

# I - SYSTEM/COMPONENT TESTS - TURBO

1995 Volvo 850

1995 ENGINE PERFORMANCE  
Volvo - System & Component Testing

850 - Turbo

## INTRODUCTION

NOTE: In this article, Engine Control Module (ECM) may also be referred to as Engine Control Unit (ECU).

Before testing separate components or systems, perform procedures in the F - BASIC TESTING - TURBO article. Since many computer-controlled and monitored components set a trouble code if they malfunction, also see the G - TESTS W/CODES - TURBO article.

NOTE: Testing individual components does not isolate shorts or opens. Unless stated otherwise in test procedure, perform all voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance. Use ohmmeter to isolate wiring harness shorts or opens.

## AIR INDUCTION SYSTEMS

### TURBOCHARGER

#### Preliminary Checks

1) Warm engine to normal operating temperature. Turn off engine. If turbine shaft does not stop rotating shortly after engine stops, remove intake hose from compressor housing.

2) Verify compressor wheel rotates freely. Ensure compressor wheel does not scrape against compressor housing when wheel is pushed radially or axially.

#### Basic Adjustment Of Pressure Regulator Push Rod

1) Remove locking circlip from end of push rod. Connect Pressure Gauge (999-5230) and Pressure Tester (999-5496) to pressure regulator. See Fig. 1. Increase pressure to 1.7-1.9 psi (.12-.13 kg/cm<sup>2</sup>). Press wastegate lever against turbine housing, closing wastegate valve.

2) Adjust push rod length so push rod fits exactly over wastegate valve lever. Install locking circlip, and tighten push rod lock nut. Remove pressure gauge and tester.

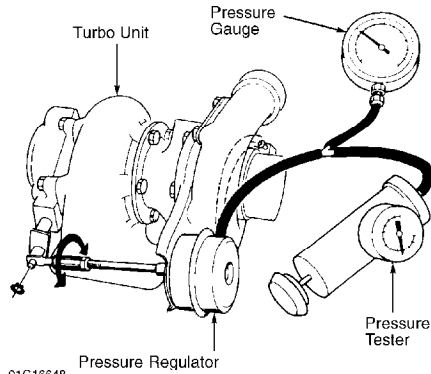


Fig. 1: Adjusting Pressure Regulator Push Rod (Typical)  
Courtesy of Volvo Cars of North America.

## COMPUTERIZED ENGINE CONTROLS

CAUTION: To prevent damage to Electronic Control Unit (ECU), ensure ignition switch is in OFF position before disconnecting or connecting ECU.

### POWERTRAIN CONTROL MODULE

NOTE: When measuring resistance and voltage at PCM, use Breakout Box (981-3190) and Adapter (951-1351). DO NOT probe connector. Before disconnecting/connecting control module connector, ensure ignition is off.

#### Preliminary Check

Turn ignition off. Disconnect PCM connector. PCM is located at right front of engine compartment. Visually inspect all terminal connector sleeves to ensure no terminals are damaged.

#### Power Circuit Check

Ensure ignition is off. Install breakout box and adapter. Connect adapter connector "A" to breakout box. Measure voltage between breakout box terminal No. 13 (ground) and terminals No. 12, 26 and 27. Battery voltage should be present at all terminals. If voltage is not as specified, check No. 1 fuse, wiring and main relay. Repair as necessary.

#### Ground Circuit Checks

Turn ignition off. Install breakout box and adapter. Connect adapter connector "A" to breakout box. Measure resistance between ground and breakout box terminals No. 13, 28 and 42. Ohmmeter should indicate about zero ohms at all terminals.

## ENGINE SENSORS & SWITCHES

CAUTION: To prevent damage to Electronic Control Unit (ECU), ensure ignition switch is in OFF position before disconnecting or connecting ECU.

#### Camshaft Position Sensor

If circuit or component is faulty, a trouble code should set. See the G - TESTS W/CODES - TURBO article.

#### Crankshaft Position Sensor

Crankshaft position sensor is also known as an RPM sensor. Turn ignition off. Disconnect sensor, located below distributor. Measure resistance between sensor terminals. Replace sensor if resistance is not 200-500 ohms.

#### Engine Coolant Temperature Sensor

1) Disconnect Engine Coolant Temperature (ECT) sensor connector. Using an ohmmeter, measure resistance between ECT sensor terminals.

2) If resistance is not as specified, replace sensor. See the ENGINE COOLANT TEMPERATURE SENSOR RESISTANCE table.

