

# ELECTRONIC ENGINE CONTROLS - TDV6 2.7L DIESEL

## DIAGNOSIS AND TESTING

## OVERVIEW

This section covers the sensors and units for the engine management system, for information on description and operation, refer to section 303-14C REFER to: Electronic Engine Controls (303-14 Electronic Engine Controls - TDV6 2.7L Diesel, Description and Operation).

## INSPECTION AND VERIFICATION

1. Verify the customer concern.
1. Visually inspect for obvious mechanical or electrical faults.

### Visual inspection

MECHANICAL	ELECTRICAL
<ul style="list-style-type: none"><li>▪ Engine oil level</li><li>▪ Cooling system coolant level</li><li>▪ Fuel level</li><li>▪ Fuel contamination/grade/quality</li><li>▪ Fuel leaks</li><li>▪ Accessory drive belt</li><li>▪ Sensor installation/condition</li><li>▪ Viscous fan and solenoid</li><li>▪ Exhaust gas recirculation (EGR) valve(s)</li></ul>	<ul style="list-style-type: none"><li>▪ Fuses</li><li>▪ Wiring harness</li><li>▪ Electrical connector(s)</li><li>▪ 5 volt sensor supply</li><li>▪ Sensor(s)</li><li>▪ Engine control module (ECM)</li><li>▪ Transmission control module (TCM)</li></ul>

1. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

1. Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.

- Make sure that all DTCs are cleared following rectification.

## SYMPTOM CHART

SYMPTOM	POSSIBLE CAUSES	ACTION
Engine cranks, but does not start	<ul style="list-style-type: none"> <li>▪ Inertia fuel shut off (IFS) switch</li> <li>▪ Low /Contaminated fuel</li> <li>▪ Air leakage</li> <li>▪ Low pressure fuel system fault</li> <li>▪ Fuel pump module fault</li> <li>▪ Blocked fuel filter</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> <li>▪ Fuel injection pump failure</li> <li>▪ Crankshaft position (CKP) sensor</li> <li>▪ ECM fault</li> </ul>	<p>Check that the inertia switch has not tripped. Check the fuel level/condition. Check the intake air system for leaks. Check the fuel pump module operation, check the low pressure fuel system for leaks/damage. Check the fuel filter, check the VCV and FPCV. Check the fuel injection pump. Refer to the relevant workshop manual section. Check the CKP sensor circuits. Refer to the electrical guides. Refer to the warranty policy and procedures manual if a module is suspect.</p>
Difficult to start	<ul style="list-style-type: none"> <li>▪ Glow plug system fault (very cold conditions)</li> <li>▪ Low /Contaminated fuel</li> <li>▪ Air leakage</li> <li>▪ Fuel pump module fault</li> <li>▪ Low pressure fuel system fault</li> </ul>	<p>Check the glow plug circuits. Check the fuel level/condition. Check the intake air system for leaks. Check the fuel pump module operation, check the low pressure fuel system for leaks /damage. Check the fuel filter, check the VCV and FPCV. For EGR valve tests, refer to the relevant workshop manual section.</p>

	<ul style="list-style-type: none"> <li>▪ Blocked fuel filter</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> <li>▪ Exhaust gas recirculation (EGR) valve(s) fault</li> </ul>	
Rough idle	<ul style="list-style-type: none"> <li>▪ Air ingress</li> <li>▪ Low /Contaminated fuel</li> <li>▪ Low pressure fuel system fault</li> <li>▪ Blocked fuel filter</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> <li>▪ Exhaust gas recirculation (EGR) valve(s) fault</li> </ul>	Check the intake air system for leaks. Check the fuel level /condition. Check the low pressure fuel system for leaks /damage. Check the fuel filter, check the VCV and FPCV and EGR valve tests, refer to the relevant workshop manual section.
Lack of power when accelerating	<ul style="list-style-type: none"> <li>▪ Intake air system fault</li> <li>▪ Restricted exhaust system</li> <li>▪ Low fuel pressure</li> <li>▪ Exhaust gas recirculation (EGR) valve(s) fault</li> <li>▪ Variable geometry turbocharger (VGT) actuator fault</li> </ul>	Check the intake air system. Check for a blockage/restriction in the exhaust system, install new components as necessary. Check the fuel pressure. For EGR valve tests and VGT actuator tests, refer to the relevant workshop manual section.
Engine stops	<ul style="list-style-type: none"> <li>▪ Air leakage</li> </ul>	Check the intake air system for leaks. Check the fuel level

