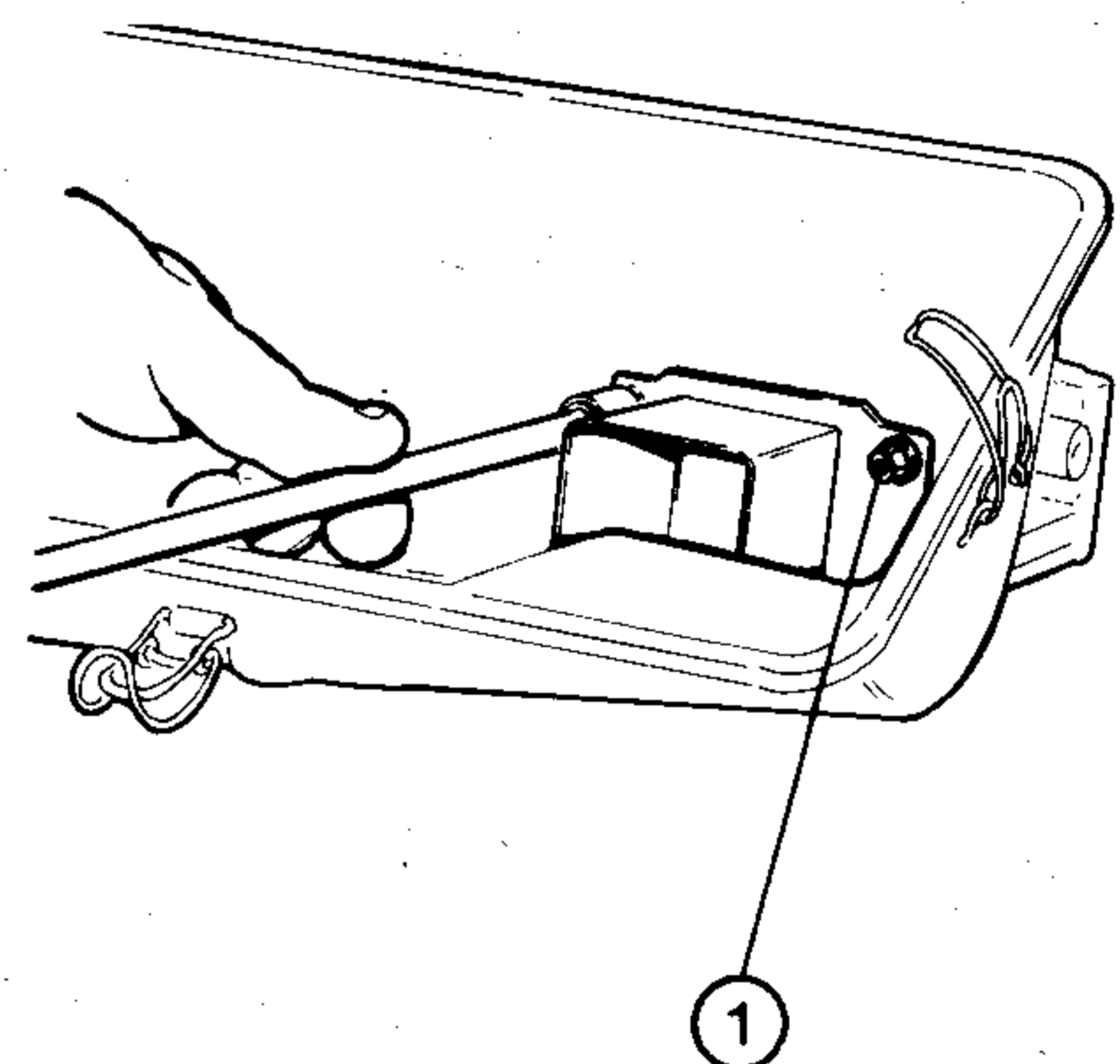
AIR FLOW GAUGE

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.



FUEL SYSTEM

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

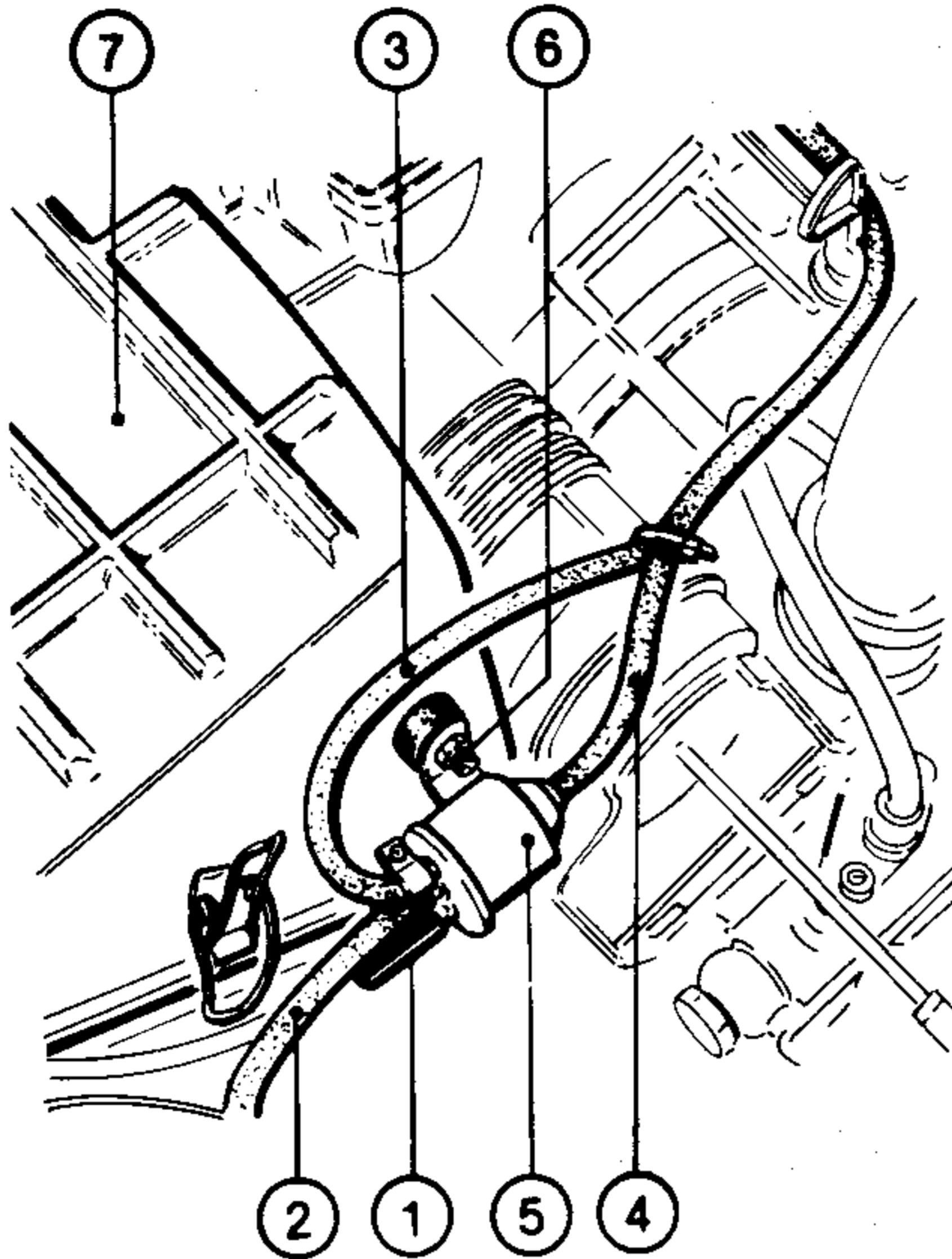
ELECTRICAL TESTS

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



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

INSTALLATION

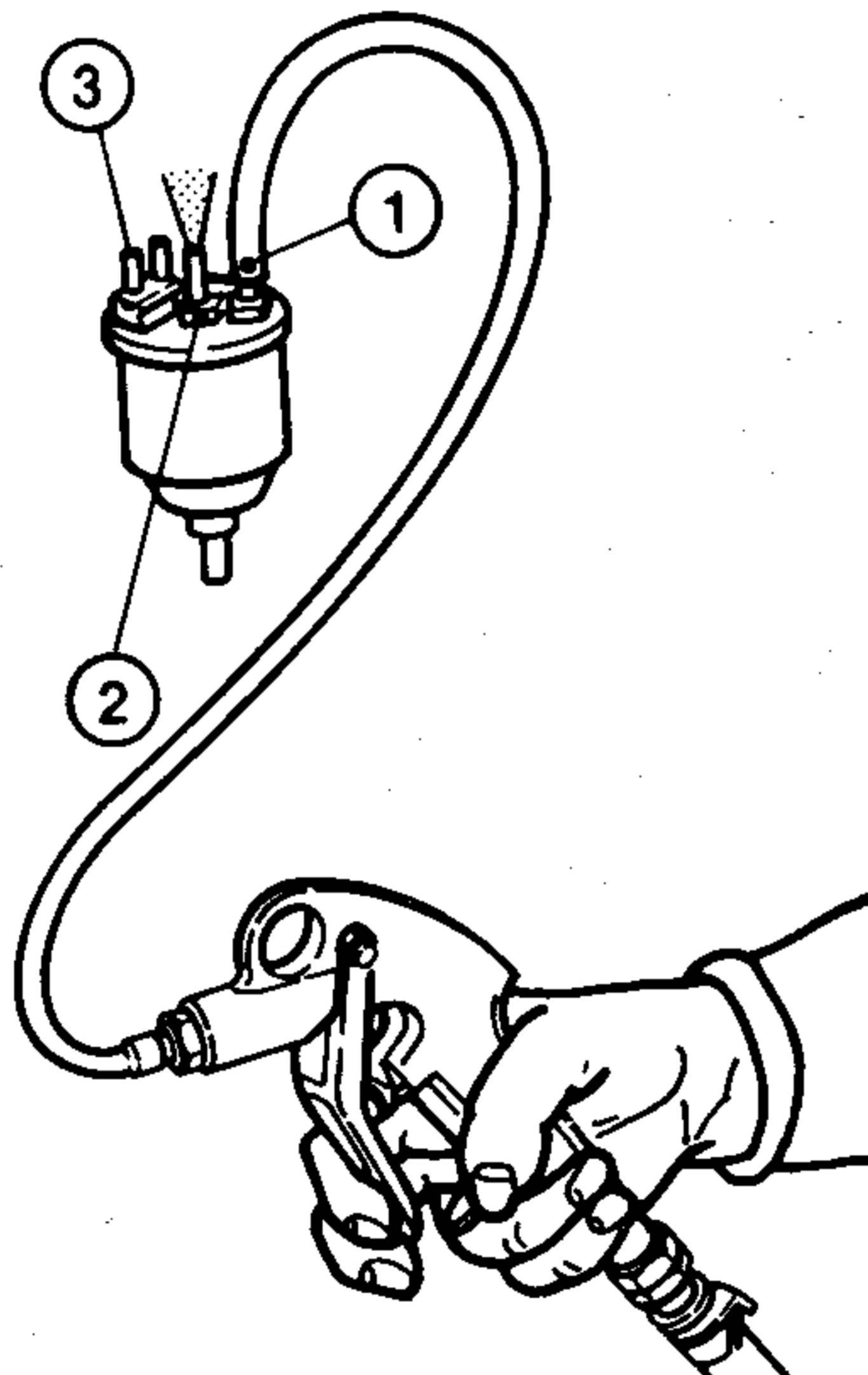
Install the supercharging pressure regulation solenoid valve by reversing the order of removal.

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).

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).



AUXILIARY AIR VALVE

CHECKS AND INSPECTIONS

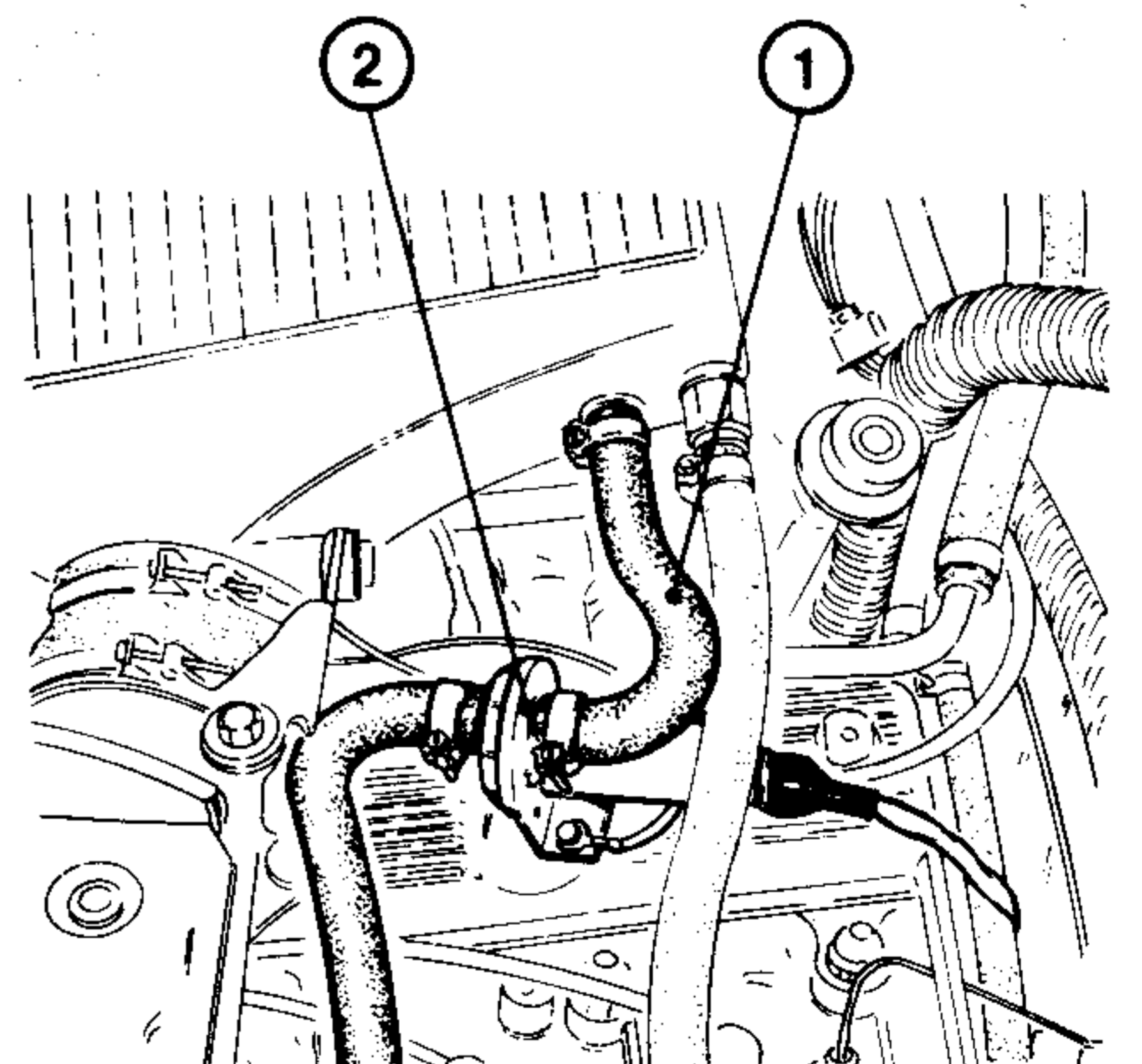
1. Valve opening check

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

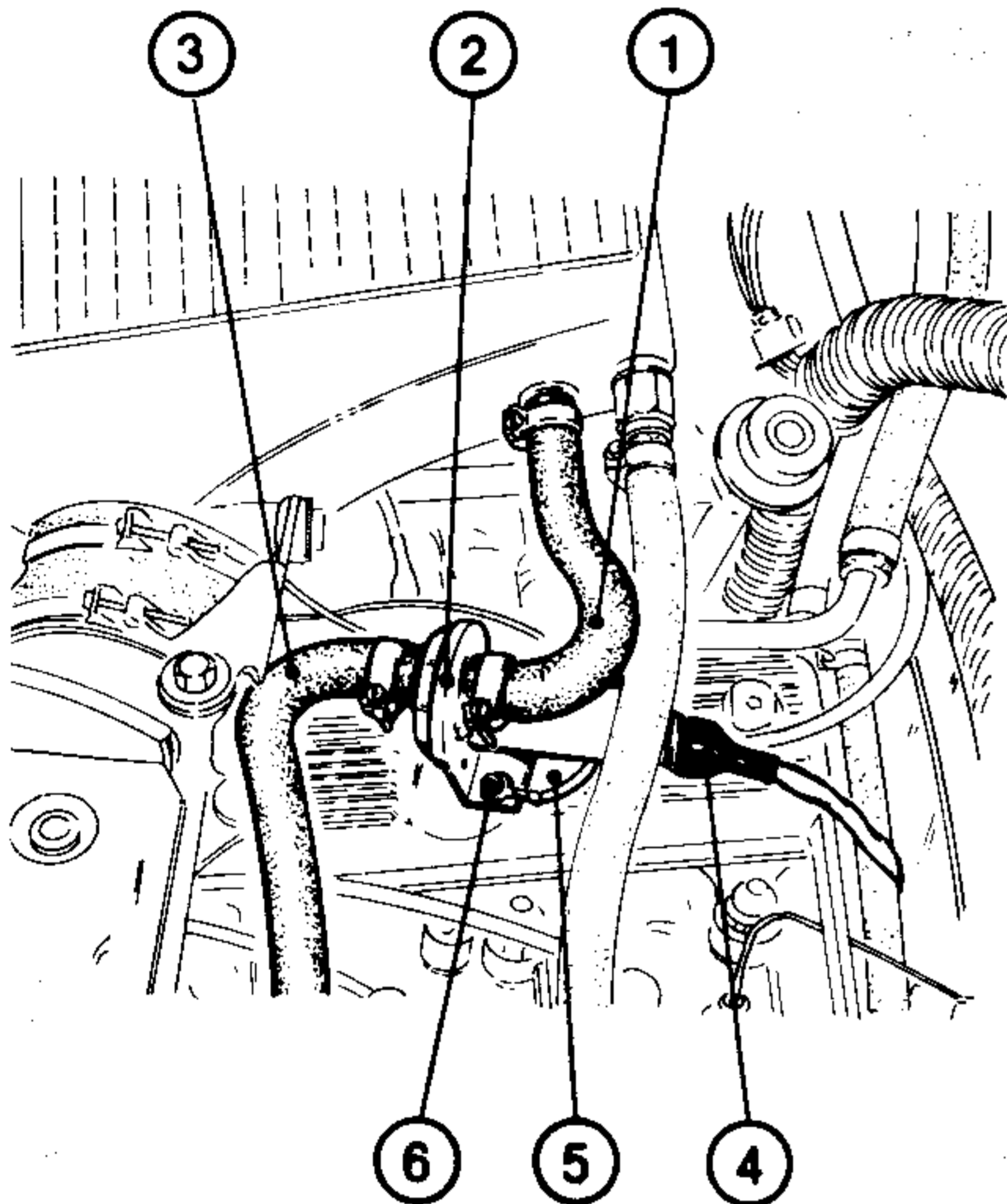
FUEL SYSTEM

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

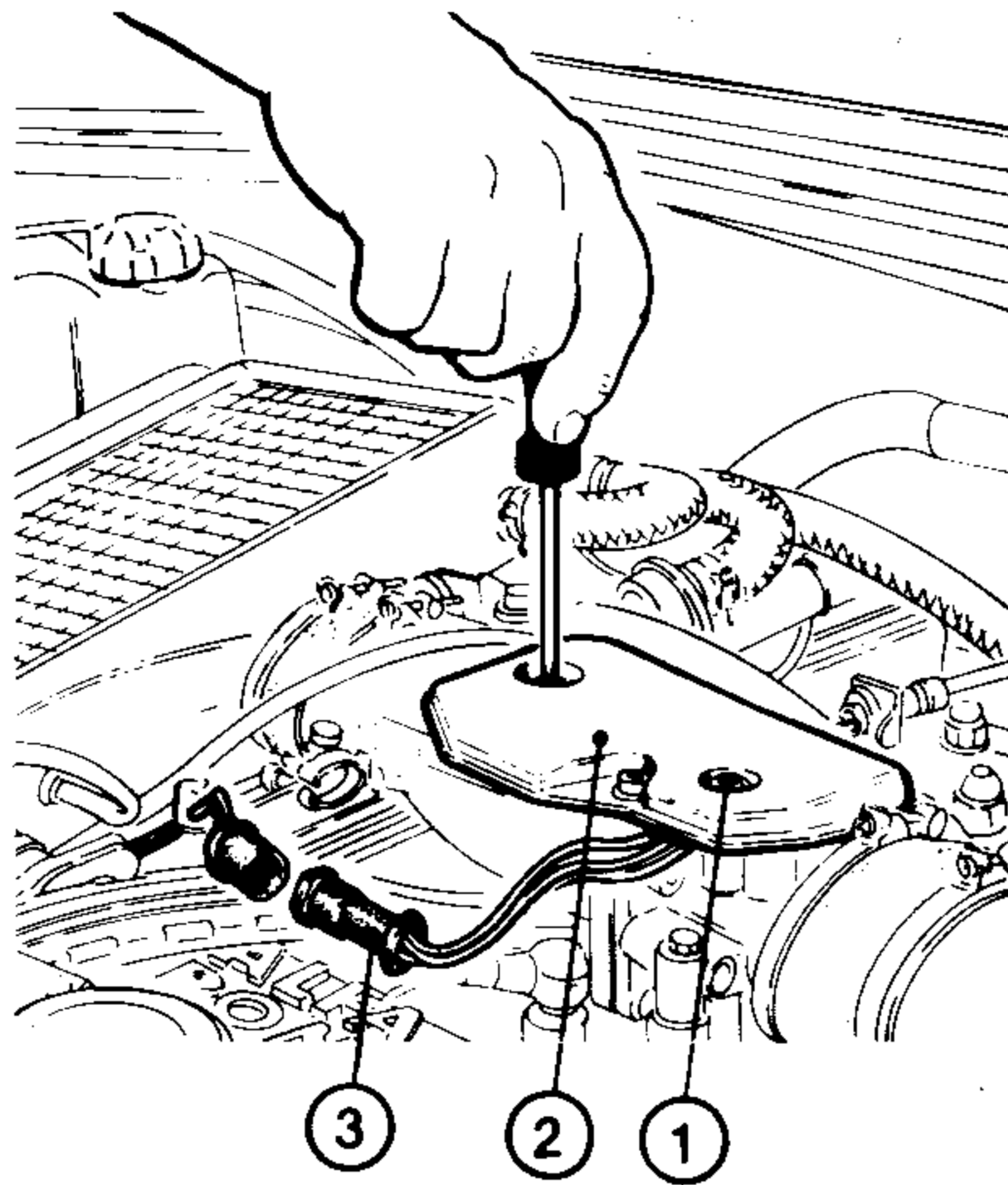
4. Position the new valve on the timing system cover and secure it together with the ground cables, using new washers. Reconnect both inlet and outlet air hoses and make the electrical connection.

THROTTLE BODY

REMOVAL

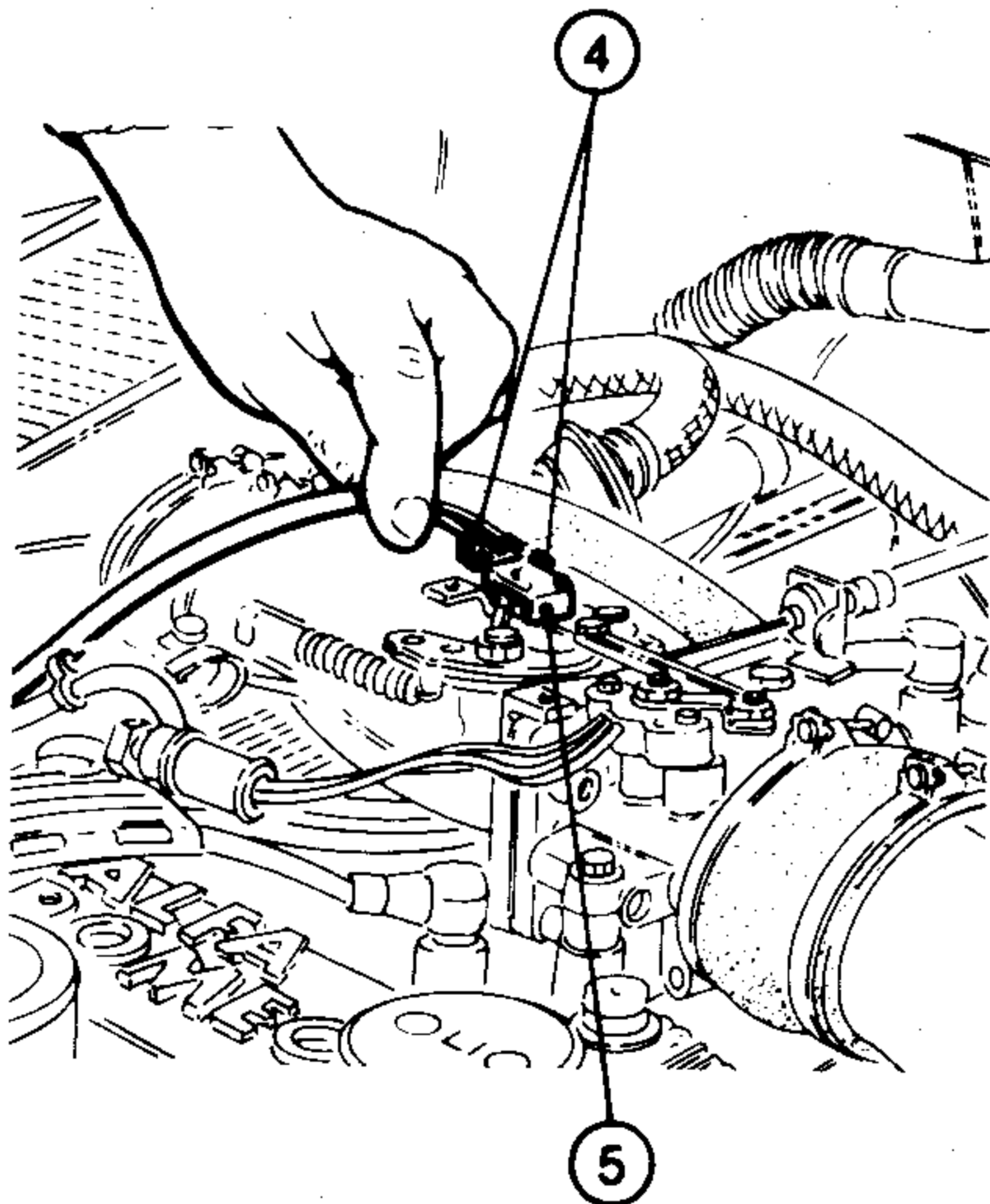
Remove throttle body assembly in the following manner:

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



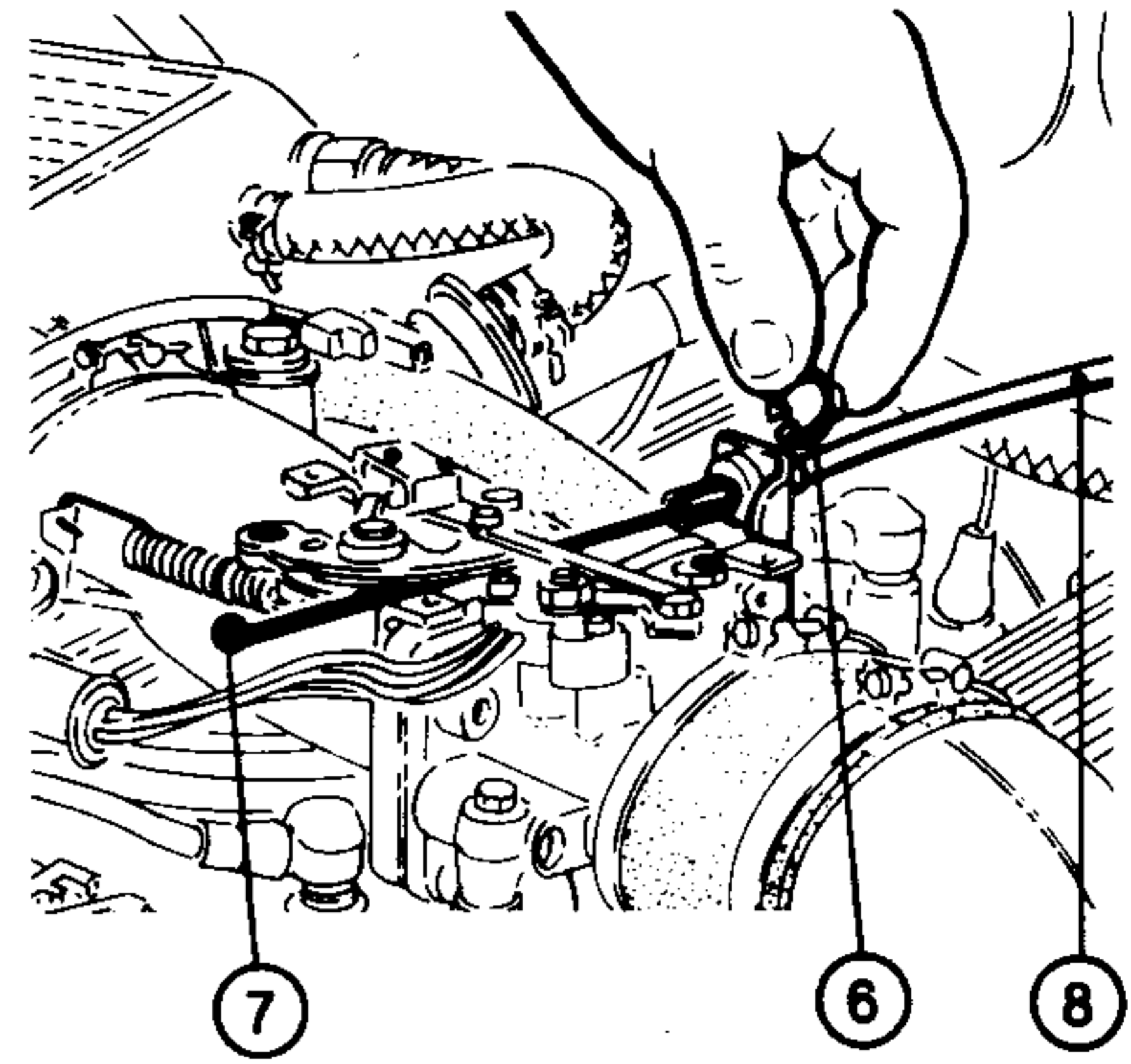
1. Cover retaining screws
2. Protective cover
3. Sending unit connector

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



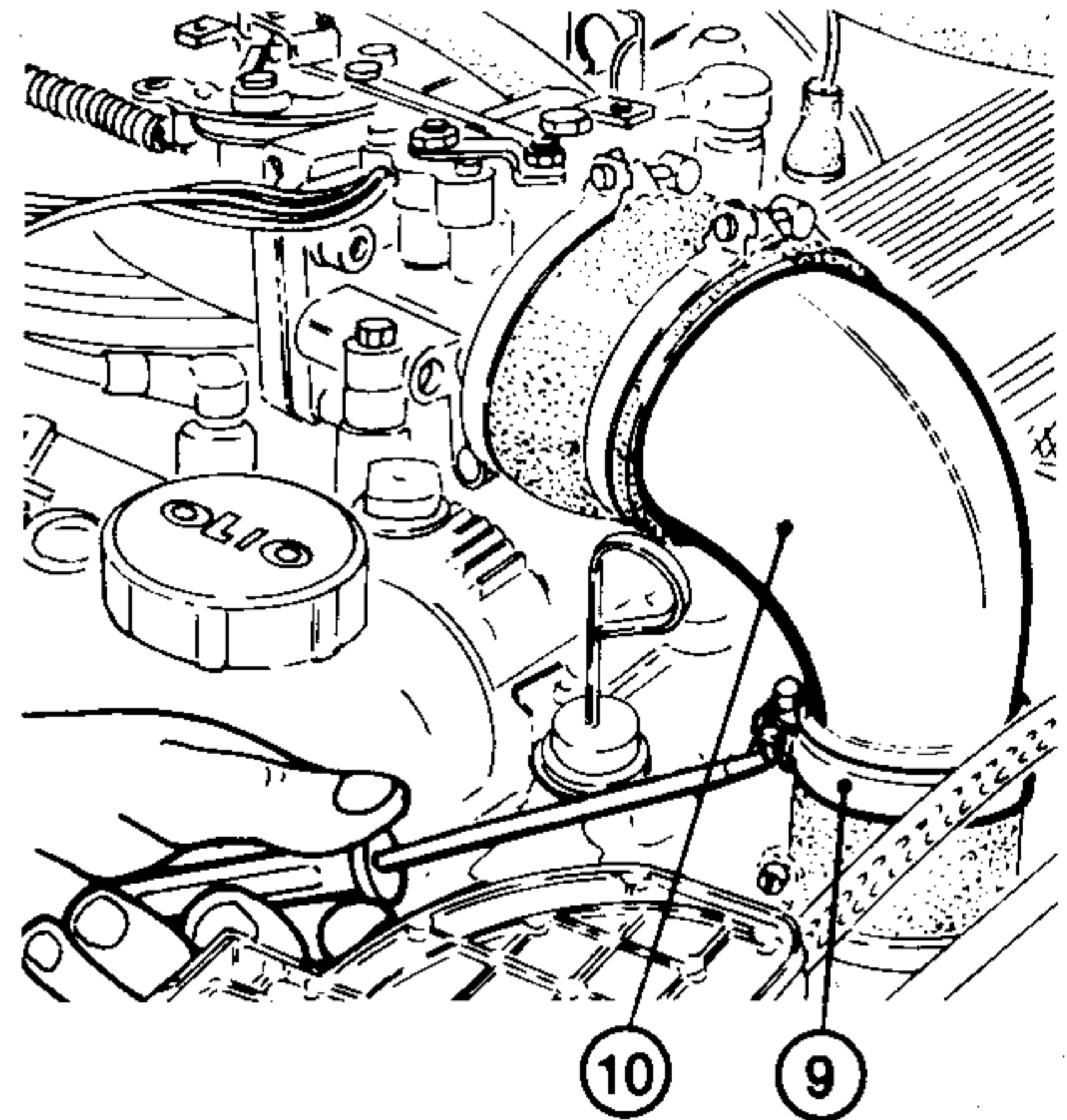
4. Minimum cutout switch feed cables
5. Minimum cutout switch

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



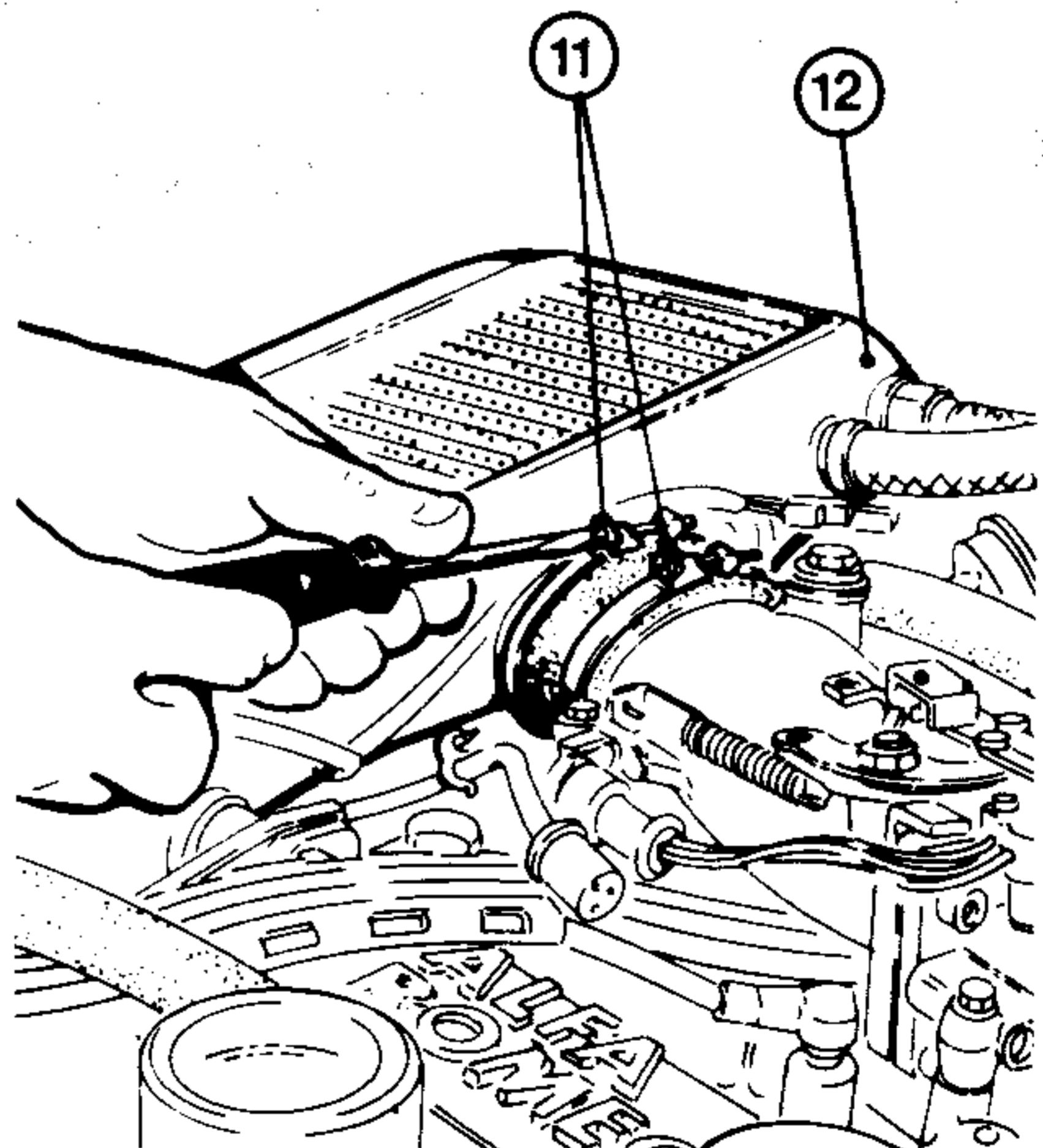
6. Stop ring
7. Accelerator cable
8. Sheath

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



9. Clamp
10. Union

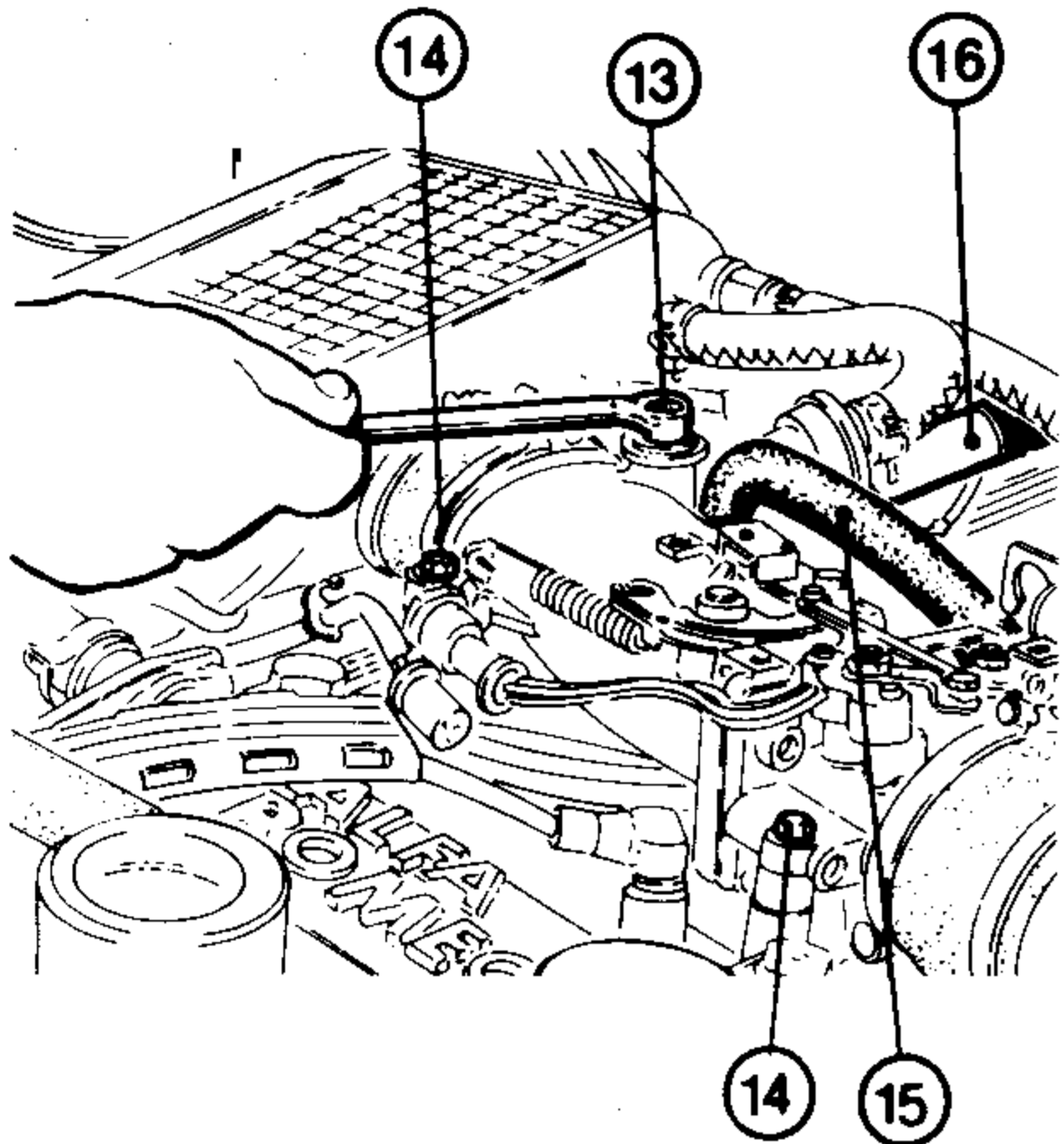
6. Loosen clamps (11) securing throttle body to intercooler (12).



11. Clamps
12. Intercooler

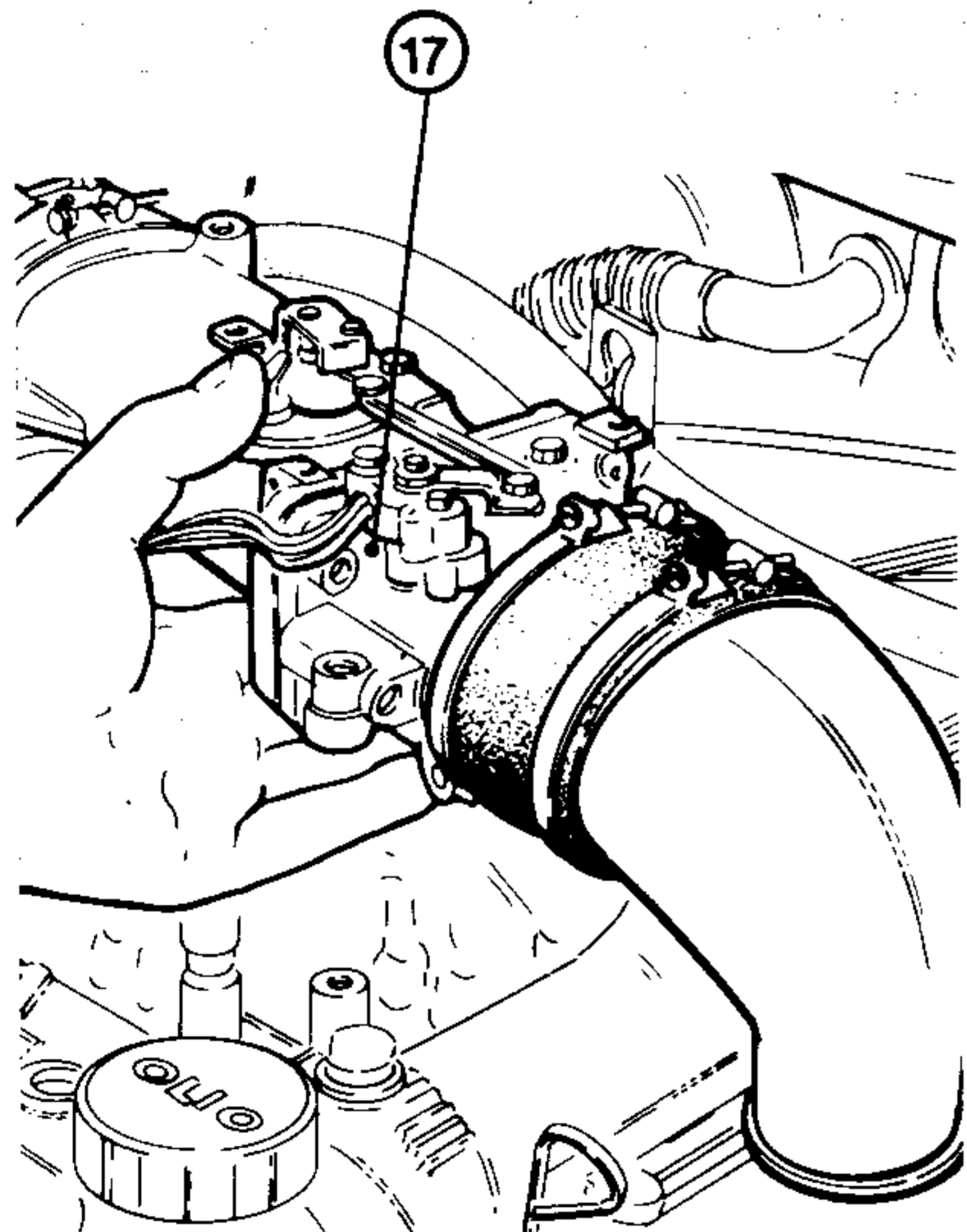
FUEL SYSTEM

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.



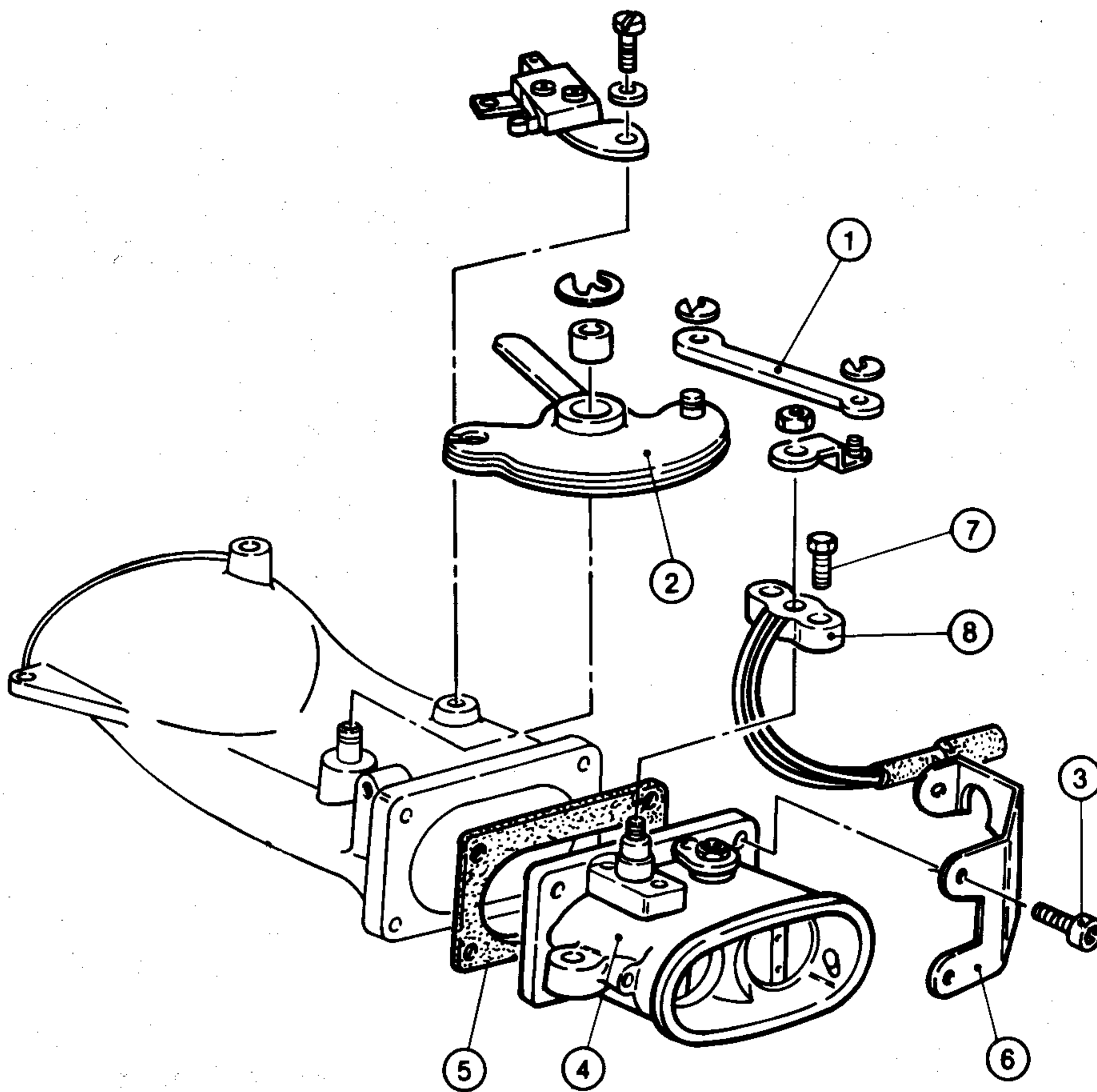
17. Throttle body

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).



1. Tie rod
2. Cam
3. Throttle body retaining screws
4. Throttle body

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).

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»).

THROTTLE POSITION SENDING UNIT

ELECTRICAL TESTS

Refer to: «Electrical Tests».

INSTALLATION

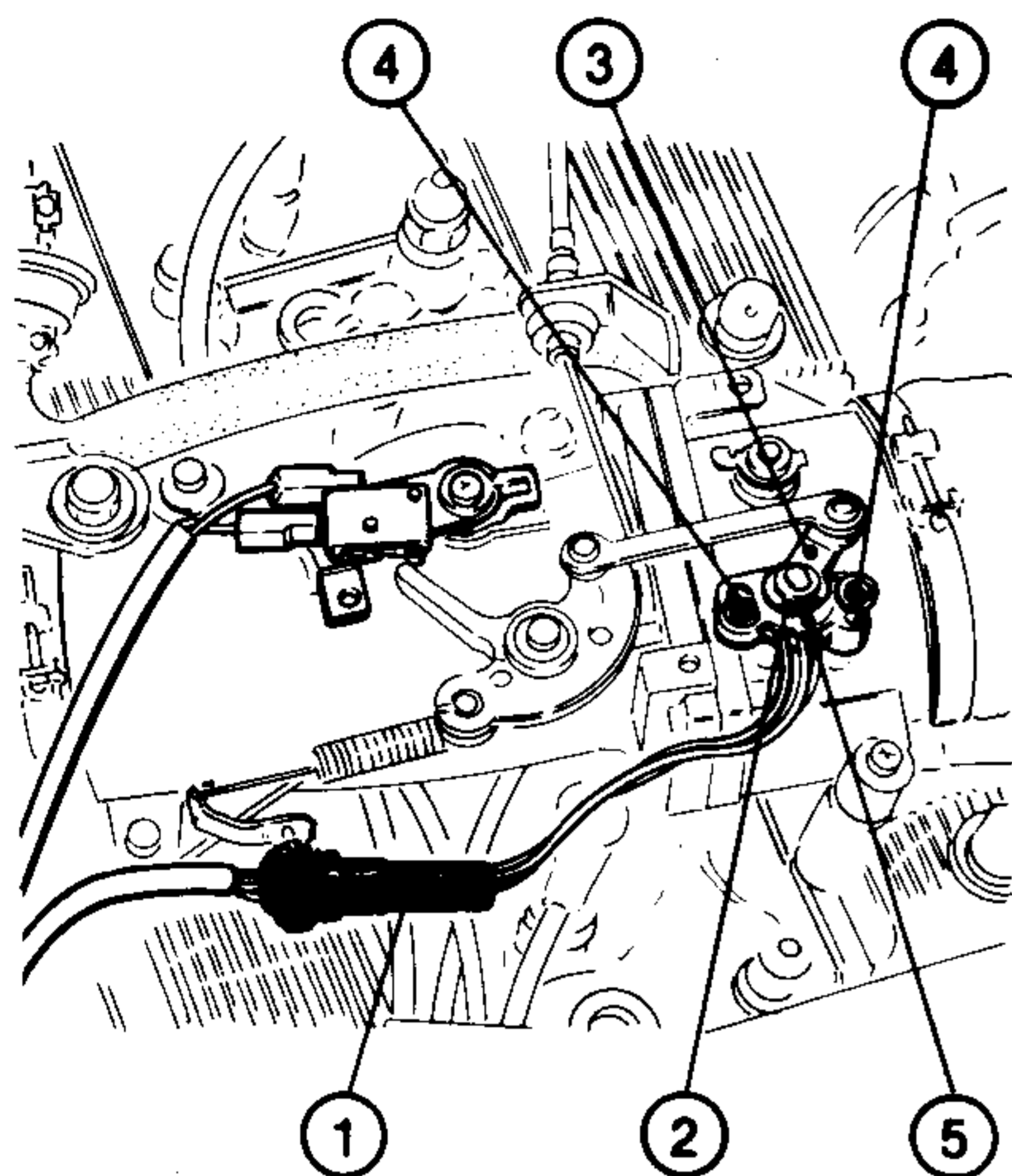
Carry out installation of the complete throttle body by reversing the order of removal, taking care to restore the electrical connections correctly and fully tighten the clamps on the supercharging air intake.

If necessary, set the throttle body (refer to: «Settings and Adjustments»).

REPLACEMENT

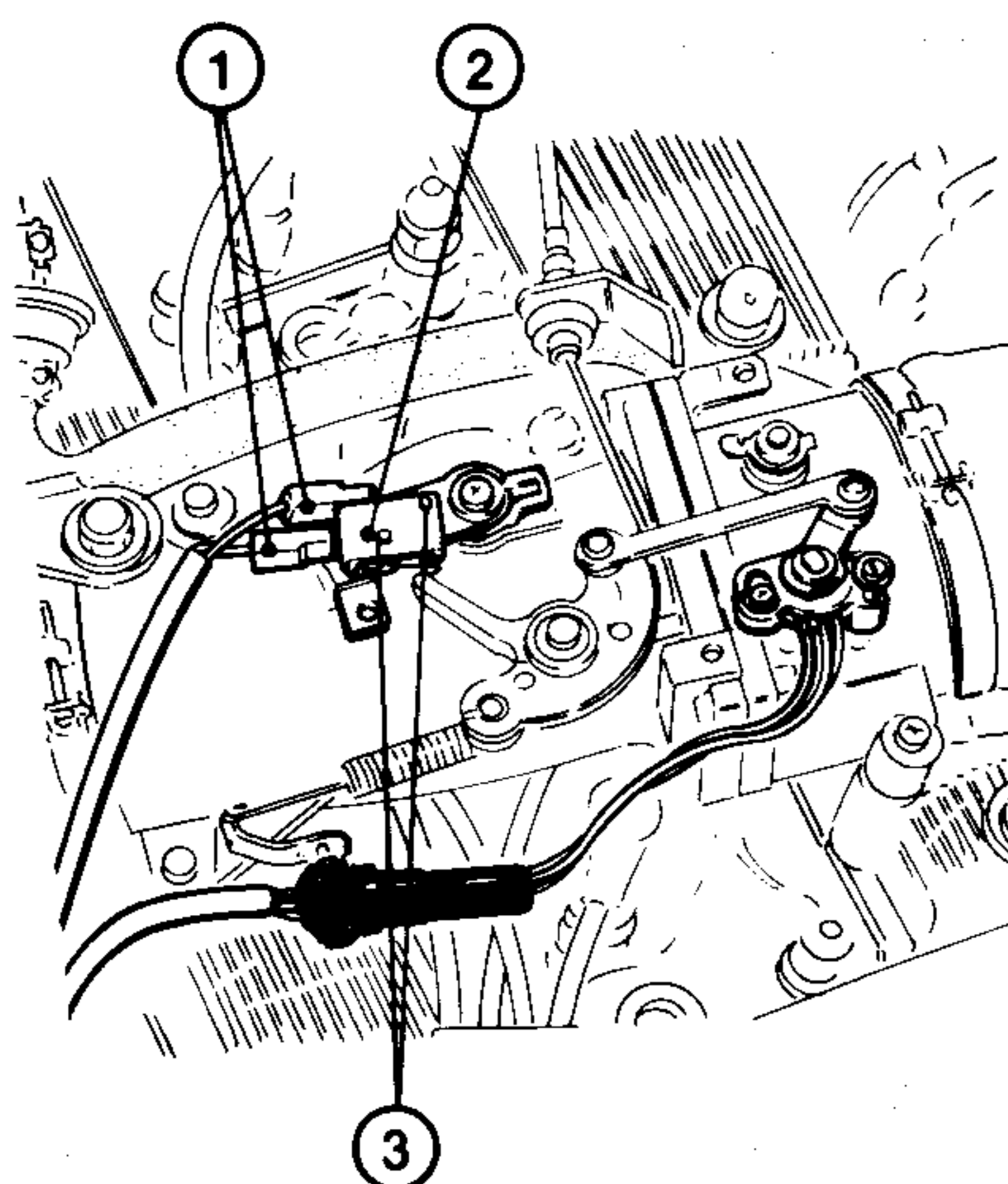
1. Detach connector (1).
2. Remove nut (2) and withdraw tie rod (3).
3. Remove screws (4) and throttle position sending unit (5).

FUEL SYSTEM



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

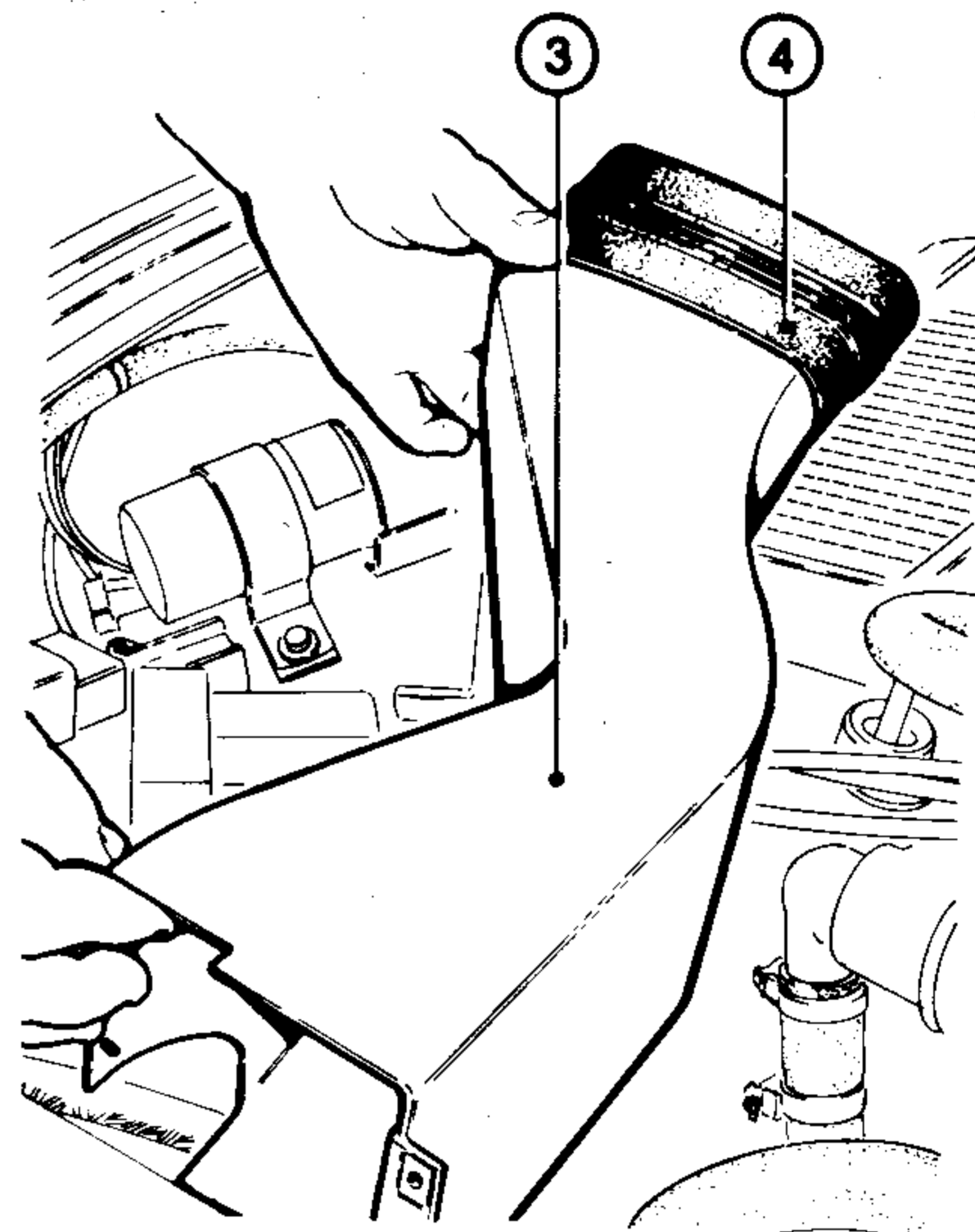
4. Install a new throttle position sending unit and register it (refer to paragraph: «Settings and Adjustments»).



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

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

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



3. Air intake duct
4. Sleeve

MINIMUM CUTOUT SWITCH

ELECTRICAL TESTS

Refer to: «Electrical Tests».

REPLACEMENT

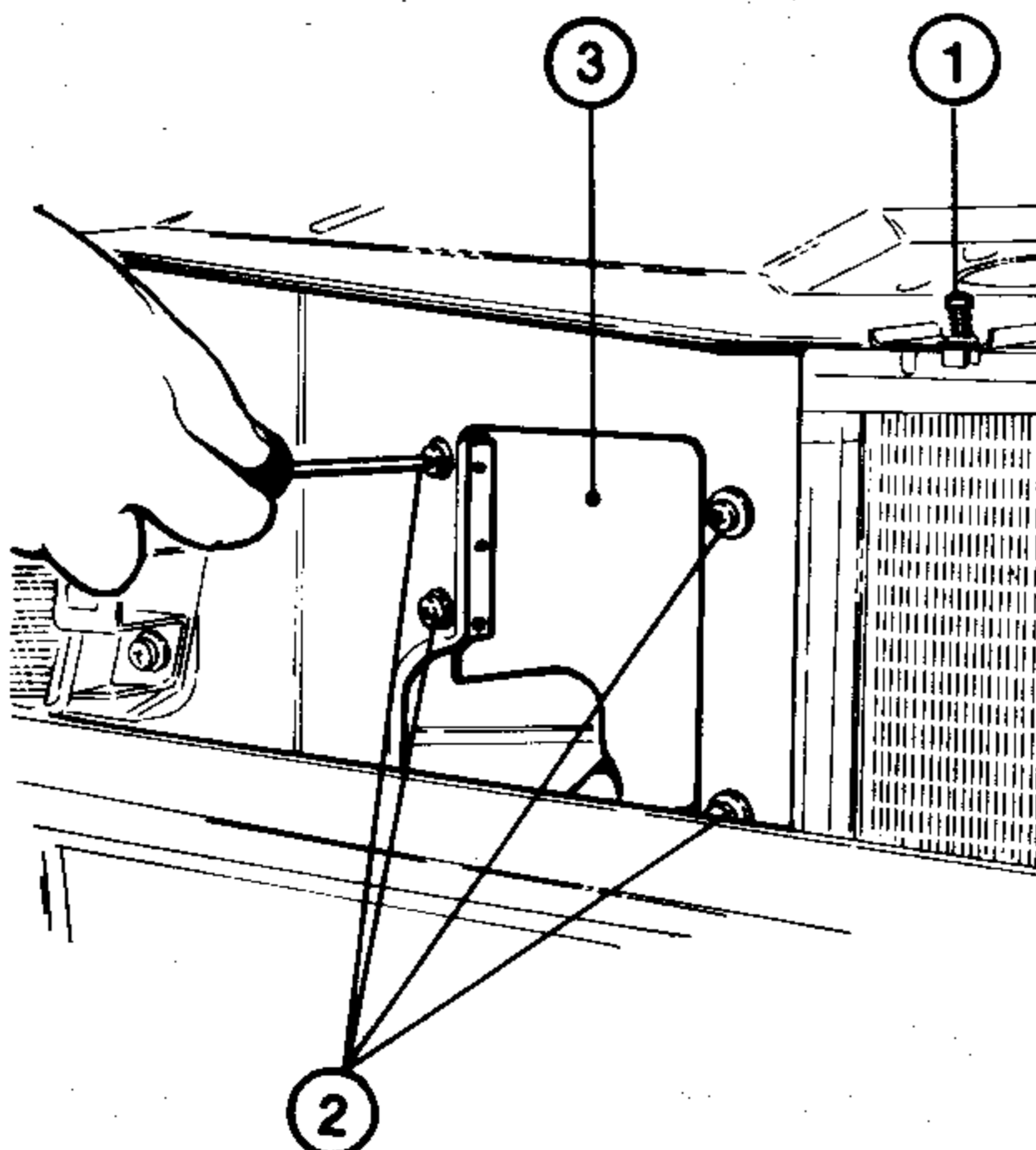
1. Detach connectors (1) from switch (2).
2. Remove the two screws (3) and remove the switch

INTERCOOLER

REMOVAL

Remove the intercooler in the following way:

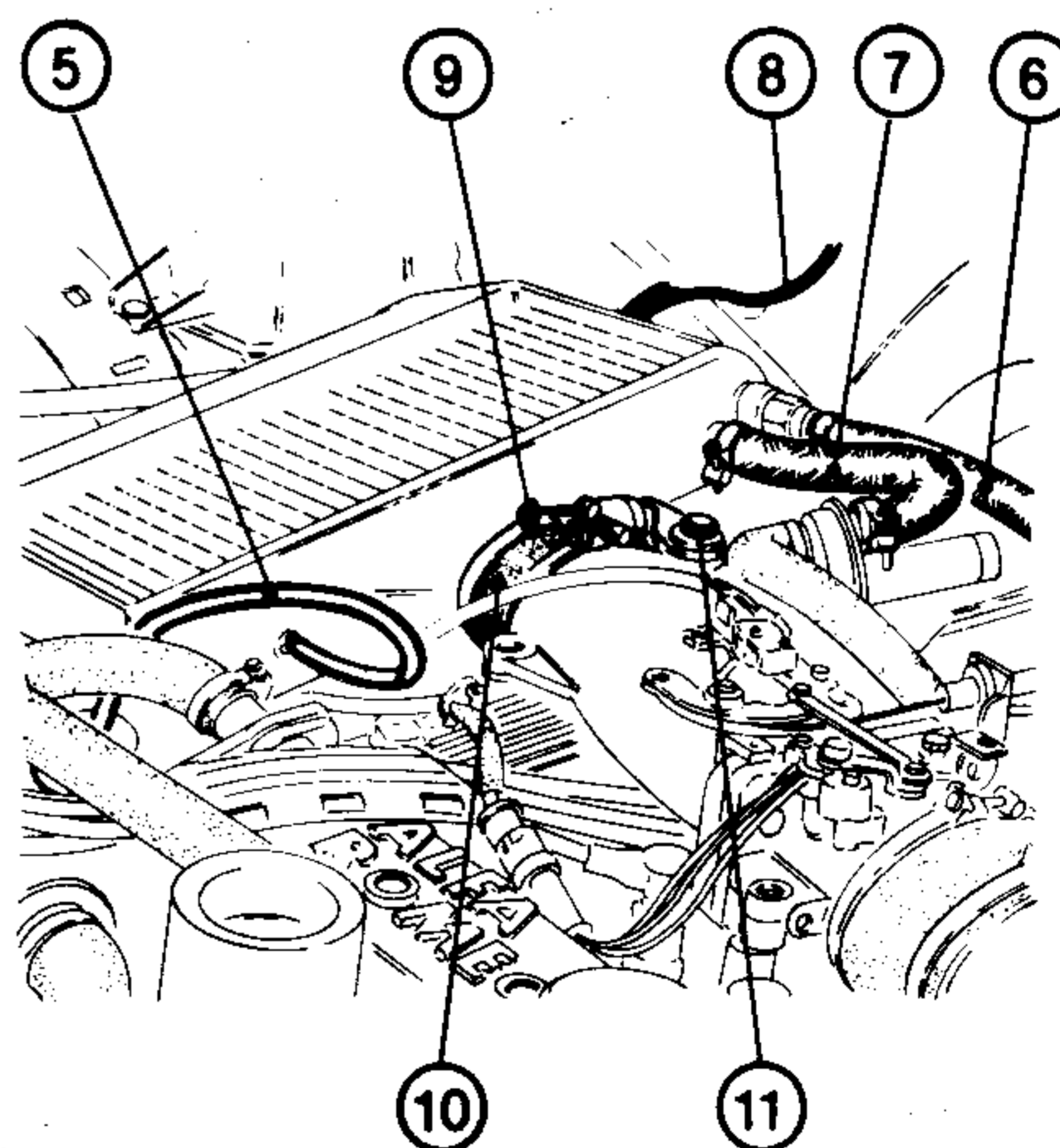
1. Disconnect battery terminals.
2. Unscrew screw (1) and remove front mask.
3. Unscrew and remove the four screws (2) securing air intake duct (3) to the body front panel and remove the bolt securing the duct to the battery bracket.



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

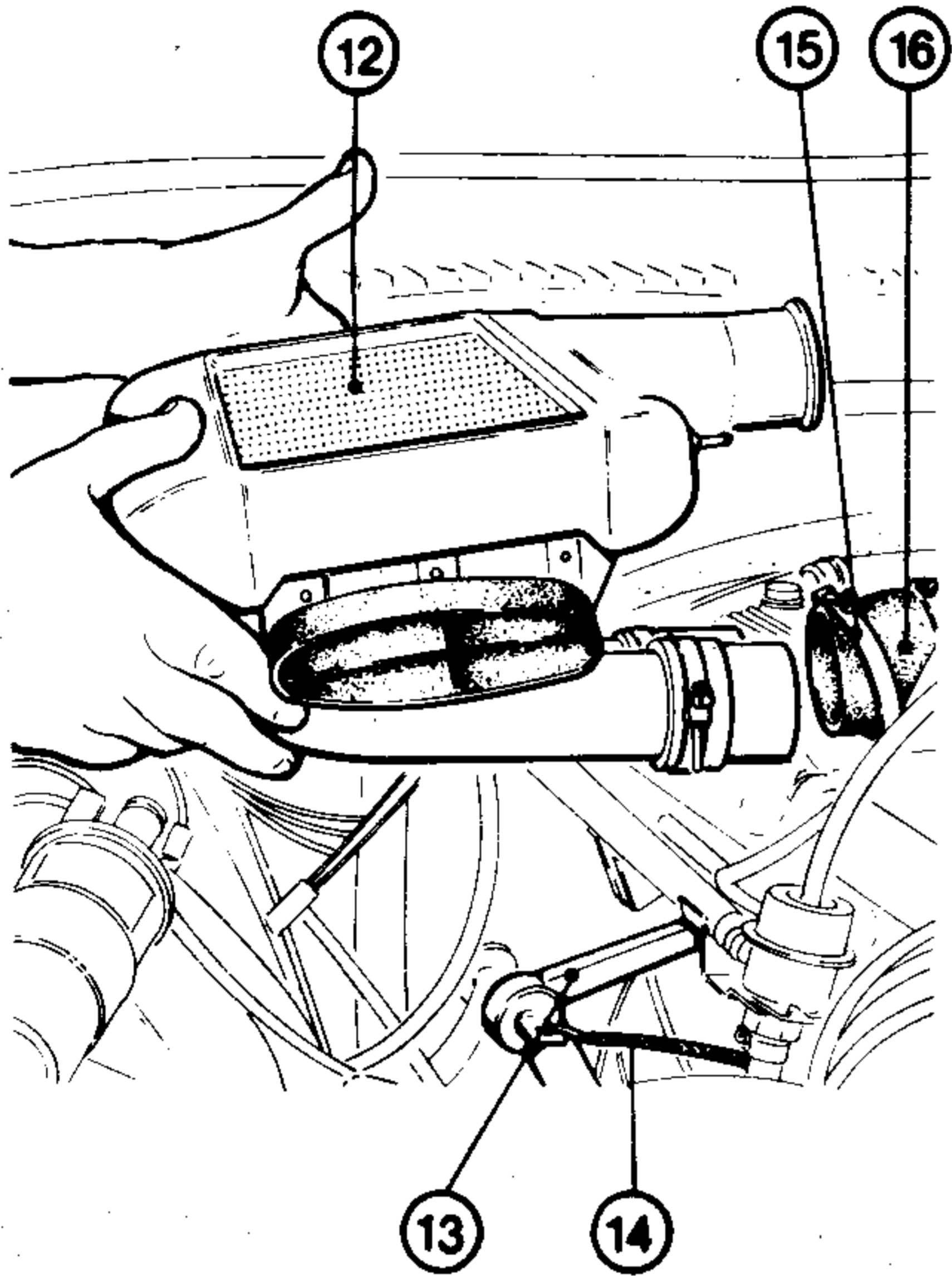
5. Detach the following hoses and wires from the intercooler:

- 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:

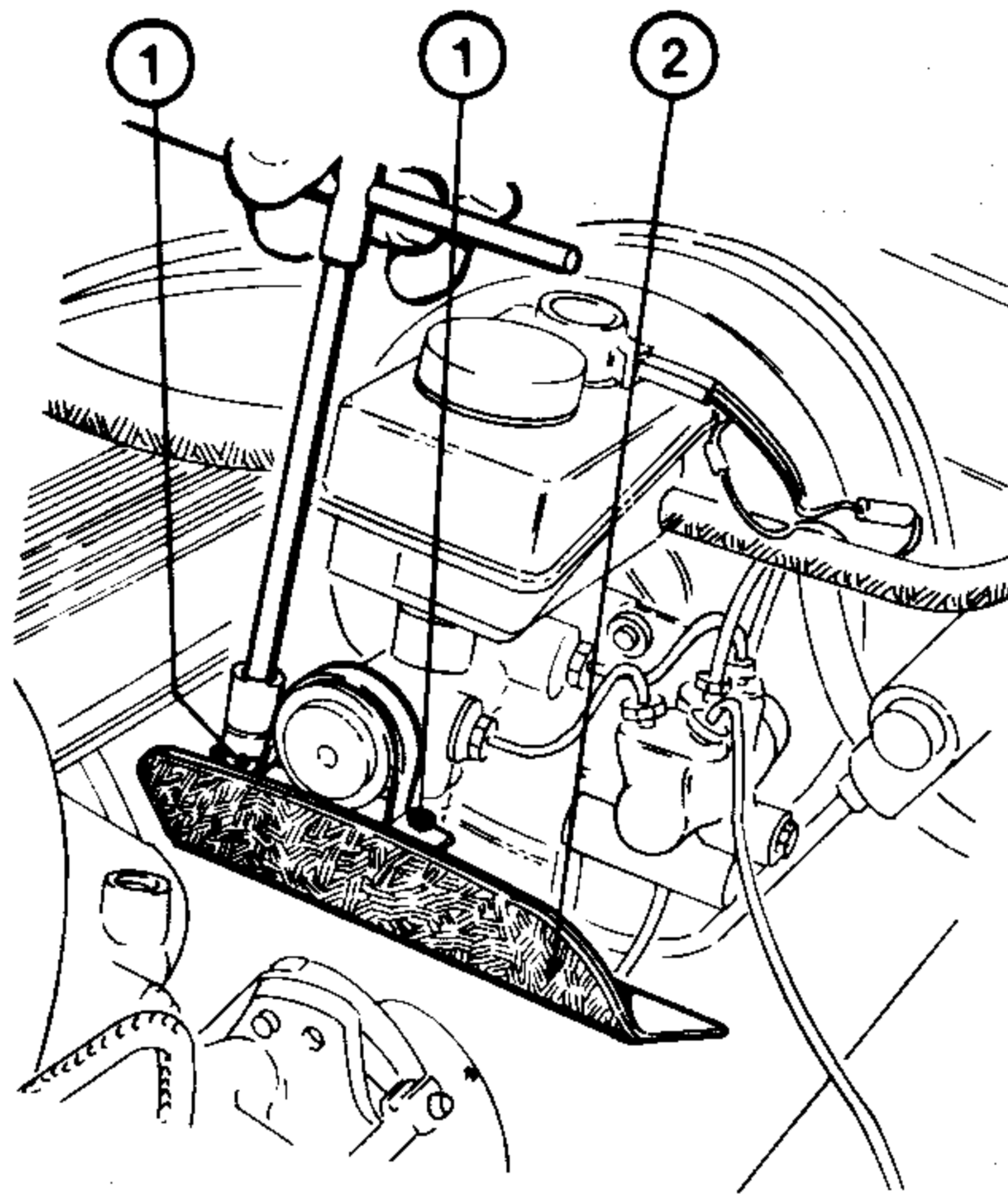
- Clamps (15) securing rubber connectors (16) to intercooler must be tightened to prevent the leakage of supercharged air.
- Re-connect the ground cable (14) to one of the screws securing the intercooler to bracket (13).

TURBOCHARGER

REMOVAL

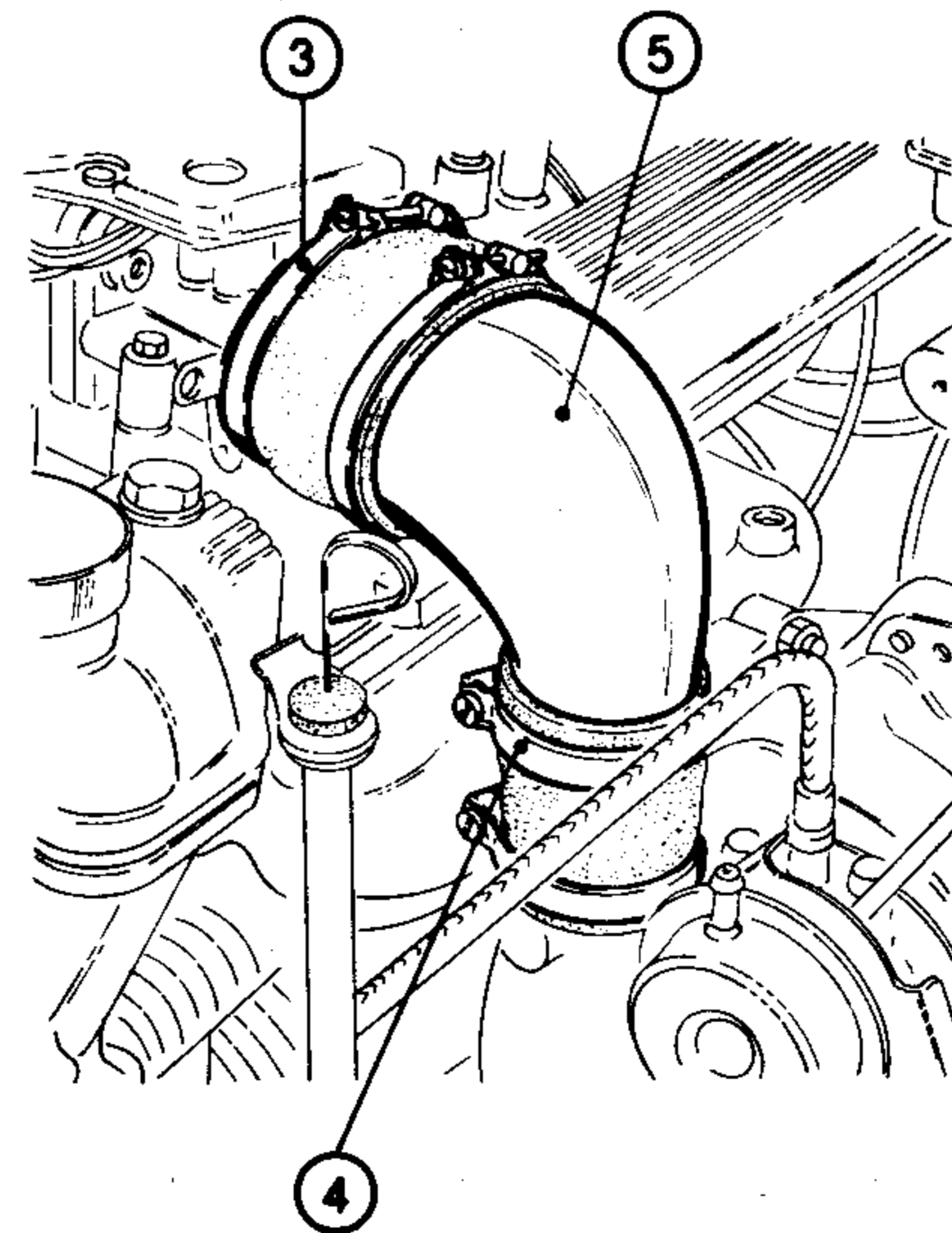
Proceed with the removal of the turbocharger as follows:

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

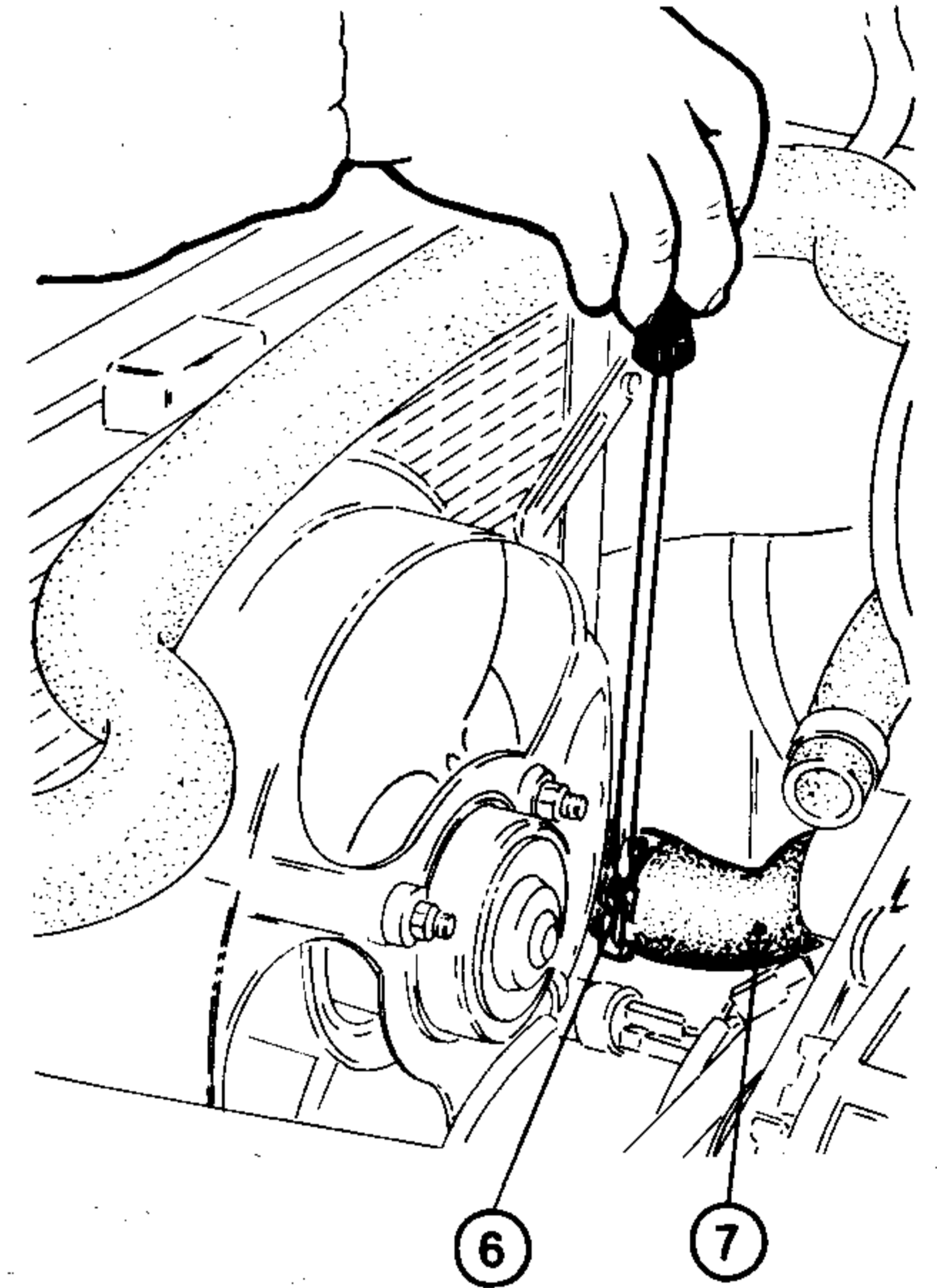
CAUTION:

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.

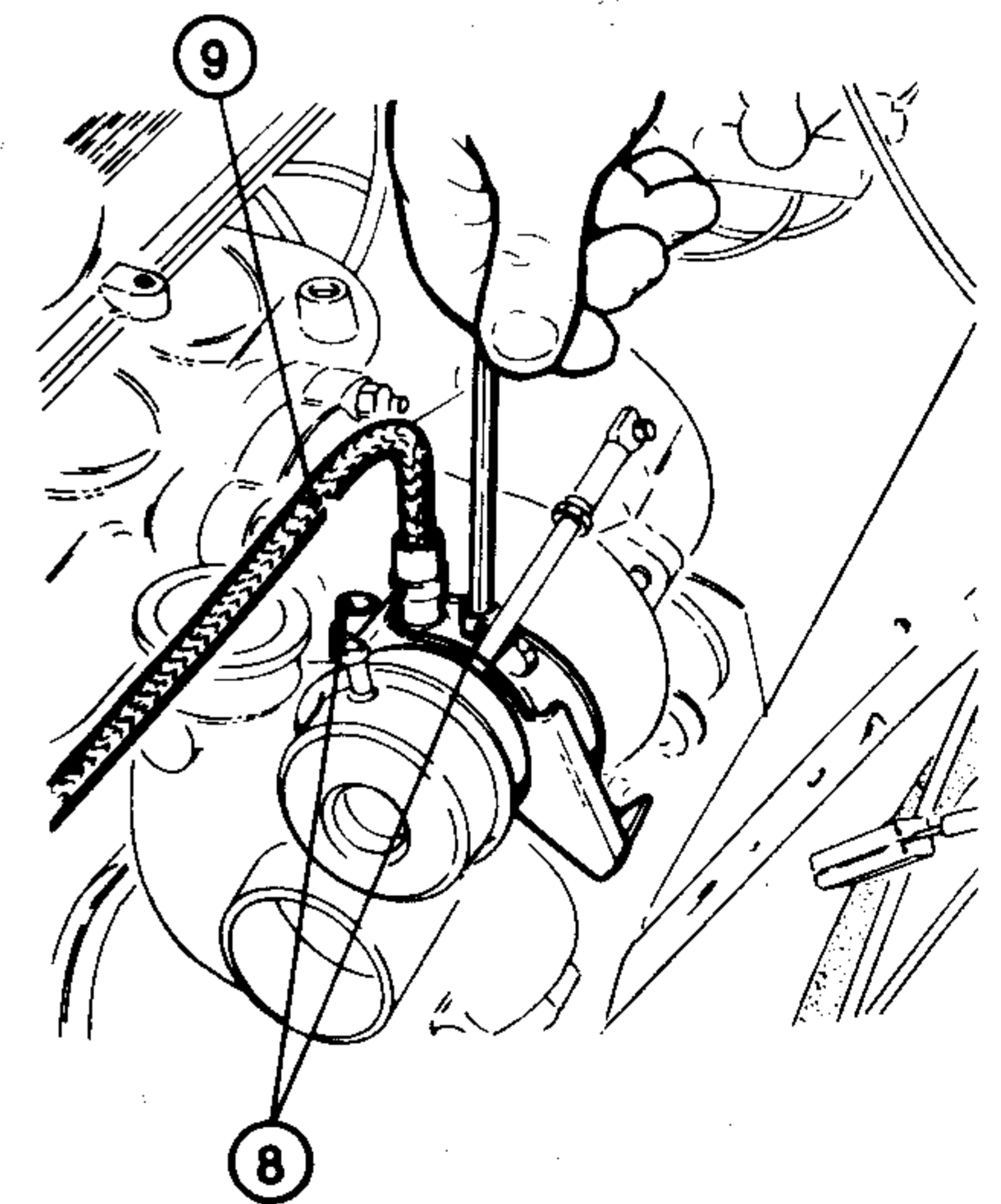
NOTE:

Place a suitable container under the vehicle to collect coolant.



- 6. Clamp
- 7. Radiator water drain sleeve

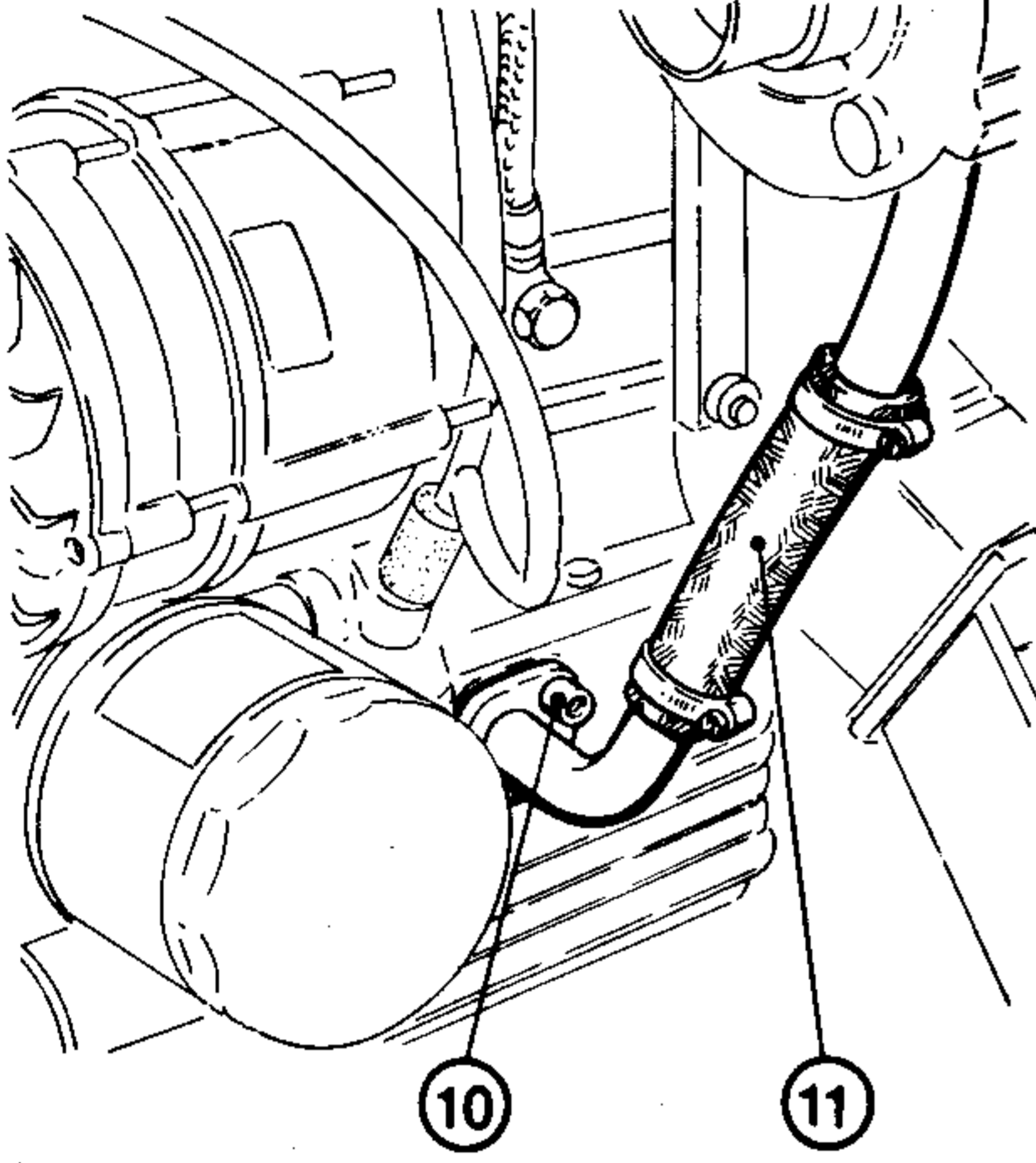
5. Remove the two screws (8) and disconnect hose (9) from the connector on the turbocharger. Remove the gasket.



- 8. Screws
- 9. Turbocharger oil delivery hose

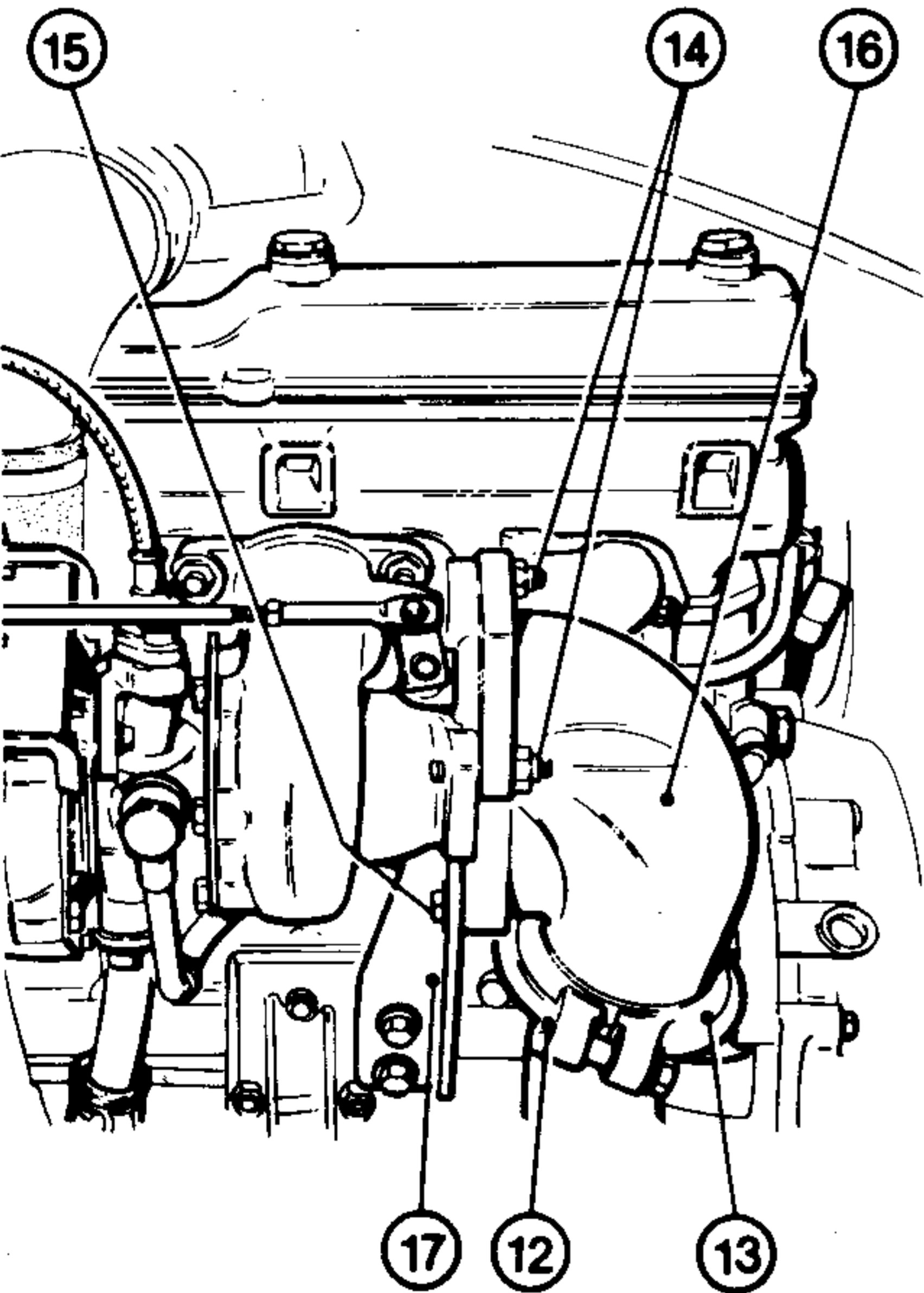
FUEL SYSTEM

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



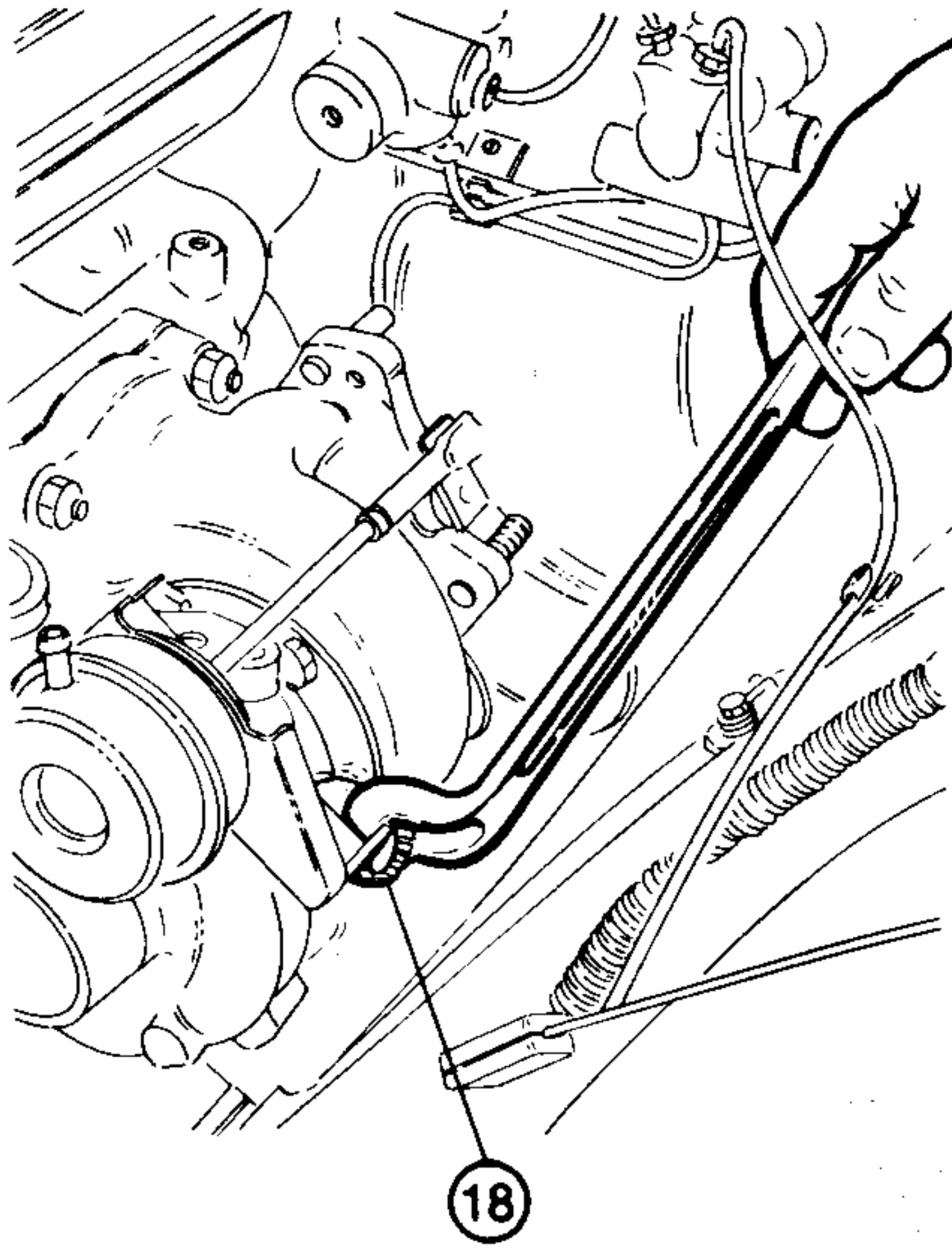
10. Screws
11. Oil-to-sump return hose

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.



