L-Jetronic Equipment **VW - PORSCHE**

THROTTLE VALVE SWITCH **0 280 120...**	TEMPERA-TURE SENSOR **0 280 130...**	AUXILIARY AIR VALVE **0 280 140...**	COLD START VALVE **0 280 170...**	THERMO-TIME SWITCH **0 280 130...**	RELAY **0 332 514...**	PRE-RESISTOR **0 280 159...**	VACUUM LIMITER **0 280 160...**
201	012	101	026	219	103	001	102
201	012	101	026	221	103	001	300

WORKSHOP MANUAL

VW–Porsche

L-Jetronic

ROBERT BOSCH

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This manual describes the trouble-shooting and repair of vehicles with the Robert Bosch L-Jetronic (EFI) System using mostly common workshop tools. You should understand this fuel injection system before you begin working on the vehicle. The Bosch Technical Instruction Booklet VDT—UBP 751/1B explains the L-Jetronic System in detail and will increase your understanding of this system. This will reduce repair times and facilitate the use of this Workshop Manual.

HOW TO USE THIS MANUAL

This manual is designed to assist the technician unfamiliar with Robert Bosch fuel injection systems in locating faults in the L-Jetronic system, isolating the component involved and testing the component for correct function. You will need a volt-ohmmeter and a pressure gauge as described in the *Tool List.* Electrical measurements are made at the terminals of the large plug at the end of the wiring harness after it is removed from the control unit, or at the terminals of the individual components themselves. Most components of this system cannot be repaired and will have to be replaced once you have determined them defective.

If you are already familiar with Bosch EFI systems and can identify and locate all the components in the vehicle, go directly to the *Trouble-Shooting Chart* to track down the faulty component according to the engine symptom given. Then go to the *Component Test Instructions* for directions on testing the suspected component. Technicians who are experienced in the various tests on this vehicle model can go directly to the *Test Chart* where the individual test steps and values are given.

An *Electric Wiring Diagram* is included at the end of the manual to assist you in tracing cables and locating the various terminals. Be sure to check and if necessary reset the CO adjustment before returning the car to the customer.

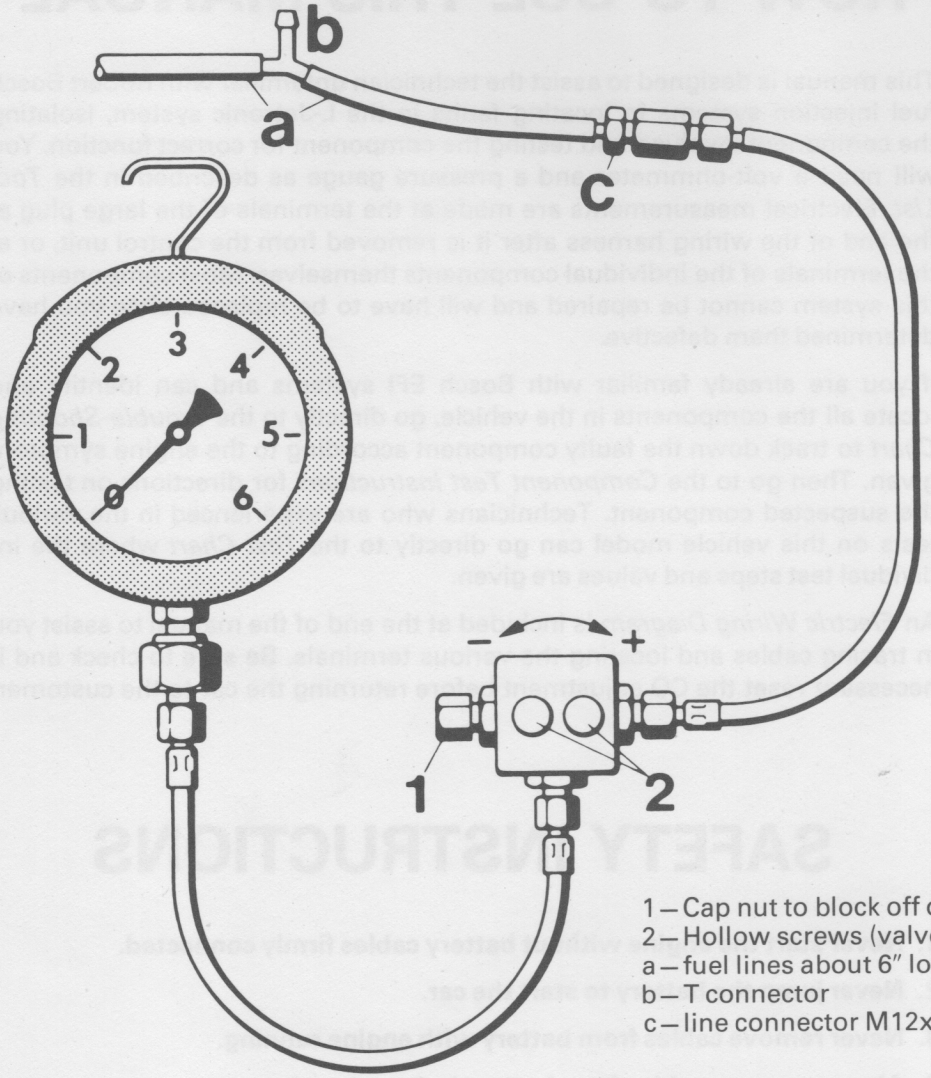
SAFETY INSTRUCTIONS

1. **Never start the engine without battery cables firmly connected.**
2. **Never jump the battery to start the car.**
3. **Never remove cables from battery with engine running.**
4. **Always remove cables from battery before charging.**
5. **Never remove or attach wiring harness plug to Control Unit with the ignition on.**
6. **When turning the engine over to check compression, unplug the red cable from the battery to the relays.**
7. **Before testing the L-Jetronic system, be sure timing, dwell and spark plugs check out OK and are within specification.**

