

TESTS W/O CODES - NON-TURBO

1995 Volvo 940

No Initial Combustion

- * Check fuel pump circuit.
- * Check RPM sensor circuit.
- * Check camshaft position sensor circuit.
- * Check power stage circuit.
- * Check MAF sensor circuit.
- * Check ECT sensor circuit.
- * Check fuel pressure.

FUEL SYSTEM

WARNING: Always relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

FUEL PRESSURE

Fuel Pressure

1) Before disconnecting, cover fuel line connector using shop towel to absorb any fuel spray. Connect Fuel Pressure Gauge (5011) between fuel line and fuel rail. Seal free end of hose using Plug (5266) or use Fuel Drainage Unit (981 2270, 2273 and 2282).

2) Lift out central electrical unit behind ashtray and remove system relay. See Fig. 1. Connect a jumper wire between relay terminals No. 30 and 87/2. See Fig. 2.

3) Turn ignition on. Fuel pump should start. Fuel filler cover can be removed to determine whether main pump is operating. Fuel pressure should be about 43.5 psi (3.06 kg/cm²). If pressure is too low, pinch return hose by hand and check whether pressure rises. DO NOT allow pressure to exceed 86 psi (6 kg/cm²).

4) If pressure rises rapidly, pump and lines are okay. Replace pressure regulator and recheck line pressure. If pressure rises slowly, fuel filter, fuel pump strainer or fuel lines are blocked. If pressure does not rise, fuel pump is probably faulty.

5) If pressure is too high, remove jumper wire between relay or fuse terminals. Remove return hose from pressure regulator. Blow in pipe. Remove vacuum hose from pressure regulator. Blow in pipe. If both hoses are open, pressure regulator is defective. Replace regulator and recheck pressure.

**Fuel Injection
System Relay**

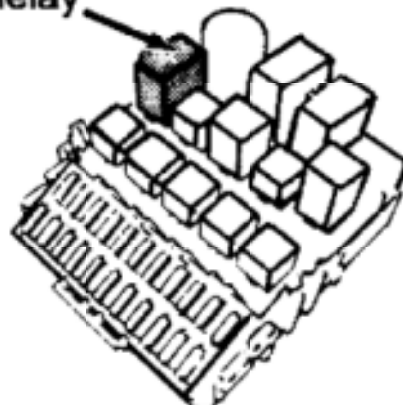


Fig. 1: Locating Fuel System Relay

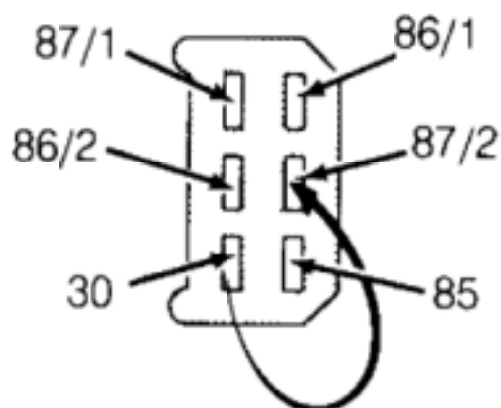


Fig. 2: Identifying Fuel Injection System Relay Terminals

Fuel Pump Circuit

1) Remove fuel injection system relay. Check voltage at terminal No. 30. See Figs. 1 and 2. If battery voltage does not exist, repair wiring between relay connector and battery.

2) Connect jumper wire between terminals No. 30 and 87/2 of fuel injection system relay connector. Fuel pump should run. If fuel pump does not run, check wiring between pump and relay. Also, check wiring between terminals No. 87/1 and 85 for continuity. Repair as necessary.

NOTE: ECU terminal identifications are marked on unit or connector.

CAUTION: Ensure ignition is off when connecting or disconnecting ECU connector.

Injection System (Fuel Pump) Relay

With ECU connector disconnected from ECU, ground ECU connector terminals No. 17 and 21. Pump relay should activate fuel pumps and pumps should start operating. Connect voltmeter between ground and terminal 87/2 in relay. See Fig. 2. Battery voltage should be present. Disconnect ground leads from ECU terminals No. 17 and 21. Replace relay if faulty.

BASIC TESTING - NON-TURBO

1995 Volvo 940

BOSCH EZ116K

NOTE: ECU terminal identifications are marked on unit or connector.

1) Ensure ground connections from ignition ECU and power stage to inlet manifold ground are okay. If ground connections are good, disconnect a spark plug wire from spark plug. Connect a test spark plug to disconnected spark plug wire and ground spark plug. Crank engine and monitor spark.

2) A strong Blue/White spark indicates engine or fuel system malfunction. If no or weak spark is present, reconnect spark plug wire to spark plug. Disconnect coil wire from distributor cap and install test spark plug. Crank engine and monitor spark. If no spark or weak spark is present, coil or ignition system primary circuit is defective.

3) If a strong Blue/White spark is present, check ignition rotor, distributor housing and spark plug wires. Replace components as necessary. If components are okay, go to next step.

4) Turn ignition off. Reconnect disconnected components. Ensure all connectors are secure and properly connected. With ignition off, remove panel from lower left dashboard and disconnect ignition ECU connector. Remove dust cover from connector. Ensure all ECU pin connection sleeves are at same height.

