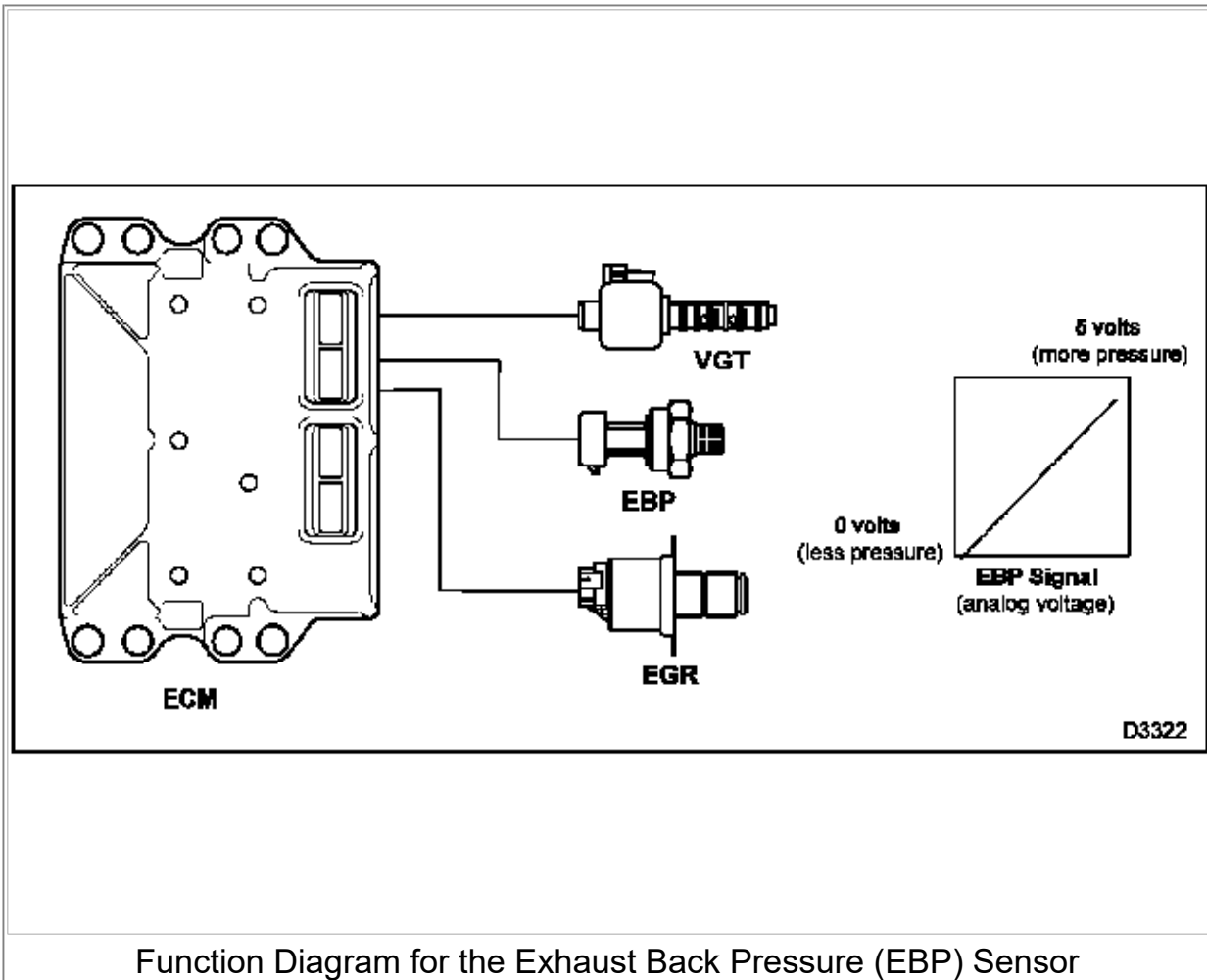


Exhaust Back Pressure (EBP) Sensor



Function Diagram for the Exhaust Back Pressure (EBP) Sensor

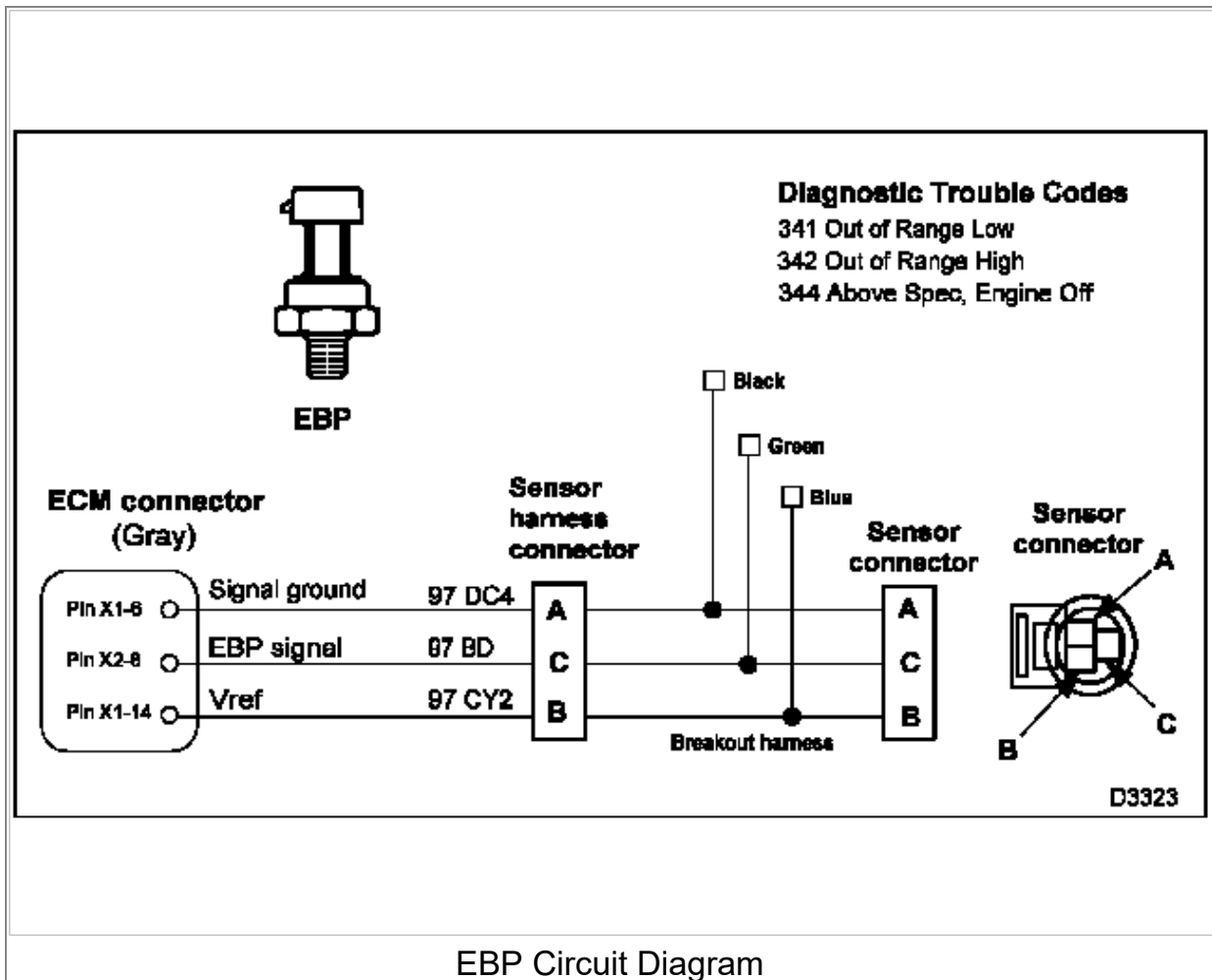
The Function Diagram for the EBP sensor includes the following:

- Exhaust Back Pressure (EBP) sensor
- Electronic Control Module (ECM)
- Variable Geometry Turbocharger (VGT) actuator
- Exhaust Gas Recirculation (EGR) actuator

Function

The Exhaust Back Pressure (EBP) sensor is a variable capacitance sensor mounted to a bracket on the left side valve cover. The ECM supplies a 5V regulated signal which the EBP sensor uses to produce a linear analog voltage that indicates pressure. The EBP measures exhaust back pressure so that the ECM can control the VGT and EGR system.

EBP Circuit Operation



The EBP sensor is supplied with a 5V reference voltage at terminal B from ECM terminal X1-14. The EBP sensor is also supplied with a ground circuit at terminal A from ECM terminal X1-6. The EBP sensor sends a signal from terminal C of the sensor to ECM terminal X2-8.