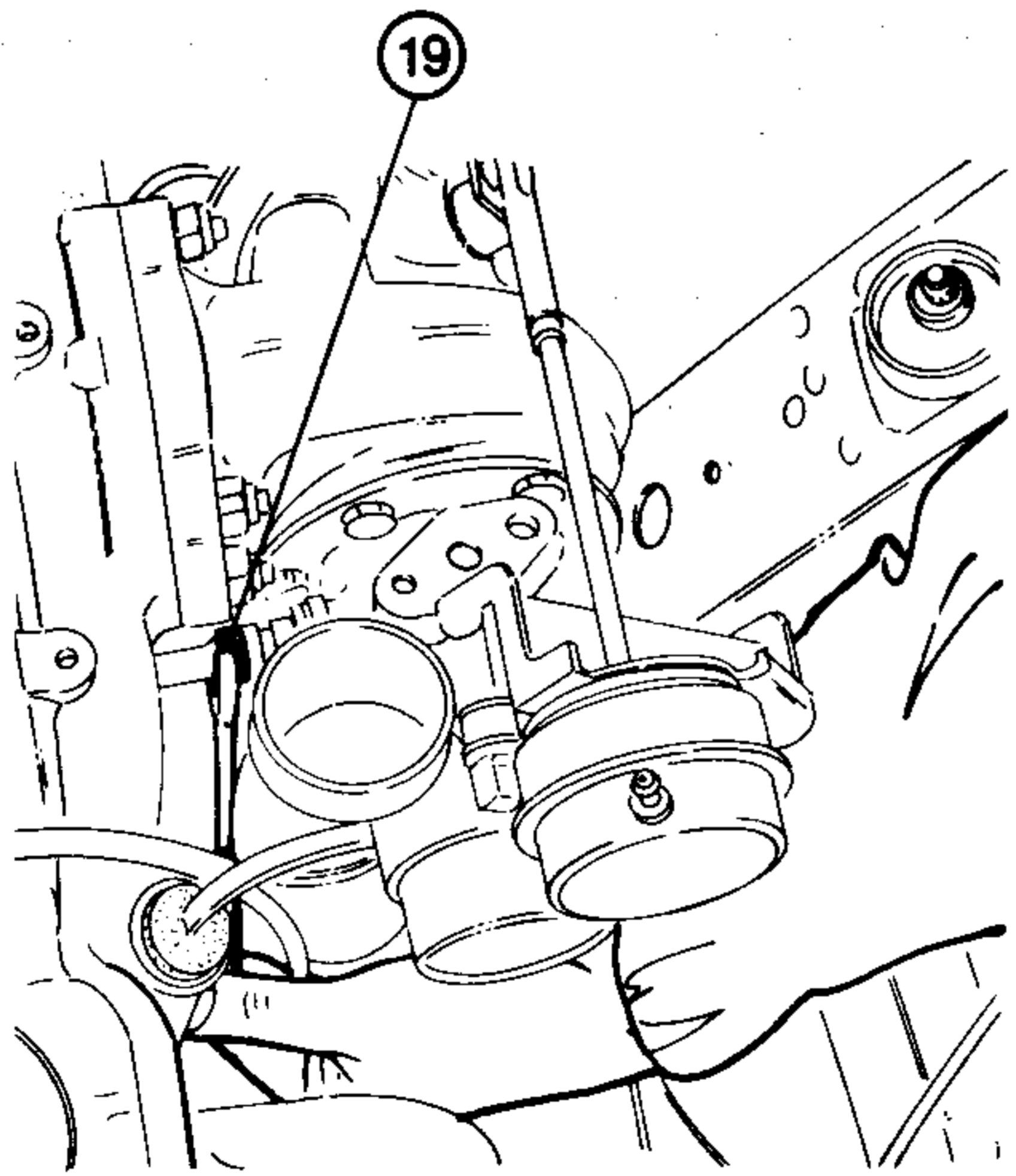
12. Bolts
13. Exhaust pipe retaining collar
14. Nuts
15. Bolts
16. Turbocharger exhaust gas union
17. Union support bracket

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



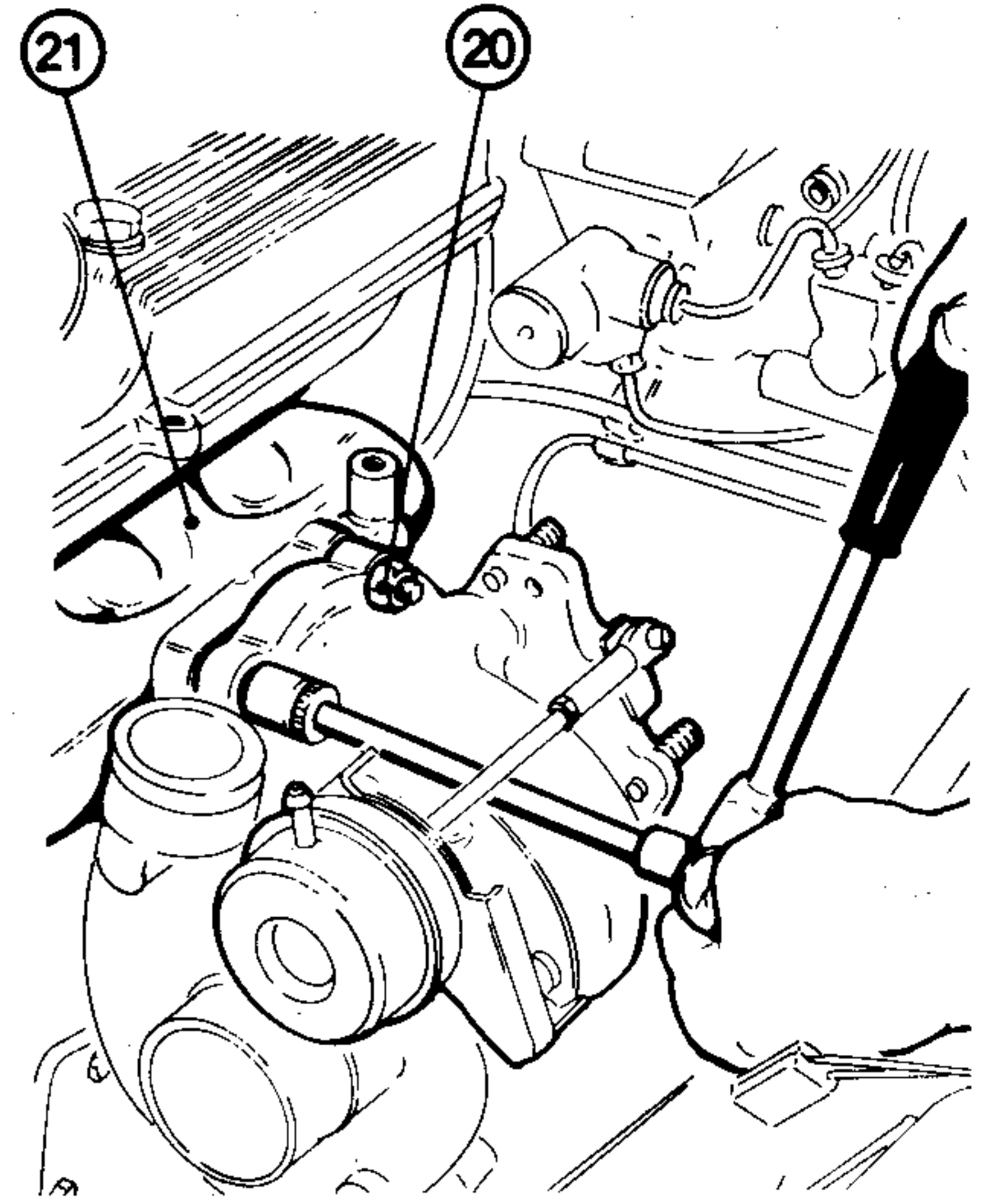
18. Coolant delivery hose securing bolt

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



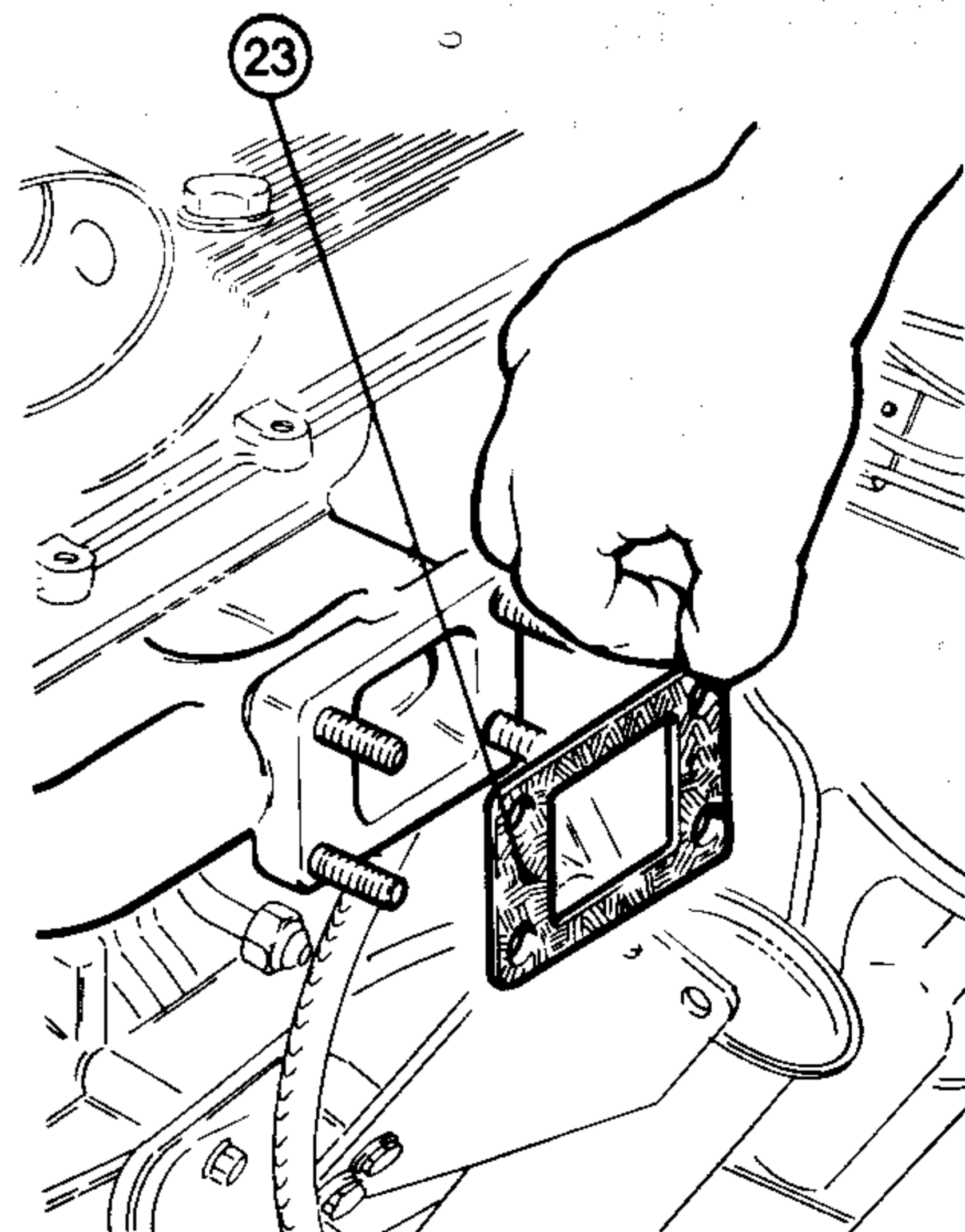
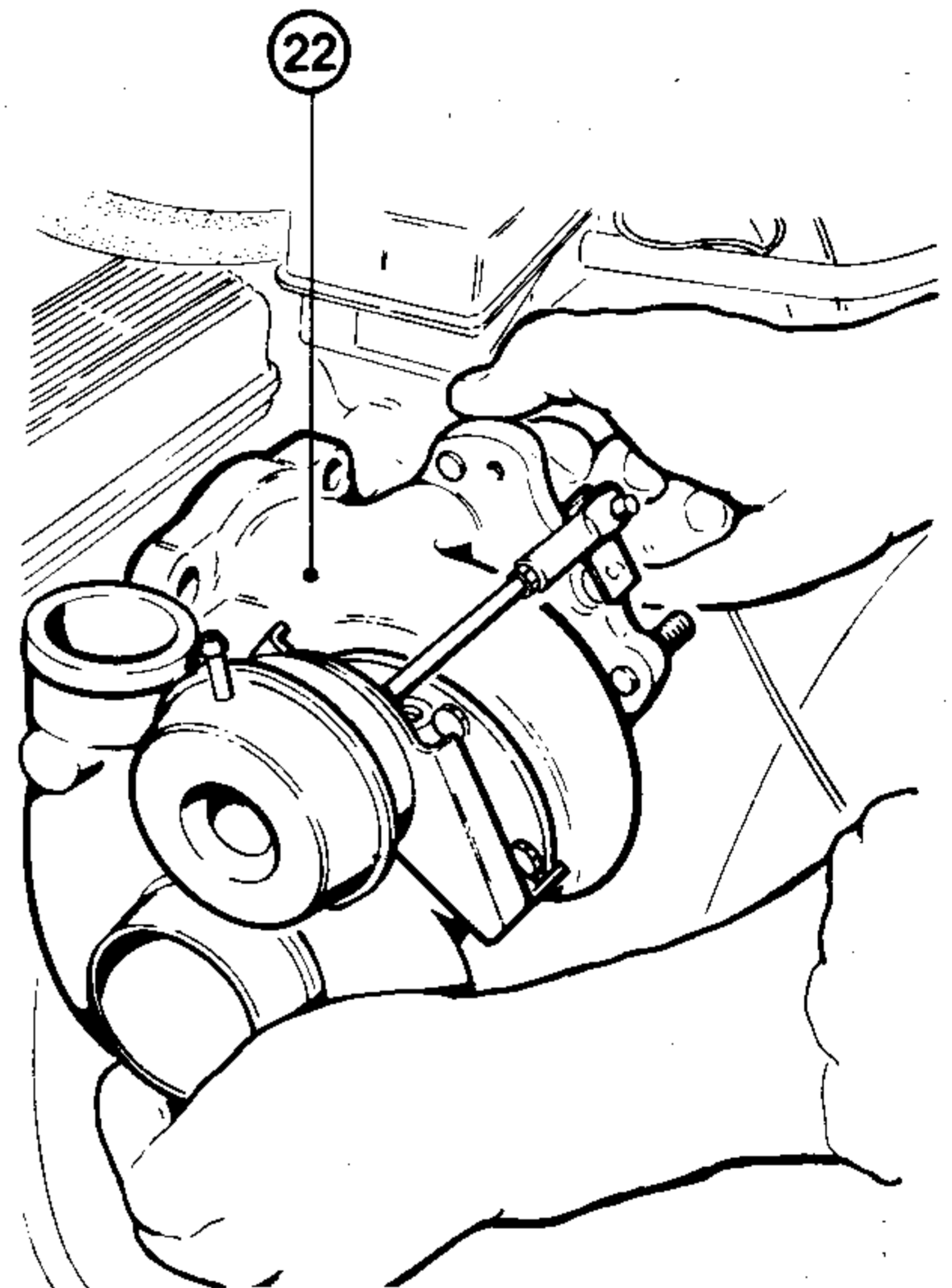
19. Nut retaining coolant return hose

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

FUEL SYSTEM

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).

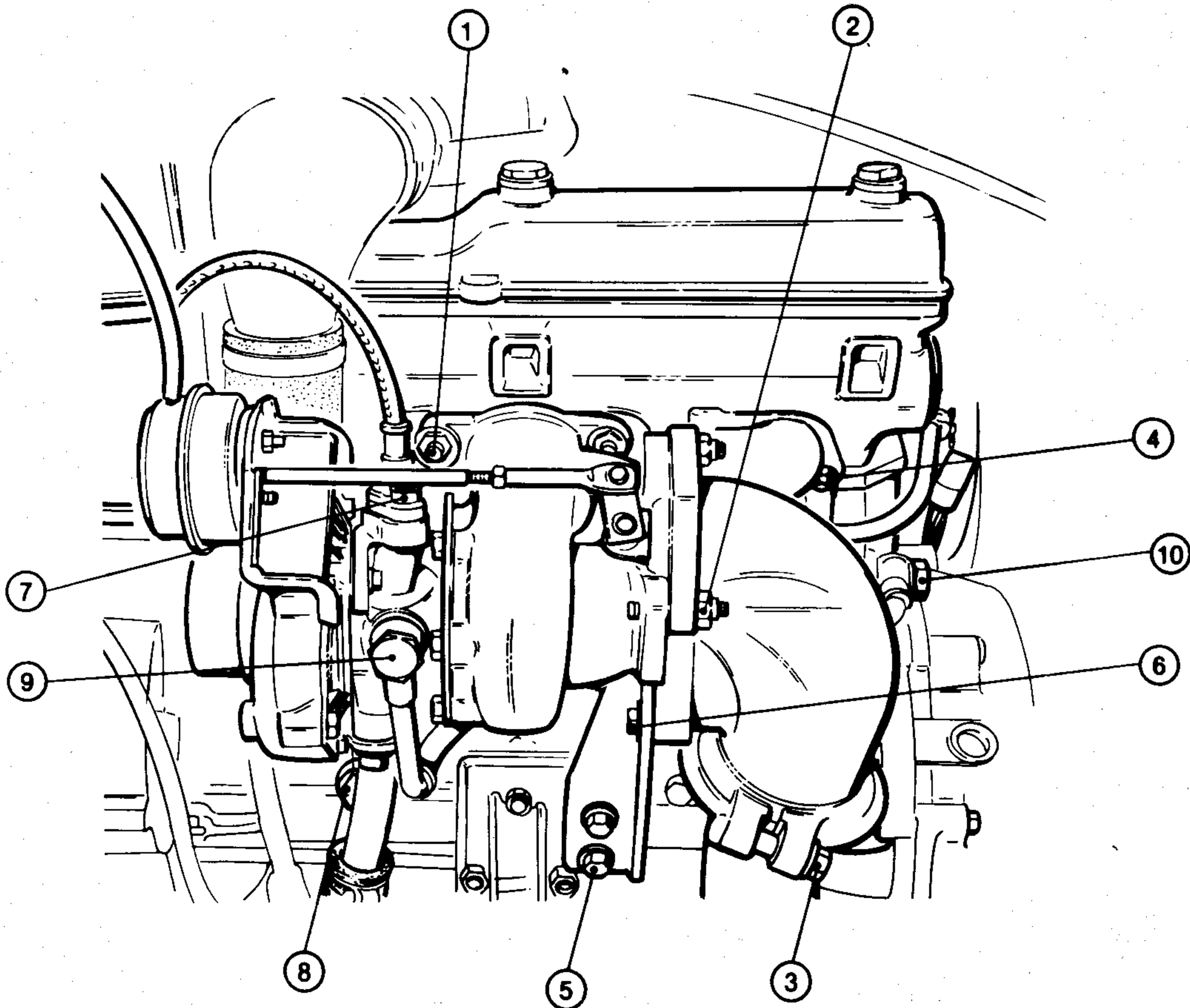
T : Tightening torque
 19 to 24 N·m
 (1.9 to 2.4 kg·m
 14.01 to 17.70 ft·lb)

- 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

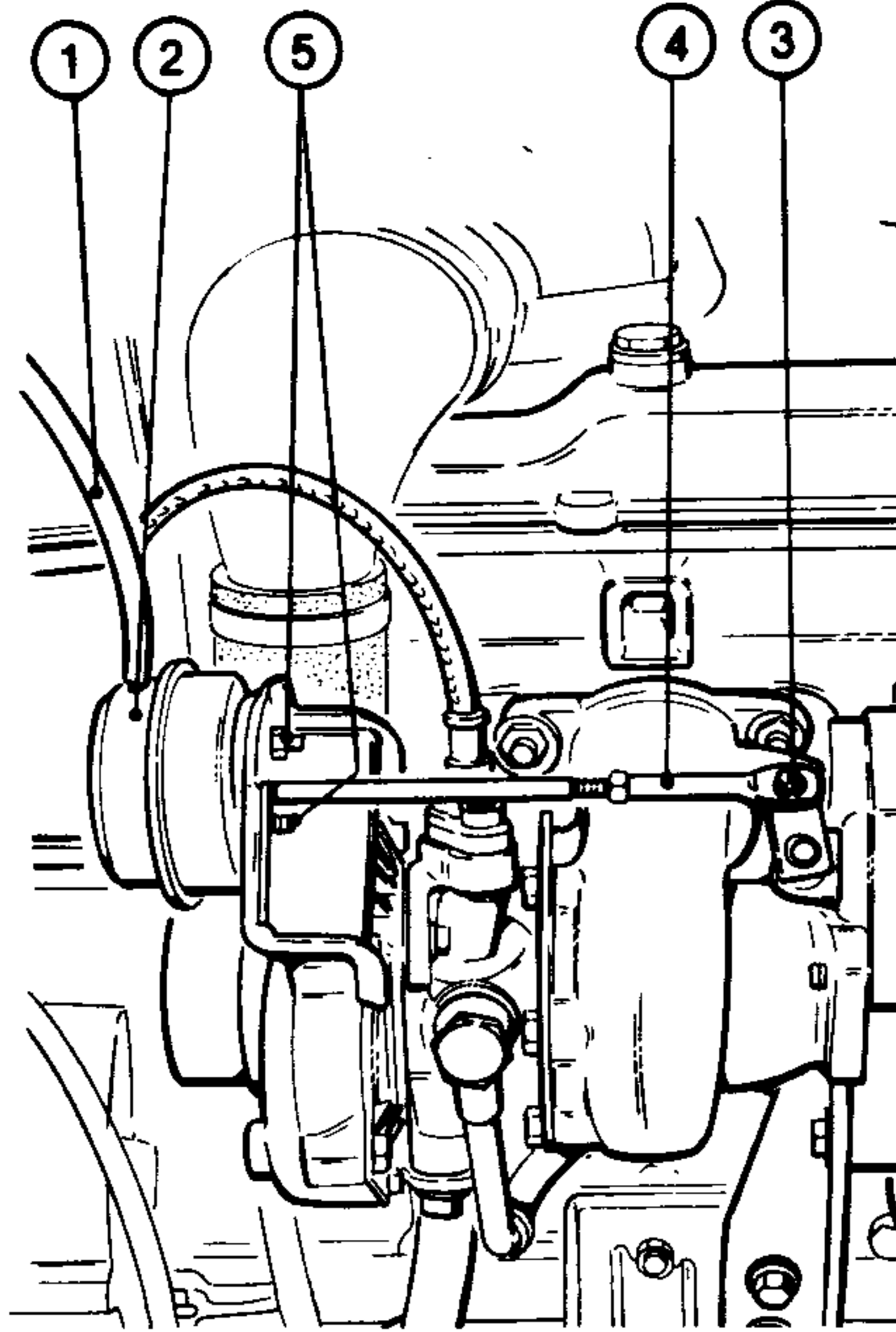
WASTE-GATE VALVE

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.



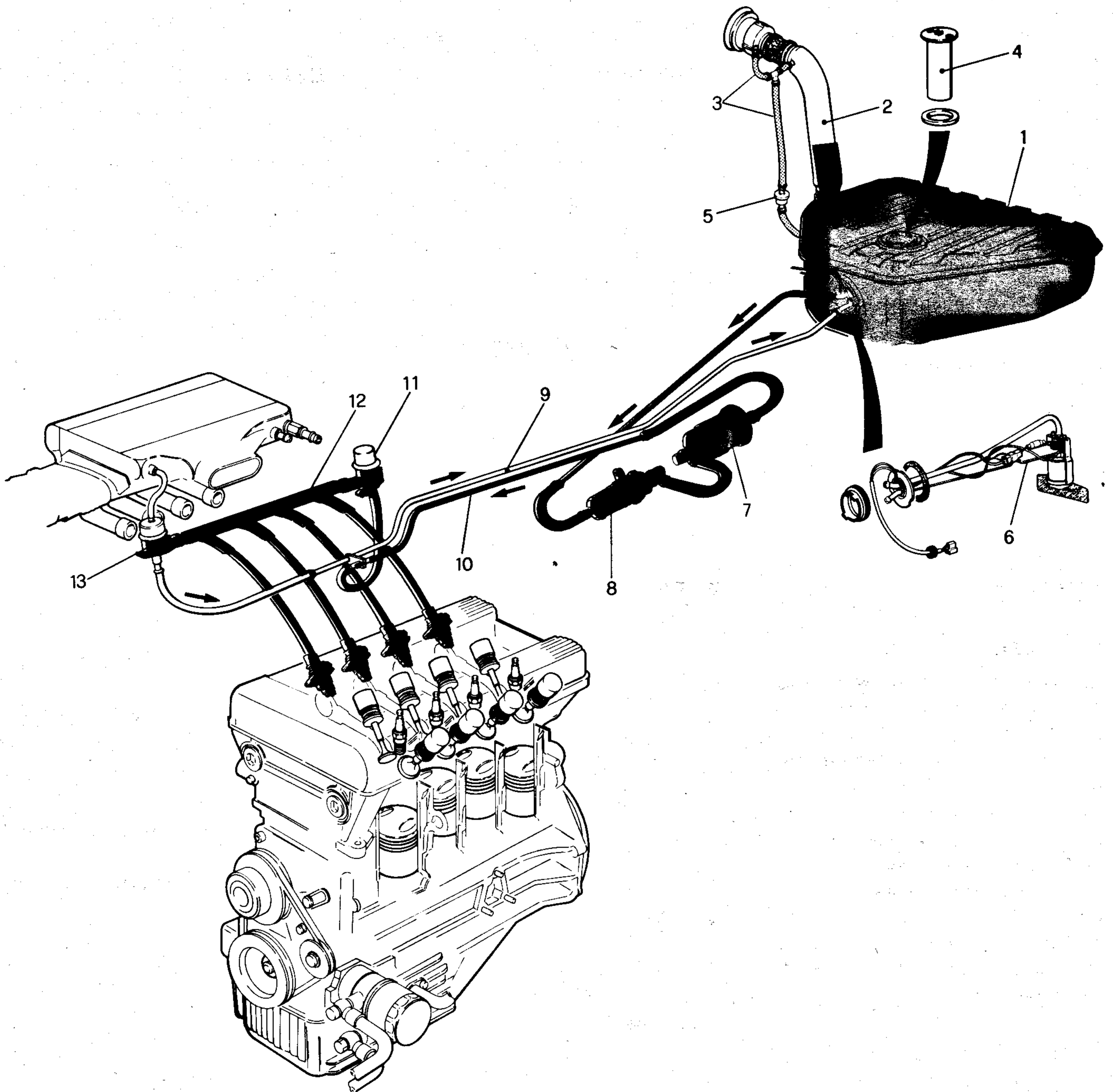
1. Hose connecting waste-gate to supercharging pressure regulation solenoid valve
2. Waste-gate valve
3. Snap ring
4. Waste-gate valve control stem
5. Nuts

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

FUEL SYSTEM

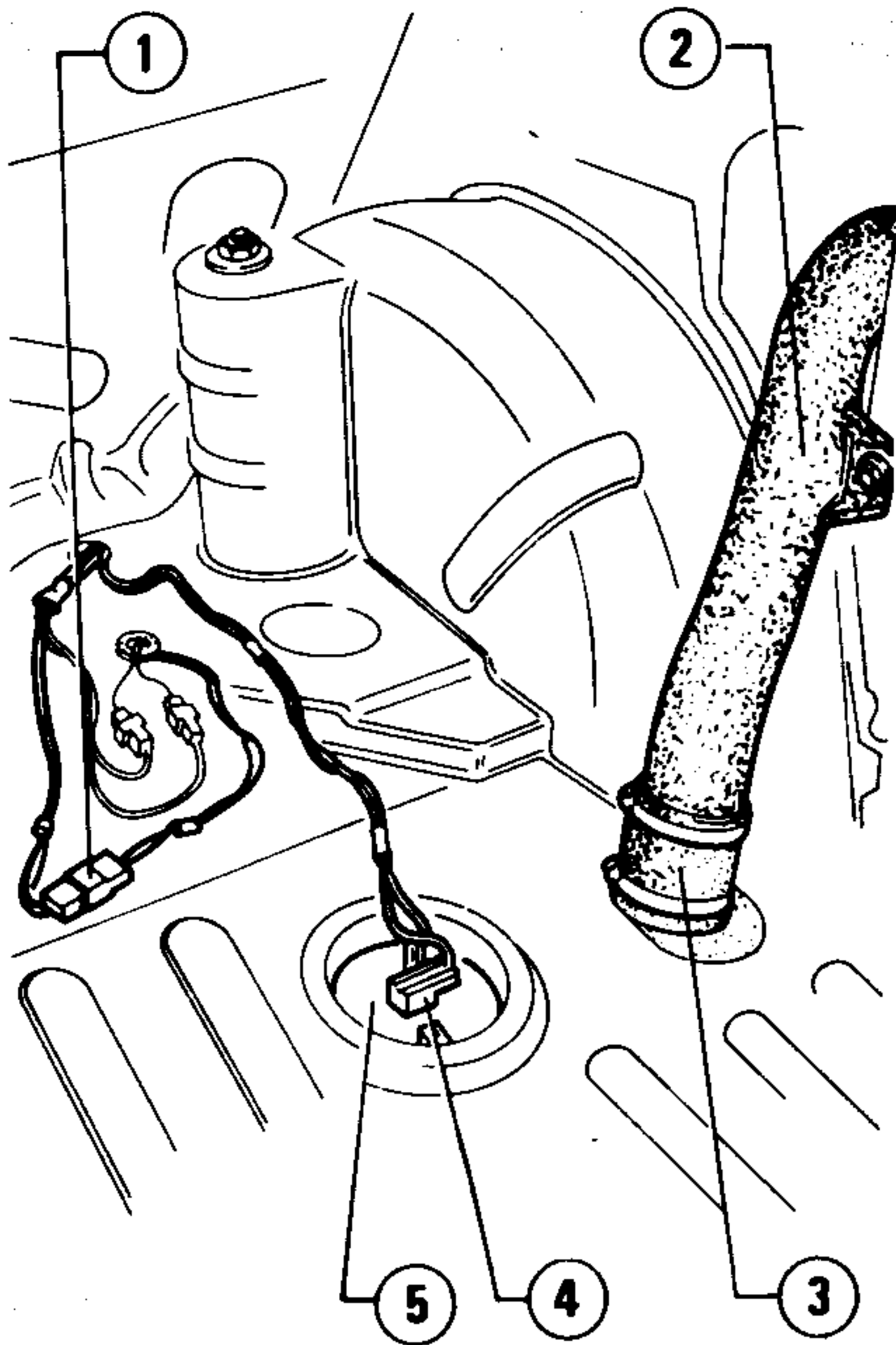
WARNING:

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.



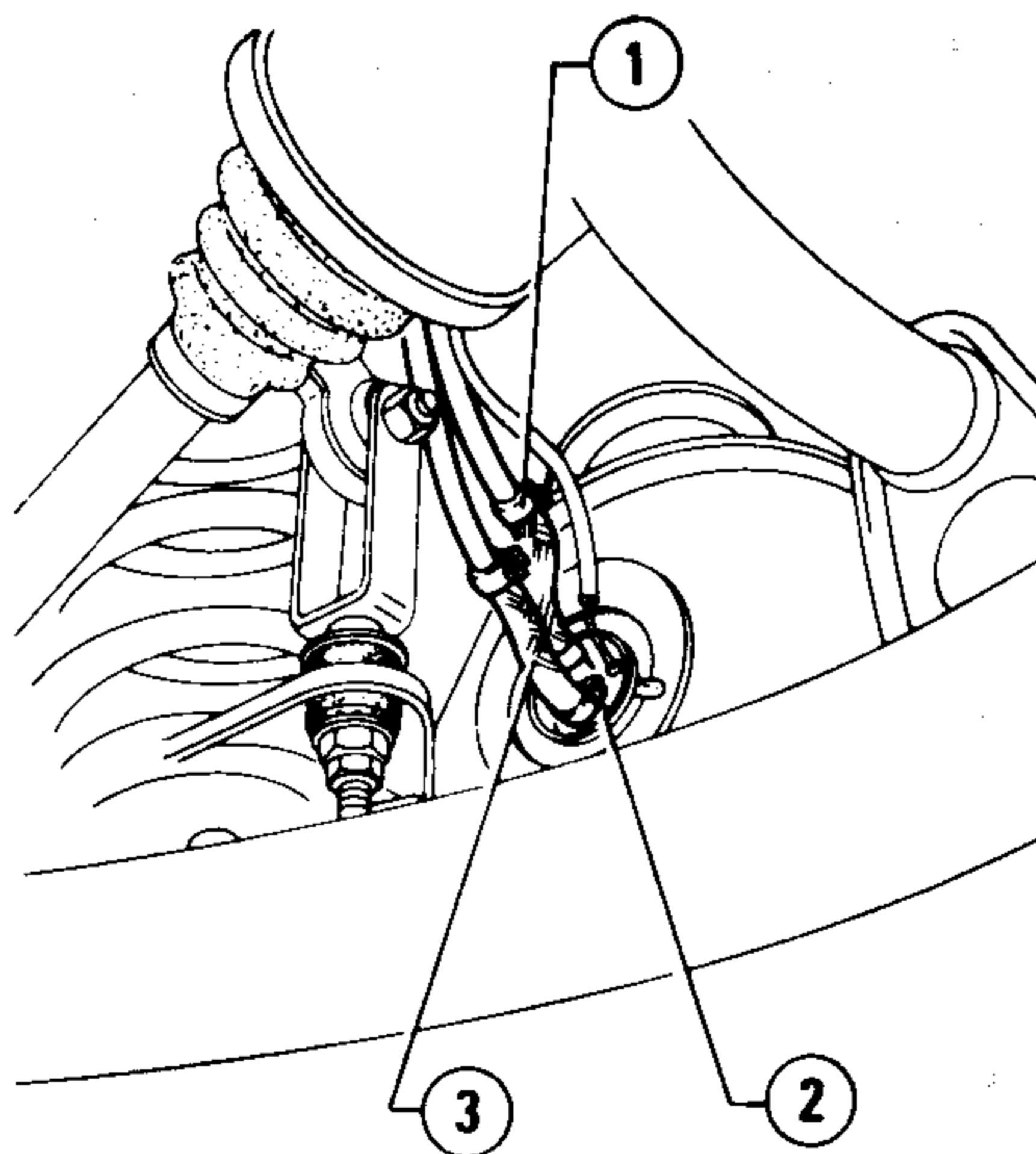
1. Submerged pump supply connector
2. Fuel filler
3. Sleeve connecting filler to tank
4. Fuel level gauge connector
5. Fuel level gauge

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.

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.

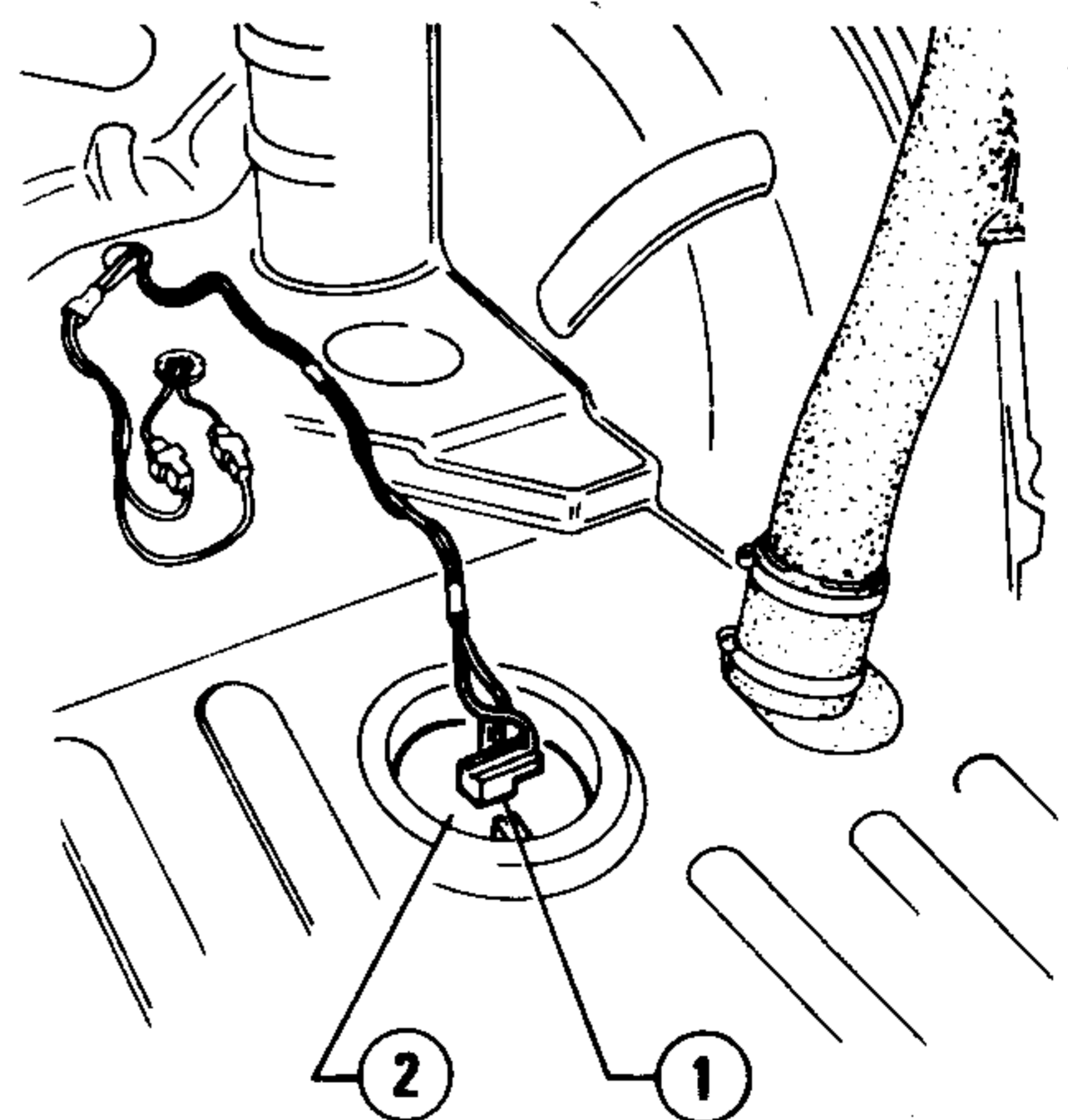
INSTALLATION

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

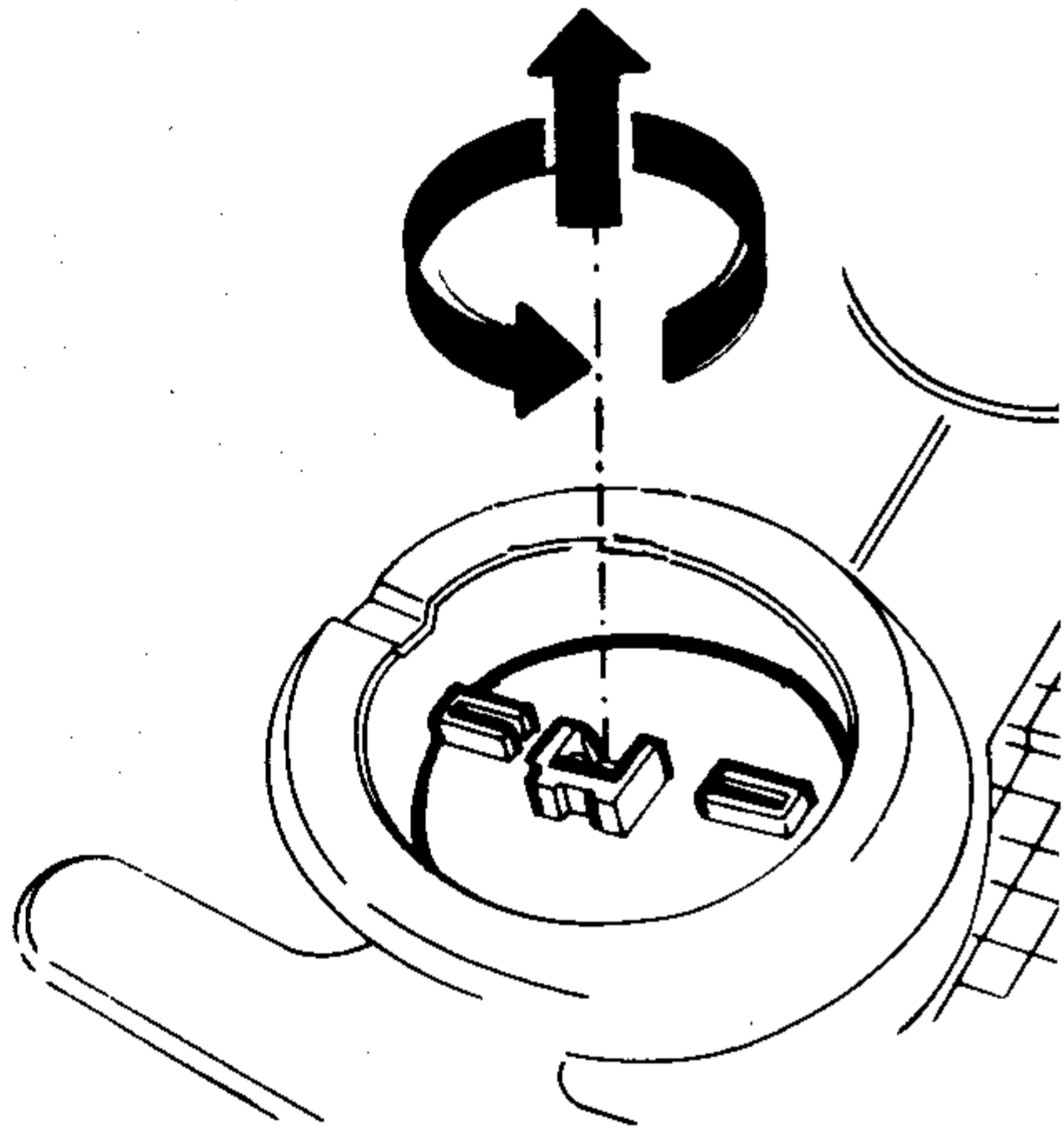
1. Remove the luggage compartment floor trim.
2. Remove cover of fuel level gauge ② and detach connector ①.



1. Fuel level gauge connector
2. Fuel level gauge

FUEL SYSTEM

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

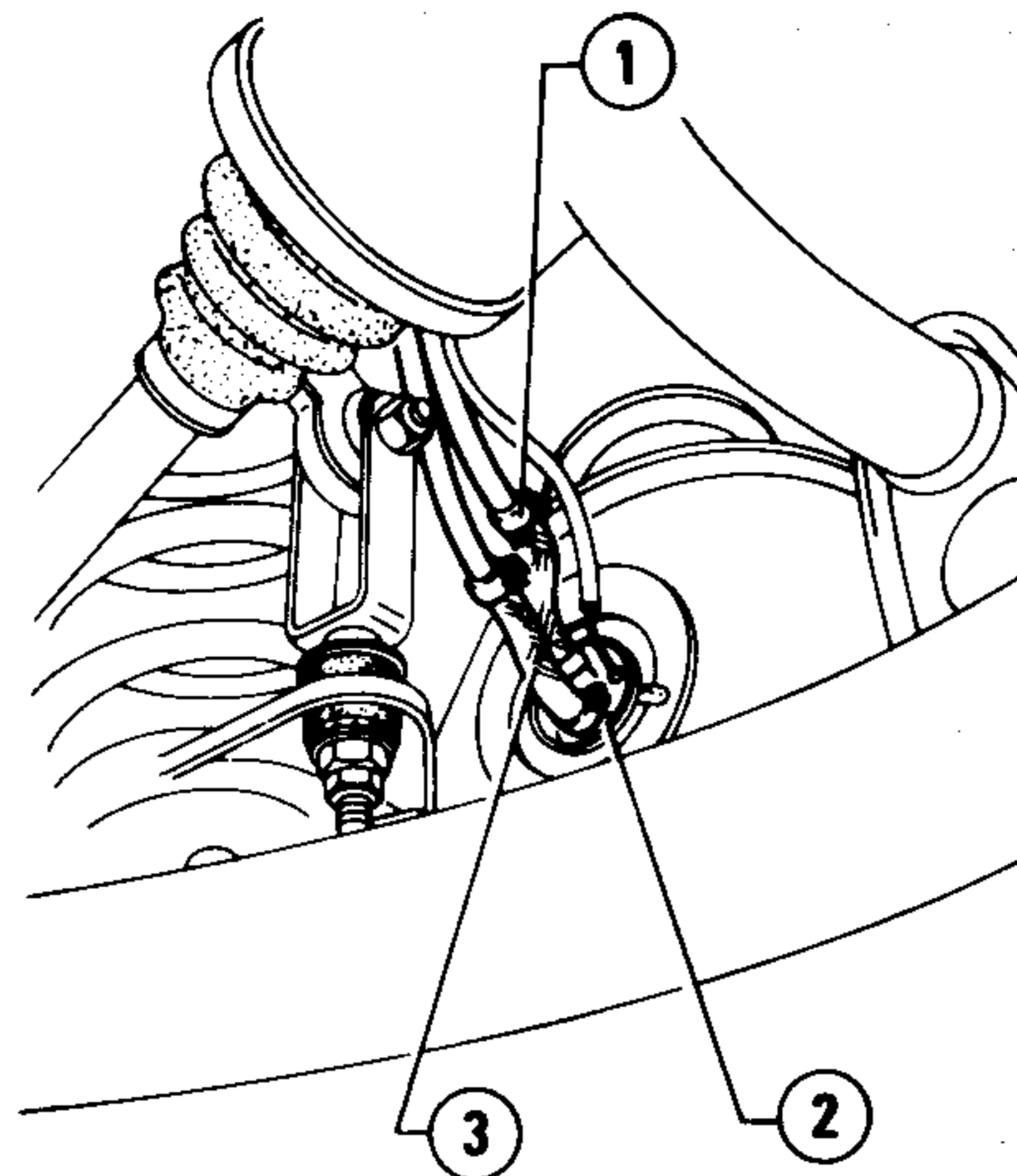


4. Replace gasket before installing the fuel level gauge on tank.

AUXILIARY FUEL PUMP AND GRID FILTER

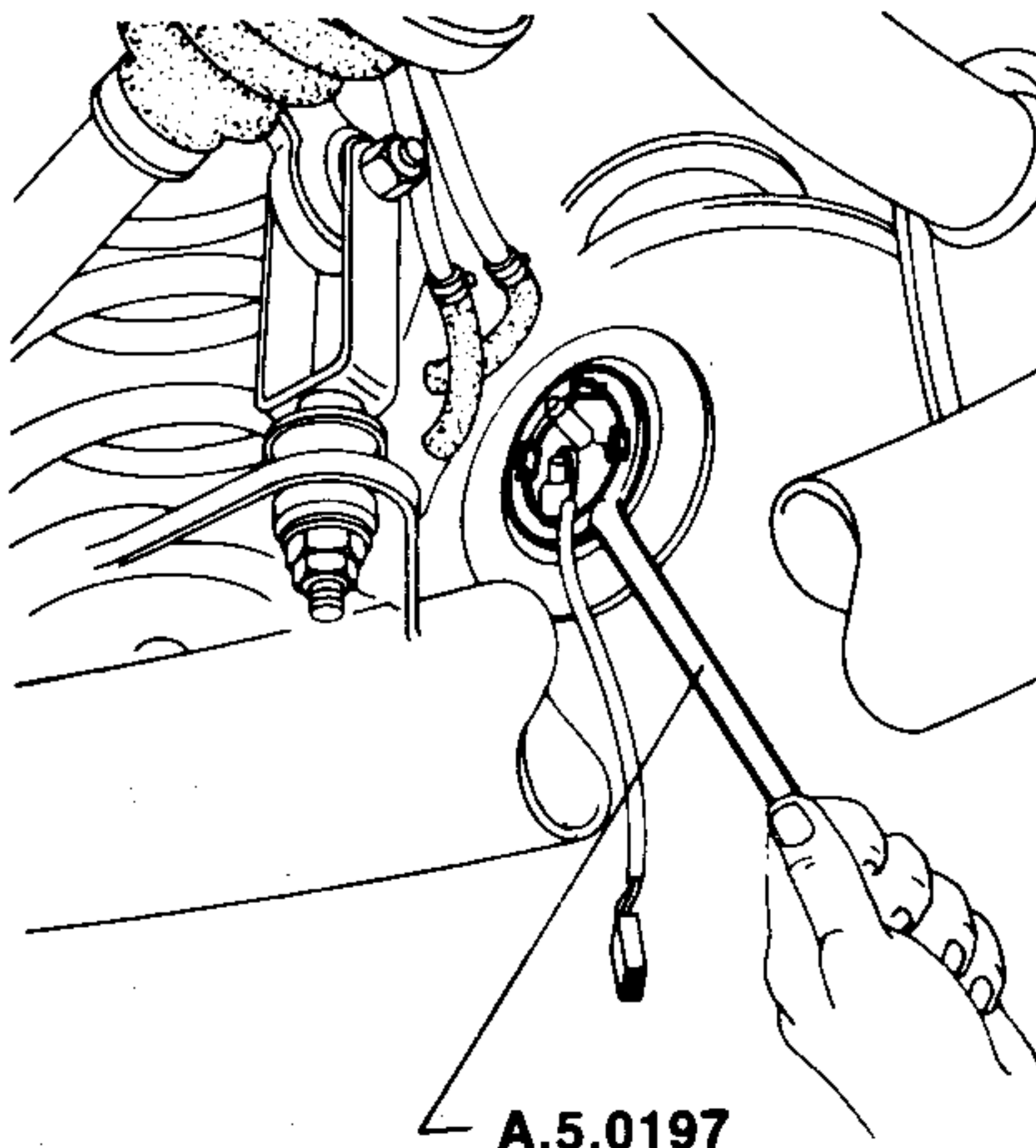
REPLACEMENT

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).



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.

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 noses 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:

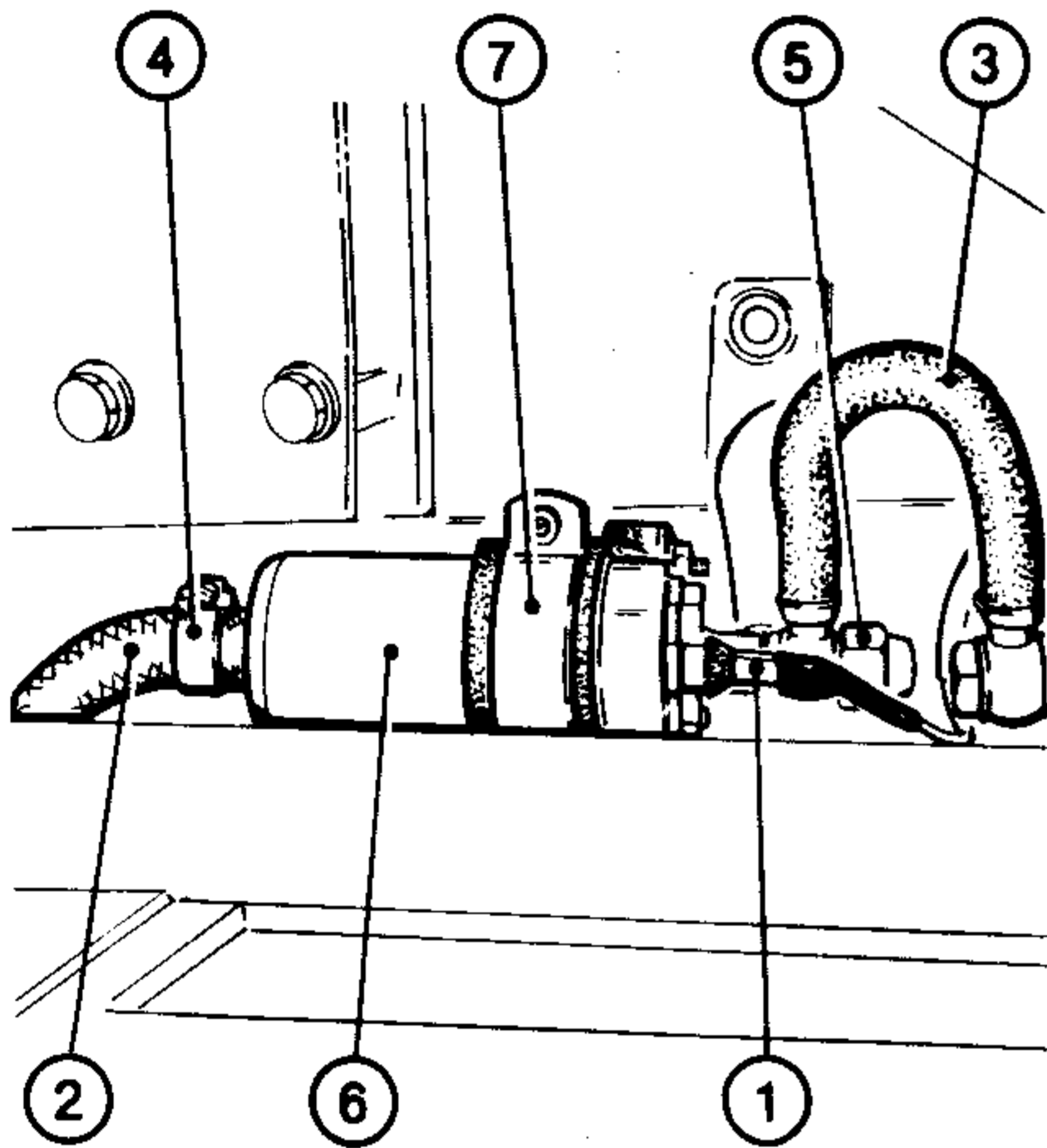
- a. Carefully install clamps on system joints.
Do not tighten clamps excessively so as to prevent damaging piping.
- b. Do not bend or twist pipes when installing them on vehicle.
- c. The piping inside the vehicle must be inserted into the related pipe-raceway up to the red reference strips marked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

FUEL SYSTEM

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)

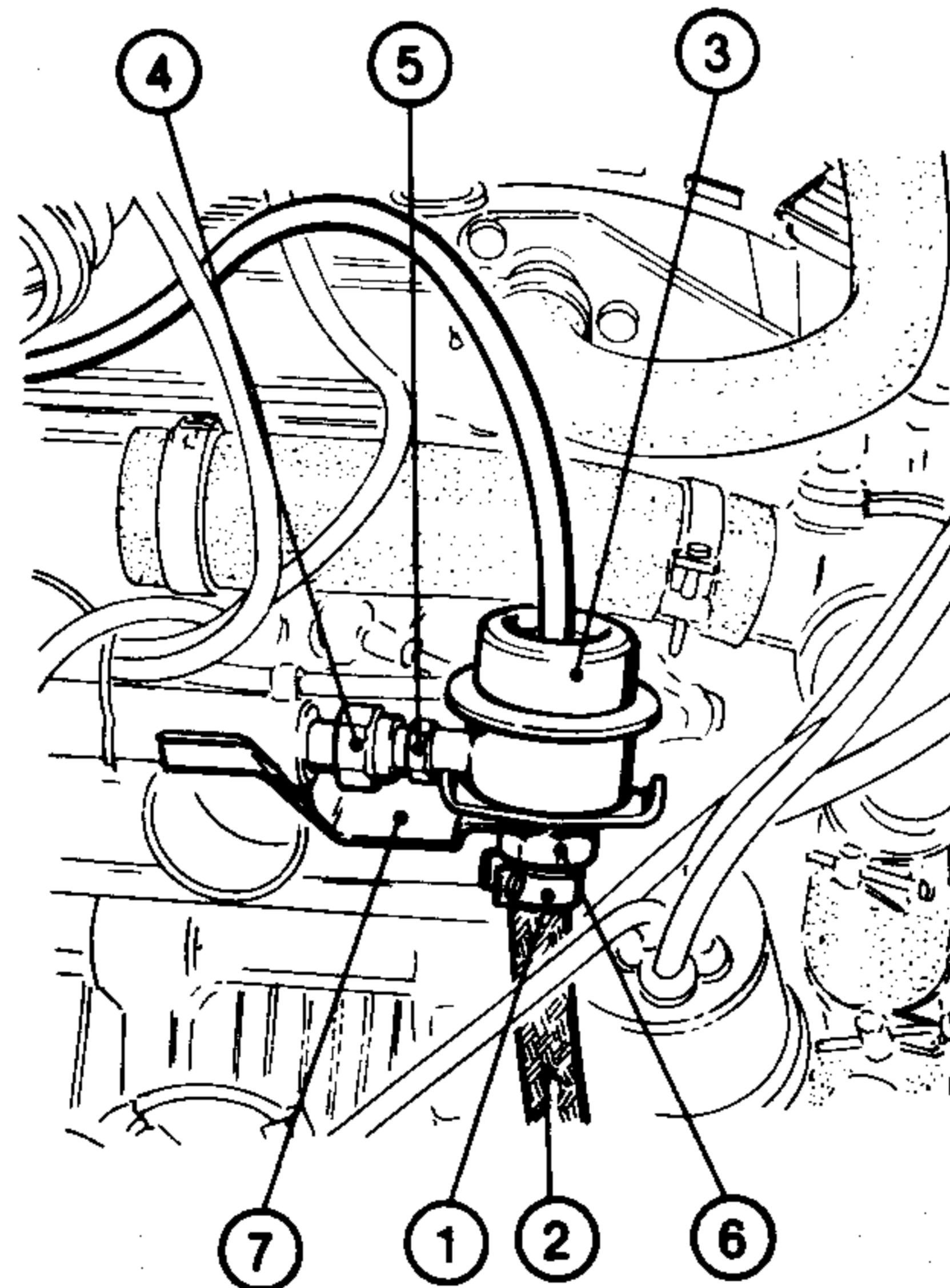
— Pump support clamp retaining nut (7).

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

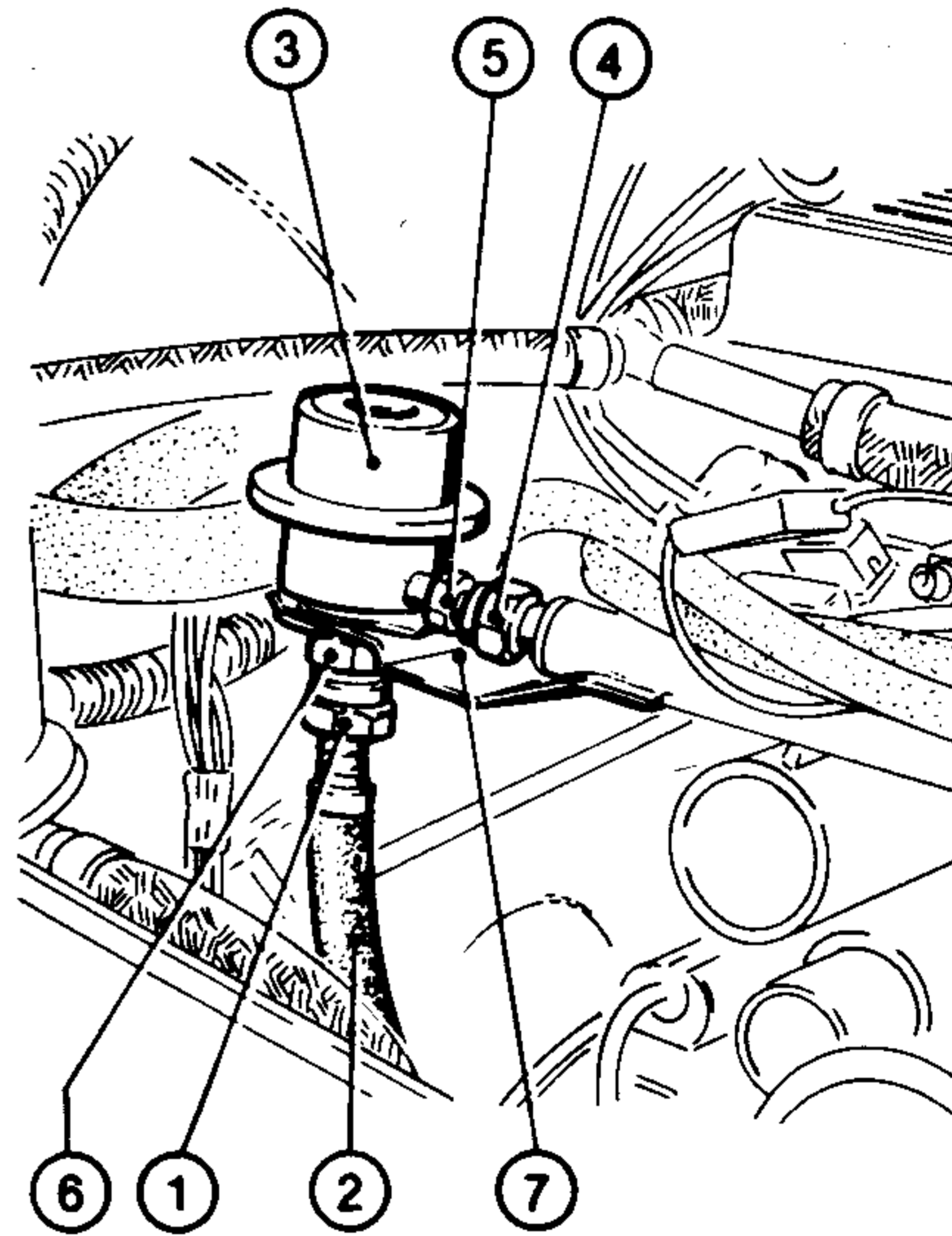
5. Assemble a new pressure regulator by proceeding in the opposite order to removal.

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, and 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.

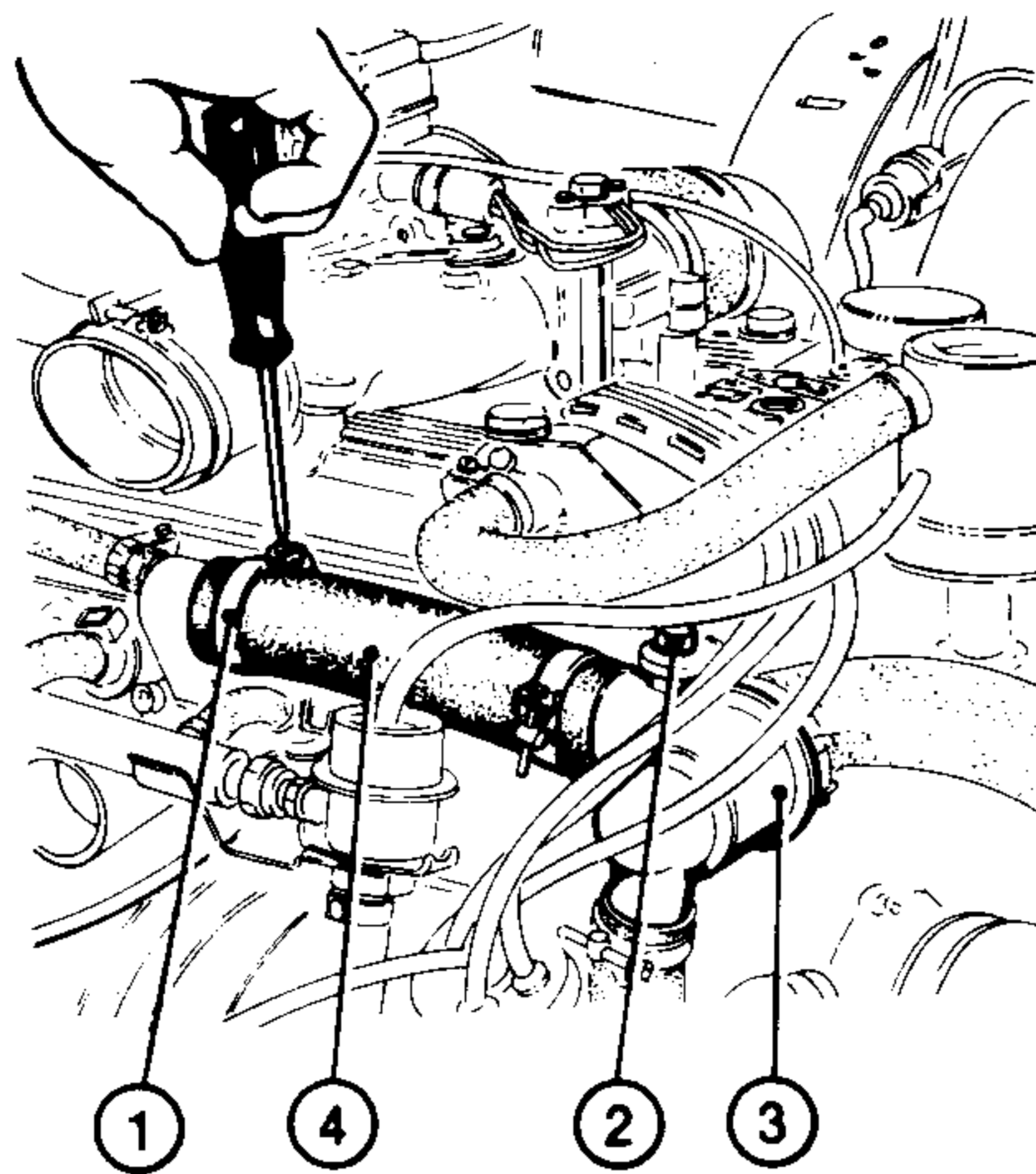
REMOVAL

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).

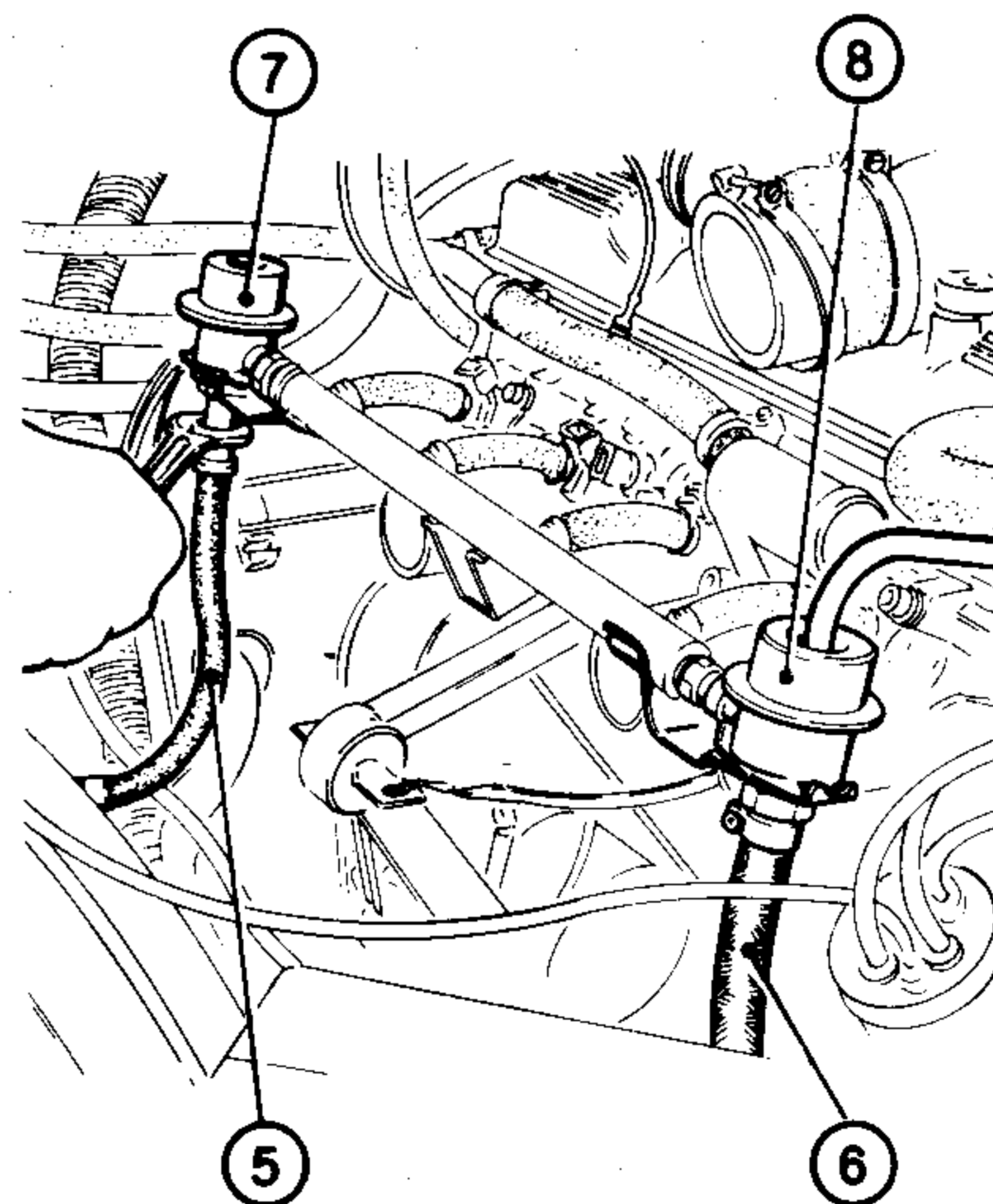


1. Clamp
2. Screw
3. Thermostatic cup
4. Sleeve

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

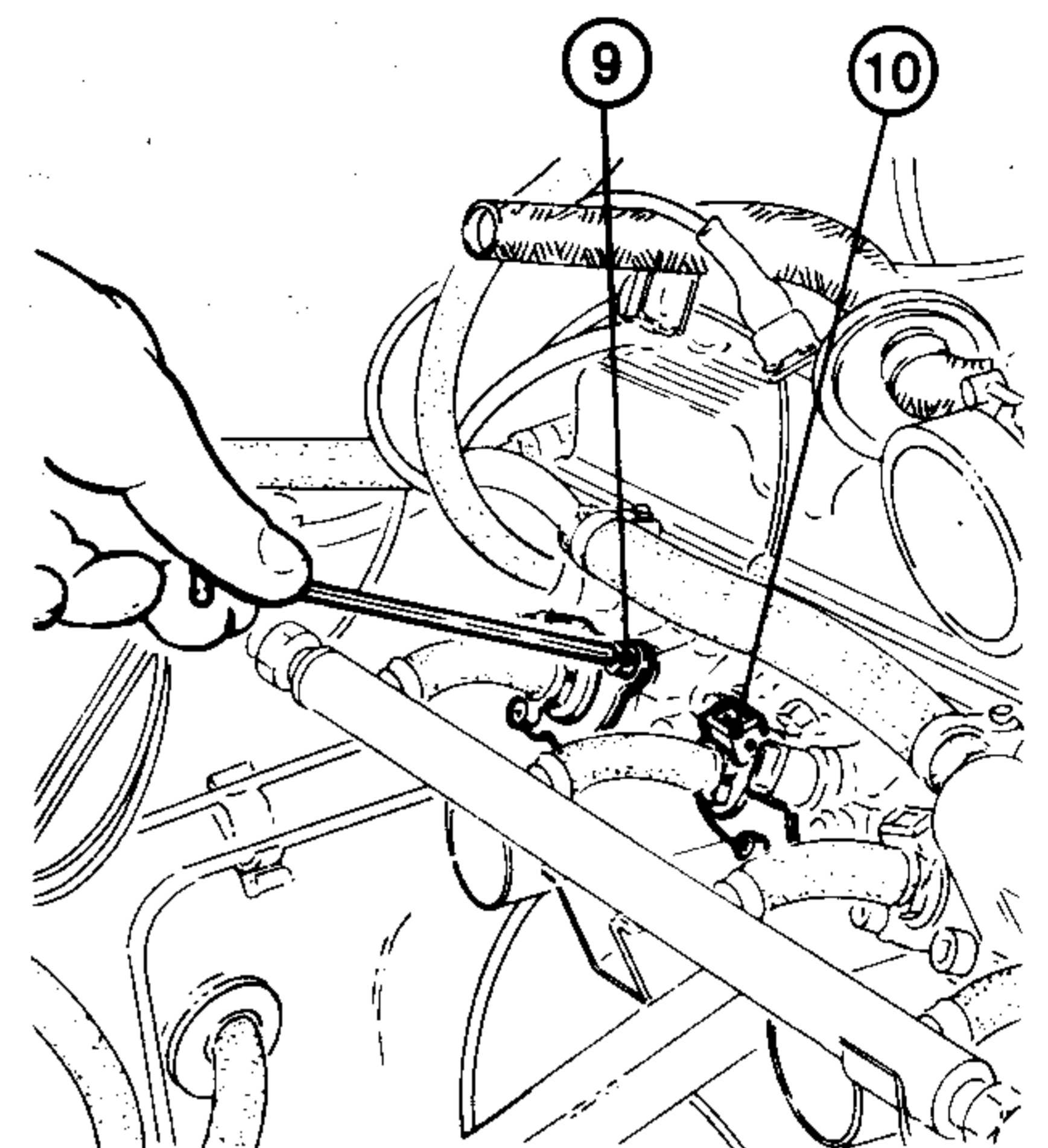
WARNING:

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



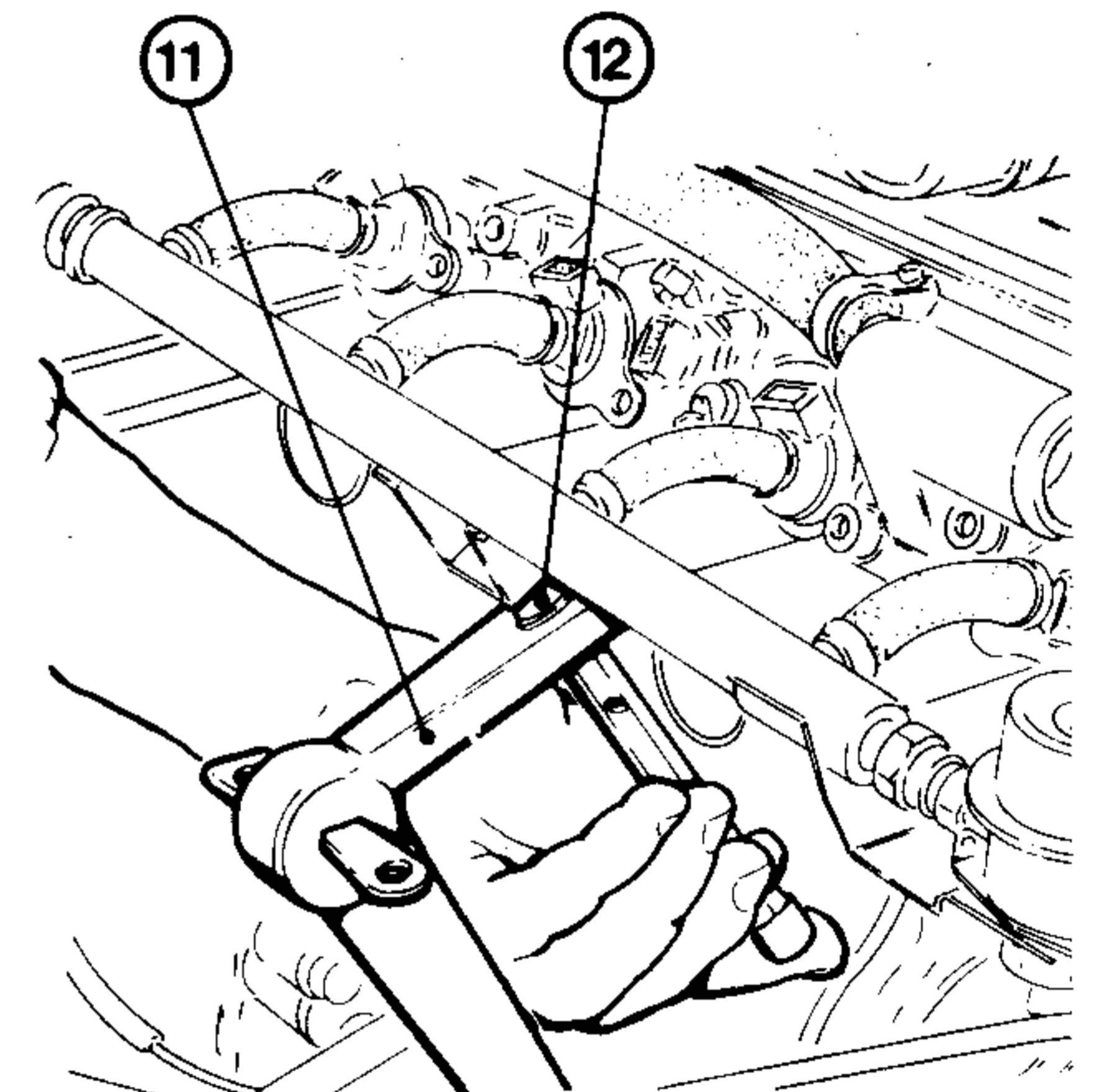
5. Fuel delivery hose
6. Fuel return hose
7. Hammering damper
8. Pressure regulator

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



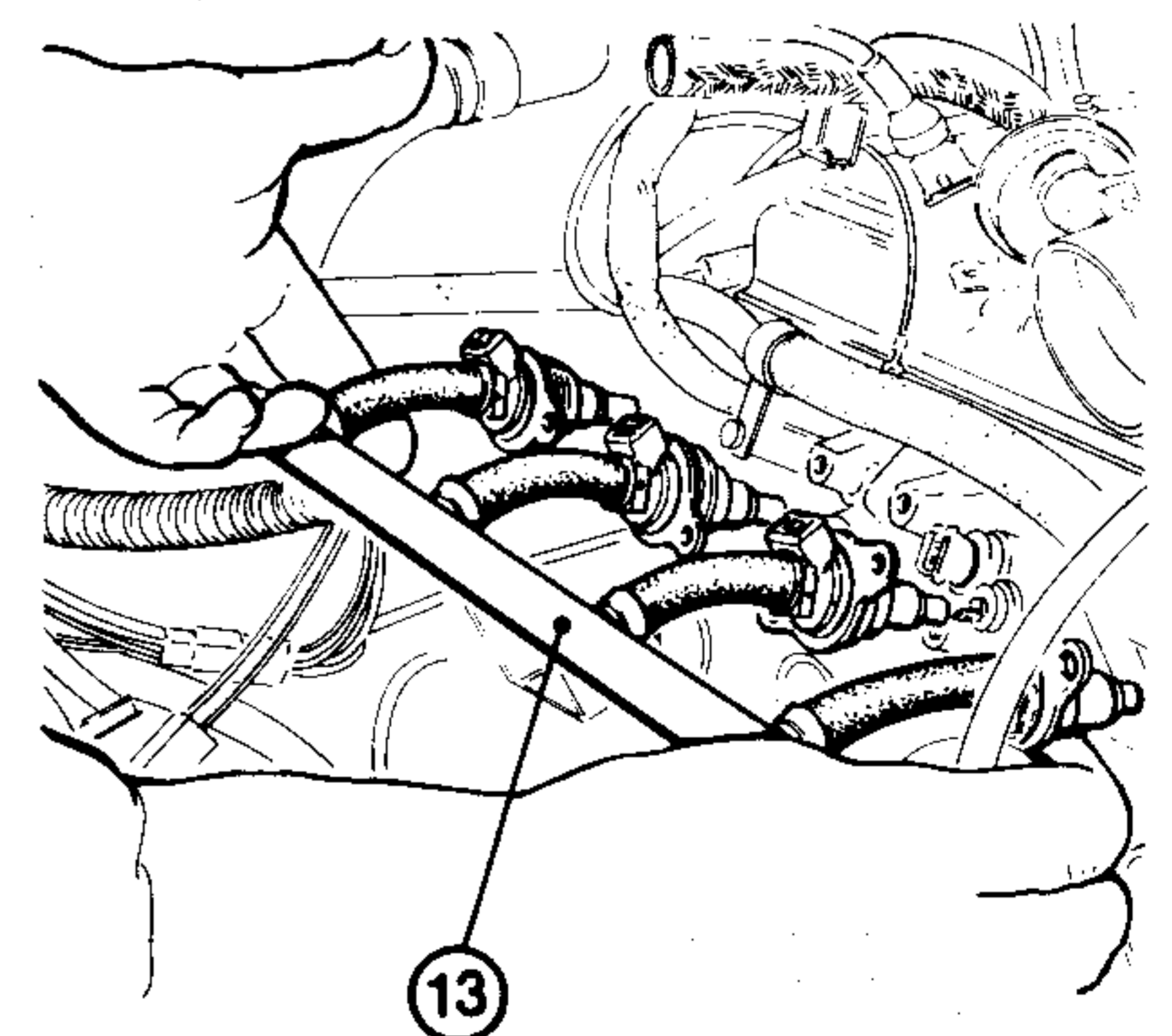
9. Electroinjector retaining screws
10. Electroinjectors

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

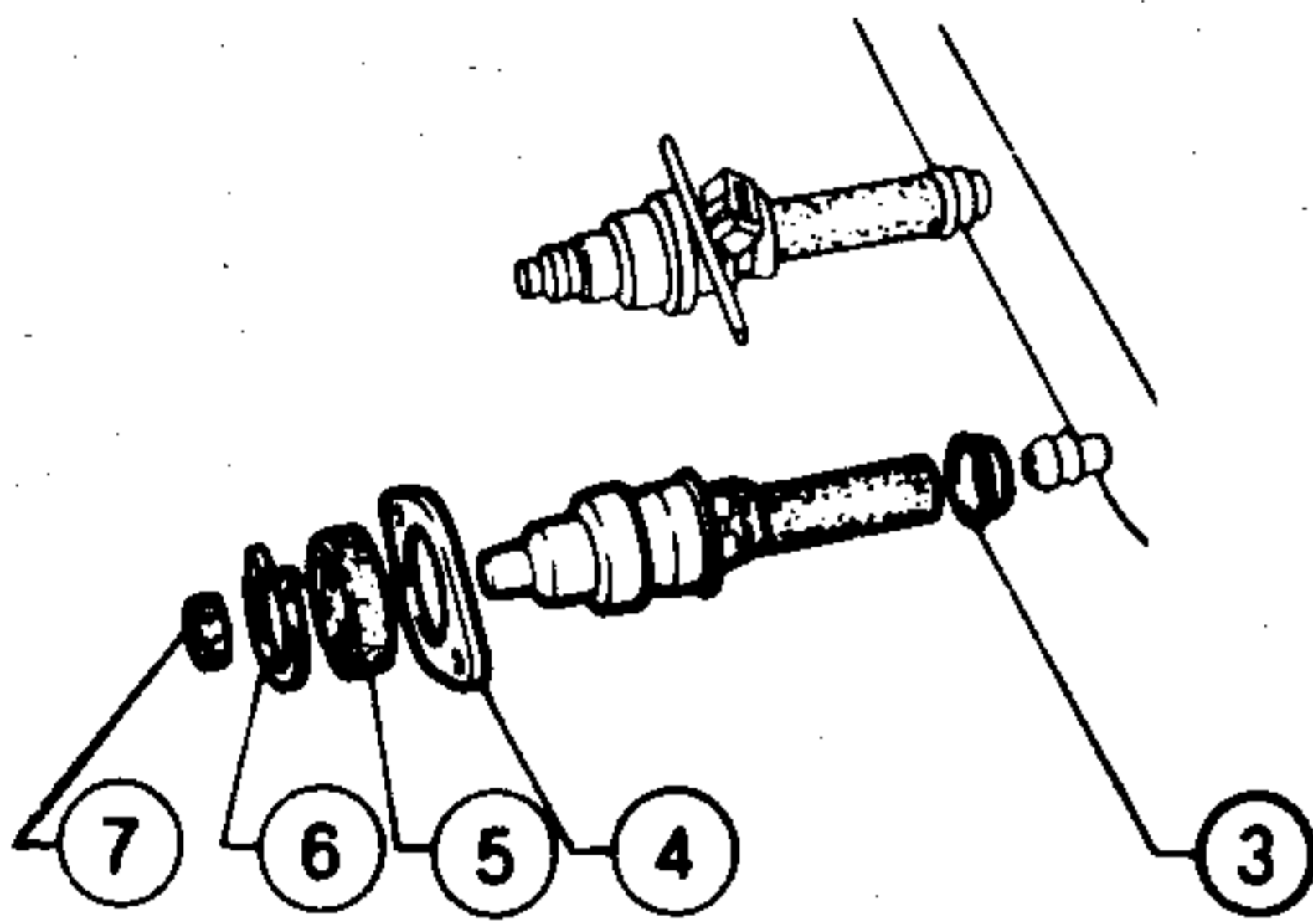
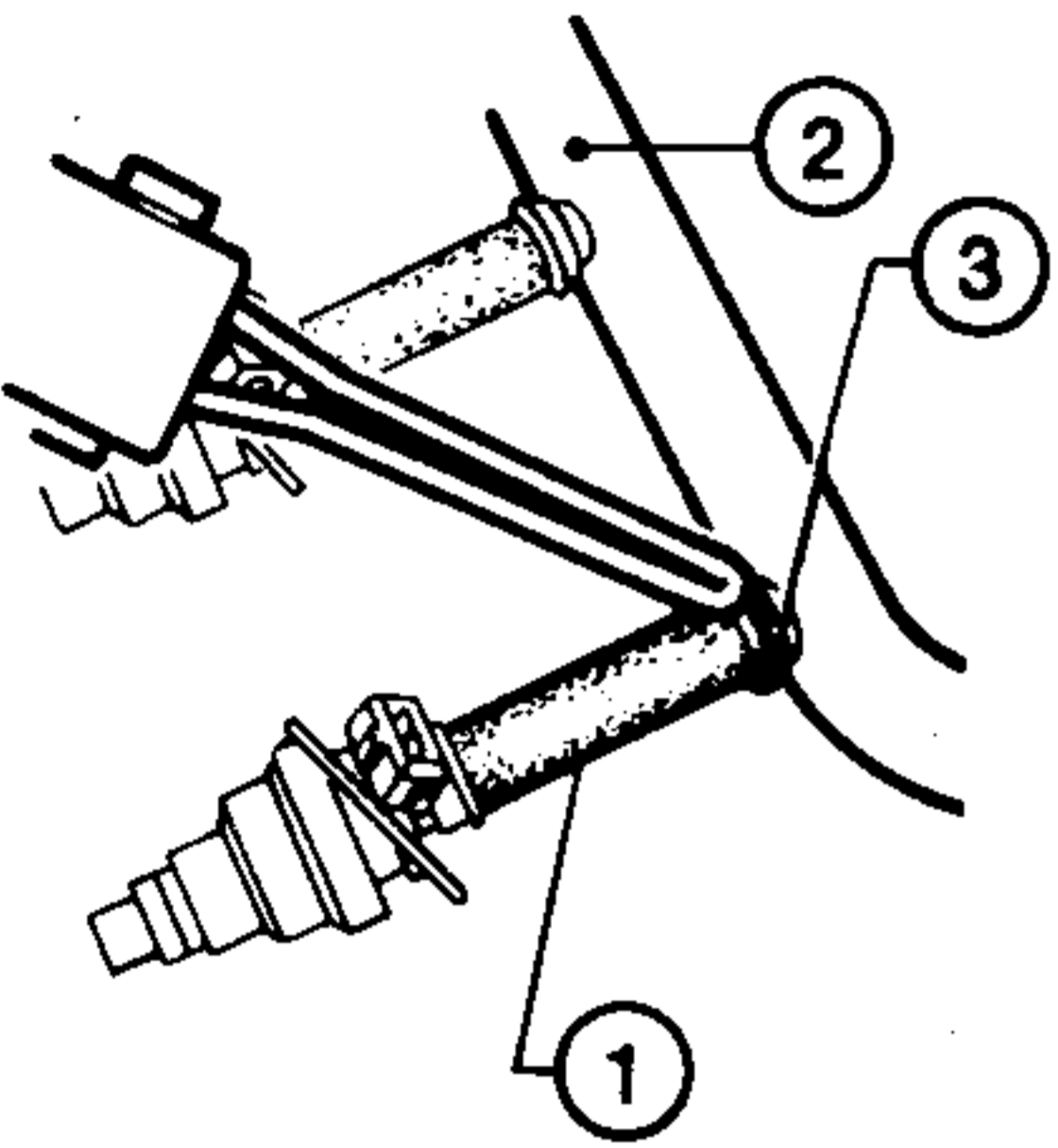
FUEL SYSTEM

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.

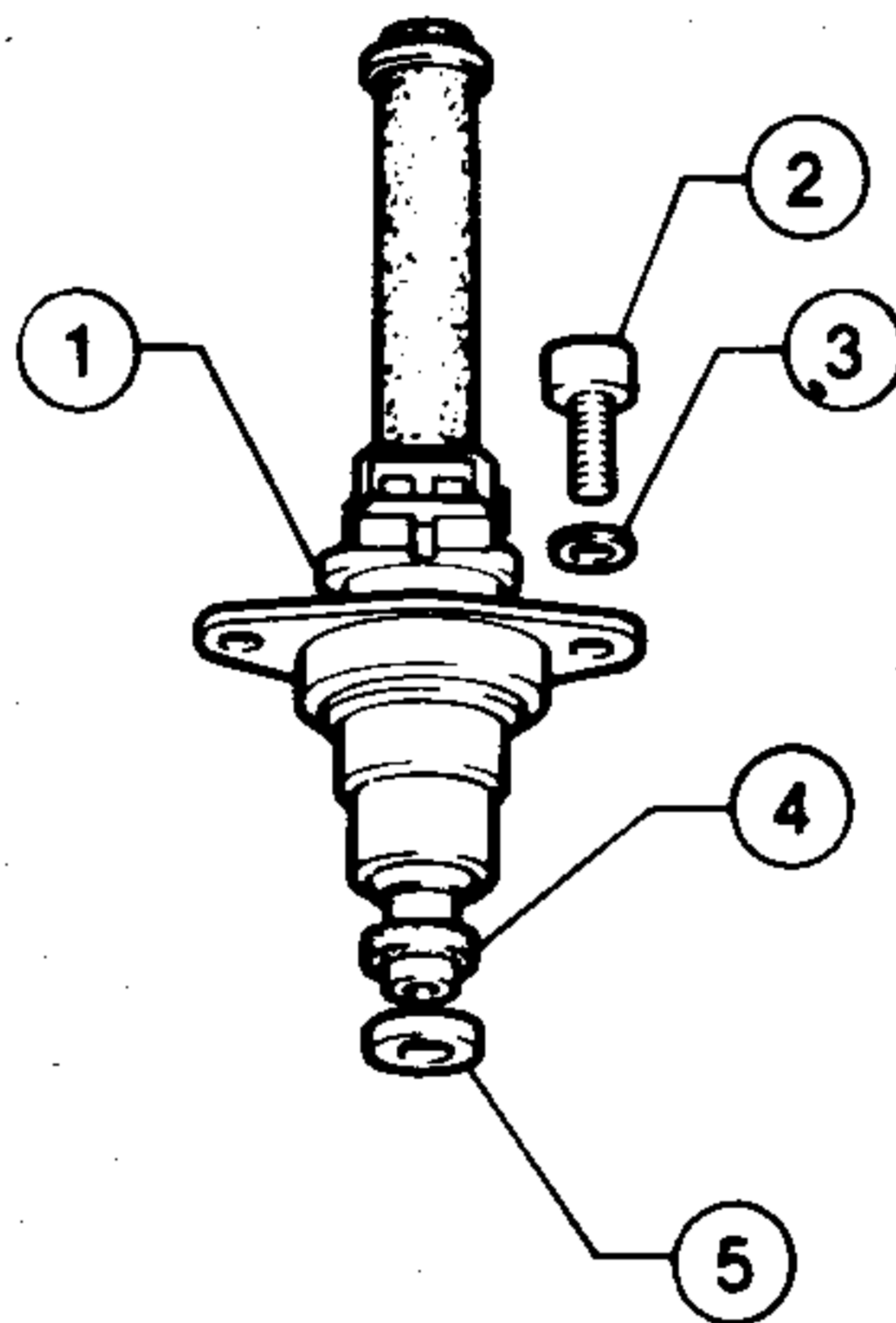
CAUTION:

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:

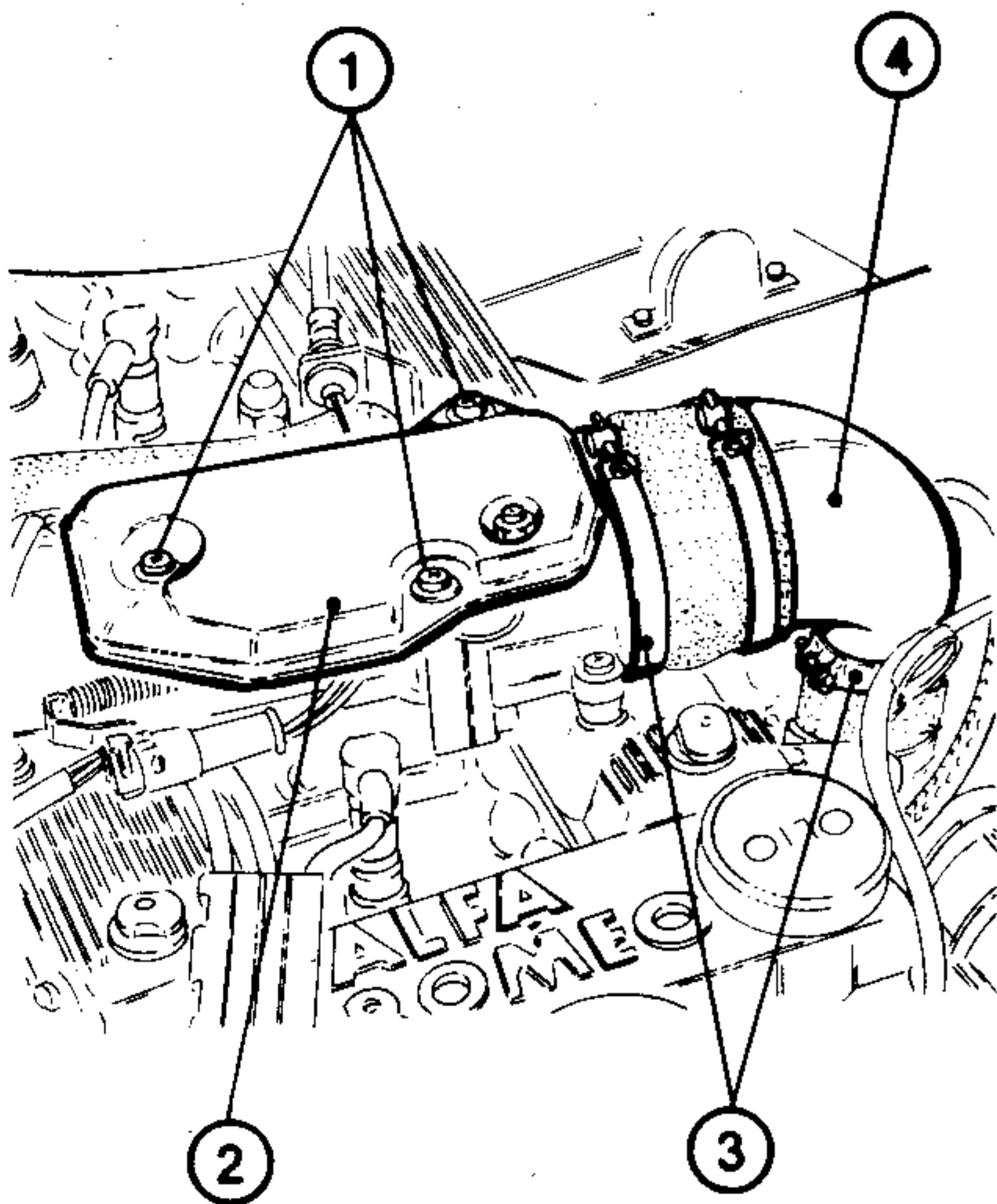
- Restore coolant correct level.
- Check the exhaust CO percentage; adjust if necessary (see paragraph «Setting and Adjustments»).