/stalls	<ul style="list-style-type: none"> <li>▪ Low /Contaminated fuel</li> <li>▪ Low pressure fuel system fault</li> <li>▪ High pressure fuel leak</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> </ul>	/condition. Check the fuel system for leaks/damage. Check for fuel system leaks, check the VCV and FPCV. For EGR valve tests, refer to the relevant workshop manual section.
Engine judders	<ul style="list-style-type: none"> <li>▪ Low /Contaminated fuel</li> <li>▪ Air ingress</li> <li>▪ Low pressure fuel system fault</li> <li>▪ Fuel metering valve blocked /contaminated</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> <li>▪ High pressure fuel leak</li> <li>▪ Fuel injection pump fault</li> </ul>	Check the fuel level/condition. Check the intake air system for leaks. Check the low pressure fuel system for leaks/damage. Check the high pressure fuel system for leaks, check the VCV and FPCV. Check the fuel injection pump. Refer to the relevant workshop manual section.
Excessive fuel consumption	<ul style="list-style-type: none"> <li>▪ Low pressure fuel system fault</li> <li>▪ Fuel volume control valve (VCV) blocked /contaminated</li> <li>▪ Fuel pressure control valve (FPCV) blocked /contaminated</li> </ul>	Check the low pressure fuel system for leaks/damage. Check the VCV and FPCV, the fuel temperature sensor, fuel injection pump, etc for leaks. Refer to the relevant workshop manual section. Check for injector DTCs. For EGR valve tests, refer to the relevant workshop manual section.

	<ul style="list-style-type: none"> <li>▪ Fuel temperature sensor leak</li> <li>▪ High pressure fuel leak</li> <li>▪ Injector(s) failure</li> <li>▪ Exhaust gas recirculation (EGR) valve(s) fault</li> </ul>	
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## DTC INDEX

### NOTES:

- Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).
- Check DDW for open campaigns. Refer to the corresponding bulletins and SSMS which may be valid for the specific customer complaint and carry out the recommendations as required

### Power latch

There are references to "power latch" within the DTC index. This is where the module must be reset by means of a complete power down and power up.

### DTC Table

DTC	DESCRIPTION	POSSIBLE CAUSES	ACTION
B10A2-31	Crash Input - no signal	<ul style="list-style-type: none"> <li>▪ No signal</li> <li>▪ Inertia switch open circuit</li> </ul>	Check the crash inertia switch. Refer to the electrical circuit diagrams and check the inertia switch circuit
B10A2-36	Crash Input - signal frequency too low	<ul style="list-style-type: none"> <li>▪ Signal frequency too low</li> <li>▪ Inertia switch low</li> </ul>	Check the crash inertia switch. Refer to the electrical circuit diagrams and check the inertia switch circuit
B10A2-37	Crash Input - signal frequency too	<ul style="list-style-type: none"> <li>▪ Signal frequency too high</li> <li>▪ Inertia switch high</li> </ul>	Check the crash inertia switch. Refer to the electrical circuit diagrams and check the inertia switch circuit

	high		
B10A2-39	Crash Input - incorrect has too few pulses	<ul style="list-style-type: none"> <li>Incorrect signal; has too few pulses</li> </ul>	Check the crash inertia switch. Refer to the electrical circuit diagrams and check the inertia switch circuit
B10A2-3A	Crash Input - incorrect has too many pulses	<ul style="list-style-type: none"> <li>Incorrect signal; has too many pulses</li> </ul>	Check the crash inertia switch. Refer to the electrical circuit diagrams and check the inertia switch circuit
B10AC-81	Fault is with link to cruse control switch, not with cruise module - invalid Serial data received	<ul style="list-style-type: none"> <li>Speed control switch invalid serial data received</li> <li>Switch circuit high resistance</li> <li>Invalid cruise button combination</li> <li>Switch fault</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
B10AC-82	Fault is with link to cruse control switch, not with cruise module - alive / sequence correct incorrect / not updated	<ul style="list-style-type: none"> <li>Speed control switch - sequence counter error</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
B10AC-83	Fault is with link to cruse control switch, not with cruise module - value of signal protection calculation incorrect	<ul style="list-style-type: none"> <li>Speed control switch - complement check error</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P0001-13	Fuel Volume Regulator Control Circuit / Open - circuit open	<ul style="list-style-type: none"> <li>Fuel volume control valve circuit open circuit</li> <li>Fuel volume control valve fault</li> </ul>	<div style="background-color: #e0f2f7; padding: 5px; border: 1px solid #ccc;"> <p> <b>NOTE:</b></p> <p>An open circuit will prevent the engine from running.</p> </div> <p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P0003-11	Fuel Volume Regulator	<ul style="list-style-type: none"> <li>Fuel volume control valve circuit short circuit to ground</li> </ul>	<div style="background-color: #e0f2f7; padding: 5px; border: 1px solid #ccc;"> <p> <b>NOTE:</b></p> </div>