Fault Detection / Management

When the EBP signal voltage is detected out of range high or low, the ECM will cause the engine to ignore the EBP signal. The EGR valve will close and the ECM will rely on the VGT pre-programmed values.

EBP Diagnostic Trouble Codes (DTCs)

DTCs are read using the Electronic Service Tool (EST) or by counting the flashes from the amber and red ENGINE lamp.

DTC 341

Out of range low

- DTC 341 is set by the ECM when the EBP signal is less than 0.039V for more than 0.5 second.
- DTC 341 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open V_{REF} circuit or V_{REF} short to ground.
- When DTC 341 is active the amber ENGINE lamp is illuminated.

DTC 342

Out of range high

- DTC 342 is set by the ECM when the EBP signal is more than 4.9V for more than 0.5 second.
- DTC 342 can be set due to an open signal ground circuit, short to a voltage source on the EBP signal circuit, or a defective sensor.
- When DTC 342 is active the amber ENGINE lamp is illuminated.

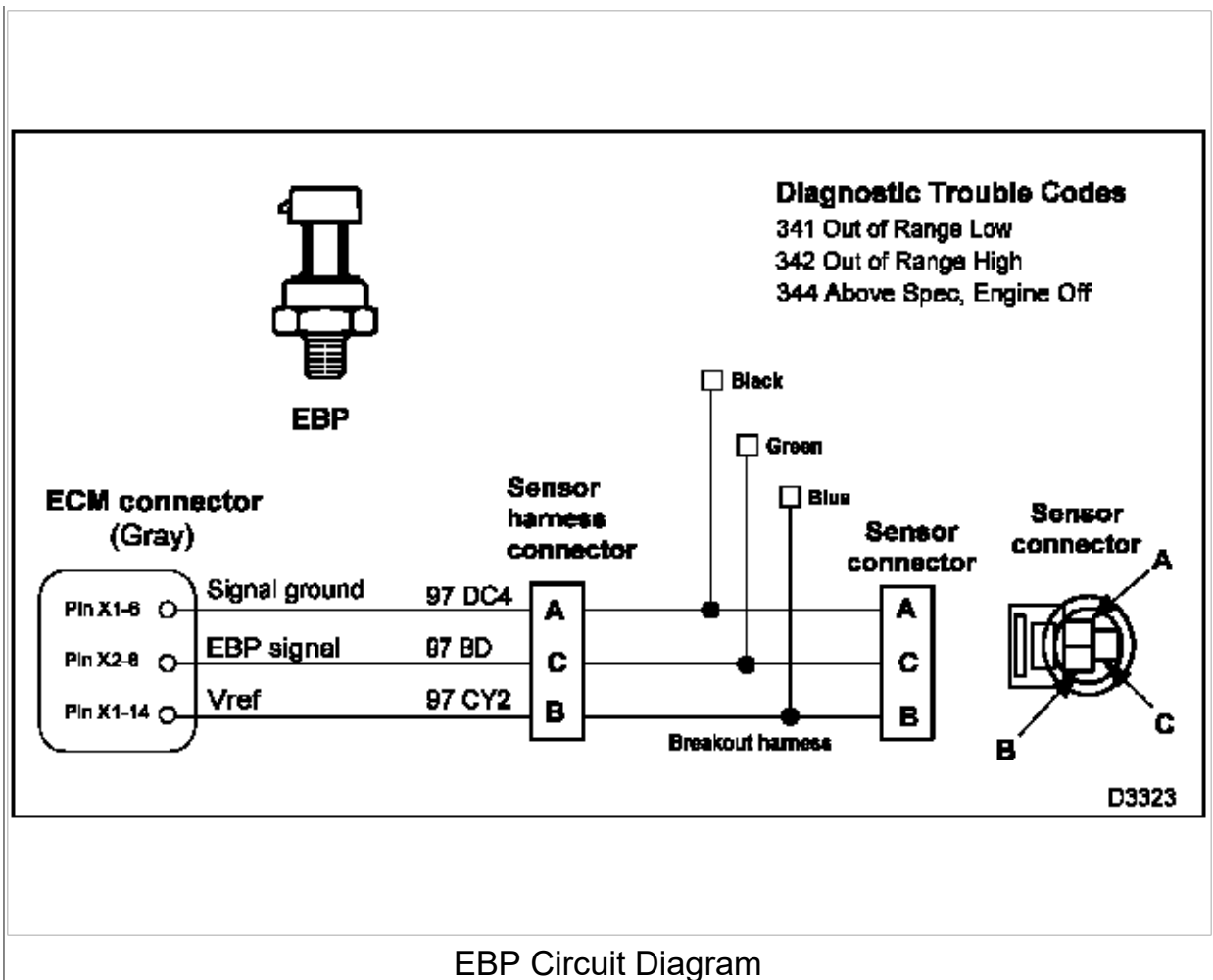
DTC 344**Above spec, engine off**

- DTC 344 is set by the ECM when the exhaust back pressure is greater than 130 kPa (19 psi) with the Key ON Engine OFF.