SETTINGS AND ADJUSTMENTS

SETTING OF THROTTLE BODY (Check with Flowmeter)

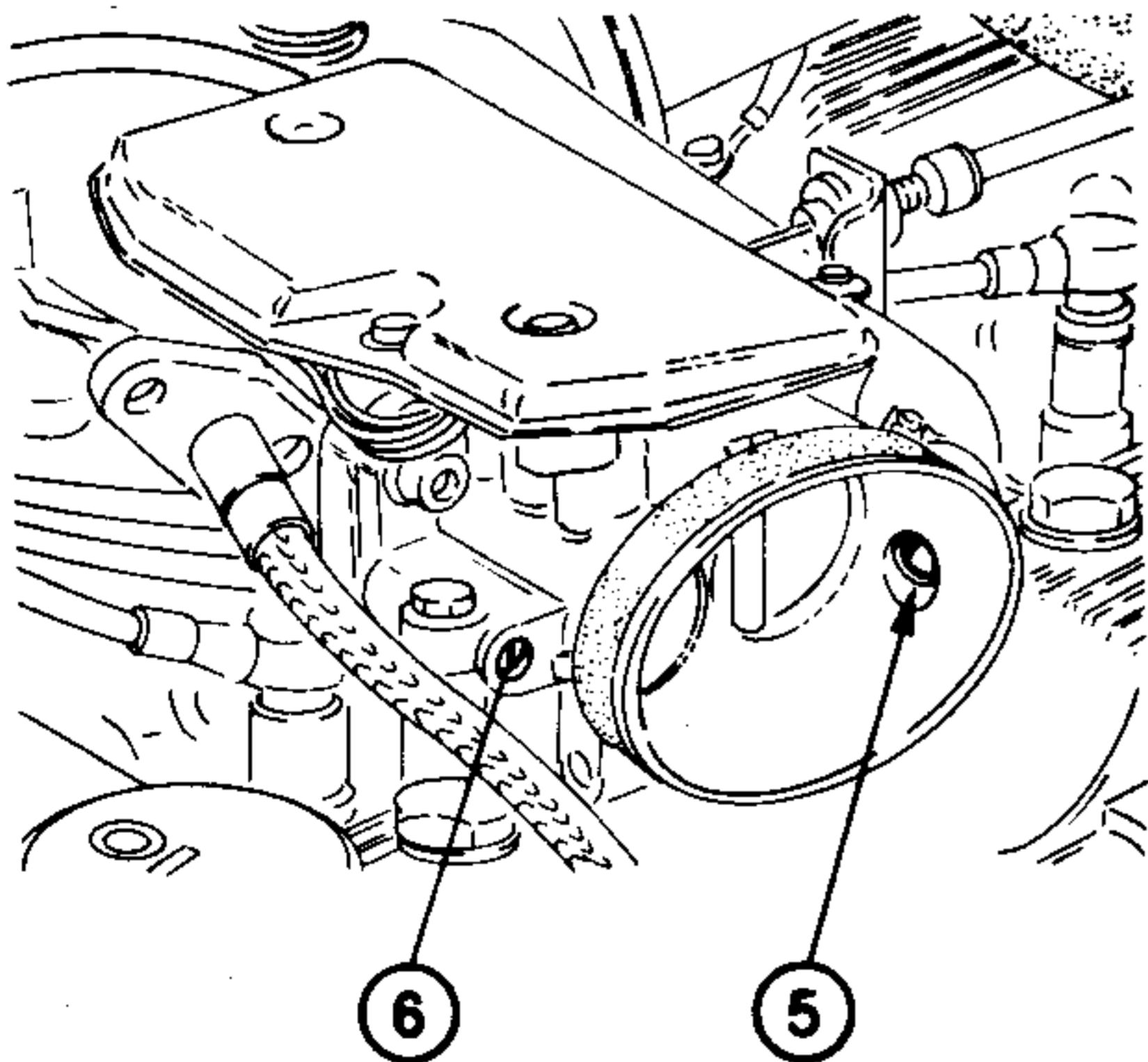
Check the tightness of the throttle body discs as follows:

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).



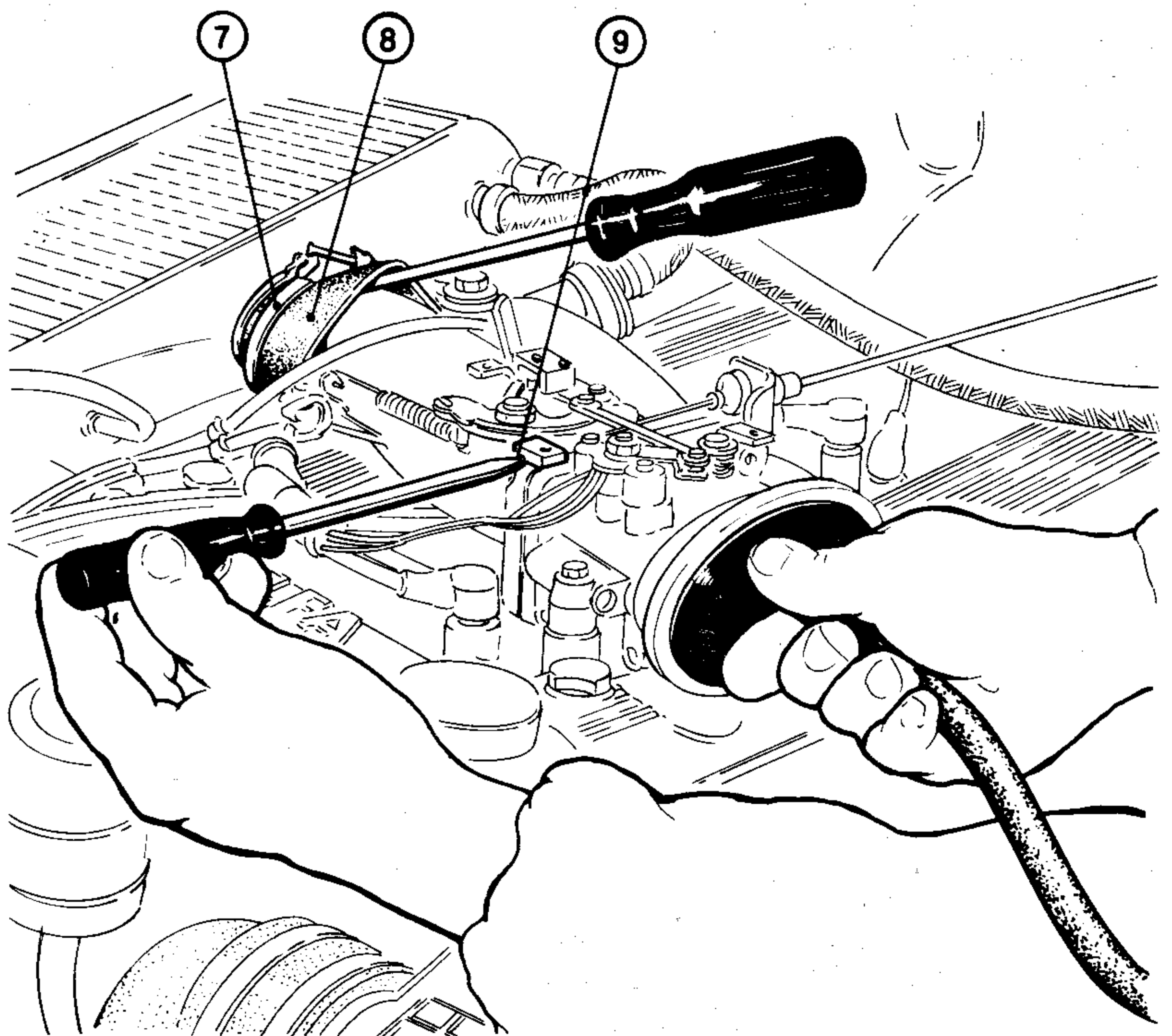
- 5. Auxiliary air valve supply duct hole
- 6. Idle r.p.m. adjustment screw

- 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. 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.»).



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

FUEL SYSTEM

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.

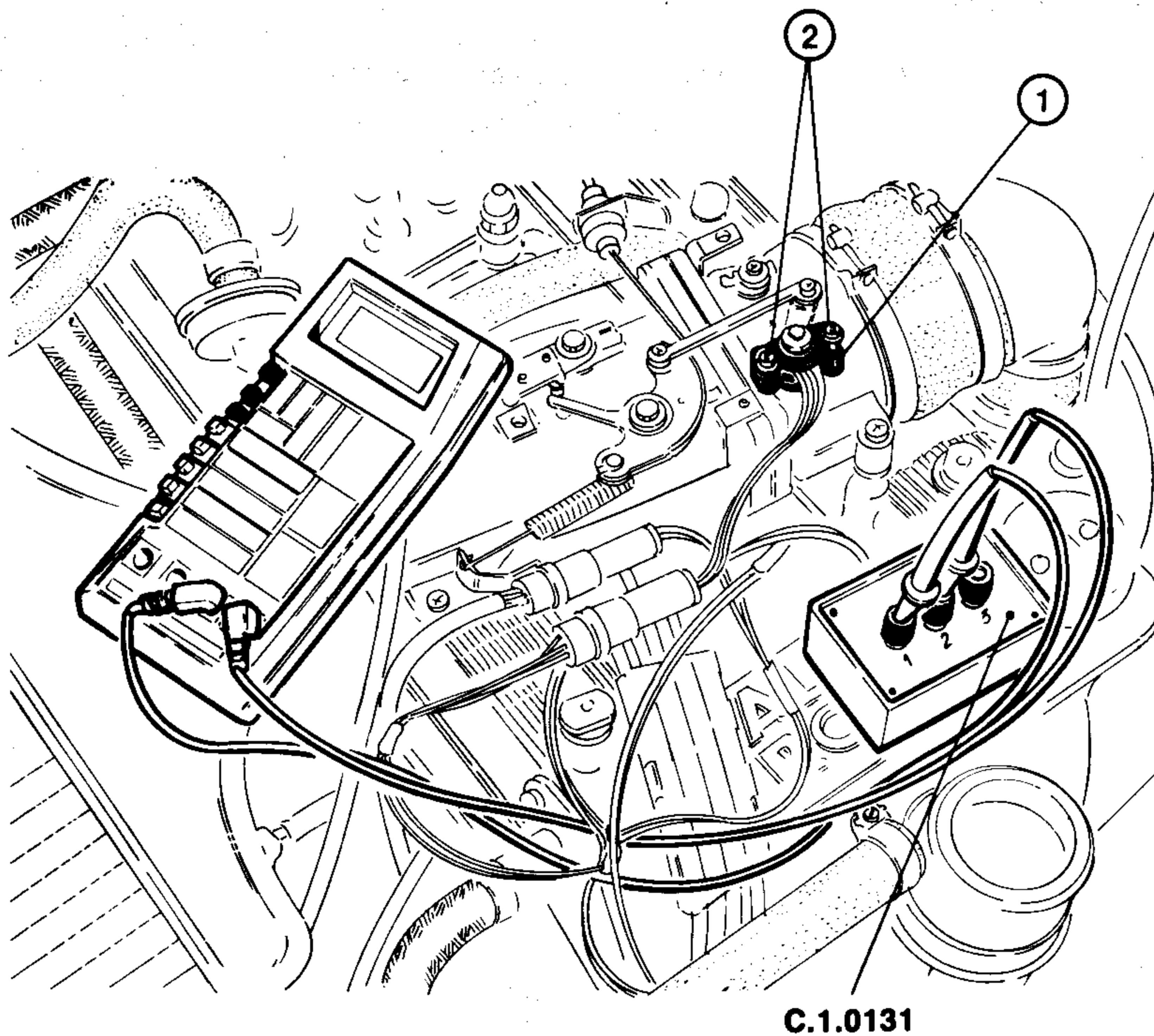
4. Insert the ignition key and check that the multimeter indicates

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.



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

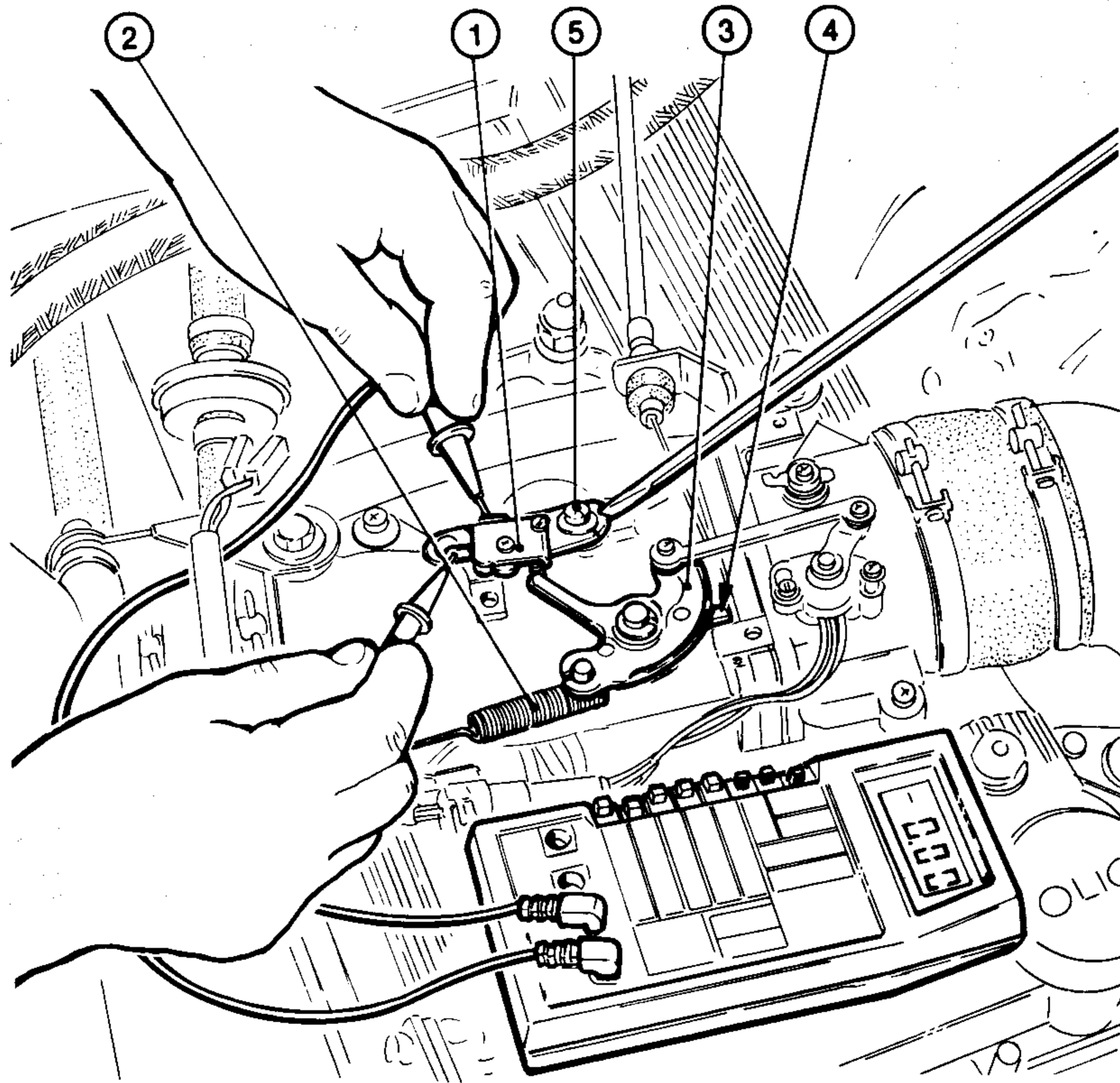
MINIMUM CUTOUT SWITCH ADJUSTMENT

NOTE:

Before adjusting the minimum cutout switch ensure that the throttle body is correctly adjusted (see paragraph «Setting of Throttle Body»).

1. Remove the protective cover and disconnect the supply cables from the minimum cutout switch (1).
2. With spring (2) attached ensure that cam (3) is stopped against adjusting screw (4).
3. Loosen screw (5) and place the prods of a multimeter on the terminals of the switch.

4. Insert a screwdriver in the seat provided, turn the switch until (0 Ω) appears on the multimeter (circuit closed) and lock switch by tightening screw (5).
5. Re-connect supply cables to the switch and re-fit protective cover.

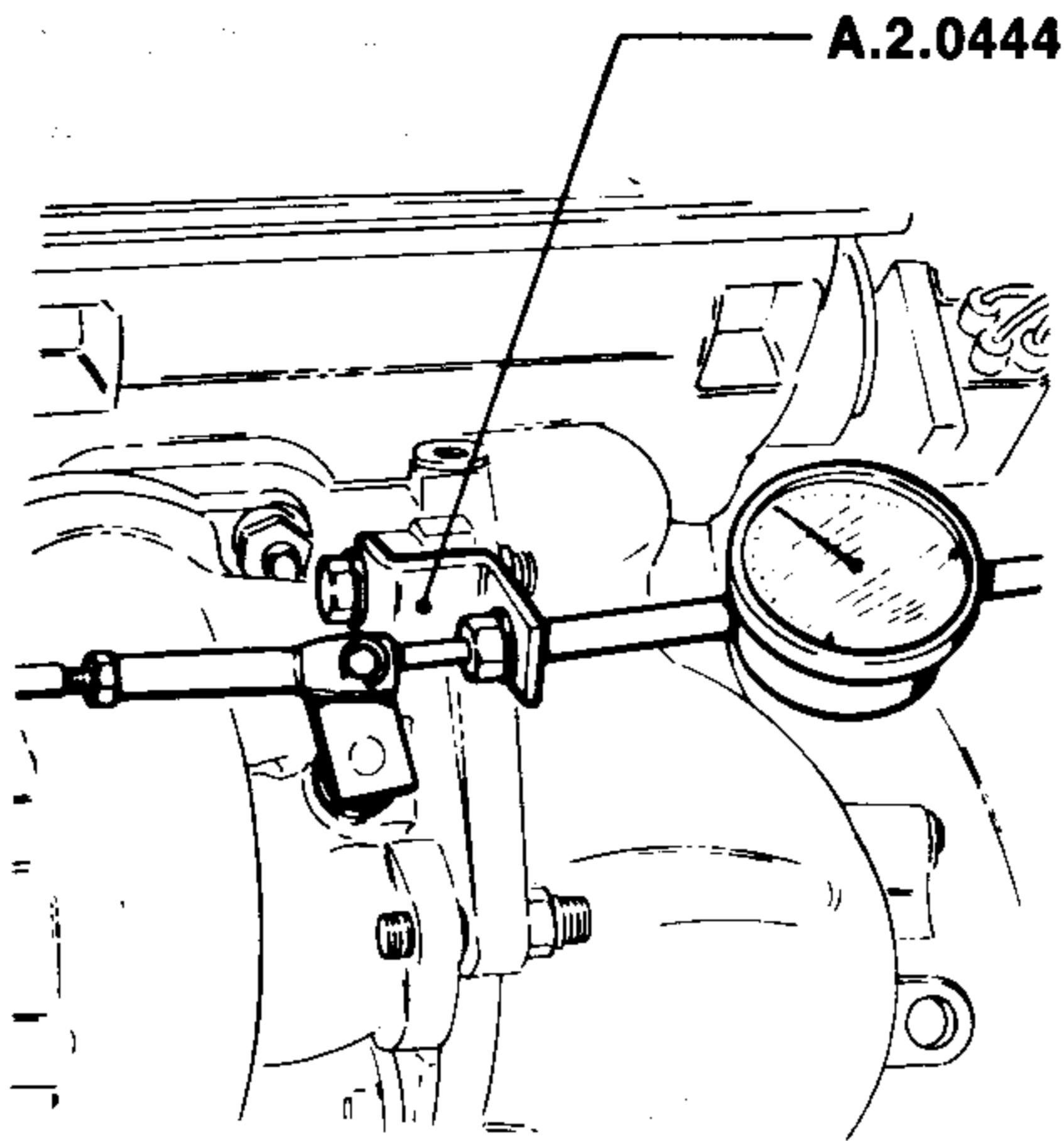


1. Minimum cutout switch
2. Spring
3. Accelerator control cam
4. Adjusting screw
5. Switch locking screw

WASTE-GATE VALVE CHECKS AND ADJUSTMENTS

With cold engine, check the setting of the waste-gate valve as follows:

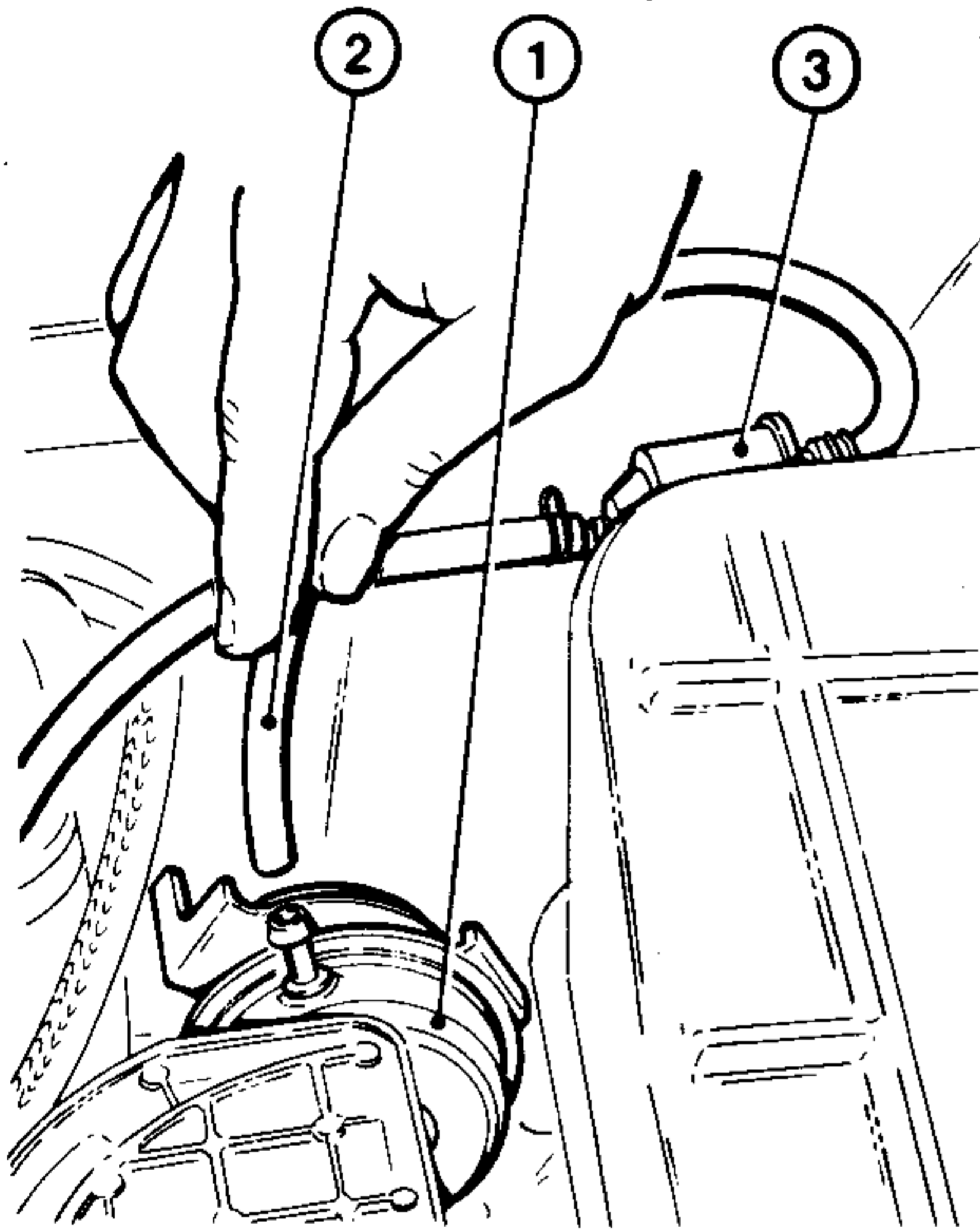
1. Detach connecting hose (2) together with supercharging pressure solenoid valve (3) from waste-gate valve (1).



4. Connect pressure gauge C.2.0126 to the waste-gate valve and then connect the pressure gauge to a low pressure compressed air supply.

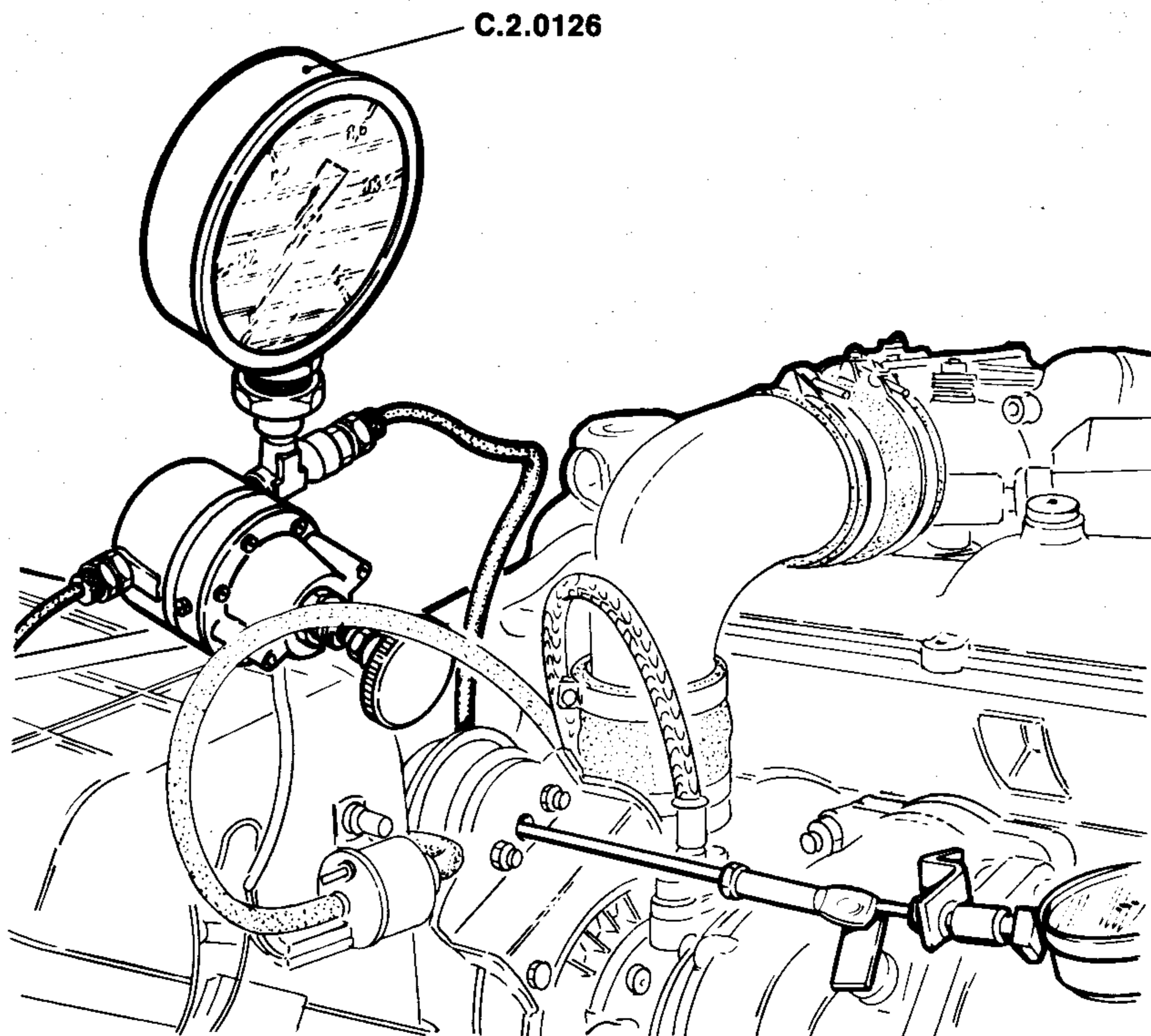
WARNING:

Before connecting the pressure gauge ensure that the pressure regulation knob is completely closed in order to prevent damage to the pressure gauge by the excessive pressure.



1. Waste-gate valve
2. Hose from waste-gate valve to supercharging pressure regulation solenoid valve
3. Supercharging pressure regulation solenoid valve

2. Fit connecting plate A.2.0444 using the free threaded hole on the turbocharger flange and fix it with a bolt.
3. Fit a dial gauge with extension to this square so that it can reach the end of the waste-gate valve stem. Zero-set the dial gauge.



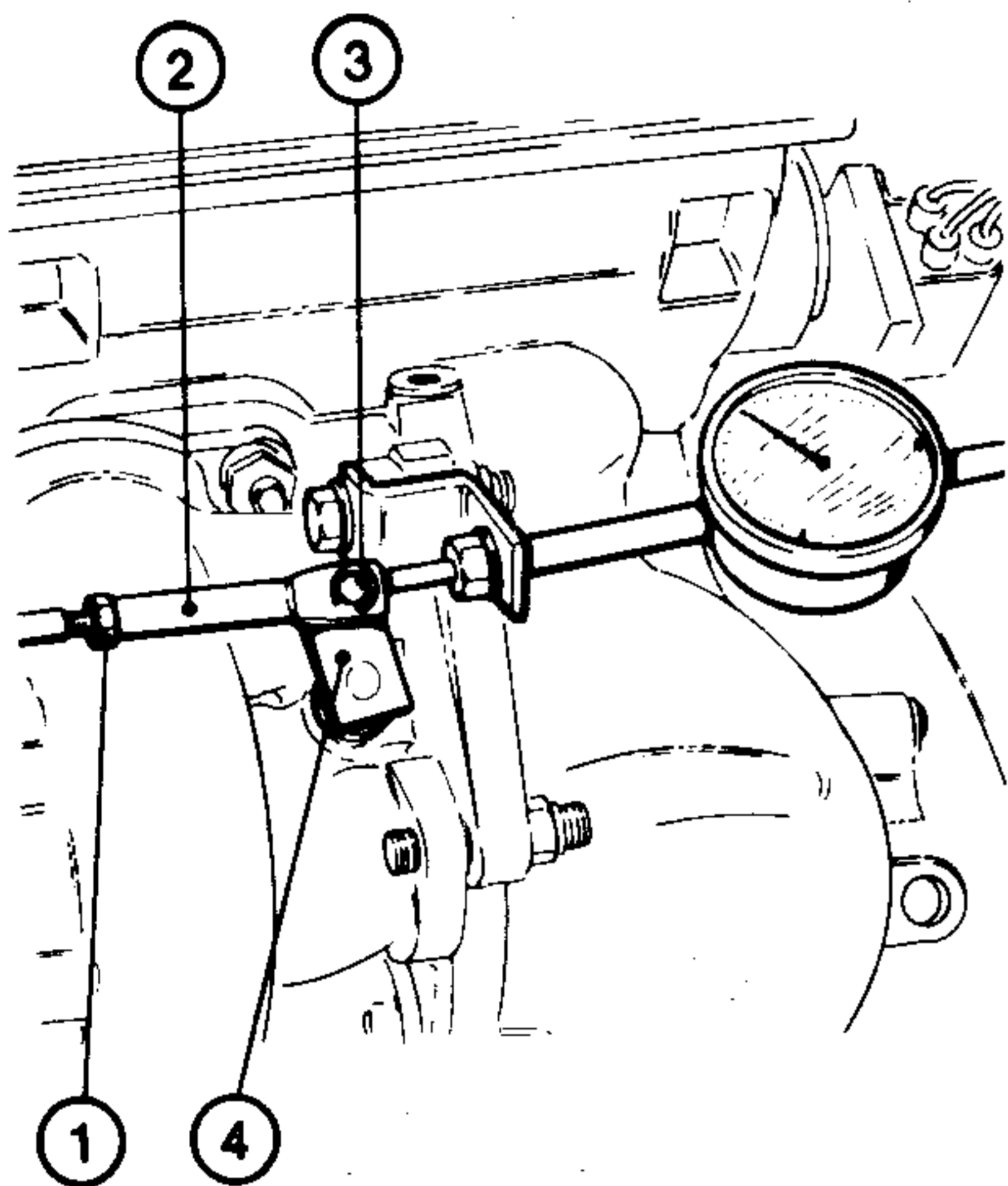
5. Supply a pressure of 0.276 bar (4 psi) (by adjusting the pressure gauge knob) and check on the dial gauge that the stem travel is 1.27 mm (0.05 in).
6. If the prescribed value is not obtained

adjust the waste-gate valve as follows:

- a. Completely relieve the pressure in the pressure gauge.
- b. Loosen lock nut (1) of adjustment tie-

FUEL SYSTEM

- rod (2) and remove stop ring (3).
- c. Detach tie rod (2) from lever (4) controlling the exhaust gas shutter and adjust its length by screwing or unscrewing it.
- d. Re-connect the rod to the lever and check the travel (see point 5.).
7. After adjustment lock nut (1), remove the dial gauge and the pressure gauge and re-connecting hose to the supercharging pressure regulation solenoid valve.



1. Lock nut
2. Tie rod
3. Stop ring
4. Exhaust gas shutter control lever

ADJUSTMENT OF ACCELERATOR CONTROL

1. Checking of cable sliding

Check that the control cable moves freely in its sheath.

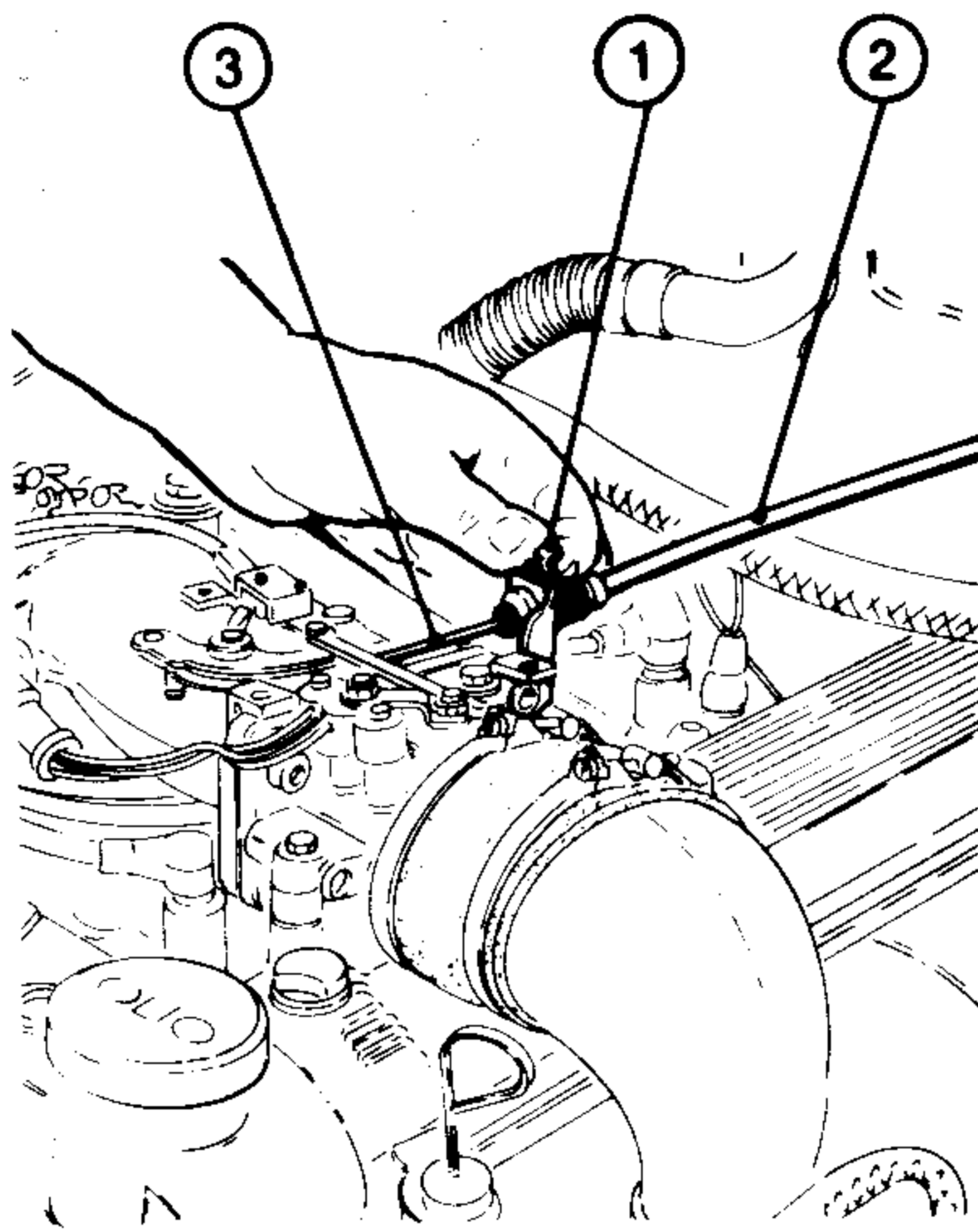
2. Check of cable backlash

a. With the accelerator pedal raised check that the accelerator cable end play on the control lever is

1 to 2 mm (0.04 to 0.08 in)

b. If necessary, adjust the cable backlash by extracting the adjusting spring (1) and moving sheath (2) in order to produce

the prescribed backlash on cable (3). Then re-insert the spring in the new position.



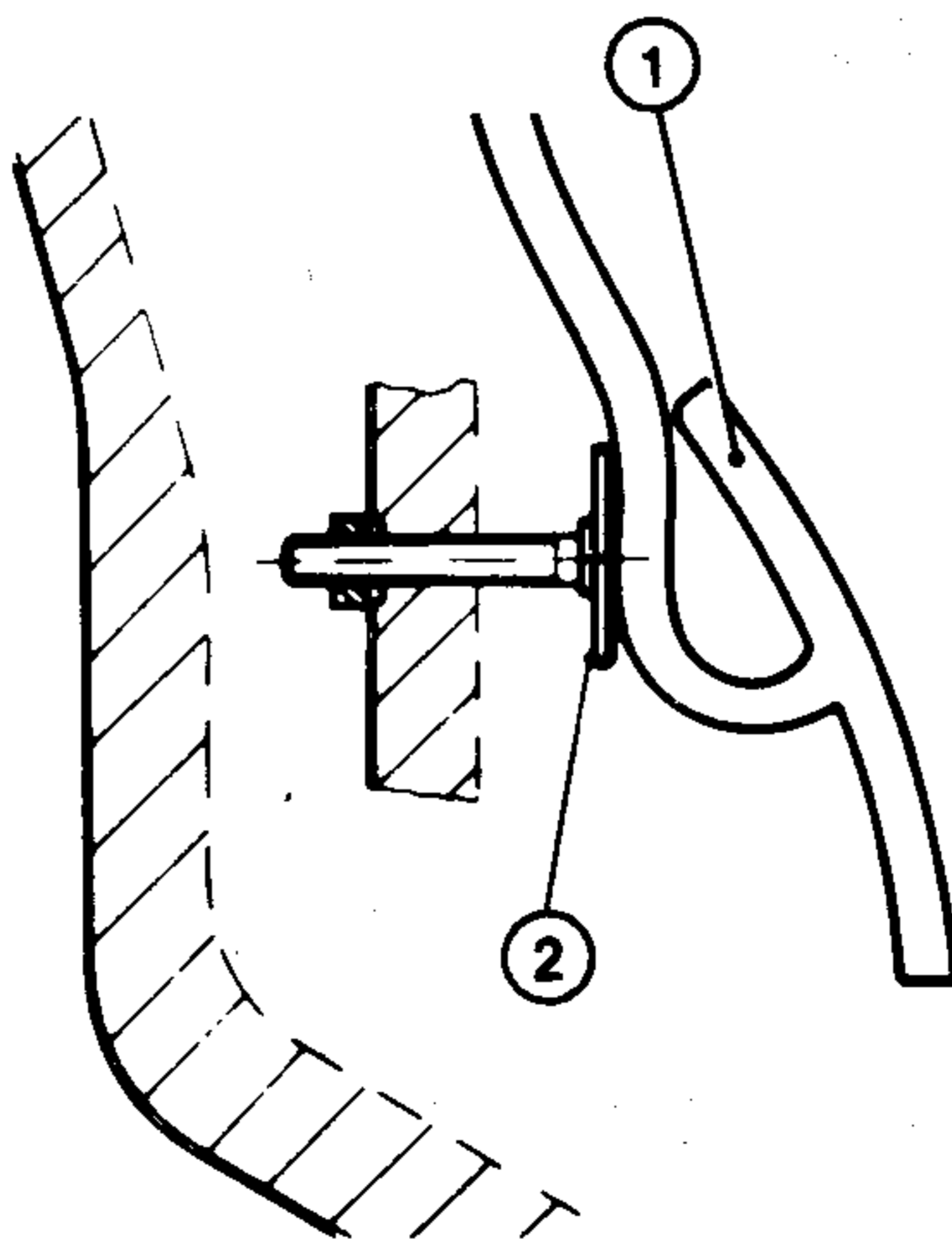
1. Adjusting spring
2. Accelerator cable sheath
3. Accelerator cable

3. Check of throttle valve max opening

a. With accelerator pedal fully depressed check that the accelerator control cam can still rotate

1 to 2 mm (0.04 to 0.08 in)

b. If necessary proceed with the adjustment by means of end of travel screw (2) under accelerator pedal (1).



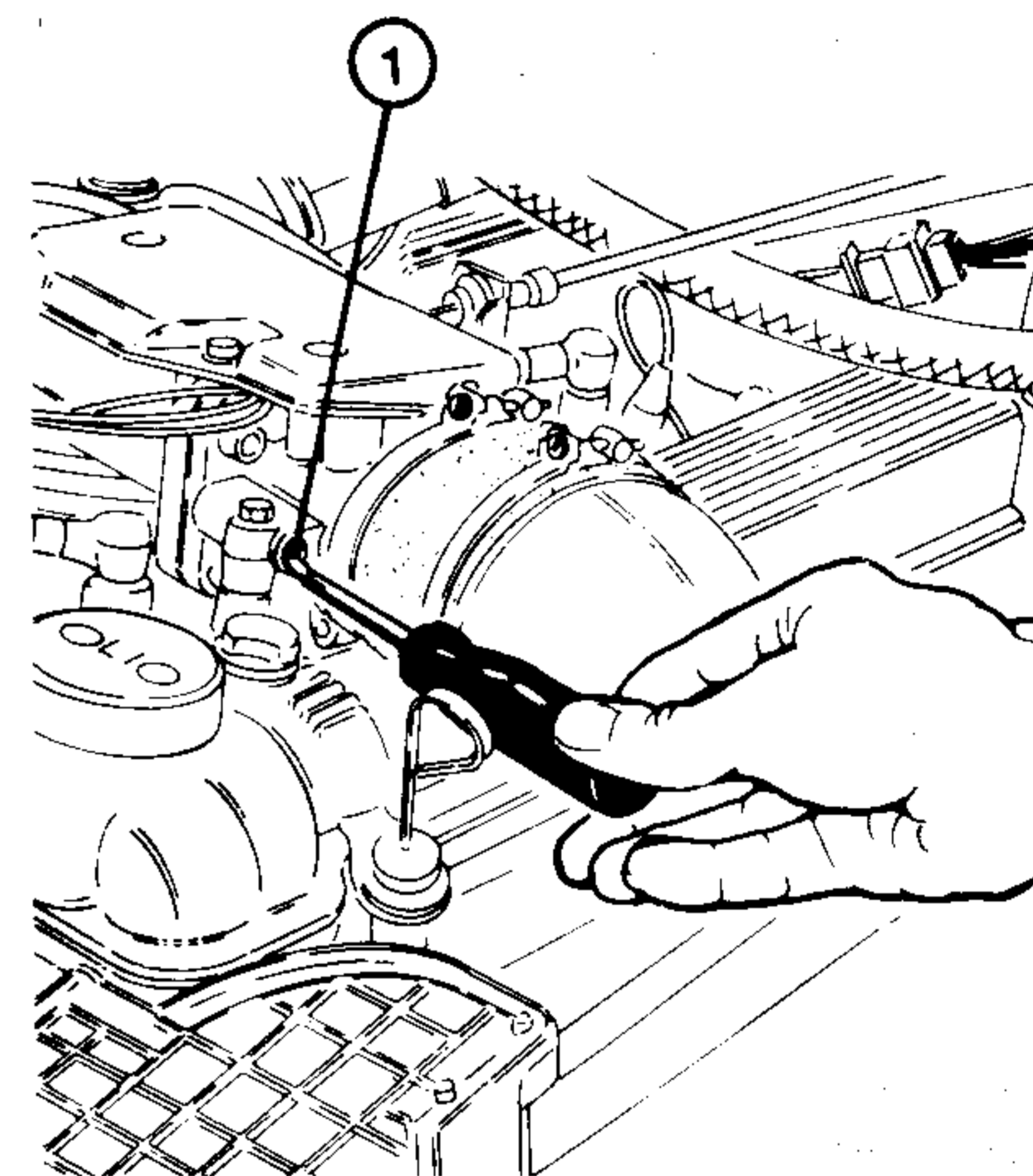
1. Accelerator pedal
2. End of travel screw

CHECK AND ADJUSTMENT OF IDLE R.P.M.

This is to be carried out with engine at normal running temperature, gearbox in neutral and all the ancillary devices excluded.

Using a screwdriver adjust screw (1) to obtain prescribed value.

Idle r.p.m.:
900 ± 50 r.p.m.



1. Idle r.p.m. adjusting screw

CHECK AND ADJUSTMENT OF EXHAUST EMISSIONS (CO)

This check is to be carried out with engine at normal running temperature (after the electric fan has switched on and off) and after having carried out the idle r.p.m. adjustment (refer to: «Adjustment of Idle r.p.m.»).

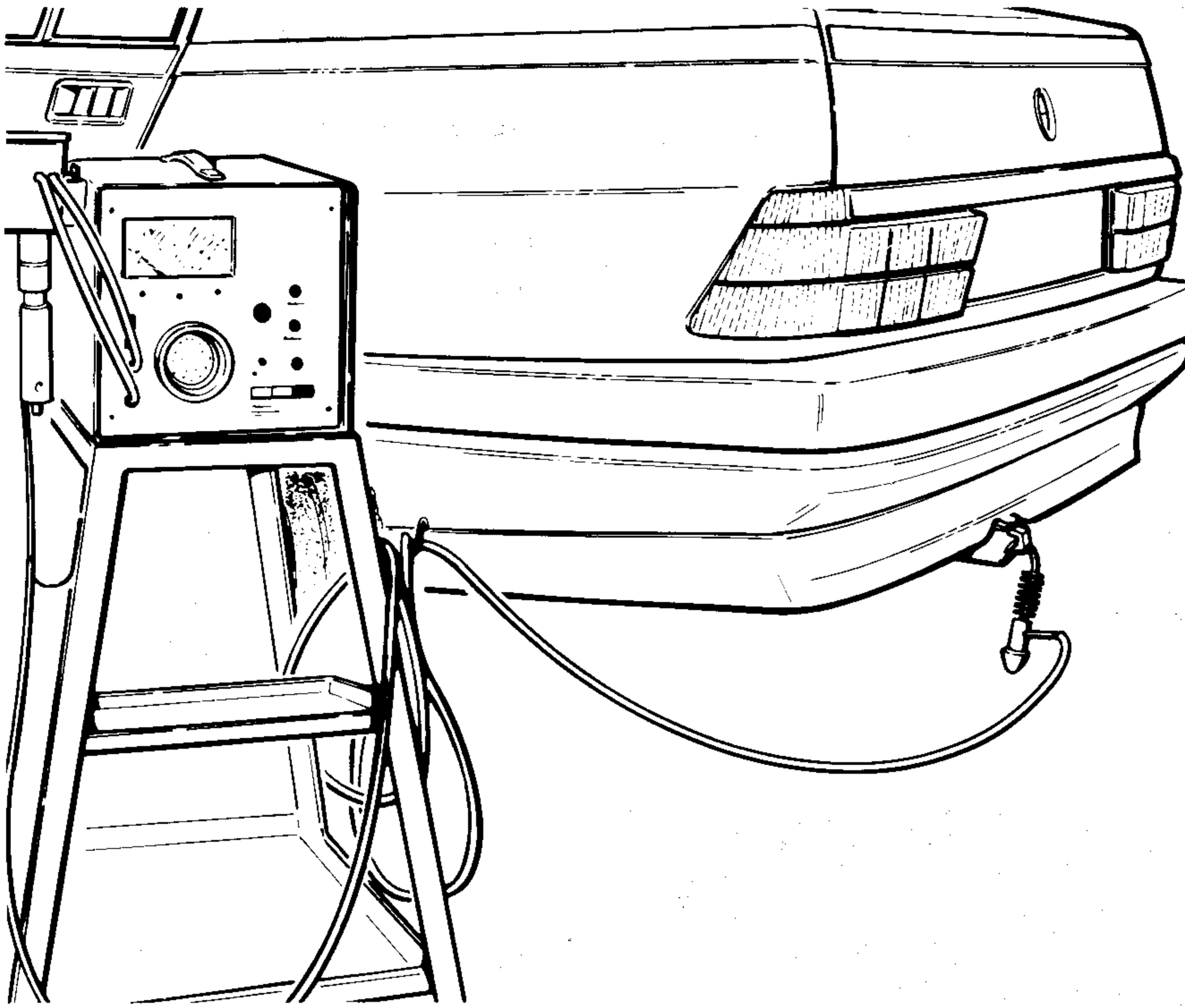
Also the following preliminary checks are to be carried out:

- Check of engine oil level
- Cleaning of air filter cartridge
- Check of ignition system efficiency
- Ignition timing

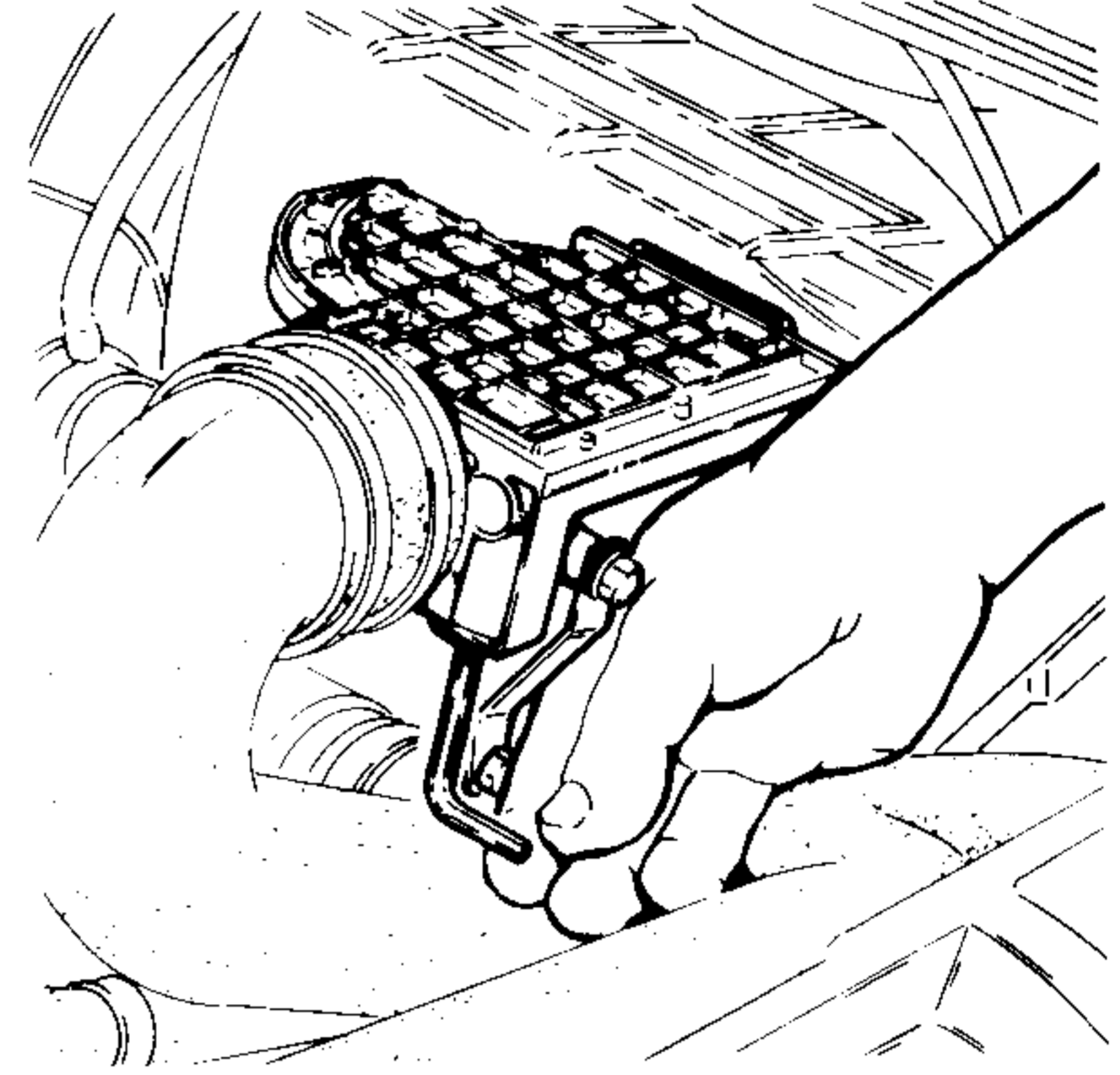
a. Insert tester probe into the fan pipe; the carbon monoxide percentage (CO %), read on tester, shall be within the prescribed values:

% CO = 0.4 to 1.2

FUEL SYSTEM

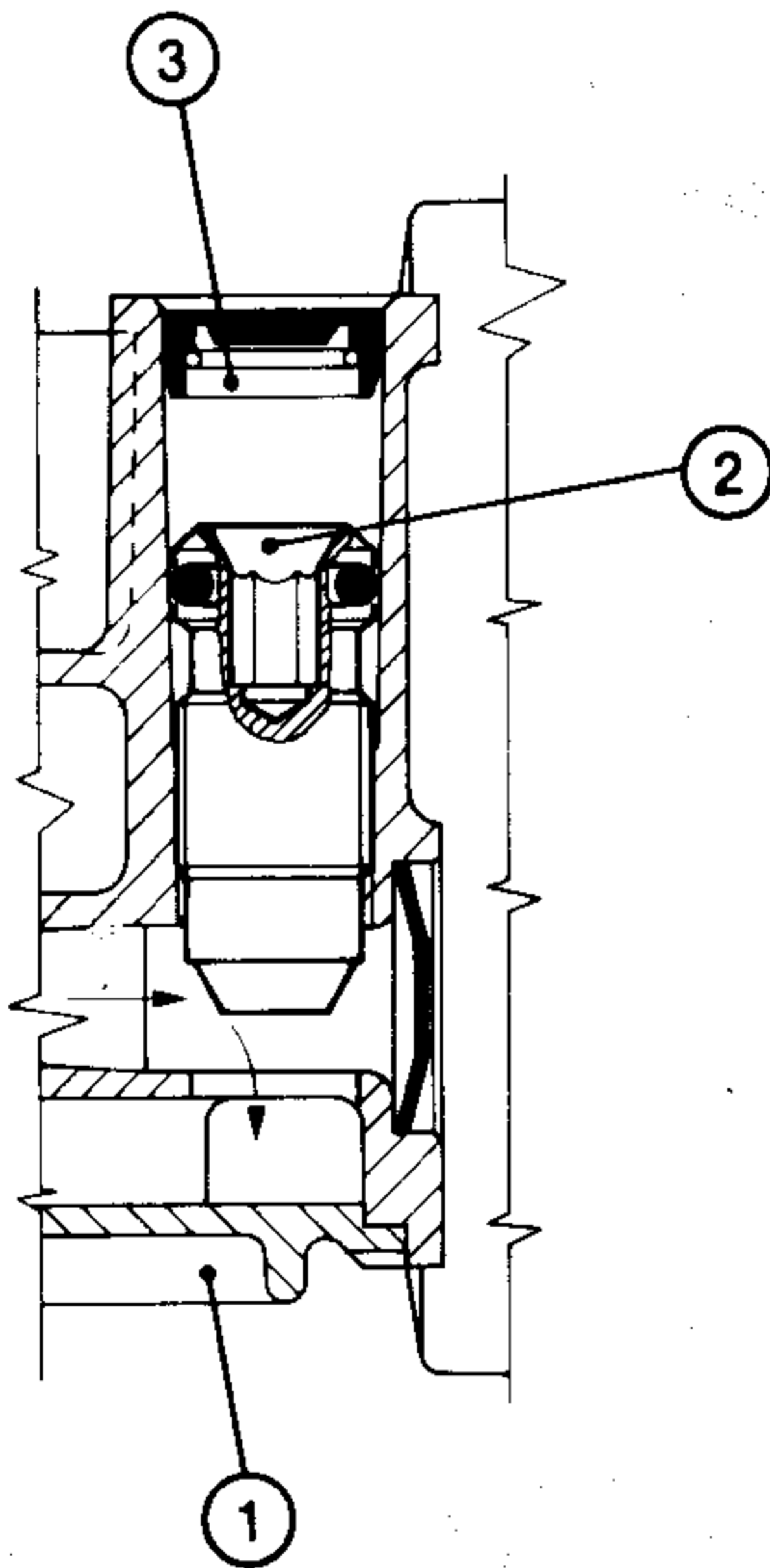


- c. Operate on the adjusting screw, keeping the idle r.p.m. constant, according to the following indications:
- when tightening, the CO% increases;
 - when loosening, the CO% decreases.



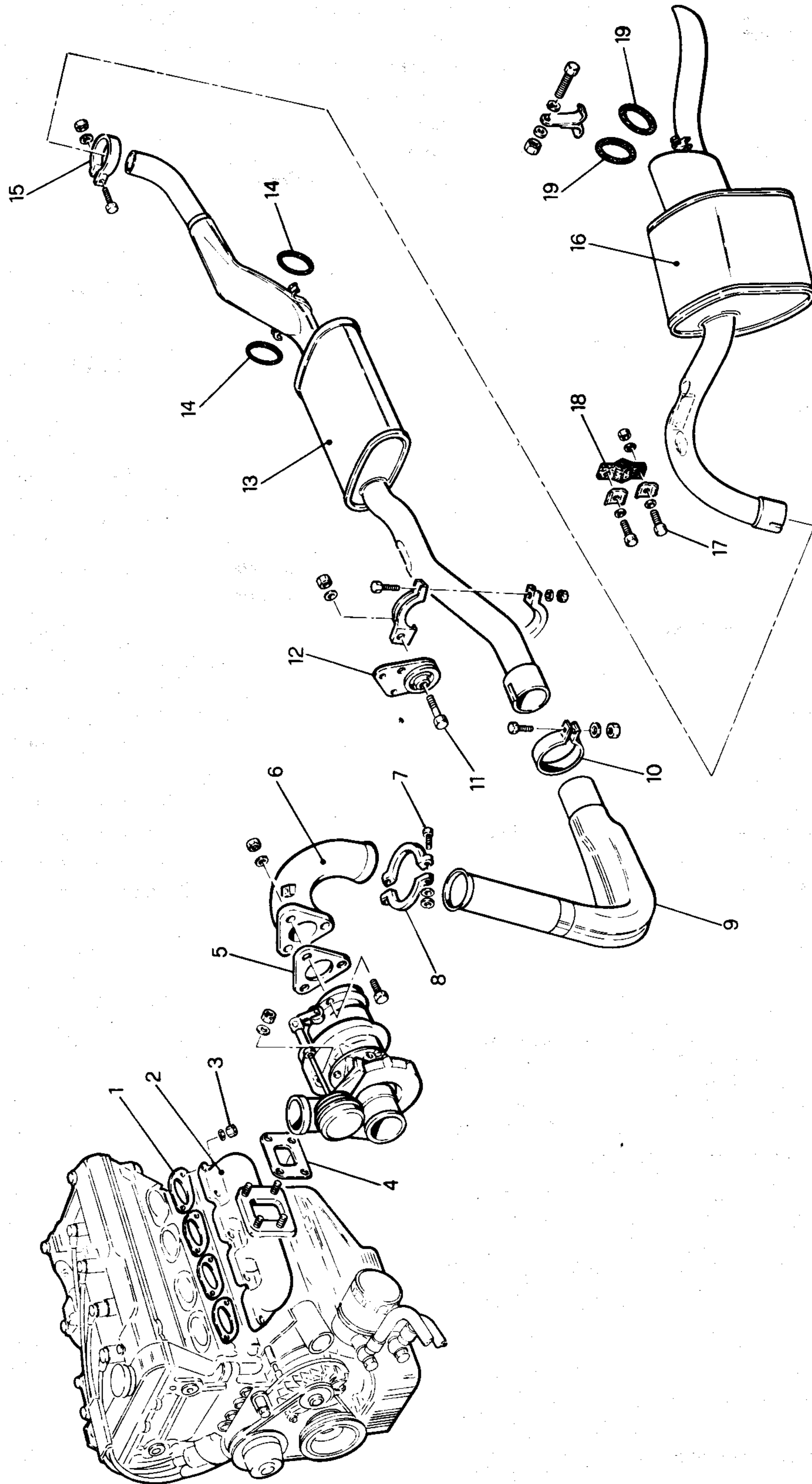
- d. Verify, on tester, that the HC value does not exceed the prescribed value
HC \leq 350 p.p.m.
- e. After adjusting insert a new sealing cap.

- b. If the CO percentage is not within the specific range remove sealing cap (3) on the underside of air flow gauge (1) in order to reach adjusting screw (2).



1. Air flow gauge
2. Adjusting screw
3. Sealing cap

EXHAUST SYSTEM



- 1. Exhaust manifold gaskets
- 2. Exhaust manifold
- 3. Manifold retaining nuts
- 4. Turbocharger gasket
- 5. Gasket
- 6. Exhaust pipe union
- 7. Collar retaining bolts

- 8. Collar
- 9. Front section
- 10. Clamp
- 11. Bolt
- 12. Support
- 13. Centre section
- 14. Retaining ring

- 15. Clamp
- 16. Front section
- 17. Bolt
- 18. Rubber support
- 19. Retaining rings

FUEL SYSTEM

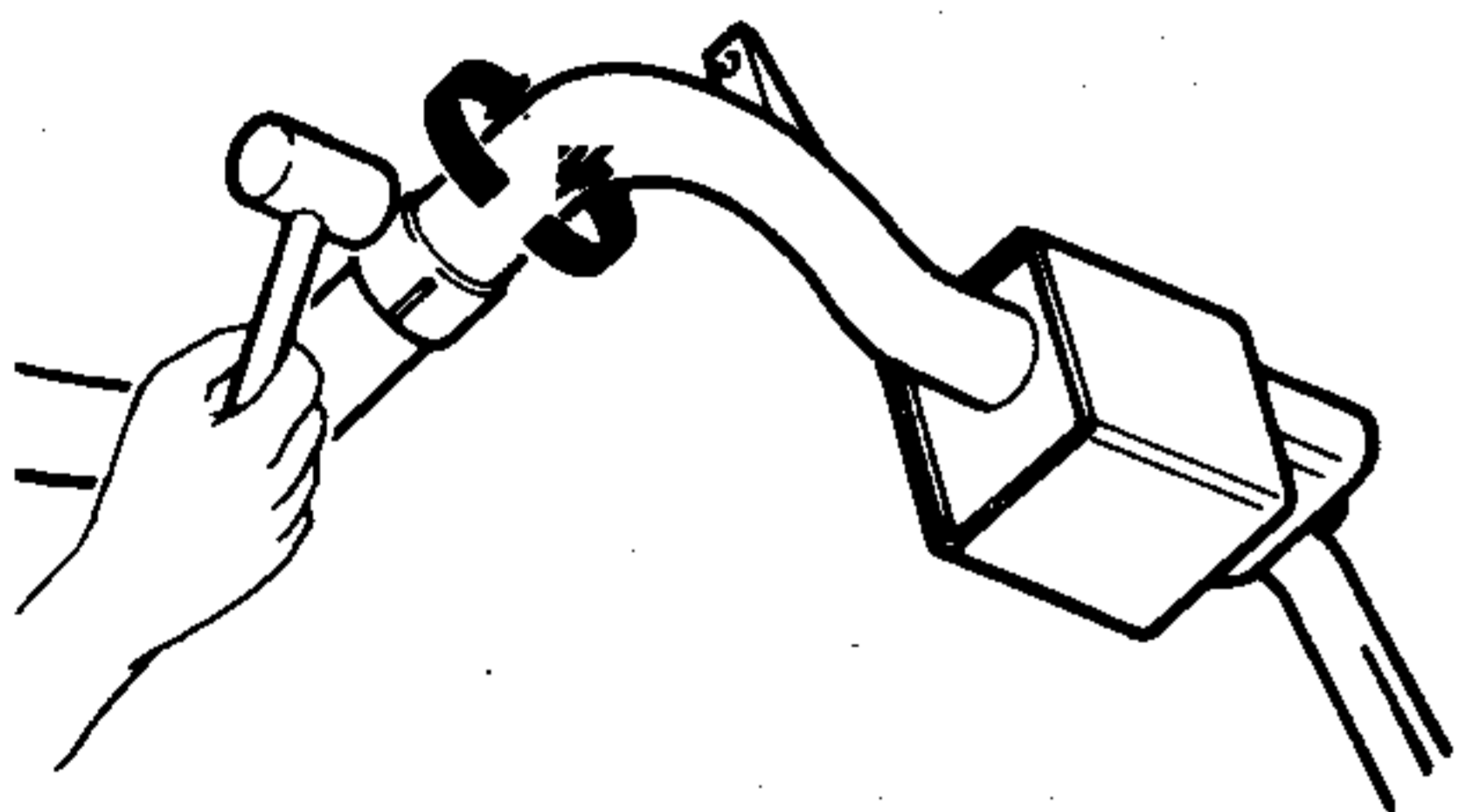
- a. The procedures described, permit single components of the system to be removed, when required.
- b. The removal procedure can be modified according to the purpose of the operation.
- c. The removal of the whole exhaust system, may require the aid of another operator.

MANIFOLD AND SILENCERS

REMOVAL

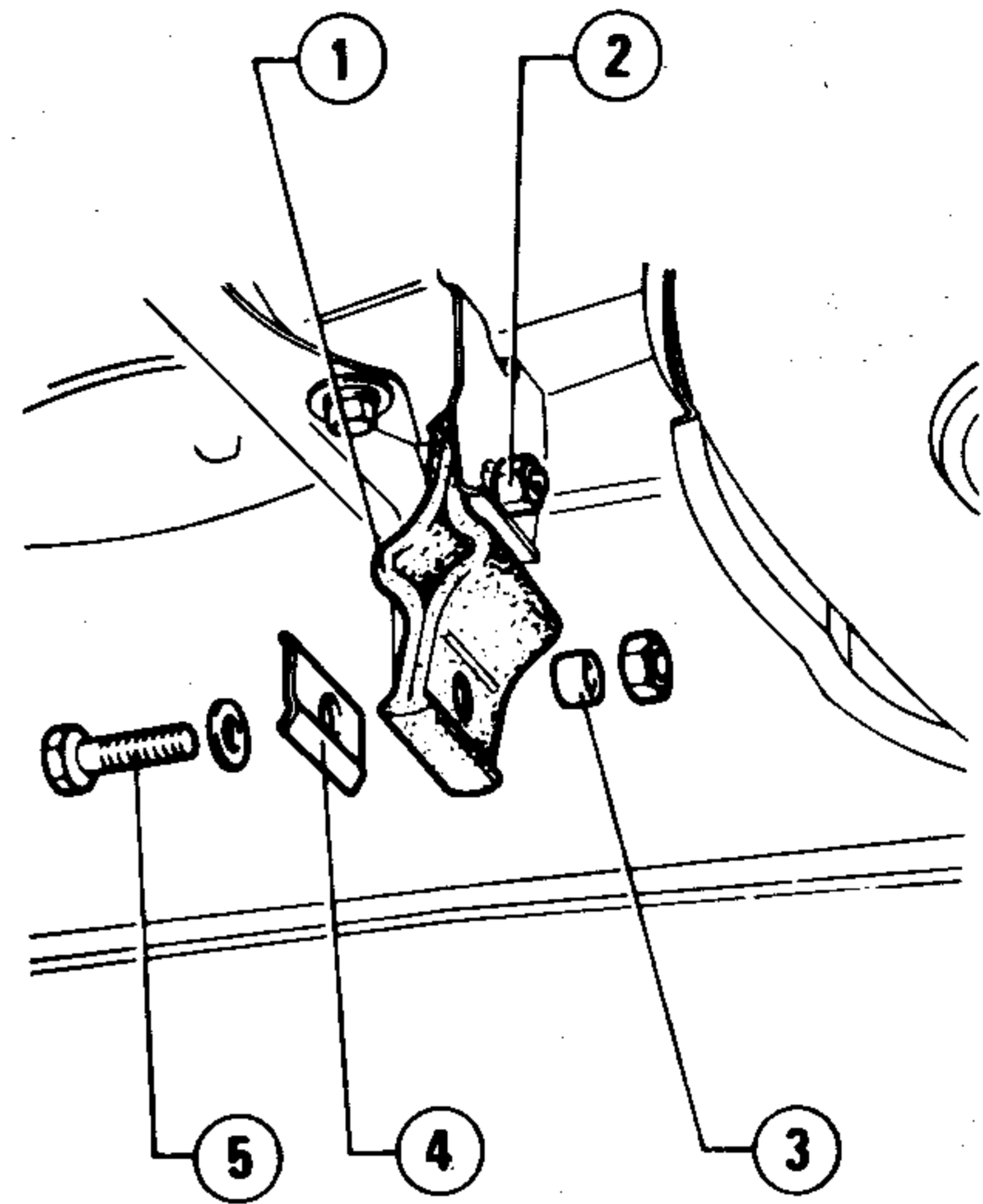
With reference to the previous figure, carry out removal, operating as follows:

1. Raise vehicle on lift.
2. Detach rear section (16) from the exhaust system, operating as follows:
 - a. Loosen clamp (15).
 - b. Unscrew and remove bolt (17) which secure support (18).
 - c. Release rear section (16) from retaining rings (19).
 - d. By means of a hammer, tap slightly and repeatedly along the piping circumference, in correspondance with the connection between the two sections; then rotate the rear section alternatively in both directions, with respect to central section so as to make separation easier.



3. Disconnect centre section (13) of the exhaust system, operating as follows:
 - a. Loosen clamp (10), remove bolt (11) retaining the centre section to support (12) and release retaining rings (14).
 - b. Remove centre section by lightly tapping (with a plastic hammer) the area where it is joined to the front section.
 4. Disconnect front section (9) by

- loosening the two bolts (7) retaining collar (8).
5. Remove exhaust manifold (2), operating as follows:
 - a. Remove turbocharger (see paragraph «Turbocharger — Removal»).
 - b. Unscrew nuts (3) securing the manifold to the cylinder head.
 - c. Remove manifold (2) together with gaskets (1).



1. Rubber support
2. Bolt securing support to body
3. Spacer
4. Plate
5. Bolt securing exhaust pipe to support

CHECKS AND INSPECTIONS

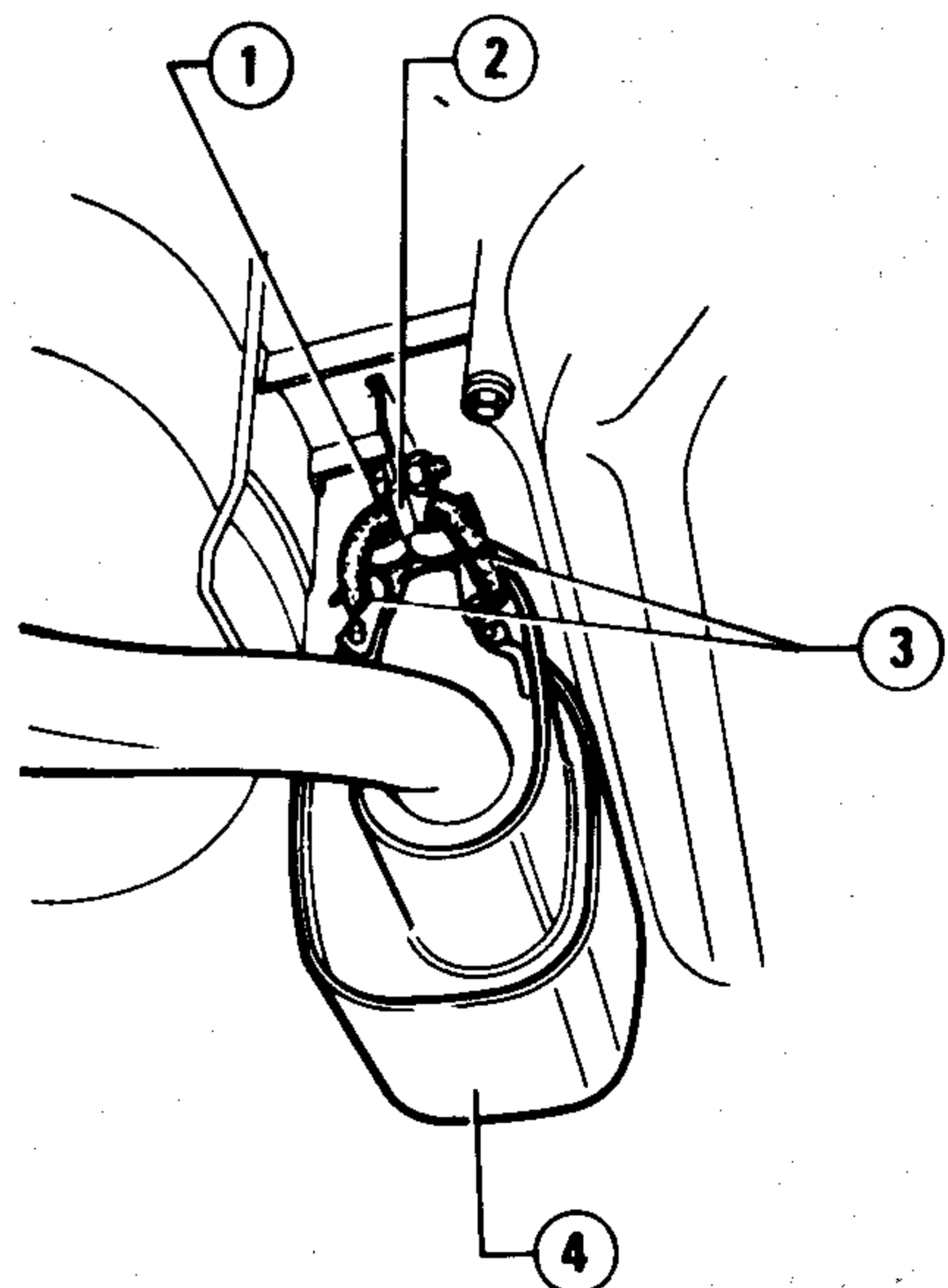
1. Check silencers and exhaust piping, and verify that no damages, cracks or corrosion signs are present. Replace if required.
2. Check rings and rubber supports; replace them in the event of cracks, scratches, porosity, or if worn.

INSTALLATION

Install each element by reversing the order of removal, and complying with the following indications:

- Install new gaskets between the flanges of the manifold and the cylinder head.
- Use new self-locking nuts to secure the exhaust manifold to the turbocharger group.
- Shake exhaust pipe so as to obtain correct alignment.
- On running engine, check for gas leaks from piping and unusual noisy.

4. For the O-rings, simply release them from hooks.
5. If required, unscrew bolt (1) and remove rear hook (2).
6. Carry out the installation by reversing the order of removal, making sure that, after installation, the supports can swing freely and are not tout.



1. Bolt
2. Rear hook
3. Retaining rings
4. Silencer - rear section

RUBBER SUPPORTS

REPLACEMENT

1. Raise vehicle on lift.
2. Unscrew lower bolt (5), recover plate (4) and spacer (3).
3. Unscrew bolt (2) and remove support (1) with related plate (4) and spacer.

SERVICE DATA AND SPECIFICATIONS

TECHNICAL DATA

SUPPLY AND INJECTION COMPONENTS

Component	ALFA ROMEO Part No	Type
<p>Main fuel pump</p> <ul style="list-style-type: none"> — Rated voltage: 12 V — Operating voltage: 7 to 15 V — Operating pressure: 3.8 bar (55.1 psi) — Max. permissible fuel temperature: 60°C (140°F) — Max. permissible temperature difference between pump and tank: ≤2°C (≤3.6°F) — Operating temperature: —30° to +70°C (—22°F to 158°F) — Rated delivery [temperature 20°C (68°F), voltage 12 V, pressure 3.0 bar (43.5 psi)]: 130 l/h (28.6 Imp.Gal/h) (minimum) — Current consumption [temperature 20°C (68°F), voltage 12 V, pressure 3.0 bar (43.5 psi)]: 6.5 A 	113.54.04.021.00	BOSCH 0.580.464.024
<p>Auxiliary fuel pump</p> <ul style="list-style-type: none"> — Rated voltage: 13.5 ±0.05 V — Rated delivery: ≥ 115 l/h (25.3 Imp.Gal/h) at 160 mbar (*) ≥ 67 l/h (14.7 Imp.Gal/h) at 230 mbar (*) 0 (0 Imp.Gal/h) at 298 to 436 mbar (*) <p>(*) Pressure measured at pump level</p>	115.41.32.009.00	GENERAL MOTORS 6441336
<p>Fuel pressure regulator</p> <ul style="list-style-type: none"> — Rated pressure at a delivery of 40 l/h (8.8 Imp.Gal/h) at 20°C (68°F): 3 bar (43.5 psi) over pressure — Temperature range on the mounting seat: —30°C to +100°C (—22° to 212°F) 	195.00.32.045.00	BOSCH 0.280.160.214
<p>Hammering damper</p> <ul style="list-style-type: none"> — Operating pressure: 1.7 to 3.7 bar (24.65 to 53.65 psi) — Temperature range on the mounting seat: —30° to +100°C (—22°F to 212°F) 	195.05.04.550.00	BOSCH 0.280.161.029
<p>Electroinjectors</p> <ul style="list-style-type: none"> — Rated voltage: supplied by ECU — Rated static delivery [with 3.0 bar (43.5 psi) test overpressure]: 236 cm³/min (14.40 cu.in./min) — Rated dynamic delivery [with 3.0 bar (43.5 psi) test overpressure]: 6.9 cm³/1000 (0.42 cu.in./1000 lifts (injection time 2.5 ms) — Operating pressure: 2.0 to 3.0 bar (29 to 43.5 psi) overpressure — Permissible temperature range: —30° to +110°C (—22°F to 230°F) — Colour: anthracite 	195.05.011.300.01	BOSCH 0.280.150.152
<p>Air flow gauge</p> <ul style="list-style-type: none"> — Rated voltage: supplied by ECU — Temperature range: —30° to +110°C (—22° to 230°F) — Rated air flow at 980 mbar, 20°C (68°F): 420 m³/h (14826 cu.ft/h) 	195.05.11.013.00	BOSCH 0.280.202.058
<p>Auxiliary air valve</p> <ul style="list-style-type: none"> — Rated voltage: 12 V — Max. permissible voltage: 15 V — Temperature range on the mounting seat: —30° to +120°C (—22°F to 248°F) — Average time from open to closed at 20°C (68°F) and 14 V: 3 min. 20 sec. — Air flow at 20°C (68°F): 10 m³/h (353 cu.ft/h) — Rated power at 20°C (68°F): 3 W 	195.00.11.017.00	BOSCH 0.280.140.166
<p>Supercharging pressure regulation solenoid valve</p> <ul style="list-style-type: none"> — Rated voltage: 12 V — Minimum operating voltage: ≤9 V — Maximum voltage: 16.5 V — Current consumption at 12 V: 0.7 A — Operating temperature: —40° to +80°C (—40°F to 176°F) 	195.05.05.020.01	PIERBURG 7.12990.00

FUEL SYSTEM

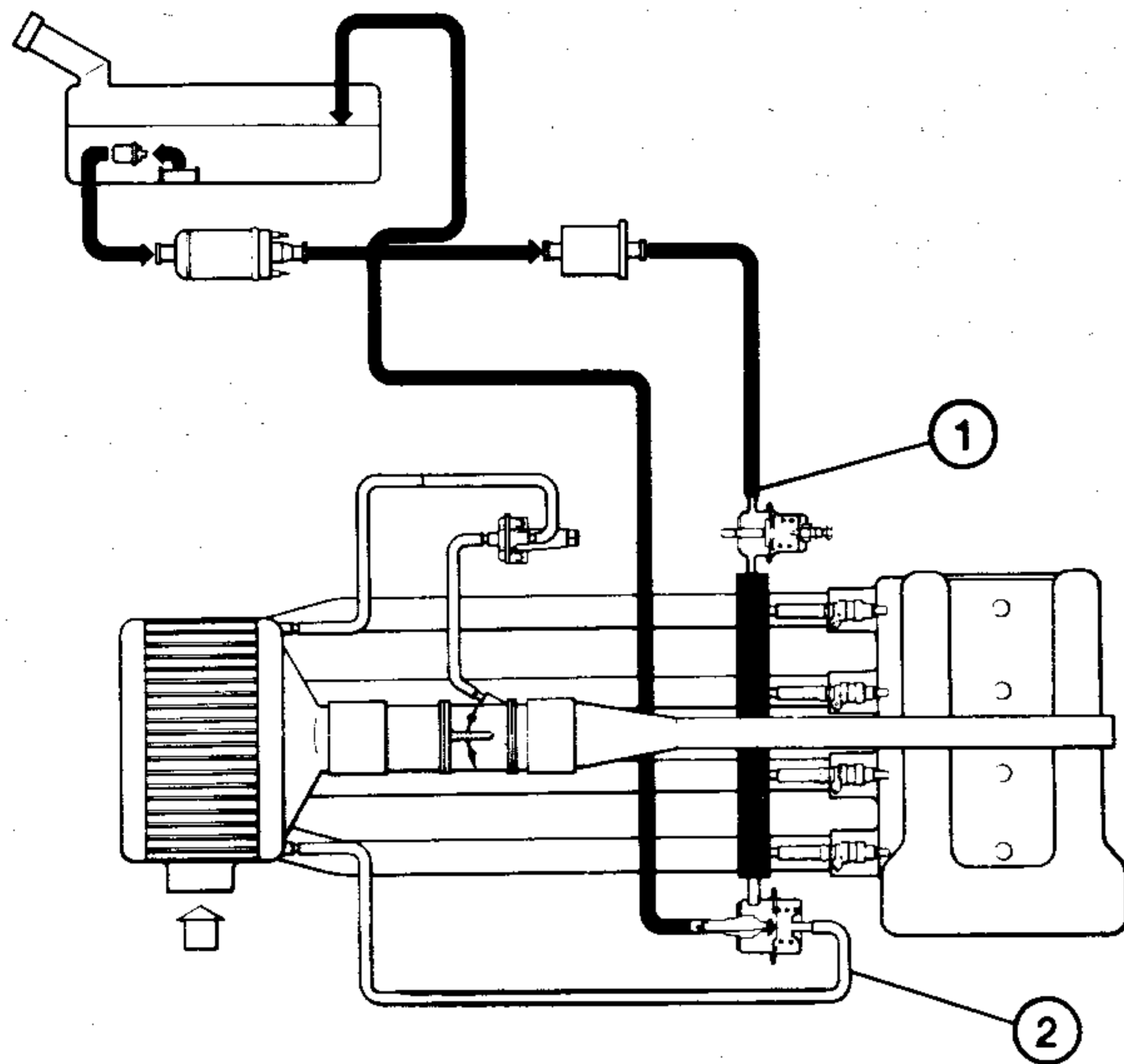
Component	ALFA ROMEO Part No	Type
Injection control unit	195.05.11.042.00	BOSCH 0.280.000.320
Ignition control unit	195.05.05.012.01	BOSCH 0.277.400.024
Coolant temperature sensor — Rated resistance at 20°C (68°F): 2 × 2.5 kΩ ± 5% — Rated voltage: supplied from ECU — Temperature range on the mounting seat: —30° to +130°C (—22°F to 266°F)	195.05.11.010.000	BOSCH 0.280.130.032
Knock sensor	195.05.05.017.00	BOSCH 0.261.231.001
Turbocharger	195.49.08.090.00	GARRET TB0353

FUEL TANK

Description	Unit of measure	
	liters	Imp. Gal
Total capacity	49	10.8
Reserve	8	1.76

FUEL SYSTEM

CHECKS AND ADJUSTMENTS FUEL SUPPLY SYSTEM PRESSURE CHECK



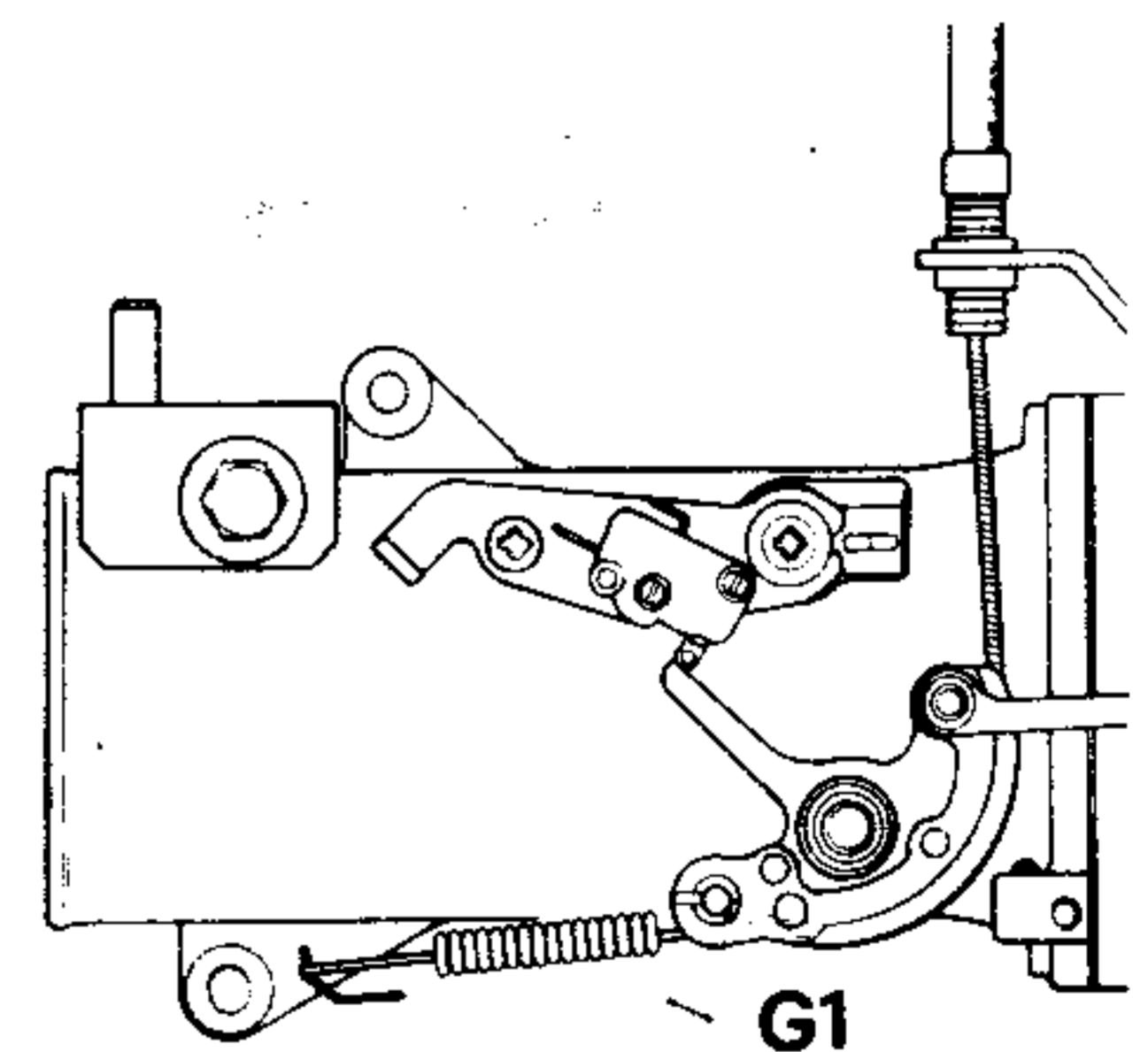
- 1. Pressure measurement point
- 2. Vacuum intake hose for pressure regulator

Check	Values								
Working pressure to be measured at point (1) with hose (2) disconnected and engine idling	<table border="0"> <tr> <td>kPa</td> <td>284.3 to 323.6</td> </tr> <tr> <td>bar</td> <td>2.8 to 3.2</td> </tr> <tr> <td>kg/cm²</td> <td>2.9 to 3.3</td> </tr> <tr> <td>psi</td> <td>40.6 to 46.4</td> </tr> </table>	kPa	284.3 to 323.6	bar	2.8 to 3.2	kg/cm ²	2.9 to 3.3	psi	40.6 to 46.4
kPa	284.3 to 323.6								
bar	2.8 to 3.2								
kg/cm ²	2.9 to 3.3								
psi	40.6 to 46.4								

ACCELERATOR CONTROL

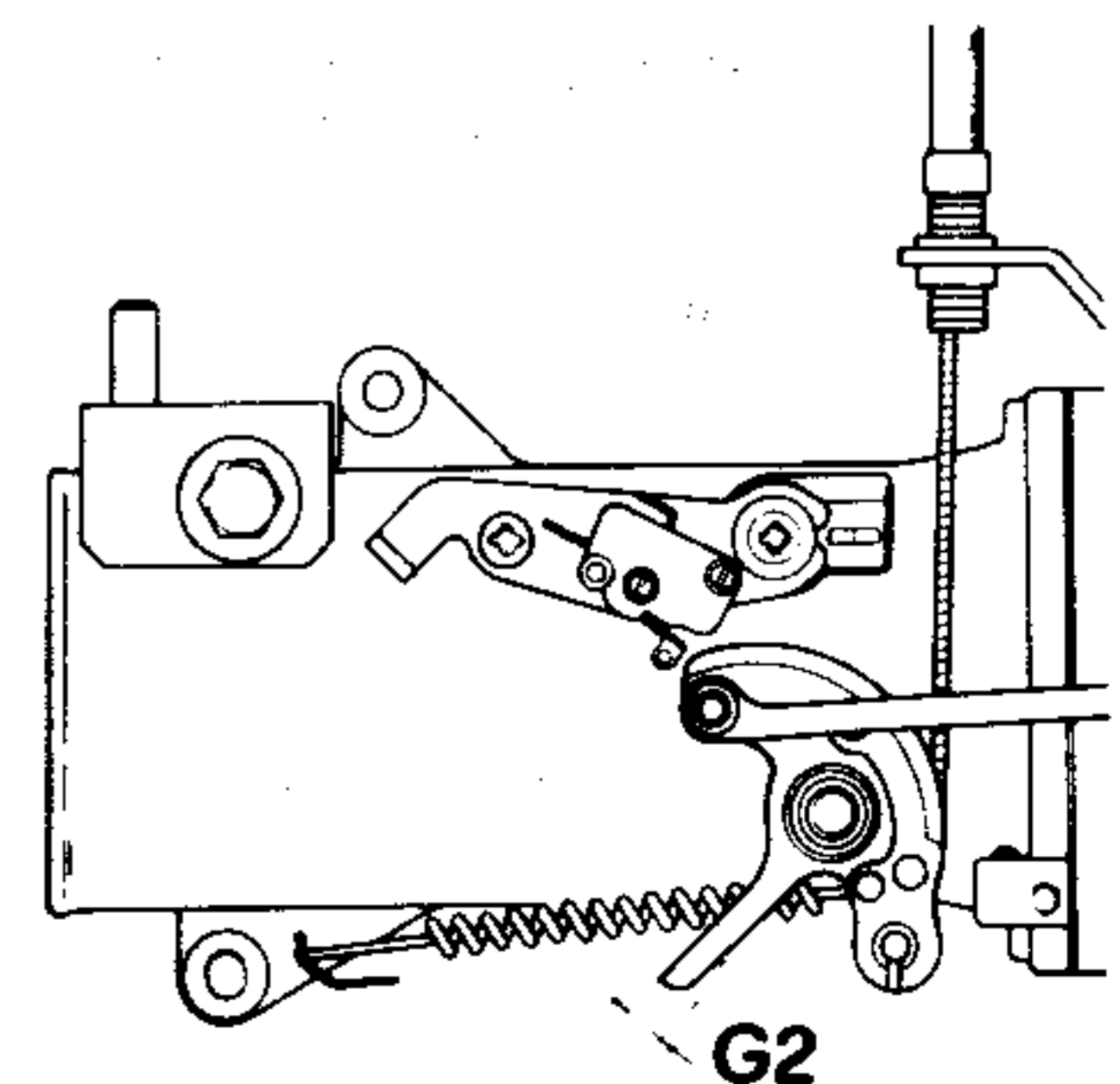
Accelerator control cable backlash (with accelerator pedal at rest)

$$G_1 = 1 \text{ to } 2 \text{ mm (0.04 to 0.08 in)}$$



Accelerator control cam backlash (with accelerator pedal fully depressed)

$$G_2 = 1 \text{ to } 2 \text{ mm (0.04 to 0.08 in)}$$



FUEL SYSTEM

ENGINE IDLE R.P.M. AND EXHAUST CO%

Check	Values
Engine idle r.p.m. (with warm engine, gearbox in neutral and ancillary devices excluded)	900 ± 50 r.p.m.
Exhaust CO percentage at idle r.p.m.	0.4 to 1.2

SETTING OF THROTTLE BODY (Check with Flowmeter)

Check	Values
Air passage with throttle valve in closed position The reading of the values on the Solex Flowmeter must be performed by applying a tap at throttle body inlet	(Solex Flowmeter) 350 N Scale

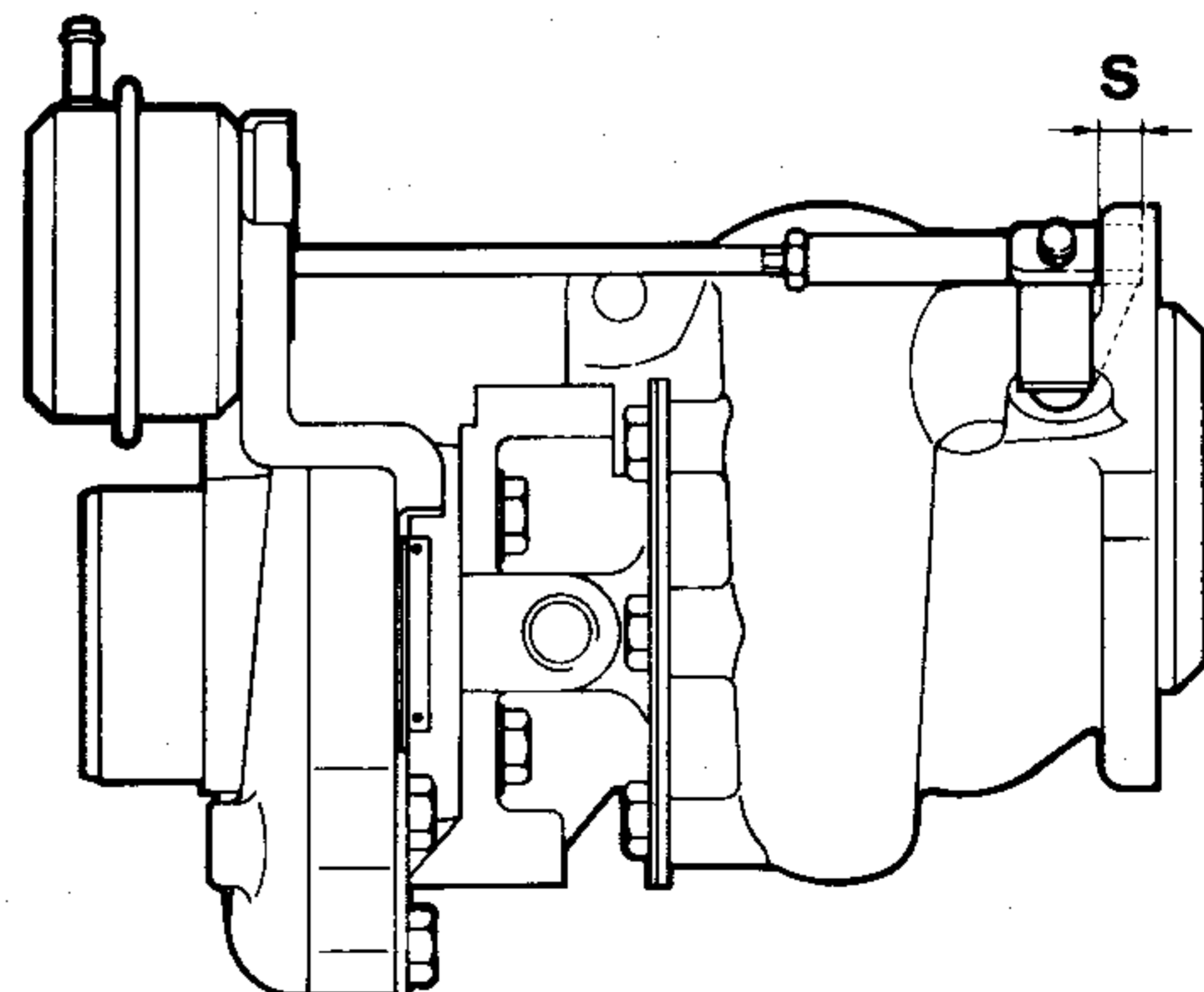
SETTING OF MINIMUM CUTOUT SWITCH

Check	Values
Resistance between terminals with accelerator pedal at rest	0 Ω
Resistance between terminals with accelerator pedal depressed	∞

CHECK AND ADJUSTMENT OF WASTE-GATE VALVE

Exhaust gas shutter control lever travel with supercharging pressure of 0.276 bar (4 psi)

S = 1.27 mm (0.045 in)



FUEL SYSTEM

GENERAL REQUIREMENTS

FLUIDS AND LUBRICANTS

Application	Type	Name	Q.ty
Accelerator pedal spindle (on rubber supports)	GREASE	ISECO Molykote Longterm n. 2 Part no 3671-69831	—

FUEL

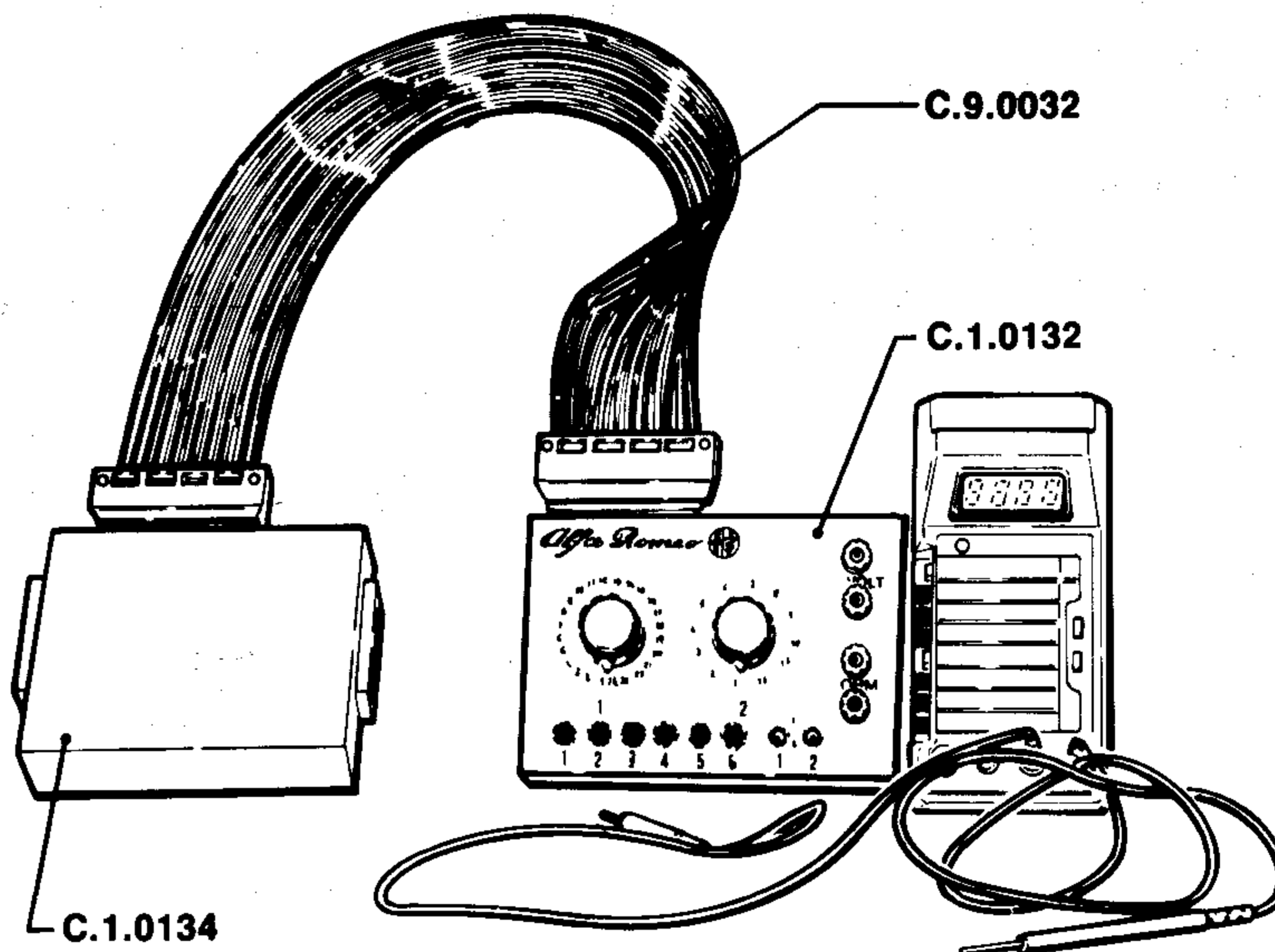
Petrol with Octane Number: ≥ 98 and sensitivity (1) ≤ 11

(1) Difference between Research Method Octane Number and Motor Method Octane Number

ELECTRICAL TESTS WITH DIAGNOSTIC INSTRUMENT

PRELIMINARY OPERATIONS

1. Take out ignition key.
2. Disconnect the connectors from the ignition and injection control units.
3. Connect interface C.1.0134 to cable side of connectors.
4. Connect interface to multimeter C.1.0132 using cable C.9.0032.