#### ENGINE COOLANT TEMPERATURE SENSOR RESISTANCE TABLE

Temperature °F (°C)	Ohms
32 (0)	7300

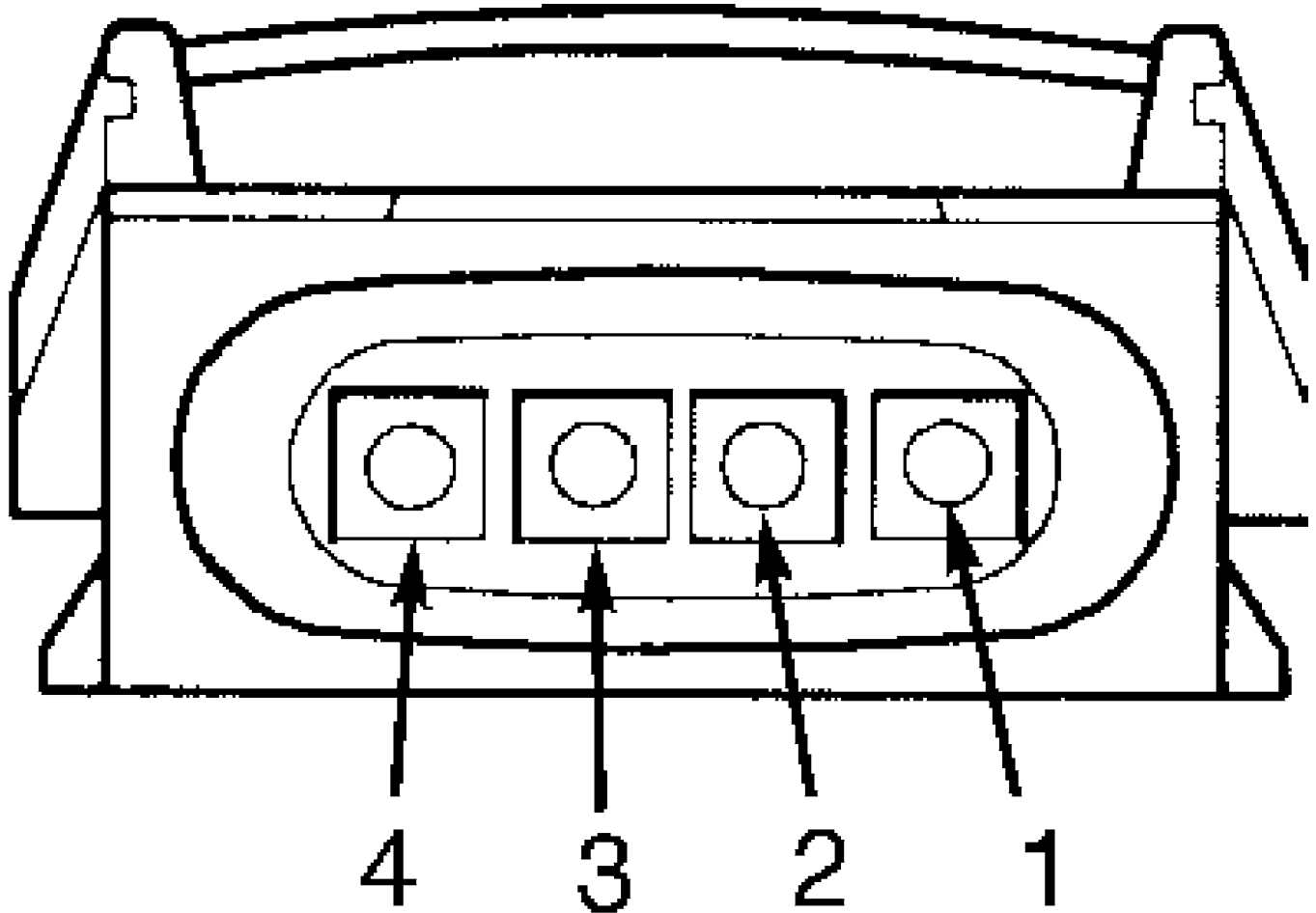
68 (20)	.....	2800
176 (80)	.....	300
212 (100)	.....	150

Mass Airflow Meter

1) Turn ignition off. Locate Mass Airflow (MAF) sensor connector. DO NOT disconnect connector. Backprobing connector, measure voltage between ground and terminal No. 3. See Fig. 2.

2) If battery voltage is present, go to next step. If battery voltage is not present, locate and repair open in wiring harness between MAF sensor and main relay.

3) Backprobing connector, measure voltage between terminals No. 2 and 4. If voltage is not .1-.2 volt, replace MAF sensor.



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Fig. 2: Identifying MAF Sensor Connector Terminals  
 Courtesy of Volvo Cars of North America.