- DTC 344 can be set due to a plugged EBP sensor or a restriction in the tube leading to the sensor. To check for this condition, remove the sensor and tube and inspect for carbon deposits.
- When DTC 344 is active the amber ENGINE lamp is illuminated.

Tools

- Electronic Service Tool (EST) with Master Diagnostics software
- International® EZ-Tech Interface Cable
- Digital Multimeter (DMM)
- Harness - 3-Banana plug and 500 ohm
- Breakout box
- Breakout harness
- Terminal Test Adapter Kit

EBP Operational Diagnostics



WARNING:

To prevent serious personal injury, possible death, or damage to the engine or vehicle - comply with the following:

Be careful to avoid rotating parts (belts and fan) and hot engine surfaces.

1. Using EST, open the continuous monitor session. To monitor signal voltage, run Key ON Engine OFF continuous monitor test.
2. Monitor EBP signal volts. Verify an active DTC for the EBP circuit.
3. If code is active, complete step 5 and do circuit check for the EBP sensor in table on the following page.
4. If code is inactive, wiggle connectors and wires at all suspected problem locations. If circuit continuity is interrupted, the EST will beep and display DTCs related to the condition.

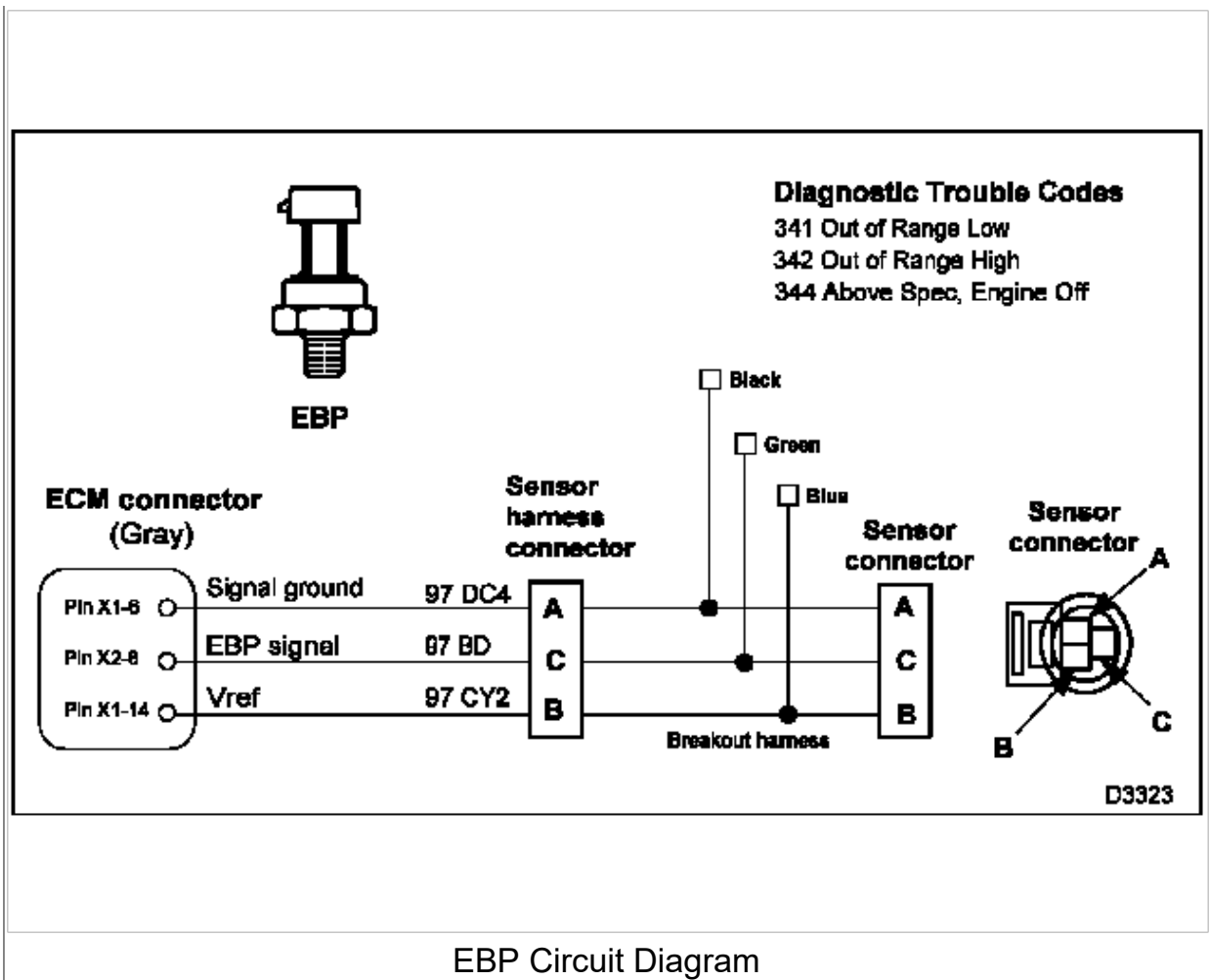
5. Install pressure sensor breakout harness to engine harness only.