INSTRUCTIONS FOR VOLTAGE MEASUREMENTS

1. Put selectors (1) and (2) in position 1.
2. Put switch (1) in position 2.
3. Put switch (2) in position 1.
4. Connect 200 mV FSR multimeter to the «VOLT» bushes of the diagnosis instrument.
5. Disconnect the fuel pump fuse.
6. Detach auxiliary air valve connector.
7. Turn the key to IGNITION ON position.

TEST NO. 1

CHECK INJECTION CONTROL UNIT 5-PIN CONNECTOR GROUND

- Selector (1) in position 1.
- Voltmeter reading < 10 mV.

TEST NO. 2

CHECK OF IGNITION CONTROL UNIT 20-PIN CONNECTOR GROUND

- Selector (1) in position 2.
- Voltmeter reading < 10 mV.

TEST NO. 3

CHECK OF INJECTION CONTROL UNIT 13-PIN CONNECTOR GROUND

- Selector (1) in position 3.
- Voltmeter reading < 10 mV.

TEST NO. 4

CHECK OF +12 WITH KEY INSERTED ON PIN 6 OF IGNITION CONTROL UNIT CONNECTOR

- Position 20 V FSR voltmeter.
- Selector (1) in position 4.
- Voltmeter reading 12 V.
- Take out ignition key.
- Voltmeter reading 0 V.
- Turn ignition key to IGNITION ON POSITION again.

TEST NO. 5

CHECK OF SPEEDOMETER RELAY - PIN 9 OF INJECTION CONTROL UNIT CONNECTOR

- Selector (1) in position 5.
- Voltmeter reading 0 V.
- Commutate switch (2) momentarily to position 2 - during this time 12 V should be read.
- Repeat the test with button (2) pressed.

TEST NO. 6

CHECK OF SPEEDOMETER RELAY - PIN 19 OF IGNITION CONTROL UNIT CONNECTOR

- Selector (1) in position 6.
- Voltmeter reading 0 V.
- Try starting - voltmeter should read > 10 V only during this time.

Set switch (2) to position 2

TEST NO. 7

STARTING SIGNAL TEST (50) ON PIN 4 OF INJECTION CONTROL UNIT CONNECTOR

- Selector (1) in position 7.
- Try starting; voltmeter should read > 10 V.

TEST NO. 8

FUEL CUT-OFF TEST ON PIN 2 OF INJECTION CONTROL UNIT CONNECTOR

- Selector (1) in position 8.
- Voltmeter reading 12 V.
- Depress accelerator pedal slightly.
- Voltmeter reading 0 V.

FUEL SYSTEM

TEST NO. 9

FUEL MINIMUM CUT-OUT SWITCH ON PIN 7 OF IGNITION CONTROL UNIT CONNECTOR

- Selector (1) in position 9.
- Repeat procedure described in previous point.

TEST NO. 10

AIR FLOW GAUGE TEST

- Selector (1) in position 10.
- Voltmeter reading 7 to 8.5 V (depending on outside temperature - the higher the temperature the higher the value).
- Move the disc of the air flow gauge and check that the voltage varies between 7 to 8.5 V and 100 to 250 without intermediate voltage holes.

TEST NO. 11

HALL EFFECT SENSOR TEST

- Selector (1) in position 11.
- 2 V FSR Voltmeter.
- Try prolonged starting.
- During this time read the value corresponding to the number of starting revs on the voltmeter
e.g. 300 r.p.m. = 300 mV
400 r.p.m. = 400 mV

TEST NO. 12

ELECTROINJECTOR ELECTRICAL TEST

- Selector (1) in position 12.
- Voltmeter 190 to 230 mV.
- A more thorough test, especially if the values are near the extremes, consists of momentarily disconnecting, one at a time, the electroconnectors.
There should be an increase of 60-80 mV each time.

TEST NO. 13

THROTTLE POSITION SENDING UNIT TEST

- Selector (1) in position 13.
- 2 V FSR voltmeter.
- Voltmeter reading 1050 to 1100 mV.

TEST NO. 14

ELECTRICAL TEST OF SUPERCHARGING PRESSURE REGULATION SOLENOID VALVE

- Selector (1) in position 14.
- 20 V FSR voltmeter.
- Voltmeter 12 V.
- Set switch (1) to position 1.
- Voltmeter reading < 1 V.

IMPORTANT:

Commutating the switch to position 1 the energizing of the solenoid valve should be heard.

TEST NO. 15

SELF-TEST EFFICIENCY TEST

- Commute self-test light enabling switch to upper position.
- Press button (1) and check that the light comes on.

PREPARATION FOR OHMMETER MEASUREMENTS

1. Set selectors (1) and (2) in position 1.
2. Set switch (1) to position 2.
3. Set switch (2) to position 1.
4. Connect multimeter (2 kOHM FSR) to the «OHM» bushes of the diagnosis instrument
5. Leave the fuel pump fuse deactivated.
6. Leave the auxiliary air valve connector deactivated.
7. Turn the ignition key to IGNITION ON position.

TEST NO. 1

SETTING TEST FOR VARIOUS MARKETS

- Selector (2) in position 1.
- Ohmmeter reading: 100 Ω for normal versions.
- Ohmmeter reading: 0 Ω for Switzerland version.

TEST NO. 2

TEST OF CONNECTION BETWEEN PIN 18 OF IGNITION CONTROL UNIT CONNECTOR AND PIN 3 OF INJECTION CONTROL UNIT

- Selector (2) in position 2.
- Ohmmeter reading 200 Ω .

TEST NO. 3

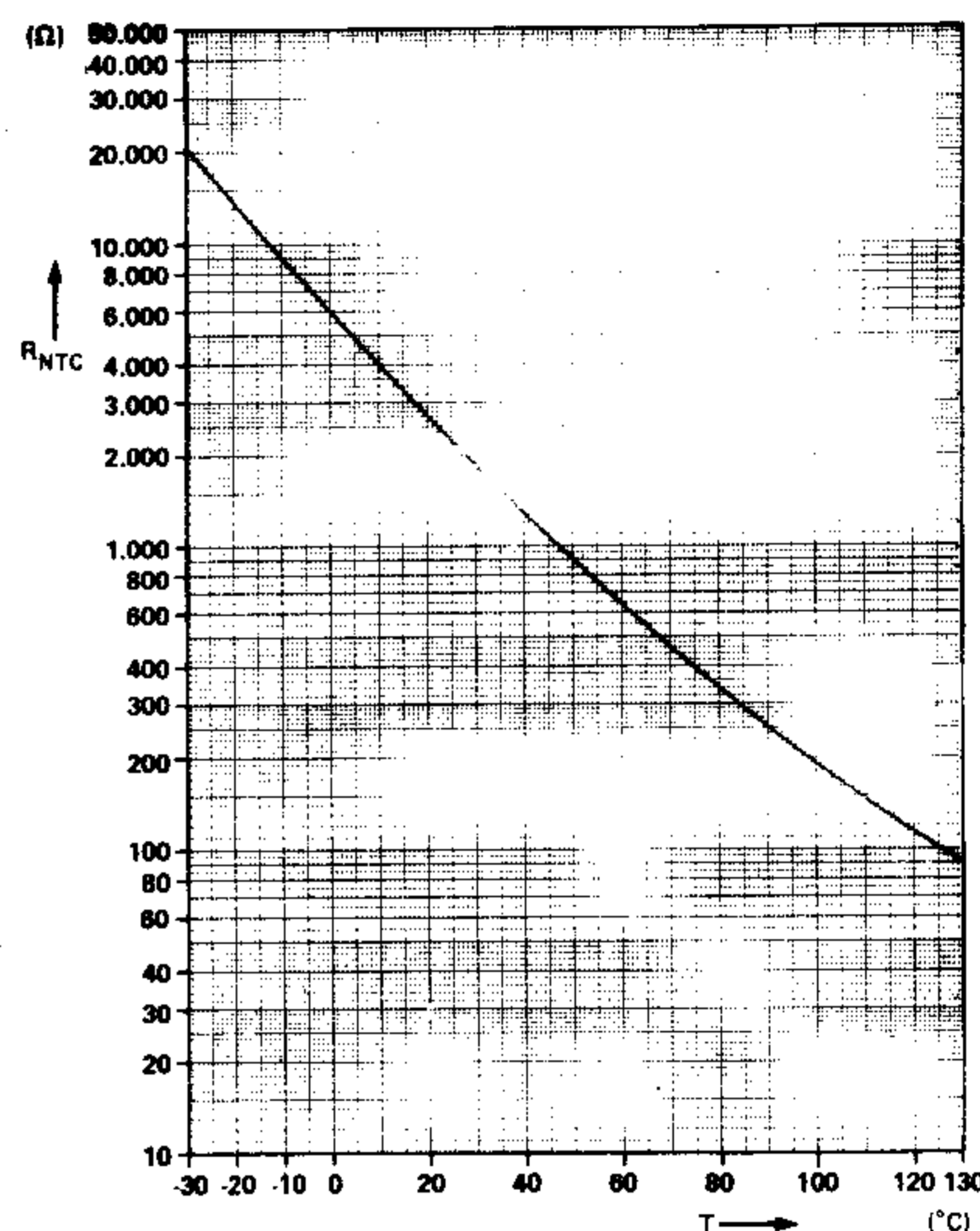
TEST OF CONNECTION BETWEEN PIN 8 OF IGNITION CONTROL UNIT AND PIN 6 OF INJECTION CONTROL UNIT

- Selector (2) in position 3.
- Ohmmeter reading 300 Ω .

TEST NO. 4

WATER TEMPERATURE SENSOR TEST

- Selector (2) in position 4.
- Ohmmeter 20 k Ω FSR
- The ohmmeter reading depends on the engine temperature (see curve).



TEST NO. 5

KNOCK SENSOR TEST

- Selector (2) in position 5.
- Ohmmeter on 2000 k Ω FSR
- Ohmmeter reading 490 to 550 k Ω .

NOTE:

The reading is 220 k Ω higher than the actual resistance of the sensor.

TROUBLE DIAGNOSIS AND CORRECTIONS

NOTE:





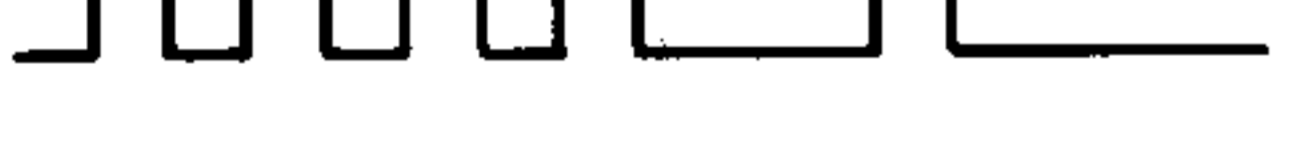
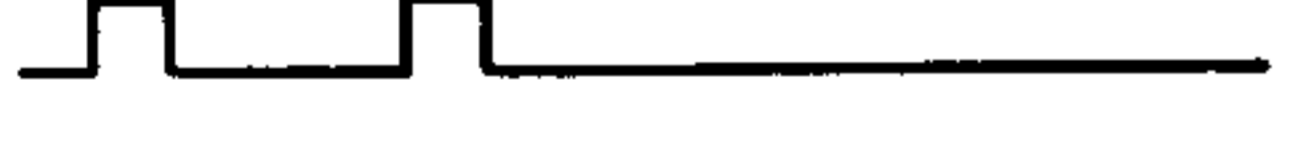
The correct use of this trouble diagnosis procedure assumes vehicle to be in order (transmission in particular), engine in good functioning conditions (valves, cylinders, couplings) and ignition system efficient (spark plugs, distributor, coil).

IGNITION ELECTRONIC CONTROL UNIT SELF-TEST

The warning of an ignition ECU fault is provided by a light located on the dashboard. The light is operated by commutating the relative control switch to the upper position. In the case of an ignition system fault the

light will be constant but will start flashing when engine r.p.m. falls below 1550. This flashing will permit the identification of the type of fault.

In the event of simultaneous faults the one signalled will be governed by the priority scale given in the table below:

INDICATOR LIGHT FLASHING FREQUENCY IN ORDER OF PRIORITY	FAULT	NOTES
 1	Battery voltage insufficient	Alarm remains until fault corrected (Check battery).
 2	Knock sensor fault	Alarm remains memorized during running. (Check and restore connection or correct installation).
 3	Knock identification system fault	Alarms remains memorized during running. (Check ECU).
 4	Anomalous load signal	Alarm remains memorized during running.
 5	Throttle position sending unit fault. Supply lacking.	Alarm remains memorized during running. (Restore connection).
 6	Maximum spark advance delay has been reached	Alarm remains until fault is corrected or the fuel cut-out switch is pressed (accelerator pedal completely depressed).

FUEL SYSTEM

ENGINE — TROUBLESHOOTING

Condition	Probable cause	Corrective action
Engine fails to start	<ul style="list-style-type: none"> • Ignition and fuel supply system connectors badly connected • No electrical continuity in ignition or fuel supply wiring • Tachometer relay faulty • Air and/or fuel hose badly connected or damaged • Main and/or auxiliary fuel pump not working • Fuel pressure irregular: <ul style="list-style-type: none"> - if excessive - if insufficient • Faulty air flow meter • Water temperature sensor faulty • Leaks in suction circuit • Ignition and/or injection ECU defective 	<p>Check efficiency of connections</p> <p>Check for electrical continuity (see paragraph «Fuel supply and ignition system — Troubleshooting»)</p> <p>Check electrically and replace tachometer relay if necessary</p> <p>Check and take appropriate action</p> <p>Check fuel pumps and wiring</p> <ul style="list-style-type: none"> - Check fuel return line - Replace pressure regulator - Check functioning of pressure regulator and fuel pumps - Check fuel supply circuit filter and gauge filter on the auxiliary pump - Check fuel delivery line <p>Perform mechanical and electrical check of meter efficiency</p> <p>Measure sensor resistance and replace it if necessary</p> <p>Check for leaks</p> <p>Replace the ECU involved</p>
Engine starts and stalls immediately	Perform checks listed in the first point «Engine fails to start»	
	<ul style="list-style-type: none"> • Auxiliary air valve inefficient (problem arises with cold engine) • Incorrect idling adjustment 	<p>Check efficiency of the valve</p> <p>Adjust idling</p>
Irregular idle rpm	All idling checks must be performed with hot engine and accessories off	
	<ul style="list-style-type: none"> • Poor tightness of air supply system • Air filter clogged • Incorrect ignition timing • Mixture too rich or too lean • Throttle position sending unit badly adjusted or defective • Fuel cutout switch badly adjusted or defective • Fuel pressure irregular • Water temperature sensor defective 	<p>Check tightness</p> <p>Replace filter</p> <p>Check timing</p> <p>Adjust mixture strength by operating on the bypass screw of the air flow gauge using a CO tester</p> <p>Check adjustment and replace if necessary</p> <p>Adjust switch and replace if necessary</p> <p>Perform all checks of piping and pressure regulator</p> <p>Check sensor resistance and replace if necessary</p>

FUEL SYSTEM

Condition	Probable cause	Corrective action
Irregular idle rpm (contd)	<ul style="list-style-type: none"> • Air flow gauge defective • One or more of the electro-injectors faulty 	<p>Perform mechanical and electrical test of the gauge</p> <p>Check using CO tester, removing the electro-injector connectors one at a time to locate the faulty one</p>
Engine will not accelerate	<ul style="list-style-type: none"> • Fuel cutout switch faulty • Air flow gauge defective 	<p>Replace switch</p> <p>Perform a mechanical and electrical test of gauge efficiency</p>
Insufficient acceleration	Perform tests listed in the first point «Engine fails to start»	
	<ul style="list-style-type: none"> • Air filter clogged • Insufficient supercharging due to: <ul style="list-style-type: none"> - supercharging regulation valve non functioning correctly - waste-gate malfunction - turbocharger rotor bearings siezed • Knock sensor faulty • One or more sensors defective • Throttle position sending unit badly adjusted or defective 	<p>Clean and replace if necessary</p> <p>Check and replace if necessary</p> <p>Check and replace if necessary</p> <p>Replace turbocharger and check efficiency of lubrication system</p> <p>Replace sensor</p> <p>Check, using a CO tester, removing electro-injector connectors one at a time in order to identify the faulty one</p> <p>Check adjustment and replace if necessary</p>
Vehicle fails to reach maximum speed	Perform checks listed in previous point «Insufficient acceleration»	
	<ul style="list-style-type: none"> • Throttle not completely open • Intercooler clogged 	<p>Adjust accelerator linkage</p> <p>Clean with compressed air</p>
Engine misses in all running conditions	<ul style="list-style-type: none"> • Spark plugs defective • High voltage wiring defective • One or more electro-injectors faulty • Malfunction of rev sensor located in the distributor (Hall effect) • Ignition and/or injection ECU defective 	<p>Replace using spark plugs of the prescribed type</p> <p>Check electrical continuity</p> <p>Check using CO tester, removing the electro-injector connectors one at a time in order to identify the faulty one</p> <p>Replace distributor</p> <p>Replace ECU involved</p>
Sudden loss of power	<ul style="list-style-type: none"> • Tachometer relay defective • Occasional continuity in the ignition and fuel supply electrical wiring • Great fluctuation of fuel pressure 	<p>Perform electricla check and, if necessary, replace</p> <p>Check electrical continuity</p> <p>Check pressure regulator, pumps and plant</p>

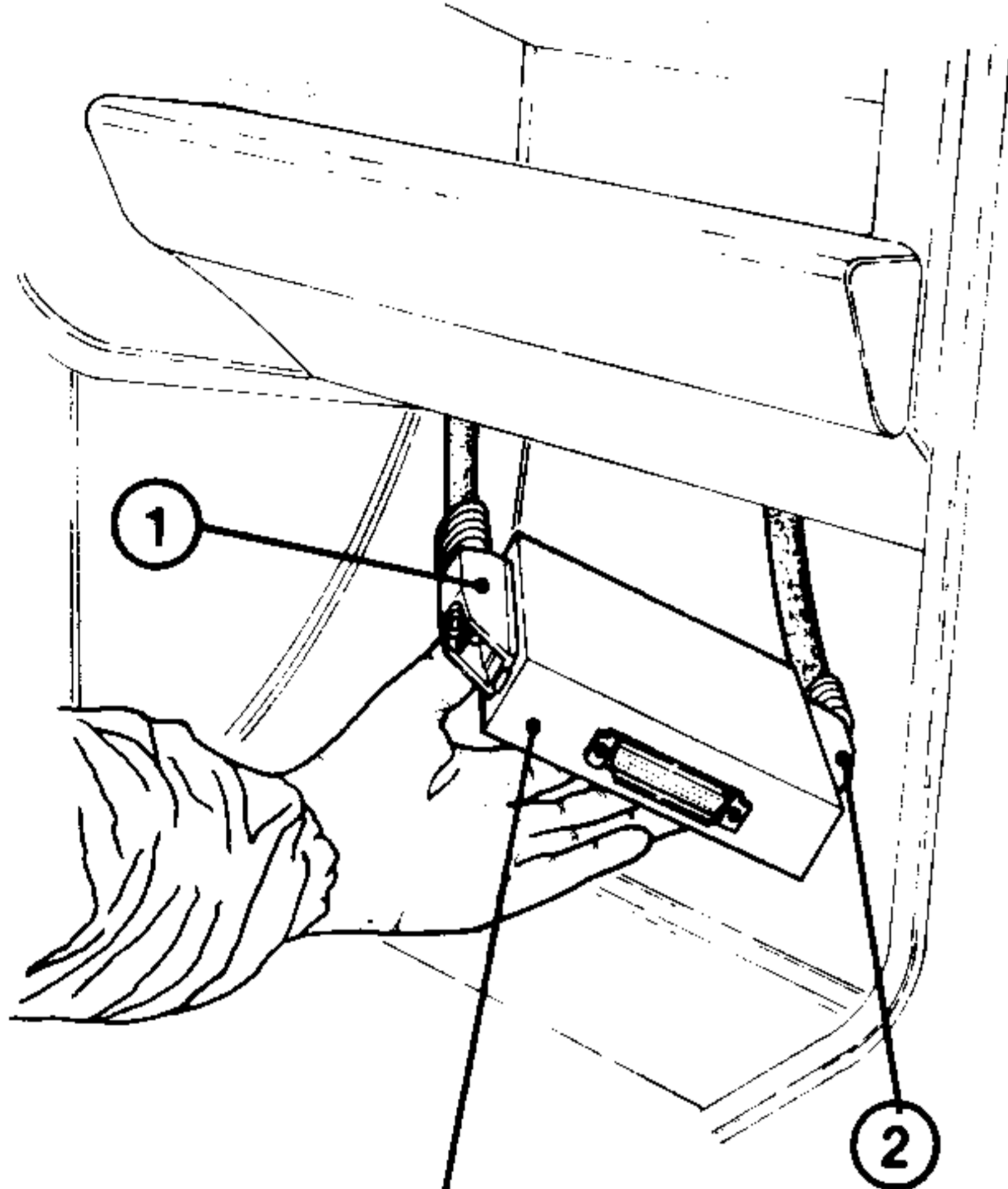
FUEL SYSTEM

Condition	Probable cause	Corrective action
Persistent engine knocking during acceleration	<ul style="list-style-type: none"> • Incorrect ignition timing • Fuel octane value insufficient • Knock sensor inefficient • Supercharging pressure excessive • Ignition ECU defective 	<p>Check timing</p> <p>Replace fuel in tank</p> <p>Replace knock sensor</p> <p>Adjust waste-gate valve and check efficiency of supercharging pressure regulating valve</p> <p>Replace ECU</p>
Excessive fuel consumption	<ul style="list-style-type: none"> • Air filter clogged • Fuel pressure too high • One or more electro-injectors defective • Fuel cutout switch badly adjusted or defective • Fuel supply ECU defective • Air flow gauge inefficient 	<p>Clean and, if necessary, replace</p> <p>Check efficiency of pressure regulator</p> <p>Check idling CO value: if it is high replace defective electro-injectors and repeat CO test</p> <p>Adjust or replace switch</p> <p>Replace ECU</p> <p>Replace gauge</p>
Irregular engine running during warming up	<ul style="list-style-type: none"> • Water temperature sensor defective • Fuel supply ECU and/or ignition ECU defective 	<p>Measure sensor resistance and replace if necessary</p> <p>Replace the ECU(s) involved</p>

**FUEL SUPPLY AND IGNITION SYSTEM
— TROUBLESHOOTING**

PRELIMINARY OPERATIONS

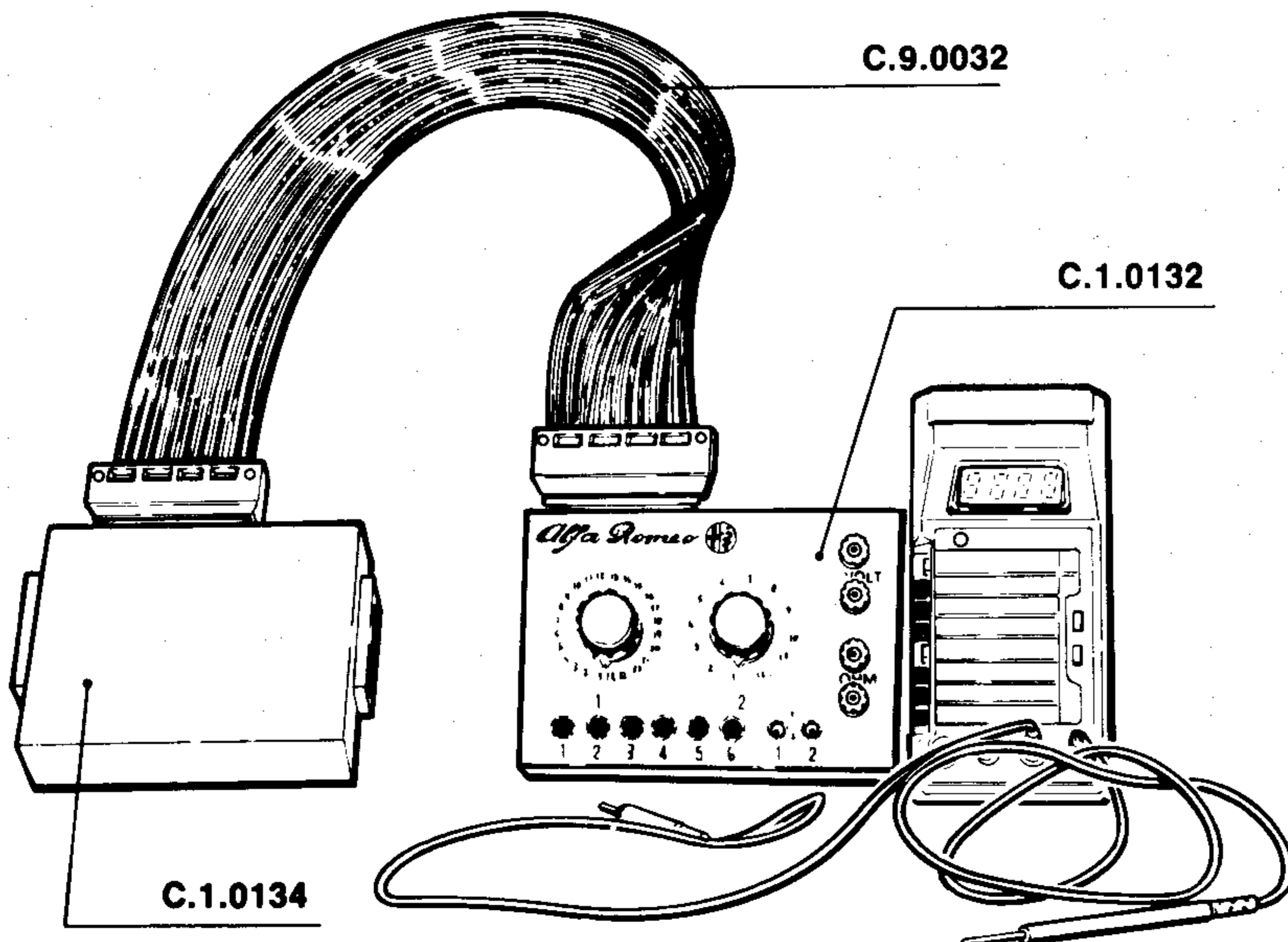
1. Turn off ignition.
2. Disconnect connector from ignition control unit (located on the right passenger compartment valance panel) and the connector from the fuel supply control unit (located under the floor pan on the right side of the passenger compartment).
3. Connect interface unit C.1.0134 to the connectors of the wiring.



C.1.0134

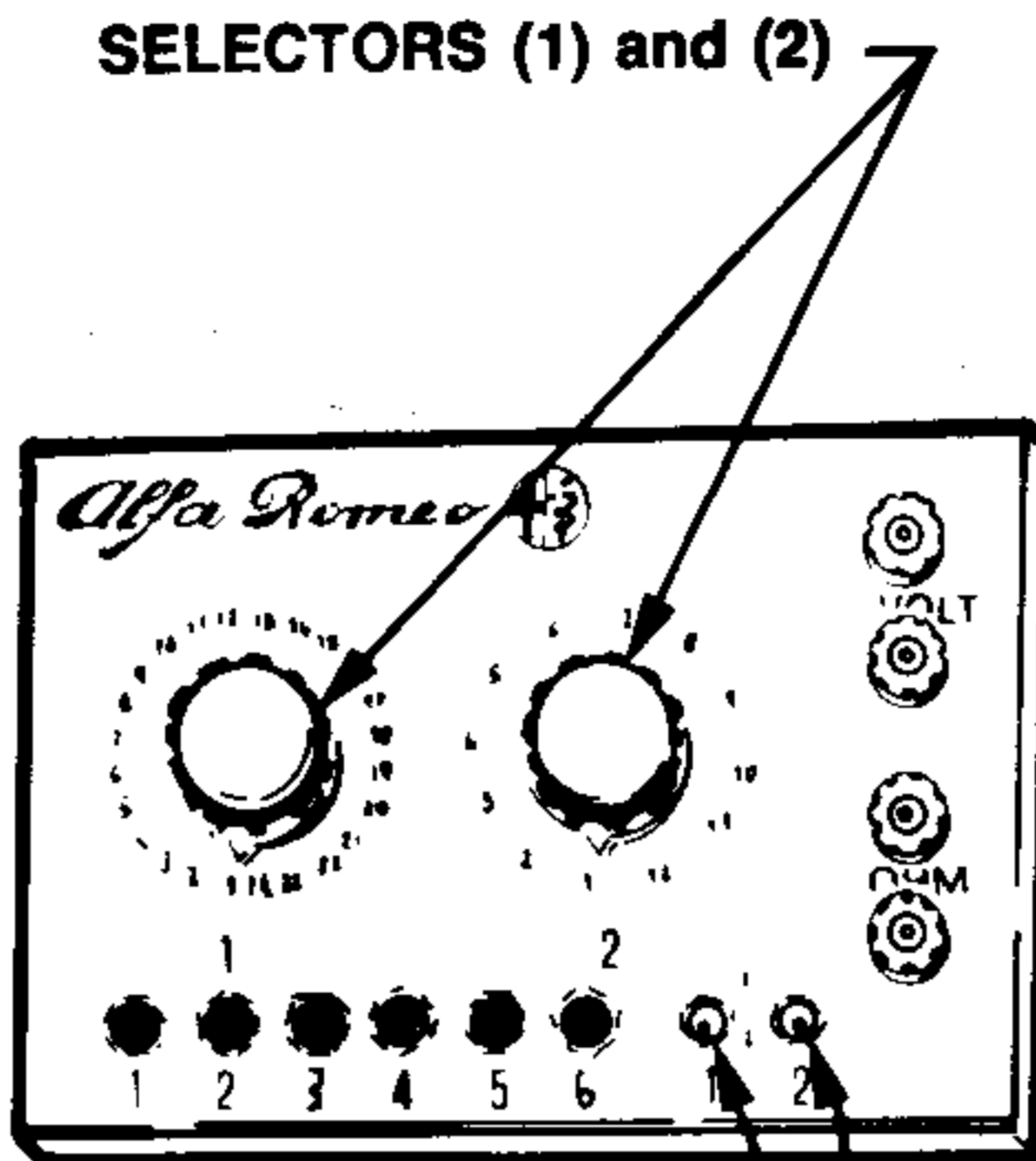
1. Injection ECU connector
2. Ignition ECU connector

4. Connect interface unit C.1.0134 to tester C.1.0132 by means of cable C.9.0032.



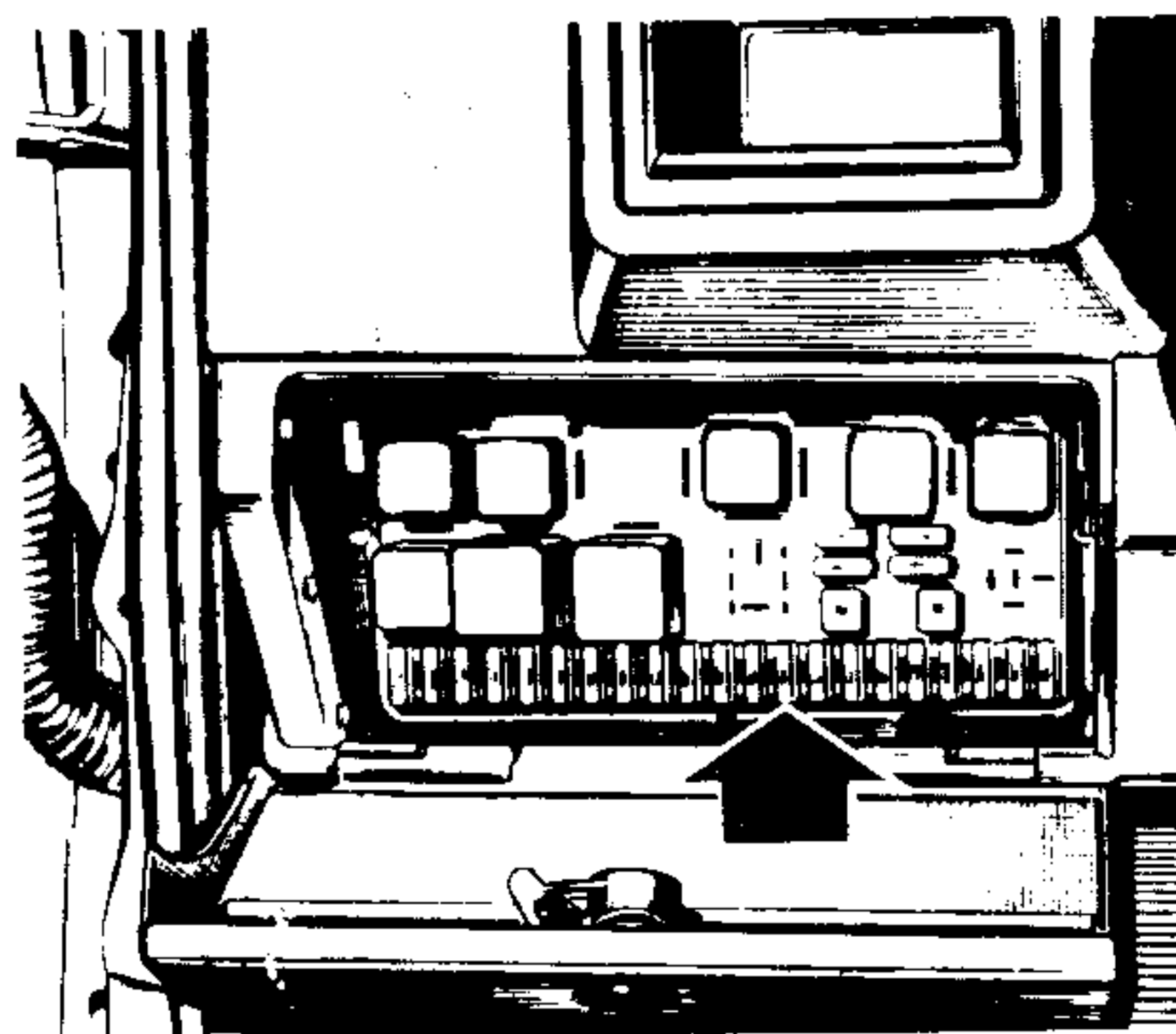
INSTRUCTIONS FOR VOLTAGE MEASUREMENTS

1. Set selectors (1) and (2) to position 1.
2. Set switch (1) to position 2.
3. Set switch (2) to position 1.

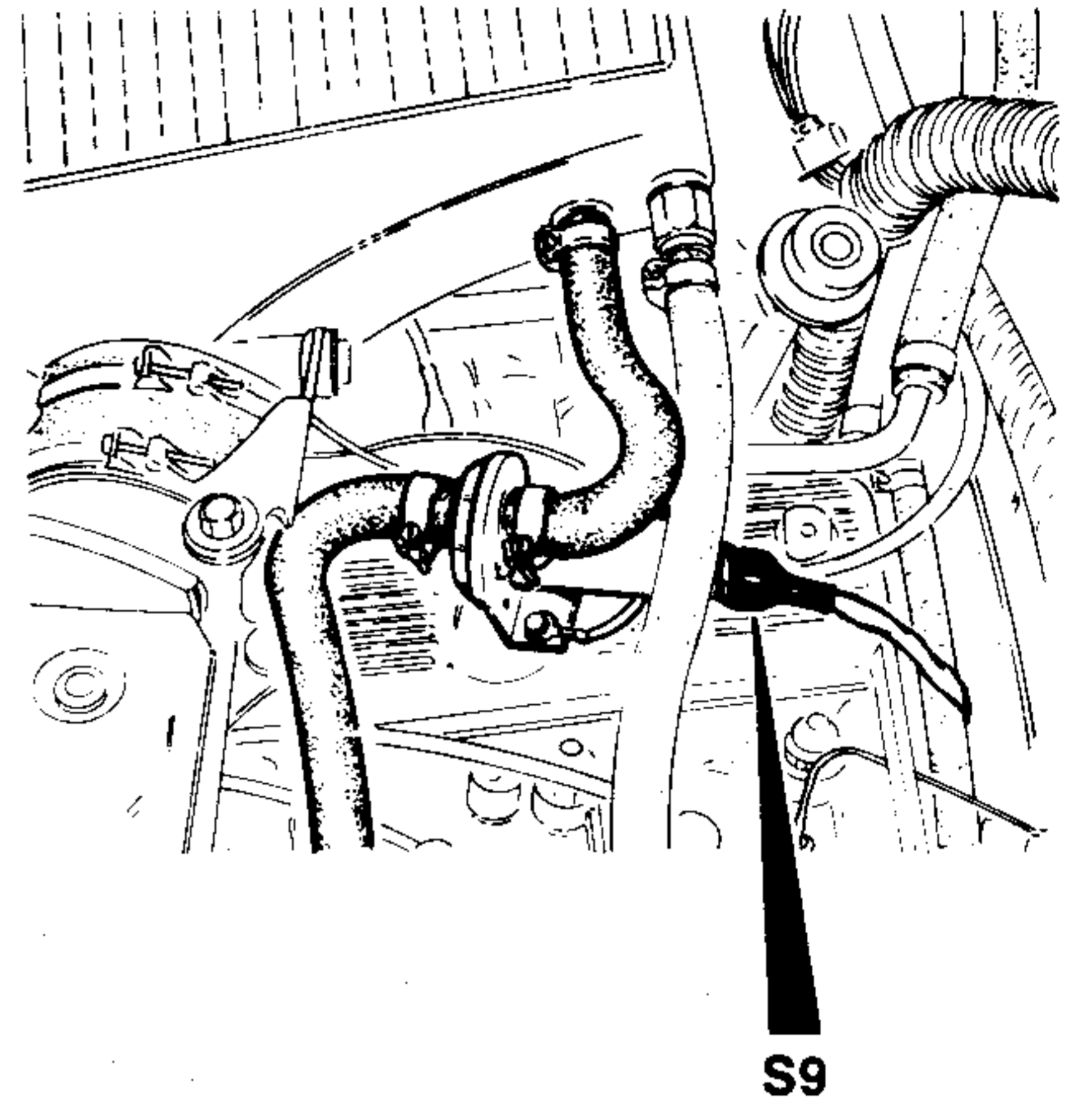


SWITCH (1) and (2)

4. Apply a 200 mV FSR multimeter to the «VOLT» bushings of the tester.
5. Disconnect the pump fuse (position 13 from the left).



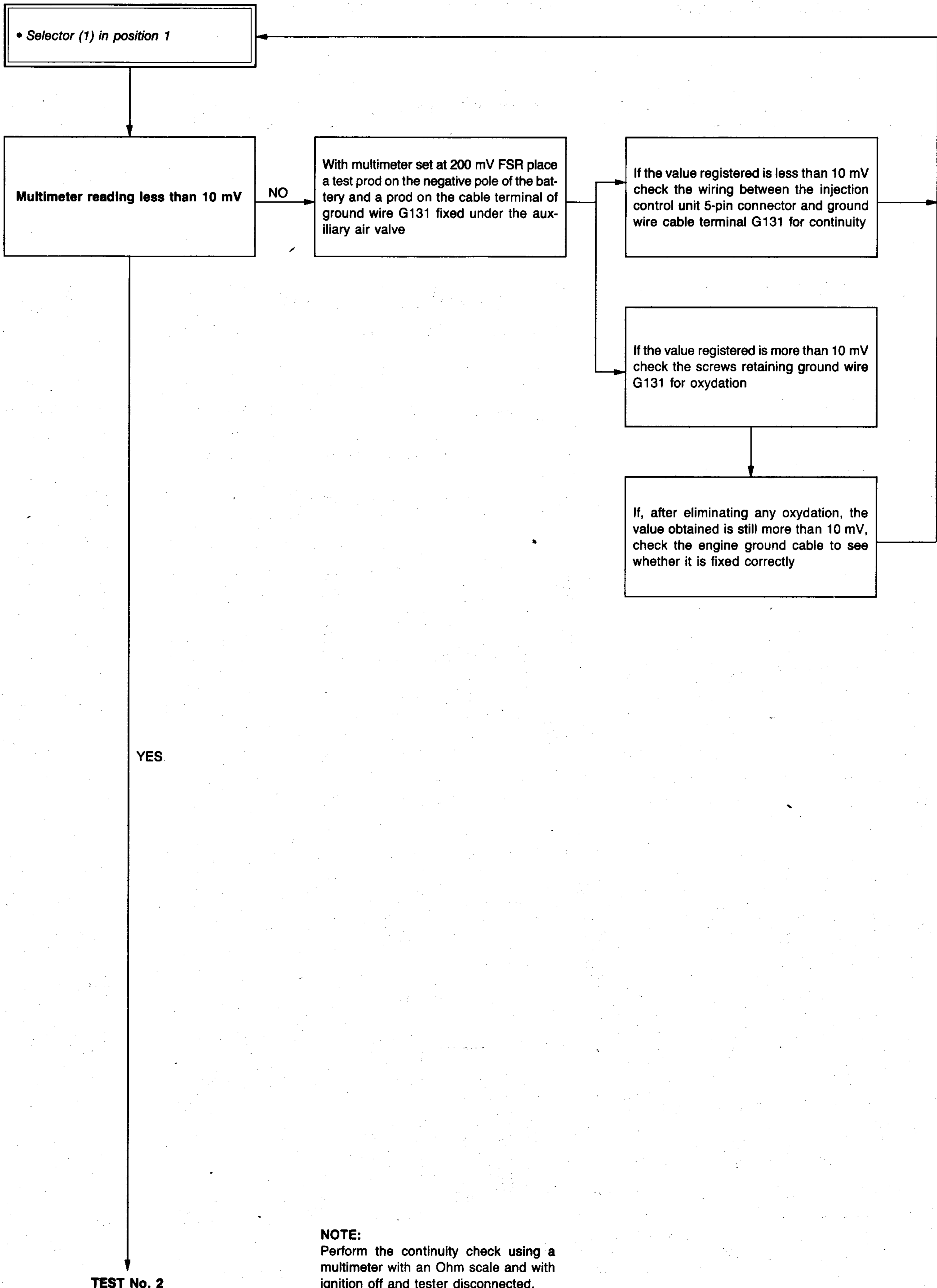
6. Disconnect the connector of the auxiliary air valve (S9).



7. Turn the key to «IGNITION ON» position.

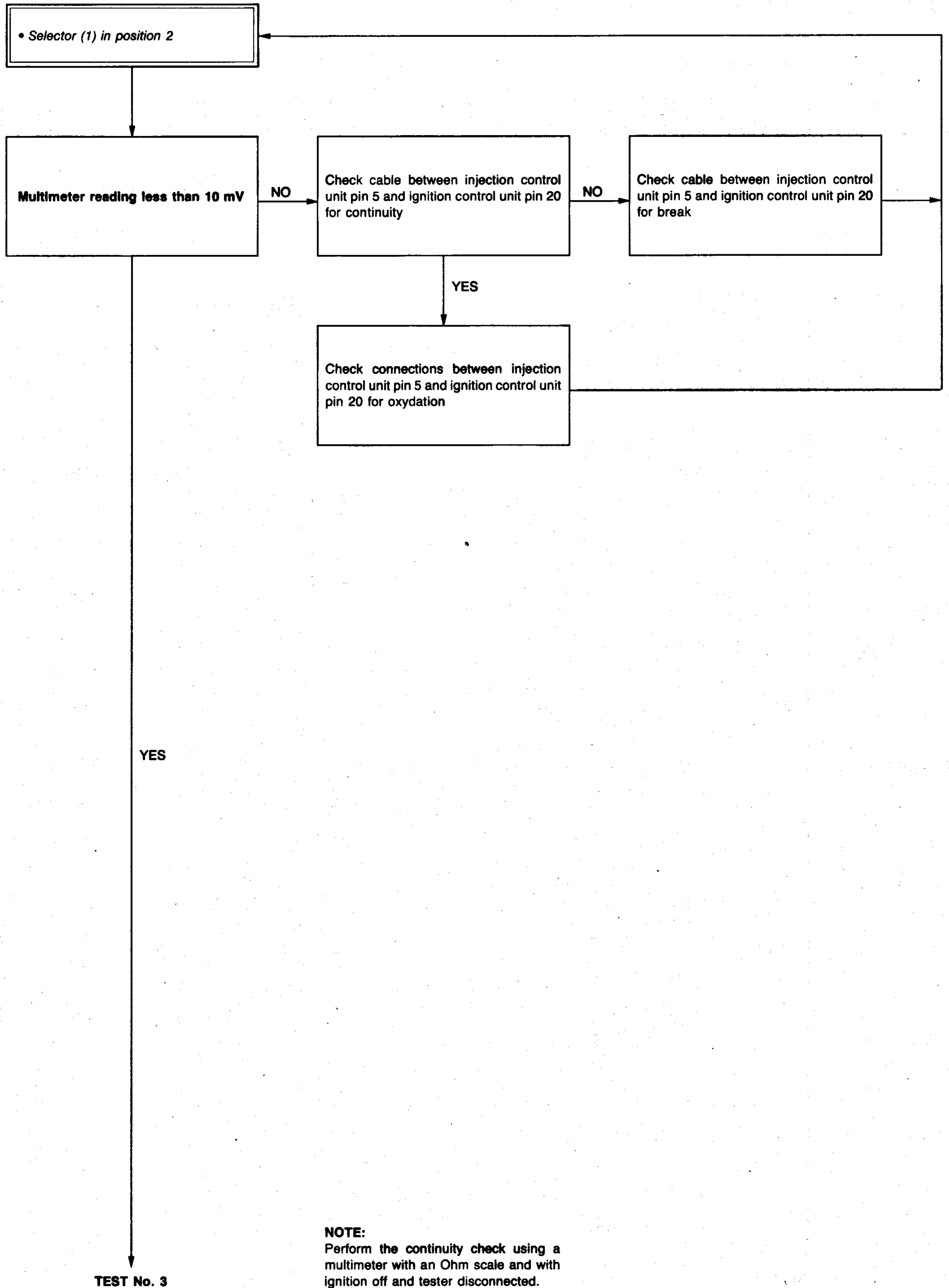
FUEL SYSTEM

TEST No. 1 — CHECK OF INJECTION CONTROL UNIT 5-PIN CONNECTOR GROUND



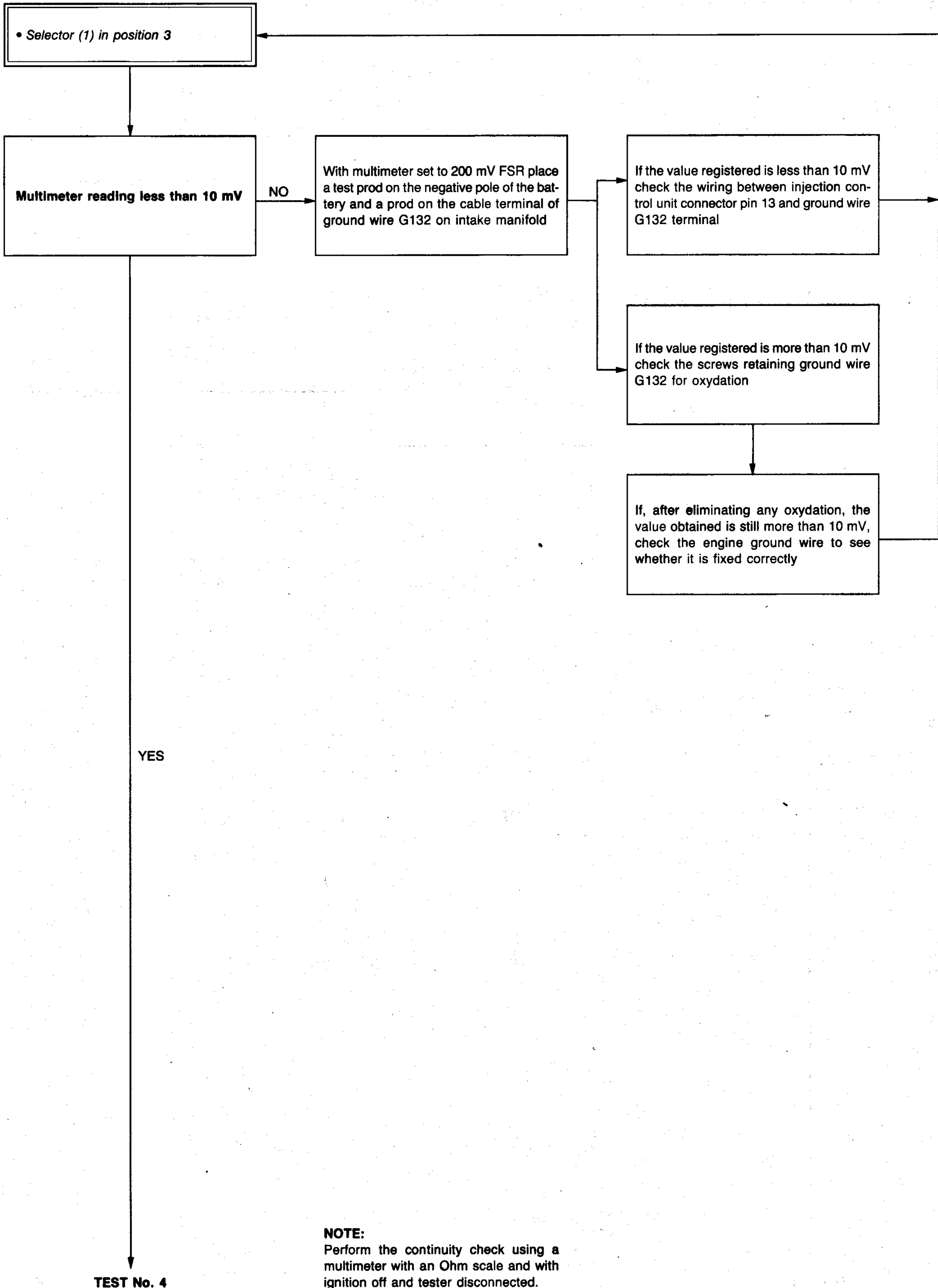
FUEL SYSTEM

TEST No. 2 — CHECK OF IGNITION CONTROL UNIT 20-PIN CONNECTOR GROUND



FUEL SYSTEM

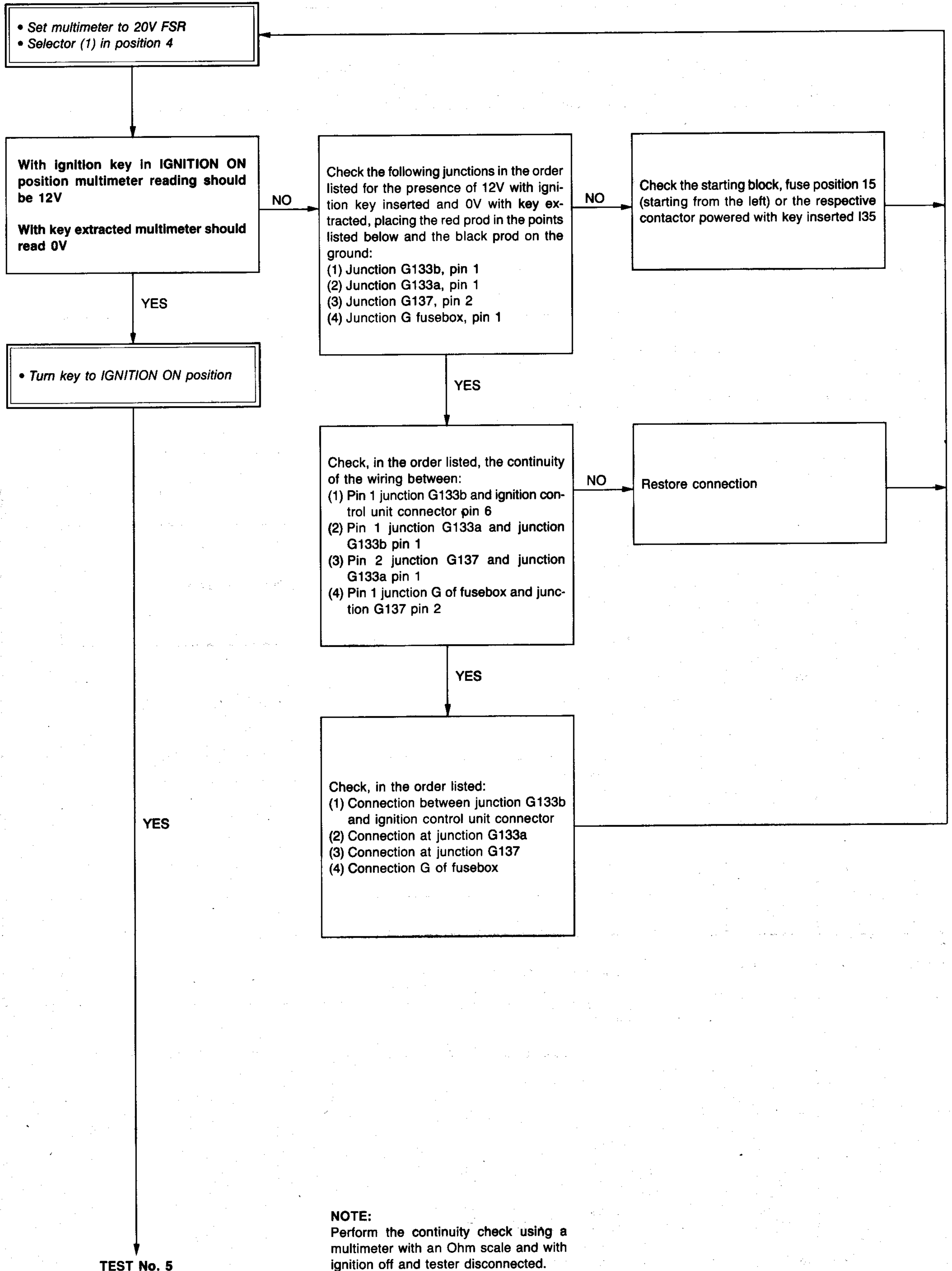
TEST No. 3 — CHECK OF INJECTION CONTROL UNIT 13-PIN CONNECTOR EARTH



NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

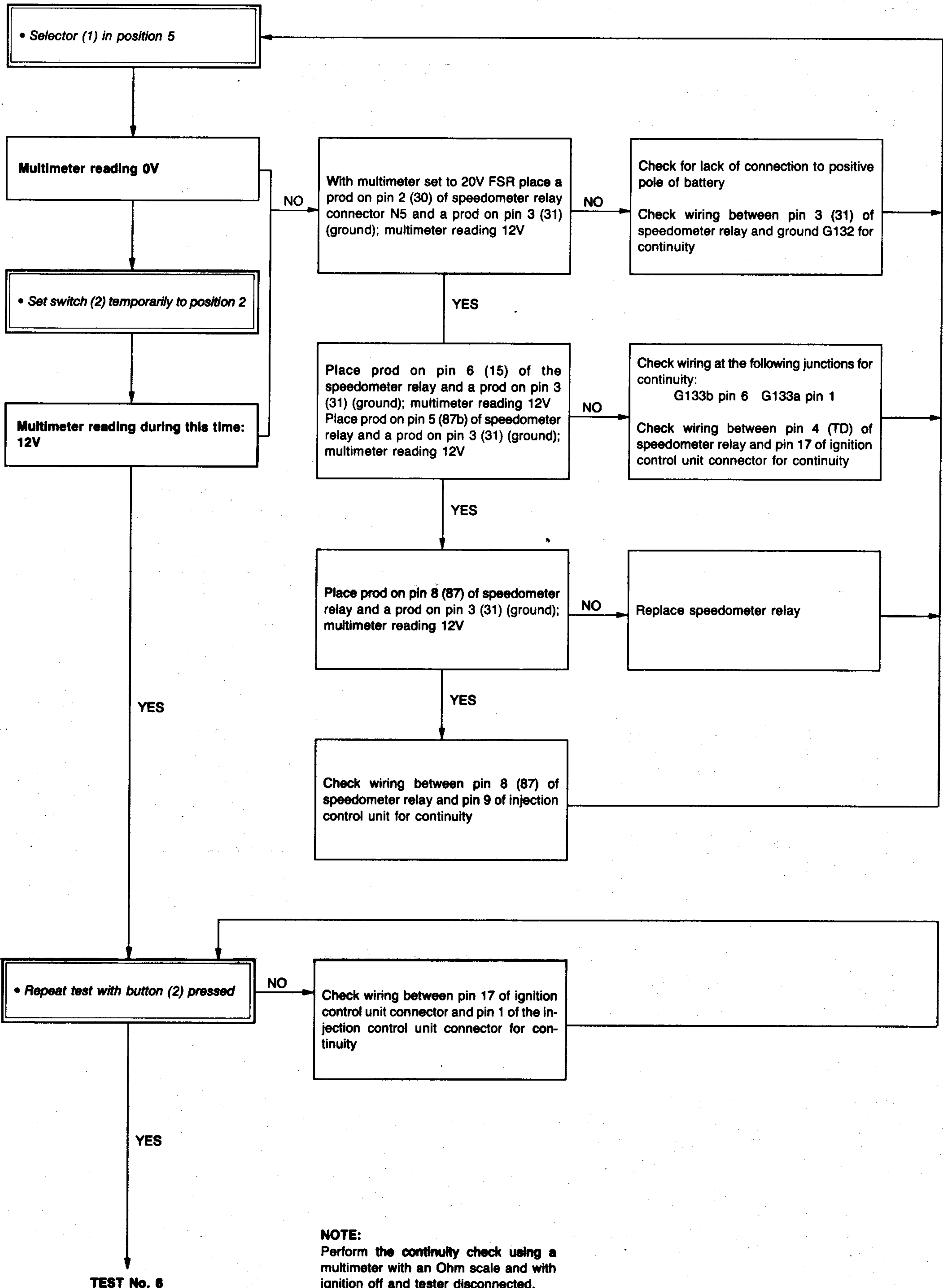
FUEL SYSTEM

TEST No. 4 — CHECK OF +12V WITH KEY INSERTED ON PIN 6 OF IGNITION CONTROL UNIT SELECTOR



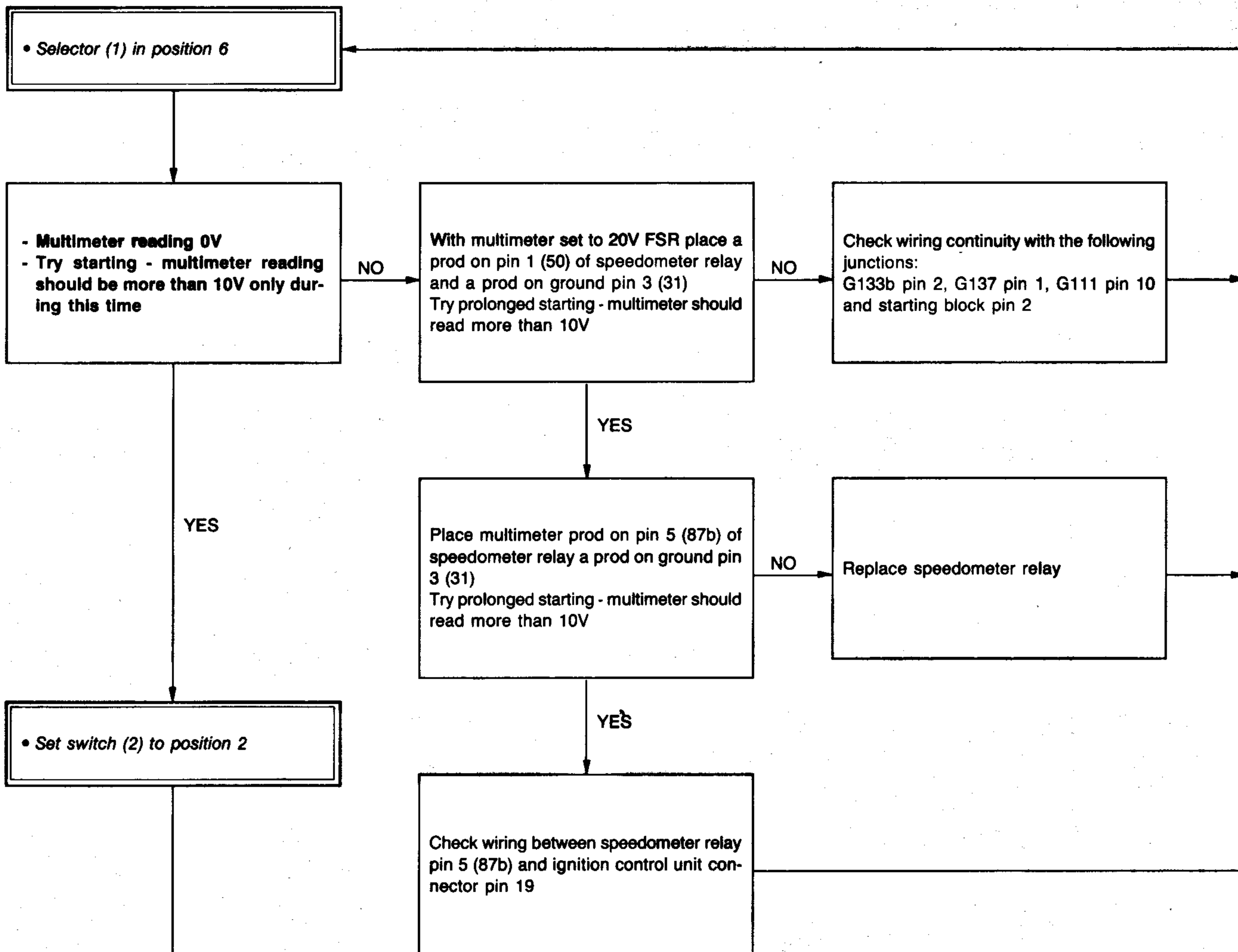
FUEL SYSTEM

TEST No. 5 — CHECK OF SPEEDOMETER RELAY - PIN 9 OF INJECTION CONTROL UNIT CONNECTOR



FUEL SYSTEM

TEST No. 6 — CHECK OF SPEEDOMETER RELAY - PIN 19 OF IGNITION CONTROL UNIT

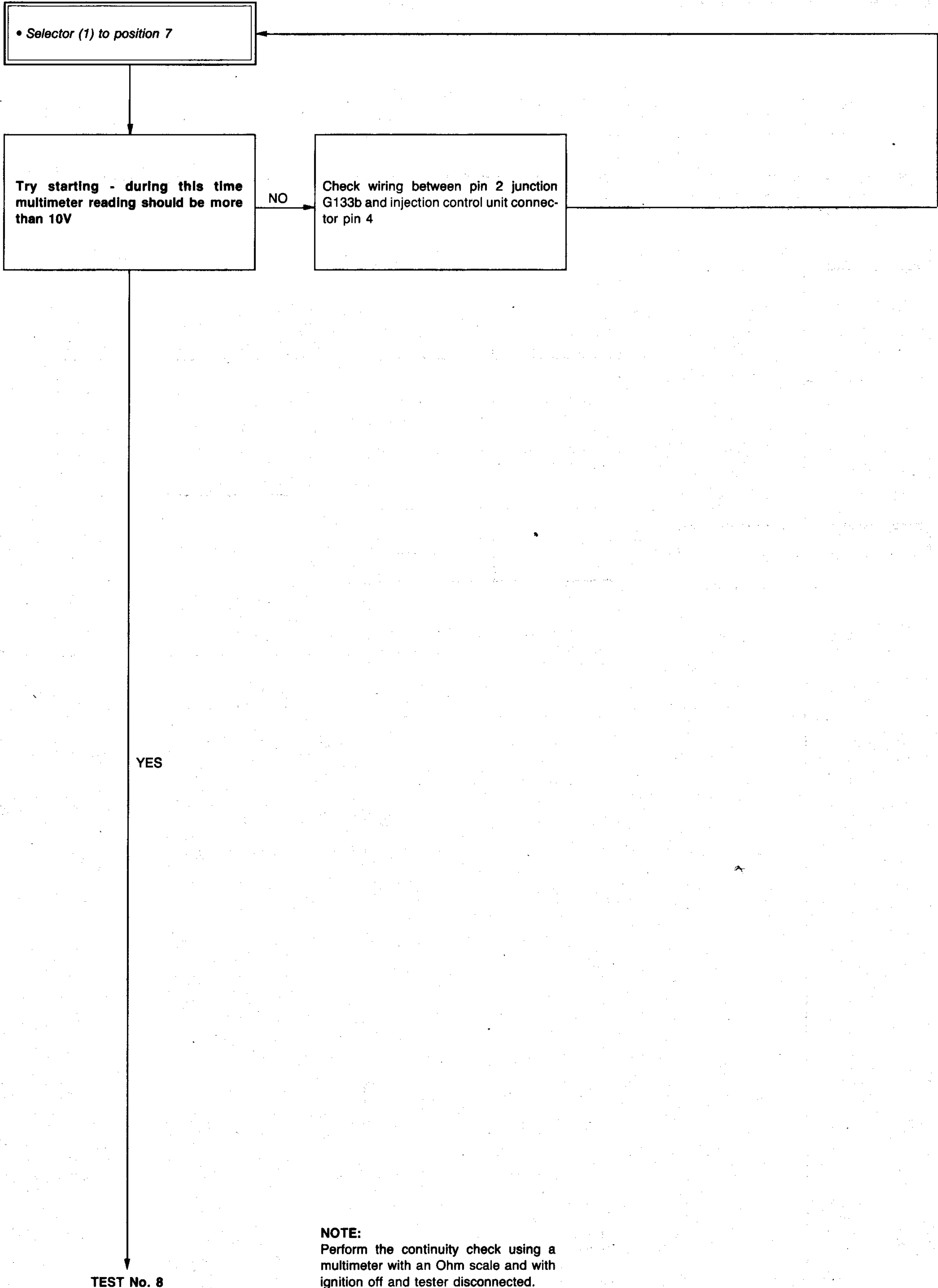


NOTE:

Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

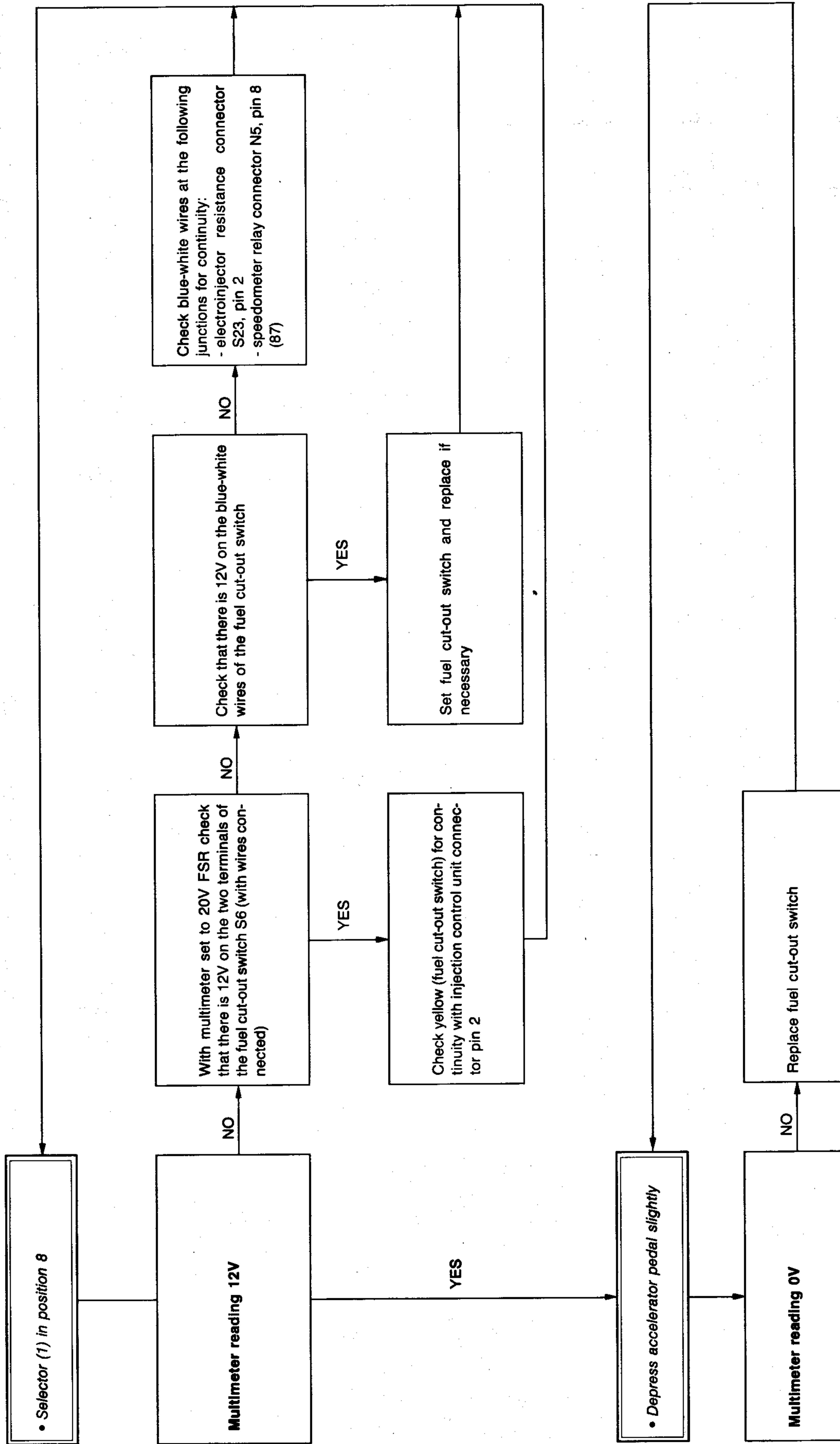
FUEL SYSTEM

TEST No. 7 — STARTING SIGNAL TEST (50) ON PIN 4 OF INJECTION CONTROL UNIT CONNECTOR



FUEL SYSTEM

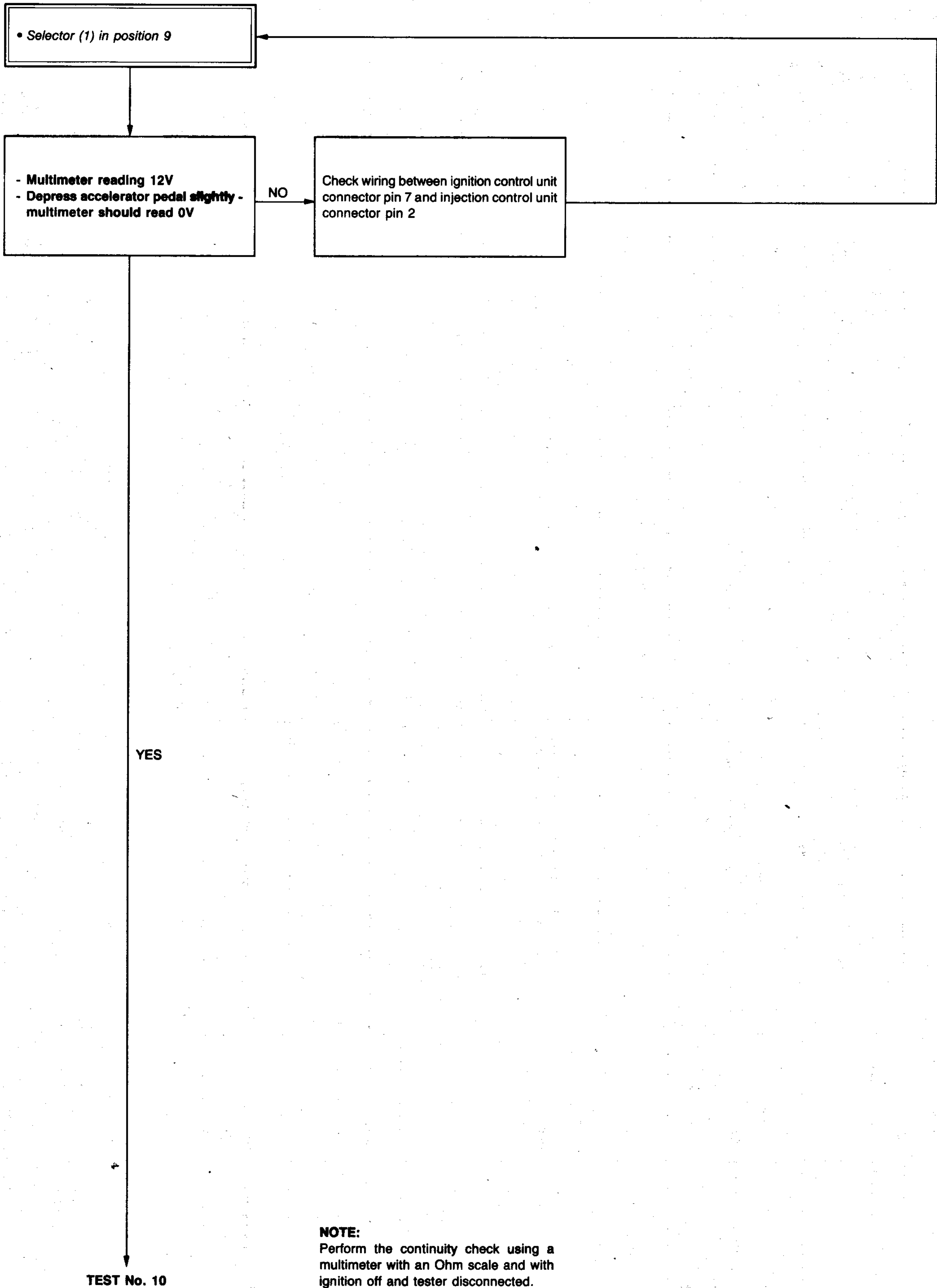
TEST No. 8 — FUEL CUT-OUT SWITCH TEST ON INJECTION CONTROL UNIT PIN 2



NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

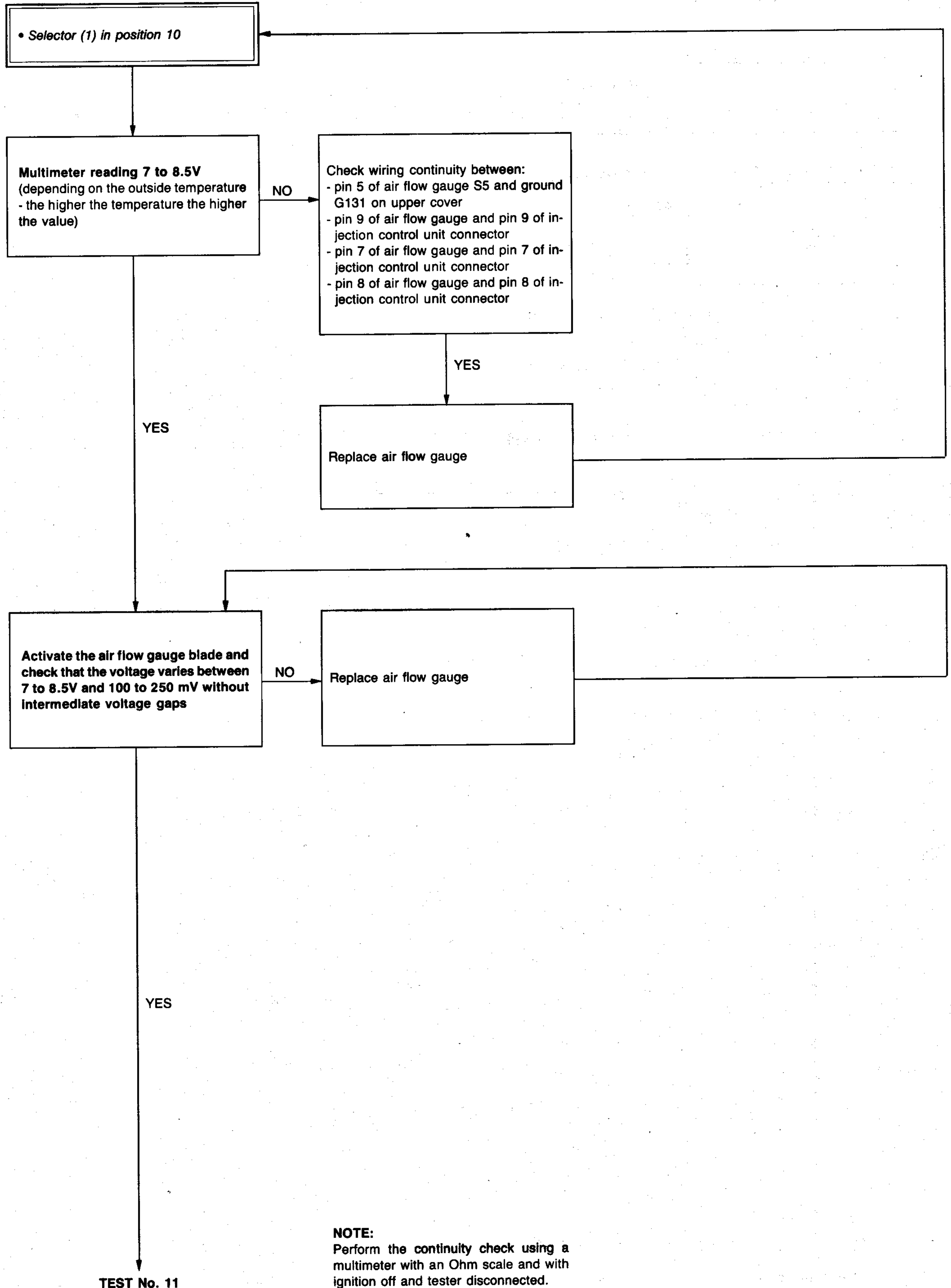
FUEL SYSTEM

TEST No. 9 — FUEL CUT-OUT SWITCH TEST OF PIN 7 OF IGNITION CONTROL UNIT CONNECTOR



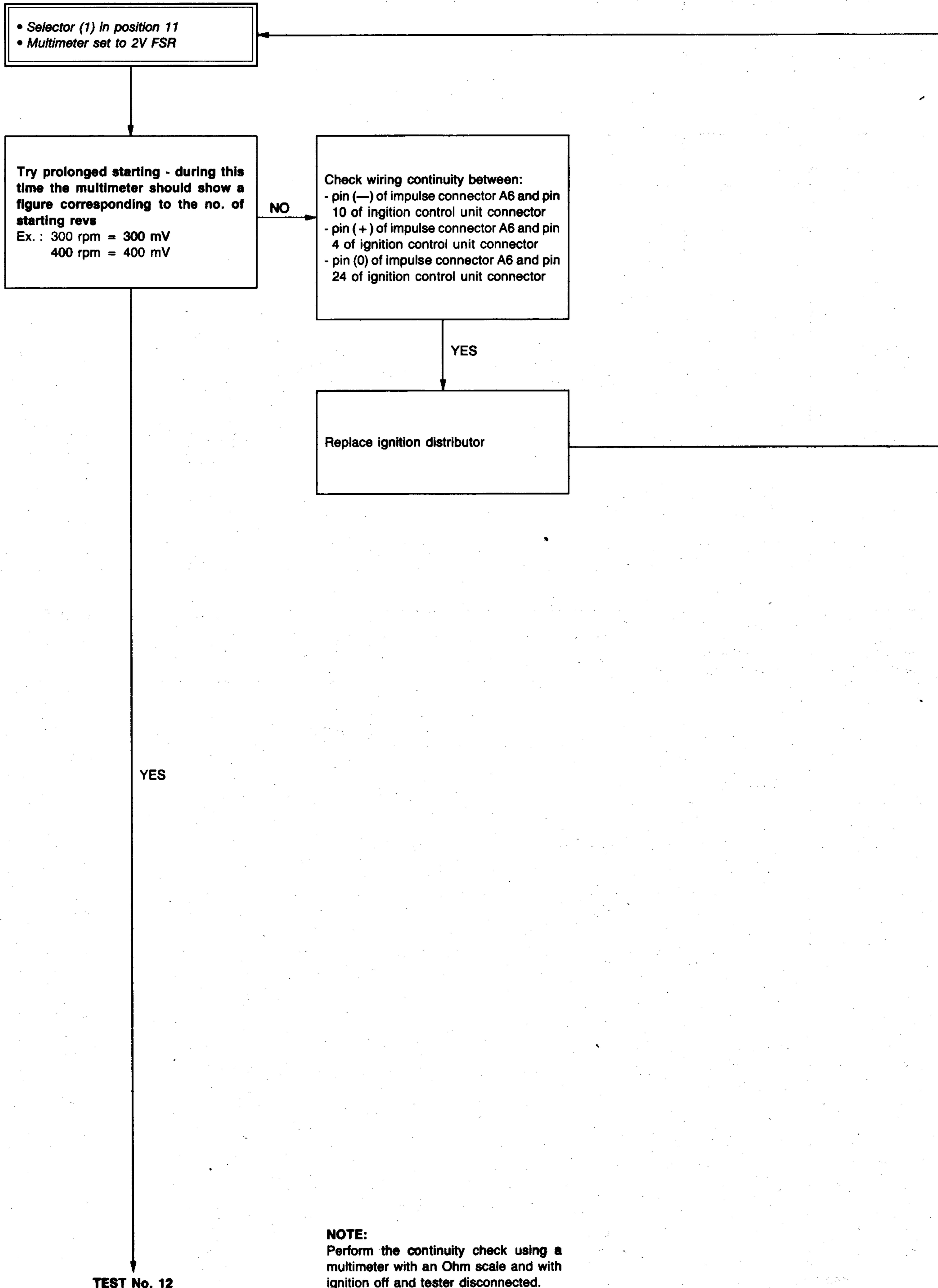
FUEL SYSTEM

TEST No. 10 — AIR FLOW GAUGE TEST



FUEL SYSTEM

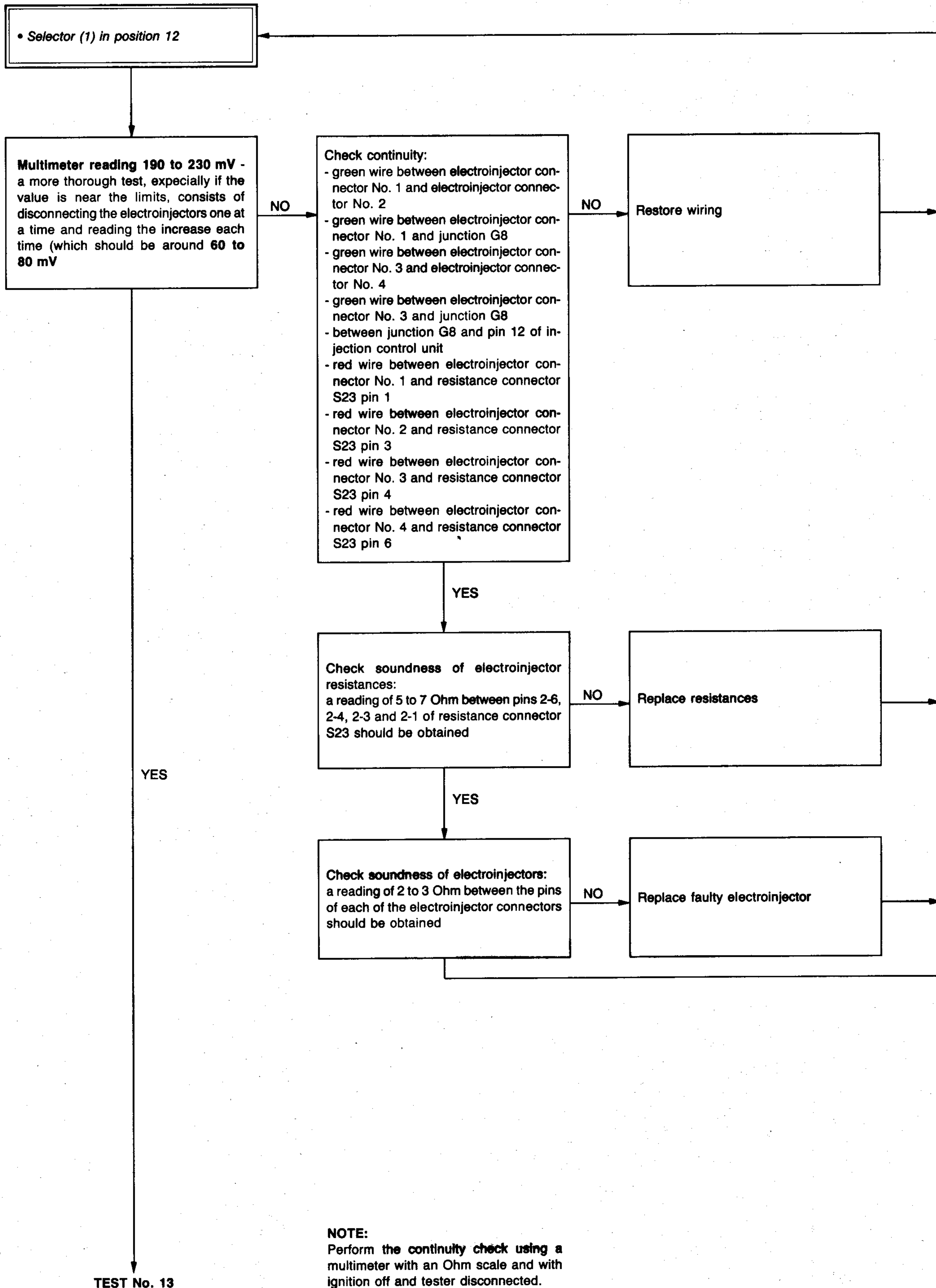
TEST No. 11 — HALL EFFECT SENSOR



NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

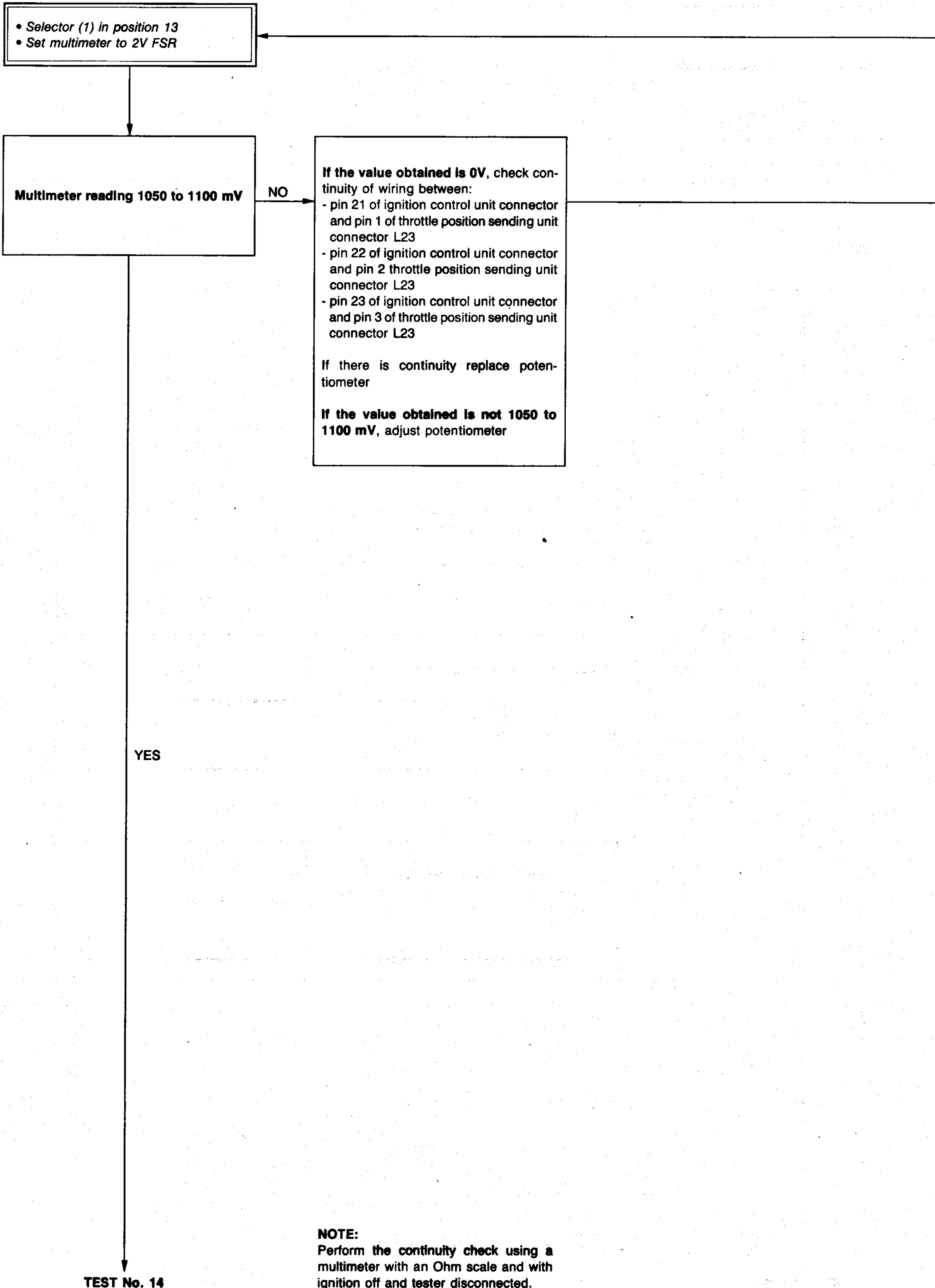
FUEL SYSTEM

TEST No. 12 — ELECTROINJECTORS ELECTRICAL TEST



FUEL SYSTEM

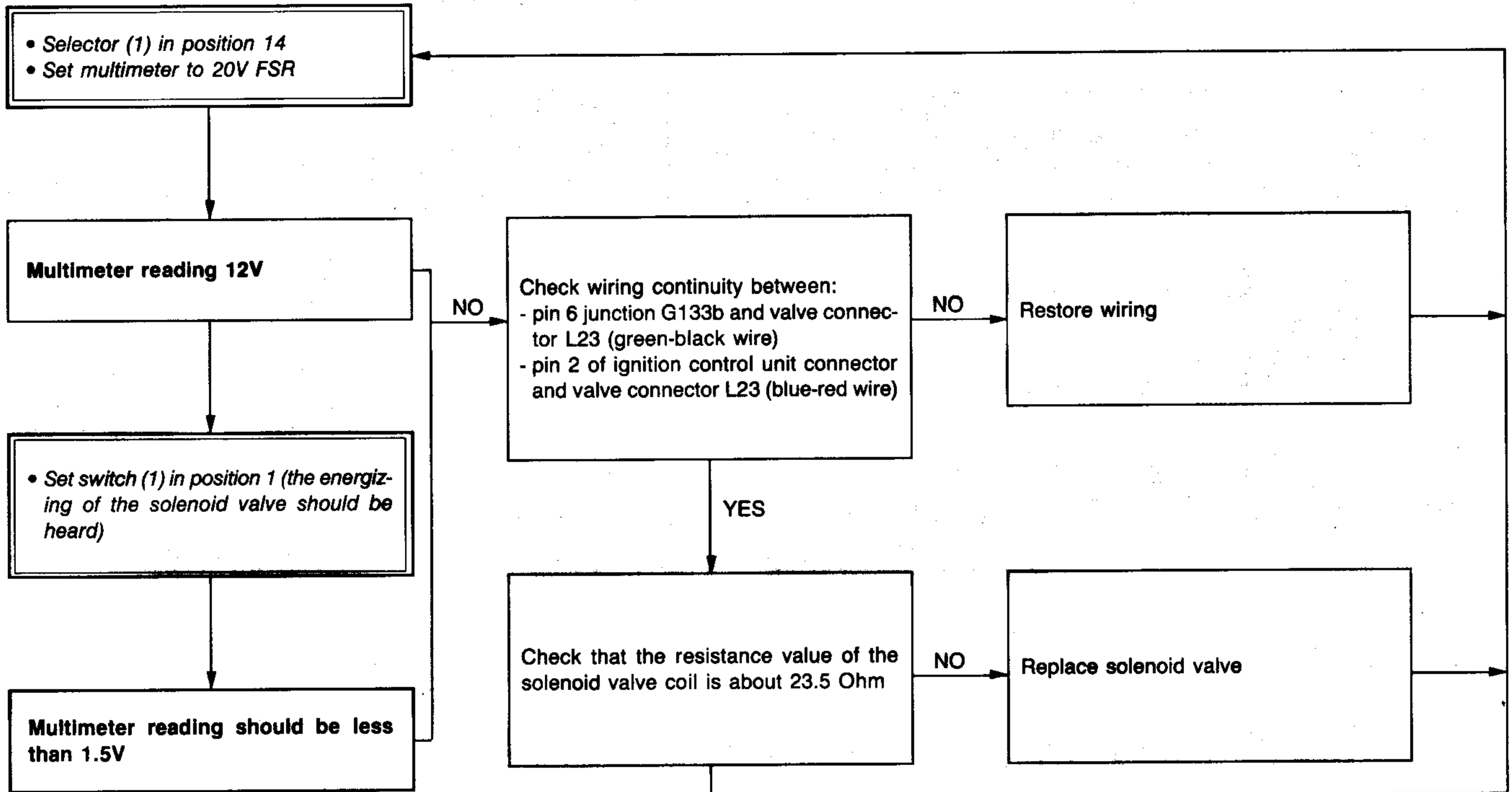
TEST No. 13 — THROTTLE POSITION SENDING UNIT TEST



NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

FUEL SYSTEM

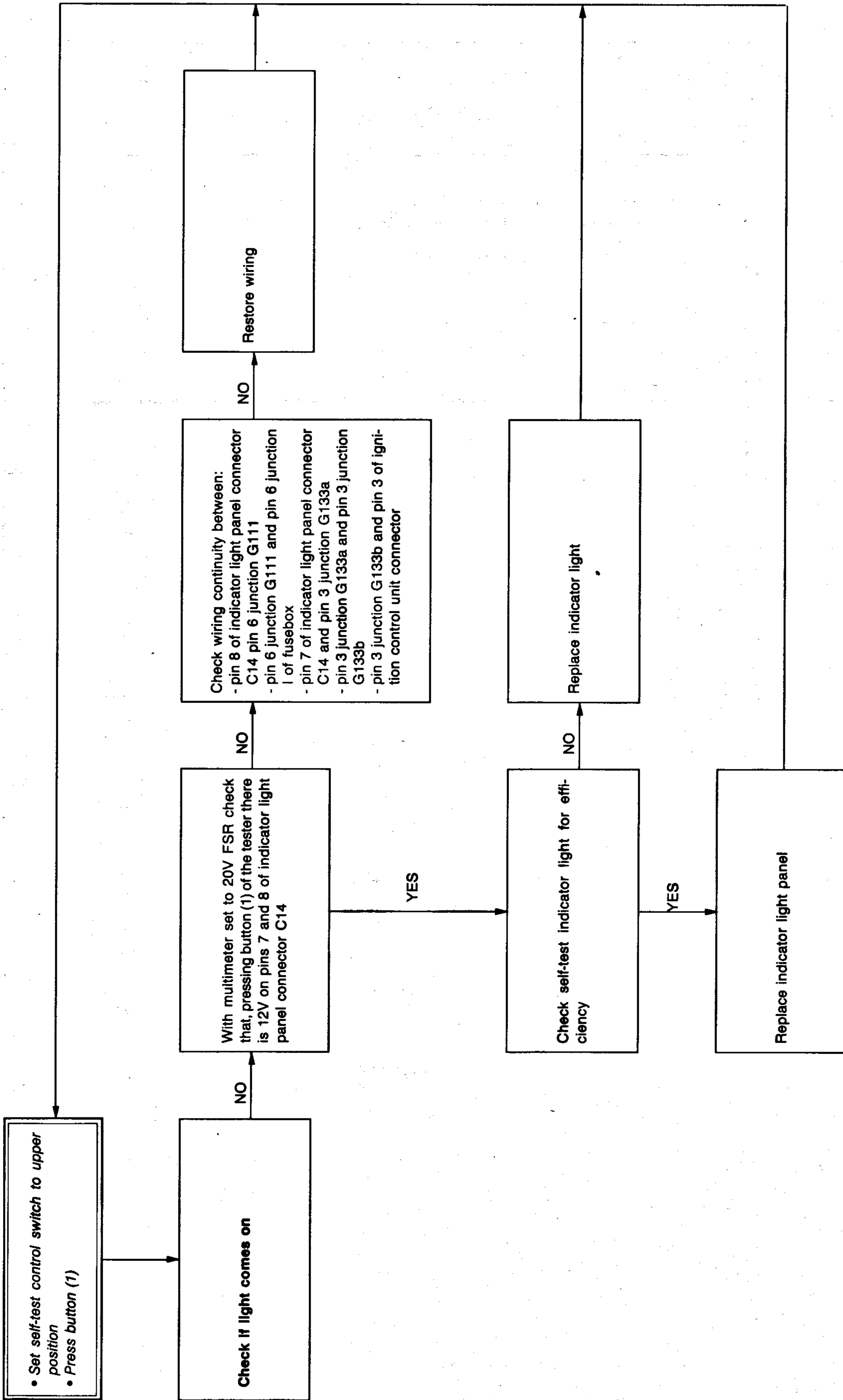
TEST No. 14 — ELECTRICAL TEST OF SUPERCHARGING PRESSURE REGULATION SOLENOID VALVE



NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

FUEL SYSTEM

TEST No. 15 — SELF-TEST EFFICIENCY TEST



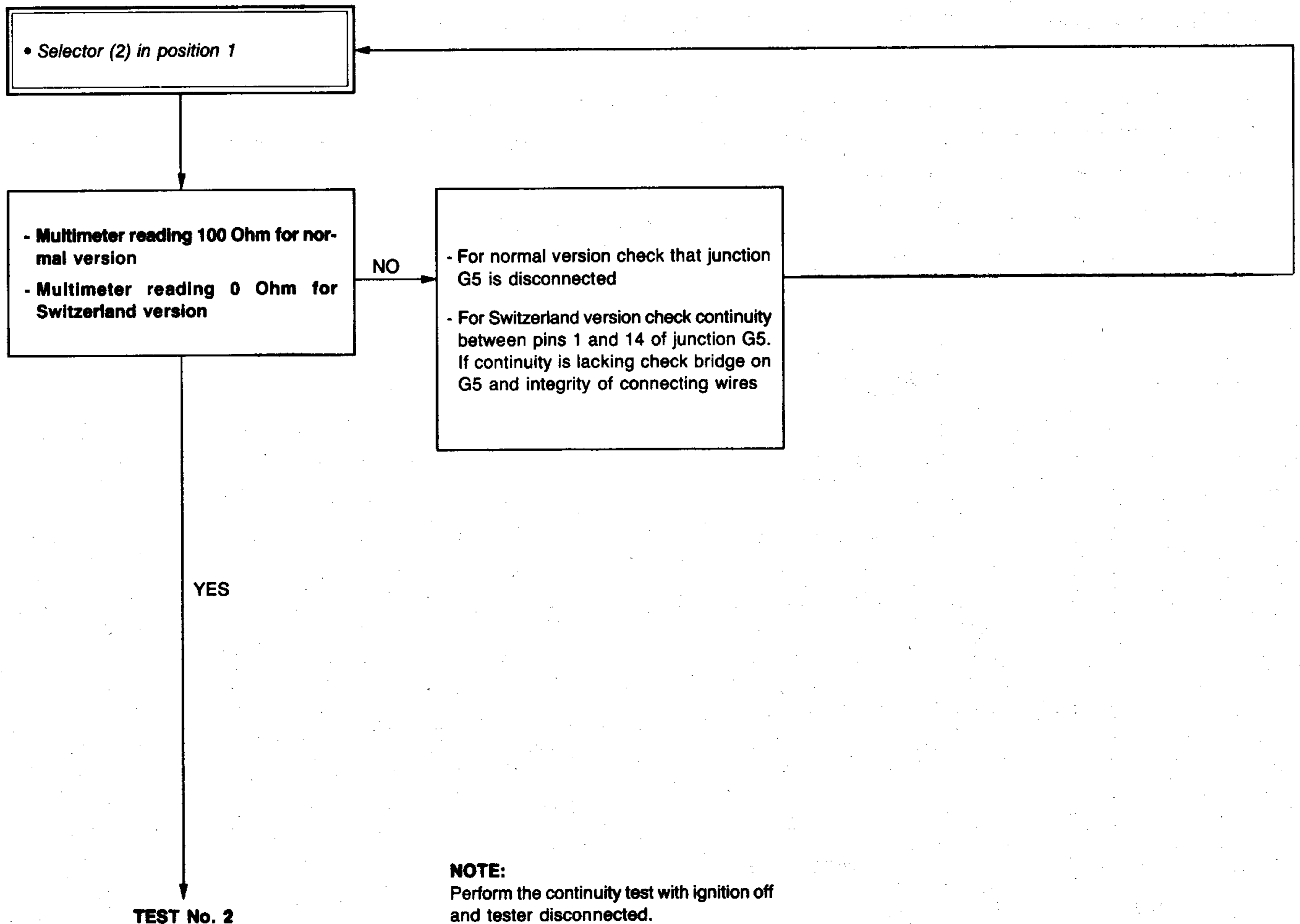
NOTE:
Perform the continuity check using a multimeter with an Ohm scale and with ignition off and tester disconnected.