TOOL LIST

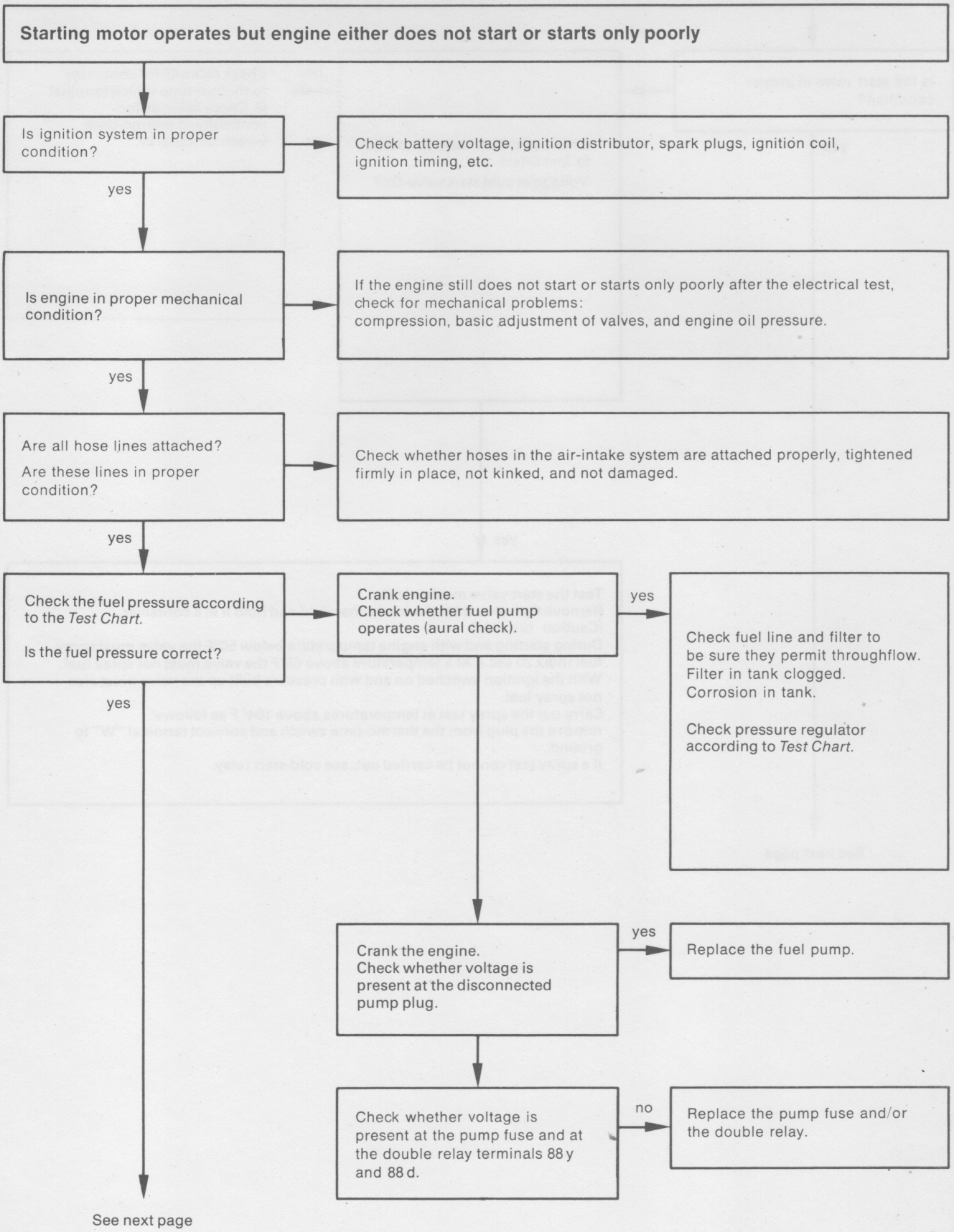
In addition to the pressure gauge and fittings shown below, a tachometer, CO meter and ohmmeter are needed for testing the L-Jetronic system in the vehicle as described in this manual.

The pressure gauge KDEP 1034 is the same unit used to test Robert Bosch K-Jetronic (CIS) systems and reads from 0-6 bar pressure. To use this gauge for testing vehicles with L-Jetronic, modify it as shown below. Order the complete gauge and directional control valve under the number **KDEP 1034**. The directional control valve alone is available under the order number **KDEP 1034/1**.



1 – Cap nut to block off outlet 3
2 – Hollow screws (valves)
a – fuel lines about 6″ long
b – T connector
c – line connector M12x1.5

TROUBLE-SHOOTING CHART



Starting motor operates but engine either does not start or starts only poorly (continued)

Is the start valve in proper condition?

yes → See next page

Check cold start valve according to *Test Chart.*
Voltage at cold start valve OK?

no → Check cable 45 for continuity to thermo-time switch terminal G. Check cable 46 for continuity to thermo-time switch terminal W.

yes →

Test the start valve mechanically
Remove the valve from the intake manifold and hold it in a container. (Caution fire risk!)
During starting and with engine temperature below 50°F the valve must spray fuel (max 20 sec.). At a temperature above 68°F the valve must not spray fuel.
With the ignition switched on and with pressure built up the valve must also not spray fuel.
Carry out the spray test at temperatures above 104° F as follows:
remove the plug from the thermo-time switch and connect terminal "W" to ground.
If a spray test cannot be carried out, see cold-start relay.

Starting motor operates but engine either does not start or starts only poorly (continued)

Is the thermo-time switch in proper condition?

yes

Check thermo-time switch according to *Test Chart.*

Does thermo-time switch check out OK?

no → Replace the thermo-time switch.

yes

Check cables 45 and 46 from the start-valve for continuity (see *Electric Wiring Diagram*).

Is the auxiliary-air device in proper mechanical condition?

Visual check of the auxilary-air device: in the cold condition the auxiliary-air device must be open but when the engine is warm it must be closed.

→ Replace the auxiliary-air device.

yes

Is the air-intake system leak-tight?

Check the intake manifold, components attached to the intake manifold, and all hose connections for leaks. Using compressed air and soapy water localize any leaks present.

yes

Is the air-flow meter in proper condition?

Check pump contacts in air flow meter according to *Test Chart.*
Remove the upper section of the air filter.
Open the air-flow meter flap by hand. It must be possible to open the air-flow meter flap with uniform ease from its fully closed position to its fully open position, and then this flap must close completely by itself. When the air-flow meter flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing.

→ When air-flow meter flap is opened:
if the inside of the air-flow meter is very dirty, clean it.

Engine starts but then dies

Is ignition system is proper condition?

→ Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.

yes ↓

Is engine in proper mechanical condition?

→ If the engine still dies after the electrical test, check for mechanical problems: compression, basic adjustment of valves, and engine oil pressure.

yes ↓

Is the fuel pressure correct?

→ Test according to *Test Chart.*

yes ↓

Fuel pressure drops again after the end of the starting process.

yes → Test the fuel-pump contact in the air-flow meter: remove the upper section of the air filter. Detach the plug from the air-flow meter and connect the ohmmeter to terminals 36 and 39 at the air-flow meter. Press the air-flow meter open slightly by hand. When this is done the resistance must change from ∞ Ω to 0 Ω.

→ Replace the air-flow meter.

yes ↓

Is the start valve in proper condition (no leaks)?

→ Test the start valve for leaks. In order to do this, clamp the fuel intake line closed with a clip. Does the engine then start when cranked?

yes → Replace the start valve.