	Control Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>Fuel volume control valve fault</li> </ul>	<p>An open circuit will prevent the engine from running.</p> <p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P0003-19	Fuel Volume Regulator Control Circuit Low - circuit current above threshold	<ul style="list-style-type: none"> <li>Fuel volume control valve circuit current above threshold</li> <li>Fuel volume control valve fault</li> </ul>	<p> <b>NOTE:</b></p> <p>An open circuit will prevent the engine from running.</p> <p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P0004-12	Fuel Volume Regulator Control Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>Fuel volume control valve (VCV) circuit short circuit to power</li> <li>VCV failure</li> </ul>	<p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P000E-21	Fuel Volume Regulator Control Exceeded Learning Limit - signal amplitude < minimum	<ul style="list-style-type: none"> <li>Fuel volume control valve amplitude is less than the minimum specified</li> </ul>	<p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P000E-22	Fuel Volume Regulator Control Exceeded Learning Limit - signal amplitude > maximum	<ul style="list-style-type: none"> <li>Fuel volume control valve amplitude is greater than the maximum specified</li> </ul>	<p>Refer to the electrical circuit diagrams and check the fuel volume control valve and circuits. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal</p>

			operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P006A-21	MAP - Mass or Volume Air Flow Correlation - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Air leakage in the intake path between the turbocharger and the engine</li> </ul>	Check the intake air system for leakage after the turbocharger. Check for DTCs indicating a Manifold Absolute Pressure sensor fault. Rectify as necessary. Clear the DTCs and test for normal operation
P006A-22	MAP - Mass or Volume Air Flow Correlation - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Mass or volume air flow correlation: right-hand bank - signal amplitude greater than maximum</li> <li>▪ Oil ingress into the intake manifold</li> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor circuit fault</li> <li>▪ MAPT sensor fault</li> <li>▪ Mass Air Flow (MAF) sensor fault</li> <li>▪ Turbocharger fault</li> </ul>	With the engine at idle, check the manifold air pressure and indicated torque set points using a data logger function. If the manifold air pressure is greater than 140 KPa (20.31 lbs/in <sup>2</sup> ) or the torque less than 70 Nm (51.63 lbf /ft), check for oil being drawn into the intake manifold. Repair/renew as necessary. Clear the DTCs and test for normal operation. Stop the engine and turn the ignition on. Using a data logger function, monitor the turbocharger actuator angles. Command the actuator to 5% pulse width modulated (PWM) then to 95% pulse width modulated (PWM) and check the angle values. The angle at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95% 80 - 95%. If the values are inside this range, install a new MAF sensor. Refer to the relevant section of the workshop manual. If the values are outside this range, install a new turbocharger. Clear the DTCs and test for normal operation
P0071-16	Ambient Air Temperature sensor Range / Performance - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Ambient air temperature sensor circuit voltage below threshold</li> <li>▪ Ambient air temperature sensor circuit short circuit to ground</li> <li>▪ Ambient air temperature sensor fault</li> </ul>	Check the ambient air temperature sensor and circuits. Refer to the electrical circuit diagrams. Install a new ambient air temperature sensor if necessary. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0071-17	Ambient Air Temperature sensor Range / Performance - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Ambient air temperature sensor circuit voltage above threshold</li> <li>▪ Ambient air temperature sensor fault</li> </ul>	Check the ambient air temperature sensor and circuits. Refer to the electrical circuit diagrams. Install a new ambient air temperature sensor if necessary. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0072-16	Ambient Air Temperature Sensor Circuit	<ul style="list-style-type: none"> <li>▪ Ambient temperature sensor circuit below threshold</li> </ul>	Refer to the electrical circuit diagrams and check the circuit