FUEL SYSTEM

INSTRUCTIONS FOR OHM MEASUREMENTS

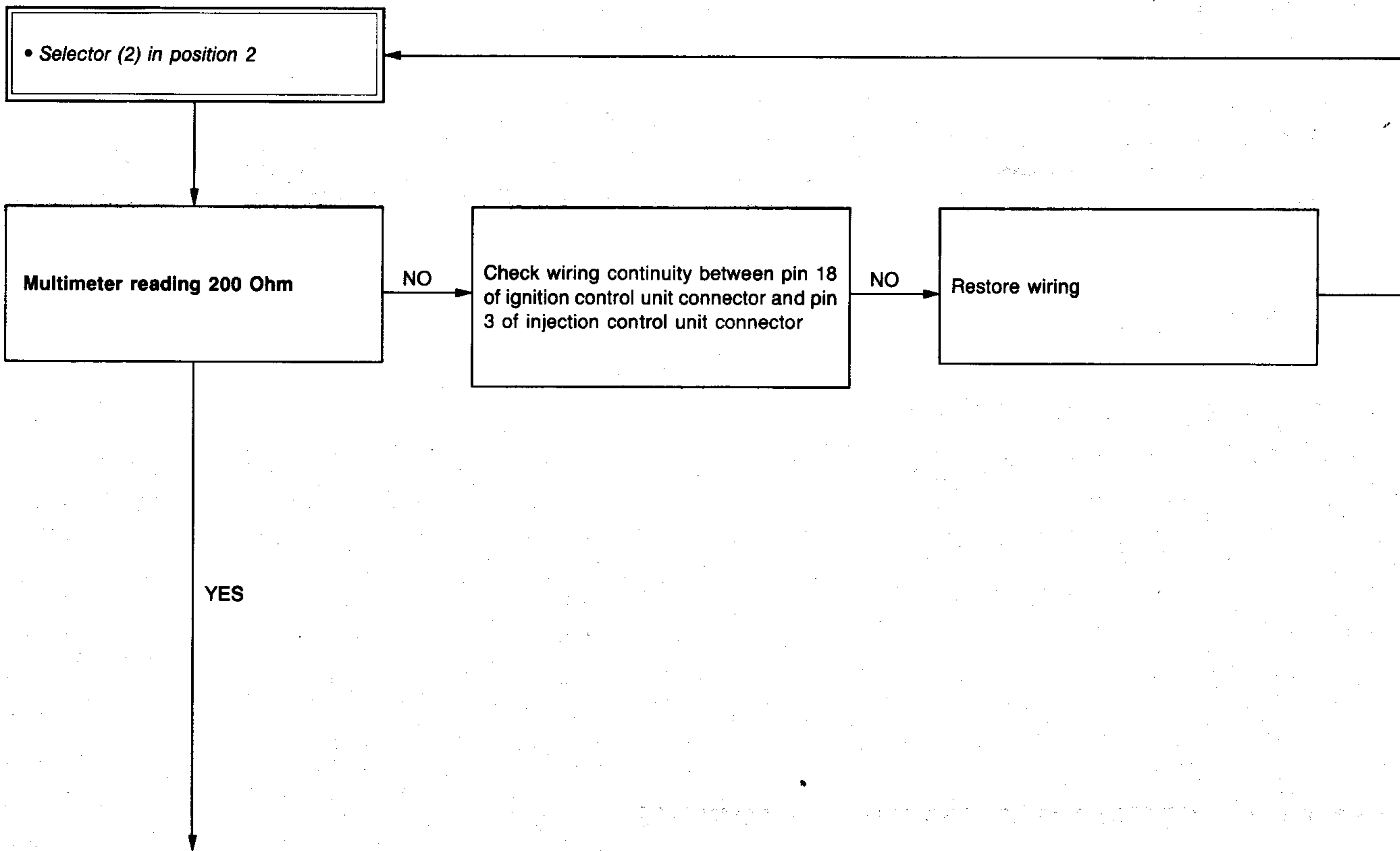
1. Set selectors (1) and (2) to position 1.
2. Set switch (1) to position 2.
3. Set switch (2) to position 1.
4. Apply a multimeter (2 kOhm FSR) to the «OHM» bushes of the tester.
5. Leave pump fuse disactivated.
6. Leave the auxiliary air valve connector disconnected.
7. Turn the ignition key to IGNITION ON position.

TEST No. 1 — SETTING TEST FOR VARIOUS MARKETS

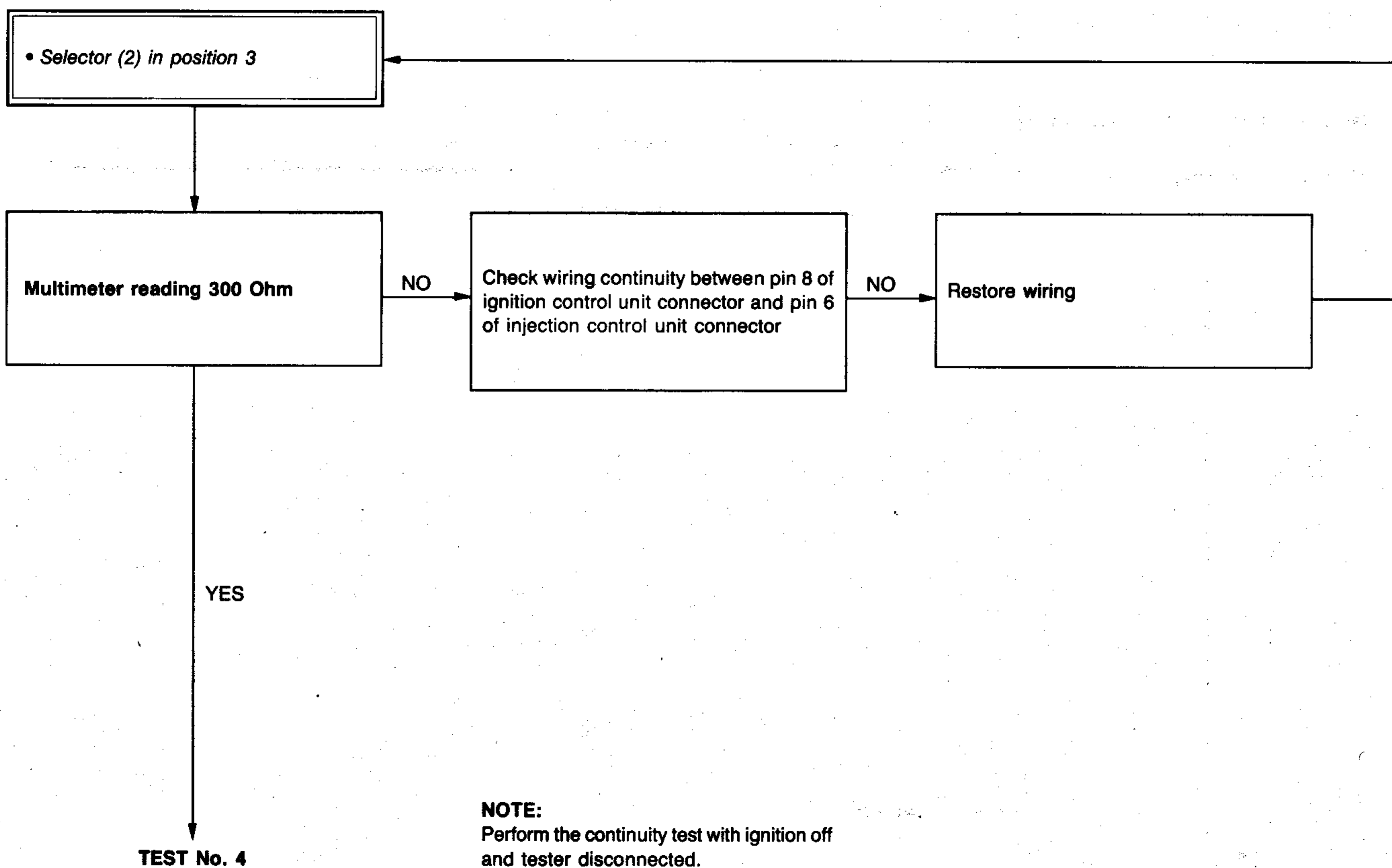


FUEL SYSTEM

TEST No. 2 — CHECK OF CONNECTION BETWEEN PIN 18 OF IGNITION CONTROL UNIT CONNECTION AND PIN 3 OF INJECTION CONTROL UNIT

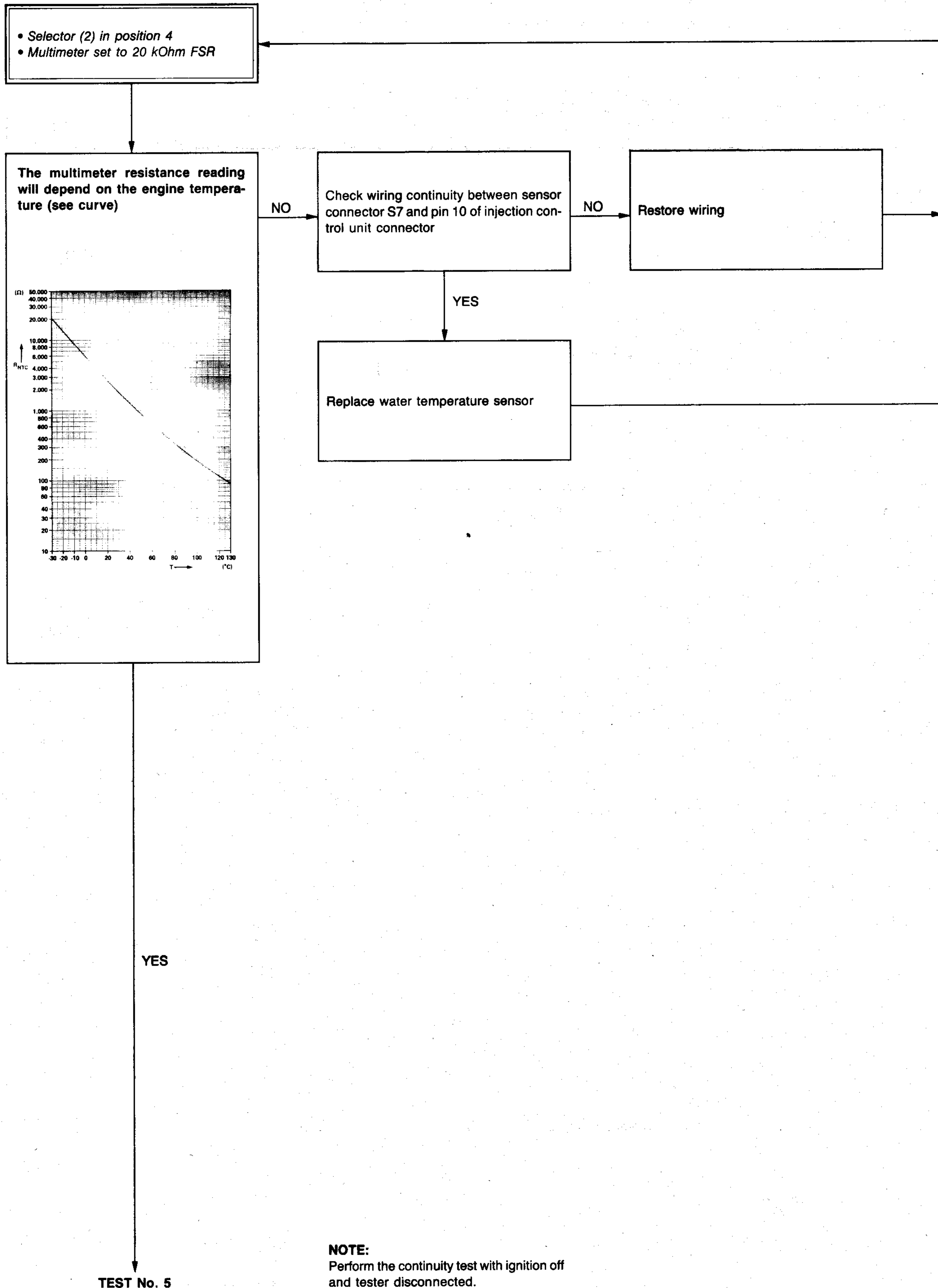


TEST No. 3 — CHECK OF CONNECTION BETWEEN PIN 8 OF IGNITION CONTROL UNIT CONNECTOR AND PIN 6 OF INJECTION CONTROL UNIT CONNECTOR



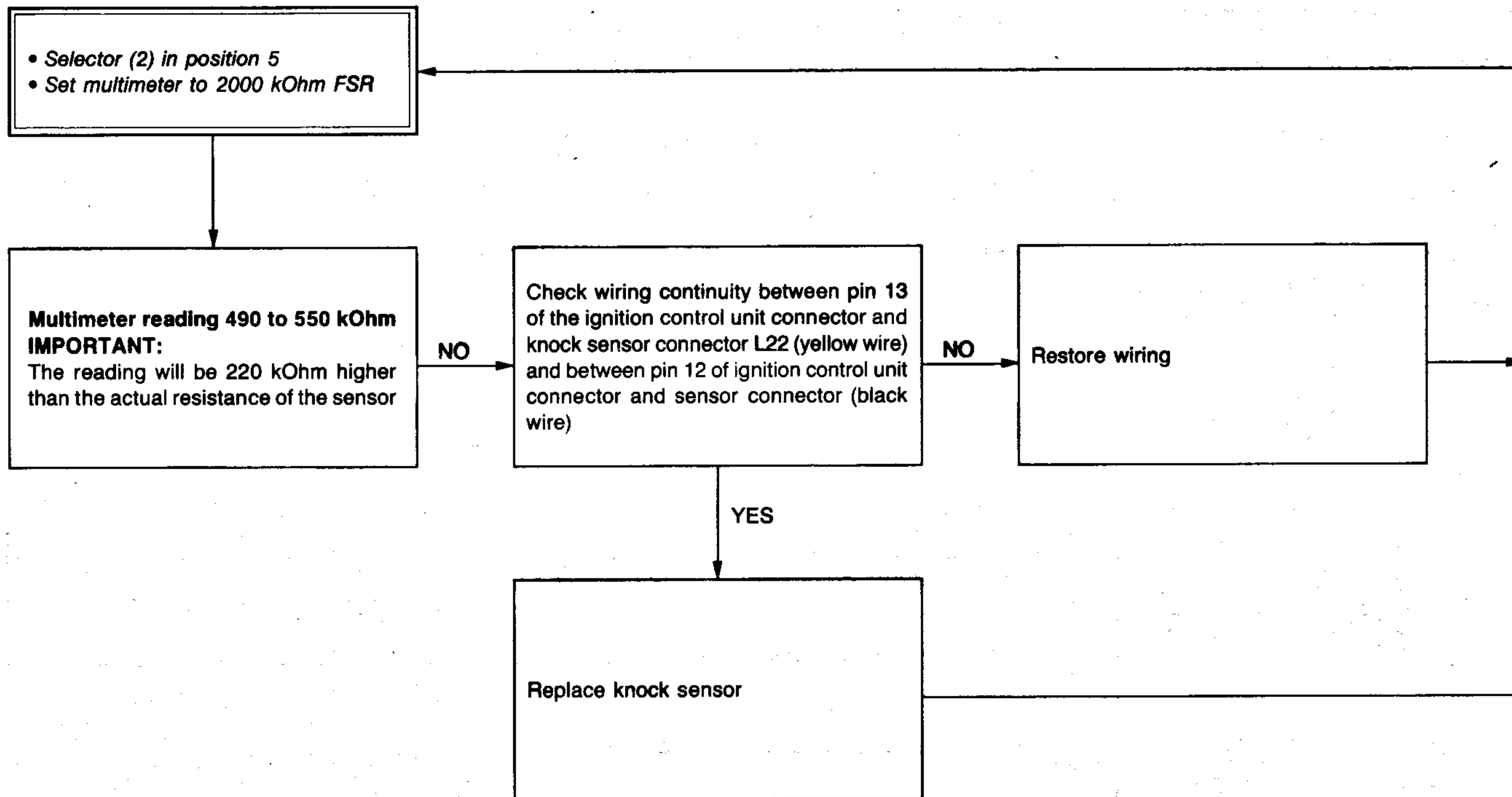
FUEL SYSTEM

TEST No. 4 — WATER TEMPERATURE SENSOR TEST




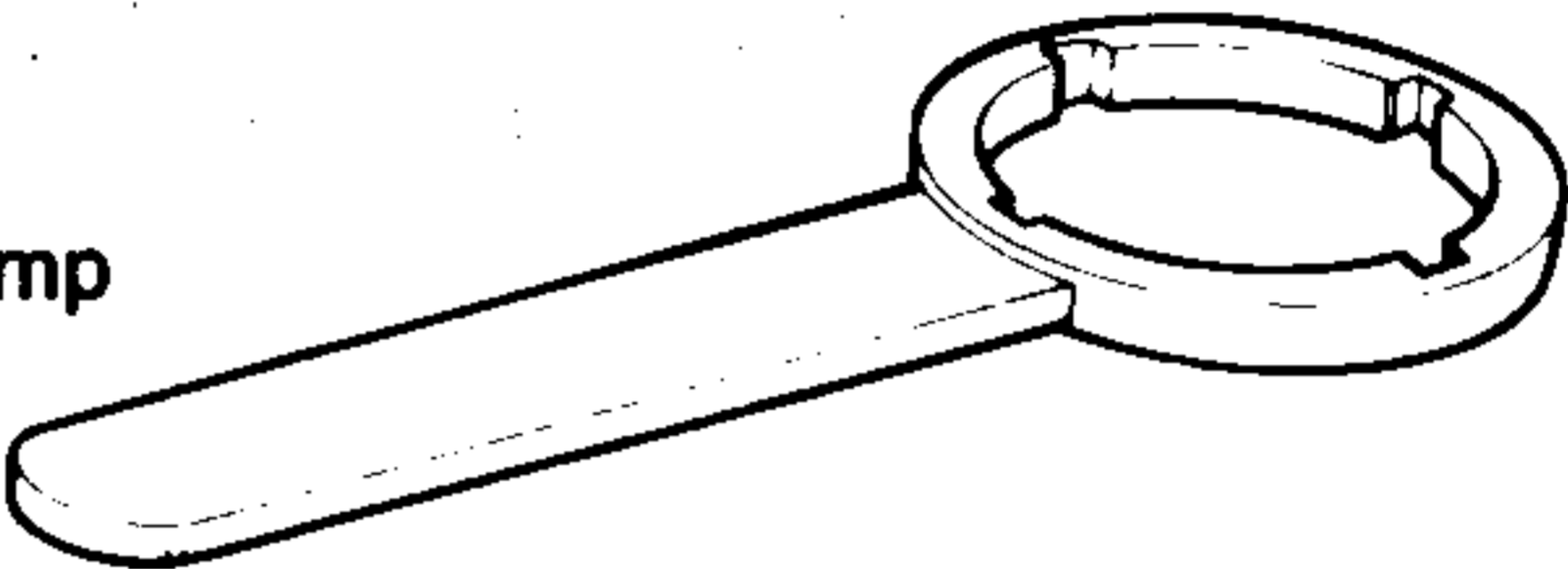
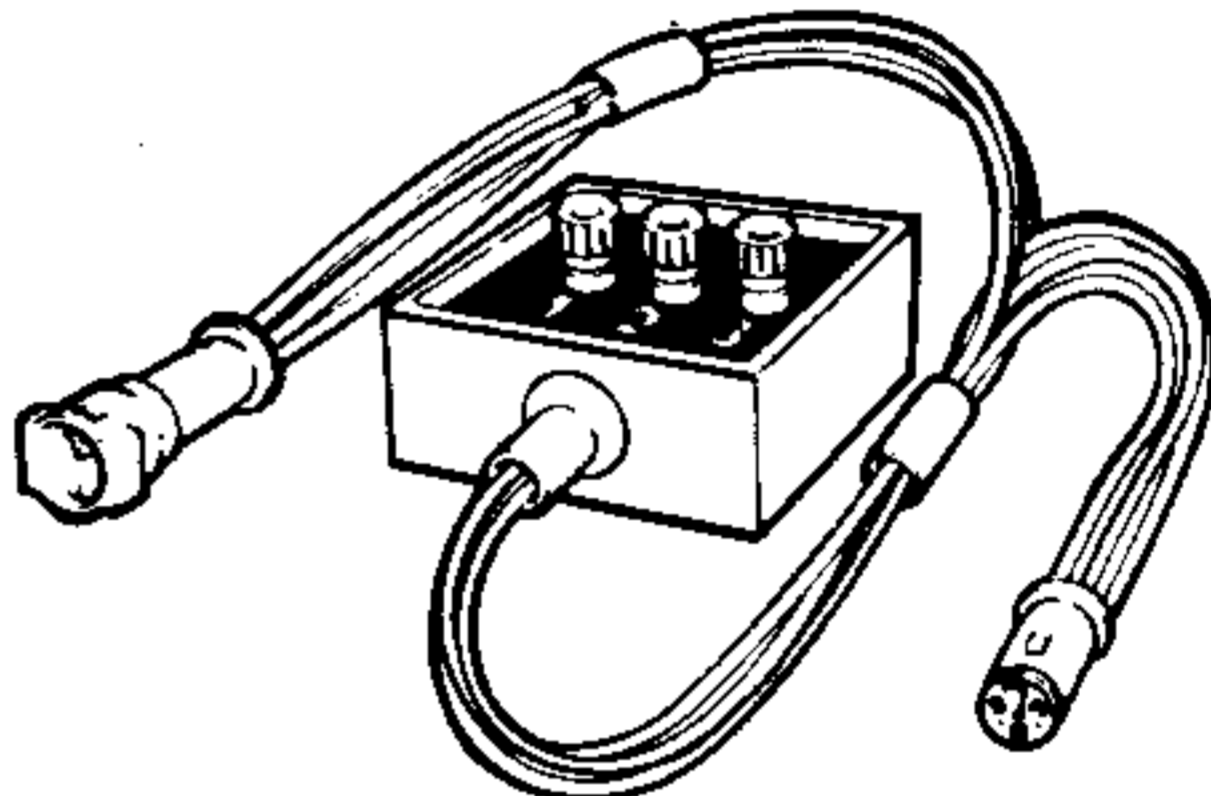
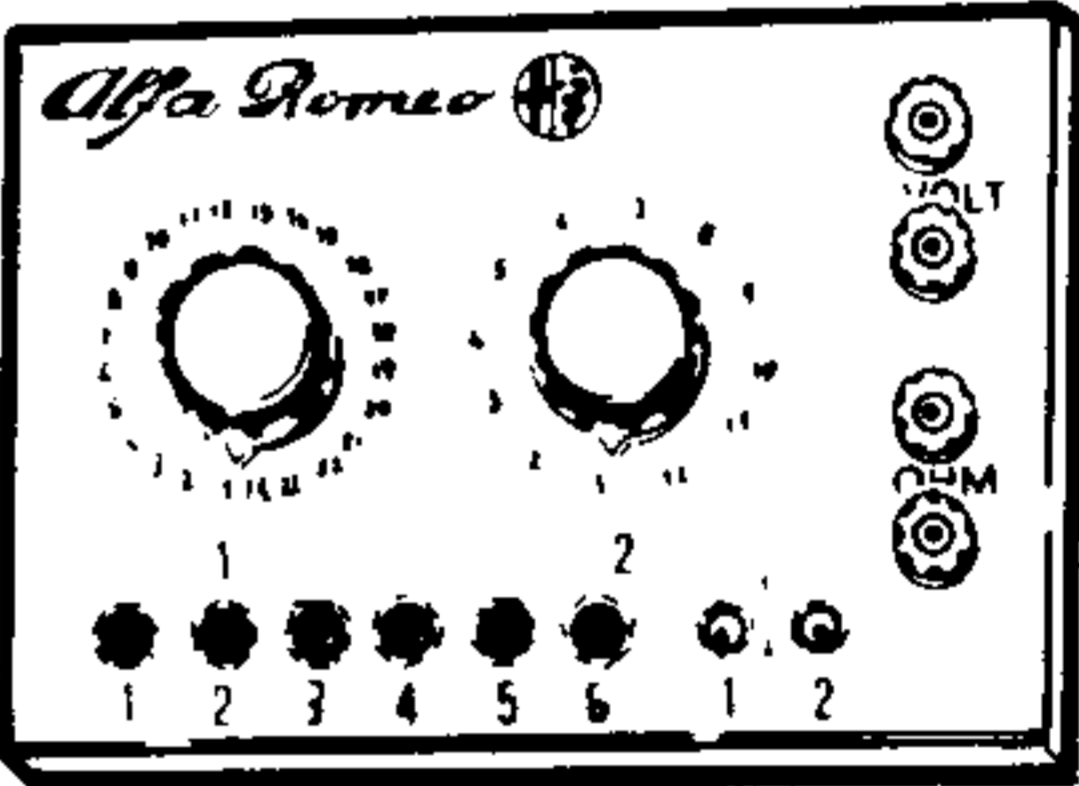
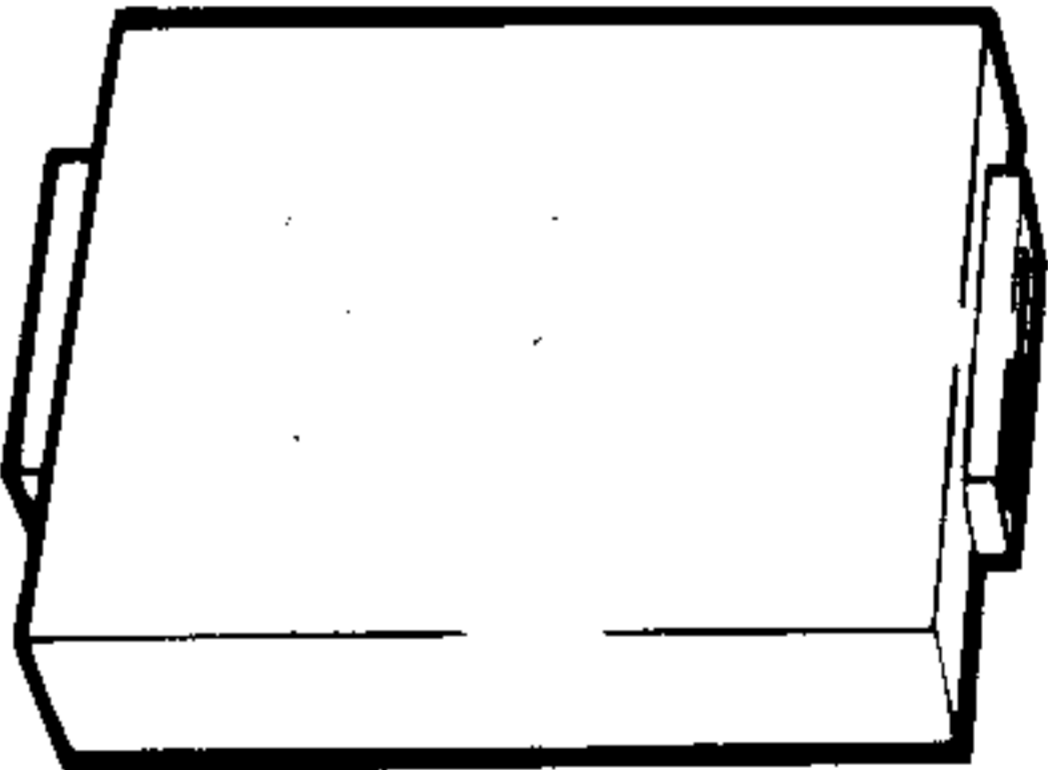
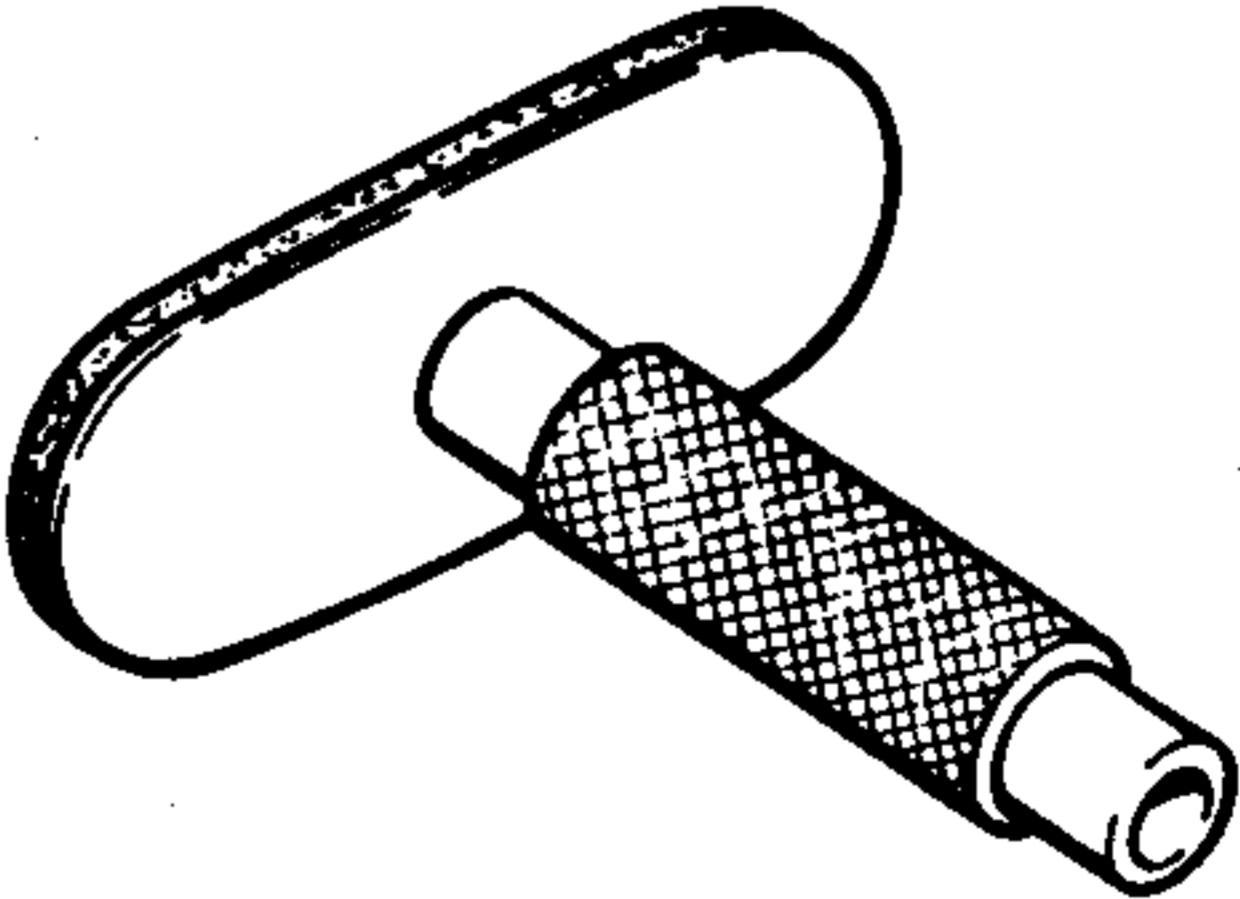
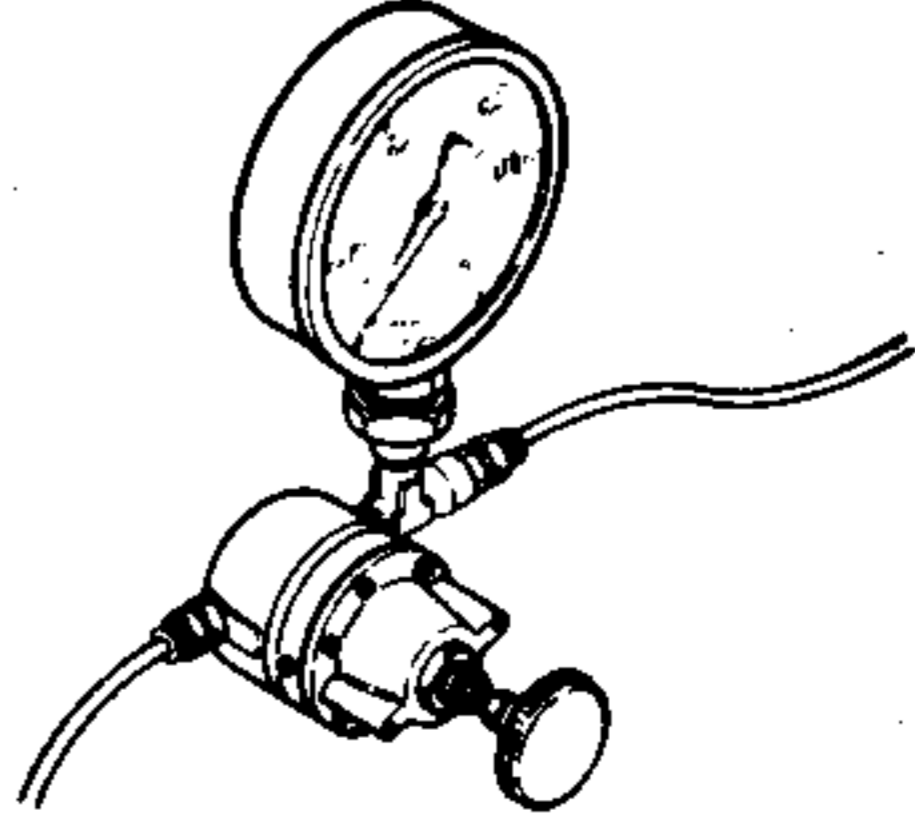
FUEL SYSTEM

TEST No. 5 — KNOCK SENSOR TEST

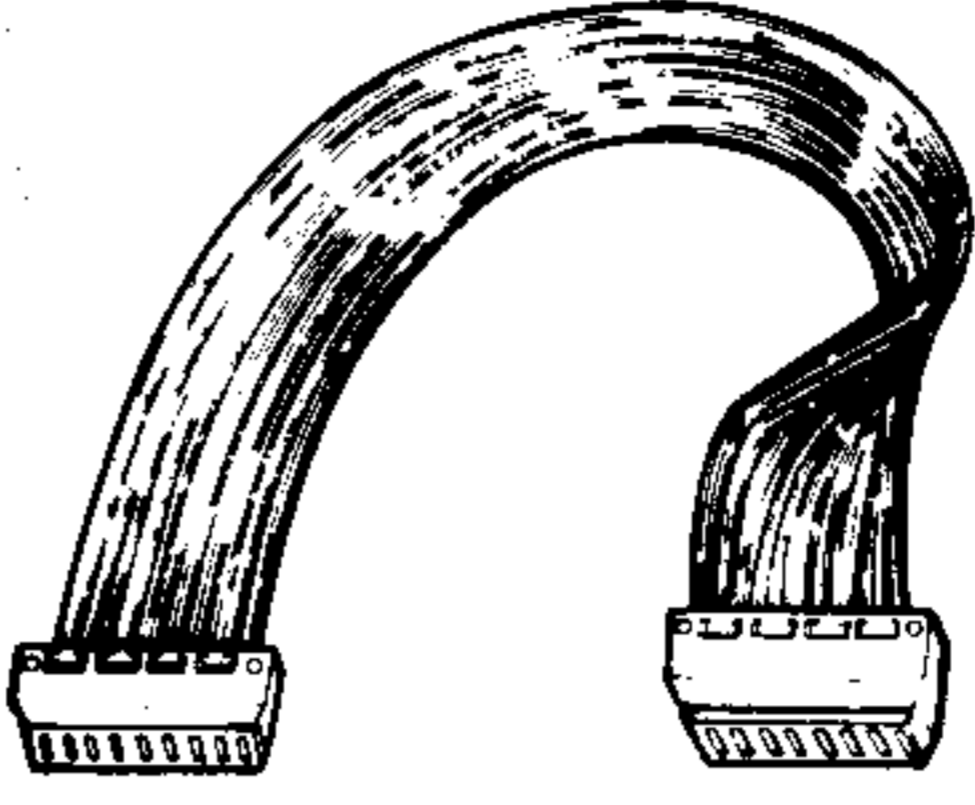


NOTE:
Perform the continuity test with ignition off
and tester disconnected.

SPECIAL TOOLS

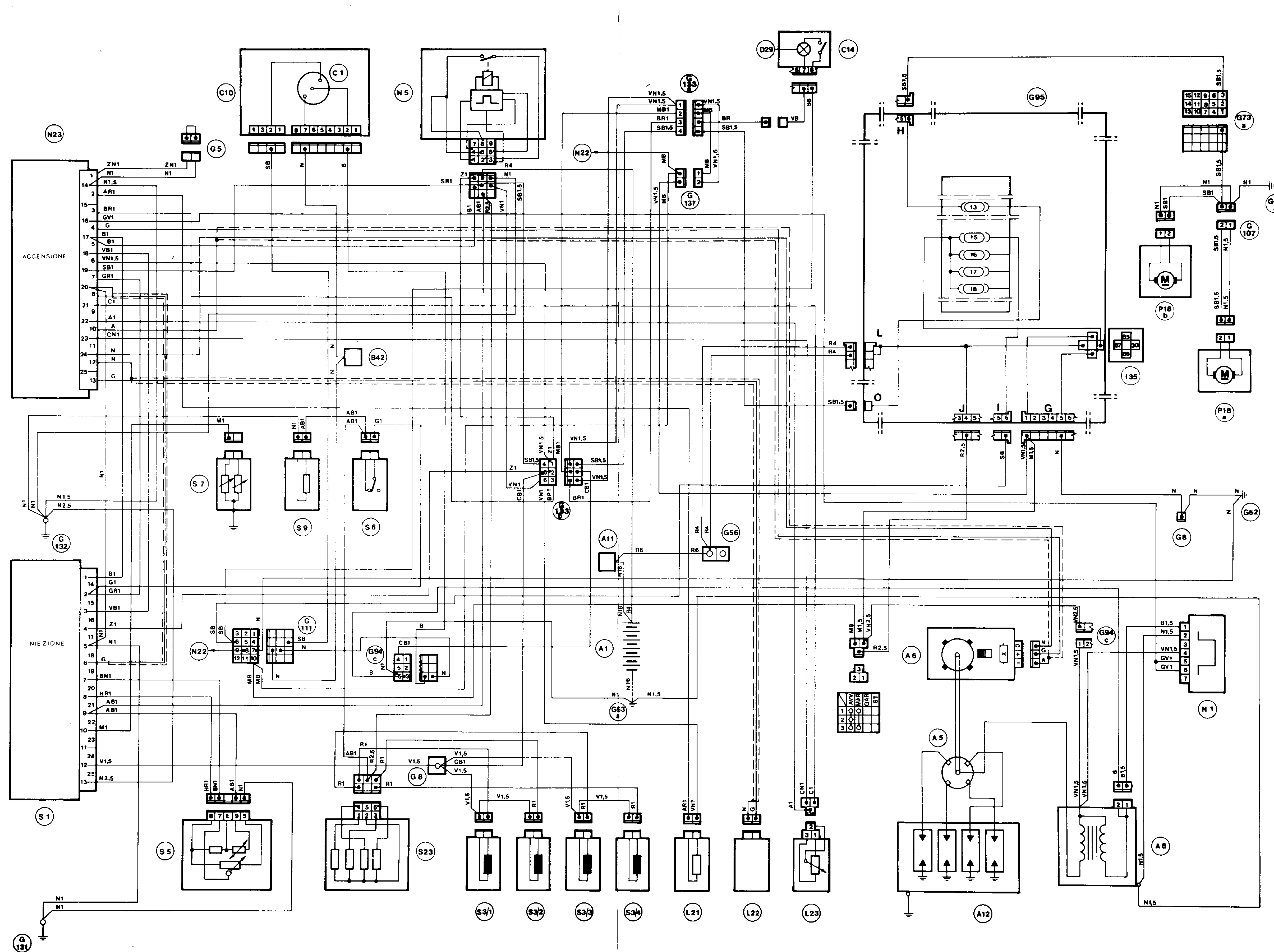
Code no.	Description	Page ref.
A.2.0444	Dial gauge securing tool 	04-70/24
A.5.0197	Spanner for lock nut securing auxiliary fuel pump 	04-70/17
C.1.0131	Device for setting throttle position sending unit 	04-70/22
C.1.0132	Multimeter 	04-70/35 04-70/41
C.1.0134	Interface 	04-70/22 04-70/35 04-70/41
C.2.0055	Tap for throttle body flowmeter 	04-70/21
C.2.0126	Pressure gauge 0 to 0.6 bar 	04-70/24

FUEL SYSTEM

Code no.	Description	Page ref.
C.9.0032	Cable connecting interface to multimeter 	04-70/35 04-70/41


INJECTION (LE2 JETRONIC) AND IGNITION (EZ 201K TURBO) WIRING DIAGRAM

- A1 Battery
- A5 Ignition distributor
- A6 Impulse generator
- A8 Ignition coil
- A11 Starter motor
- A12 Spark plugs
- B42 Lamp dimmer rheostat
- C1 Electronic rev-counter
- C10 Cluster
- C14 Warning lamp panel
- D29 Ignition diagnosis warning lamp
- G5 Multiple connector
- G8 Single connector
- G52 Fusebox ground
- G53a Engine compartment ground - right side
- G56 Branch terminal board
- G63a Rear right ground
- G73a Connector for right rear services
- G94c Engine compartment connector - right side
- G95 Central fusebox
- G107 Connector for fuel pump
- G111 Connector for dashboard instruments wiring
- G131 Ground on upper cover
- G132 Ground on manifold
- G133a Electronic injection-ignition wiring connection
- G133b Electronic injection-ignition wiring connection
- G137 (Electronic) supply-injection wiring connection
- I35 Key-operated supply relay
- L21 Solenoid valve regulating the supercharging pressure
- L22 Knocking sensor
- L23 Potentiometer
- N1 Electronic ignition module
- N5 Tachymetric switch device
- N22 ALFA ROMEO Control control unit
- N23 Ignition control unit
- P18a Fuel electric pump
- P18b Auxiliary fuel electric pump
- S1 Injection control unit
- S3/1 Electroinjector No. 1
- S3/2 Electroinjector No. 2
- S3/3 Electroinjector No. 3
- S3/4 Electroinjector No. 4
- S5 Air flow gauge
- S6 Throttle switch
- S7 Engine coolant temperature sensor
- S9 Auxiliary air valve
- S23 Electroinjector resistor



DESCRIPTION

6 cylinders Alfa 90 2.5  iniezione

6 cylinders Alfa 75 2.5  6V iniezione

6 cylinders GTV 6 2.5

GENERAL DESCRIPTION

The L-JETRONIC electronic system is composed of an indirect-intermittent fuel injection, fitted with a control unit.

Ignition occurs through an electronic injection system fitted with an electronic power module.

The parameters required to actuate the various controls are picked up by suitable sensors and changed into electric signals.

Parameters are as follows:

- battery voltage
- accelerator throttle position signal (fully open/closed)
- engine coolant temperature

- quantity of air sucked by engine
- starter operation signal
- engine rev number (from distributor).

The electronic control unit (ECU) collects the data and calculates the opening time of injectors, in relation to the instantaneous r.p.m. and load conditions of engine.

After calculating, the control unit provides to open the electroinjectors for the period required.

Since the difference between fuel pressure and air pressure in the manifold is kept

constant by a regulator, the amount of fuel injected is proportional to the period of delivery time.

In addition, the injection control unit is capable of executing, each time, the most suitable operations according to engine requirements (i.e., cold start electroinjector fuel delivery cut off during deceleration).

L-JETRONIC INJECTION SYSTEM

The system, composed of an air supply system and a fuel supply system, includes:

- a main pump and an auxiliary pump (Alfa 90 and Alfa 75 only) submerged in the tank, with relative filters for fuel delivery;
- **Alfa 90** and **Alfa 75** : a dashpot, provided to eliminate pulsation due to pressure surging;
- one pressure regulator; it keeps the pressure between fuel system and intake manifold constant;
- six electroinjectors which, tanks to regulator, provide to inject a fuel amount in relation to their opening period;
- one electroinjector for cold starting, it

injects a very fine spray of fuel, controlled by a timed thermal switch;

- one air flow gauge; it measure the quantity of air sucked by engine (regulated in relation to air temperature), fitted with an idle r.p.m. CO regulator;
- one auxiliary air solenoid valve; it supplies auxiliary air when engine is cold;
- one device for the idle r.p.m. adjustment;
- one switch on the accelerator throttle which senses the two position of throttle (i.e. fully open/closed);
- one sensor for the engine coolant temperature;
- one sensor for rotation speed;

- piping and wiring; this last including control relays and control unit.
- (For Switzerland, Sweden and Australia versions only) a vacuum regulating valve which is activated when the accelerator is released if there is a greater vacuum than prescribed in the suction tank.

IGNITION SYSTEM

This system is composed of:

- one electronic power module integrated with the coil for the generation of the high voltage discharge

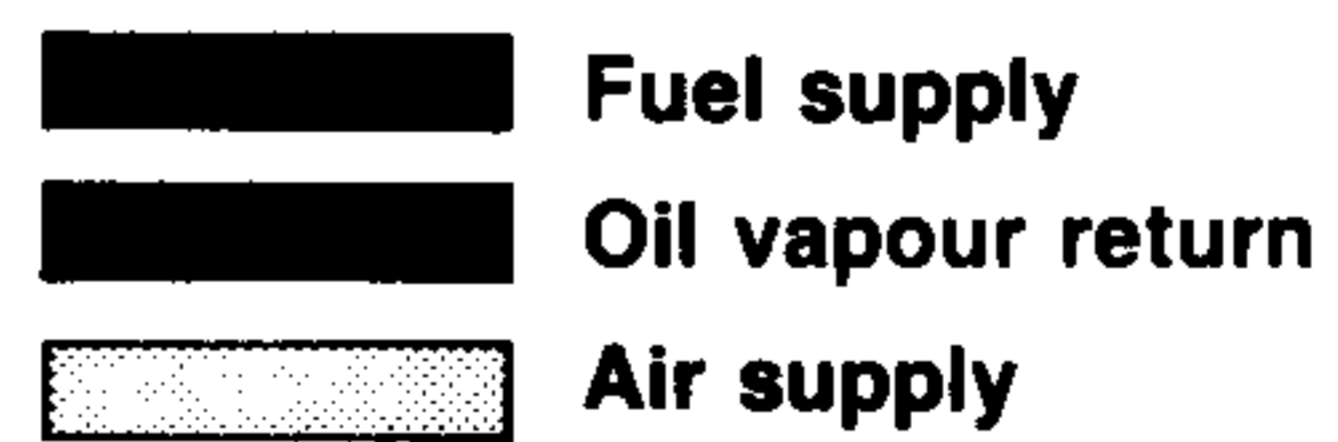
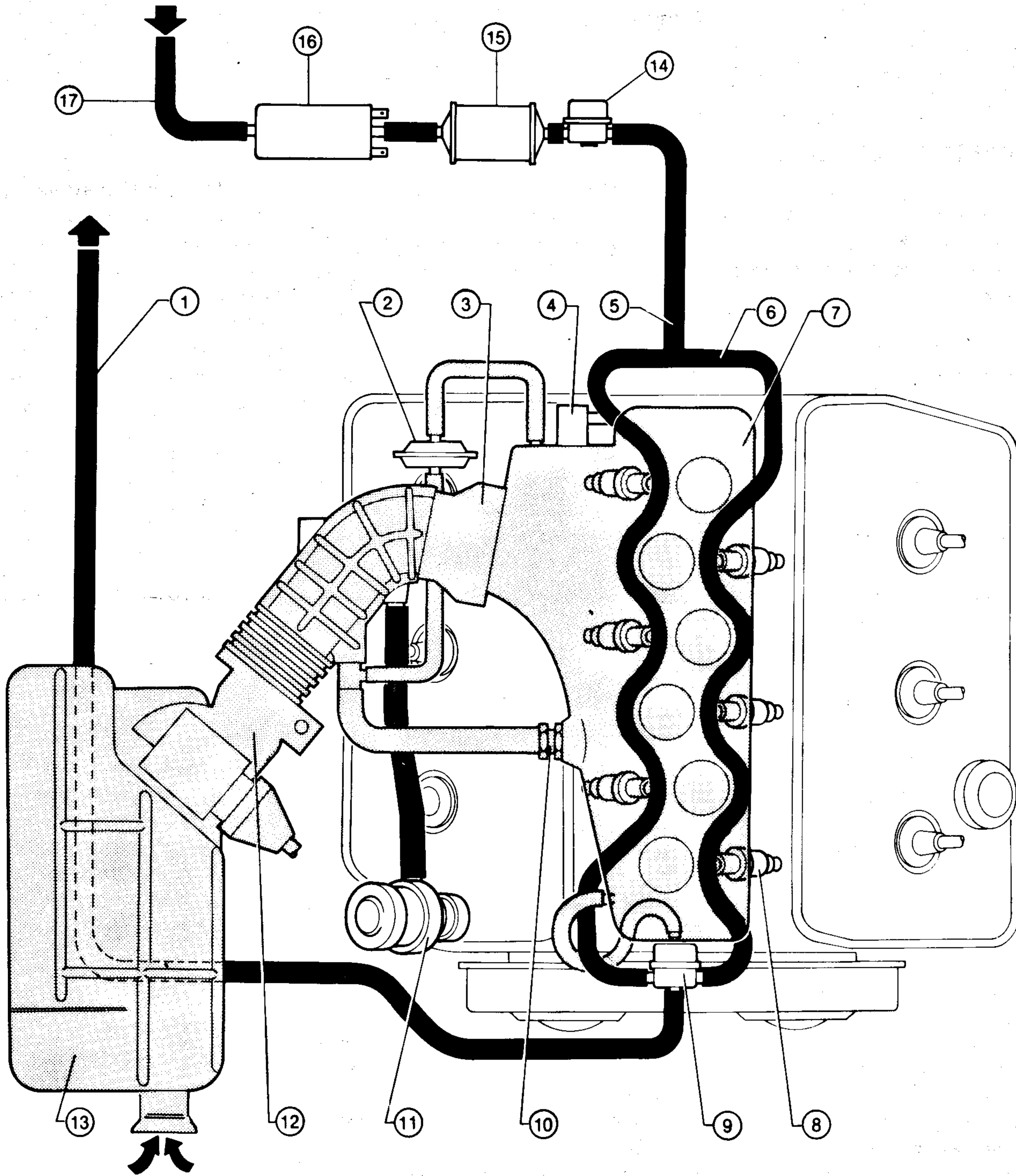
- one high voltage distributor which sends current to spark plugs

- six ignition spark plugs
- high/low voltage wiring

FUEL SYSTEM

L-JETRONIC FUEL SUPPLY DIAGRAM

(Except Switzerland, Sweden, Australia)



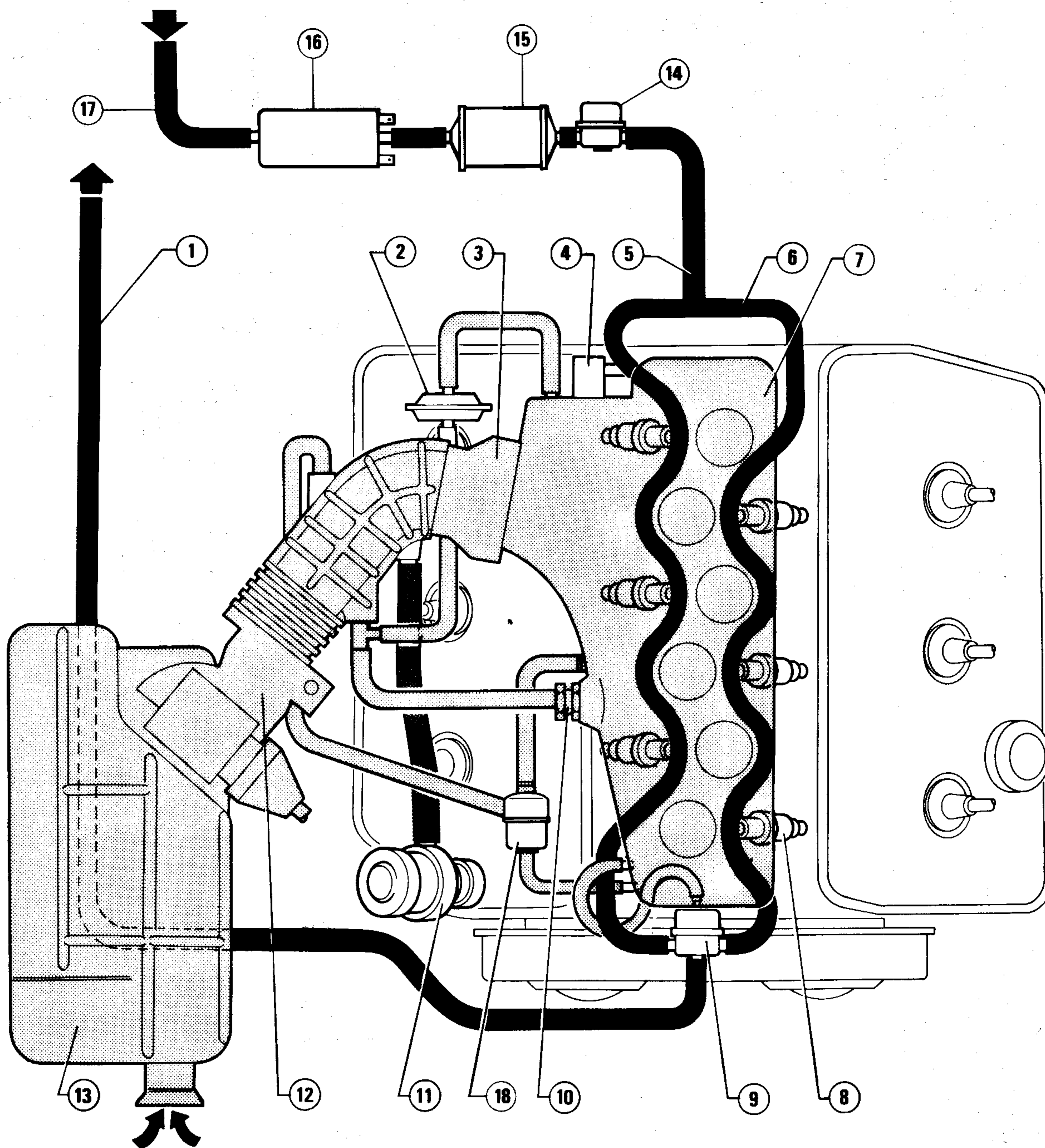
- 1. Fuel return piping
- 2. Auxiliary air solenoid valve
- 3. Throttle body
- 4. Cold starting electroinjector
- 5. Fuel delivery piping
- 6. Fuel system manifold

- 7. Intake air box
- 8. Electroinjector
- 9. Pressure regulator
- 10. Idle r.p.m. adjusting device
- 11. Oil vapour sedimenter
- 12. Air flow gauge

- 13. Air filter
- 14. Dashpot
(Alfa 90 and Alfa 75)
- 15. Fuel filter
- 16. Fuel pump
- 17. Fuel delivery line

L-JETRONIC FUEL SUPPLY DIAGRAM

(For Switzerland, Sweden, Australia)



Fuel supply
 Oil vapour return
 Air supply

- 1. Fuel return piping
- 2. Auxiliary air solenoid valve
- 3. Throttle body
- 4. Cold starting electroinjector
- 5. Fuel delivery piping
- 6. Fuel system manifold

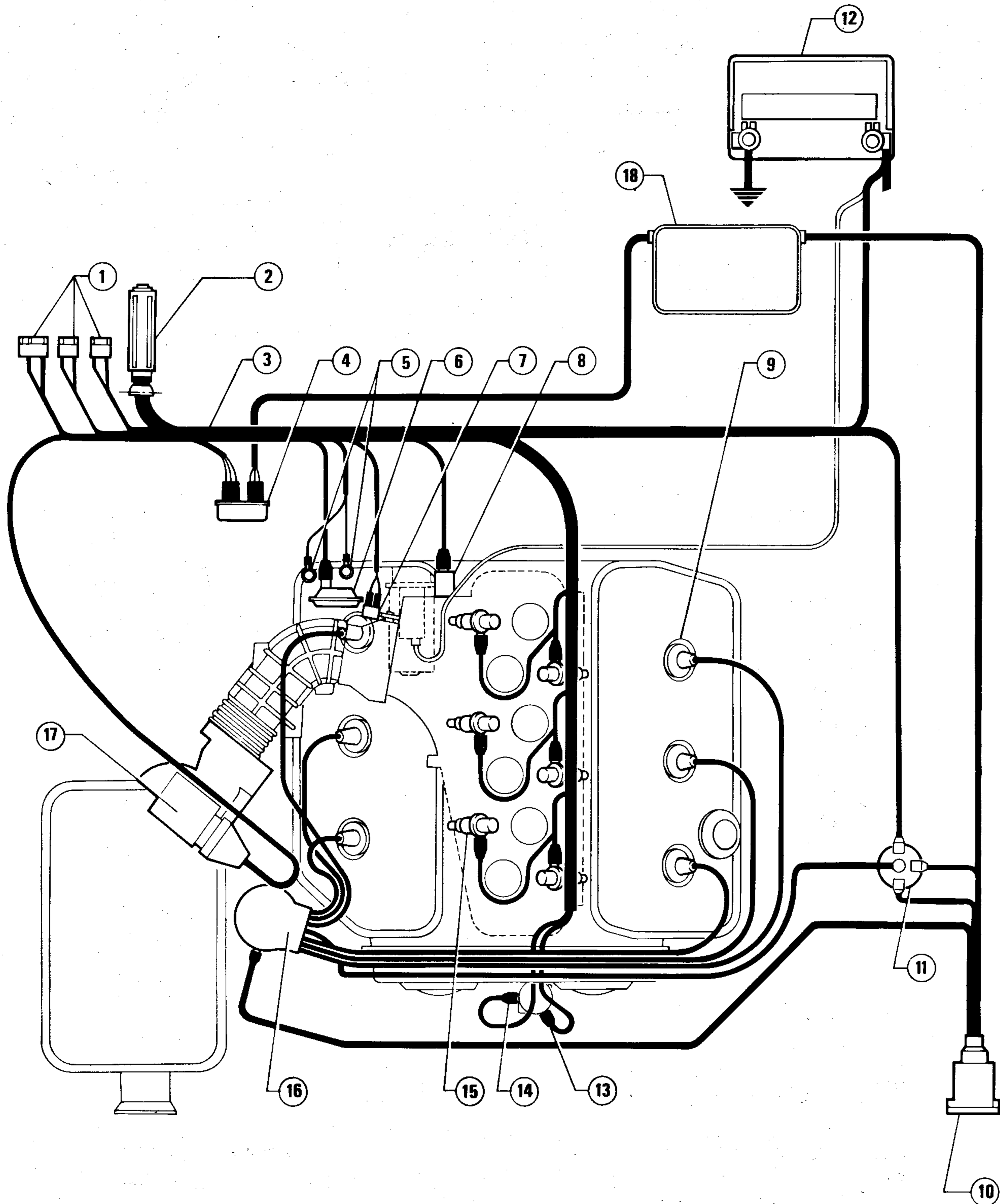
- 7. Intake air box
- 8. Electroinjector
- 9. Pressure regulator
- 10. Idle r.p.m. adjusting device
- 11. Oil vapour sedimenter
- 12. Air flow gauge

- 13. Air filter
- 14. Dashpot (Alfa 90 and Alfa 75)
- 15. Fuel filter
- 16. Fuel pump
- 17. Fuel delivery line
- 18. Vacuum regulating valve

FUEL SYSTEM

WIRING AND MAIN COMPONENTS OF L-JETRONIC SYSTEM

GTV 6 2.5



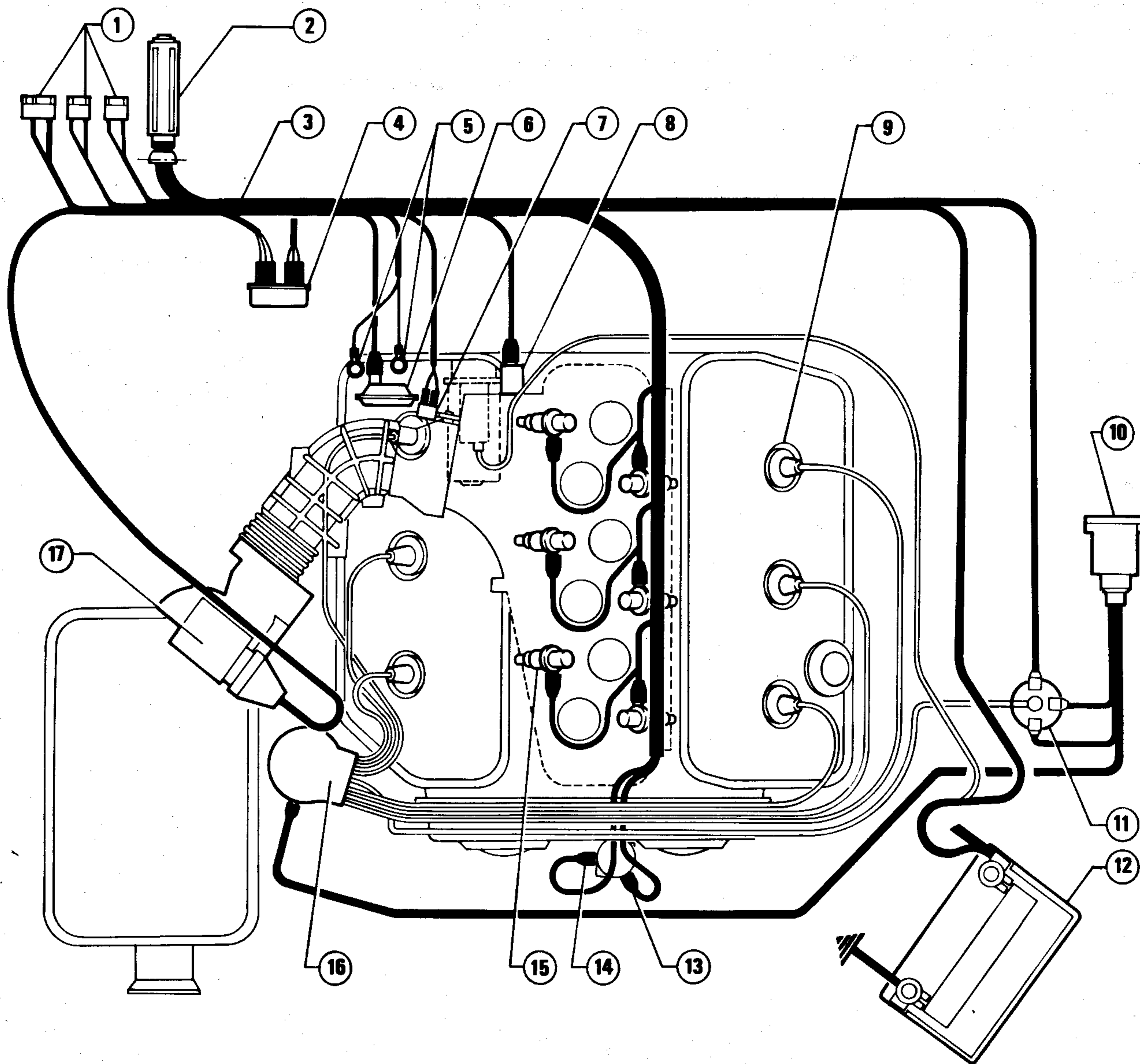
1. Vehicle wiring connectors
2. Electronic control unit
3. L-Jetronic wiring
4. Double relay
5. Ground terminals (common)
6. Auxiliary air solenoid valve

7. Accelerator throttle switch
8. Cold starting electroinjector
9. Spark plug
10. Electronic power module
11. Ignition coil
12. Battery

13. Engine coolant temperature sensor
14. Thermo-time switch
15. Electroinjector
16. Ignition distributor
17. Air flow gauge
18. Fusebox

WIRING AND MAIN COMPONENTS OF L-JETRONIC SYSTEM

Alfa 90 Alfa 75



- 1. Vehicle wiring connectors
- 2. Electronic control unit
- 3. L-Jetronic wiring
- 4. Double relay
- 5. Ground terminals (common)
- 6. Auxiliary air solenoid valve

- 7. Accelerator throttle switch
- 8. Cold starting electroinjector
- 9. Spark plug
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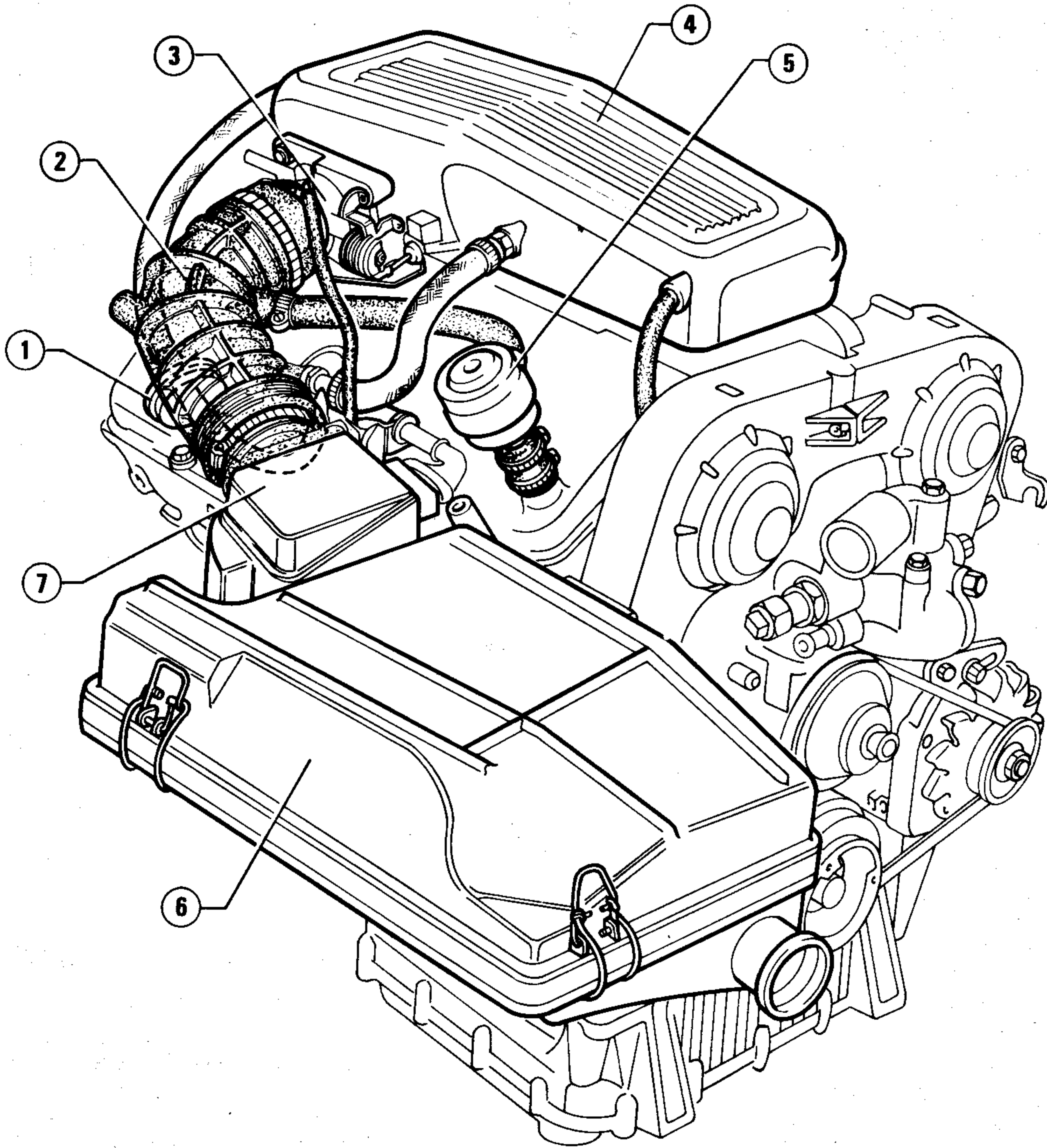
- 13. Engine coolant temperature sensor
- 14. Thermo-time switch
- 15. Electroinjector
- 16. Ignition distributor
- 17. Air flow gauge

FUEL SYSTEM

IMPORTANT GENERAL INFORMATION

- Never start the engine when battery cables are connected incorrectly.
- Never use fast charging to start the engine.
- Never detach battery from the vehicle electronic system when engine is running.
- Never perform battery fast charging.
- Remove the electronic control unit if vehicle is to be furnace-painted at temperatures higher than 80 °C (176°F).
- Verify that the shielded wire connectors are correctly secured.
- Never attach/detach connector to/from the electronic control unit leads with ignition on.
- Never ground the high/low voltage cables for test purposes.
- In the event of installation of ancillary equipment on vehicle, always disconnect the electronic control unit in order to carry out functional test of ancillary equipment itself with ECU disconnected. Never by to connect other devices to ECU wiring.

AIR SUPPLY SYSTEM

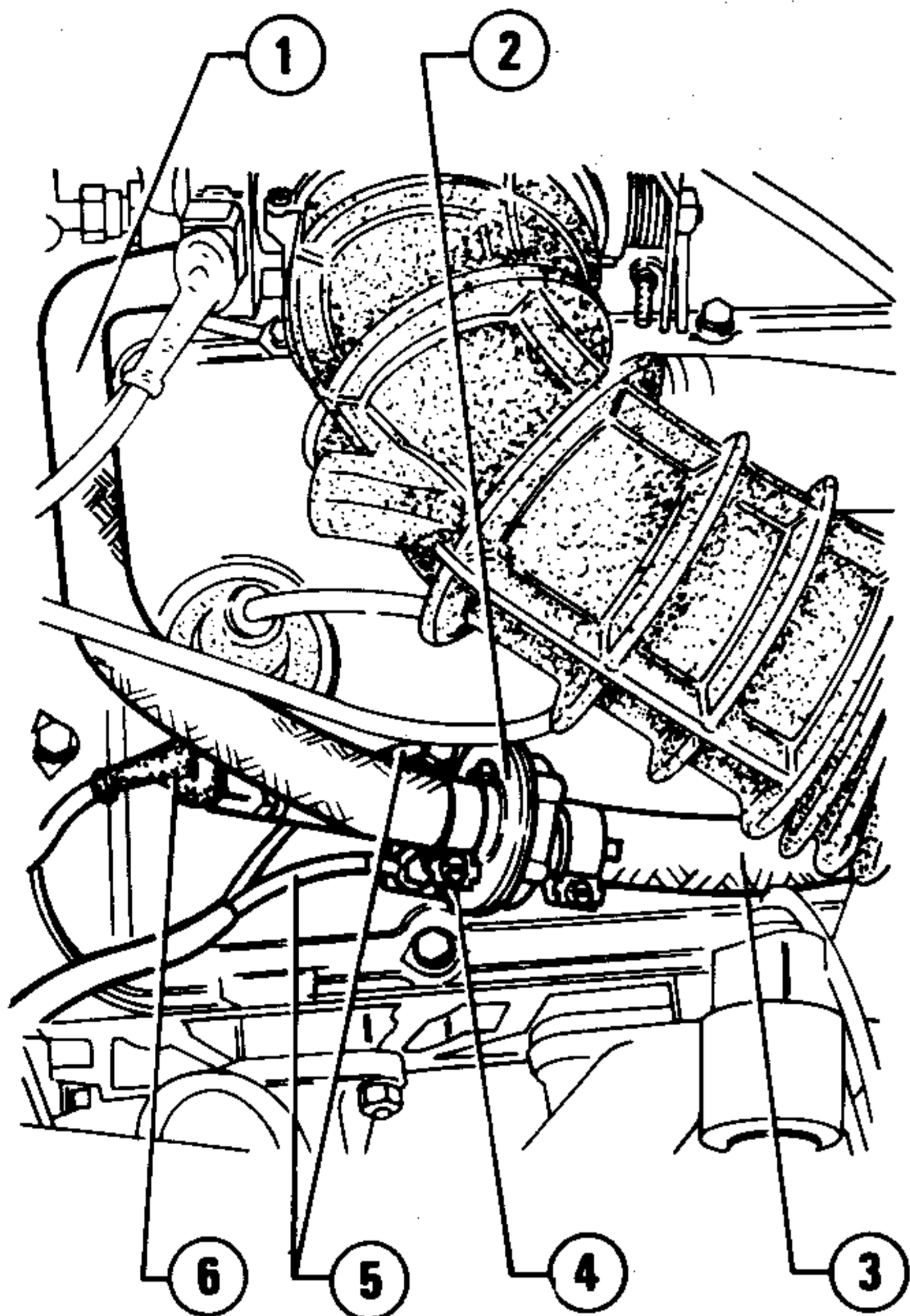


- 1 Auxiliary air solenoid valve
- 2 Corrugated sleeve
- 3 Throttle body
- 4 Intake air box
- 5 Oil vapour sedimenter
- 6 Air filter
- 7 Air flow gauge

FUEL SYSTEM

REPLACEMENT

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



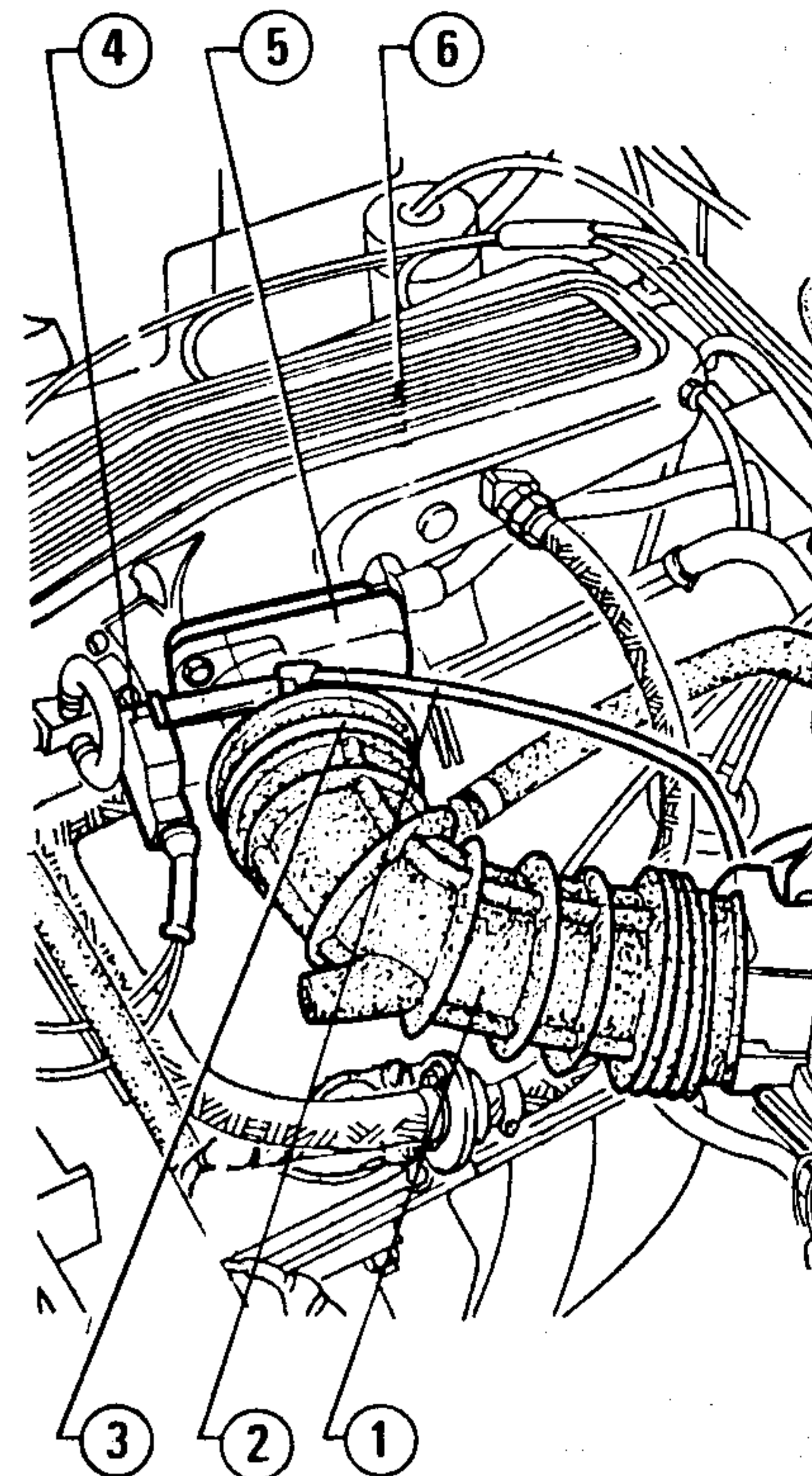
- 1 Air outlet hose
- 2 Auxiliary air solenoid valve
- 3 Air inlet hose
- 4 Screw securing solenoid valve to timing system cover
- 5 Ground cables
- 6 Solenoid valve control cable connector

4. Position the new solenoid valve on the timing system cover and secure it to tappets cover, together with the ground cables of the L-JETRONIC injection system, using **new** washers. Reconnect both inlet and outlet air hoses to valve.

THROTTLE BODY

REMOVAL

1. Detach accelerator control cable from lever on throttle body and release sheath from bracket.
2. Detach hose (2) and sleeve (1) from throttle body (5).
3. Detach connector from switch (4).
4. Unscrew the nuts which secure throttle body (5) to air intake box (6), and remove throttle body and the related gasket.
5. If required, remove switch and the accelerator cable securing bracket from throttle body.



- 1 Corrugated sleeve
- 2 Vacuum intake hose for ignition advance pneumatic regulator
- 3 Clamp
- 4 Accelerator throttle switch
- 5 Throttle body
- 6 Intake air box

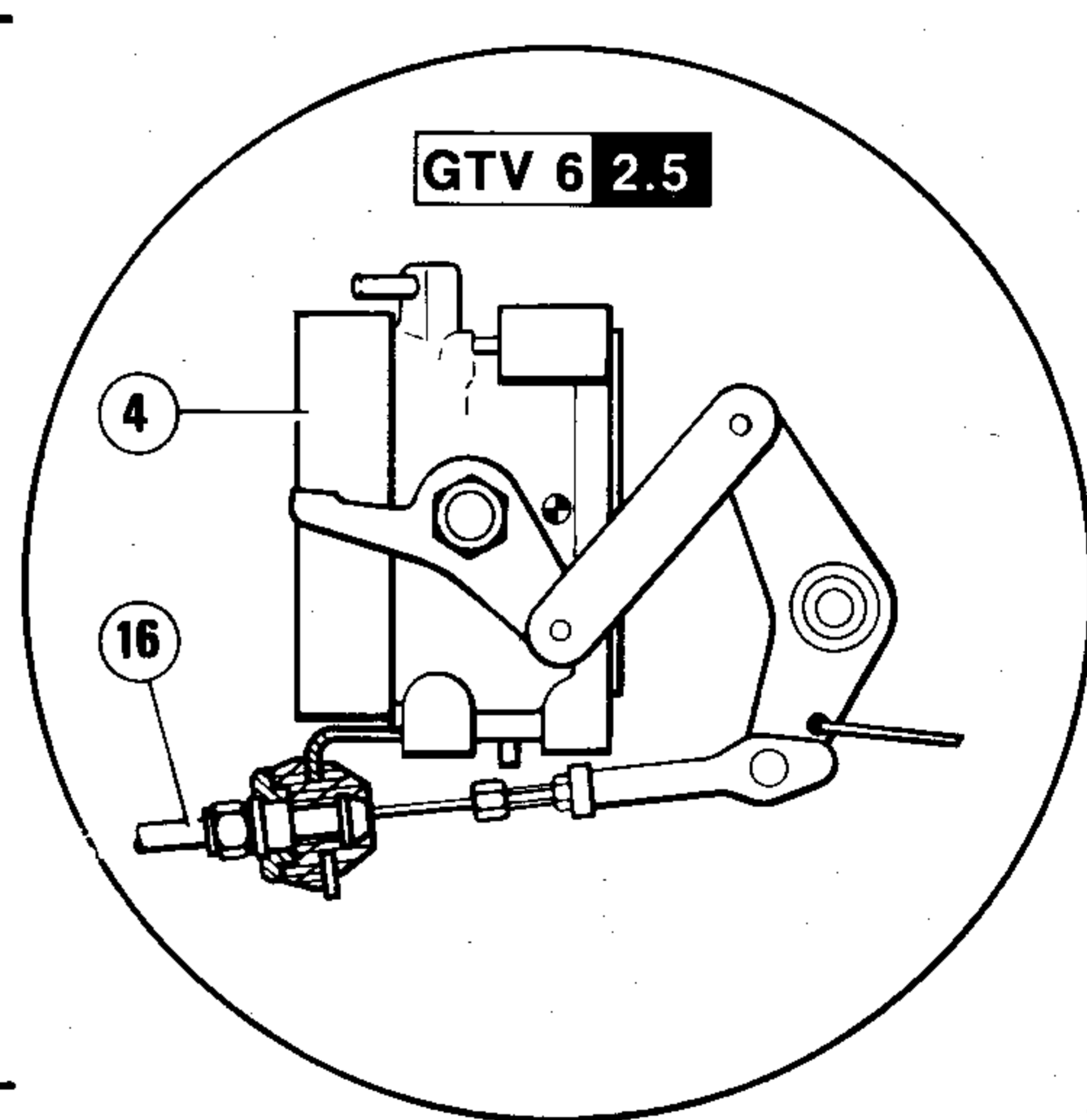
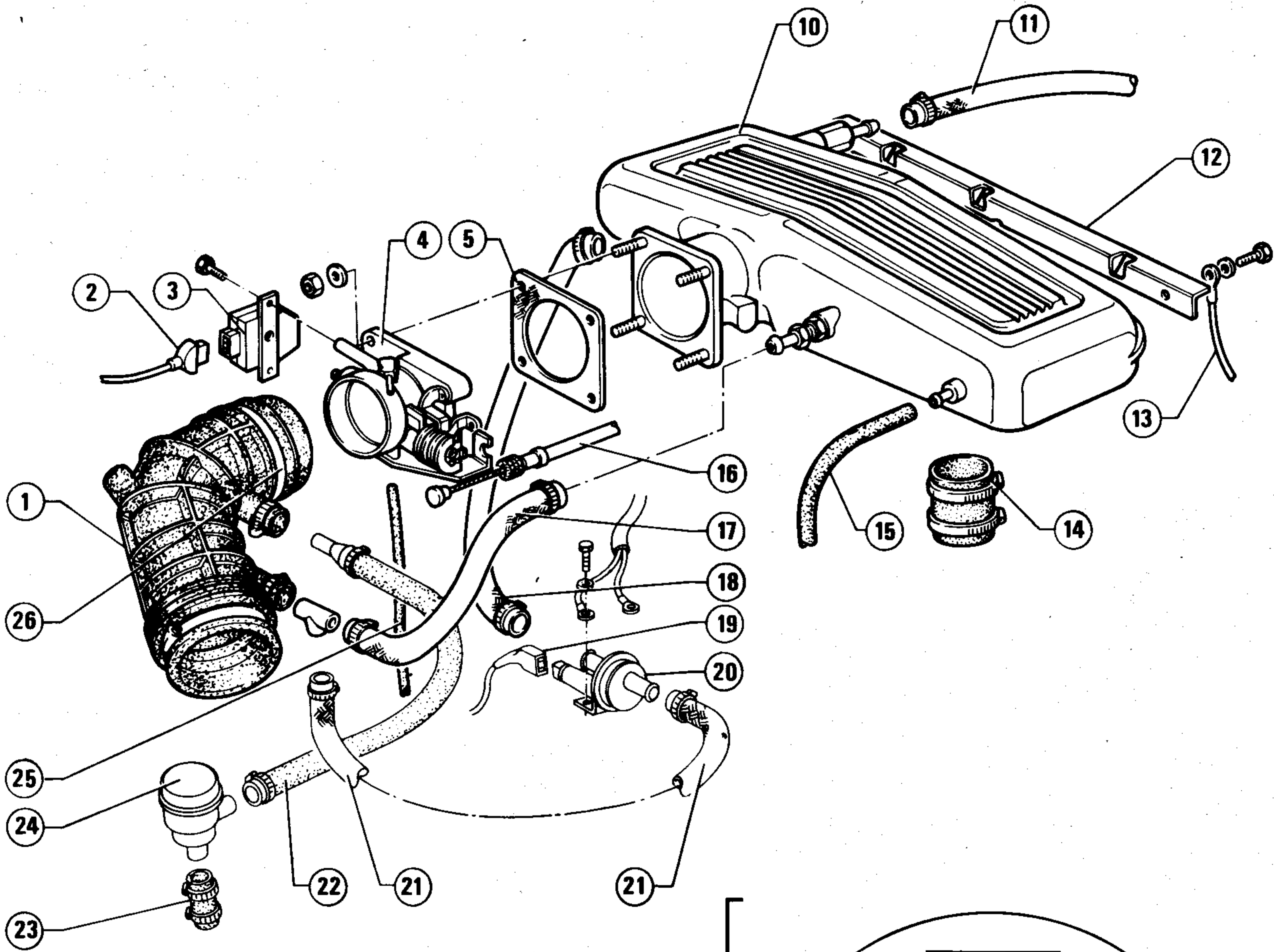
INSTALLATION

Carry out the installation by reversing the order of removal, complying with the following indications.

- Interpose a **new** gasket between throttle body and intake air box.
- Perform the settings and adjustments (refer to: Settings and Adjustments).

INTAKE AIR BOX

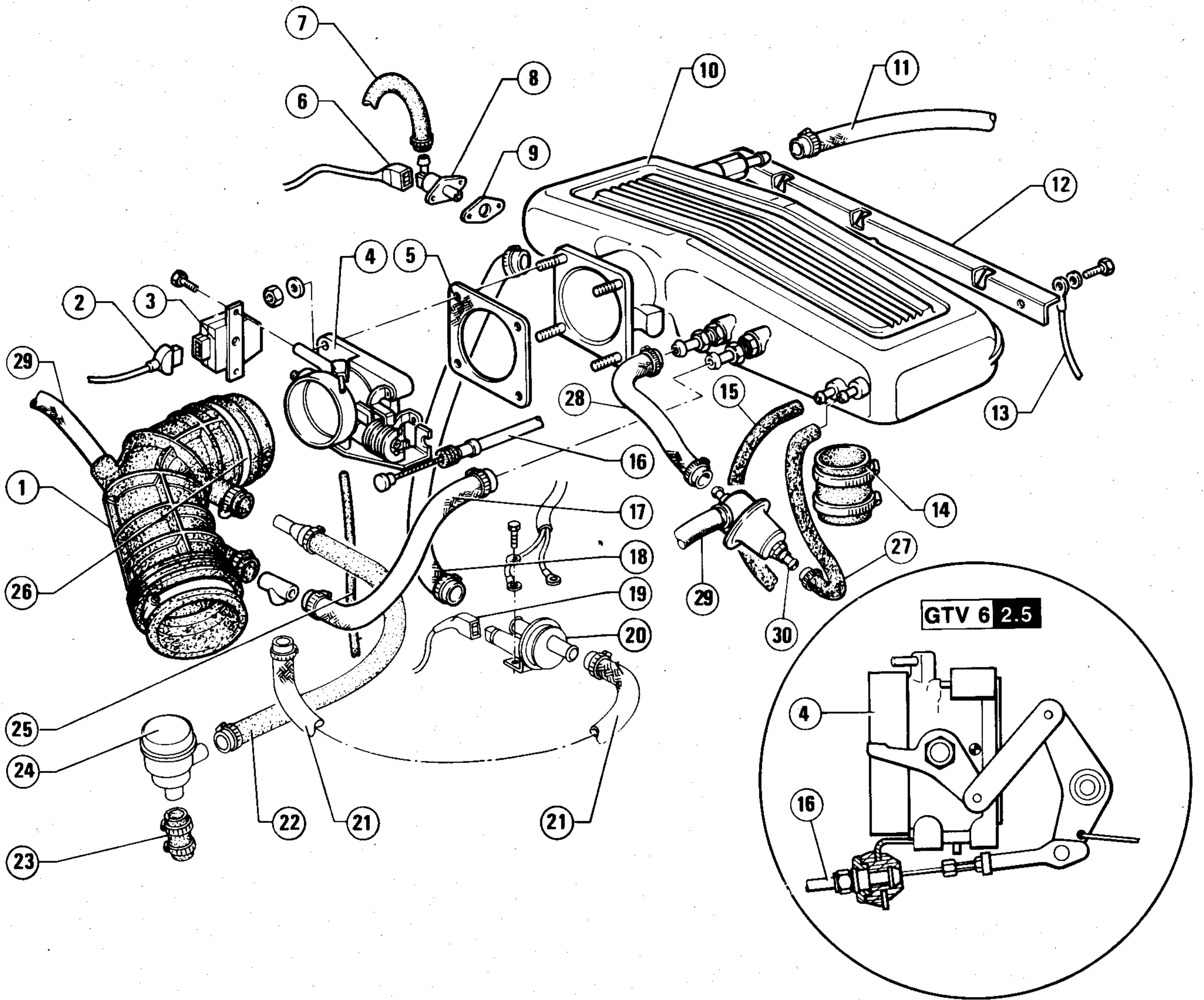
(Except Switzerland, Sweden, Australia)



- | | | |
|--|---|---|
| 1. Corrugated sleeve | 11. Servo brake vacuum intake hose | 19. Connector |
| 2. Connector | 12. Wiring protection | 20. Auxiliary air solenoid valve |
| 3. Throttle body switch | 13. Intake air box earth braid | 21. Hose for air delivery to auxiliary air solenoid valve |
| 4. Throttle body | 14. Sleeve connecting intake air box to intake manifold | 22. Oil vapour return hose |
| 5. Gasket | 15. Vacuum intake hose for pressure regulator | 23. Oil recovery hose |
| 6. Connector | 16. Accelerator control cable | 24. Oil vapour sedimenter |
| 7. Supply hose for cold starting electroinjector | 17. By-pass hose for idle r.p.m. adjustment | 25. Vacuum intake hose for ignition advance pneumatic regulator |
| 8. Cold starting electroinjector | 18. Hose for auxiliary air delivery to intake air box | 26. Clamp |
| 9. Gasket | | |
| 10. Intake air box | | |

INTAKE AIR BOX

(For Switzerland, Sweden, Australia)



- | | | |
|--|---|---|
| 1. Corrugated sleeve | 13. Intake air box earth braid | 22. Oil vapour return hose |
| 2. Connector | 14. Sleeve connecting intake air box to intake manifold | 23. Oil recovery hose |
| 3. Throttle body switch | 15. Vacuum intake hose for pressure regulator | 24. Oil vapour sedimenter |
| 4. Throttle body | 16. Accelerator control cable | 25. Vacuum intake hose for ignition advance pneumatic regulator |
| 5. Gasket | 17. By-pass hose for idle r.p.m. adjustment | 26. Clamp |
| 6. Connector | 18. Hose for auxiliary air delivery to intake air box | 27. Vacuum intake hose for valve control |
| 7. Supply hose for cold starting electroinjector | 19. Connector | 28. Hose for air delivery to air intake box |
| 8. Cold starting electroinjector | 20. Auxiliary air solenoid valve | 29. Air weighing hose for vacuum regulating valve |
| 9. Gasket | 21. Hose for air delivery to auxiliary air solenoid valve | 30. Vacuum regulating valve |
| 10. Intake air box | | |
| 11. Servo brake vacuum intake hose | | |
| 12. Wiring protection | | |

FUEL SYSTEM

REMOVAL

With reference to the exploded view, operate as follows:

1. Loosen clamps and disconnect hoses (11) and (17) from intake air box, and sleeve (1) from throttle body.
2. Detach hose (25) from throttle body, and hose (15) from intake air box.
- 2A. (Only for Switzerland, Sweden and Australia) Disconnect hoses (27) and (28) from the intake air box.
3. Detach hose (18) from the auxiliary air solenoid valve.
4. Detach accelerator control cable (16) from the lever on throttle body, and release sheath from securing bracket.
5. Detach connector (2) from switch (3) on throttle body.
6. Detach connector (6) from electroinjector (8).
7. Detach hose (7) from electroinjector (8).

WARNING:

Operate carefully: fuel system may be under pressure.

8. Unscrew the screws which secure cover (12) and remove it. One of these screws secures earth braid (13).
9. Loosen the clamps which secure intake air box (10) to sleeves (14) of intake manifolds; remove intake air box (10) complete with throttle body (4).
10. If required, disassemble the intake air box operating at bench, by proceeding as follows.
 - a. Unscrew the nuts which secure throttle body (4) to intake air box (10), remove them and withdraw gasket (5).
 - b. Unscrew the screws which secure electroinjector (8) and remove it together with the related gasket.
 - c. Remove the union for idle r.p.m. adjustment and the servo brake single-acting valve.

- d. Detach the auxiliary air inlet hose (18).