5) Measure voltage at ignition ECU connector terminal No. 5. Voltage should be about 12 volts. If voltage is not present, check circuit between ignition ECU and fuse holder.

6) Turn ignition on. Open diagnostic connector at left rear of engine compartment and connect test lead to socket No. 6 (marked on unit). See Fig. 3. Measure voltage at ignition ECU connector terminal No. 1. Voltage should be about 12 volts. Press test button on diagnostic unit. Voltage should now be zero volt. If voltage is not present at control unit or if voltmeter reads 12 volts with button pushed, measure voltage at diagnostic unit connector.

7) Measure voltage at diagnostic unit connector Blue lead. Voltage should be about 12 volts. Using ohmmeter, check continuity between diagnostic connector Black lead and ground. Continuity should exist.

8) Turn ignition off. Check continuity between diagnostic test lead and pin No. 8 (under function selector button). Ohmmeter should read infinity. Press button on diagnostic unit. Ohmmeter should now show continuity.

9) Using ohmmeter, check continuity of diagnostic unit LED. Connect ohmmeter leads to test lead and to pin under LED. Continuity should exist in one direction only.

10) Turn ignition on. Measure voltage at ignition ECU terminal No. 6 (Blue wire). Voltage should be about 12 volts. Turn ignition off. Check continuity between ignition ECU connector terminals No. 20 (Brown wire) and No. 14 (Black wire). Continuity should be present.

11) Measure resistance between ground and ignition Engine Control Unit (ECU) connector terminal No. 2 (Red/Black wire). See the ENGINE COOLANT TEMPERATURE SENSOR RESISTANCE table. If reading is not correct, test sensor directly to determine if fault is in sensor or wiring.

12) Check continuity between ignition ECU connector terminal No. 7 (Orange wire) and ground. Ohmmeter should show continuity. Depress accelerator until throttle switch opens slightly. Ohmmeter reading should increase to infinity. If reading is not correct, measure throttle switch resistance directly to determine if fault is in switch or wiring. Adjust throttle switch if necessary. See procedures in the D - ADJUSTMENTS article.

13) Measure voltage at ignition ECU connector terminal No. 8

(Yellow wire). Turn ignition on. Voltage should be about .1 volt. If reading is not correct, check for open circuit between ignition ECU and fuel injection ECU or for fault in fuel injection ECU.

14) Turn ignition off. Measure resistance between ignition ECU connector terminals No. 10 (Red wire) and No. 23 (Blue wire). Resistance should be 215-265 ohms. Ensure shield is connected to ignition ECU terminal No. 11.

15) Disconnect knock sensor connector and place a jumper wire between terminals. Check for continuity between ignition ECU terminals No. 12 (Black wire) and No. 13 (Green wire). Continuity should exist. If continuity does not exist, remove jumper wire and check each wire for an open circuit. If wiring is okay, replace knock sensor.

16) Reconnect knock sensor connector. Reassemble and reconnect ignition ECU connector.

17) Remove air cleaner assembly. Ensure ignition is off, and disconnect power stage connector. Power stage is located at front of left front fender panel. Remove connector dust cover. Connect multimeter negative (-) lead to ground and positive (+) lead to connector pin No. 4. Turn ignition on, and note voltage reading. Voltage should be about 12 volts.

18) Leave multimeter attached, and crank starter motor. Voltage should be at least 10.5 volts. If voltage is too low, check battery and charging system. If voltage is not present, check Blue wire from ignition ECU to ignition coil and power stage. Repair or replace as necessary.

19) Check continuity of power stage ground by connecting multimeter to power stage connector pin No. 2 and ground. Multimeter should show continuity. Check ignition coil resistance. Connect multimeter to power stage connector pins No. 1 and 4. Resistance should be 0.6-1.0 ohm. If resistance is less than 0.6 ohm, check wires for short circuit.

20) If wires are okay but resistance is still not 0.6-1.0 ohm, connect multimeter between ignition coil terminals No. 1 (Red/White wire) and No. 15 (Blue wire). If resistance is not 0.6-1.0 ohm, install a new ignition coil. If resistance is 0.6-1.0 ohm, check continuity of wires between ignition coil and power stage connector pins No. 1 and 4. Repair or replace as necessary.

21) Check shield (ground) wire between ignition ECU and power stage. Shield wire is connected to power stage connector pin No. 3 (Gray wire). Repair if necessary. Ensure power stage is receiving signal from ignition ECU. Disconnect wires from ignition coil terminal No. 1. Connect multimeter positive (+) lead to power stage connector pin No. 5 and negative (-) lead to ground.

22) Crank starter motor, and monitor voltage reading. Voltage should pulsate between 0-2 volts. If voltage is within specification, install a new power stage and recheck circuit. If voltage is very low and/or irregular, check wiring between ignition ECU and crankshaft position sensor. Repair or replace as necessary.

23) Turn ignition off. If no defects are found in previous steps or if engine still malfunctions after repairs, install a new ignition ECU. Recheck system as necessary.

Fig. 3: Identifying Diagnostic Unit Components
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