Rough engine idle, speed adjustment (idle), and exhaust gas test

Is ignition system in proper condition?

→ Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.

yes ↓

Is engine in proper mechanical condition?

→ If the engine still does not idle properly after the electrical test, check for mechanical problems:
compression, basic adjustment of valves, and engine oil pressure.

yes ↓

Is the throttle valve closed?

→ Determine whether the throttle valve can be closed farther and whether the engine speed decreases when this is done.

yes → Remove the throttle valve clamps; if the throttle linkage is bent, straighten it; reset the adjusting screw at the throttle valve.

yes ↓

Is the throttle valve switch set correctly?

→ Adjust throttle valve switch.

yes ↓

Set the idle speed with the idle screw, according to the *Test Chart.* Was test value not reached or engine idle uneven?

→ Perform exhaust gas test using CO tester with the engine at normal operating temperature according to the *Test Chart.*
Can value be reached?

no → yes ↓

No leaks in air-intake system. System in proper condition?

→ For testing, see under "Starting motor operates but engine either does not start or starts only poorly".

yes ↓

Is the auxiliary-air device closed when the engine is at normal operating temperature?

→ Using a clip, clamp one hose leading to the auxiliary-air device closed.
The engine speed may drop only slightly. Or:
visual check with the hose detached: when the engine is at normal operating temperature the auxiliary-air device must be closed.
Speed falls sharply or auxiliary-air device open: replace the auxiliary-air device.

yes ↓

See next page

Rough engine idle, speed adjustment (idle), and exhaust gas test (continued)

Is the start valve in proper condition (no leaks)?

yes → Test the start valve for leaks. For this purpose clamp the fuel intake line closed with a clip. Does engine then run evenly?

yes → Replace start valve.

yes ↓

Are the fuel injection valves in proper mechanical condition?

yes → With the engine operating, detach the valve plugs individually one after the other from the fuel injection valves. With a good injection valve the engine speed must drop as the plug is detached.

no → Replace a defective injection valve.

yes ↓

Is the fuel pressure correct?

→ Test fuel pressure according to *Test Chart*.

yes ↓

Is the air-flow meter in proper condition?

→ For testing, see under "Starting motor operates but engine either does not start or starts only poorly".

yes ↓

Exhaust gas test (repeat) using CO tester with the engine at normal operating temperature: see *Test Chart* for value.

→ If the concentration of CO is too high, turn the bypass screw in the air-flow sensor ½ turn counterclockwise.
Measure the speed and the concentration of CO again. Make corrections in several steps.

Fuel not accepted smoothly

Is the ignition system in proper condition?
- → Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.
- yes ↓

Is the engine in proper mechanical condition?
- → If the fuel acceptance of the engine is still poor after the electrical test, check for mechanical problems: compression, basic adjustment of valves, and engine oil pressure.
- yes ↓

Is the throttle valve switch set correctly?
- → Adjust throttle valve switch.
- yes ↓

Is the air-intake system leak-tight?
- → For testing, see under "Starting motor operates but engine either does not start or starts only poorly".
- yes ↓

Is the auxiliary-air device in proper mechanical condition?
- → Visual check of the auxiliary-air device: in the cold condition the auxiliary-air device must be partly open but when the engine is warm it must be closed.
  - no → Replace the auxiliary-air device.
- yes ↓

Is the air-flow meter in proper mechanical condition?
- → For testing, see under "Starting motor operates but engine either does not start or starts only poorly".
- yes ↓

Is composition of exhaust gas (concentration of CO) correct?
- → Check according to *Test Chart*.

Engine misses occur under all operating conditions

Is the ignition system in proper condition?

→ Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.

yes ↓

Is engine in proper mechanical condition?

→ If engine misses still occur after the electrical test, check for mechanical problems:
compression, basic adjustment of valves, and engine oil pressure.

yes ↓

Are the plug connections in the L-Jetronic wiring harness in proper condition?

→ Check for engine misses caused by loose contacts as follows
Start engine with tachometer connected. Hold the engine speed constant while observing the reading and/or listening for engine misses.
Move the wiring harness and the plug connections the reading must not vary and engine misses must not occur. Check the plug connections for correct seating and corrosion. Test ground cables 5, 16, 17, and 49 for continuity and loose contacts.

yes ↓

Is the voltage supply for the fuel injection system in proper condition?

→ Detach both wiring harness plugs from the double relay. Check that all plug sleeves and electric cables are in proper condition. Check all connector cables for continuity. Move the wiring harness when doing this (suspicion of broken cables). See also preceding testing step with wiring harness.

yes ↓

Is the start valve in proper condition (no leaks)?

→ Using a clip, clamp the fuel pressure hose closed in front of the connection at the start valve.
If this eliminates the engine misses, replace the start valve.

yes ↓

Are the alternator and regulator in proper condition?
(Engine misses caused by voltage peaks.)

→ With the engine stopped remove the plug from the alternator. Start the engine. If this eliminates the engine misses, check the alternator and regulator.

yes ↓

See next page

Engine misses occur under all operating conditions (continued)

Is the quantity of fuel delivered by the fuel pump correct?

In order to test the quantity of fuel delivered detach the fuel hose at the start valve. Extend the hose and lead it to a measuring vessel of 5 liters capacity with a graduated scale. Remove the top section of the air filter, open the air-flow sensor flap by hand until the pump operates.
Measured value for correct delivery (after 1 min. of operation) about 1.0 liter/minute.

yes

Is the quantity of fuel delivered by the injection valves correct?

Remove one valve at a time and inject fuel into a graduate for 30 seconds while engine idles. Compare quantity with that delivered by a known good injector. If delivery quantity deviates from good injector, original valve was defective.

yes

Is the air-flow meter in proper mechanical condition?

For testing, see under "Starting motor operates but engine either does not start or starts only poorly".

yes

Is the control unit in proper condition?

Connect tachometer. Let the engine run. Tap lightly on the control unit and move the multiple plug. Watch the reading and listen for engine misses. Replace the control unit with a known good one. If the problem is solved, original control unit was defective.