INSTALLATION

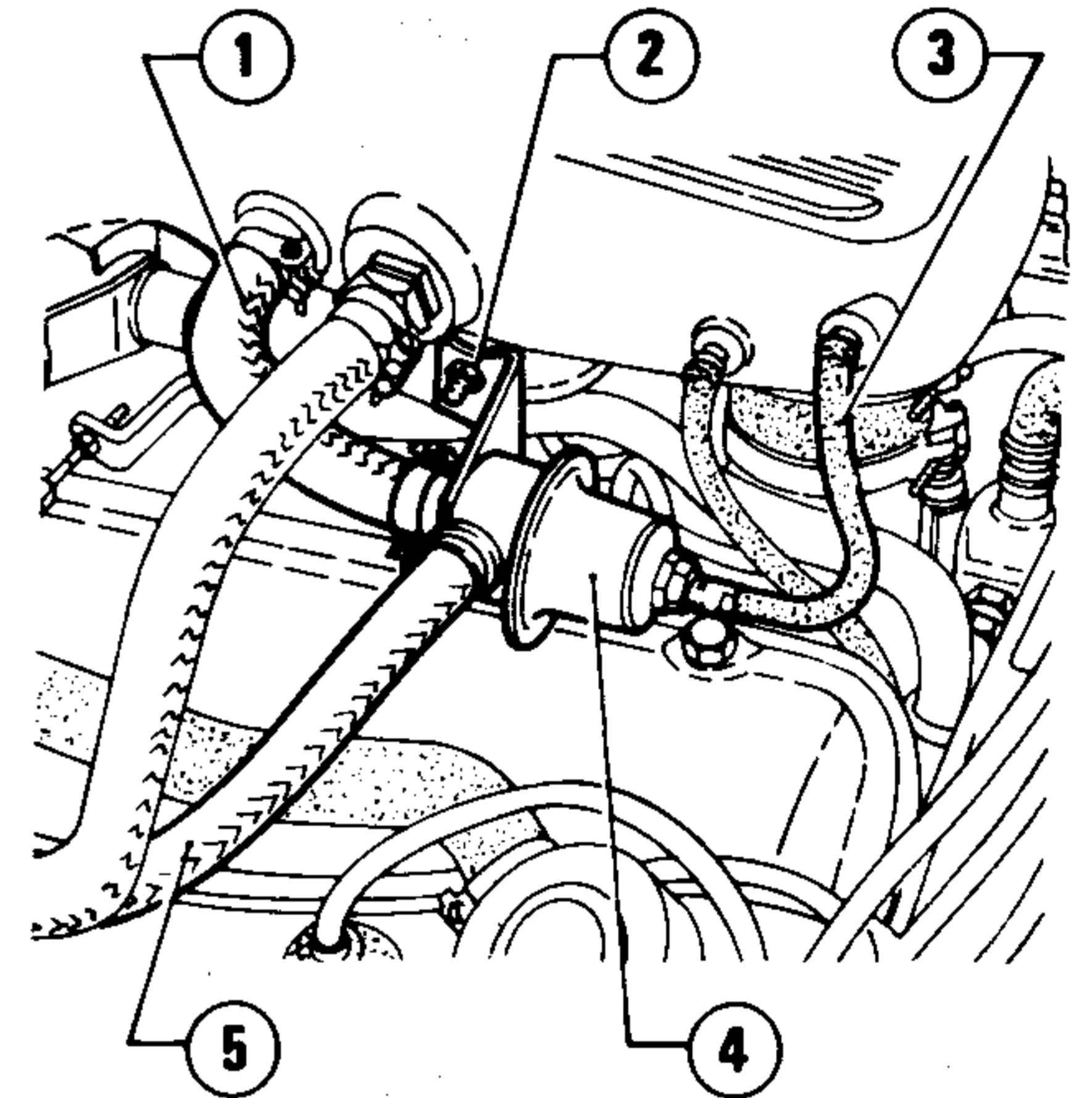
Carry out the installation by reversing the order of removal, complying with the following indications.

- If the intake air box has been disassembled, interpose **new** gaskets between:
 - throttle body and intake air box
 - cold starting electroinjector and intake air box
 - single-acting valve, for servobrake vacuum intake, and intake air box
- Install a **new** O-ring on the union for the idle r.p.m. adjustment.
- If required, replace the sleeves between intake air box and intake manifolds.
- Perform the checks and adjustments (refer to: Checks and Adjustments).

- Bring engine to **5000 r.p.m.**, then release accelerator immediately. If valve operates, a vibration can be felt inside it, during deceleration. However, the vibration felt is very slight.
- Detach the air intake hose from the valve, bring engine to **5000 r.p.m.**, then release accelerator immediately. If valve operates, a vacuum can be felt, during deceleration, on the valve inlet union.

REPLACEMENT

1. Disconnect hoses (1), (3) and (5) from the vacuum regulating valve.
2. Unscrew nut (2), and remove valve (4).
3. Carry out installation by reversing the order of removal.



- 1 Hose for air delivery to intake air box
- 2 Nut
- 3 Vacuum intake hose for valve control
- 4 Vacuum regulating valve
- 5 Hose for air intake from corrugated sleeve

VACUUM REGULATING VALVE

(For Switzerland, Sweden and Australia)

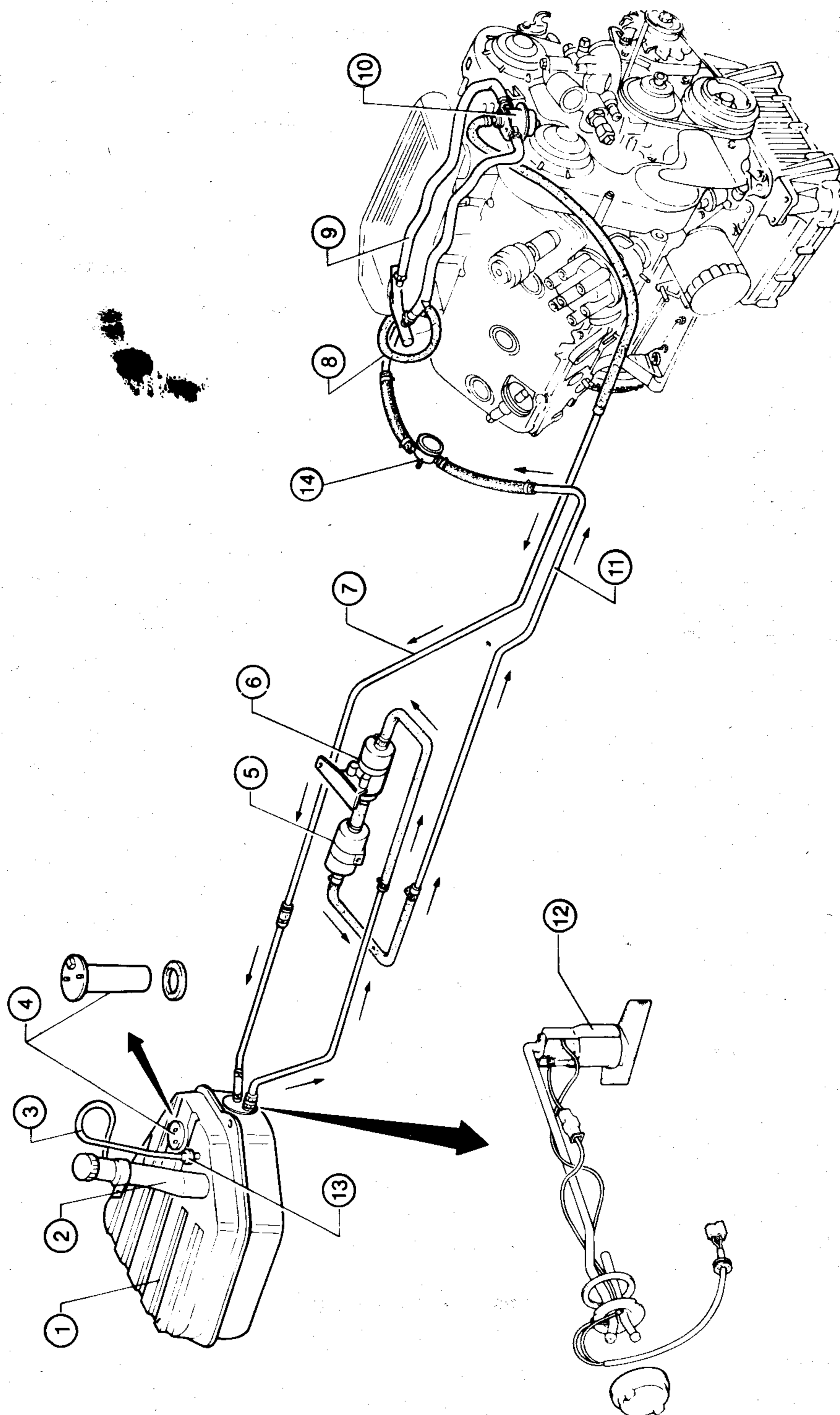
CHECKS AND INSPECTION

This valve operates during the acceleration release phase. If during transient, a vacuum exceeding that prescribed is generated in the intake air box, the valve opens and delivers auxiliary air to engine, so as to reduce the exhaust emissions.

Check the valve functioning by operating in one of the following ways:

FUEL SUPPLY SYSTEM

Alfa 90 Alfa 75

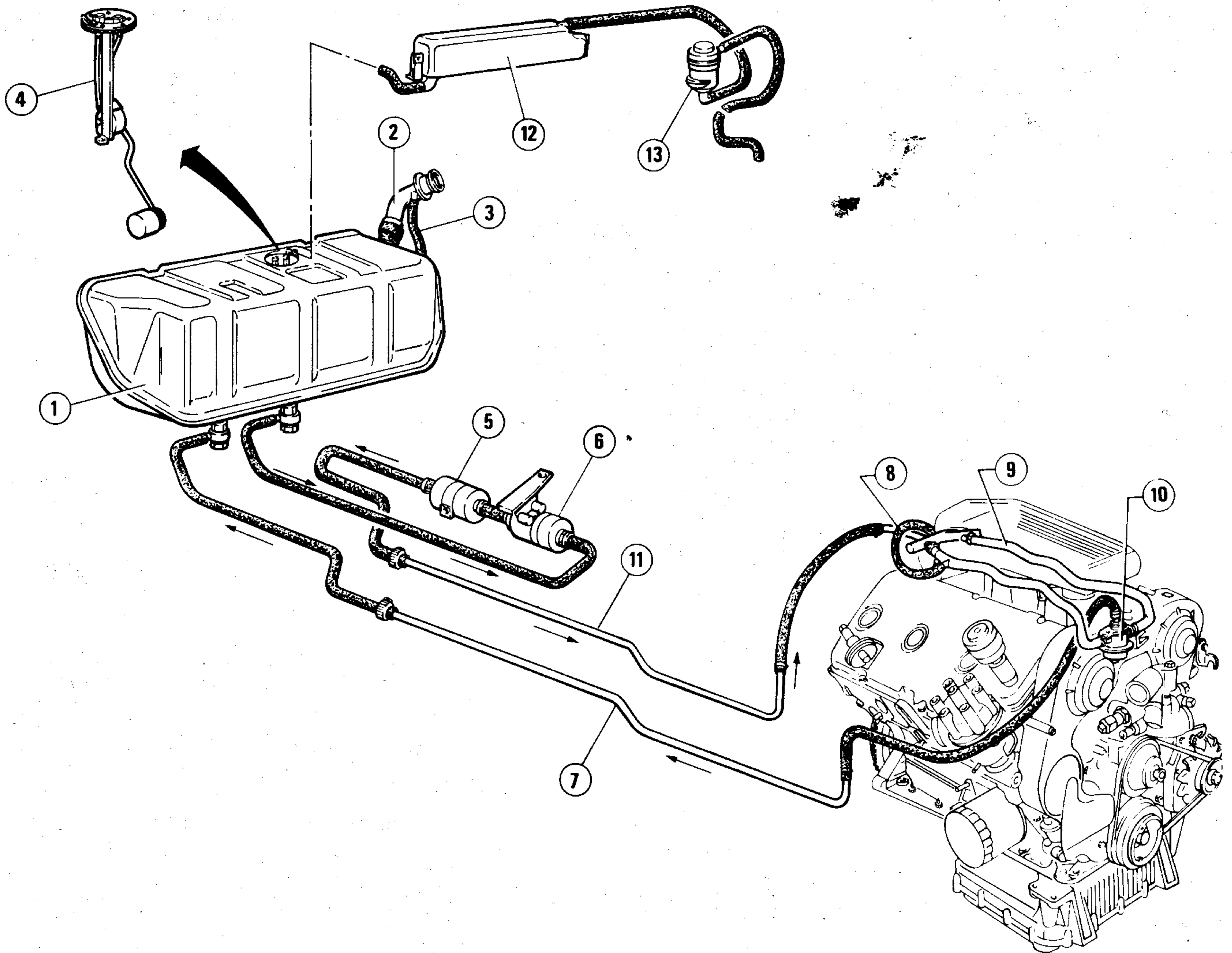


- 1. Tank
- 2. Filler
- 3. Fill-up breather hose
- 4. Fuel level gauge
- 5. Filter
- 6. Main pump
- 7. Excess fuel return hose

- 8. Supply hose for cold starting electroinjector
- 9. Fuel supply manifold
- 10. Pressure regulator
- 11. Fuel delivery hose
- 12. Submerged pump
- 13. Relief valve
- 14. Dashpot

FUEL SUPPLY SYSTEM

GTV 6 2.5



1. Tank
2. Filler
3. Fill-up breather hose
4. Fuel level gauge
5. Filter
6. Main pump
7. Excess fuel return hose

8. Supply hose for cold starting electroinjector
9. Fuel supply manifold
10. Pressure regulator
11. Fuel delivery hose
12. Fuel vapour venting tank
13. Tank venting inertia valve
(Except Australia version)

FUEL SYSTEM

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 (five extinguishers, etc.).
- b. Detach the battery ground cable.
- c. Pour the fuel drawn from the tank into a suitable container fitted with safety cover.

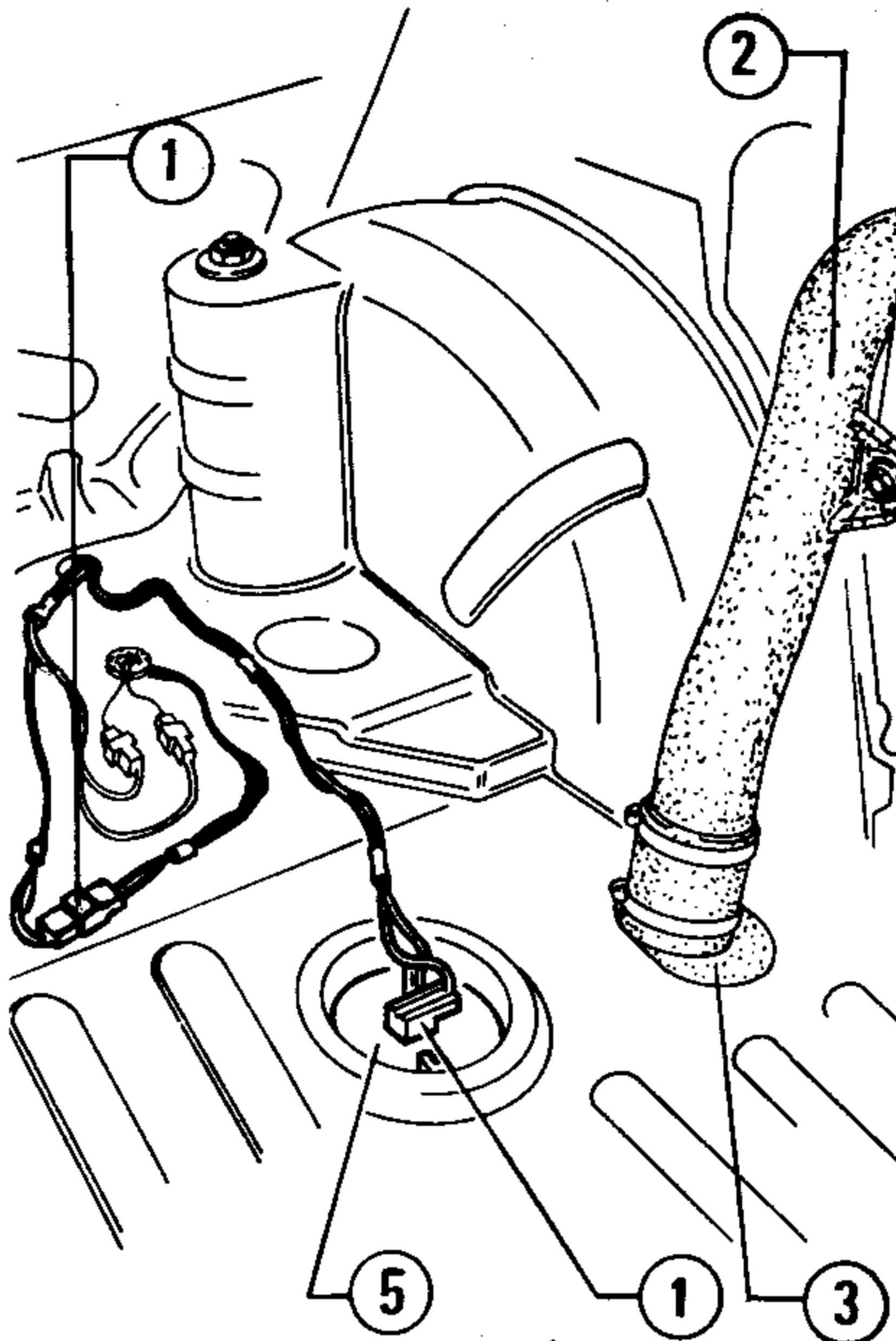
CAUTION:

After having reassembled the fuel system components, verify system tightness when at 2.5 bar.

COMPLETE FUEL TANK

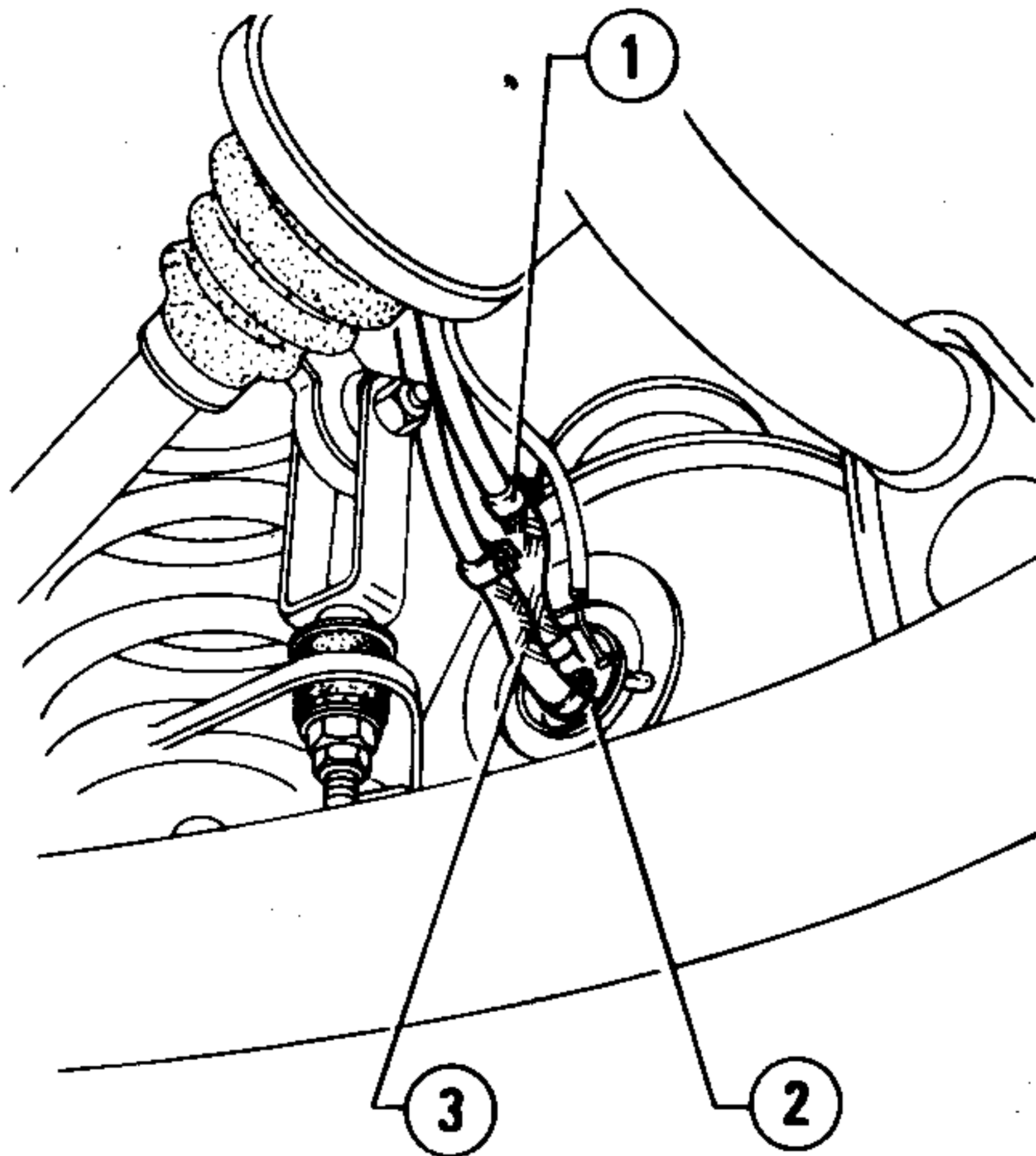
REMOVAL

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 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 Sleeves 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.

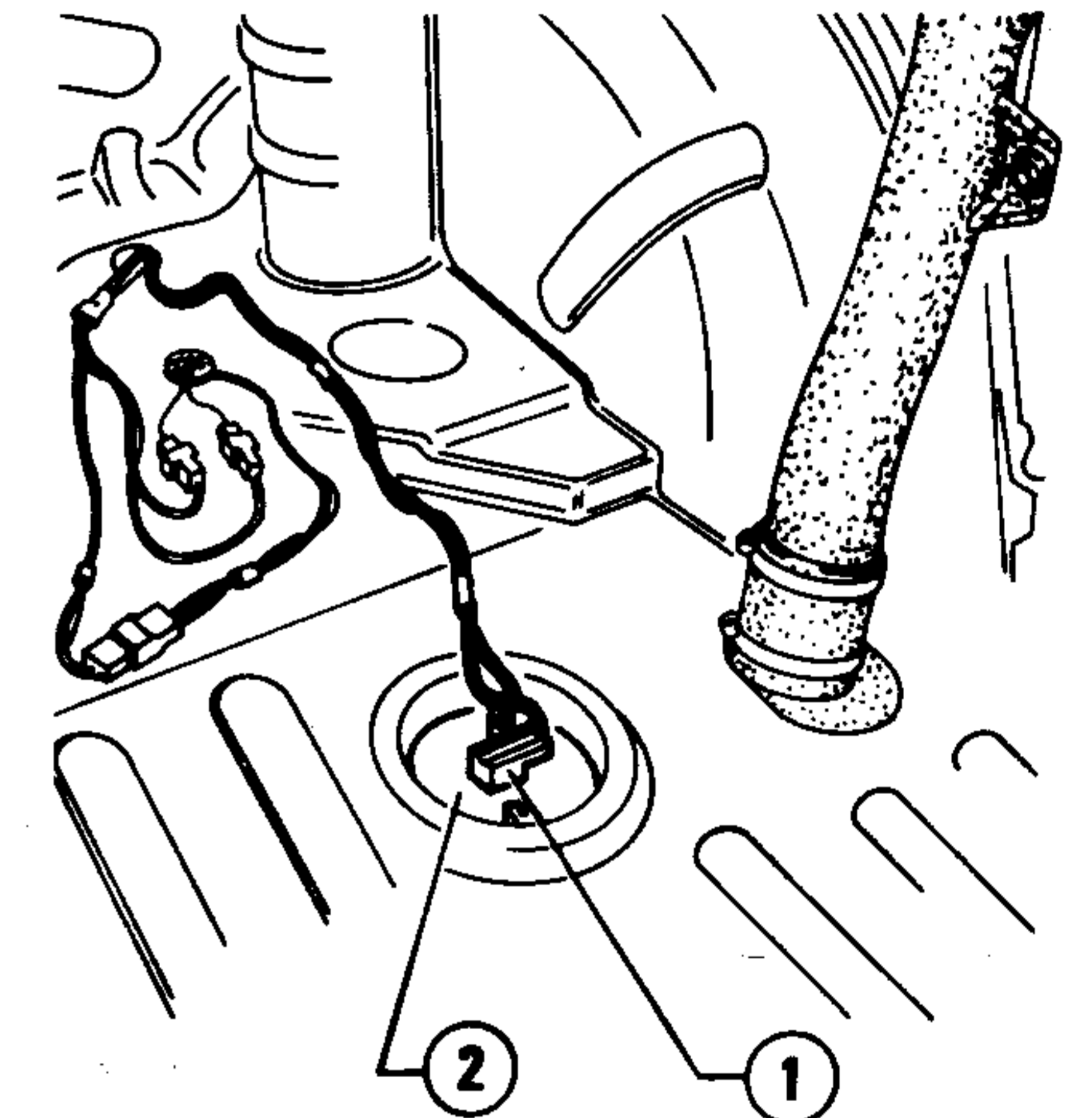
INSTALLATION

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

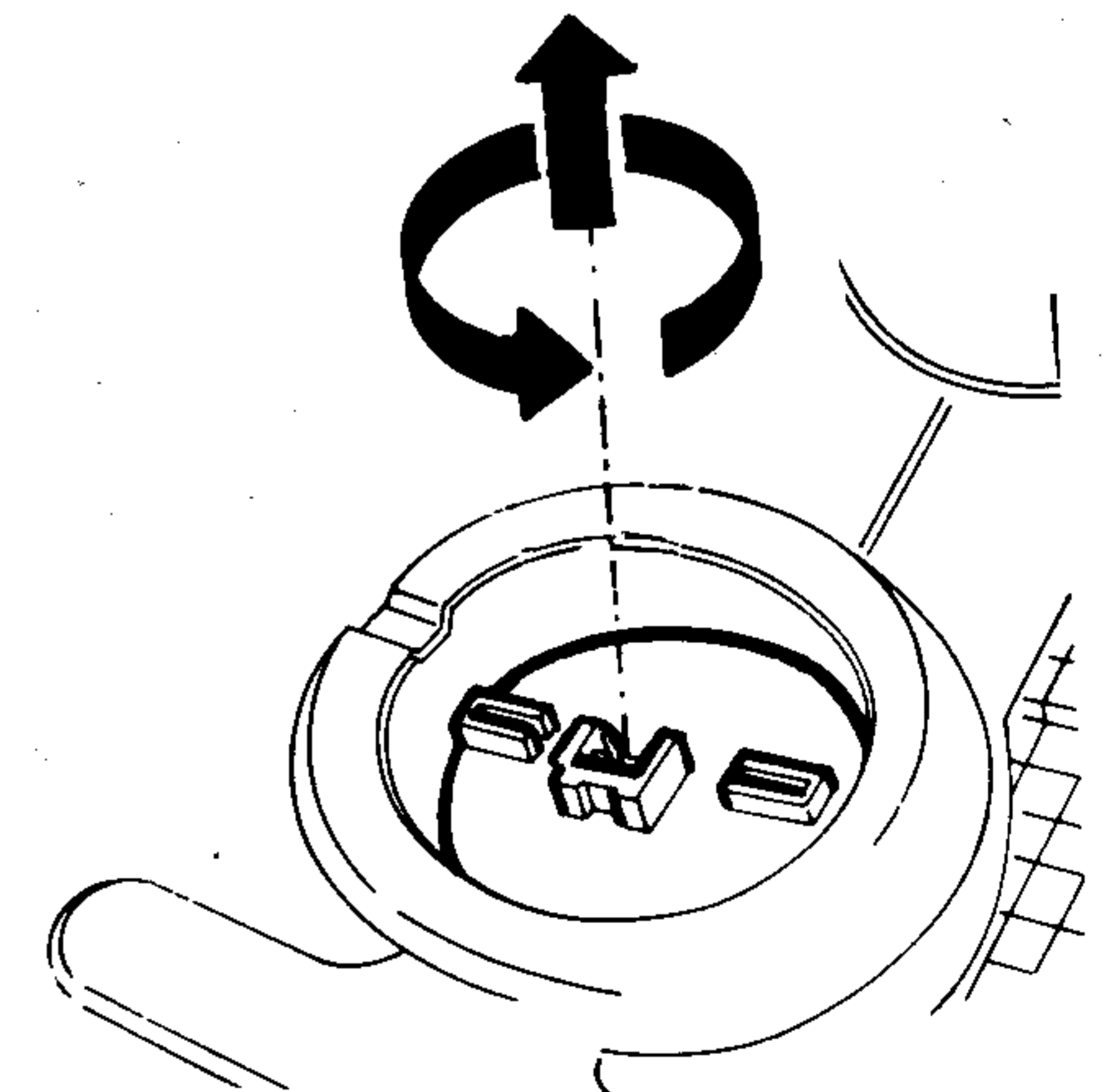
REPLACEMENT

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 counter-clockwise; then withdraw it from tank together with the related gasket.



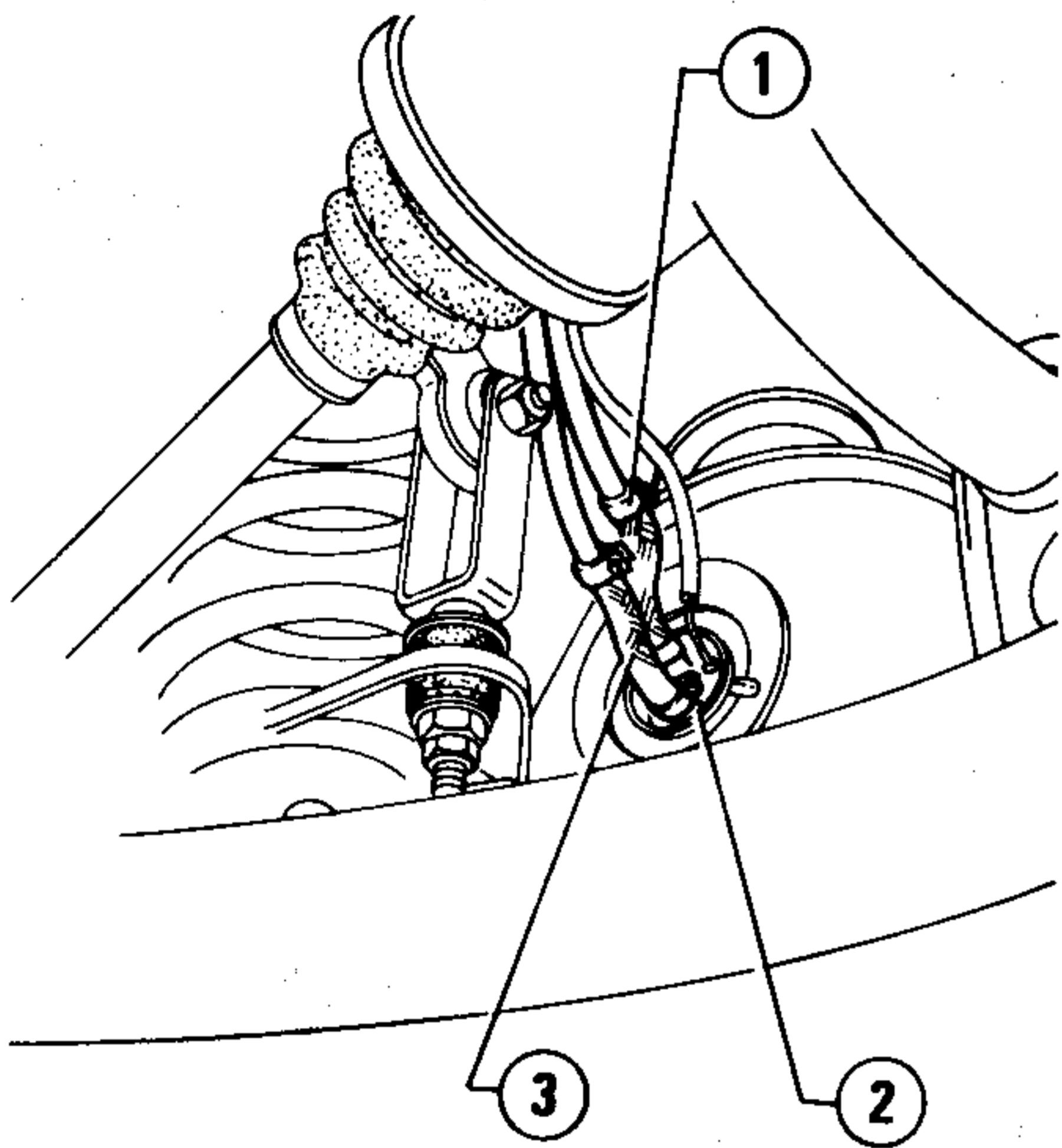
4. Replace gasket before installing the fuel level gauge on tank.

SUBMERGED PUMP AND GRID FILTER

Alfa 90 Alfa 75

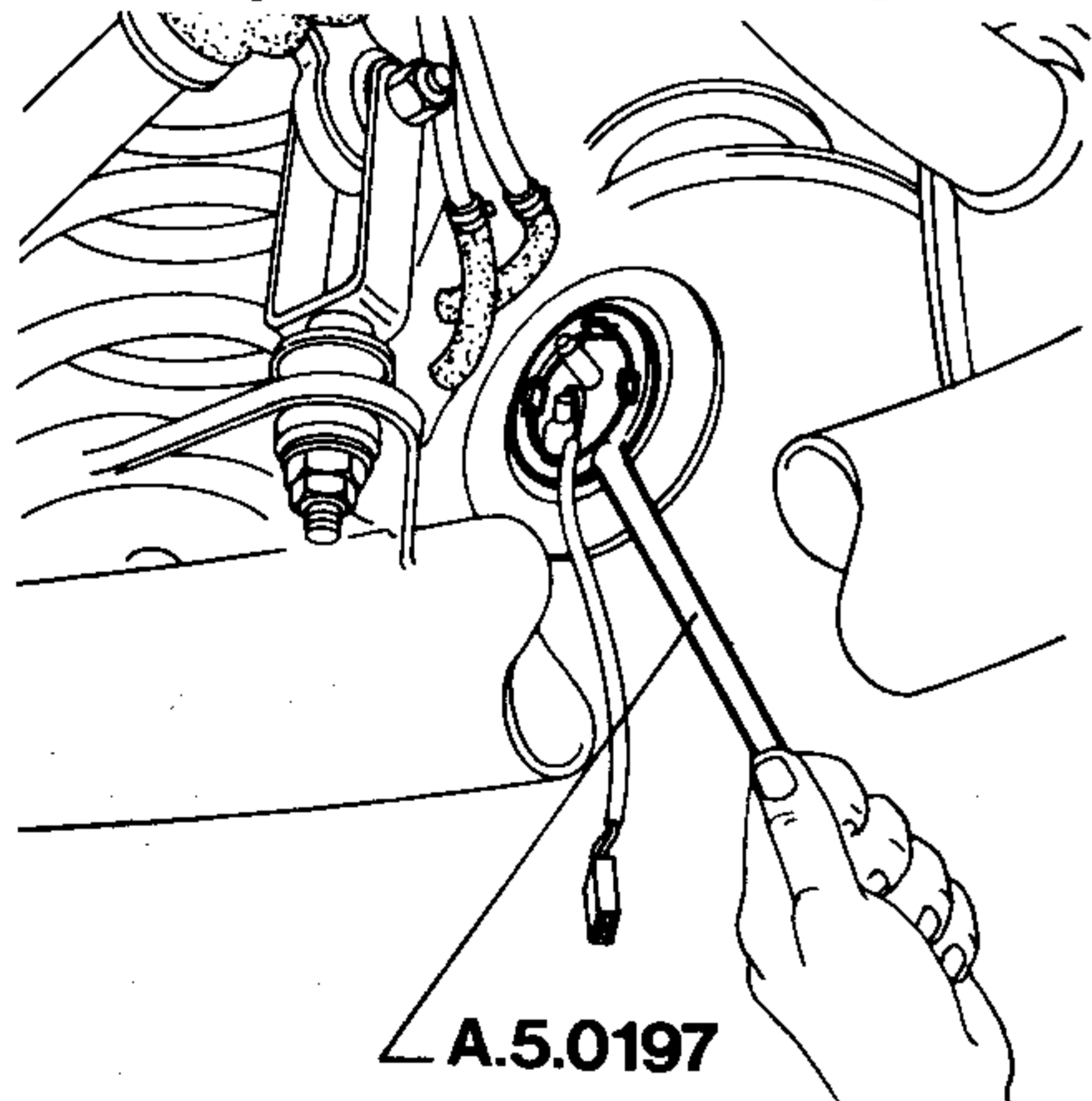
REPLACEMENT

1. Set vehicle on lift, remove filler cap and suck the 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.



- 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 counter-clockwise, 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.

FUEL PIPING

REMOVAL

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:

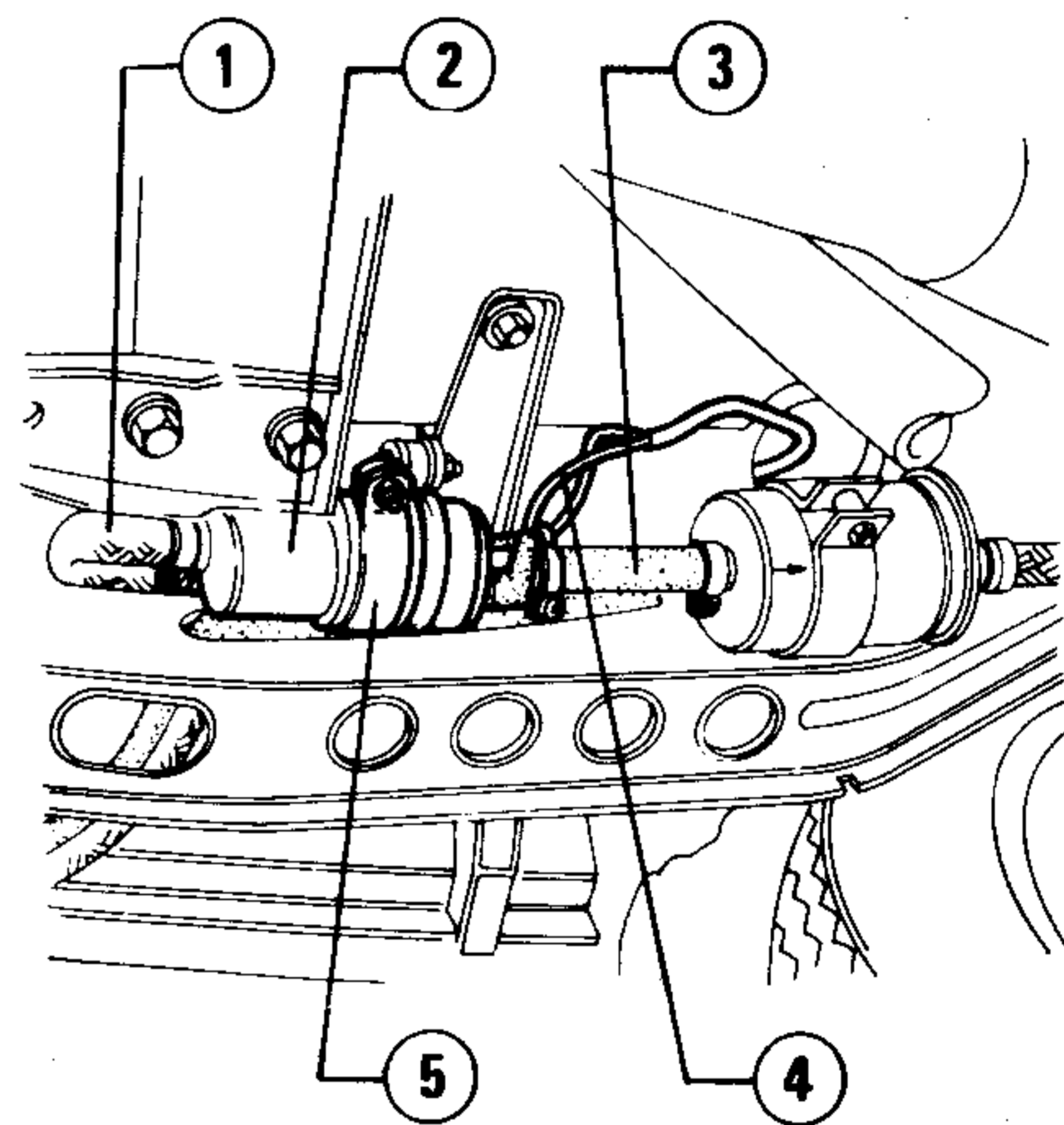
- a. Carefully install clamps on system joints. Do not tighten clamps accessively so as to prevent damaging piping.
- b. Do not bend or twist pipes when installing them on vehicle.
- c. The piping inside vehicle must be inserted into the related pipe-raceway up to the red reference strips marked on each pipe/hose.

- d. Start the engine and check for leaks from joints.

MAIN FUEL PUMP

REPLACEMENT

1. Set vehicle on a lift and detach the battery negative terminal.
2. Operating from under the vehicle, detach pump supply cables ④.
3. Throttle hoses ① and ③, then loosen clamps and detach hoses from pump.
4. Loosen clamp ⑤ and withdraw pump ②.



- 1 Fuel inlet hose to pump
- 2 Fuel pump
- 3 Fuel outlet hose from pump
- 4 Pump supply cables
- 5 Pump support clamp

5. Install the new fuel pump securing it with the related clamp; then reconnect hoses.

Pump is supplied as spare part into a sealed pack, filled with protective oil and with unions closed by caps. When installing the pump it is not necessary to empty it.

6. Reconnect the pump supply cables, taking care not to exchange them.
7. After installation, remove the tools used to throttle hoses, and reconnect battery.

DASHPOT

Alfa 90 Alfa 75

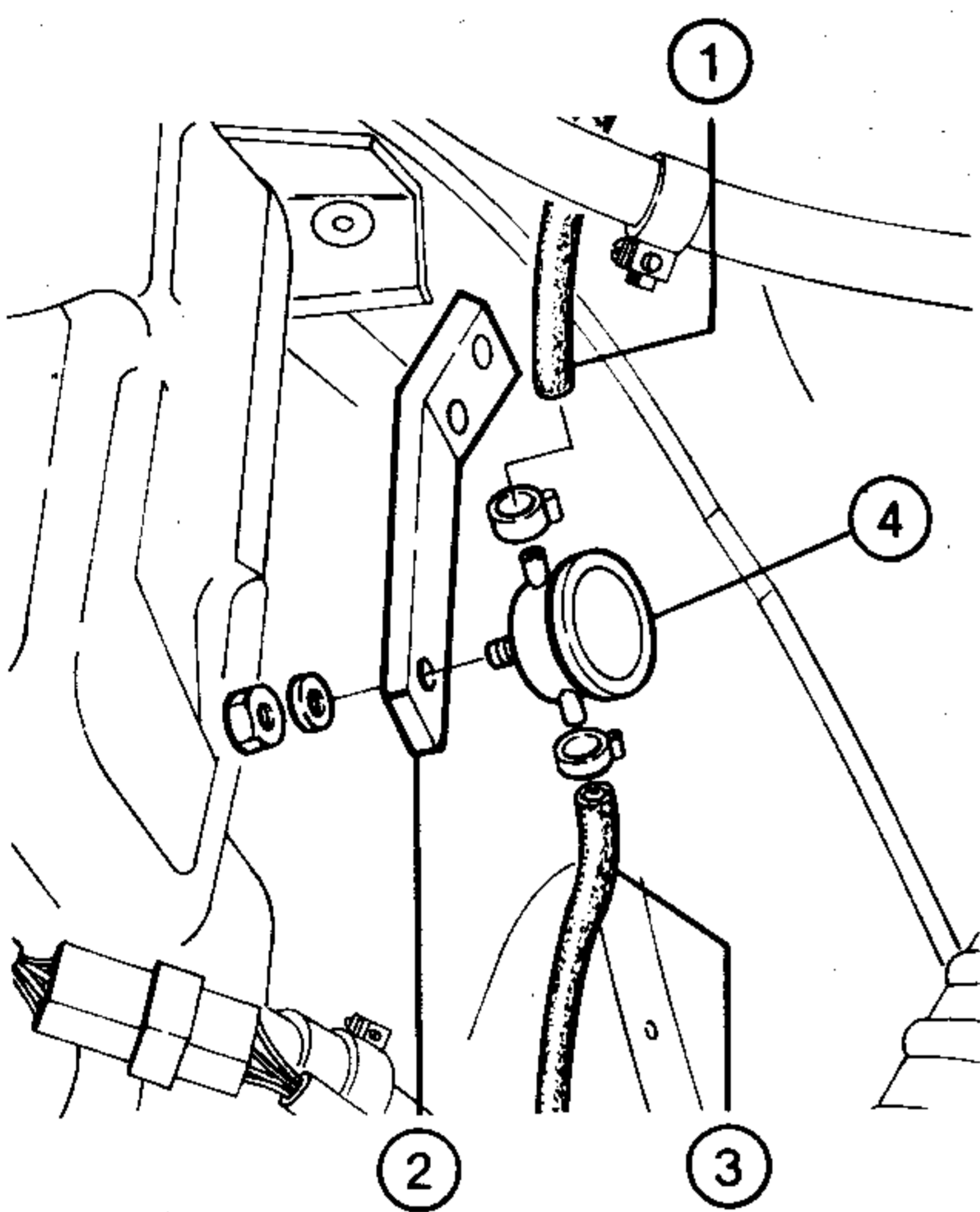
REPLACEMENT

1. Back off nut retaining dashpot (4) to bracket (2).
2. Disconnect fuel in hose (3) and fuel out hose (1).

CAUTION:

Be alert: fuel system may be under pressure.

3. Install a new dashpot adopting a reversal of the removal sequence.



1. Fuel out hose
2. Bracket
3. Fuel in hose
4. Dashpot

COLD STARTING ELECTROINJECTOR

CHECKS AND INSPECTIONS

1. Electric Continuity check.

Refer to: Electrical Tests

2. Functional test.

a. Unscrew the two screws which secure electroinjector to intake air box; detach electroinjector without disconnecting wiring.

b. On cold engine, operate starter and verify that fuel is sprayed by electroinjector.

With engine at the normal running tem-

perature, verify that no fuel is sprayed by electroinjector.

c. If the above conditions do not take place, replace the cold starting electroinjector (refer to: Replacement).

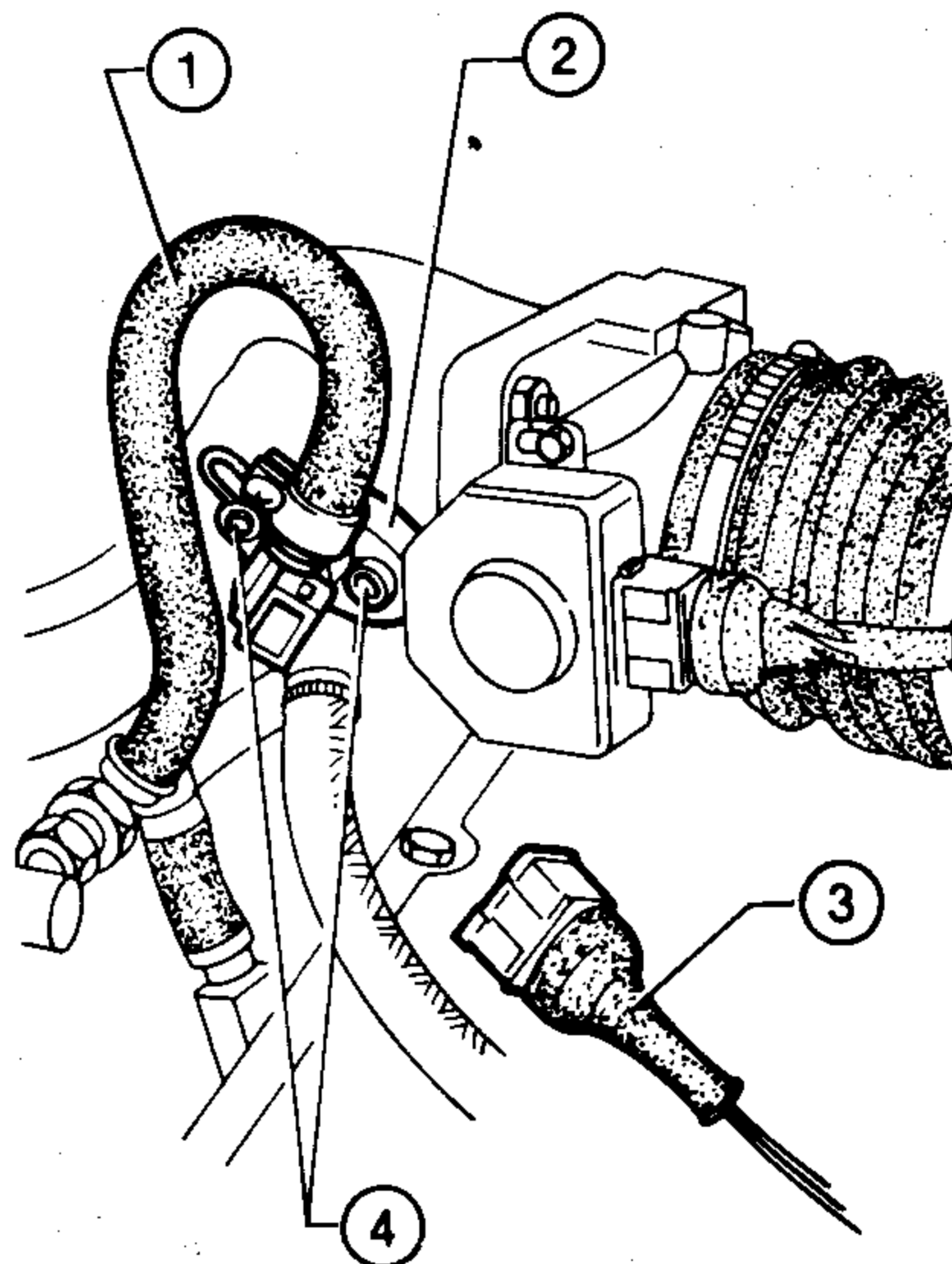
REPLACEMENT

1. Detach electroinjector supply connector (3).
2. Loosen clamp and detach hose (1) from electroinjector.

WARNING:

Operate carefully: fuel system may be under pressure.

3. Unscrew the two screws which secure electroinjector to intake air box; remove electroinjector together with the related gasket.



- 1 Fuel supply hose
- 2 Cold starting electroinjector
- 3 Supply connector
- 4 Screws securing electroinjector to intake air box

4. Install electroinjector by reversing the order of removal taking care to interpose a new gasket between electroinjector and intake air box.

ELECTROINJECTORS

CHECKS AND INSPECTIONS

1. Check of electroinjectors electric continuity.

Refer to: Electrical Tests.

2. Check of electroinjectors opening.

a. Measurement of exhaust CO emission. (Refer to: Alfa 90 "WORK SHOP MANUAL"- GROUP 00 - Engine Maintenance - Check and Adjustment of Idle r.p.m. and Exhaust Emissions).

b. Detach electroinjector connectors one at a time; check the CO percentage each time, and verify that value is constant at each check.

c. If not so, identify the faulty electroinjector and replace it (refer to: 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 and re-connect battery.

c. Operate starter and check for fuel leaks from electroinjectors; if leaks are present, replace the faulty electroinjector.

FUEL SYSTEM

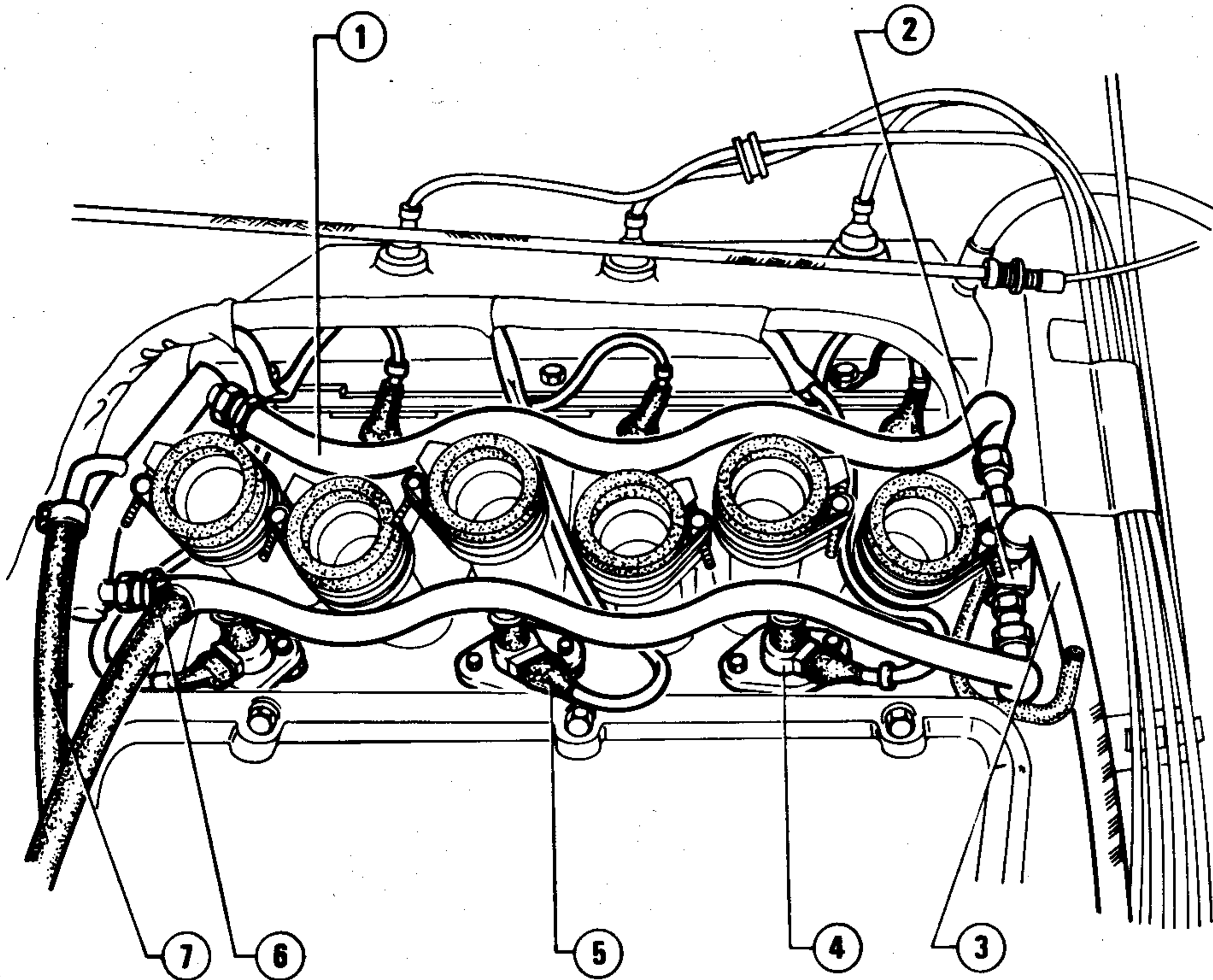
REPLACEMENT

Removal

1. Remove the intake air box (refer to: Air Supply System - Intake Air Box - Removal - step 1 to step 9).

2. Detach connectors (5) from electroinjectors.
3. Detach hose (7) from supply manifold (1), and hose (3) from pressure regulator.

4. Unscrew the screws which secure electroinjectors (4) to air supply manifolds, then remove electroinjectors together with manifold (1).

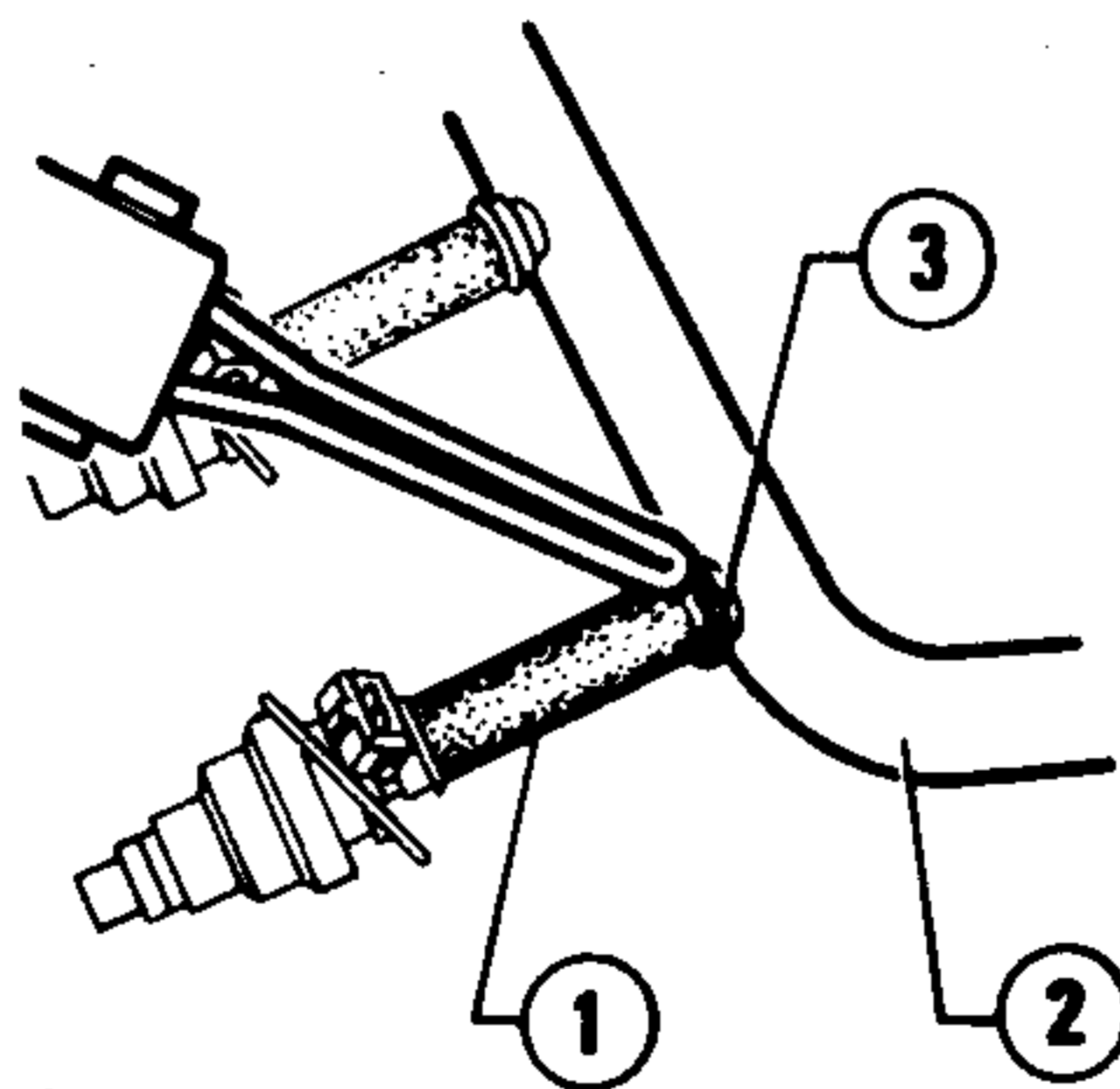


- 1 Fuel supply manifold
- 2 Pressure regulator
- 3 Excess fuel return hose
- 4 Electroinjectors
- 5 Electroinjector control cable connector
- 6 Supply hose for cold starting electroinjector
- 7 Fuel to manifold delivery hose

5. Replace electroinjectors operating as follows.

CAUTION:

Before replacing an electroinjector, take note of connector position on electroinjector so that it can be correctly re-positioned when installing the new electroinjector.

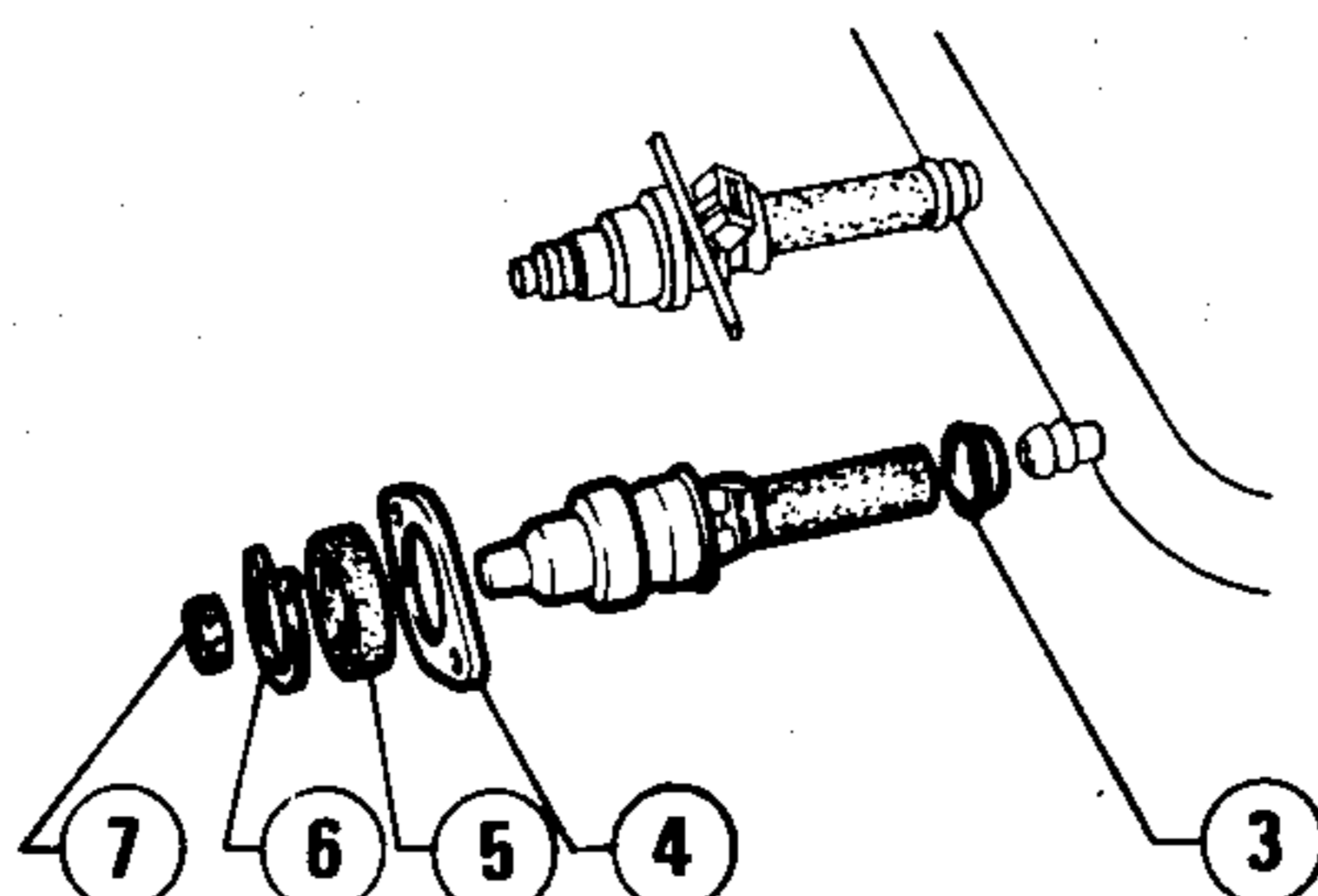


b. Install a new electroinjector fitting bush and supply hose on fuel distributor manifold until it strikes against bush itself.

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 operation never use grease or vaseline.



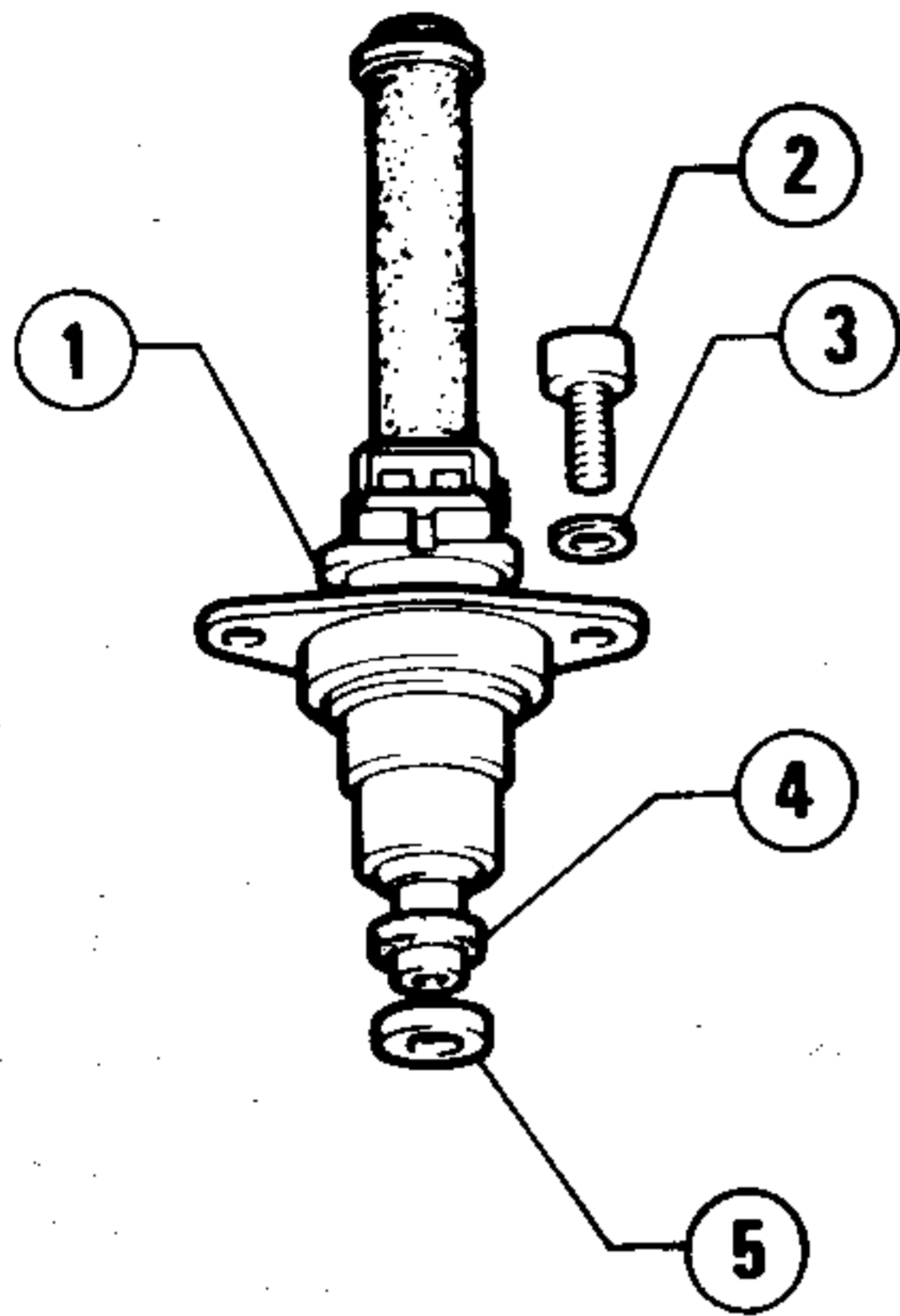
- 1 Electroinjector supply hose
- 2 Fuel distributor manifold
- 3 Bush
- 4 Flange
- 5 Rubber gasket
- 6 Seeger ring
- 7 O-Ring

a. Cut hose (1) by means of a welder, remove it from fuel manifold, and recover bush (3).

INSTALLATION

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

FUEL SYSTEM



- 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.

- Check the exhaust CO emission; adjust if necessary.

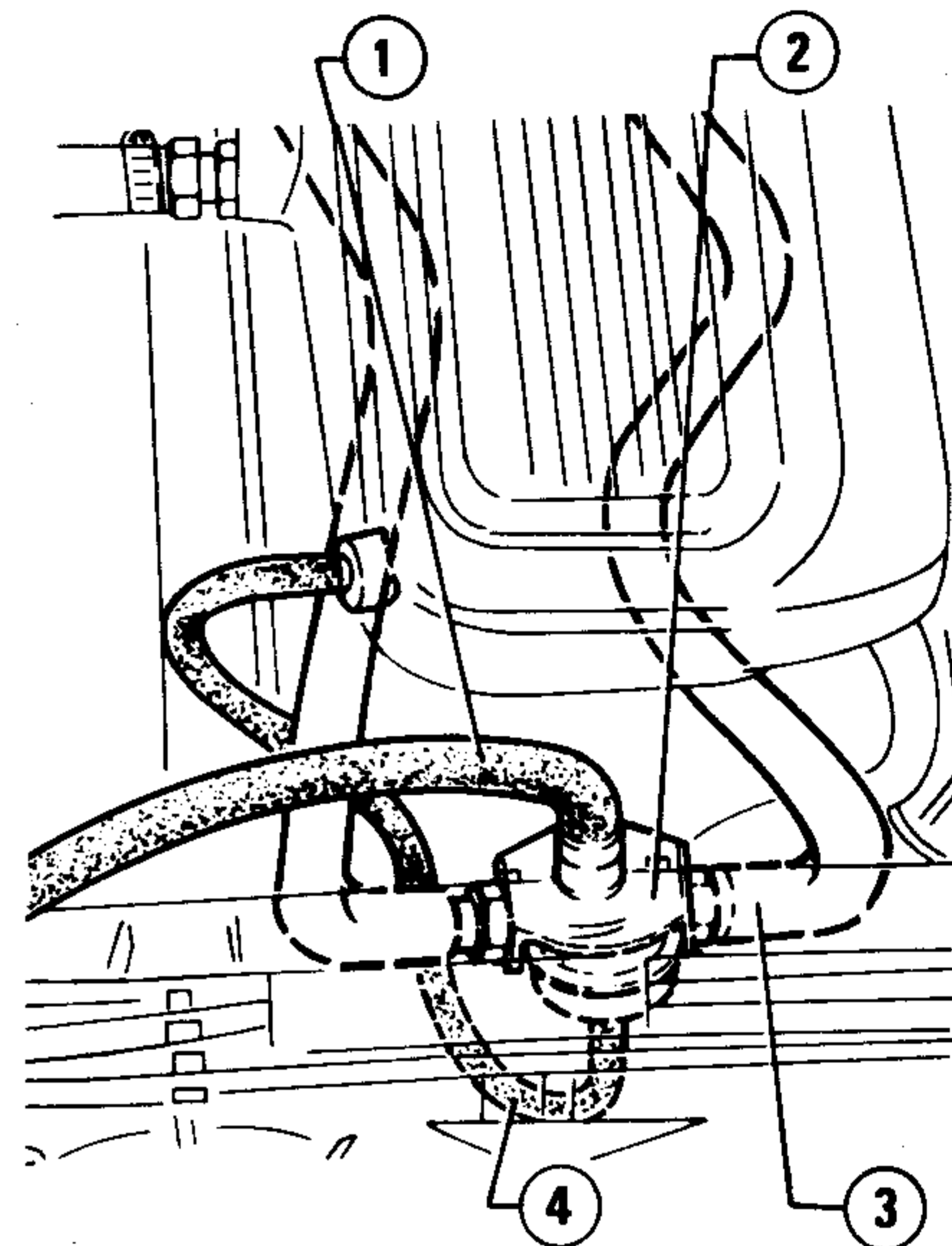
FUEL PRESSURE REGULATOR

REPLACEMENT

WARNING:
Operate carefully: fuel system may be under pressure.

1. Detach hoses ① and ④ from pressure regulator ②.
2. Unscrew the unions which secure regulator ② to supply manifold ③; remove pressure regulator.

3. Carry out installation by reversing the order of removal.



- 1 Excess fuel return hose
- 2 Pressure regulator
- 3 Supply manifold
- 4 Pressure regulator vacuum intake

SETTINGS AND ADJUSTMENTS

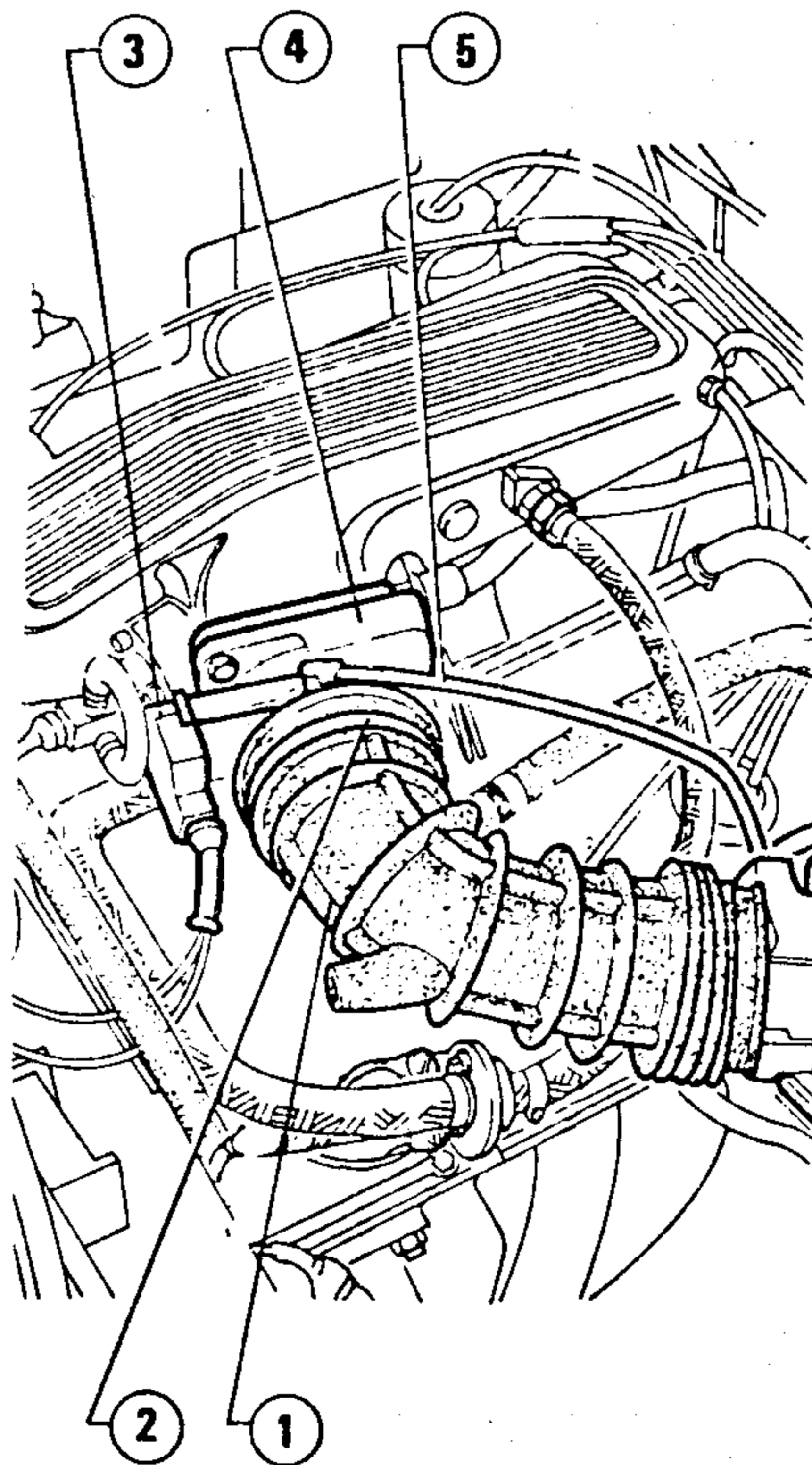
SETTING OF THROTTLE BODY (Check with flowmeter)

1. Loosen clamp ② and disconnect sleeve ① from throttle body ④.
2. Disconnect hose ⑤ and suitably plug the related union on throttle body.
3. Loosen the screws which secure switch ③ to throttle body.
4. Disconnect the accelerator control cable.
5. By means of a flow meter, check the throttle body setting, operating as follows.
 - a. Rest the flow meter tap on throttle body inlet.

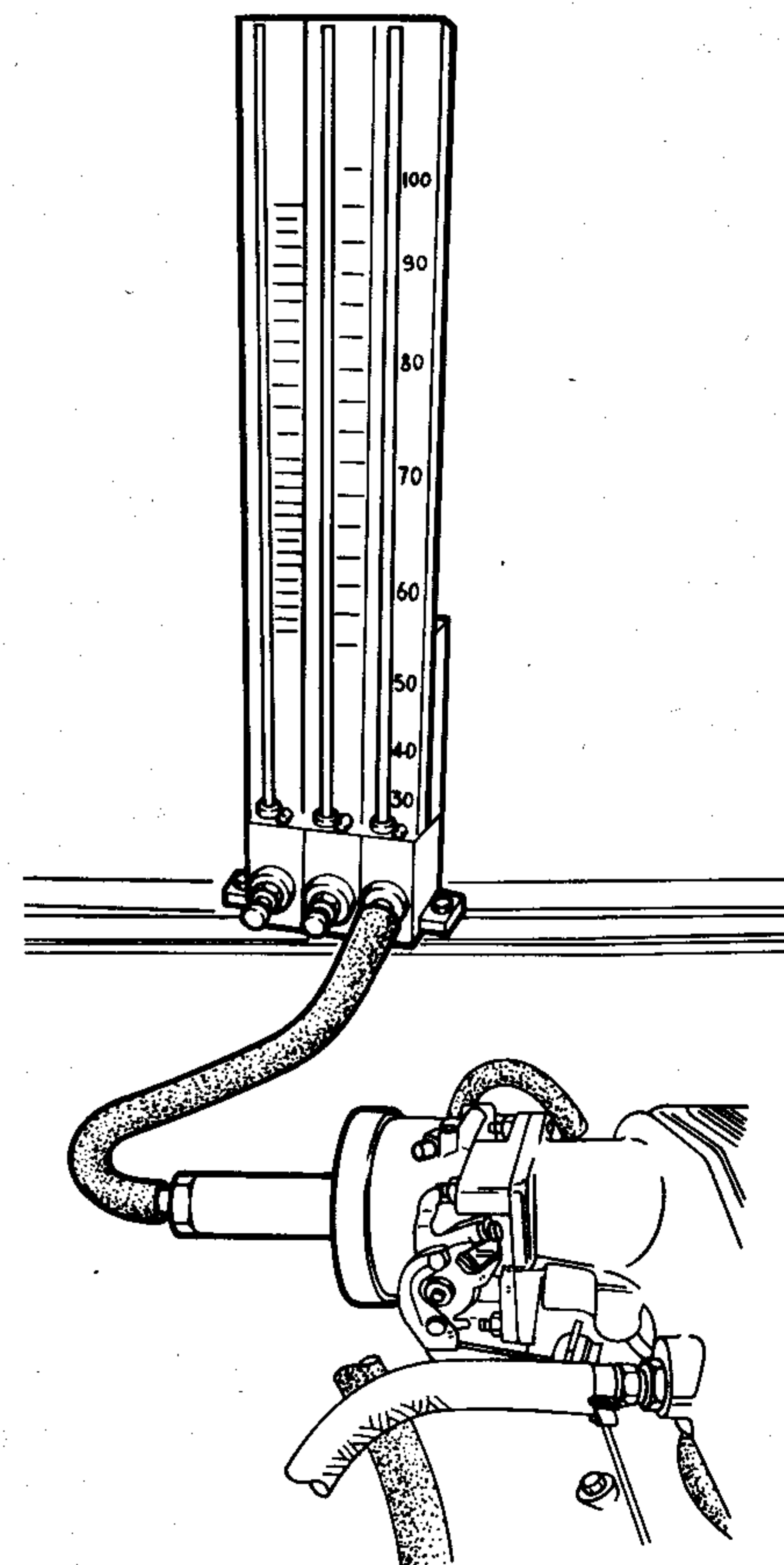
b. Measure the air flow through throttle and verify that it is within the prescribed values.

Air flow from accelerator throttle in the closed position (flowmeter Solex):

300 on N scale



- 1 Corrugated sleeve
- 2 Clamp
- 3 Accelerator throttle switch
- 4 Throttle body
- 5 Vacuum intake hose for ignition advance pneumatic regulator



6. If not so, carry out the adjustment.
 a. Remove seal (3) and operate on adjusting screw (2) until the prescribed flow value is obtained.

SETTING OF ACCELERATOR THROTTLE SWITCH

1. Detach the female connector from throttle switch and, by means of a tester, check the following resistances on the male connector.

a. With throttle fully closed, 0Ω resistance must be measured between terminals (2) and (18).

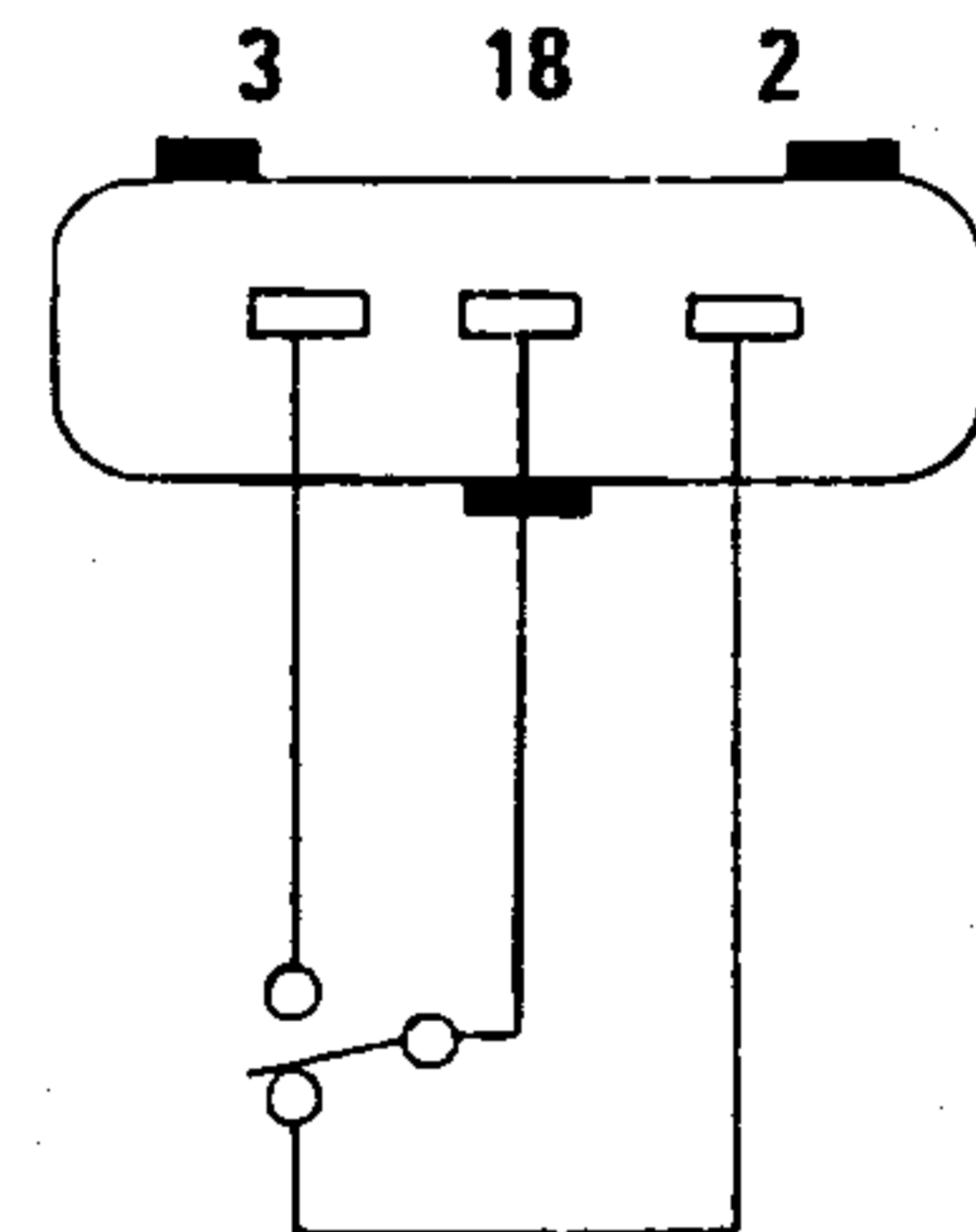
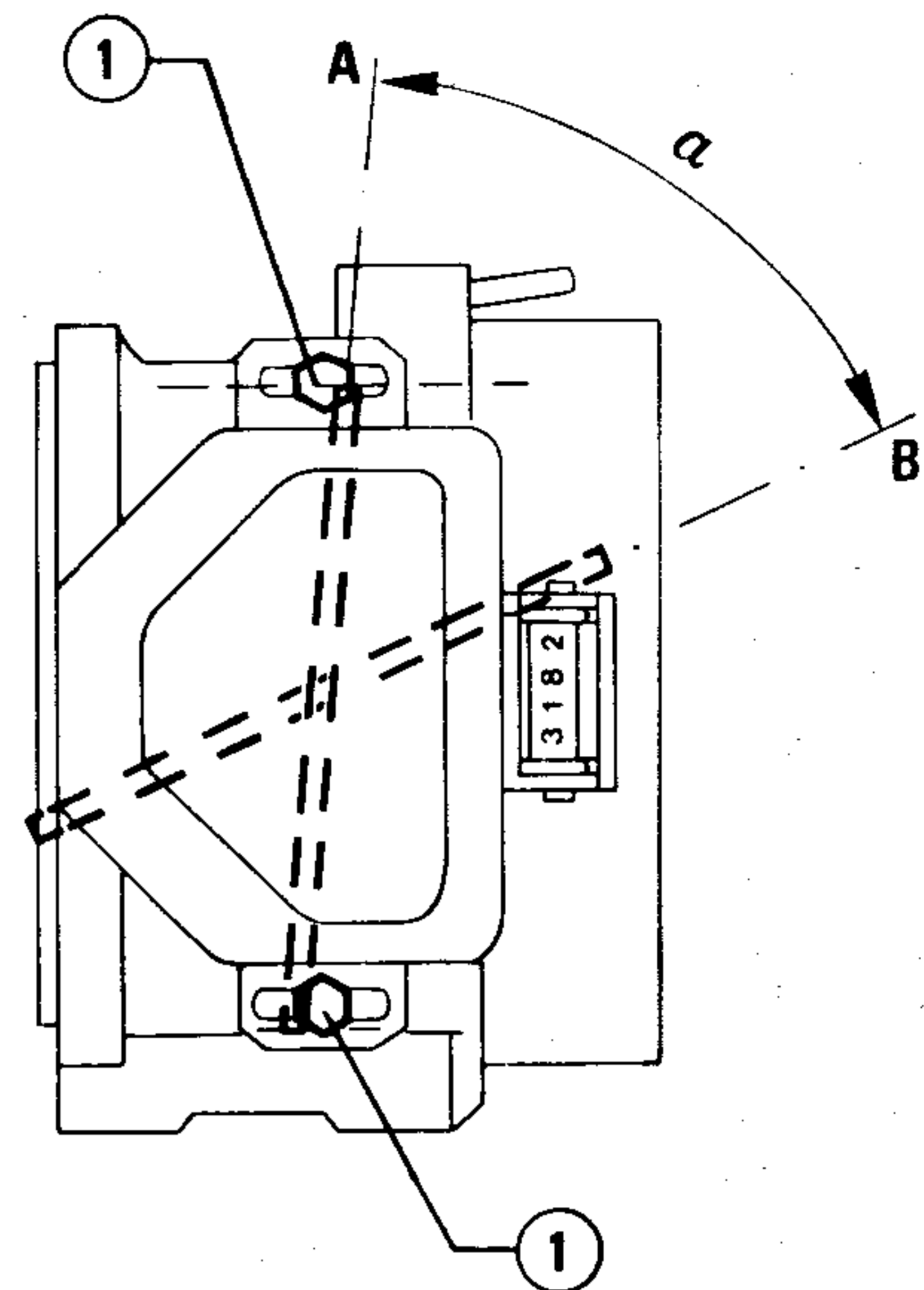
b. Rotate throttle slowly: with tester between terminals (2) and (18), ∞ resistance must be measured before throttle is rotated by 1° with respect to the fully closed position.

2. If not so, loosen screws (1) and rotate switch until contact ($\approx 0 \Omega$ resistance) between terminals (2) and (18) is obtained, with throttle fully closed; re-tighten the screws.

3. Rotate throttle by 58° and verify that the full load contact closes, by measuring the following resistances with a tester on male connector.

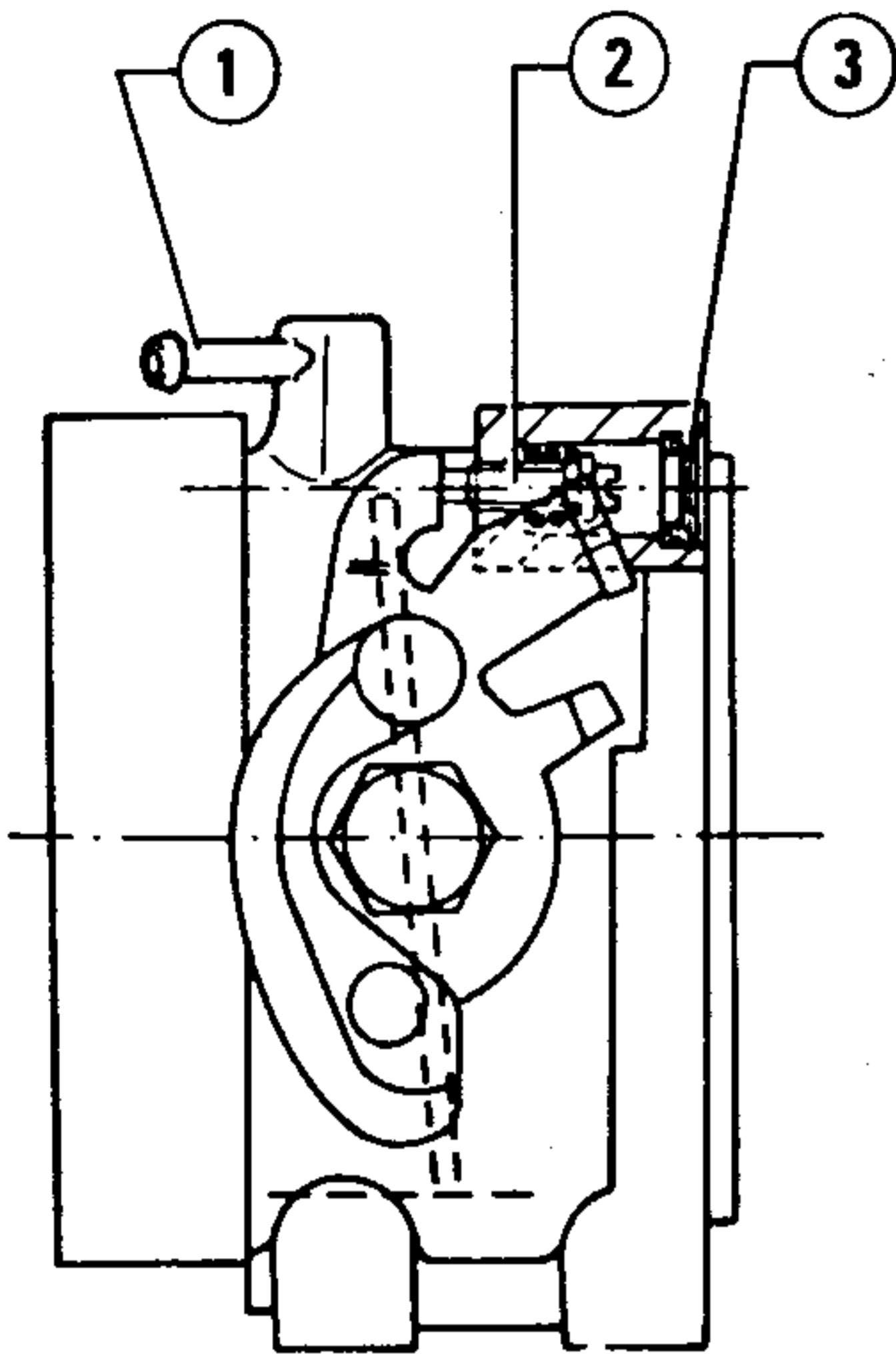
- 0Ω resistance (approx.) must be measured between terminals (3) and (18), when accelerator throttle is open by an angle of $\alpha \approx 58^\circ$.

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

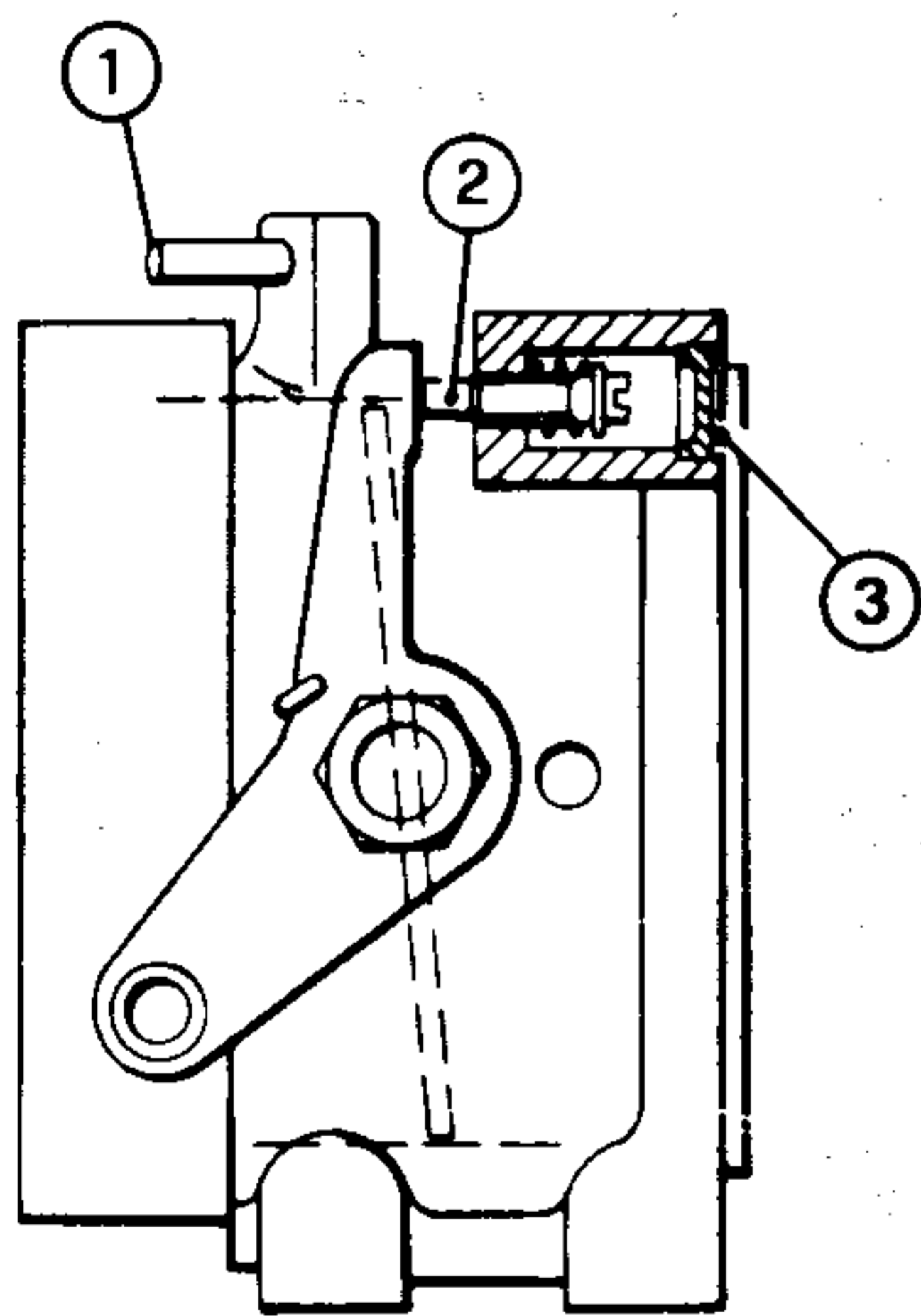


- 1 Screws securing switch to throttle body
- 2 Idle r.p.m. terminal (corresponding to position A: throttle closed)
- 3 Peak r.p.m. terminal (corresponding to position B: throttle open)

Alfa 90 Alfa 75



GTV 6 2.5



- 1. Vacuum intake union
- 2. Adjusting screw
- 3. Seal

b. Carry out the adjustment and seal again the adjusting screw seat by means of the suitable cap.