	Low - circuit voltage below threshold		
P0073-17	Ambient Air Temperature Sensor Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Ambient temperature sensor circuit above threshold</li> </ul>	Refer to the electrical circuit diagrams and check the circuit
P007C-16	Charge Air Cooler Temperature Sensor Circuit Low (Bank 1) - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Right-hand charge air temperature sensor circuit voltage below threshold (the charge air temperature sensor is part of the manifold absolute pressure and temperature (MAPT) sensor)</li> <li>▪ Charge air temperature sensor circuit short circuit to ground</li> <li>▪ Right-hand MAPT sensor fault</li> </ul>	Check the right-hand MAPT sensor and circuits. Refer to the electrical circuit diagrams. Check the resistance of the temperature sensor (pins 1 and 4 of the MAPT). Nominal resistance at 20°C (68° F) should be 2.5 Kiloohms. Install a new MAPT if necessary. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P007D-17	Charge Air Cooler Temperature Sensor Circuit High (Bank 1) - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Charge air temperature sensor circuit voltage above threshold (the charge air temperature sensor is part of the manifold absolute pressure and temperature (MAPT) sensor)</li> <li>▪ Right-hand MAPT sensor fault</li> <li>▪ Circuit voltage above threshold</li> <li>▪ Range check above max value - Bank 0</li> </ul>	Refer to the electrical circuit diagrams and check right-hand MAPT sensor and circuits, check - <b>Air Charge Temperature Sensor - Signal</b> - circuit for short circuit to power. Check the resistance of the temperature sensor (pins 1 and 4 of the MAPT). Nominal resistance at 20°C (68° F) should be 2.5 Kiloohms
P007E-27	Charge Air Cooler Temperature Sensor Circuit Intermittent /Erratic (Bank 1) - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Right-hand charge air temperature sensor signal rate of change above threshold (the charge air temperature sensor is part of the manifold absolute pressure and temperature (MAPT) sensor)</li> <li>▪ Right-hand MAPT sensor fault</li> </ul>	Check the right-hand MAPT sensor and circuits. Refer to the electrical circuit diagrams. With the engine running and at operating temperature, check the charge air temperature using a data logger function. Record the measurement at idle and increase the engine speed to 3,000 rpm. Record the reading and compare with the idle figure. If the value has increased by more than 20°C in 100 ms, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0087-00	Fuel Rail /System Pressure Too Low - no sub	<ul style="list-style-type: none"> <li>▪ Fuel rail pressure sensor disconnected</li> </ul>	Refer to the electrical guides and check the fuel rail pressure sensor circuits. For fuel rail pressure sensor tests, refer to the relevant workshop manual section.

	type information	<ul style="list-style-type: none"> <li>▪ Fuel rail pressure sensor to Engine Control Module sensing circuit short circuit to ground</li> <li>▪ Fuel rail pressure sensor supply circuit high resistance</li> <li>▪ Fuel rail pressure sensor failure</li> <li>▪ Fuel line leak</li> <li>▪ Restricted fuel line</li> <li>▪ Fuel pump module circuit high resistance</li> <li>▪ Fuel pump module circuit short circuit to ground</li> <li>▪ Fuel pump module failure</li> <li>▪ Volume control valve fault</li> <li>▪ Pressure control valve fault</li> </ul>	<p>Check the low pressure fuel lines for damage or restrictions. Check the fuel pressure. Check the low pressure fuel pump module circuits and operation. Check for fuel rail and high pressure fuel line leaks. Check for volume control valve and pressure control valve DTCs and rectify as necessary</p>
P0087-72	Fuel rail /system pressure too low - actuator stuck open	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve fault <ul style="list-style-type: none"> <li>▪ Actuator stuck open</li> </ul> </li> </ul>	<p>Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect</p>
P0088-00	Fuel Rail /System Pressure - Too High - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel rail pressure sensor to Engine Control Module wiring (supply/sense) short circuit to each other</li> <li>▪ Fuel rail pressure sensor to Engine Control Module sense circuit short circuit to power</li> <li>▪ Fuel rail pressure sensor failure</li> <li>▪ Fuel pressure control valve (FPCV) fault</li> <li>▪ Fuel pump module circuit short circuit to power</li> </ul>	<p>Check the fuel rail pressure sensor circuits. Refer to the electrical guides. For fuel rail pressure sensor tests, refer to the relevant workshop manual section. Check the fuel lines, check the fuel pressure and the fuel pump module circuits</p>