Fuel consumption too high

Is the ignition system in proper condition?
- → Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.
- yes ↓

Is engine in proper mechanical condition?
- → Check for mechanical problems: compression, basic adjustment of valves, and engine oil pressure.
- yes ↓

Is the fuel pressure correct?
- → Test fuel pressure according to *Test Chart.*
- yes ↓

Is the quantity of fuel delivered by the injection valves correct?
- → Remove one valve at a time and inject fuel into a graduate for 30 seconds while engine idles. Compare quantity with that delivered by a known good injector. If delivery quantity deviates from good injector, original valve was defective.
- yes ↓

Is the start valve in proper condition (no leaks)?
- → Testing as described under "Starting motor operates but engine either does not start or starts only poorly".
- yes ↓

Is the air-flow meter in proper condition?
- → For testing see under "Starting motor operates but engine either does not start or starts only poorly".
- yes ↓

Is composition of exhaust gas (CO concentration) correct?
- → Check according to *Test Chart.*
- ↓

Is altitude compensator functioning correctly? (Installed in some vehicles operated at high altitudes).
- → Check according to *Test Chart.*

No maximum power / maximum speed cannot be attained

Is the ignition system in proper condition?

→ Check battery voltage, ignition distributor, spark plugs, ignition coil, ignition timing, etc.

yes ↓

Is the engine in proper mechanical condition?

→ If maximum power still cannot be attained after the electrical test, check for mechanical problems: compression, basic adjustment of valves, and engine oil pressure.

yes ↓

Does the throttle valve open completely?

→ Are the throttle linkage and accelerator pedal in proper condition?

→ Straighten a bent throttle linkage. Watch for a sticking accelerator pedal (caused, for example, by a floor mat, etc.).

yes ↓

Is the fuel pressure correct?

→ Test according to *Test Chart.*

yes ↓

Is the air-intake system free of leaks?

→ For testing, see under "Starting motor operates but engine either does not start or starts only poorly".

yes ↓

Is the quantity of fuel delivered by the fuel pump correct?

→ In order to test the quantity of fuel delivered detach the fuel hose at the start valve. Extend the hose and lead it to a measuring vessel of 5 liters capacity with a graduated scale. Remove the top section of the air filter, open the air-flow meter flap by hand until the pump operates.
Measured value for correct delivery (after 1 min. of operation) about 1.0 liter/minute.

no → Fuel filter clogged. Replace fuel filter. Pay attention to direction of flow.

no → Fuel-pressure regulator defective. Replace fuel-pressure regulator.

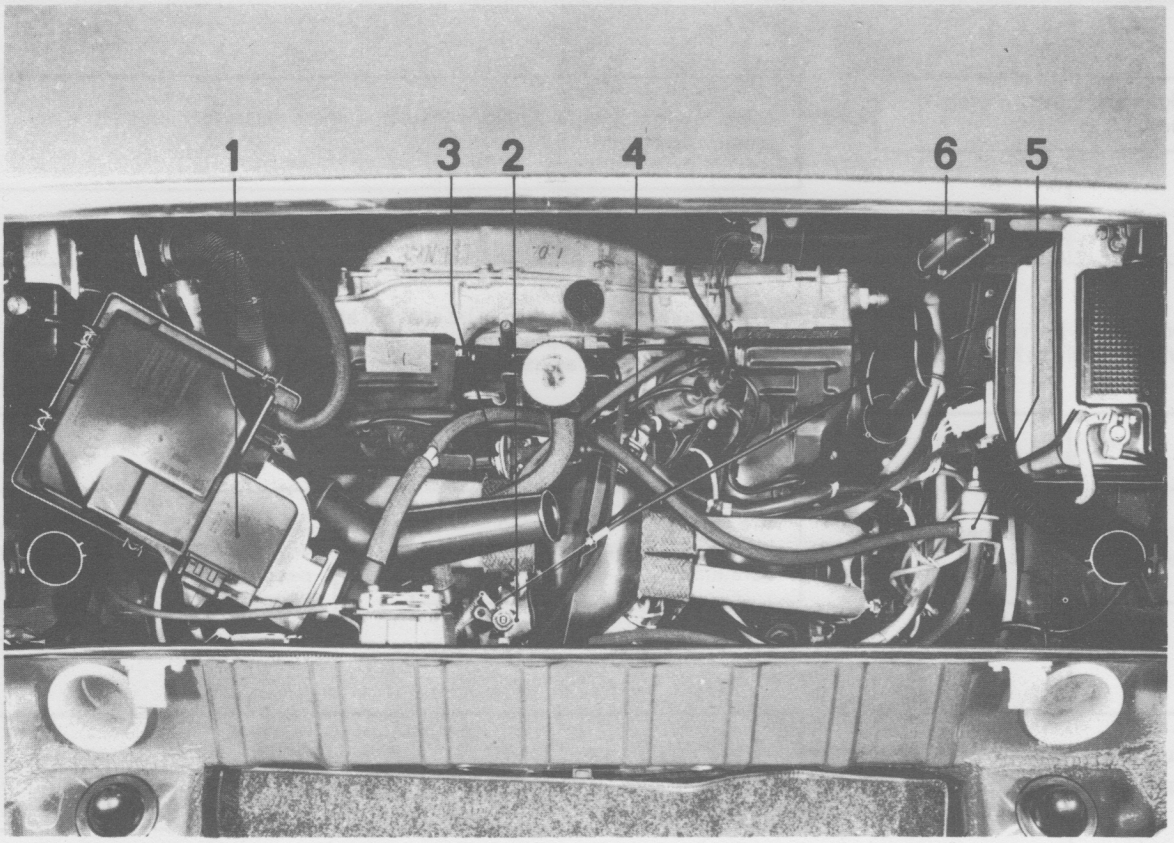
no → Power of fuel pump too low. Replace fuel pump.

yes ↓

Is the air-flow meter in proper mechanical condition?

→ For testing, see under "Starting motor operates but engine either does not start or starts only poorly".

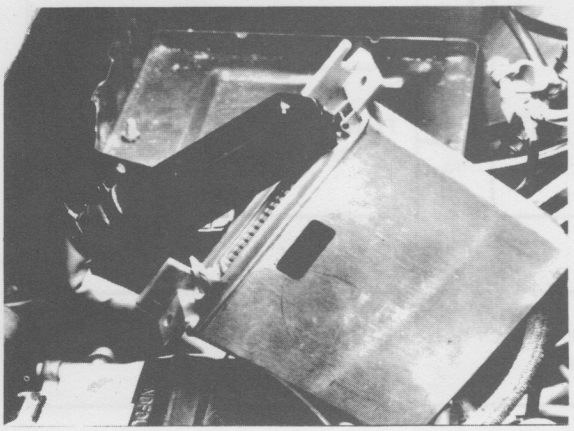
COMPONENT TEST INSTRUCTIONS



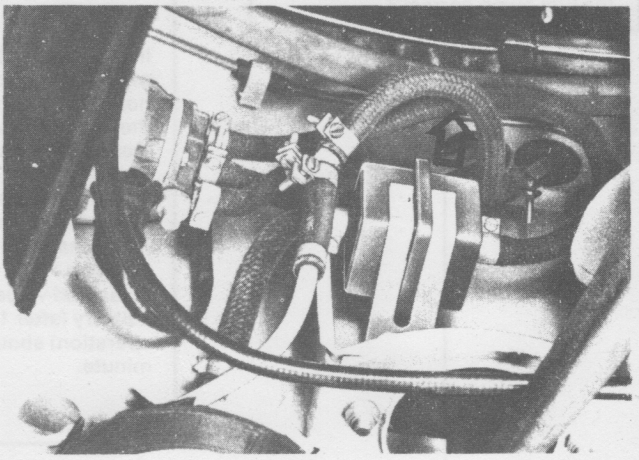
1—Air flow meter
2—Throttle venturi housing
3—Auxiliary air valve
4—Cold-start valve
5—Pressure regulator
6—Control unit

To check the entire system for air leaks, disconnect one hose from the auxiliary air valve and blow compressed air through the hose with the throttle open. Soapy water on hoses and connections will then indicate leaks.