7. Install the detached components by reversing the order of removal, then carry out further adjustment.

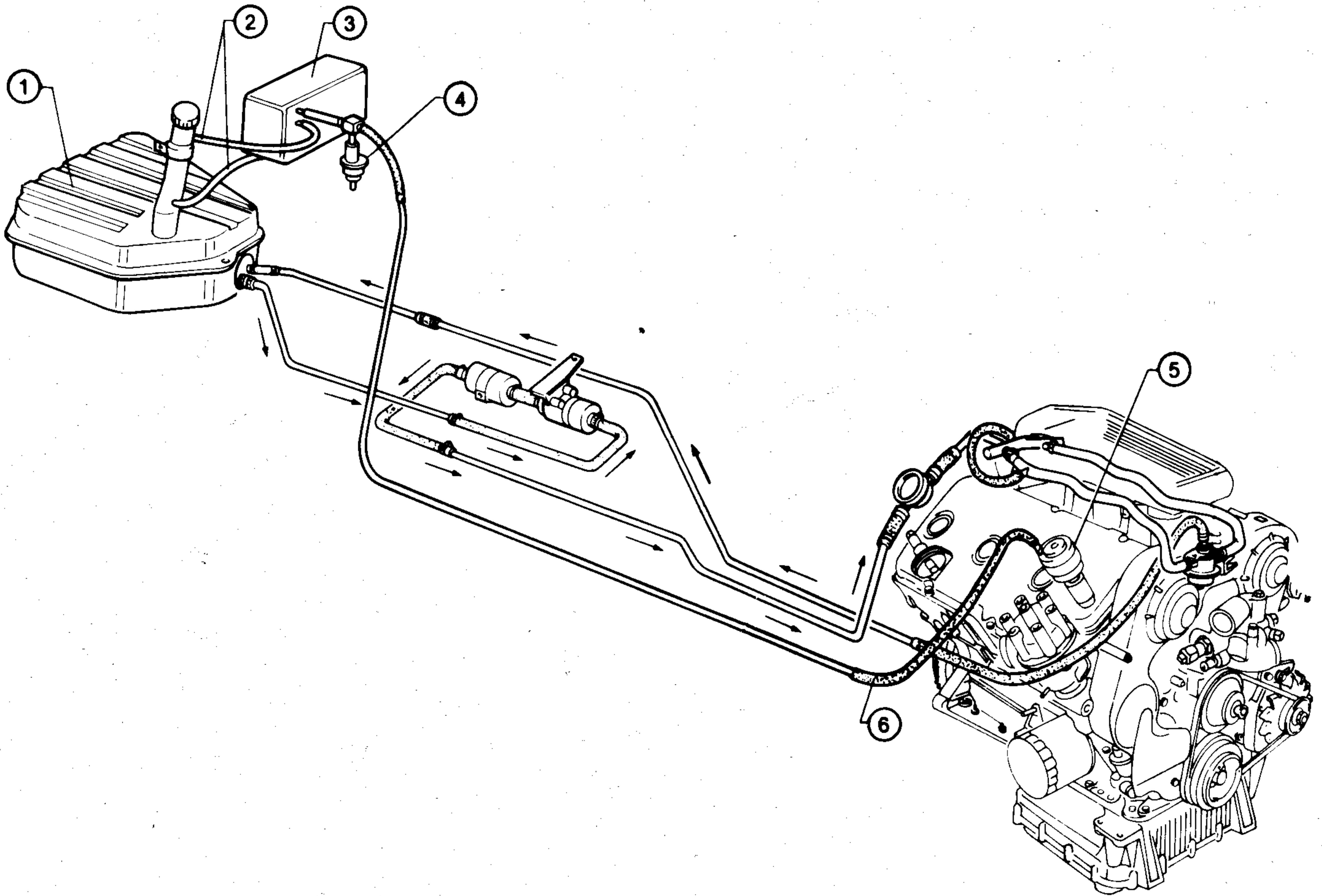
FUEL SYSTEM

EXHAUST EMISSION CONTROL SYSTEM

Alfa 90

Alfa 75

(For Australia only)

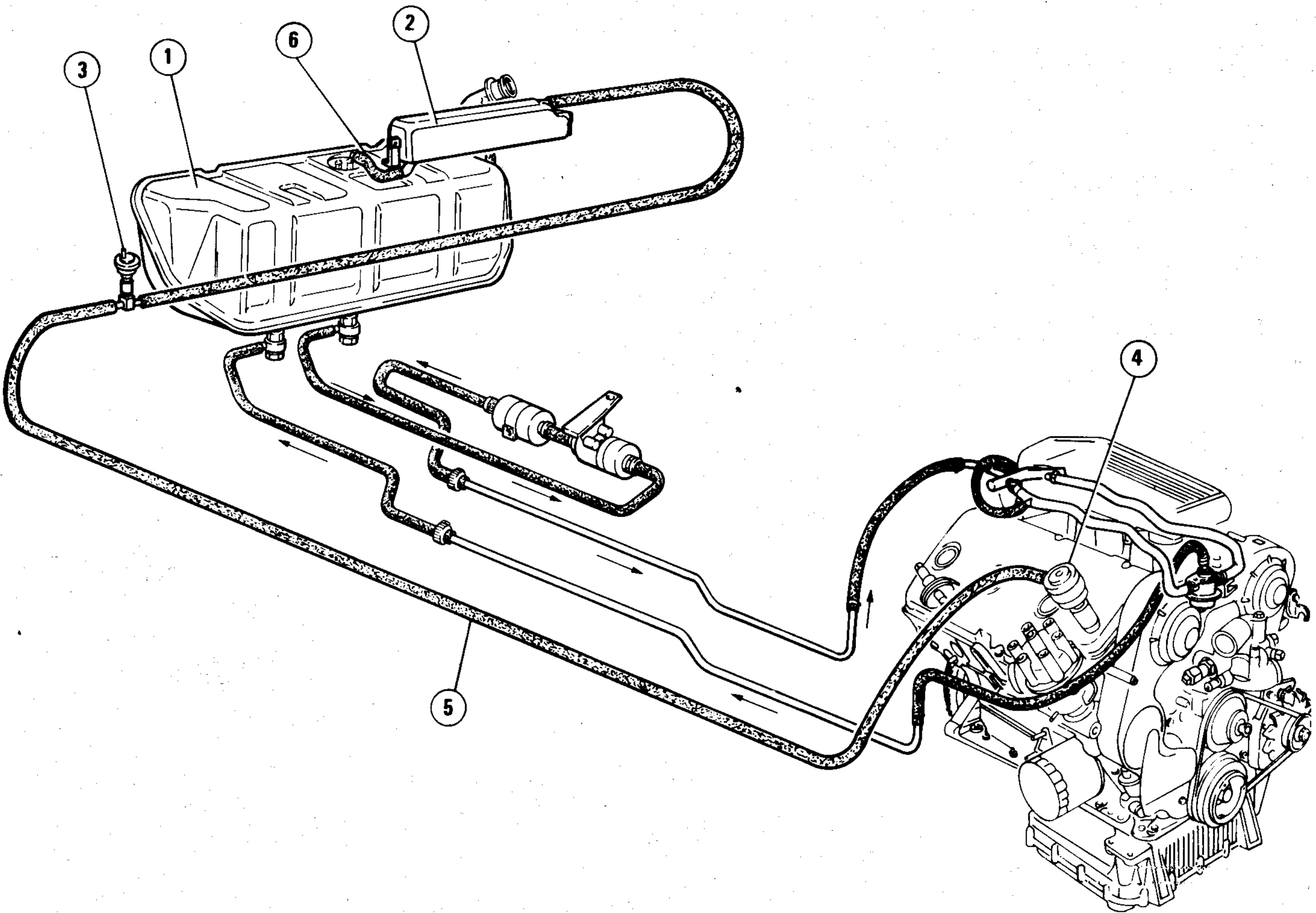


1. Fuel tank
2. Fuel vapour venting hose
3. Vapour separating tank
4. Fuel vapour venting valve
5. Oil vapour separator
6. Fuel vapour hose

EXHAUST EMISSION CONTROL SYSTEM

GTV 6 2.5

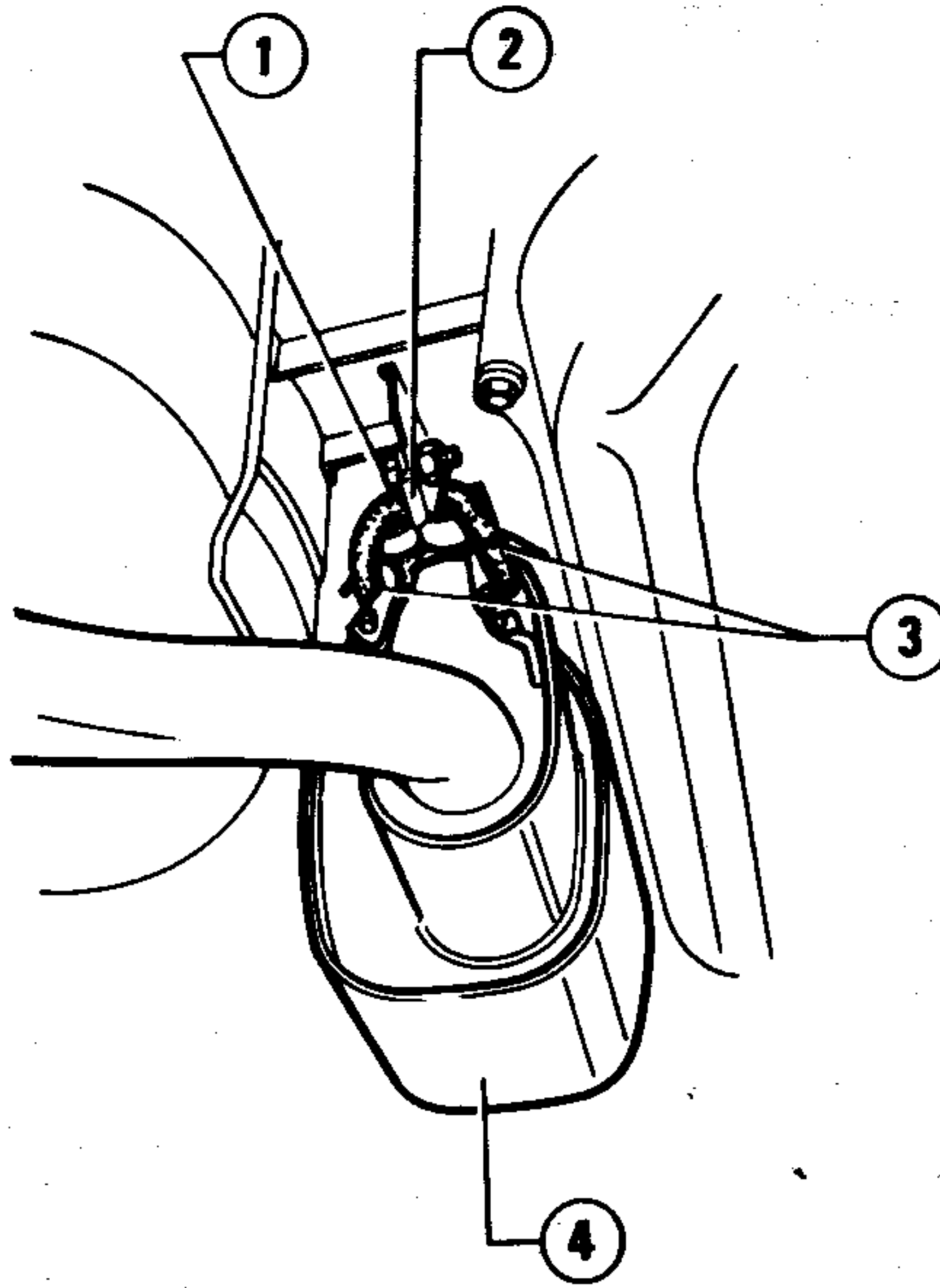
(For Australia only)



- 1. Fuel tank
- 2. Vapour separating tank
- 3. Fuel vapour venting valve
- 4. Oil vapour separator
- 5. Fuel vapour hose
- 6. Fuel vapour venting hose

FUEL SYSTEM

4. For the O-rings, simply release them from hooks.
5. If required, unscrew bolt ① and remove rear hook ②.
6. Carry out the installation by reversing the order of removal, making sure that, after installation, the supports can swing freely and are not tout.



- 1 Bolt
- 2 Rear hook
- 3 Retaining rings
- 4 Silencer - rear section

FUEL SYSTEM

SPECIFICATIONS AND GENERAL REQUIREMENTS

6 cylinders **Alfa 90 2.5**  **iniezione**

6 cylinders **Alfa 75 2.5**  **6V iniezione**

6 cylinders **GTV 6 2.5**

SPECIFICATIONS

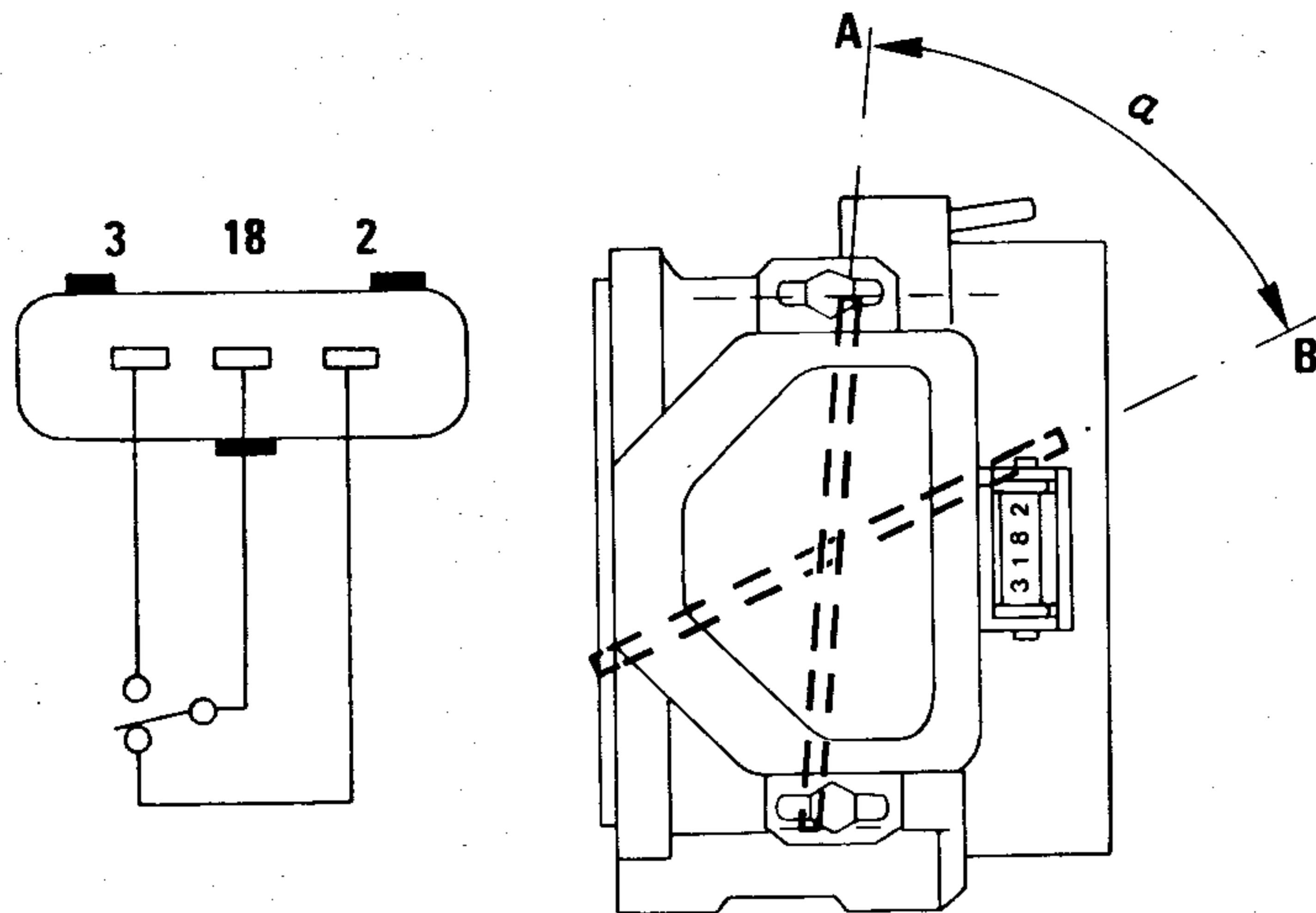
SUPPLY AND INJECTION SYSTEM COMPONENTS

Component	ALFA ROMEO Std. Number	Type
Main fuel pump	116.46.04.021.00	BOSCH 0.580.464.020
	119.11.04.021.00	BOSCH 0.580.464.013
Fuel pressure regulator	119.11.32.045.00	BOSCH 0.280.160.210
Electroinjectors	119.11.11.300.00	BOSCH 0.280.150.105
Air flow gauge	116.46.11.013.00	BOSCH 0.280.202.013
Control unit	116.46.11.042.00	BOSCH 0.280.001.117

FUEL TANK

Features	Unit: litres (Imp.gall)	
	Alfa 90	Alfa 75
Overall capacity	49 (10.78)	GTV 6 2.5 75 (16.5)
Reserve	8 (1.76)	8 to 10 (1.76 to 2.2)

SETTING OF ACCELERATOR THROTTLE SWITCH



- 2 — Idle r.p.m. terminal
(corresponding to position A: throttle closed)
- 3 — Peak r.p.m. terminal
(corresponding to position B: throttle open)

Unit: Ω

Resistance	
Terminals 2-18	Terminals 3-18
0	∞
∞	0

Accelerator throttle fully closed

Accelerator throttle open by an angle $\alpha = 58^\circ$

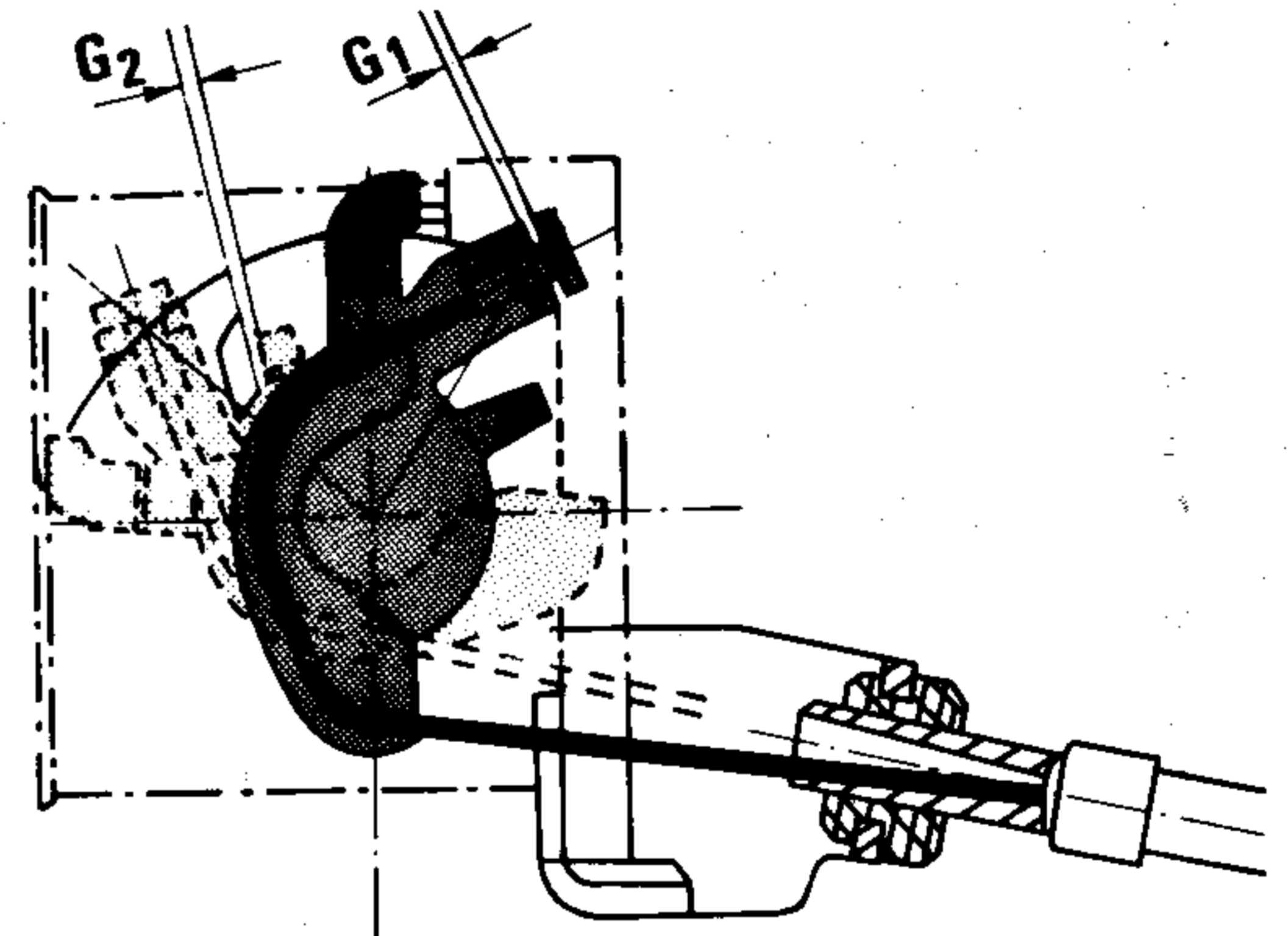
ACCELERATOR CONTROL **Alfa 90** **Alfa 75**

Backlash between throttle control lever and accelerator cable end
(with accelerator pedal at rest)

$$G_1 = 1 \text{ to } 2 \text{ mm (0.0394 to 0.0787 in)}$$

Backlash between throttle control lever and end-of-travel
(with accelerator pedal at the end-of-travel)

$$G_2 = 1 \text{ to } 2 \text{ mm (0.0394 to 0.0787 in)}$$



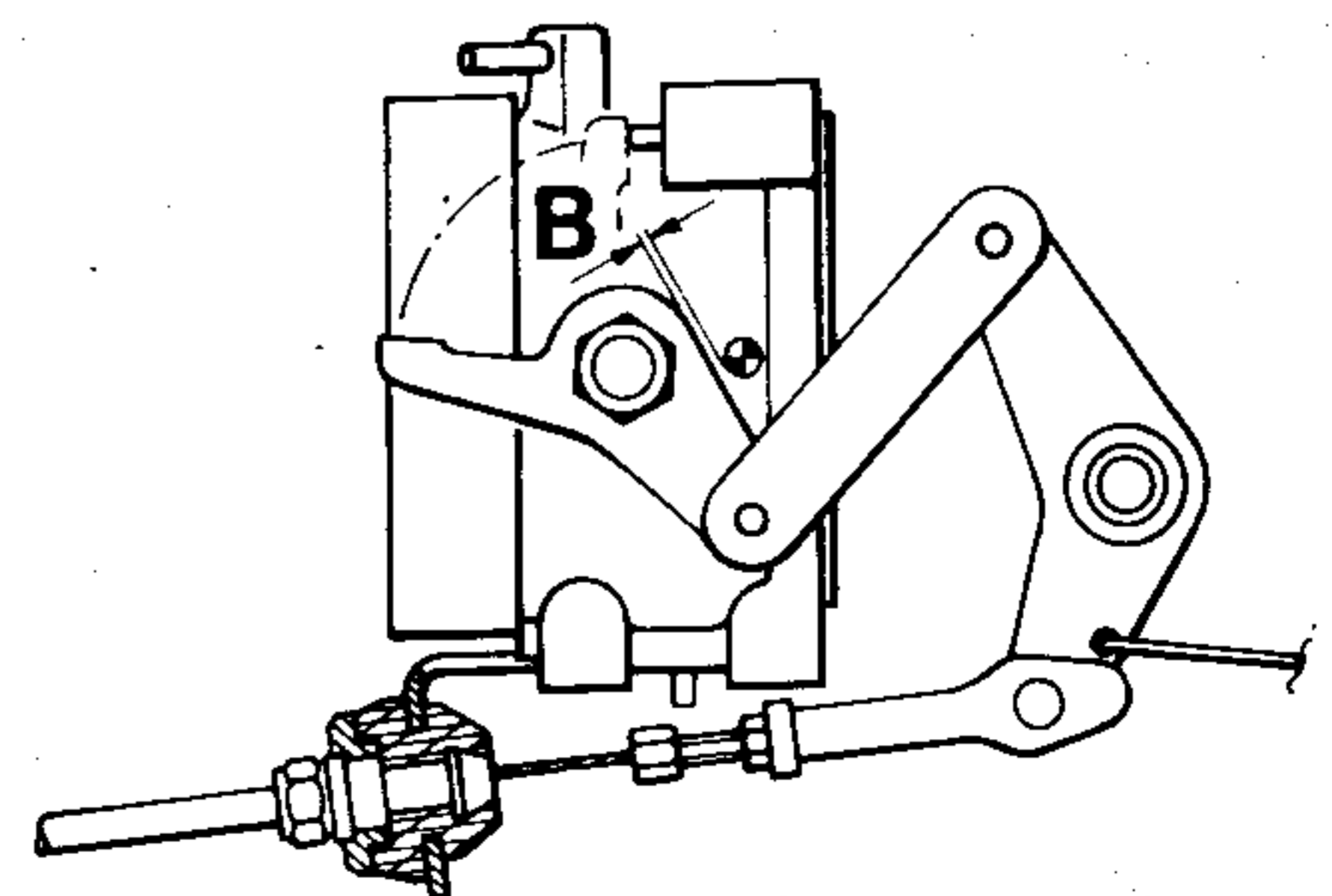
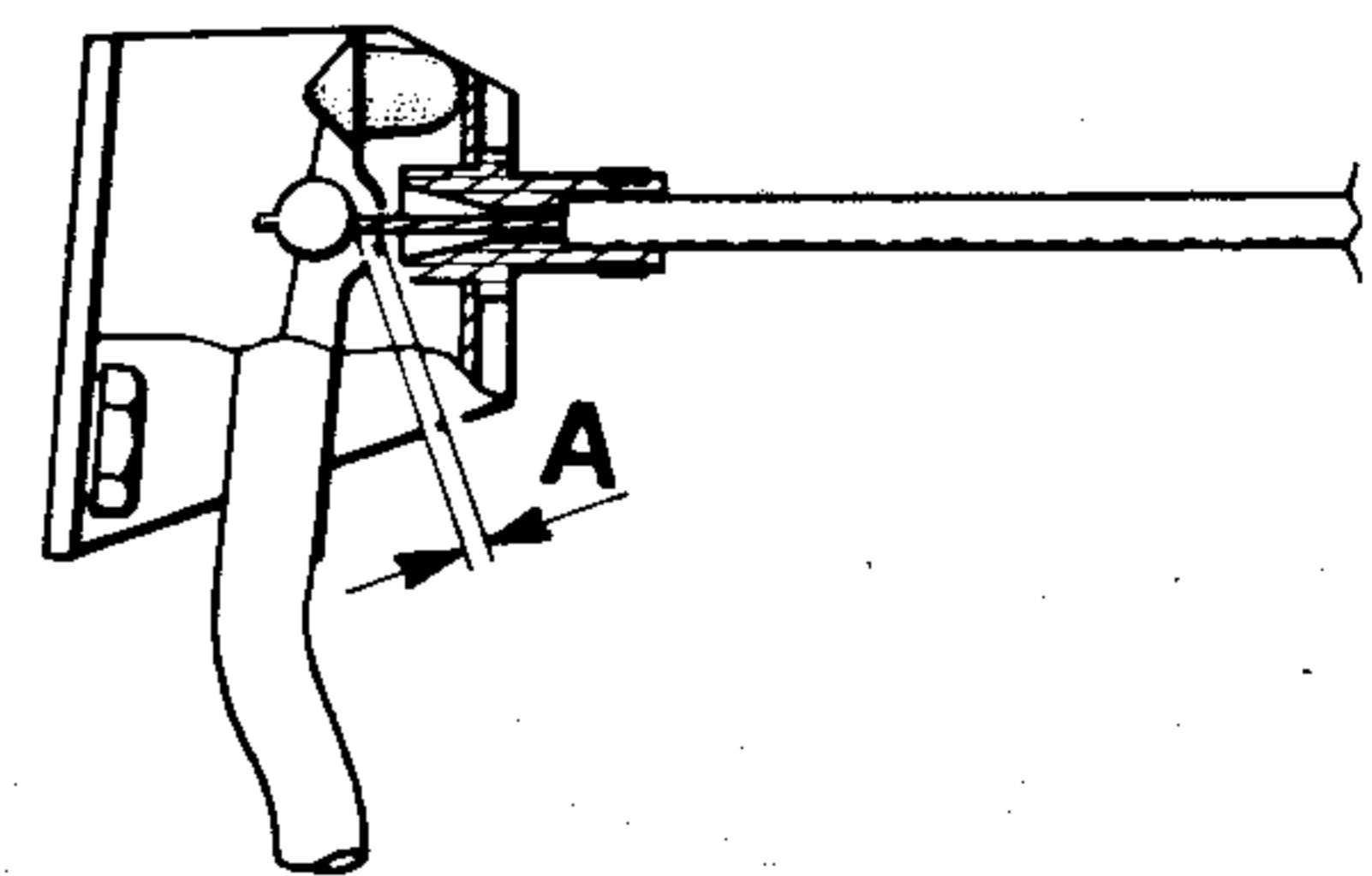
ACCELERATOR CONTROL **GTV 6 2.5**

Accelerator pedal idle before throttle opening

$$A = 1 \text{ mm (0.0394 in)}$$

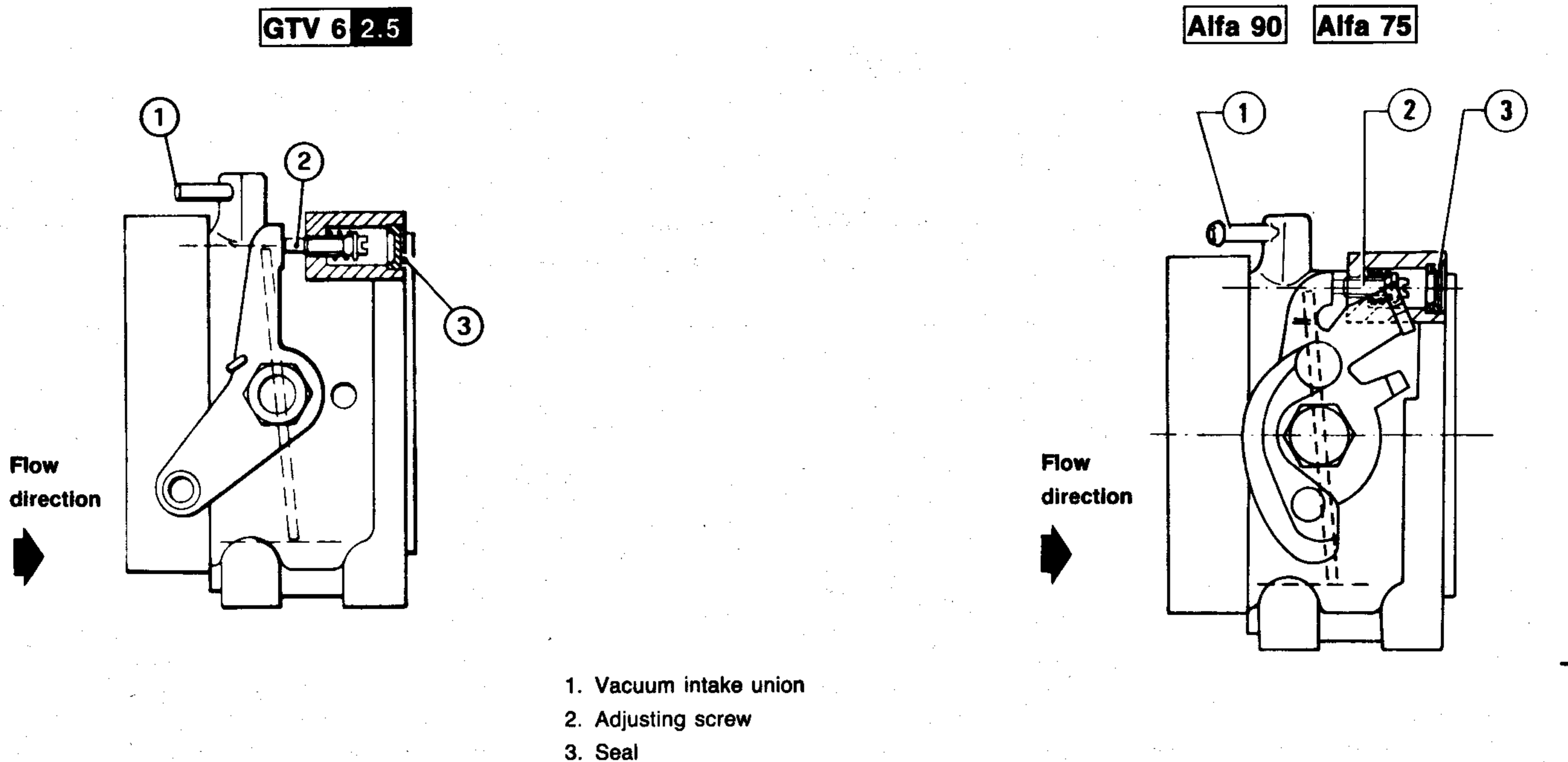
Backlash between throttle control lever and end-of-travel
(with accelerator pedal at the end-of-travel)

$$B = 0.5 \text{ to } 1 \text{ mm (0.0196 to 0.0394 in)}$$



FUEL SYSTEM

SETTING OF THROTTLE BODY (CHECK WITH FLOWMETER)



	Reading
Air passage with throttle valve in the closed position (Flowmeter Solex) (1)	300 N scale

(1) Plug the vacuum intake union when carrying out the measurement

GENERAL REQUIREMENTS

FLUIDS AND LUBRICANTS

Application	Type	Name	Q.ty
Accelerator pedal shaft (on support rubbers)	GREASE	ISECO Molykote Longterm n. 2 Std. N. 3671-69831	—

FUEL

Petrol with Octane Number: (R.M.) ≥ 98 and sensitivity (1) ≤ 11

(1) Difference between Research Method Octane Number and Motor Method Octane Number

FUEL SYSTEM

TROUBLE DIAGNOSIS AND CORRECTIVE ACTION

QUICK DIAGNOSIS

NOTE:

The correct use of this trouble diagnosis procedure assumes vehicle to be in order (transmission in particular), and engine in good functioning conditions (valves, cylinders, couplings).

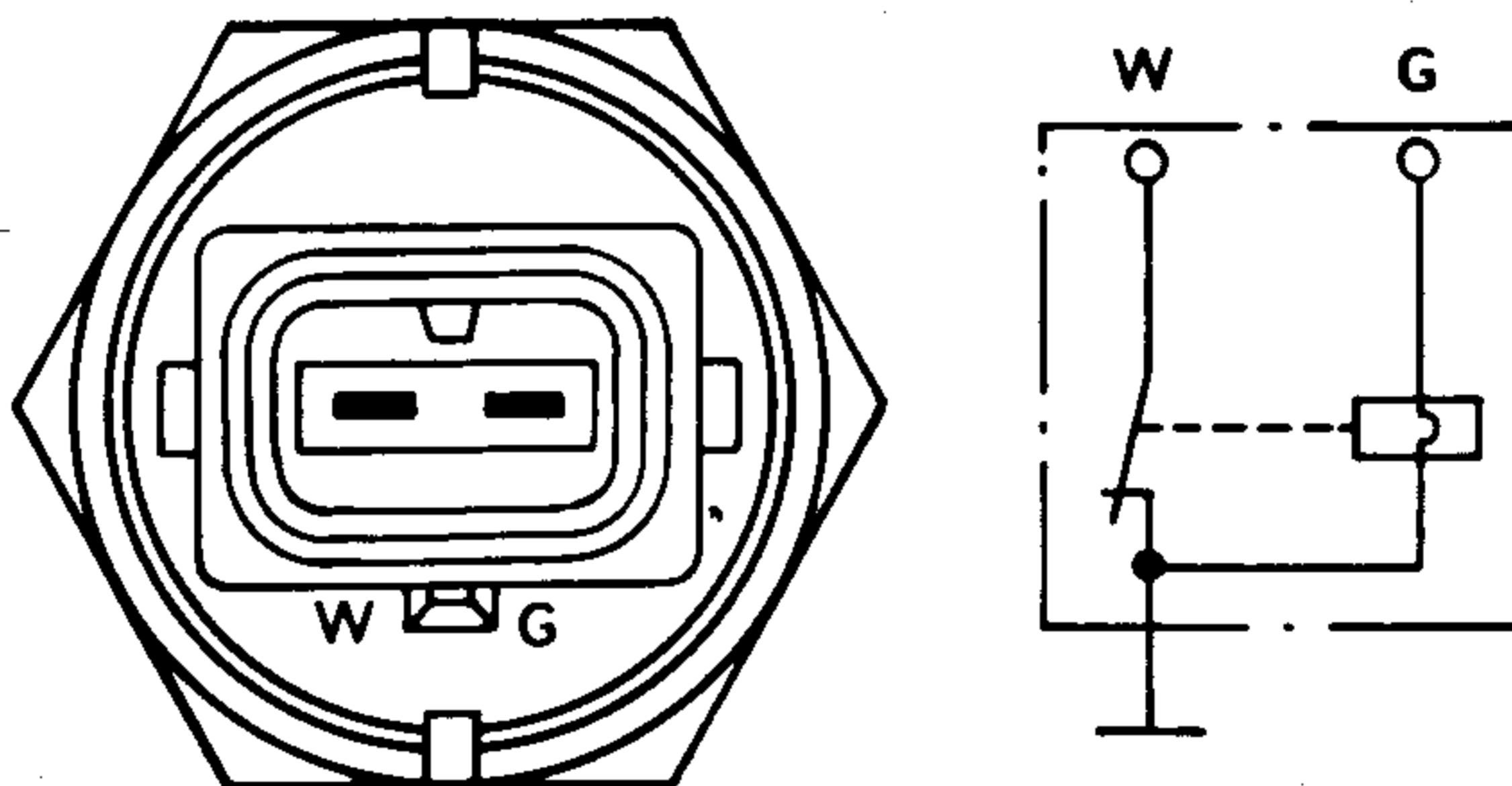
1 Cold starting is difficult or impossible 2 Warm starting is difficult or impossible 3 Engine starts and stalls immediately 4 Irregular functioning during warm-up 5 Irregular idle r.p.m. 6 Fail to reach max speed 7 Excessive fuel consumption 8 Engine misses in all running conditions 9 Idle CO value too high 10 Idle CO value too low										Symptoms	
1	2	3	4	5	6	7	8	9	10	Probable cause	Corrective action
X	X	X	X	X	X	X	X			<ul style="list-style-type: none"> Poor connections of system connectors and/or wiring continuity absent 	Check correct connection of connectors and electric continuity
X	X	X								<ul style="list-style-type: none"> Double relay faulty 	Replace relay
X	X	X		X	X					<ul style="list-style-type: none"> Air and/or fuel piplug incorrectly connected or damaged 	Check, and restore if required
X	X	X			X		X			<ul style="list-style-type: none"> Fuel pump faulty or delivery insufficient 	Check pump and related connector
X	X	X		X	X		X		X	<ul style="list-style-type: none"> Fuel pressure too low 	Check functioning of pump and pressure regulator Check delivery piping Verify supply system filter
	X	X		X		X				<ul style="list-style-type: none"> Fuel pressure too high 	Check pressure regulator Check return piping
X										<ul style="list-style-type: none"> Cold starting electroinjector fails to open 	Replace electroinjector

ELECTRICAL DATA

COLD STARTING ELECTROINJECTOR

Data	Measurement unit
Resistance between terminals	4 Ω

THERMO-TIME SWITCH



		Values
Triggering temperature	°C (°F)	30 to 40 (86 to 104)
Triggering max time (at -20°C)	s.	8

Resistance		Temperature	
		<30°C (<80°F)	>40°C (>104°F)
Between Terminal W and ground	Ω	0	100 to 160
Between Terminal G and ground and between Terminals G and W	Ω	25 to 40	50 to 80

ENGINE TEMPERATURE SENSOR

Resistance between terminals	Temperature
7 to 12 kΩ	10°C (50°F)
2 to 3 kΩ	20°C (68°F)
250 to 400 Ω	30°C (86°F)

FUEL SYSTEM

c. Turn throttle unit as directed under «Tuning and Adjustments».

THROTTLE STOP ACTUATOR (TSA)

TSA consists of a d.c. motor activated directly by ECU.

TSA actuates throttle abutment lever.

Upon starting, TSA permits correct throttle opening to secure optimum starting conditions in relation to engine temperature. During warm-up, TSA progressively reduces throttle angle down to normal idle, and thereafter maintains idle speed whenever extra loads (i.e. air conditioner, fans heated rear window) are inserted.

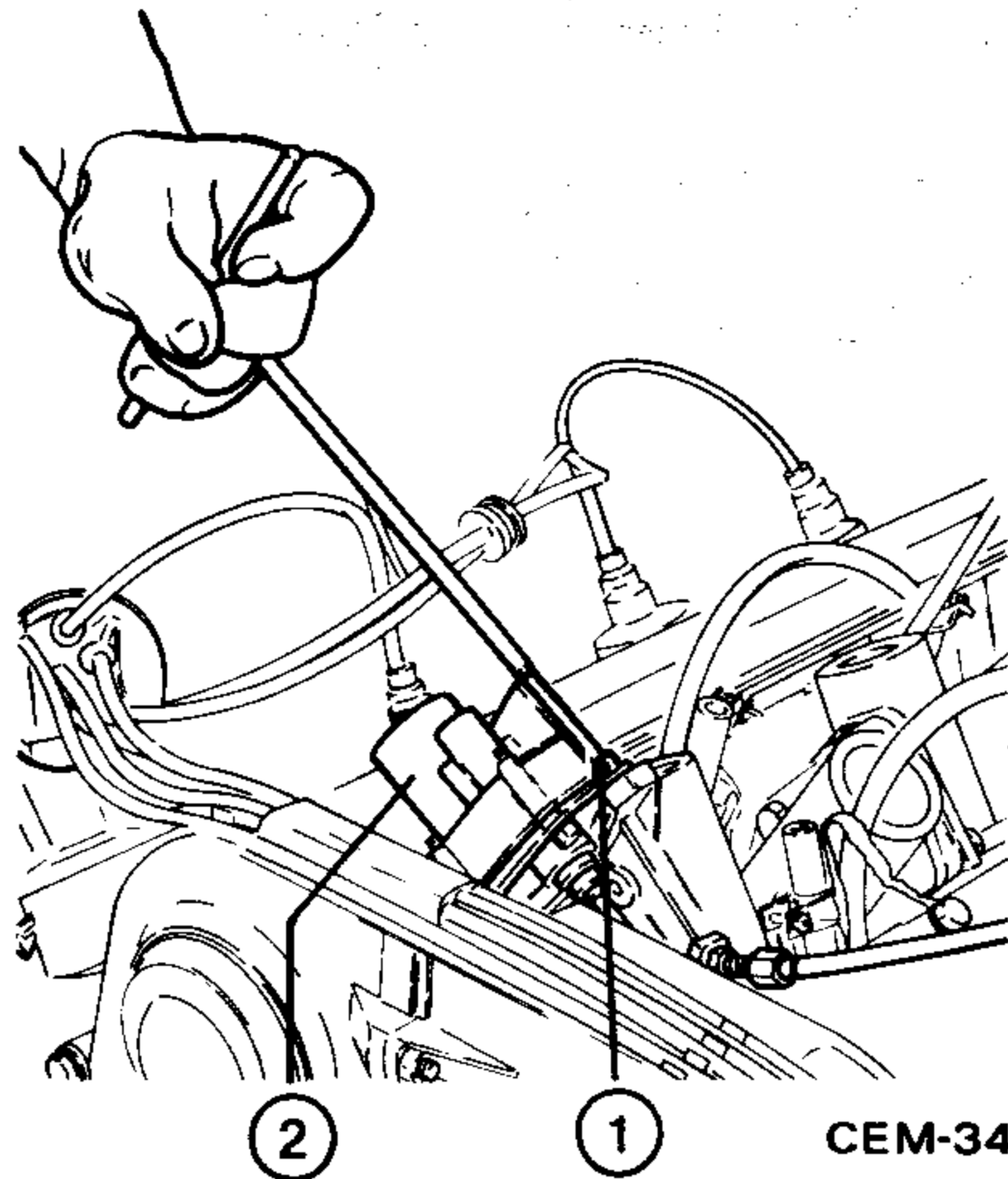
TSA operates only with accelerator pedal released; upon accelerating TSA remains in the position previously taken up.

ELECTRICAL CHECKS

See «Electrical Checks» section.

REMOVAL

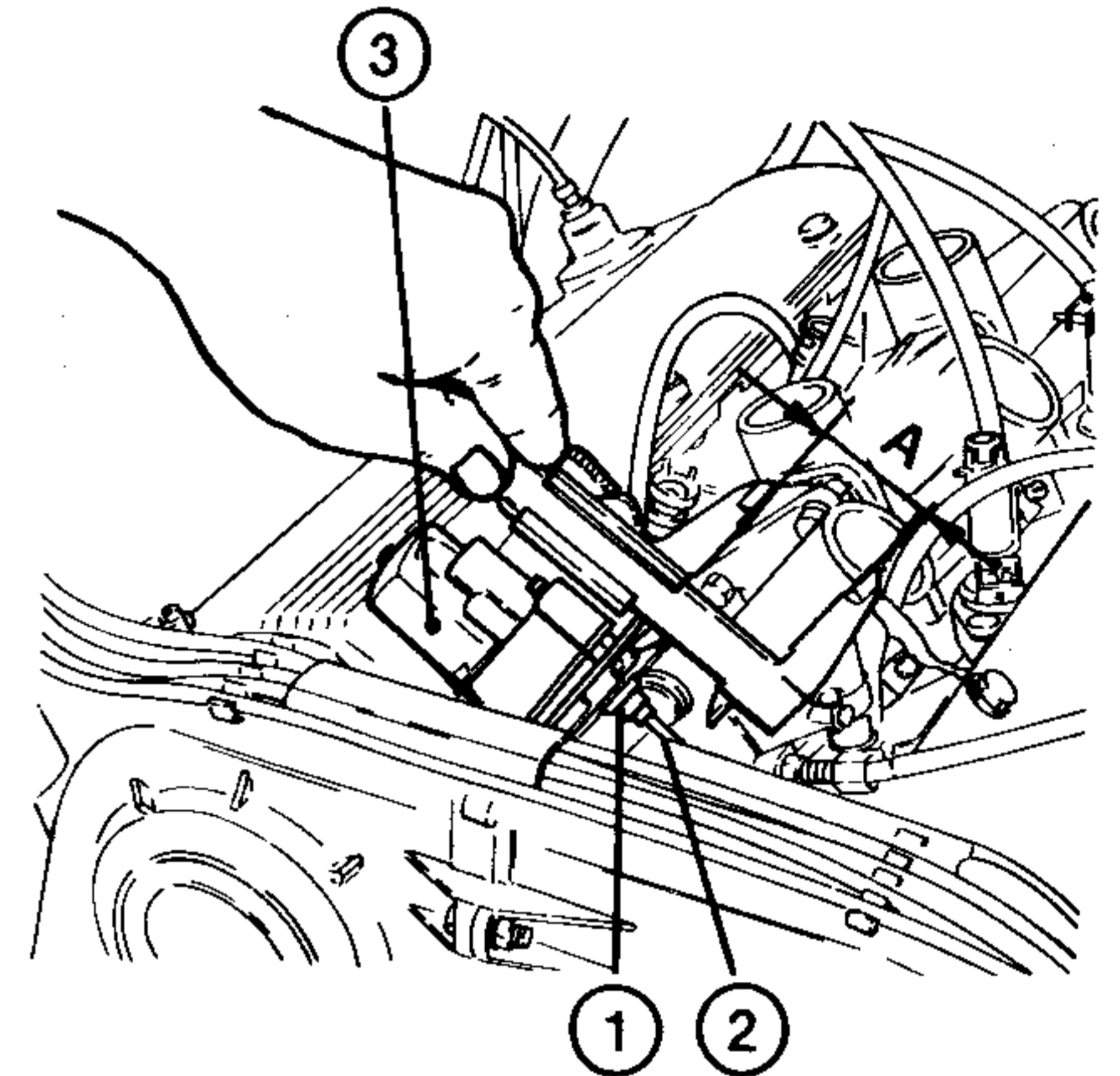
a. Back off two hex. socket head cap-screws (1) and remove TSA (2) from front throttle body support.



1. TSA screws
2. Throttle stop actuator

d. Install screw (2) on TSA plunger (1) adjusting standout «A» with switch closed (1) to 34 ± 0.25 mm (1.33 ± 0.009 in). To close switch press on plunger lightly.

A = Screw and plunger standout
(switch closed, plunger in)
 34 ± 0.25 mm
(1.33 ± 0.009 in)



CEM-35

1. Plunger
2. Adjusting screw
3. TSA

INSTALLATION

For TSA installation proceed as follows:

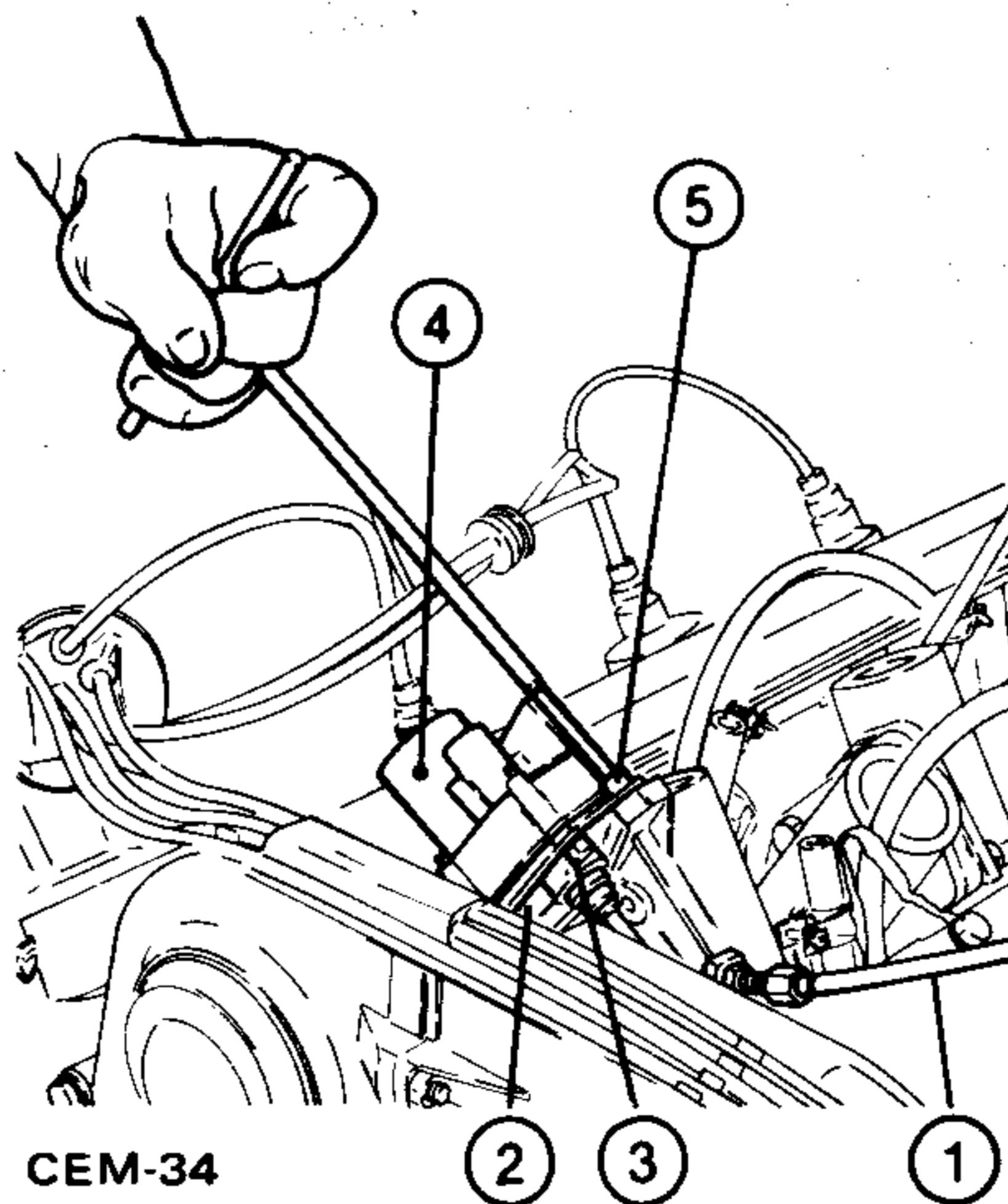
- a. Check for proper accelerator cable (1) connection to pulley.
- b. Install TSA carrier plate (2) on TSA tightening nuts (3) to 5.5 Nm (0.56 kgm; 4.05 ft.lb).
- c. Install TSA (4) to support on front throttle body using two hex. socket head capscrews (5).

e. Check that standout «B» of screw (1) from plunger (2) is 16.5 to 18.5 mm (0.64 to 0.72 in).

If this requirement is not met it is possible that plunger is not fully in.

Move plunger fully back as directed below, then readjust standout «B» of screw (1).

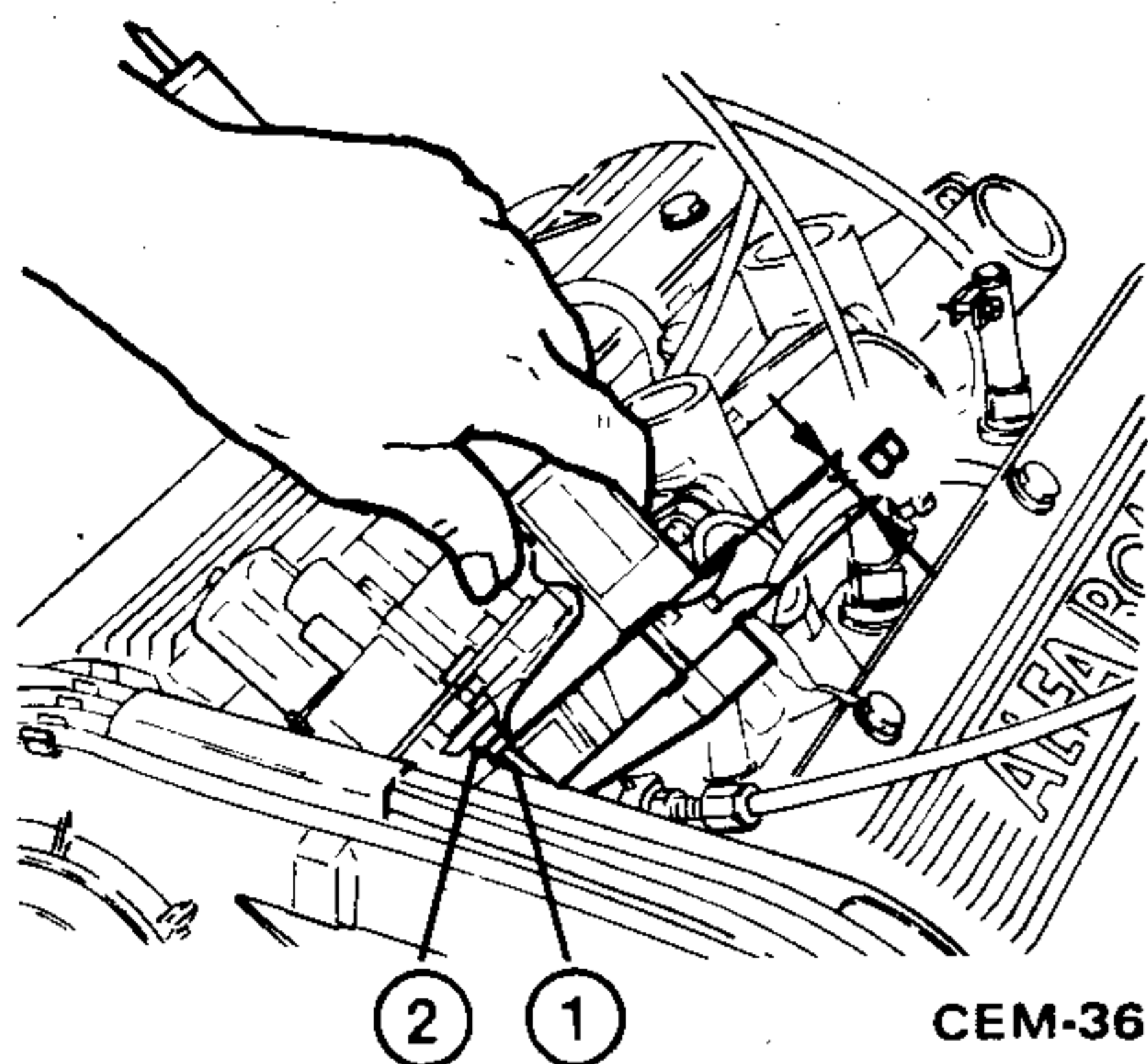
B = Screw standout relative
to plunger
16.5 to 18.5 mm
(0.64 to 0.72 in)



CEM-34

1. Accelerator cable
2. TSA carrier plate
3. Retaining nut
4. TSA
5. Retaining screw

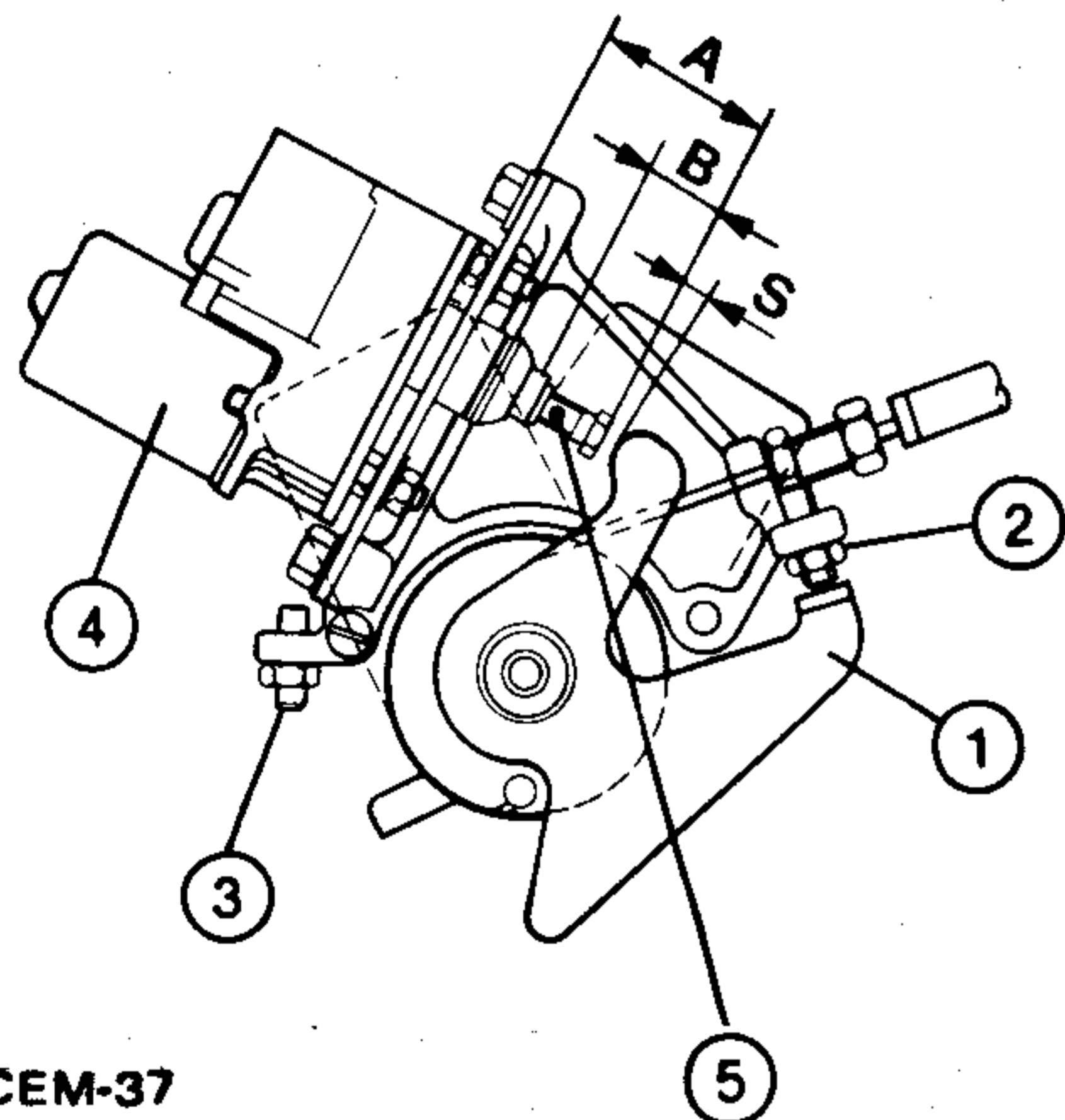
FUEL SYSTEM



1. Adjusting screw
2. Plunger

- f. Turn pulley to bring lever (1) in abutment with idle stop screw (2).
- g. Check that gap «S» with switch closed is 0.8 to 3.8 mm (0.03 to 0.15 in). Adjust idle screw (2) as necessary.

S = Gap between actuator screw (plunger fully back) and throttle lever
0.8 to 3.8 mm
(0.03 to 0.15 in)



1. Idle limit travel lever (throttles closed)
2. Idle adjusting screw
3. WOT adjusting screw
4. TSA
5. Actuator screw

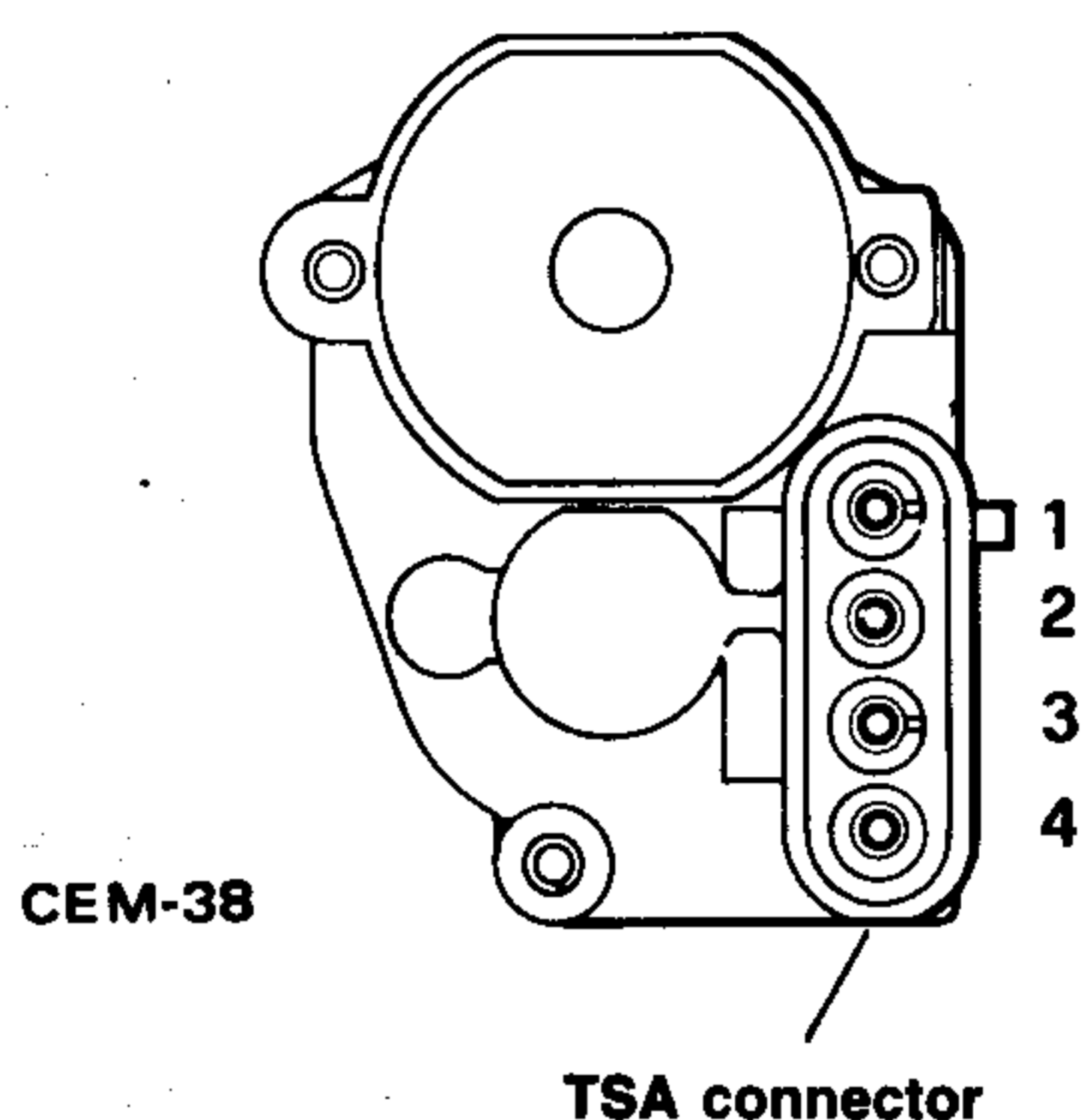
A = Screw and plunger standout (plunger in)
34 ± 0.25 mm
(1.33 ± 0.009 in)

B = Screw standout relative to plunger
16.5 to 18.5 mm
(0.64 to 0.72 in)

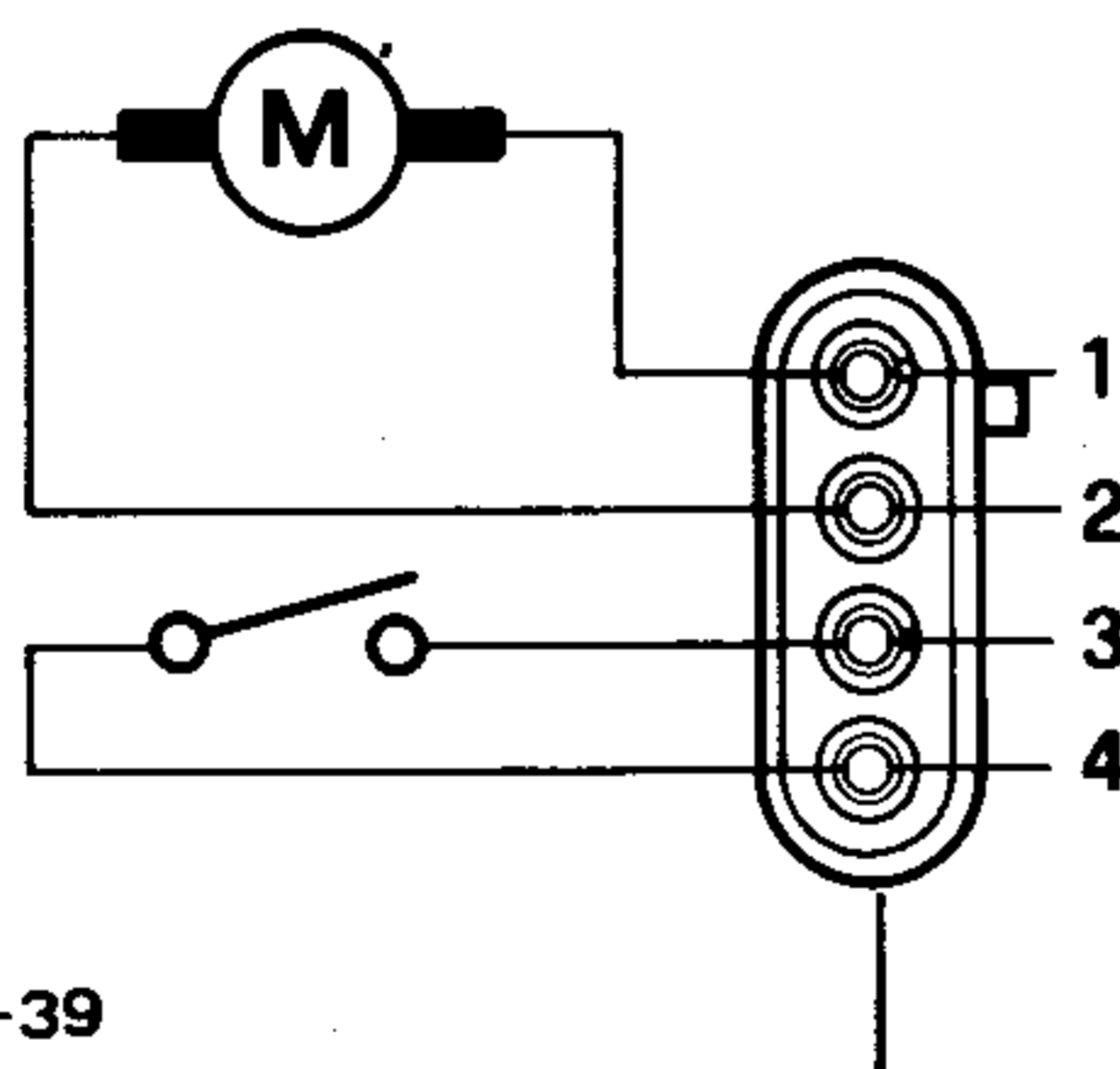
S = Gap between plunger and lever
0.8 to 3.8 mm
(0.03 to 0.15 in)

Plunger backup

To move plunger fully back without damaging TSA, establish electrical connections as indicated in the wiring diagram below or using tool C.9.0031 to be connected to TSA connector.



CEM-38



CEM-39

Wiring connector

Wiring connector

- a. Lightly press on TSA plunger to close the switch.
- b. Supply circuit at 10 to 12 V through terminals (3) and (4) until plunger stops in fully back position as switch opens.

CAUTION:

Do not connect TSA motor directly through terminals (1) and (2) otherwise TSA may be damaged as plunger locks at stroke end.

THROTTLE ANGLE SENSOR (TAS)

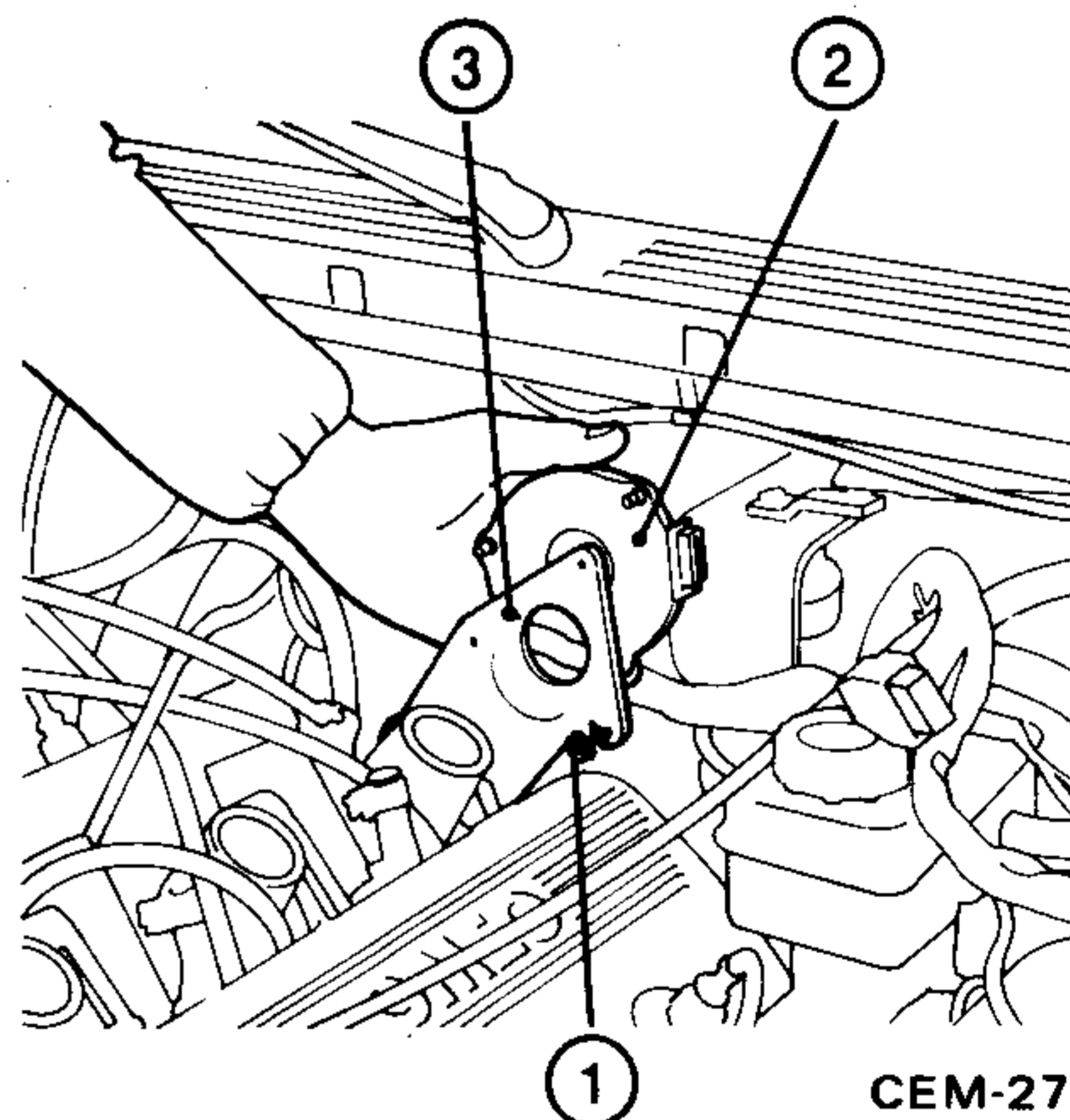
TAS is connected to throttle lever on rear body to provide information on load required by engine and produce exact ignition advance and the correct volume of fuel to be injected.

ELECTRICAL CHECKS

See «Electrical Checks» section.

REMOVAL

- a. Back off three nuts and washers (1) and remove TAS (2) from support (3) on rear throttle body.



CEM-27

1. Nuts and washers
2. TAS
3. Support

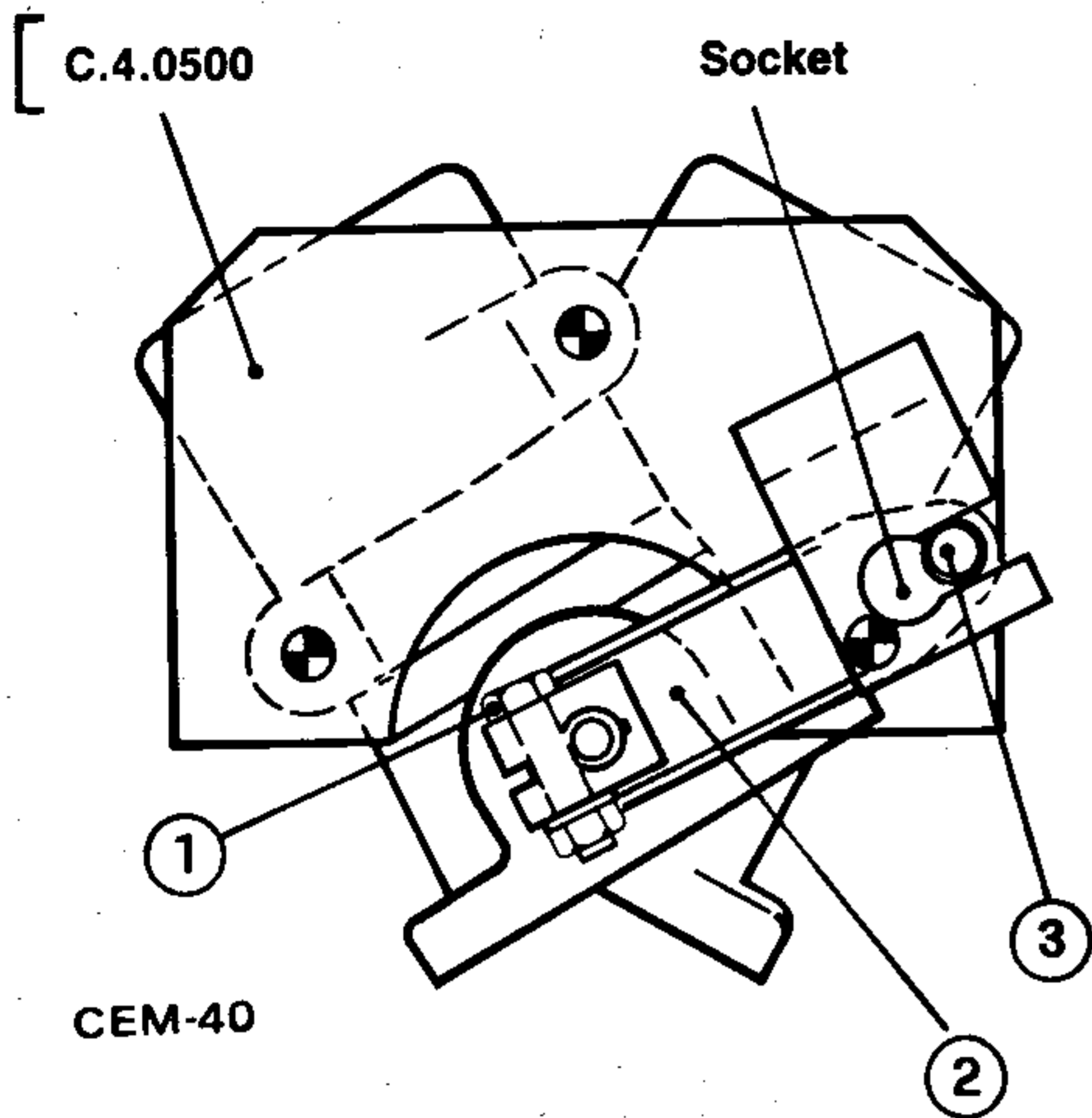
INSTALLATION

For TAS installation proceed as follows:

- a. **TAS lever adjustment**
 - Slacken screw (1) of TAS lever (2) on rear throttle body so that it is free to turn relative shaft.
 - Install tool C.4.0500 for positioning lever (2) as shown in figure, inserting ball end (3) in tool socket.

FUEL SYSTEM

- Tighten screw (2) to lock lever in this position.

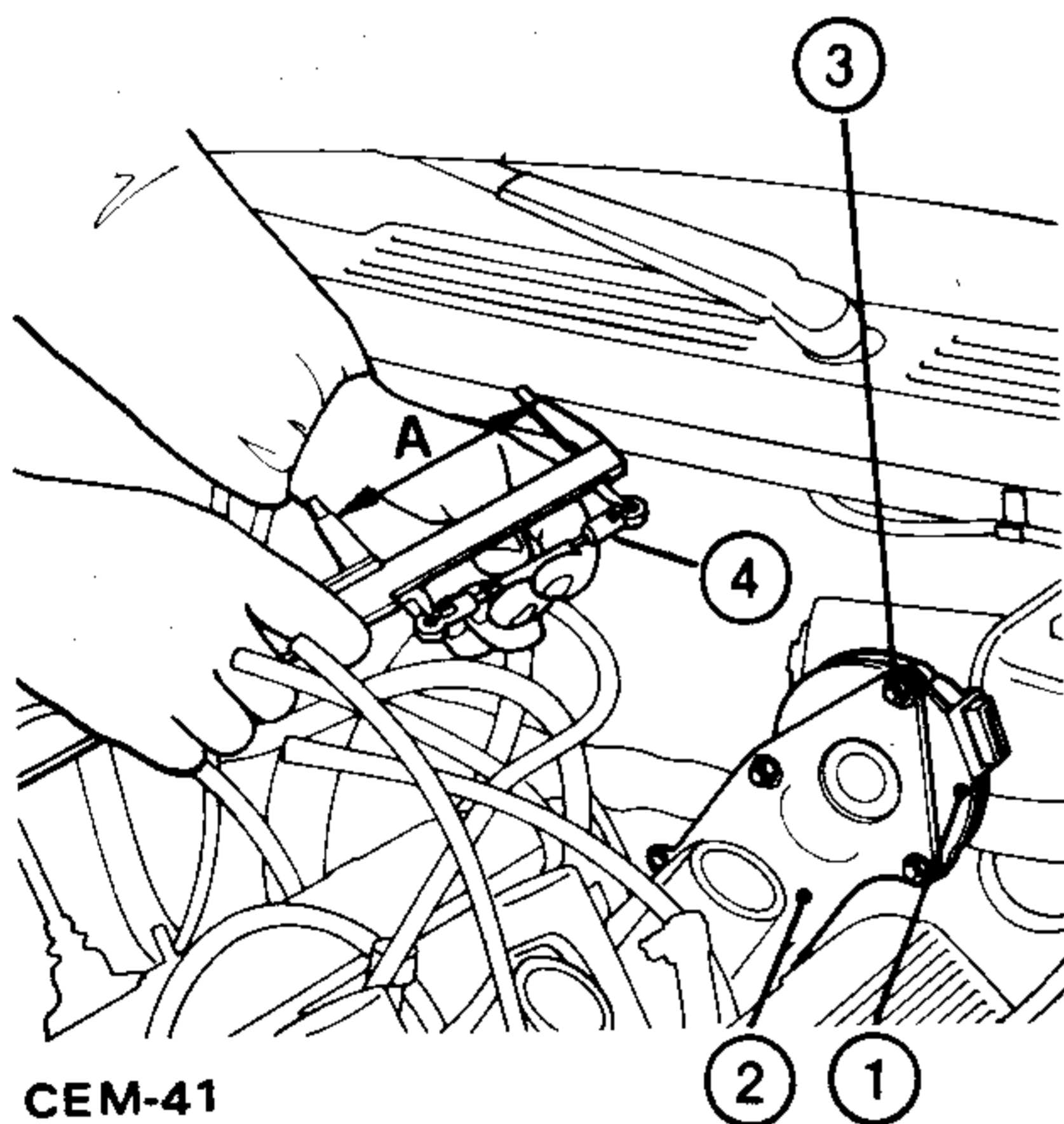


1. Retaining screw
2. TAS lever
3. Ball end

b. In position shown TAS lever angle is $62^\circ \pm 5'$.

c. Install TAS (1) on support (2) using nuts and washers (3).

d. Check that length of link (4) (center distance) is 105.75 to 106.15 mm (4.12 to 4.15 in).

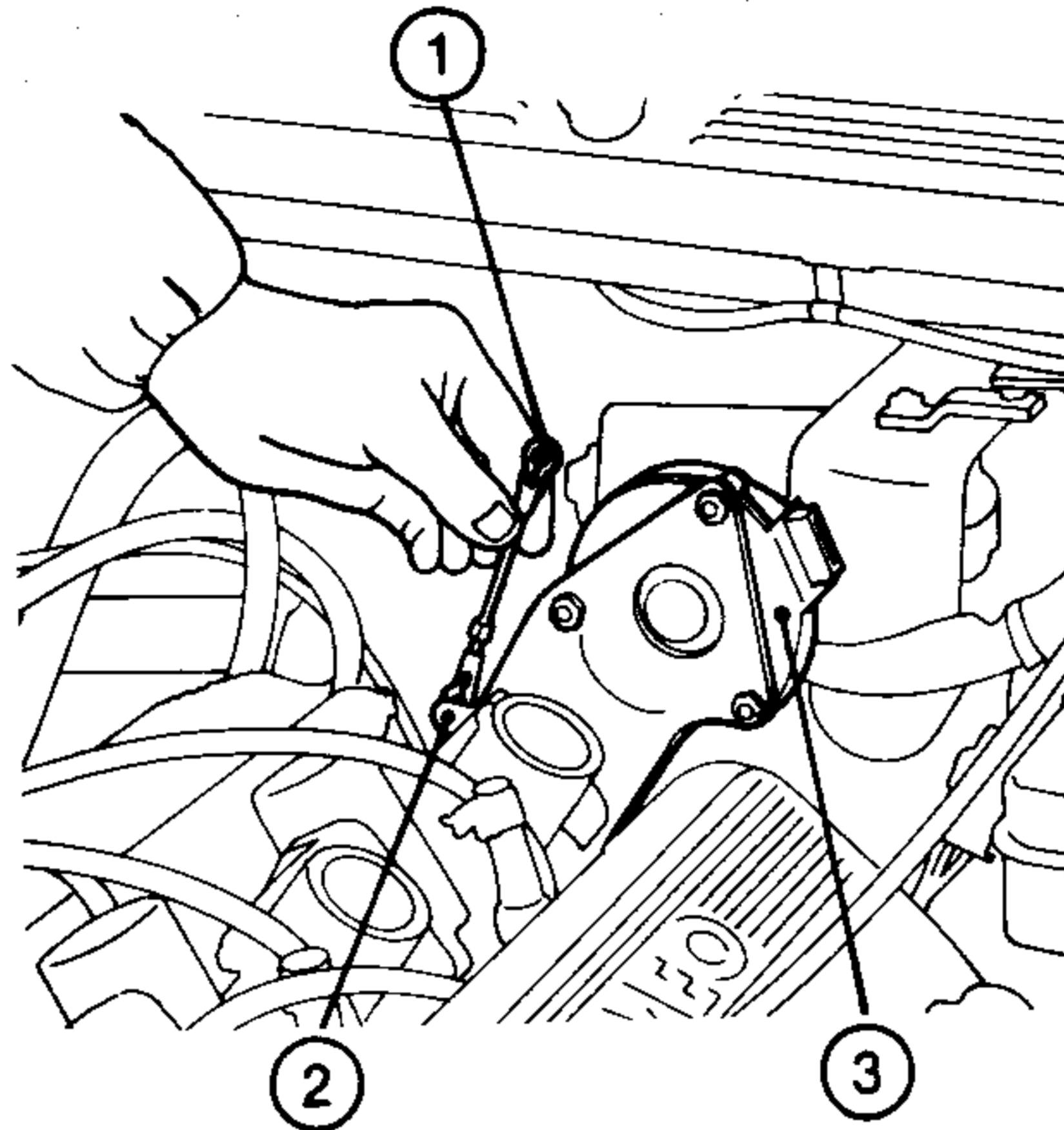


1. TAS
2. TAS support
3. Nuts and washers
4. Connecting link

**A = Link length
(ball end center distance)
105.75 to 106.15 mm
(4.12 to 4.15 in)**

e. Install link (1) with turnbuckle hexagon facing throttle lever.

On link installation ensure that ball ends are spotlessly clean on both levers and link.



CEM-42

1. Link
2. Throttle lever
3. TAS

f. Connect diagnostic tester C.9.0030 to TAS as follows:

- Disconnect harness connector from TAS;
- Connect tester connector to connector (1) of TAS (2);
- Connect tester positive (red) to battery positive and tester negative (black) to battery negative.

Pay attention not to reverse polarity.

g. Insert a 0.35 to 0.36 mm (0.0135 to 0.0140 in) feeler between idle stop screw (3) and abutment on pulley.

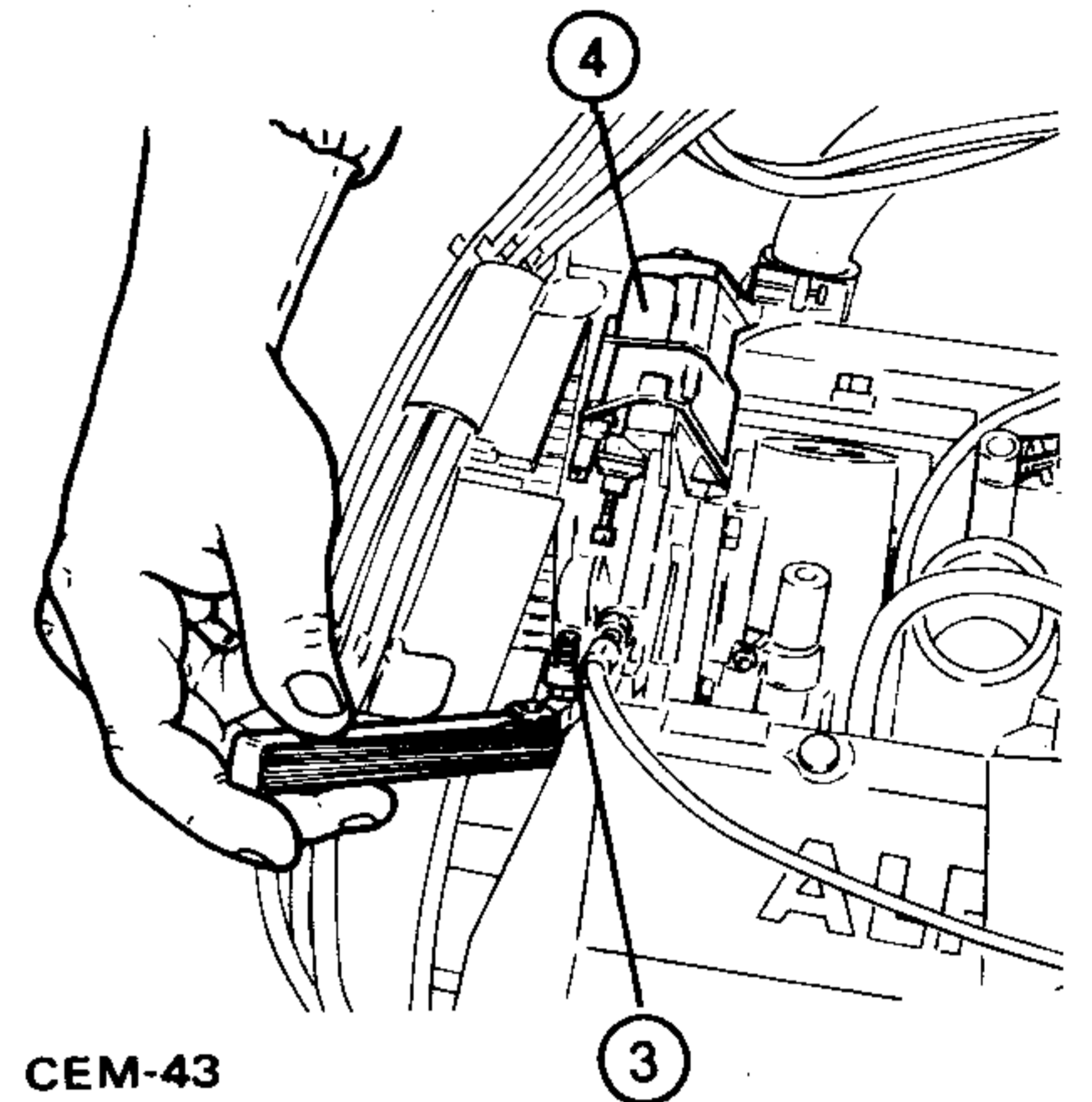
Ensure that pushrod of TAS (4) is fully in, otherwise proceed as directed under «Throttle Stop Actuator», «Plunger Backup».

h. Hold feeler in position and check that tester displays 4th TAS position, i.e. $\alpha = 003$.

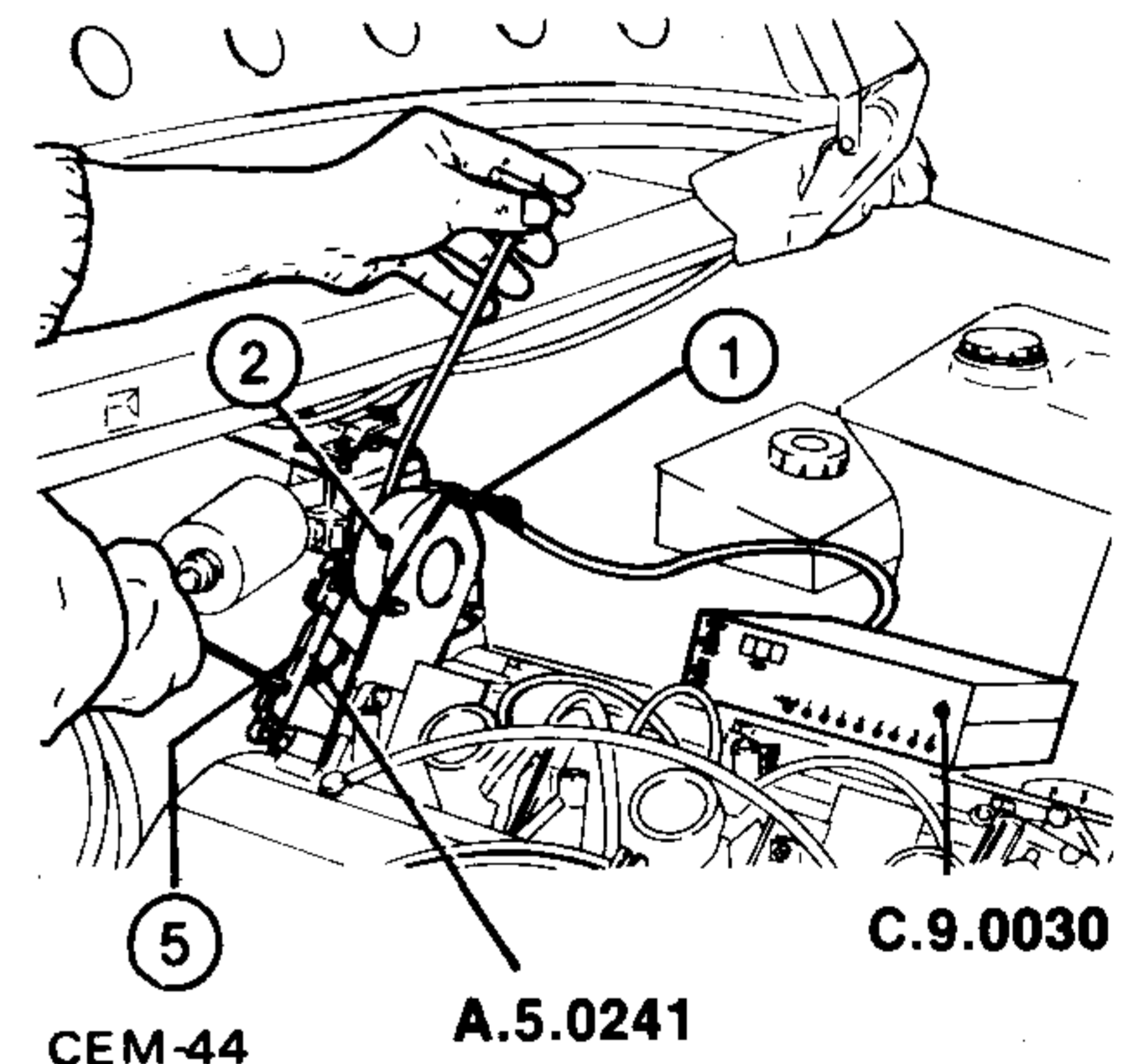
i. If reading is higher than $\alpha = 003$, shorten link (5) by rotating turnbuckle counterclockwise until the specified reading is obtained.

If the reading is lower than $\alpha = 003$ lengthen link by turning clockwise.

In the process hold both link ends (5) still with tool A.5.0241 as shown.



CEM-43



CEM-44

1. Diagnostic connector
2. TAS
3. Stop screw (idle adjust.)
4. TSA
5. Connecting link

j. Remove feeler and with throttles against abutment at idle check that diagnostic tester display shows first TAS position $\alpha = 000$.

If the specified reading is not obtained check for the anomaly preventing throttle closing.

CAUTION:

Do not actuate throttles through sensor lever otherwise correspondence of throttle opening to configuration indicated by sensor may be adversely affected.

COOLANT TEMPERATURE SENSOR (CTS)

Engine temperature is monitored through NTC sensor (resistance varies in proportion to temperature, namely low resistance for high temperatures and vice versa) which picks up coolant temperature.

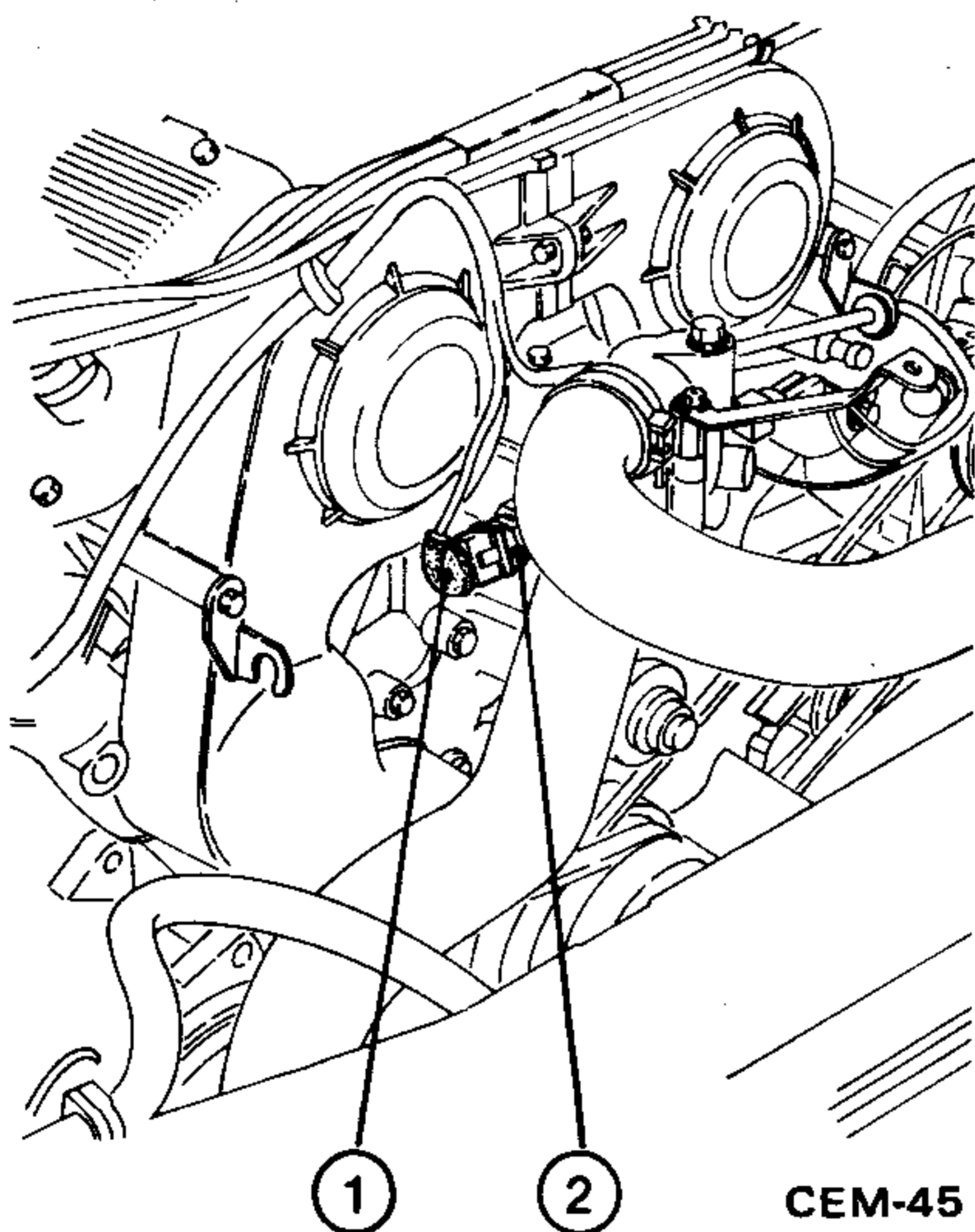
Upon starting this information is used to determine injection time, and thereafter to correct injection time contained in ECU map up to end of warm-up period.

INSPECTION

See «Electrical Tests» section.

REPLACEMENTS

- a. Disconnect harness connector ① from CTS.
- b. Using a suitable wrench, back off CTS ② from thermostat on engine front end.



1. Sensor connector
2. CTS

INSTALLATION

- a. For CTS installation adopt a reversal of the removal sequence.
- b. Check and if necessary adjust CO emission as directed in «WORKSHOP MANUAL», Alfa 90 - 6V 2.0 iniezione — Group 00 — Engine Maintenance, para. «Idle and Emission Check and Adjustment».

ELECTRONIC CONTROL UNIT (ECU)

DESCRIPTION

Signals picked up by ATS, CTS, MRS, TAS and rpm and timing sensor are fed to ECU microprocessor.

ECU processes sensor signals comparing them to optimum engine operation data stored in program memory (map).

Based on the results obtained, microprocessor supplies engine with suitable control signals through interface circuitry.