		<ul style="list-style-type: none"> <li>▪ Fuel pump module failure</li> </ul>	
P0088-73	Fuel rail /system pressure too high - actuator stuck closed	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve (PCV) stuck closed</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0089-21	Fuel Pressure Regulator Performance - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Fuel pressure regulator performance - signal amplitude less than minimum</li> <li>▪ Fuel pressure regulator signal circuit short to ground, open circuit or high resistance</li> <li>▪ Fuel pressure regulator failure</li> </ul>	Refer to the electrical circuit diagrams and check fuel pressure regulator circuit for short to ground, open circuit, high resistance. Check for fuel pump related DTCs. Check and install new fuel pressure regulator as required
P0089-22	Fuel Pressure Regulator Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Fuel pressure regulator performance - signal amplitude greater than maximum</li> <li>▪ Fuel pressure regulator signal circuit short to power</li> <li>▪ Fuel pressure regulator fault</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0089-2F	Fuel Pressure Regulator Performance - signal erratic	<ul style="list-style-type: none"> <li>▪ Fuel pressure regulator signal circuit fault - signal erratic</li> <li>▪ Fuel pressure regulator fault</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0090-13	Fuel Pressure Regulator 1 Control Circuit	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve circuit open circuit</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary.

	/Open - circuit open	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve fault</li> </ul>	Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0091-11	Fuel Pressure Regulator 1 Control Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve circuit short circuit to ground</li> <li>▪ Fuel pressure control valve fault</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0091-19	Fuel Pressure Regulator 1 Control Circuit Low - circuit current above threshold	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve circuit short circuit to power (circuit current above threshold)</li> <li>▪ Fuel pressure control valve fault</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0092-12	Fuel Pressure Regulator 1 Control Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve circuit short circuit to power</li> <li>▪ Fuel pressure control valve fault</li> </ul>	Refer to the electrical circuit diagrams and check the pressure control valve actuator circuits and rectify as necessary. Check the resistance of the fuel pressure control valve. If the resistance is not between 0 and 5.4 ohms, install a new high pressure fuel pump (the fuel pressure control valve cannot be serviced separately). Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation. Refer to the warranty policy and procedures manual if a high pressure fuel pump is suspect
P0100-36	Mass or Volume Air Flow A Circuit - signal frequency too low	<ul style="list-style-type: none"> <li>▪ Mass air flow (MAF) sensor circuit short circuit to ground</li> <li>▪ Mass air flow (MAF) sensor circuit short circuit to power</li> <li>▪ Mass air flow (MAF) sensor circuit high resistance</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div>

		<ul style="list-style-type: none"> <li>▪ Mass air flow (MAF) sensor signal frequency too low</li> <li>▪ Mass air flow (MAF) sensor fault</li> <li>▪ Mass air flow diagnosis range check</li> </ul>	<p>Check the MAF sensor and circuits. Clear the DTCs and test for normal operation. If the problem persists, renew the MAF sensor. As the two MAF sensors are identical, it is possible to confirm the diagnosis by swapping the units from side to side and testing to see if the DTC resets. Refer to the electrical circuit diagrams and check - <b>MAF</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
P0101-16	Mass or Volume Air Flow A Circuit Range /Performance - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Intake air path fault</li> <li>▪ Mass Air Flow (MAF) sensor circuit voltage below threshold</li> <li>▪ MAF sensor fault</li> </ul>	<p>Check the intake air system for leaks, restrictions, etc. Check the MAF sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation. If the problem persists, renew the MAF sensor</p>
P0101-17	Mass or Volume Air Flow A Circuit Range /Performance - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Intake air path fault</li> <li>▪ Mass air flow (MAF) sensor circuit short circuit to ground</li> <li>▪ Mass air flow (MAF) sensor circuit short circuit to power</li> <li>▪ Mass air flow (MAF) diagnosis plausibility (MAX)</li> <li>▪ Mass air flow (MAF) sensor circuit voltage above threshold</li> <li>▪ Mass air flow (MAF) sensor fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the intake air system for leaks, restrictions, etc. Check the mass air flow (MAF) sensor and circuits. Clear the DTCs and test for normal operation. If the problem persists, renew the mass air flow (MAF) sensor. Refer to the electrical circuit diagrams and check - <b>MAF</b> - circuit for short circuit to ground, short circuit to power</p>
P0102-21	Mass or Volume Air Flow A Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Intake air system fault</li> <li>▪ Mass Air Flow (MAF) sensor circuit signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> </ul>	<p>Check the intake air system for leaks, etc. Repair/renew as necessary. Check the MAF sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Check that the EGR valves are not stuck. Using a data logger function, monitor the air flow and EGR valve position for both banks and road test the vehicle. Check that the EGR valves are in synch. Repair/renew as necessary. Clear the DTCs and test for normal operation</p>
P0103-22	Mass or Volume Air Flow A Circuit High - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Check for water ingress into the Mass Air Flow (MAF) sensor <ul style="list-style-type: none"> <li>▪ Water in the air intake can give the impression of high air flow</li> </ul> </li> <li>▪ Intake air system fault</li> <li>▪ Mass Air Flow (MAF) sensor circuit signal amplitude greater than minimum</li> </ul>	<p>Check the intake air system for leaks, etc. Repair/renew as necessary. Check the MAF sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. With the ignition on, engine off, and using a data logger function, monitor the turbocharger actuator angles. Command the actuator to 5% pulse width modulated (PWM) then to 95% pulse width modulated (PWM) and check the angle values. The angle at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95%</p>