NOTE: After removing connector, inspect for damaged pins, corrosion, or loose terminals. Repair as required.

Circuit Checks for EBP Sensor (Use EST, DMM, breakout harness, and 500 ohm wire harness.)		
Test Condition	Spec	Checks
Sensor disconnected	0V	If voltage >0.039V, check signal circuit for short to V _{REF} or B+.
Measure voltage from BLUE PIN to ground with DMM	5V ±0.5	If voltage >5.5V, check V _{REF} for short to B+. If voltage is <4.5V, check V _{REF} circuit for open or short to ground.
500 ohm harness installed between GREEN and BLUE pins of breakout harness.	5V	If voltage <4.9V, check signal circuit for open or short to ground. Remove negative battery cable. Measure resistance from PIN C to ground (spec >1kΩ) to check for short to ground. Use a breakout box from PIN C to PIN X2-8 (spec <5Ω) to check for open in the harness.
Resistance from BLACK pin of breakout harness to chassis ground using DMM.	<5Ω	If resistance is >5Ω, check for open or high resistance between ECM and sensor connector. Use a breakout box and measure resistance from between PIN A and PIN X1-6 (spec <5Ω).

6. Connect engine harness to sensor. Use the EST to clear DTCs. If an active code remains after checking test conditions, replace the EBP sensor.

EBP Pin Point Diagnostics



WARNING:

To avoid serious personal injury, possible death, or damage to the engine or vehicle, always disconnect main negative battery cable first. Always connect the main negative battery cable last.

Connector Voltage Checks (Disconnect sensor from harness and turn ignition key ON.)

Test Point	Spec	Comments
A to gnd	0V	Signal ground (no voltage expected) If voltage is present, check for short to B+ or V _{REF} .
B to gnd	5V ±0.5	If voltage is not to spec, V _{REF} is open or shorted to ground.
C to gnd	<0.25V	If voltage >0.25V, signal wire is shorted to V _{REF} or B+.

Connector Resistance Checks to Chassis Ground (Turn ignition key OFF. Disconnect negative battery cable and sensor connector.)		
A to gnd	<5Ω	If >5Ω, check for open circuit.
B to gnd	>500Ω	If <500Ω, check for short to ground.
C to gnd	>1kΩ	If <1kΩ, check for short to ground.
Harness Resistance Checks (Install breakout box on engine harness only.)		
X1-6 to A	<5Ω	If >5Ω, check for open ground wire.
X1-14 to B	<5Ω	If >5Ω, check for open V _{REF} wire.
X2-8 to C	<5Ω	If >5Ω, check for open signal wire.

EBP Operational Voltage Checks (Check with breakout box installed to the ECM and engine harness.)		
Test Point	Volt	kPa (psi)
X2-8 to X1-6	.8-1.0V	0 (0)
X2-8 to X1-6	1.73V	55 (8)
X2-8 to X1-6	2.72V	124 (18)
EBP Diagnostic Trouble Code		
DTC 341 = Signal voltage was <0.039V for more than 0.5 second		
DTC 342 = Signal voltage was >4.9V for more than 0.5 second		
DTC 344 = Exhaust back pressure was >19 psi with Key ON Engine OFF		

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