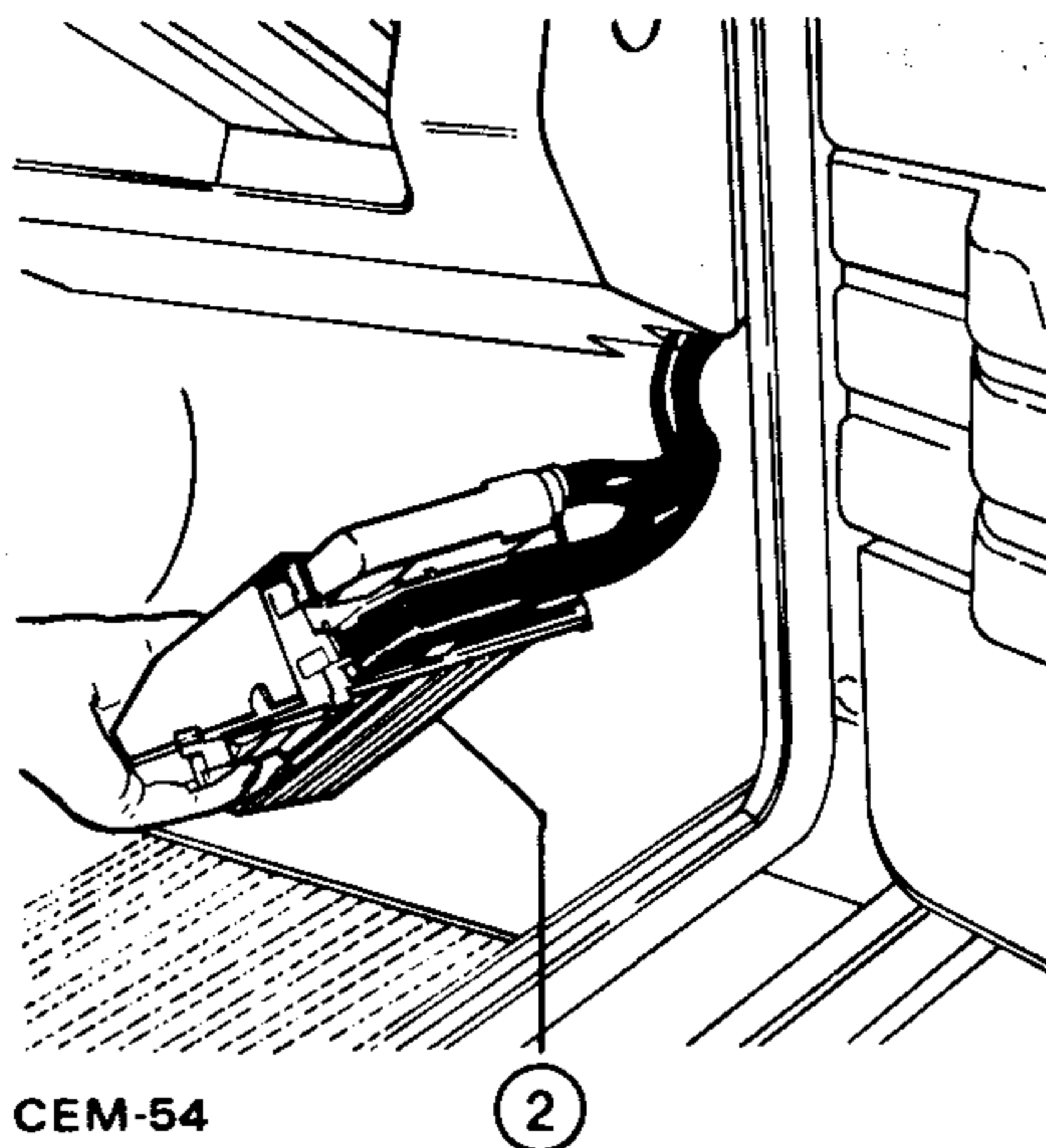
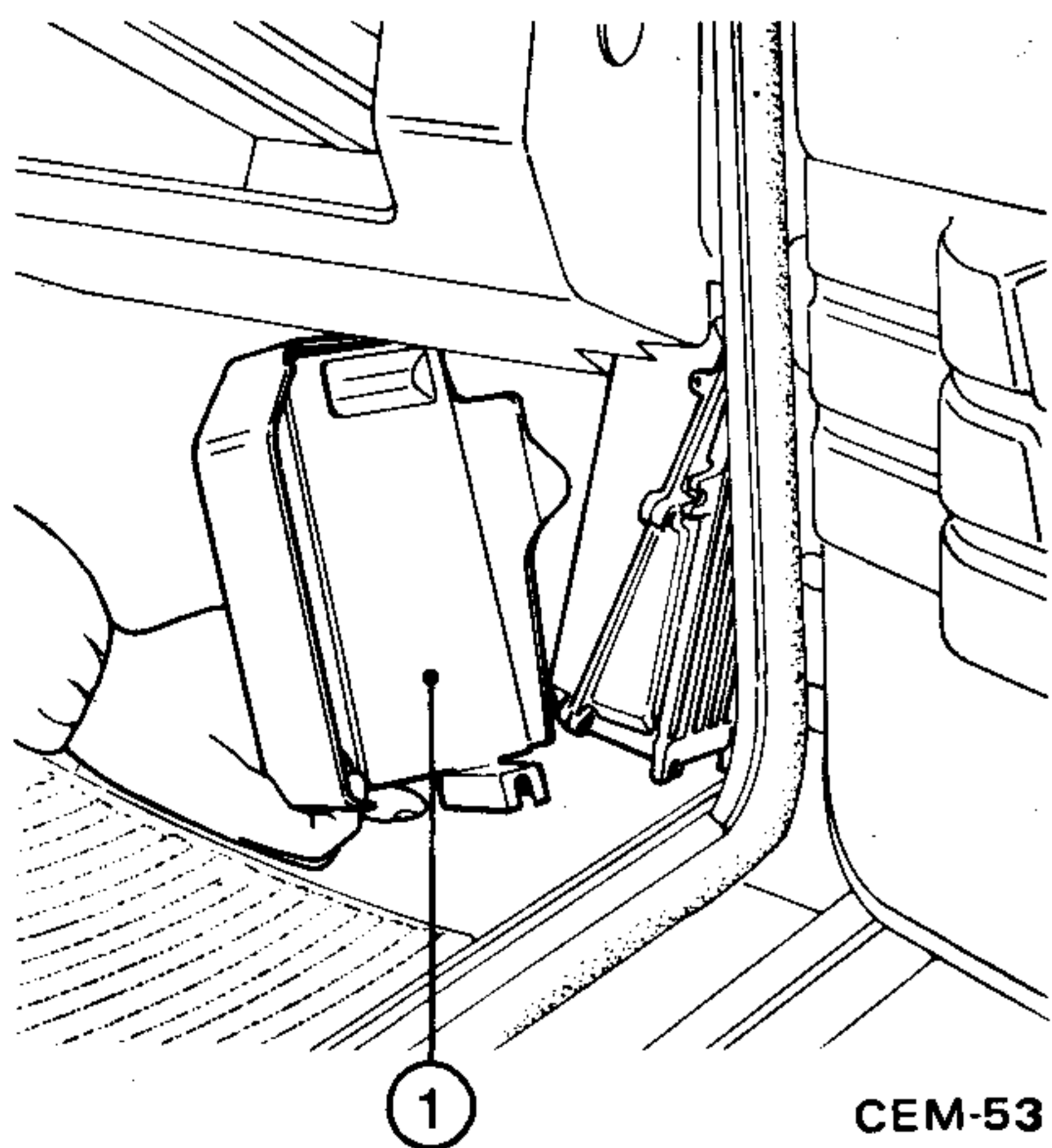
These signals include injector opening time, ignition advance and TSA commands.

INSPECTION

See «Electrical Tests», «Power Supply Check».

REPLACEMENT

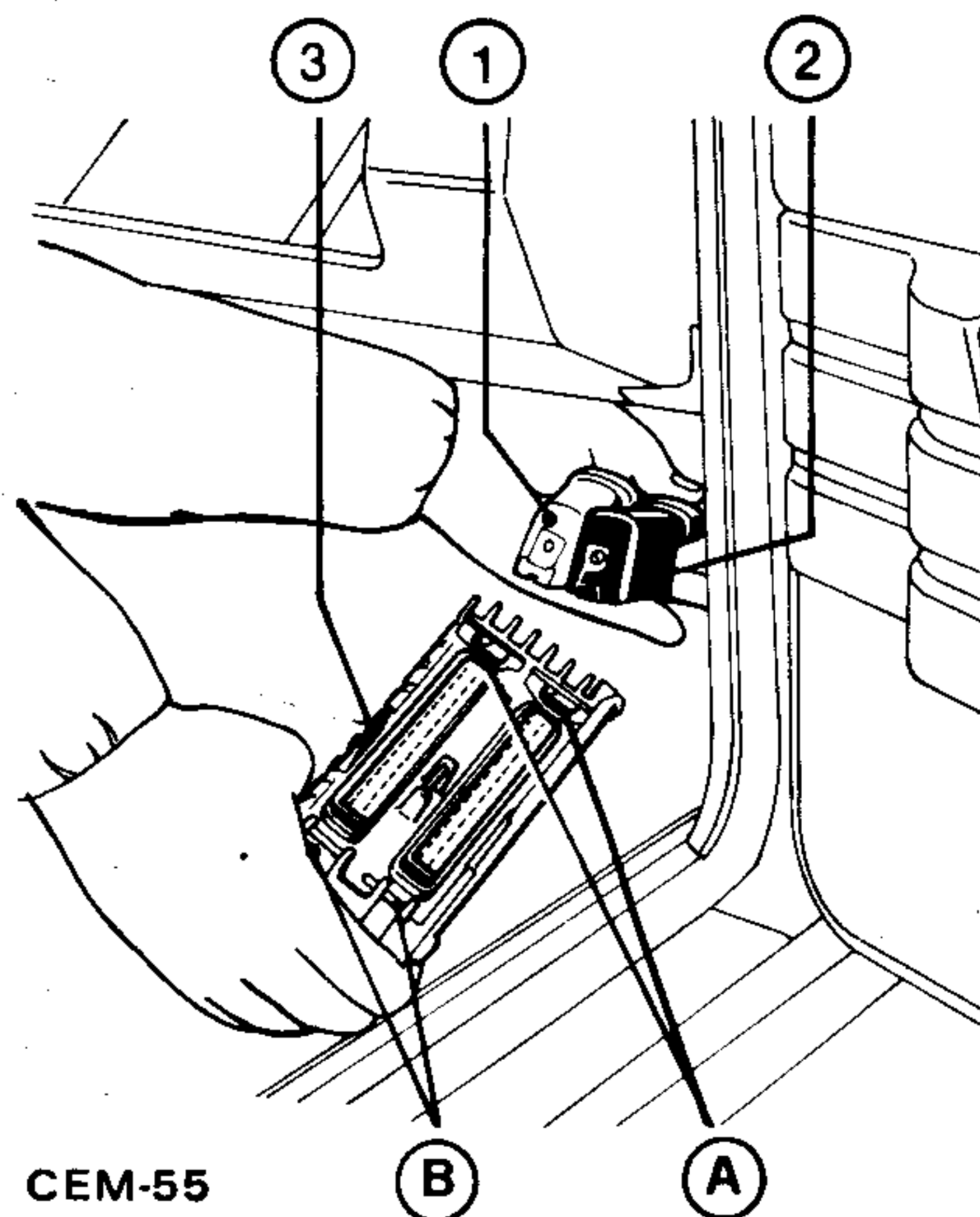
- a. Disconnect negative battery terminal.
- b. Back off plastic protector screw and remove protector (1).
- c. Back off retaining screws and remove ECU (2) from right side panel.



1. Plastic protector
2. ECU

d. Disconnect WHITE connector (1) and BLACK connector (2) from ECU (3) as follows:

- Lightly press retainer in direction A.
- Pull out connector upward, releasing them from pin B on ECU.



CEM-55

1. WHITE connector
2. BLACK connector
3. ECU
- A. Retainer
- B. Pin

INSTALLATION

For ECU installation adopt a reversal of the removal sequence.

a. Engage connectors to pin B first, and then press fully into retainer A, taking care not to damage the contacts.

b. BLACK connector must be inserted nearer the side panel.

However, wrong connection is impossible as width of engagement of pin B on the two connectors is different.

BLACK connector is narrower than WHITE connector.

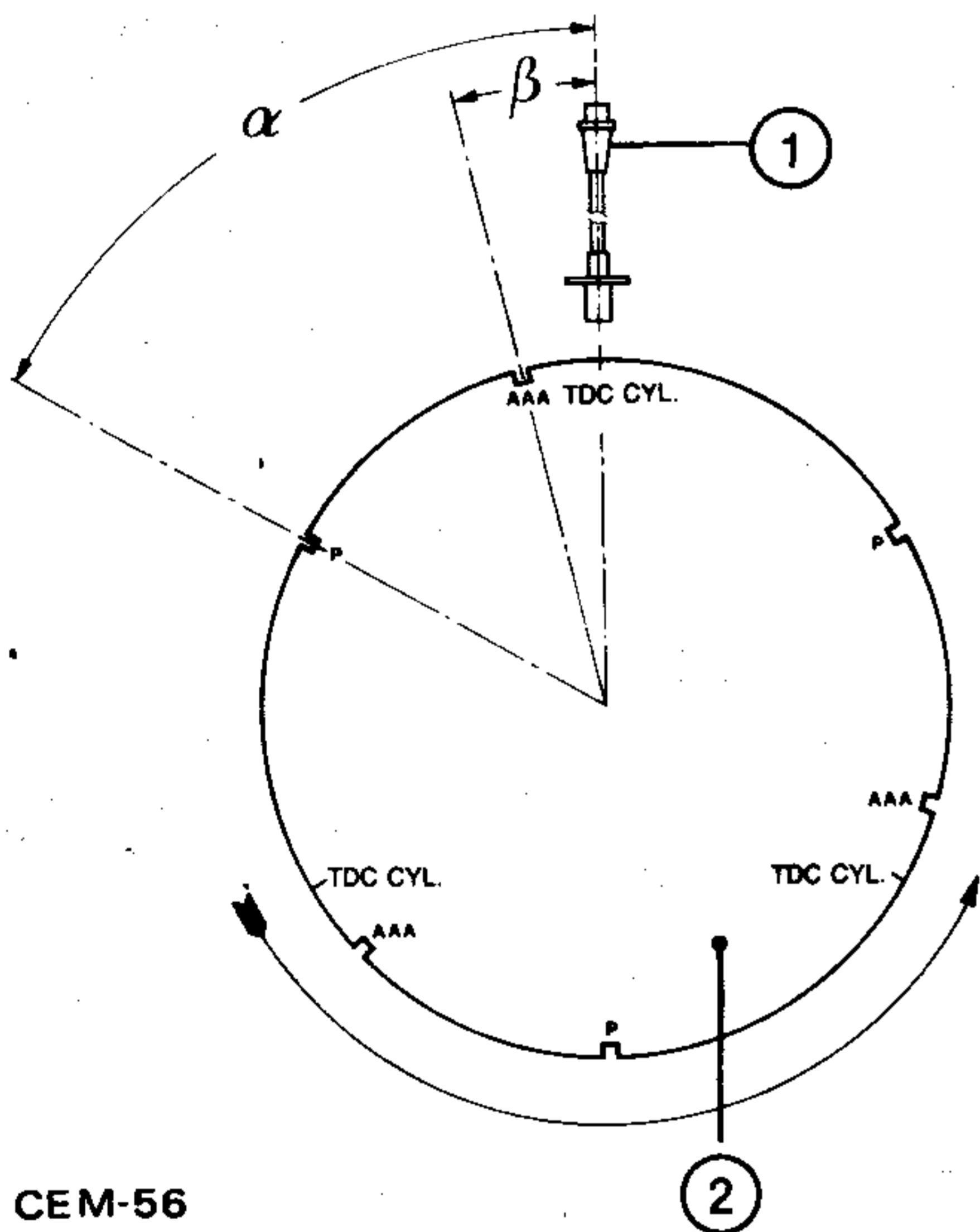
RPM AND TIMING SENSOR

DESCRIPTION

RPM and timing sensor, located on bell housing, reads sets of reference slots machined in the flywheel.

- Set of three reference slots **P**.
During normal operation these slots represent the starting point of ignition advance calculation.
- Set of three reference slots **AAA**.
During normal running, these slots permit calculation of RPM and fuel injection timing.

Upon starting and up to a given rpm rate slots «P» are not utilized, whereas slots «AAA» provide static ignition advance, as well as normal running functions. As the flywheel completes two revolutions to each engine cycle, the same reference slots control all cylinders, which are one flywheel revolution out of phase. The figure below shows flywheel position for TDC position in cylinder no. 1.



CEM-56

1. RPM and timing sensor
 2. Flywheel
- β 13°
 α 60°

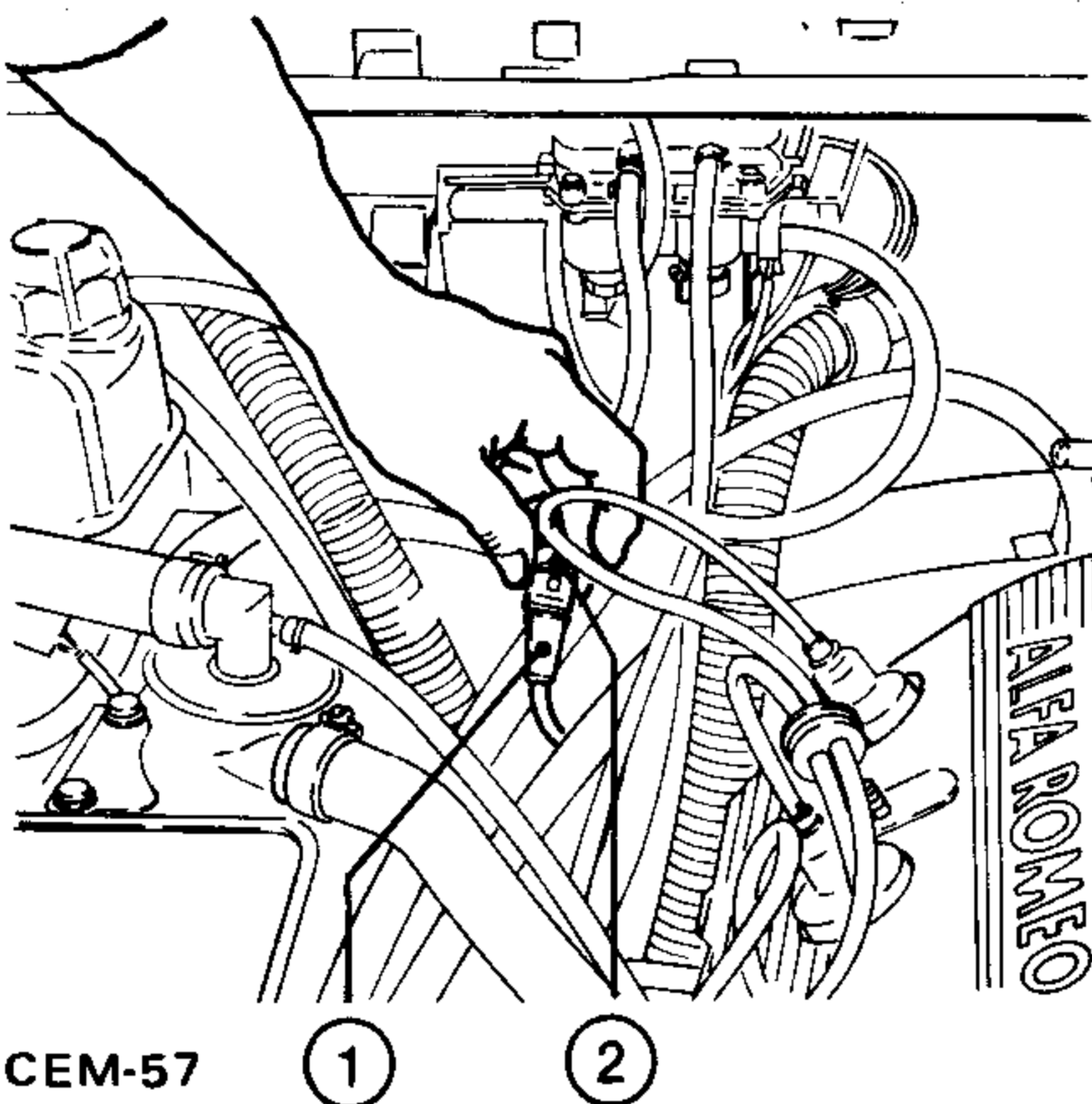
INSPECTION

See under «Electrical Tests».

REPLACEMENT

For RPM and timing sensor replacement proceed as follows:

- a. Disconnect sensor terminal (1) from connector (2) of wiring harness.



CEM-57

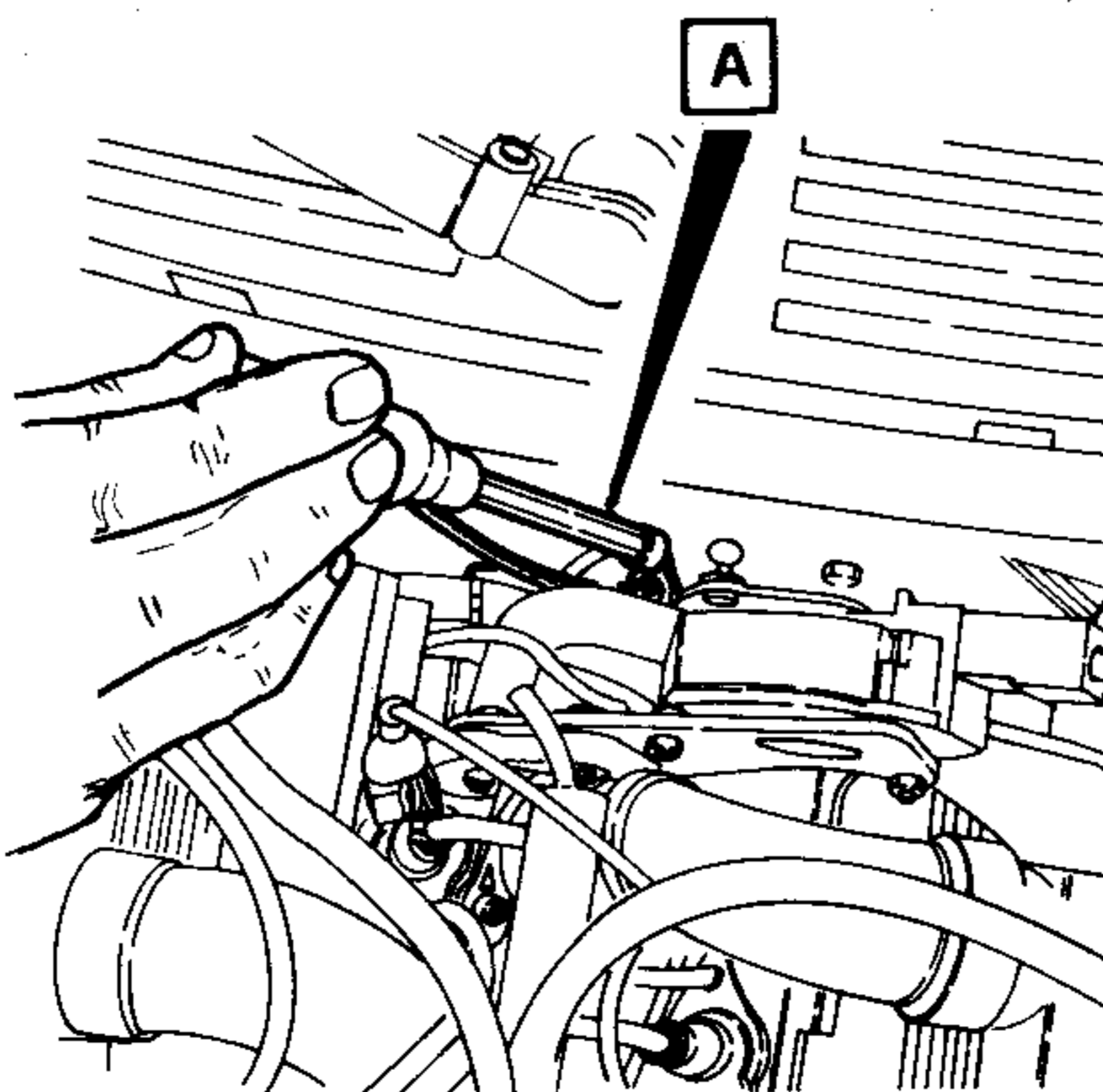
1. Sensor terminal (WHITE)
2. Wiring connector (BLACK)

- b. Back off two nuts (1) and remove sensor (2).

NOTE:

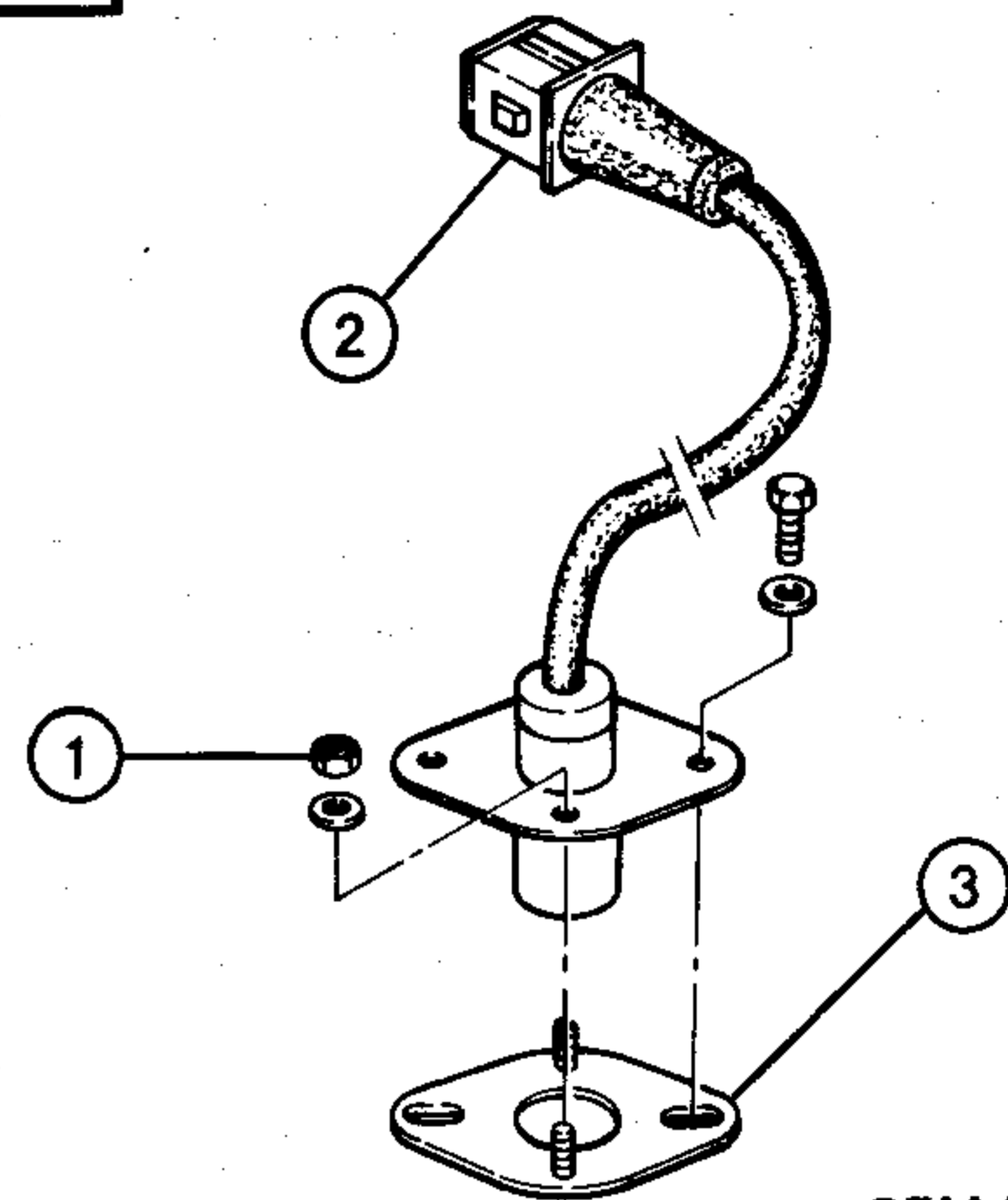
Do not disturb sensor carrier plate (3).

- c. Install new sensor and fasten to plate.



CEM-58

A



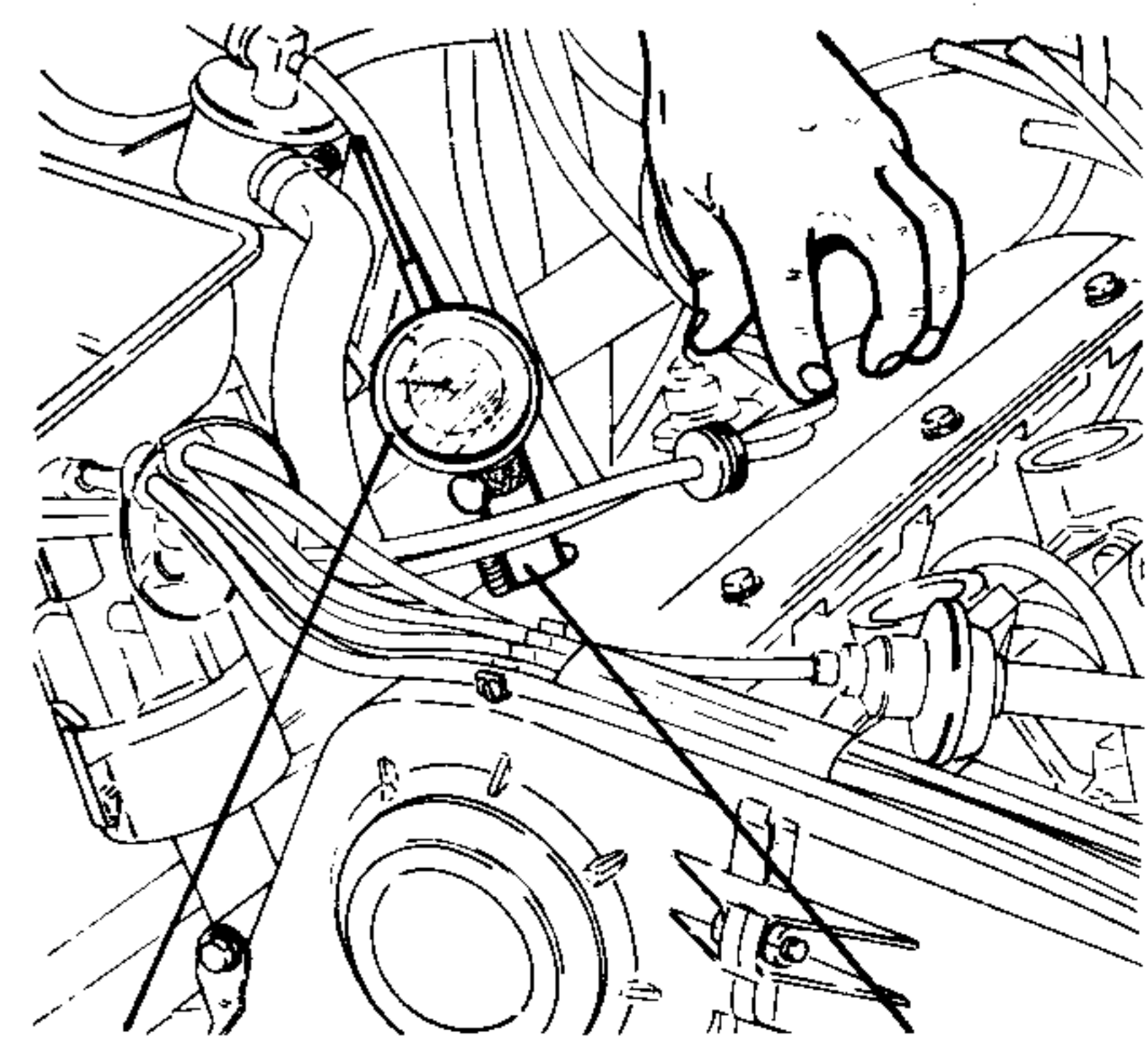
CEM-59

1. Sensor retaining nuts
2. RPM and timing sensor
3. Sensor carrier plate

INSTALLATION

If flywheel, bell housing or sensor plate has been removed, proceed as follows:

- a. Disconnect battery negative terminal.
- b. Remove spark plug from cylinder no. 1 using appropriate articulated wrench A.5.0258.
- c. Install dial support C.6.0183 on cylinder no. 1 spark plug seat. Install dial gauge C.6.0198 on support. Gauge should permit 30 mm (1.17 in) stroke.



C.6.0198

CEM-60

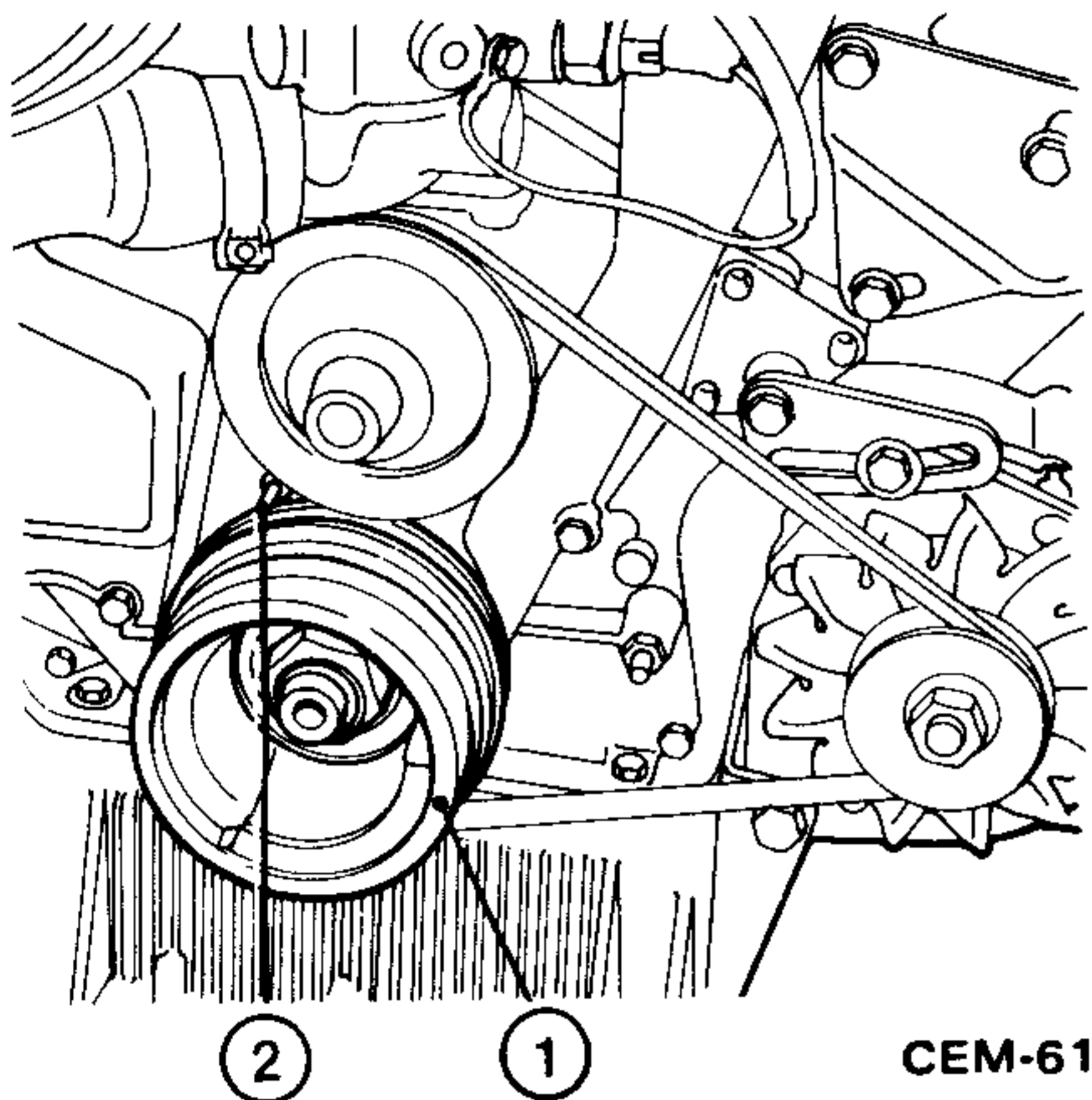
C.6.0183

FUEL SYSTEM

d. Rotate crankshaft through pulley to bring piston of cylinder no. 1 to TDC on expansion stroke.

This position is reached when gauge needle dwells between clockwise and counterclockwise oscillation.

e. Also check that mark «F» stamped on pulley of crankshaft (1) lines up with fixed pointer (2) on engine block.



1. Crankshaft pulley
2. Fixed pointer

f. Install sensor plate (1) on bell housing and fasten using two screws (2).

Do not tighten screws.

g. Zero dial gauge.

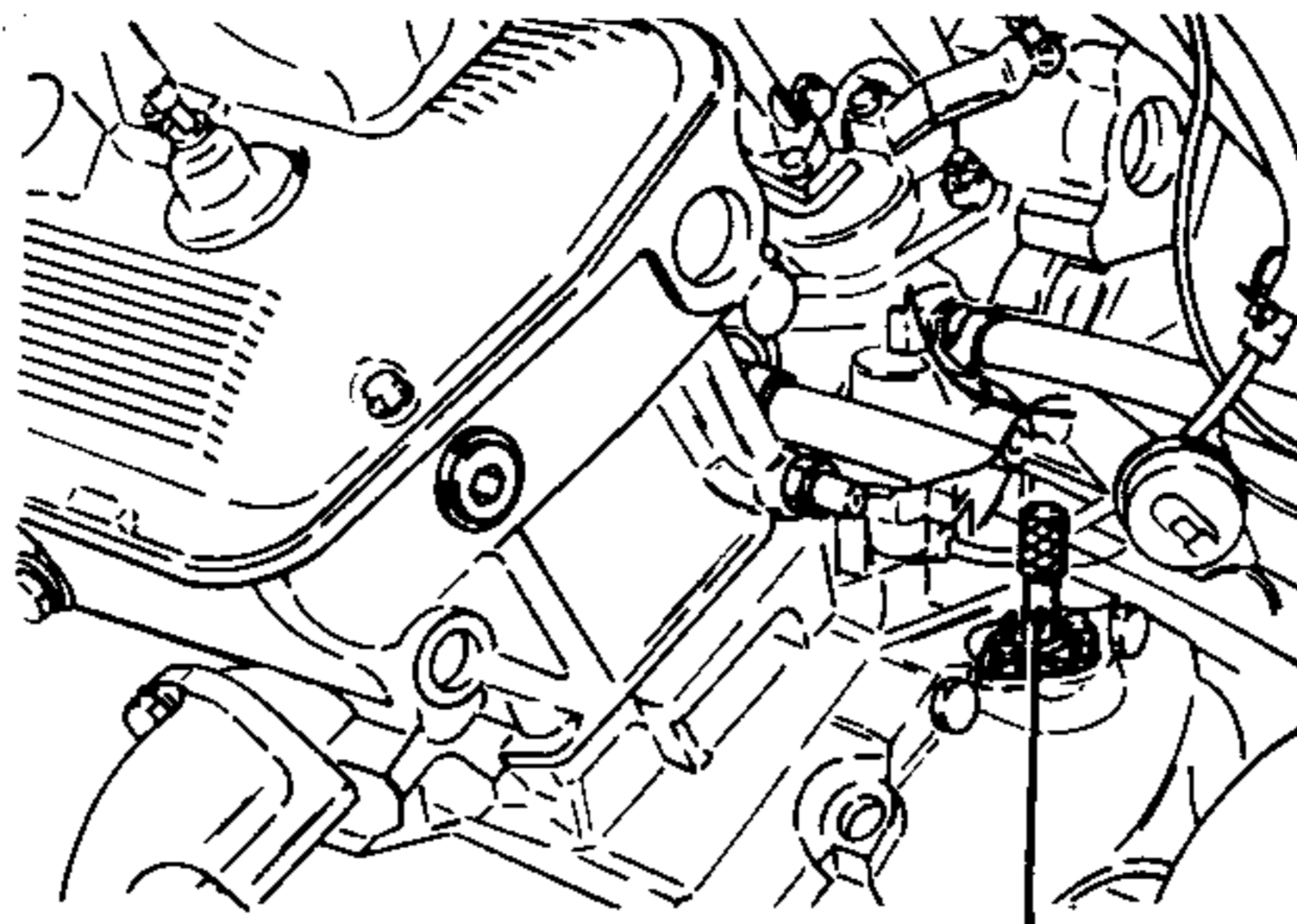
h. Bring piston of cylinder no. 1 to compression stroke (turning crankshaft clockwise, as seen from flywheel end) to a position giving a 19.70 ± 0.04 mm (0.77 ± 0.002 in) reduction from zero gauge reading (equivalent to $60^\circ \pm 4'$ BTDC crank angle).

i. Introduce tool **A.2.0419** in sensor plate bore and move plate along elongated holes to permit insertion of tool **A.2.0419** protrusion in associated hole on the flywheel.

j. In this position tighten plate to bell housing through the associated screws and remove tool **A.2.0419**.

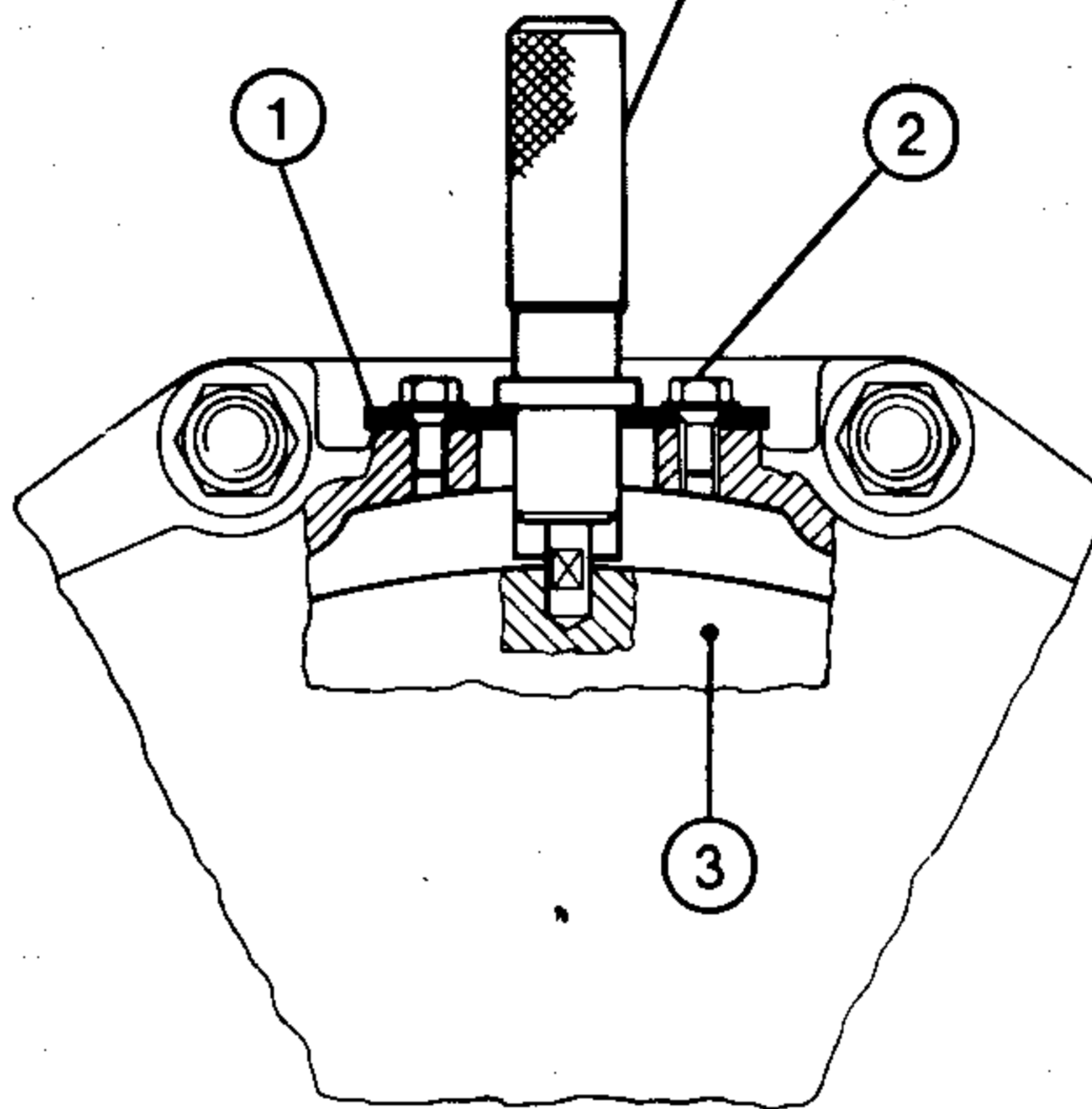
k. Install sensor and fasten to plate.

Finally, connect sensor terminal to wiring connector.



CEM-62

A.2.0419



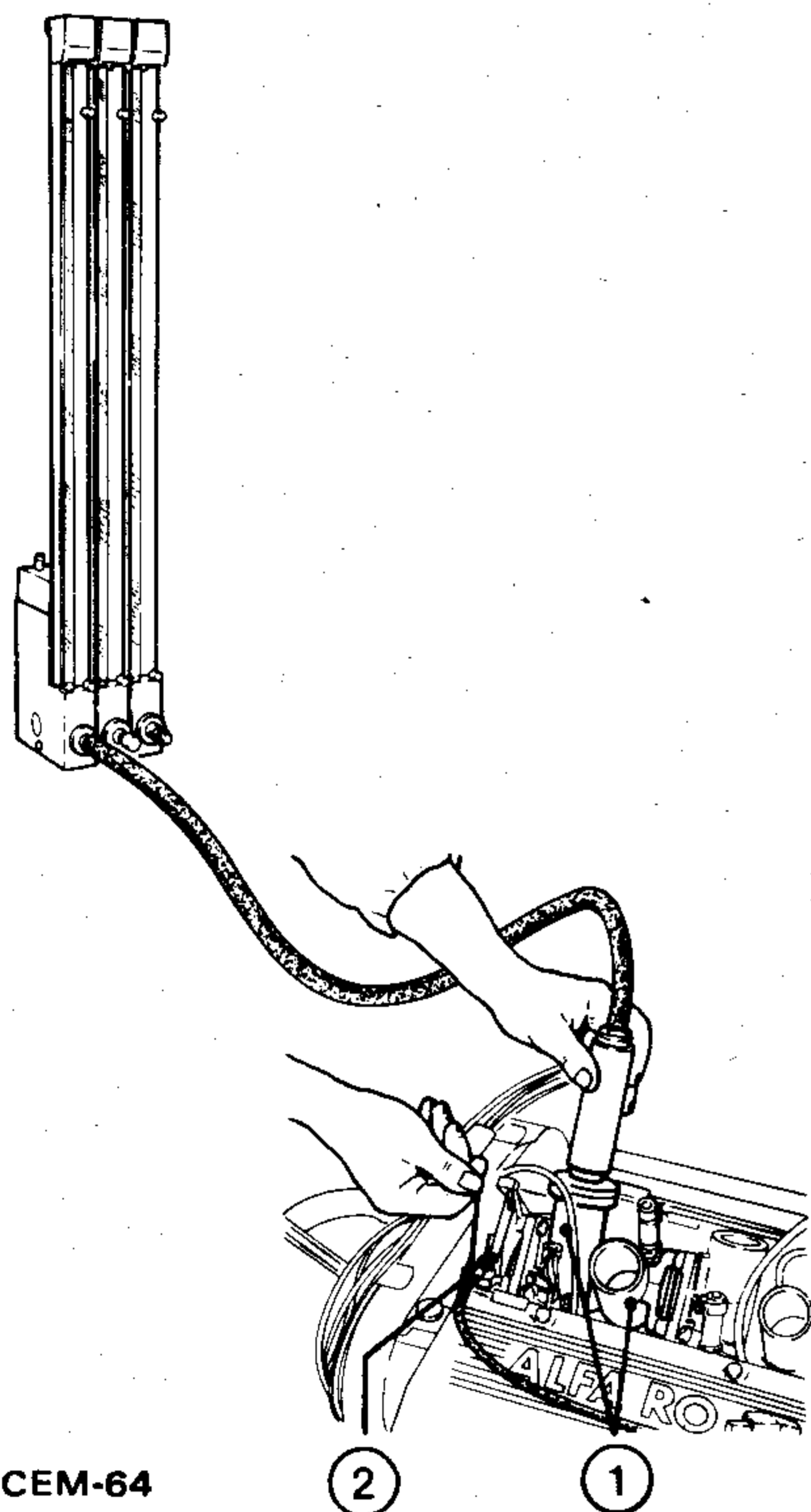
CEM-63

1. Sensor carrier plate
2. Plate retaining screws
3. Flywheel

TUNING AND ADJUSTMENTS

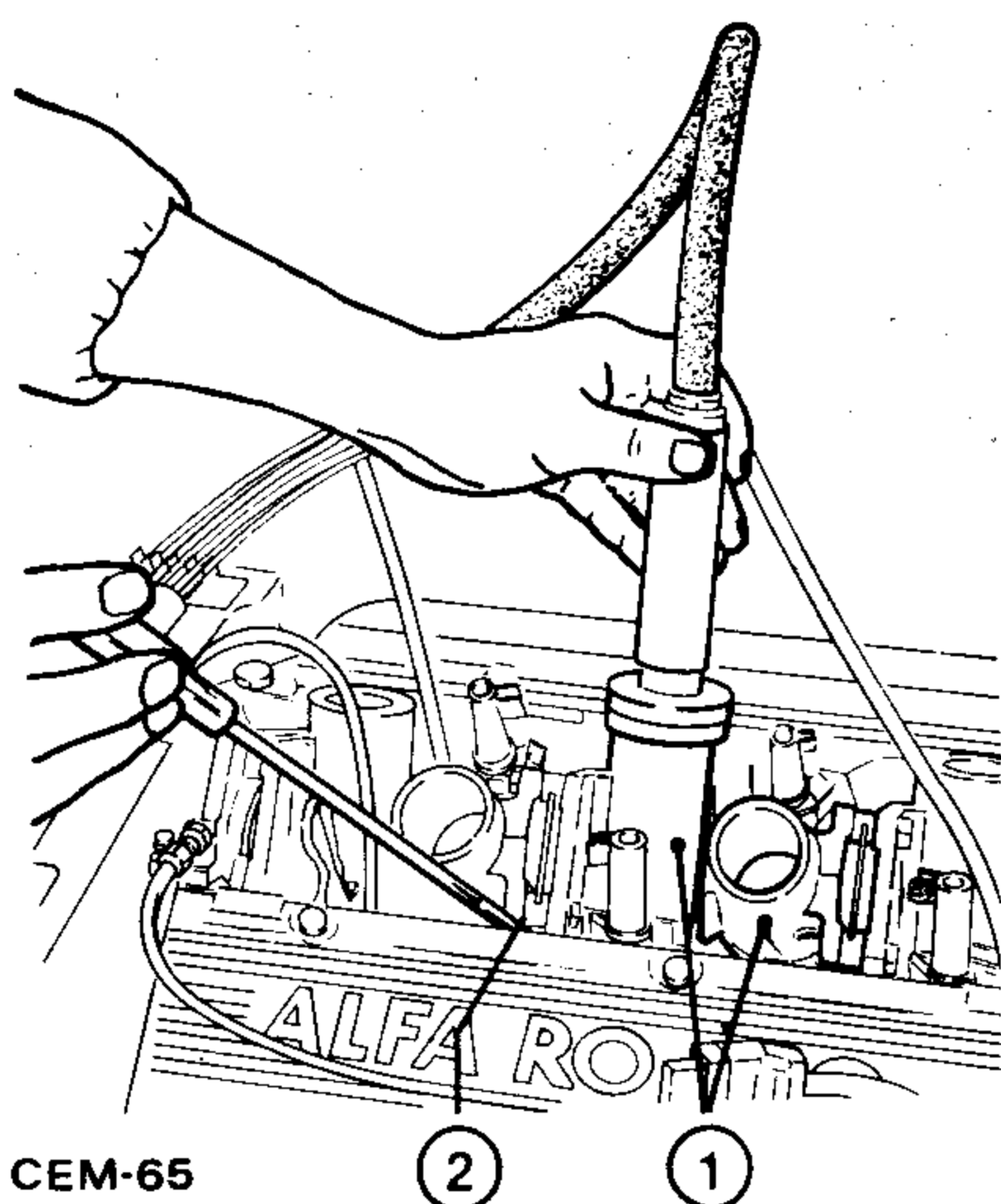
THROTTLE TUNING (Air leakage with throttle closed)

- a. Remove induction chambers, and proceed as directed under «Air Induction Chambers», paras. a. through i.
- b. Check throttle unit tuning using a suitable flowmeter as follows:
 - Connect Solex flowmeter plug to scale D.
 - With throttles closed rest plug on inlet of front throttle body (1) (cylinder no. 1 and no. 4).
 - Measure air flow through each port (on front body) and compare to specified readings.
 - To adjust back off locknut and turn adjusting screw (2) until the correct flow rate is obtained.



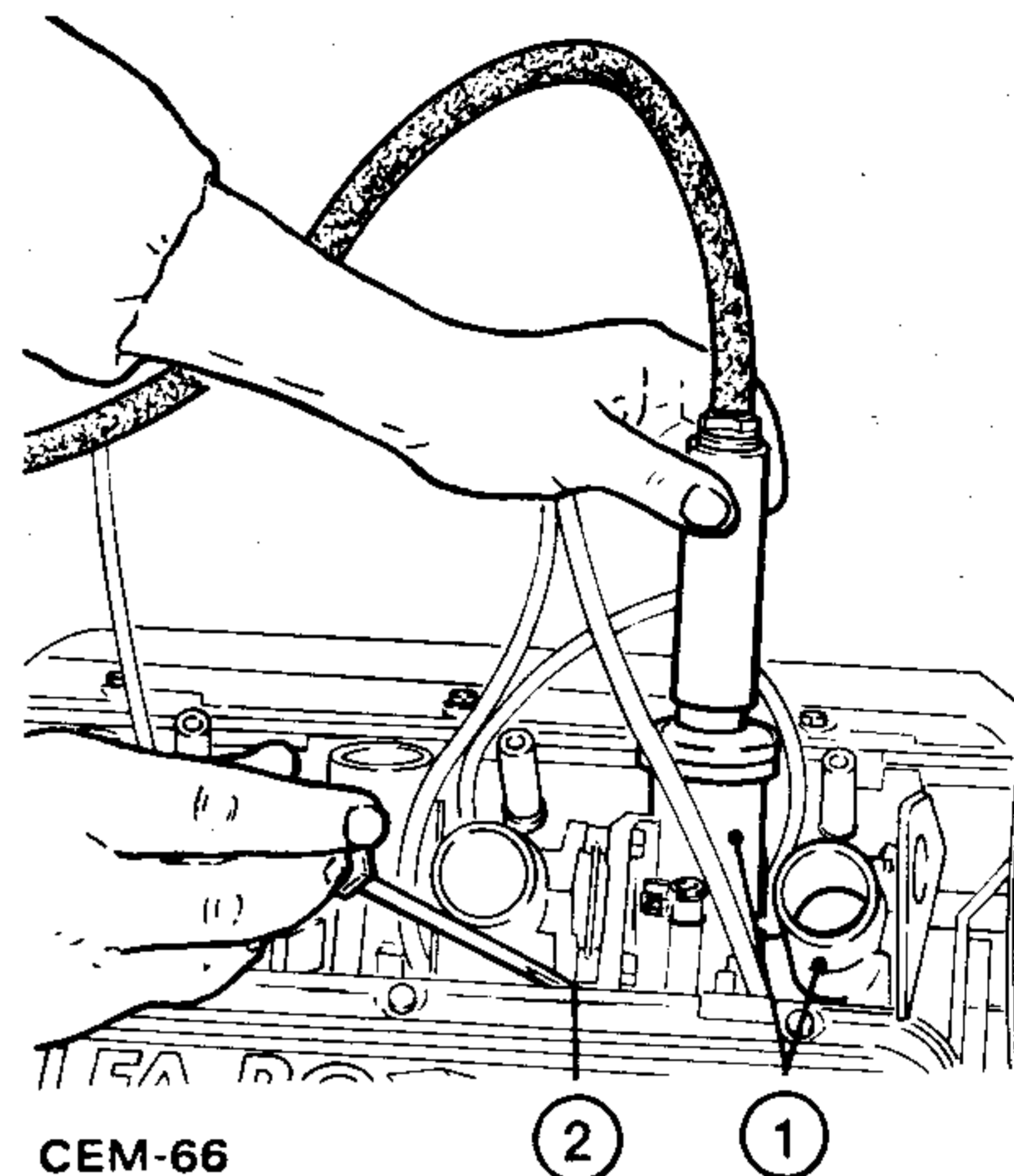
1. Front throttle body
2. Idle adjusting screw

- Still with throttles closed, rest flowmeter plug on inlet of center throttle body (1) (cylinders no. 5 and no. 2).
- Measure air flow through each port (in center body) and turn adjusting screw (2) until higher equivalent flow on center body (1) is equal to the higher flow on front throttle body.



1. Center throttle body
2. Adjusting screw

- With throttles closed, rest plug on inlet of rear throttle body (1) (cylinder no. 3 and no. 6).
- Measure air flow through each port (rear body) and turn adjusting screw (2) until equivalent higher flow on rear throttle body (1) is equal to the higher flow on front throttle body.



1. Rear throttle body
2. Adjusting screw

c. Scale D readings on Solex flowmeter must indicate 75 to 90 with plug upstream of throttles and accelerator released.

d. Install parts previously removed adopting a reversal of the removal sequence and proceed with adjustment.

ACCELERATOR CONTROL ADJUSTMENT

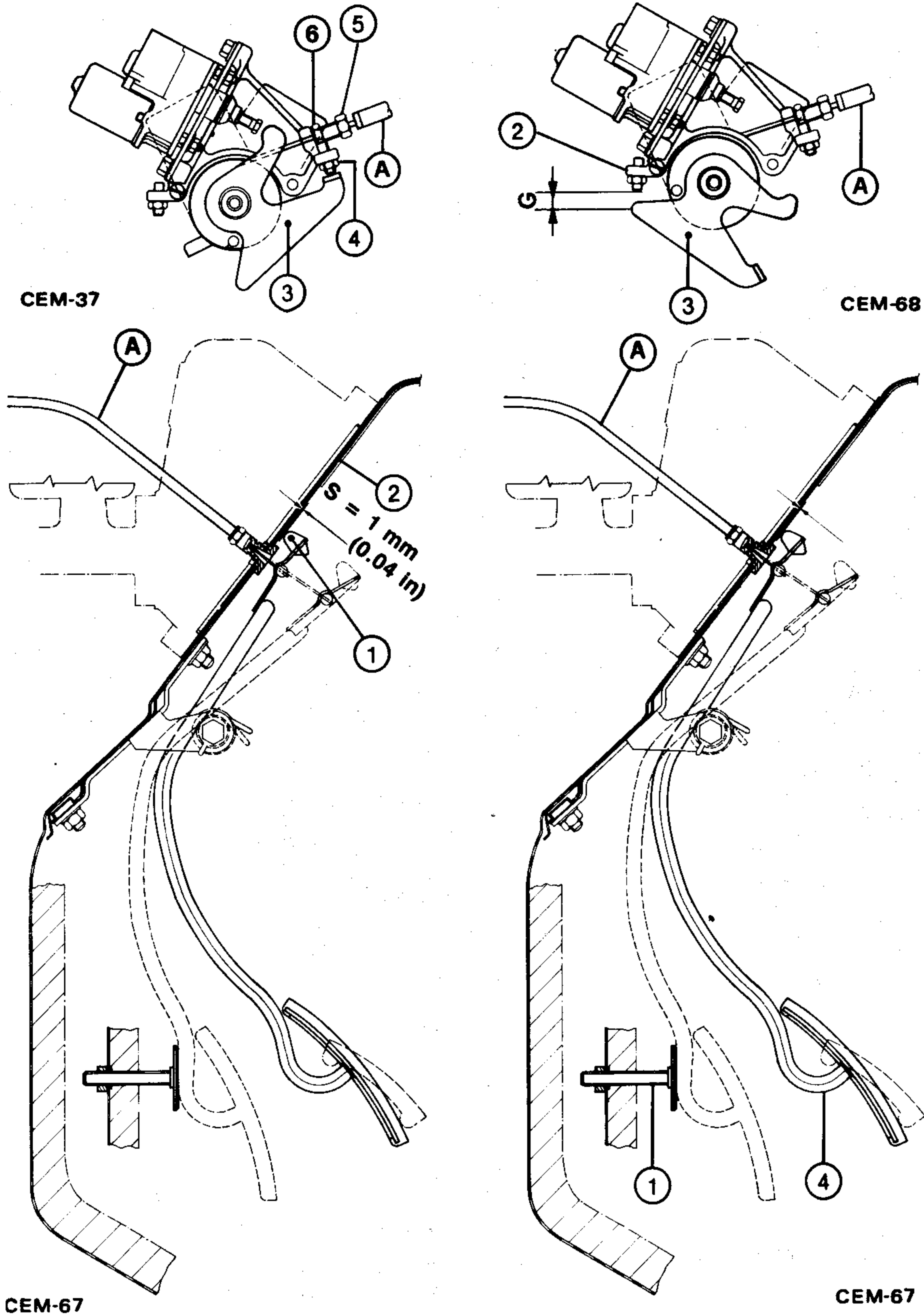
1. Cable binding check

Check accelerator cable for binding in conduit.

2. Cable clearance check

- a. With accelerator pedal raised, insert a shim $S = 1 \text{ mm (0.039 in)}$ between pedal stop pad (1) and sheet metal (2).
- b. With pulley register (3) contacting idle adjusting screw (4) back off cable adjusting screw (5) until pulley starts to turn.
- c. Remove shim, check that register (3) makes full contact with idle adjusting screw (4) and tighten locknut (6) on adjusting screw of cable (5).

FUEL SYSTEM



1. Accelerator pedal stop pad
2. Sheet metal
3. Pulley register
4. Idle adjusting screw
5. Cable adjusting screw
6. Locknut

3. Wide open throttle (WOT) check

a. With accelerator pedal depressed to contact limit travel screw (1), check that gap between WOT stop screw (2) and register (3) on pulley is:

$$G = 1.5 \text{ mm (0.06 in)}$$

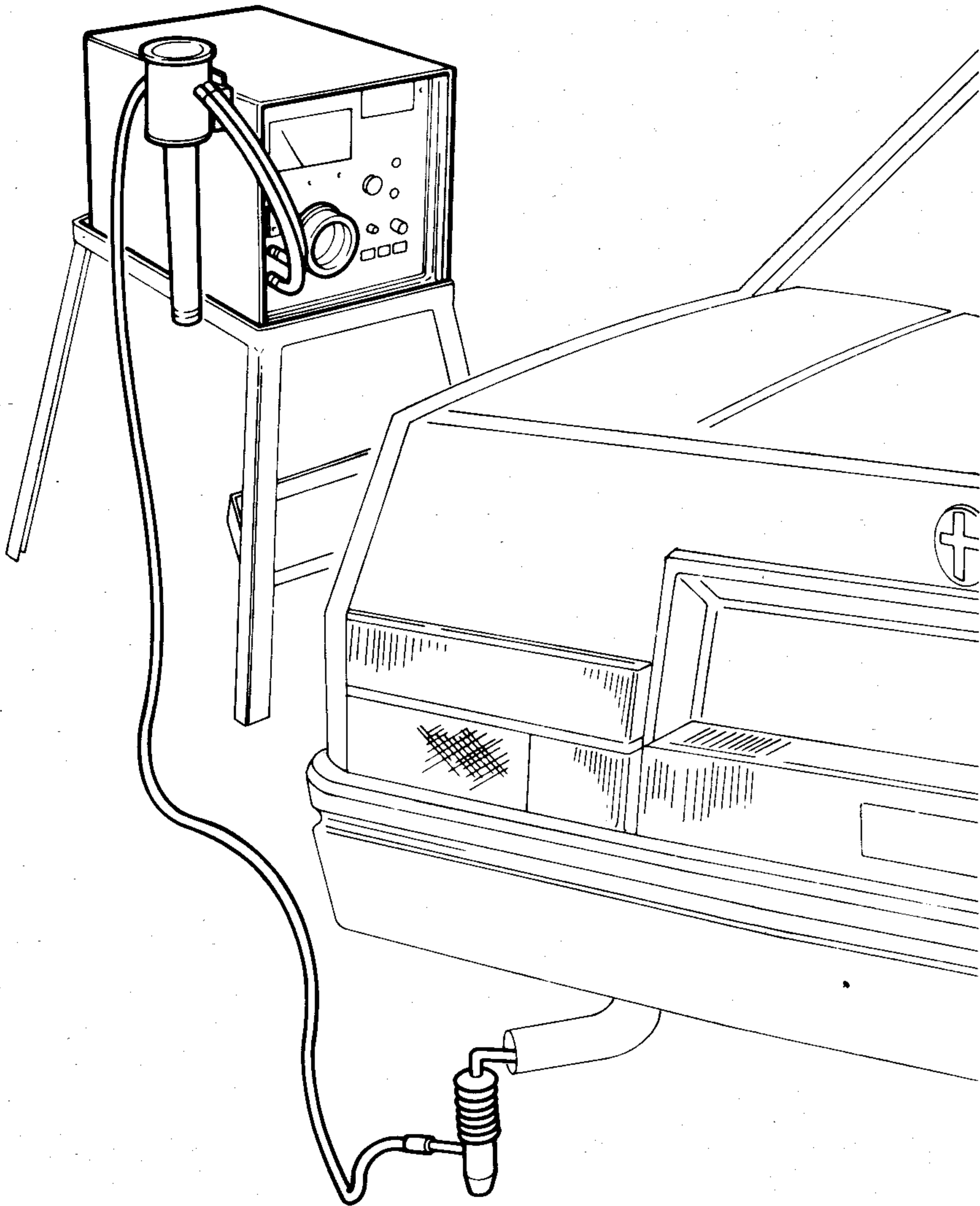
b. To adjust screw in or back off limit travel screw (1) under accelerator pedal (4) as necessary.

1. Limit travel screw
2. WOT stop screw
3. Pulley register
4. Accelerator pedal

EMISSION CHECK AND ADJUSTMENT

After warm-up idling for 5 to 10 minutes check CO percentage as directed below.

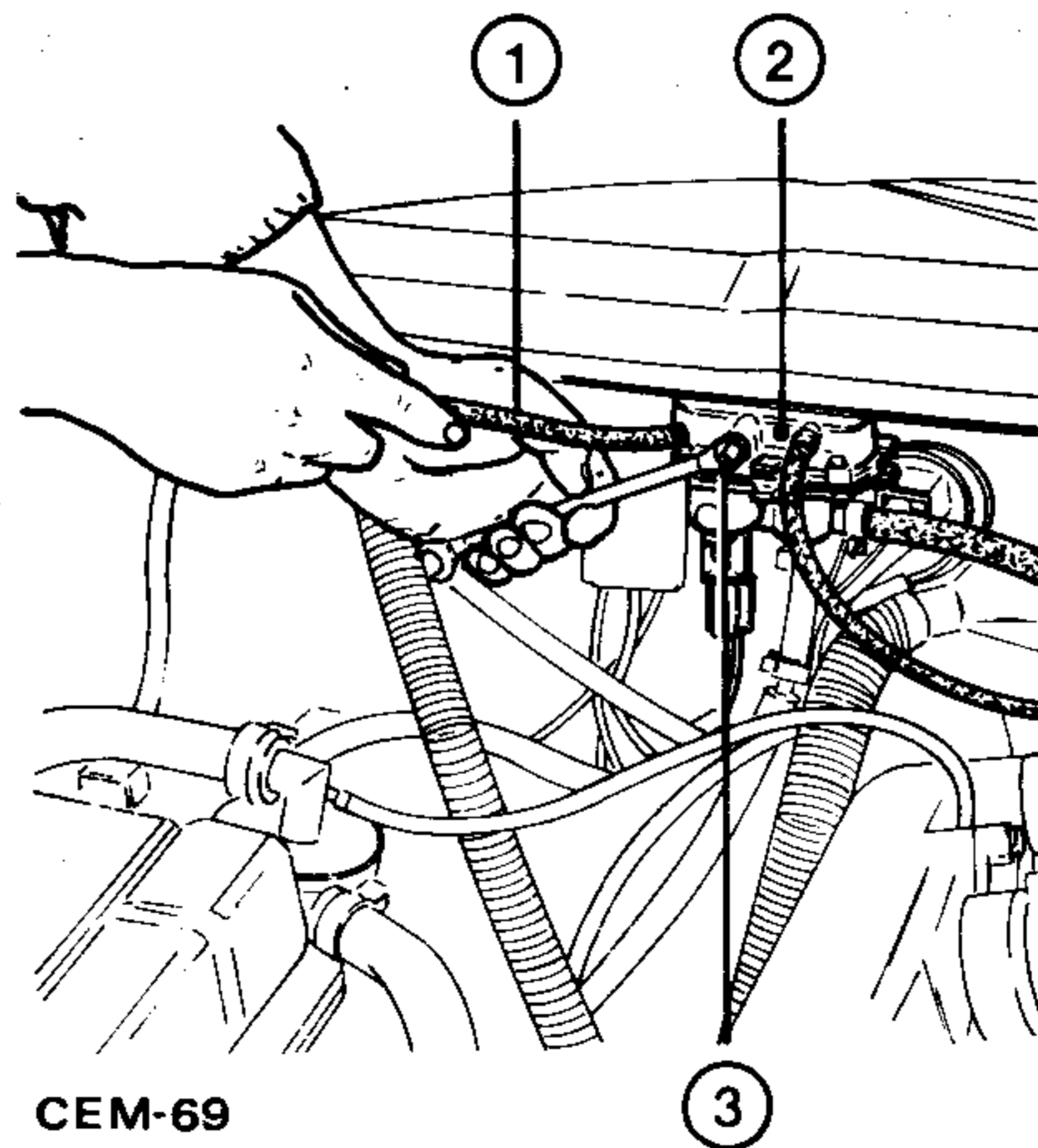
FUEL SYSTEM



- a. Introduce analyzer probe in tail pipe
% CO tester reading must be as specified.

% CO = 0.5 to 1.5

- b. To adjust proceed as follows:
- Disconnect idle air tube (1) from pressure regulator tube (2). Tube is connected to air cleaner.
 - Slacken locknut (3) and turn adjusting screw as follows:
 - Screw in to reduce % CO.
 - Back off to increase % CO.

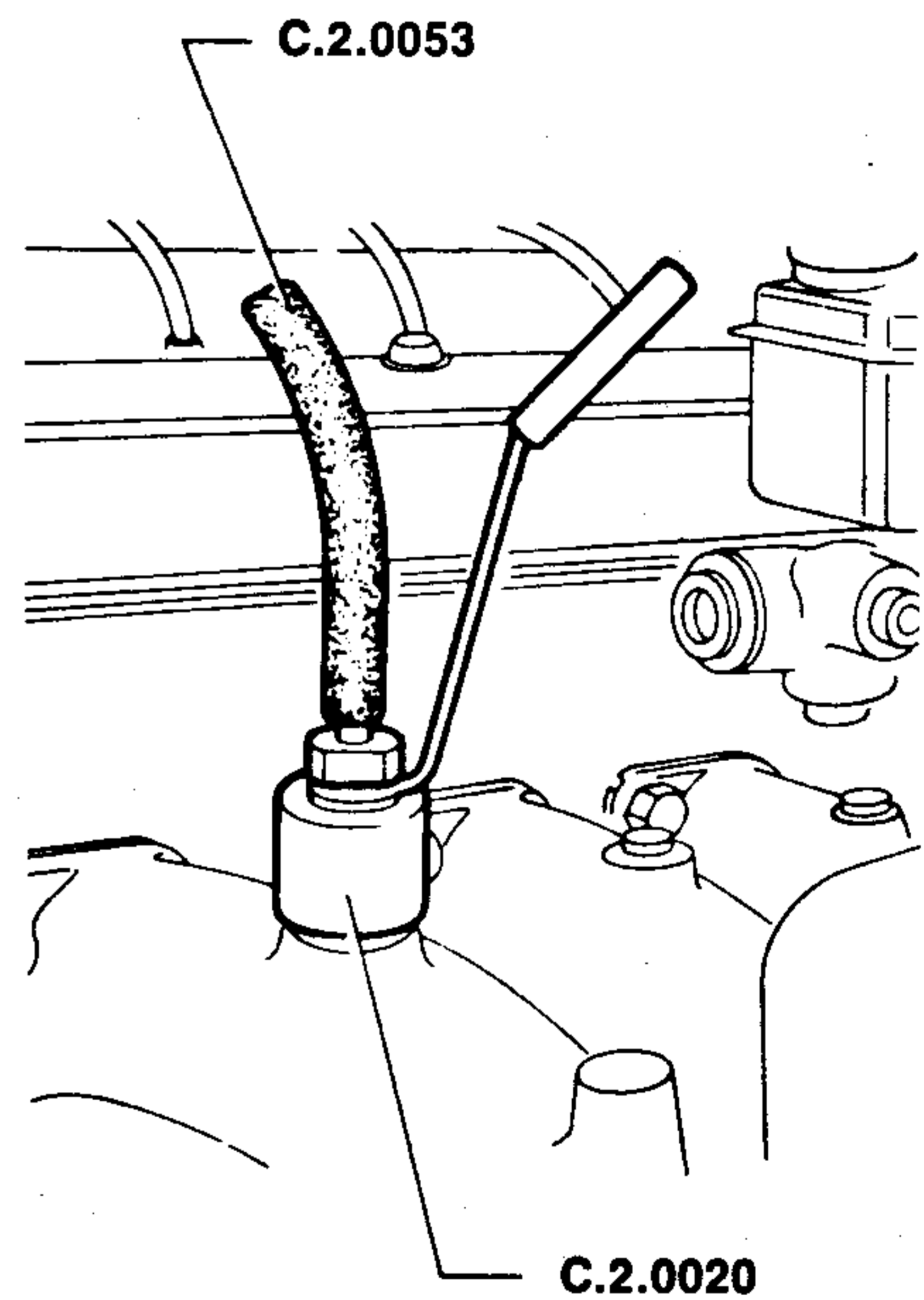


CEM-69

1. Idle air tube, air cleaner to pressure regulator
2. Pressure regulator
3. Adjusting screw locknut

Emission check cylinder by cylinder

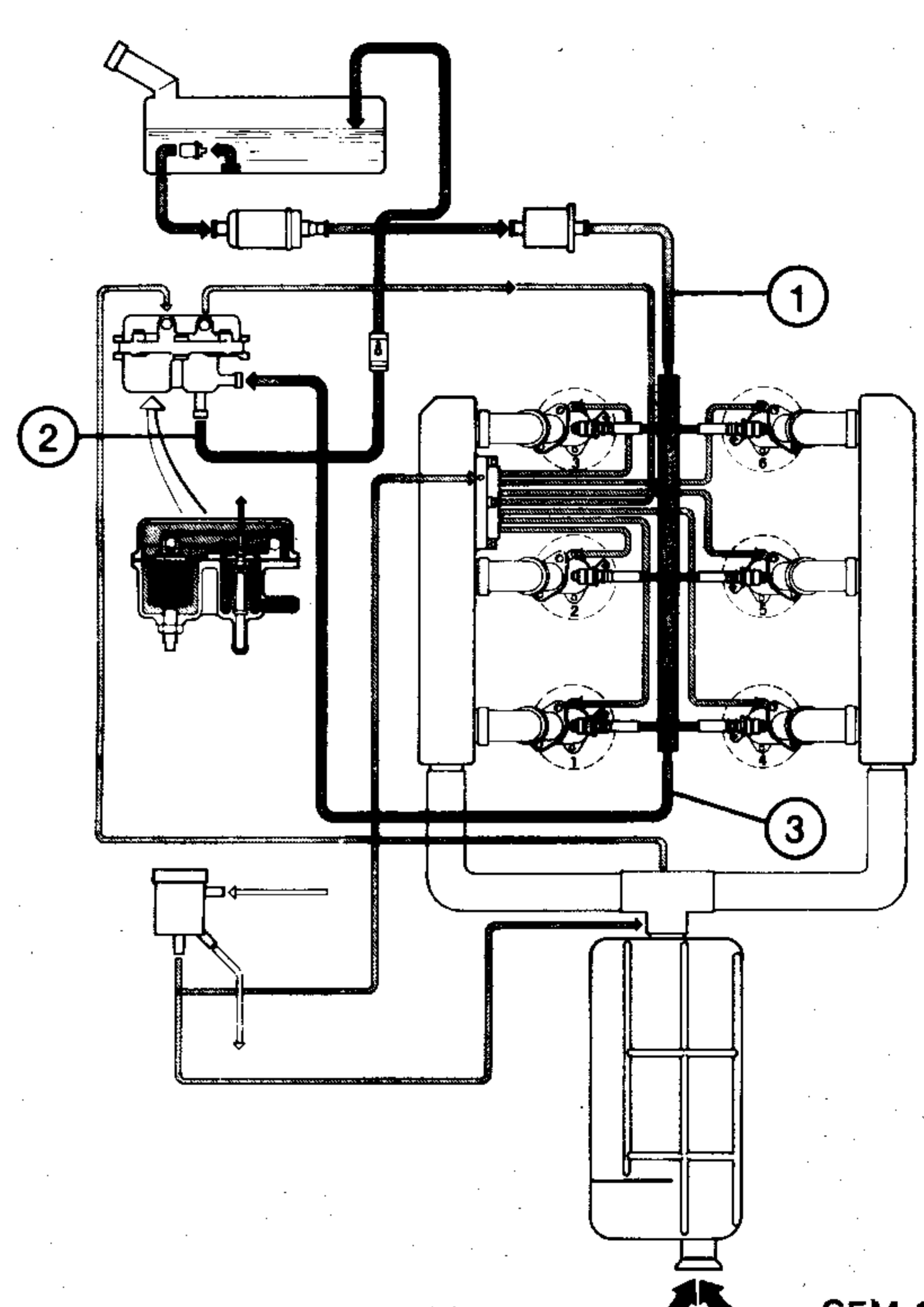
- a. After warm-up adjust overall CO to 1 to 1.5%.
- b. Check % CO cylinder by cylinder. To do this remove plug from each exhaust manifold in turn and install connector C.2.0020 and hose C.2.0053 for CO analyzer.
- c. Check individual cylinder CO and scrap injectors of cylinders exhibiting CO < 0.3% or > 6%.
- d. If overall CO cannot be adjusted to below 1.5%, check individual COs and replace injectors of cylinders exhibiting higher, or at any rate > 6%, reading, and repeat the check.
- e. If overall CO cannot be adjusted to at least 1% check individual COs and replace injectors of cylinders exhibiting lower, or at any rate < 0.3%, reading, and repeat the check.



FUEL SYSTEM

CHECKS AND ADJUSTMENTS

FUEL SUPPLY SYSTEM

Description	Values																								
<p>Operating pressure: To be measured at points ① and ② disconnecting fuel delivery line at fuel manifold and pressure regulator fuel leak-back line.</p>	<p>kPa 170 bar 1.7 kg/cm² 1.7 psi 24.65</p>	 <p>1. Fuel delivery line 2. Leak-back line to tank 3. Fuel return to pressure regulator</p>																							
<p>Pressure regulator operating pressure: To be measured at point ③ disconnecting fuel return line to pressure regulator. Pressure varies in relation to atmospheric pressure.</p> <table border="0"> <tr> <td>mbar (mm Hg)</td> <td>1013 (760)</td> <td>kg/cm²</td> <td>1.90</td> <td>psi</td> <td>27</td> </tr> <tr> <td>mbar (mm Hg)</td> <td>954 (716)</td> <td>kg/cm²</td> <td>1.70</td> <td>psi</td> <td>24</td> </tr> <tr> <td>mbar (mm Hg)</td> <td>898 (674)</td> <td>kg/cm²</td> <td>1.50</td> <td>psi</td> <td>21</td> </tr> <tr> <td>mbar (mm Hg)</td> <td>845 (634)</td> <td>kg/cm²</td> <td>1.30</td> <td>psi</td> <td>18</td> </tr> </table>	mbar (mm Hg)		1013 (760)	kg/cm ²	1.90	psi	27	mbar (mm Hg)	954 (716)	kg/cm ²	1.70	psi	24	mbar (mm Hg)	898 (674)	kg/cm ²	1.50	psi	21	mbar (mm Hg)	845 (634)	kg/cm ²	1.30	psi	18
mbar (mm Hg)	1013 (760)	kg/cm ²	1.90	psi	27																				
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mbar (mm Hg)	898 (674)	kg/cm ²	1.50	psi	21																				
mbar (mm Hg)	845 (634)	kg/cm ²	1.30	psi	18																				

THROTTLE TUNING (Air leakage with throttle closed)

Description	Reading
<p>Air leakage with throttle closed. Flowmeter readings must be taken applying plug upstream of throttles.</p>	<p>(Solex flowmeter) Scale D 75 to 90</p>

FUEL SYSTEM

GENERAL REQUIREMENTS

FLUIDS AND LUBRICANTS

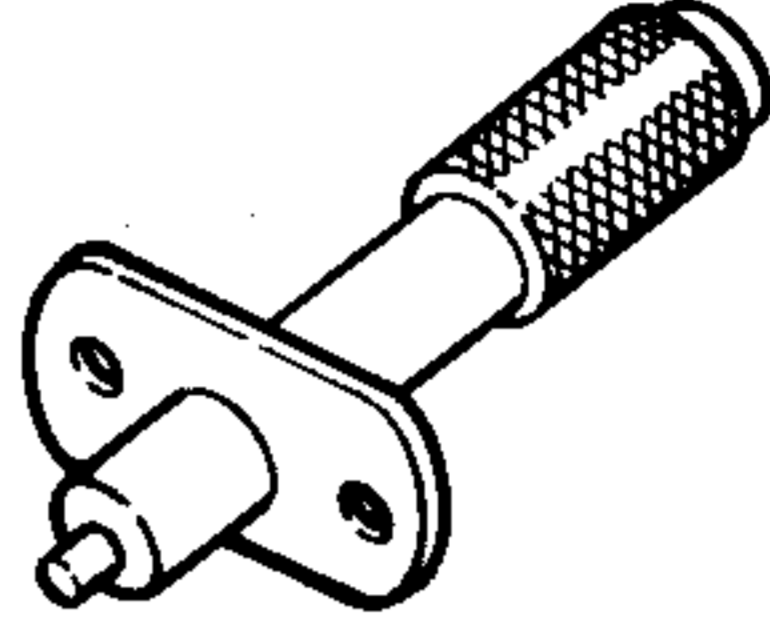
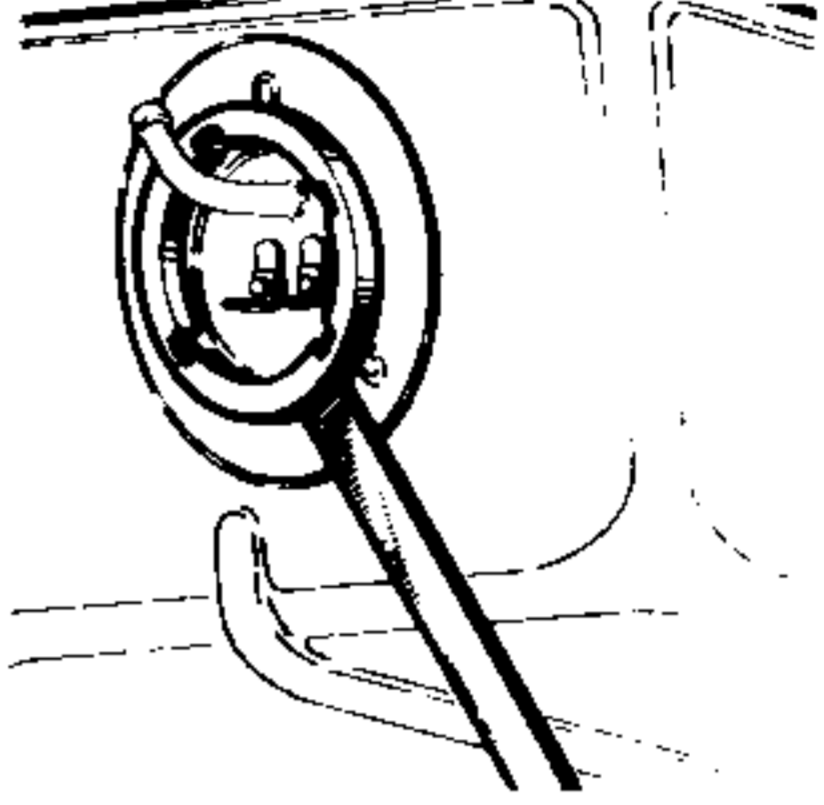
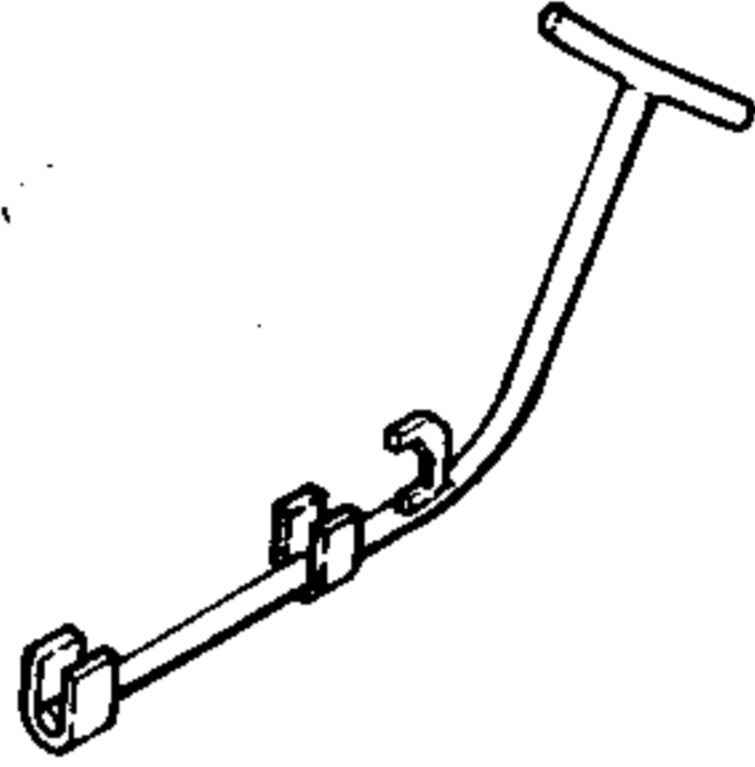
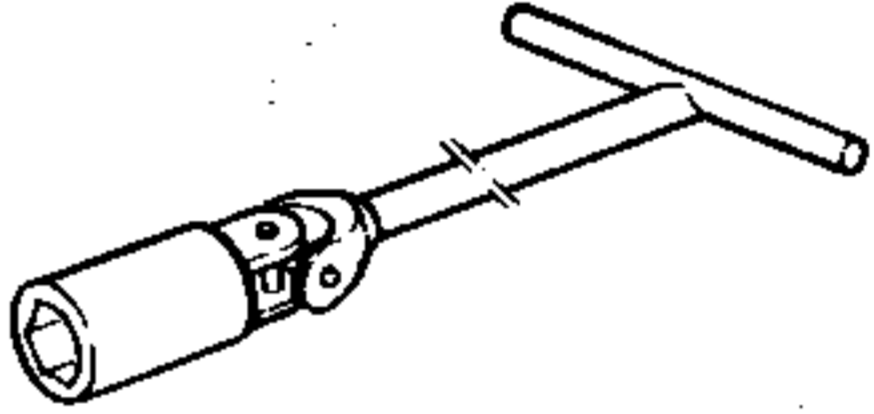
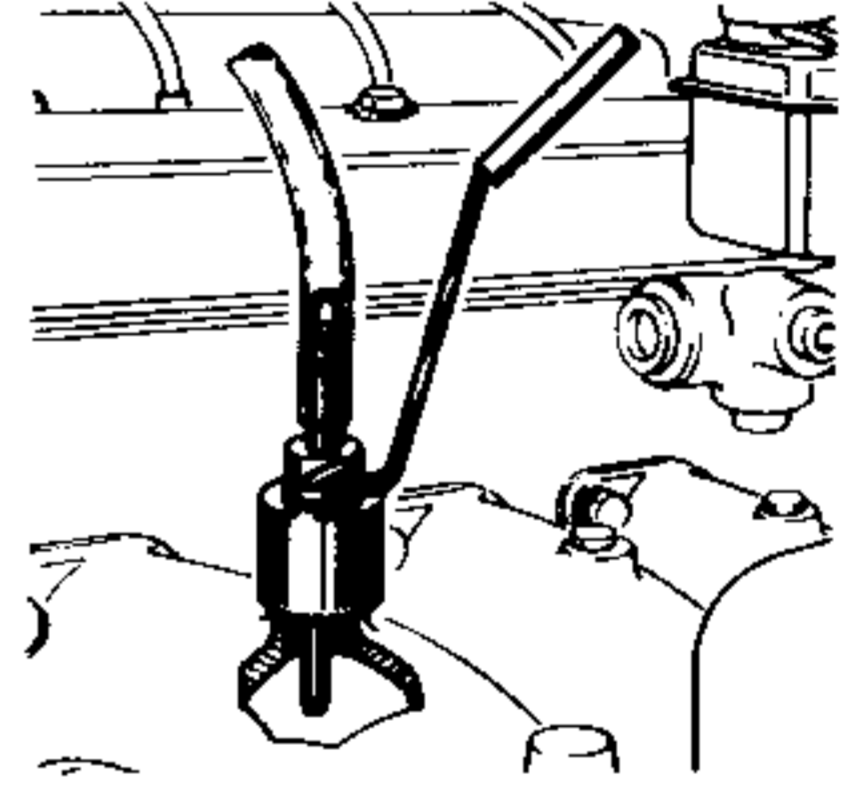
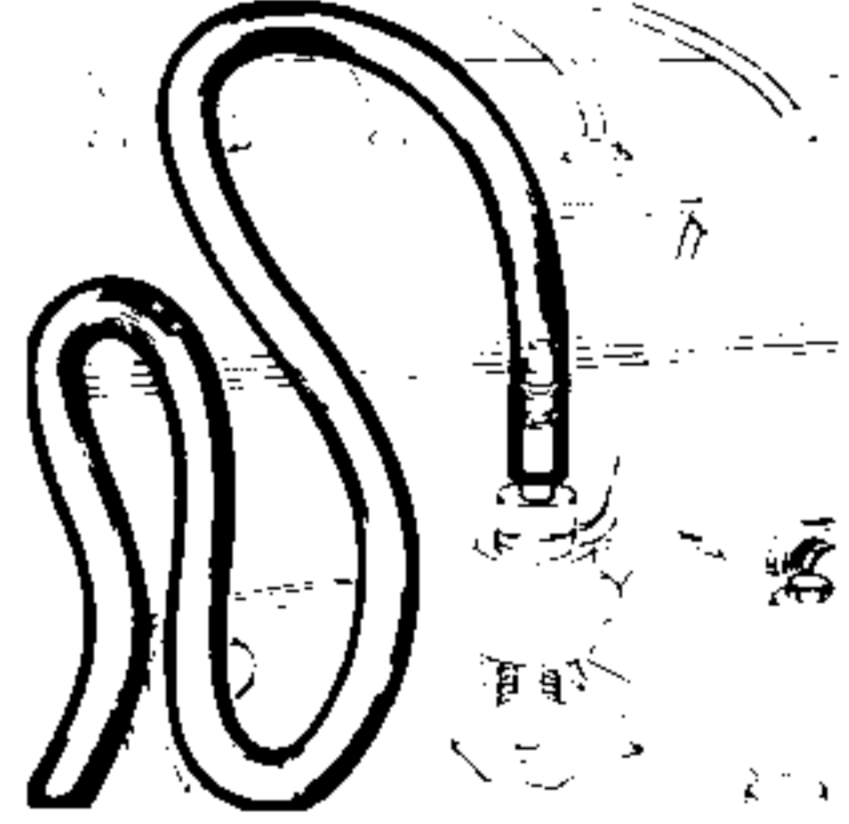

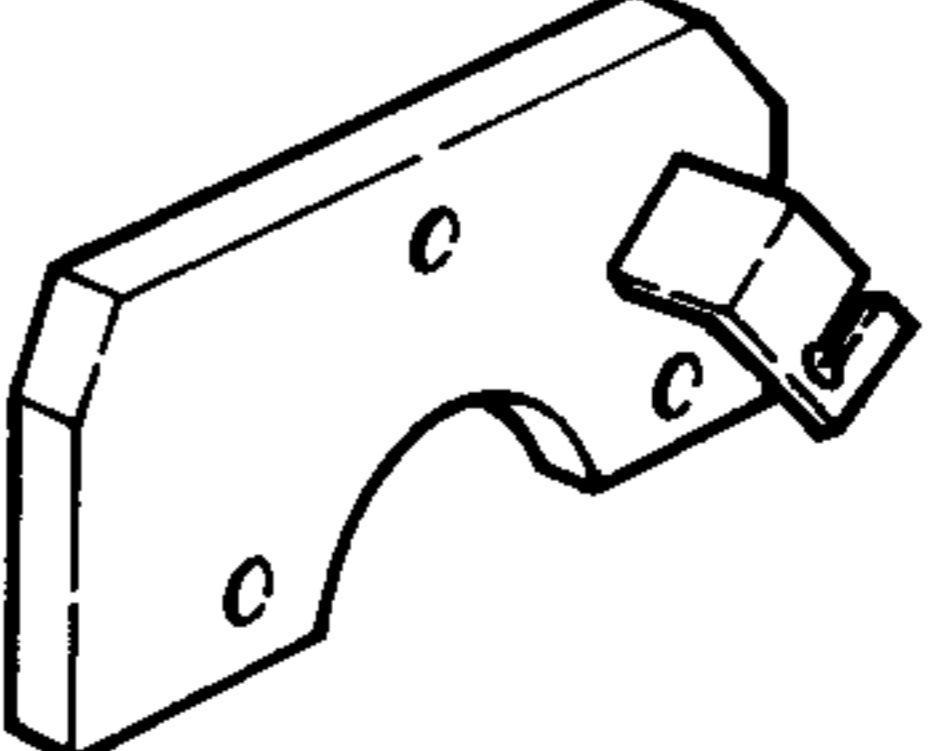
Application	Type	Description	Q.ty
Accelerator pedal shaft	GREASE	ISECO Molykote Longterm n. 2 Part No. 3671-69831	—

FUEL

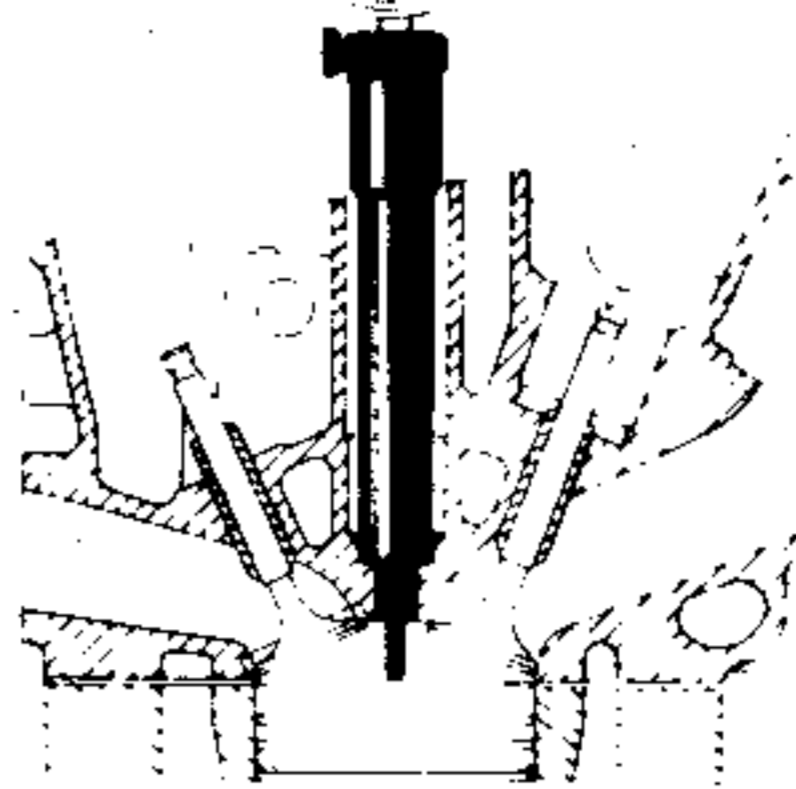
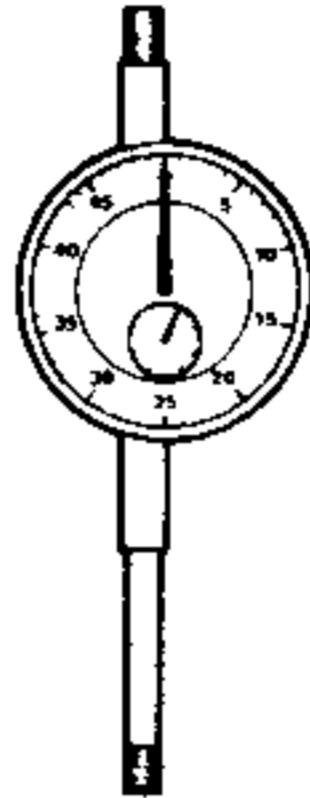
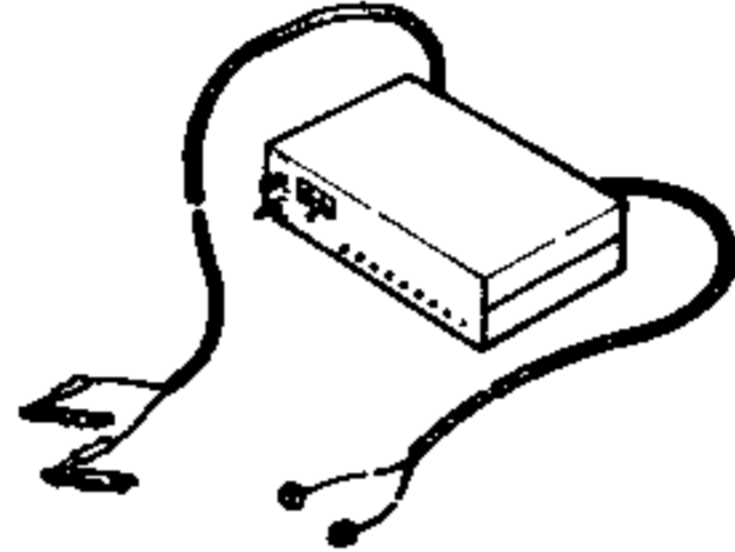

Gasoline: Octane Number (R.M.) ≥ 98 and sensitivity (1) ≤ 11

(1) Difference between NORM and NOMM

SPECIAL TOOLS

Part No.	Description	Page ref.
A.2.0419	Positioner, sensor plate 	04-129
A.5.0197	Wrench, tank pump and fuel level indicator sender lockring 	04-123
A.5.0241	Adjuster, TAS link 	04-119
A.5.0258	Wrench, articulated, spark plug 	04-128
C.2.0020	Connector, exhaust manifold (use with C.2.0053) 	04-132
C.2.0053	Hose, CO probe 	04-132
C.2.0125	Fitting, pump pressure test 	04-124
C.4.0500	Positioner, TAS lever 	04-118 04-119

FUEL SYSTEM

Part No.	Description	Page ref.
C.6.0183	Carrier, TDC gauge 	04-128
C.6.0198	Gauge, clock, 30 mm (1.17 in) stylus stroke (use with C.6.0183) 	04-128
C.9.0030	Tester, diagnostic, CEM System 	04-119 04-149
C.9.0031	Backer, throttle actuator, for mechanical adjustment 	04-118