Heated Oxygen Sensor (HO2S)

1) Turn ignition off. Disconnect Powertrain Control Module (PCM) connector. Connect Breakout Box (981-3190) and Adapter (951-1351).

2) To check oxygen sensor signal, connect voltmeter between breakout box terminal No. 42 and terminal No. 33 (front sensor) or No. 19 (rear sensor). Start engine and allow it to idle.

3) Voltage signal should leave its bottom setting of .17 volt and stabilize between .1-.9 volt within 10 minutes. If voltage is not as specified, replace sensor and retest.

RPM Sensor

See CRANKSHAFT POSITION SENSOR.

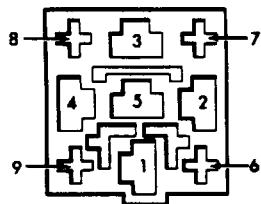
Throttle Position (TP) Sensor

If circuit or component is faulty, a trouble code should set. See the G - TESTS W/CODES - TURBO article.

## RELAYS

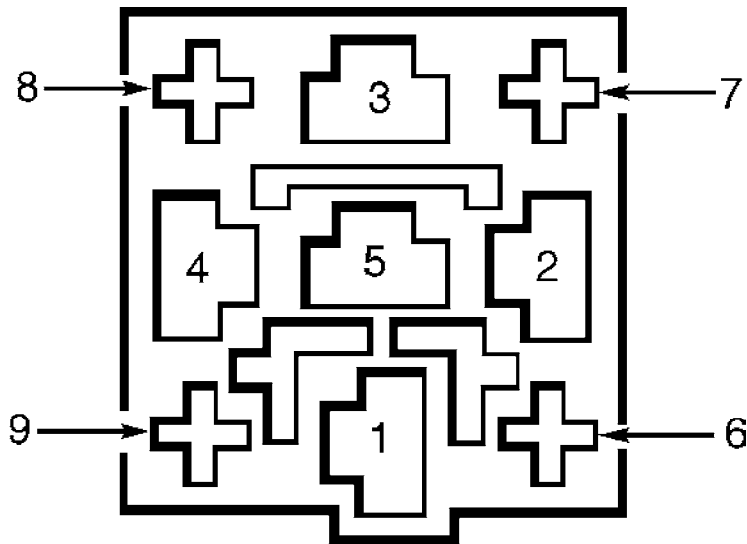
Fuel Pump Relay

1) Remove fuel pump relay. See Fig. 3. Connect jumper wire between fuel pump relay terminals No. 1 and 3. See Fig. 4. Turn ignition on. If fuel pump does not start, go to next step. If fuel pump starts, replace fuel pump relay.



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Fig. 3: Locating Fuel Pump Relay & Fuse  
Courtesy of Volvo Cars of North America.



93G78481

Fig. 4: Identifying Fuel Pump Relay Base Terminals  
Courtesy of Volvo Cars of North America.

2) Turn ignition off. To check relay ground, connect ohmmeter between ground and fuel pump relay terminal No. 2. See Fig. 4.

Ohmmeter should indicate about zero ohms. If ohmmeter does not indicate about zero ohms, check wiring between fuel pump relay and ground.

3) To check fuel pump relay voltage supply, connect voltmeter between ground and fuel pump relay terminal No. 1. See Fig. 4 . Turn ignition on. Battery voltage should be present. If battery voltage is not present, check wiring between fuel pump relay and fuse No. 2.

4) Turn ignition off. Connect ohmmeter between ground and relay terminal No. 3. See Fig. 4. About 1.5 ohms should be present. If about 1.5 ohms are not present, check resistance at fuel pump connector to determine whether fault is in pump or wiring.

5) To check fuel injection control signal to fuel pump relay, connect voltmeter between ground and fuel pump relay terminal No. 4. See Fig. 4. Operate starter motor. If voltmeter indicates about 3 volts, replace relay. If voltage is not to specification, check wiring between fuel pump relay and ECU. If wiring is okay, see procedures under POWERTRAIN CONTROL MODULE under COMPUTERIZED ENGINE CONTROLS.

## FUEL SYSTEM

NOTE: For fuel system pressure testing, see the F - BASIC TESTING - TURBO article.

WARNING: Always relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components. Cover fuel line connector with shop towel to absorb any fuel spray.

## FUEL DELIVERY

### Fuel Pressure Regulator

1) Install Connector (998-9725) to Fuel Pressure Gauge (999-5011). Using Adapter (999-5479), connect pressure gauge to valve on fuel distribution manifold. Turn valve in direction of adapter. Connect other gauge connection to Fuel Drainage Unit (981-2270, 2273 and 2282).