		<ul style="list-style-type: none"> <li>▪ Turbocharger fault</li> </ul>	<p>pulse width modulated (PWM) 80 - 95%. If the values are inside this range, install a new MAF sensor. If the values are outside this range, install a new turbocharger. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation</p>
P0104-38	Mass or Volume Air Flow A Circuit Intermittent /Erratic - signal frequency incorrect	<ul style="list-style-type: none"> <li>▪ Mass air flow (MAF) sensor circuit short circuit to ground</li> <li>▪ Mass air flow (MAF) sensor circuit short circuit to power</li> <li>▪ Mass air flow (MAF) sensor circuit high resistance</li> <li>▪ Mass Air Flow (MAF) sensor signal frequency incorrect</li> <li>▪ Mass air flow diagnosis gradient check</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Refer to the electrical circuit diagrams and check - <b>MAF</b> - circuit for short circuit to power, high resistance and sensor</p>
P0112-16	Intake Air Temperature Sensor 1 Circuit Low (Bank 1) - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Intake Air Temperature (IAT) sensor circuit voltage below threshold</li> <li>▪ Intake air temperature sensor fault</li> </ul>	<p>Check the intake air temperature sensor and circuits. Refer to the electrical circuit diagrams. Measure the resistance of the intake air temperature sensor (pins 2 and 3 of the MAF sensor). Nominal resistance at 20°C (68°F) should be 2.5 Kiloohms. If the values are outside this range, install a new MAF sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation</p>
P0113-00	Intake Air Temperature Sensor 1 Circuit High (Bank 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Intake air temperature (IAT) sensor circuit short circuit to ground</li> <li>▪ Intake air temperature sensor fault</li> </ul>	<p>Check the intake air temperature sensor and circuits. Refer to the electrical circuit diagrams and check - <b>MAF</b> - circuit for short circuit to ground. Measure the resistance of the IAT sensor (pins 2 and 3 of the MAF sensor). Nominal resistance at 20°C (68°F) should be 2.5 Kiloohms</p>
P0113-17	Intake Air Temperature Sensor 1 Circuit High (Bank 1) - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Intake air temperature (IAT) sensor circuit short circuit to power</li> <li>▪ Intake air temperature (IAT) sensor circuit voltage above threshold</li> <li>▪ Intake air temperature sensor fault</li> <li>▪ Intake air temperature sensor range check above MAX value</li> </ul>	<p>Check the intake air temperature sensor and circuits. Refer to the electrical circuit diagrams and check - <b>MAF</b> - circuit for short circuit to power. Measure the resistance of the Intake air temperature (IAT) sensor (pins 2 and 3 of the MAF sensor). Nominal resistance at 20°C (68°F) should be 2.5 Kiloohms</p>
P0114-27	Intake Air Temperature Sensor 1 Intermittent /Erratic (Bank 1) - signal rate	<ul style="list-style-type: none"> <li>▪ Intake Air Temperature (IAT) sensor circuit signal rate of change above threshold</li> </ul>	<p>Check the intake air temperature sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Read the intake air temperature using a data logger function and record the value. After ten minutes,</p>