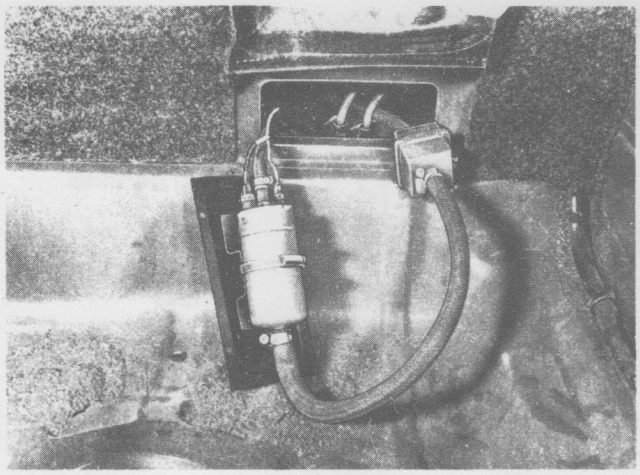
The **control unit** is located behind the battery. The plug is removed for several of the tests described in the *Test Chart.*



The **fuel pump** and **fuel filter** are accessible after removing the right hand side heater box in 1974 914 models.

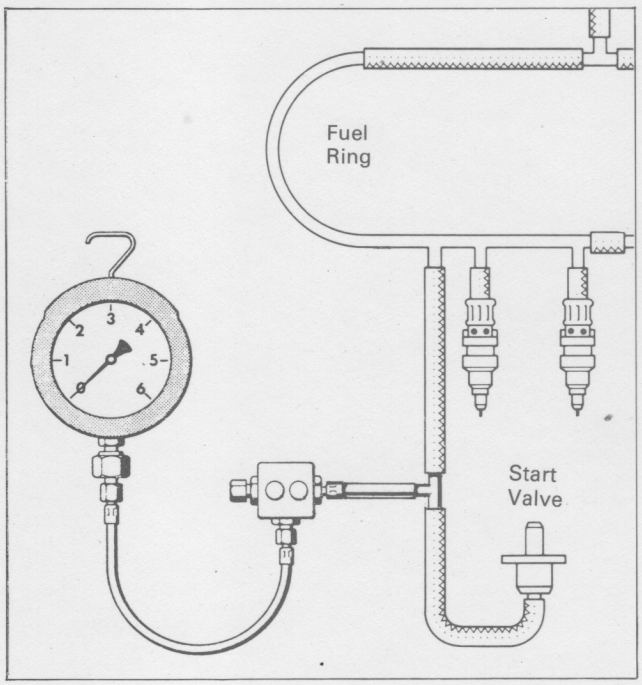


In 1975 models, the pump and filter are located behind the cover in the front luggage compartment, in front of the gas tank.



The voltage check described in the *Test Chart* is performed at the fuel plug contacts after the plug is removed from the pump.

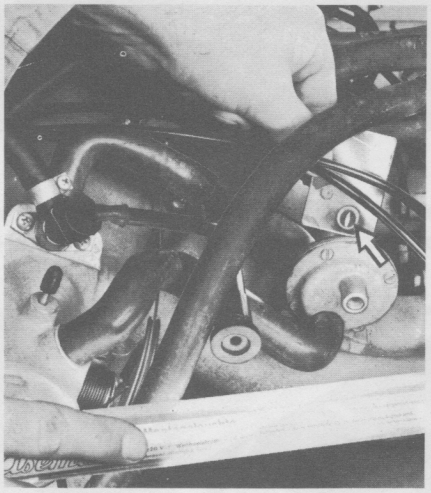
The fuel pressure test is made inside the engine compartment by removing the hose from the start valve and connecting pressure gauge KDEP 1034 in series with the line using a T-piece and extra length of hose as shown below.



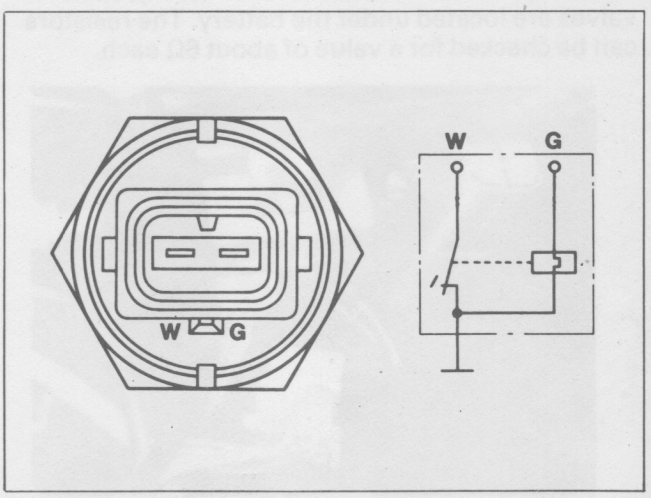
Before testing the system for correct pressure value, remove the pressure regulator vacuum hose at the regulator or manifold and block the opening (see *Fuel System Description*). Start the engine and let it idle. Read the gauge for the correct pressure as shown in the *Test Chart* **2.3-2.7 bar.** Now reconnect the vacuum hose to the regulator. The pressure should drop to about 2 bar at idle, and rise again when the throttle is opened. If this is not the case, check the vacuum hose for leaks.

A clean, unclogged filter is a prerequisite for accurate fuel pressure and delivery tests as described in the *Test Chart.*

To test the **auxiliary air valve,** remove the 2 hoses from the valve and use a mirror and light source to look through the valve. It should be partially open when the engine is cold and fully closed when the engine is warmed up.