2) Remove electrical distribution unit cover in engine compartment. Remove fuel pump relay. See Fig. 3. Connect jumper wire between fuel pump relay terminals No. 1 and 3. Turn ignition on. Fuel pump should start. If system pressure is 43.5 psi (300 kPa), go to step 5).

3) If system pressure is too high, remove jumper wire. Disconnect pressure regulator return and vacuum lines and blow through lines. If both lines are okay, replace regulator and recheck pressure.

4) If system pressure is too low, squeeze return line and ensure pressure rises. Do not allow pressure to exceed 87 psi (600 kPa). If pressure rises quickly, pump and line are okay. Replace pressure regulator and recheck system pressure. If pressure rises slowly, check for blocked fuel filter, fuel pump strainer or fuel lines. If pressure does not rise, replace pump.

5) If system pressure was 43.5 psi (300 kPa) in step 2), check operation of pressure regulator by connecting Vacuum Pump (999-5843) to pressure regulator. Apply vacuum to regulator. Ensure system pressure falls by same amount as regulator pressure.

6) Turn ignition off. Remove jumper wire between fuel pump relay terminals No. 1 and 3. Reinstall fuel pump relay. Check fuel system residual pressure. Pressure should not fall below 20 psi (200 kPa) in less than 20 minutes. If fuel pressure falls faster, check injectors, pressure regulator, and fuel pump. Disconnect Pressure Gauge (999-5011).

## FUEL CONTROL

### Fuel Injectors

Turn ignition off. Disconnect fuel injector connector. Using an ohmmeter, measure resistance between injector terminals. With injector temperature at about 68°F (20°C), resistance should be about 14.5 ohms. Replace injector as necessary.

## IDLE CONTROL SYSTEM

### Idle Air Control (IAC) Valve

Ensure ignition is off. Disconnect IAC valve connector. Connect an ohmmeter between connector terminals No. 1 (Blue/Black wire) and No. 2 (Blue/White wire), then between terminals No. 2 (Green wire) and No. 3 (Green wire). If resistance is not 9-14 ohms, replace IAC valve. If resistance is 9-14 ohms, IAC valve is okay. Check IAC circuits. See the G - TESTS W/CODES - TURBO article.

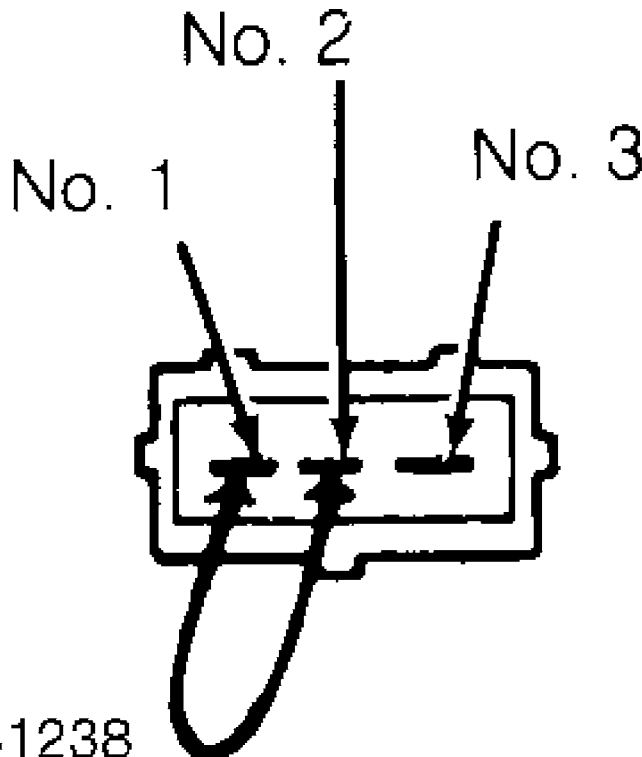
## IGNITION SYSTEM

NOTE: For basic ignition checks, see the F - BASIC TESTING - TURBO article.

## TIMING CONTROL SYSTEMS

### Detonation (Knock) Sensors

If circuit or component is faulty, a trouble code should set. See the G - TESTS W/CODES - TURBO article.



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Fig. 5: Knock Sensor Connector Terminals (Typical)  
Courtesy of Volvo Cars of North America.

## EXHAUST GAS RECIRCULATION (EGR)

If circuit or component is faulty, a trouble code should set.  
See the G - TESTS W/CODES - TURBO article.

## FUEL EVAPORATIVE (EVAP)

NOTE: Fuel evaporative testing procedures not available at time of publication. See M - VACUUM DIAGRAMS - TURBO article for information on hose routing.