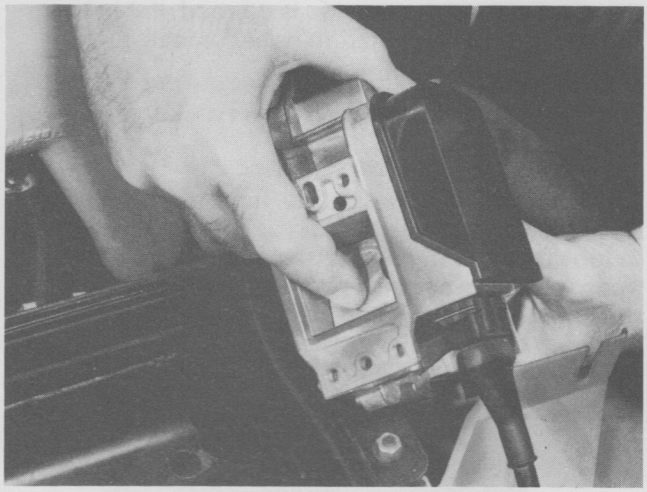


The **thermo-time switch** is tested in the vehicle for correct resistance values at certain engine temperatures as given in the *Test Chart.* For this purpose remove the plug from the switch and measure directly at the terminals of the switch. The illustration below shows the condition of the thermo-time switch when the coolant temperature is below 50°F terminal W is connected to ground to complete the circuit and activate the cold start valve.

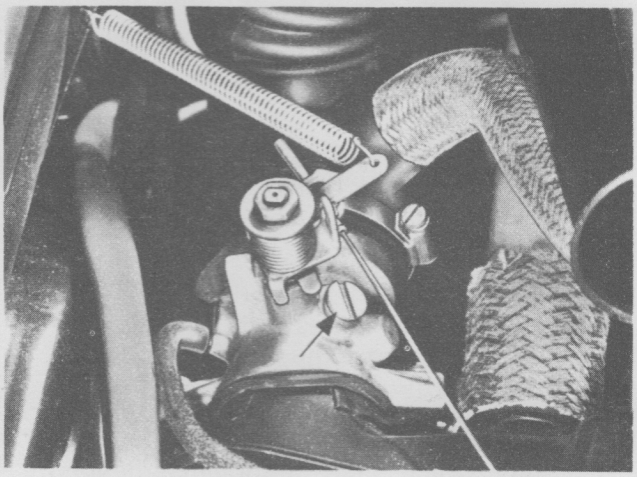


The bypass air screw in the **air flow meter** controls idle mixture. Turning the screw out (counter-clockwise) reduces CO. See the *Test Chart* for correct value.

After the air flow meter is removed from the air filter, the flap can be pressed by hand to check for correct function as described in the *Test Chart.*

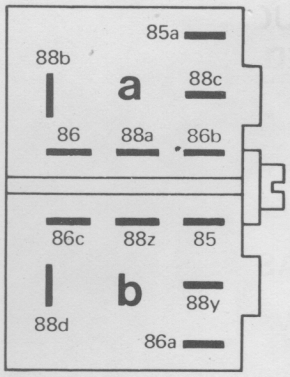


Idle speed is set with the large bypass air screw on the throttle venturi housing (arrow) to **800-900 RPM**.



The **relays** and **series resistors** for the injection valves are located under the battery. The resistors can be checked for a value of about 6Ω each.

To test the voltage supply to the injection valves, unscrew the double relay and turn it around so both terminal sets are accessible.



a — L-Jetronic wiring harness

b — Vehicle wiring harness

With the ignition on, there should be full system voltage between terminal 88z and ground and between 88b and ground. If this is not the case, the relay is defective.

Also check the voltage at terminals 43/1 and 43/2 against ground to insure that the injection valves are being supplied with full system voltage. See the *Electrical Wiring Diagram* for terminal identifications.

TEST CHART

ALL MEASUREMENTS ARE MADE ON THE TERMINALS OF THE DISCONNECTED WIRING HARNESS PLUG TO THE CONTROL UNIT (ECU) WITH IGNITION OFF UNLESS OTHERWISE INDICATED.

Voltage Supply

OPERATE: Ignition on.

MEASURE: Voltage supply to the ECU.

VALUE: 11-12.5 V between terminal 10 and system ground at terminal 17 of ECU plug.

DEVIATION: **No reading**: open circuit in cable from main relay to ECU, main relay does not energize, ignition switch defective (check for voltage at terminals 86c and 88y of relay against ground). Check cable 10 connecting main relay and ECU for continuity. Check cable 17 to ground.

Voltage below 11 V: Contact resistance in cable 10 or 17 or at relay contacts.

OPERATE: Ignition on.

MEASURE: Function of main relay section.

VALUE: 11-12.5 V between relay terminals 88a, 88c and 88z with respect to ground (terminal 85).

DEVIATION: If any of the terminals does not give system voltage, the relay is defective.

OPERATE: Ignition on.

MEASURE: Function of pump relay section.

VALUE: 52-78 Ω between ECU plug terminal 20 and system ground at terminal 17.

DEVIATION: If resistance of pump relay coil is out of specification, check cable from ECU plug terminal 20 to relay terminal 86b for continuity and relay terminal 85 for continuity to ground. If these both check OK, relay is defective.

VOLTAGE SUPPLY TEST CONTINUED ON NEXT PAGE

TEST CHART

Voltage Supply (continued)

OPERATE: Starter.

MEASURE: Voltage from ECU plug terminal 4 to ground at terminal 17.

VALUE: 9-12 V.

DEVIATION: **No reading, but starter operates**: relay defective, open circuit from relay terminal 86 to ECU terminal 4, open circuit from starter terminal 50 to relay terminal 86a.

No reading, starter does not operate: ignition switch defective or open circuit in cables to or from ignition switch.

Voltage below 9 V: battery low or voltage drop in cable from ignition switch to starter terminal 50 (check cable).

Air Flow Meter

OPERATE: Deflect meter flap slightly.

MEASURE: Function of pump contacts.

VALUE: Transition from $\infty\Omega$ (flap closed) to 0Ω (flap slightly open) between terminals 36 and 39 on air flow meter.

DEVIATION: If no transition from infinity to zero, replace air flow meter.

CO: Using the bypass air screw in the air flow meter to adjust idle mixture, set the CO to 2-3% (1974 models) or 0.2-1.2% (1975 models) with the engine at normal operating temperature.

IDLE: With the engine at normal operating temperature, set the idle speed at the screw on the throttle venturi to 800-900 RPM.

TEST CHART

Throttle Valve Switch

OPERATE: Accelerator in idle position.

MEASURE: Function of idle contacts.

VALUE: 0Ω (continuity) between terminals 2 and 18 of ECU plug.

DEVIATION: **Resistance** ∞Ω: throttle valve switch incorrectly adjusted. Open circuit in cable (check cables). If direct reading at terminals 2 and 18 of throttle valve switch still gives infinite resistance (∞Ω), replace throttle valve switch.

OPERATE: Accelerator fully depressed.

MEASURE: Function of full load contacts.

VALUE: 0Ω between terminals 3 and 18 of ECU plug.

DEVIATION: **Resistance** ∞Ω: throttle valve switch incorrectly adjusted or short circuit in cables. Pull plug from throttle valve switch. If meter at ECU plug still reads ∞Ω, cable is defective. Otherwise adjust or replace throttle valve switch.

NOTE: Between idle and full load positions, resistance across throttle valve switch terminals is ∞Ω.

TEST CHART

Fuel Pump, Pressure Regulator and Relay

OPERATE: Turn on ignition and deflect air flow meter flap by hand to energize relays and operate fuel pump. Connect pressure gauge KDEP 1034 as described in the *Component Test Instructions.*

MEASURE: Pressure in fuel line and function of pressure regulator.

VALUE: 2.3-2.7 bar.

DEVIATION: **No pressure build-up (pump does not start)**: pull plug from pump and measure voltage at plug contacts. If 12 V, pump is defective. If 0 V, check pump fuse in B+ line to relay terminal 88y. If relay is operating, then check cable from relay terminal 88d to pump. If cables OK, relay is defective.

Pressure above or below specification: check fuel filter and return lines for free passage. If all fuel lines are OK, pressure regulator is defective.

OPERATE: Ignition with fuel hose removed from cold start valve and placed in a graduate. Deflect air flow meter flap by hand to operate fuel pump.

MEASURE: Delivery quantity of fuel pump.

VALUE: 1.0 liter per minute.

DEVIATION: If fuel filter and lines are free and correct delivery quantity cannot be reached, fuel pump is defective.

Temperature Sensor

MEASURE: Resistance of the temperature sensor.

VALUE: 2-3 KΩ at 68°F between ECU plug terminals 13 and 17 (ground). At 14°F, 7-12 KΩ; at 176°F, 250-400 Ω.

DEVIATION: **Meter reads ∞Ω**: check temperature sensor directly at terminals on sensor. If sensor resistance is OK, replace cables. If tester shows 0Ω (continuity) at sensor terminals, replace sensor.

Meter reads 0Ω: pull plug from sensor. If meter at ECU plug then reads ∞Ω, replace sensor. If not, replace cables.

TEST CHART

Injection Valves

MEASURE: Resistance of coil winding in injection valve.

VALUE: 2-3 Ω between terminals on each injector.

DEVIATION: If winding is open (∞Ω) or shorted (0 Ω), replace injector.

Check resistance of series resistors for injection valves: 5-7 Ω each. With ignition on, supply voltage of 11-12.5 V must be present from terminal 43/1 and terminal 43/2 of series resistors to ground.

Cold Start Valve

OPERATE: Engine at idle speed with electrical plug disconnected from start valve.

MEASURE: Voltage supply at cold start valve.

VALUE: 11-12.5 V between terminals 45 and 46 of the disconnected cold start valve plug with engine temperature below 86°F.

0 V between terminals as above with engine temperature above 104°F.

DEVIATION: If values given are not reached, check thermo-time switch for proper function (see below). Check cables 45 and 46 for continuity.

MEASURE: Resistance of start valve coil windings.

VALUE: About 4 Ω between terminals 45 and 46 of cold start valve.

DEVIATION: If windings are open (∞Ω) or shorted (0 Ω), replace start valve.

TEST CHART

Thermo-Time Switch

MEASURE: Resistance between terminal "G" on thermo-time switch and ground.

VALUE: 25-40Ω with engine temperature below 50°F. 50-80Ω with engine temperature above 68°F.

DEVIATION: If resistance value lies outside of specification, thermo-time switch is defective.

MEASURE: Resistance between terminal "W" on thermo-time switch and ground.

VALUE: 0Ω (continuity) with engine temperature below 50°F. 100-160Ω with engine temperature above 68°F.

DEVIATION: If resistance value lies outside of specification, thermo-time switch is defective.

MEASURE: Resistance between terminals "G" and "W" on thermo-time switch.

VALUE: 25-40Ω with engine temperature below 50°F. 50-80Ω with engine temperature above 68°F.

DEVIATION: If resistance value lies outside of specification, thermo-time switch is defective.

Altitude Compensator

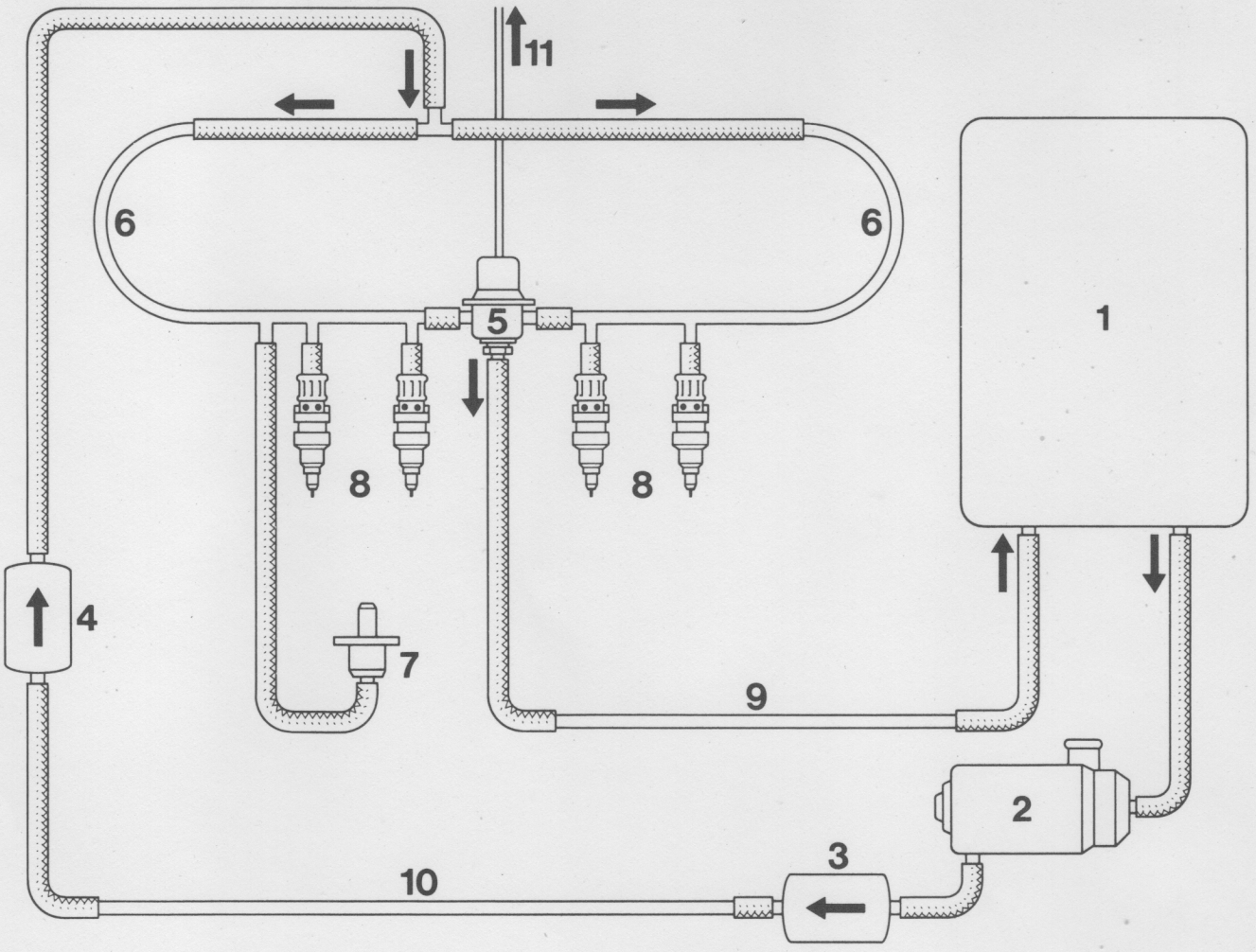
This device is installed near the control unit in some models operated at high altitudes. See the *Electric Wiring Diagram* for more information.

MEASURE: Resistance of windings in altitude compensator.

VALUE: 1-10 kΩ between terminals 6 and 9 of ECU plug, 0.2-2 kΩ between terminals 6 and 12.

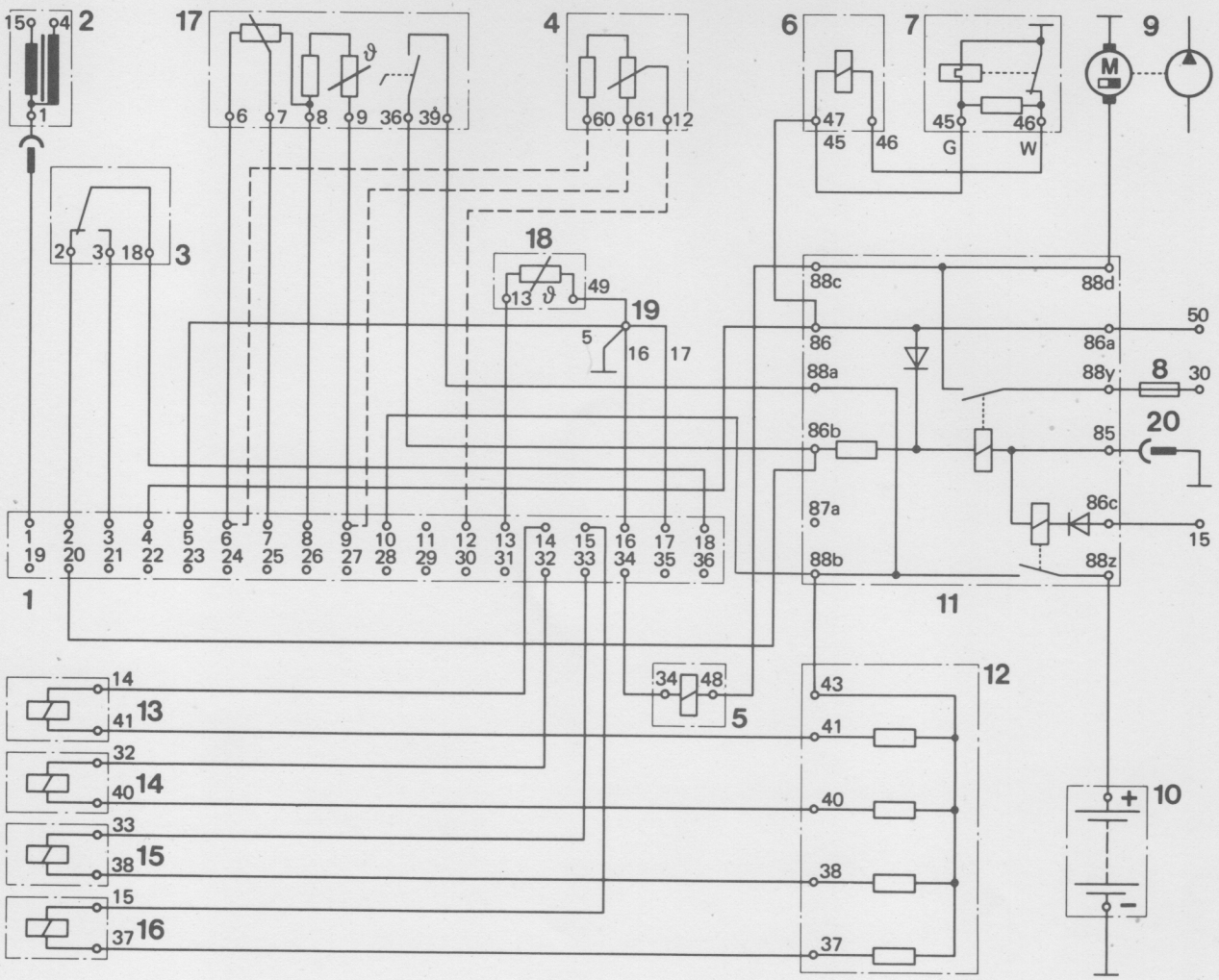
DEVIATION: If readings out of specification, check cables to altitude compensator. If cables check OK, compensator is defective.

FUEL SYSTEM DESCRIPTION



1 – Fuel tank
2 – Electric fuel pump
3 – Expansion chamber (optional)
4 – Fuel filter
5 – Pressure regulator
6 – Fuel ring
7 – Cold start valve
8 – Fuel injection valves
9 – Fuel return line
10 – Fuel pressure line
11 – To intake manifold (this hose removed for fuel pressure test)

ELECTRIC WIRING DIAGRAM



1 – ECU wiring harness plug
2 – Ignition coil
3 – Throttle valve switch
4 – Altitude compensator (optional)
5 – Auxiliary air valve
6 – Cold start valve
7 – Thermo-time switch
8 – Fuel pump fuse
9 – Fuel pump
10 – Battery
11 – Relay set
12 – Series resistors
13 – Cylinder 4 injection valve
14 – Cylinder 3
15 – Cylinder 2
16 – Cylinder 1
17 – Air flow meter
18 – Temperature sensor
19 – System ground
20 – Relay ground