	of change above threshold	<ul style="list-style-type: none"> <li>▪ Intake air temperature sensor fault</li> </ul>	read the value again and compare to the first reading. If the value has increased by more than 10° C per 100 ms, install a new MAF sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0116-26	Engine Coolant Temperature Sensor 1 Circuit Range /Performance - signal rate of change below threshold	<ul style="list-style-type: none"> <li>▪ Engine Coolant Temperature (ECT) sensor circuit range /performance - signal rate of change below threshold</li> <li>▪ ECT sensor fault</li> </ul>	Check the ECT sensor and circuits. Refer to the electrical circuit diagrams. With the engine cold, read the coolant temperature sensor using a data logger function and start the engine. Record the value and allow the engine to idle for 20 minutes. After 20 minutes, recheck the value. If the value has not increased by more than 10°C, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0117-00	Engine Coolant Temperature Sensor 1 Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Engine coolant temperature sensor signal below minimum threshold voltage</li> <li>▪ Engine coolant temperature sensor fault</li> <li>▪ Engine coolant temperature sensor circuit - short to ground</li> </ul>	Check the engine coolant temperature sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P0117-16	Engine Coolant Temperature Sensor 1 Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine Coolant Temperature (ECT) sensor circuit low input - voltage below threshold</li> <li>▪ ECT sensor fault</li> </ul>	Check the ECT sensor and circuits. Refer to the electrical circuit diagrams. Measure the resistance of the sensor. Nominal resistance at 20°C (68°F) should be between 35.47 and 39.21 Kilohms. If the resistance is outside this range, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0118-17	Engine Coolant Temperature Sensor 1 Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine Coolant Temperature (ECT) sensor circuit high input - voltage above threshold</li> <li>▪ ECT sensor fault</li> </ul>	Check the ECT sensor and circuits. Refer to the electrical circuit diagrams. Measure the resistance of the sensor. Nominal resistance at 20°C (68°F) should be between 35.47 and 39.21 Kilohms. If the resistance is outside this range, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0119-27	Engine Coolant Temperature Sensor 1 Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Engine Coolant Temperature (ECT) sensor circuit intermittent/erratic - signal rate of change above threshold</li> <li>▪ ECT sensor fault</li> </ul>	Check the ECT sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Read the coolant temperature using a data logger function and record the value. Increase the engine speed to 2,000 rpm and recheck the value after two minutes at this engine speed. If the value has increased faster than 5°C per second, install a new sensor. Refer to the relevant section of the workshop manual.

			Clear the DTCs and test for normal operation
P0181-26	Fuel Temperature Sensor A Circuit Range /Performance - signal rate of change below threshold	<ul style="list-style-type: none"> <li>▪ Fuel temperature sensor circuit range /performance - signal rate of change below threshold</li> <li>▪ Fuel temperature sensor fault</li> </ul>	Check the fuel temperature sensor and circuits. Refer to the electrical circuit diagrams. Check the fuel temperature using a data logger function. Make sure the fuel temperature is less than 30°C (86°F). Start the engine and allow to warm up for ten minutes. Recheck the fuel temperature. If the value has not increased by more than 8°C in this time, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0182-16	Fuel Temperature Sensor A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Fuel temperature sensor circuit low input - voltage below threshold</li> <li>▪ Fuel temperature sensor fault</li> </ul>	Check the fuel temperature sensor and circuits. Refer to the electrical circuit diagrams. Measure the sensor resistance. Nominal resistance at 20°C (68°F) should be between 5.86 and 6.62 Kilohms. If the resistance is outside this range, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0183-17	Fuel Temperature Sensor A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Fuel temperature sensor circuit high input - voltage above threshold</li> <li>▪ Fuel temperature sensor fault</li> </ul>	Check the fuel temperature sensor and circuits. Refer to the electrical circuit diagrams. Measure the sensor resistance. Nominal resistance at 20°C (68°F) should be between 5.86 and 6.62 Kilohms. If the resistance is outside this range, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0184-27	Fuel Temperature Sensor A Circuit Intermittent - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Fuel temperature sensor circuit intermittent - signal rate of change above threshold</li> <li>▪ Fuel temperature sensor circuit intermittent high resistance</li> <li>▪ Fuel temperature sensor fault</li> </ul>	Check the fuel temperature sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Check the fuel temperature using a data logger function. Increase the engine speed to 2,000 rpm and recheck the value. If the value has increased by more than 10°C per 100 ms, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0191-23	Fuel Rail Pressure Sensor A Circuit Range /Performance - signal stuck low	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit range/performance - signal stuck low</li> <li>▪ Low fuel level</li> <li>▪ Blocked/incorrectly connected low-pressure fuel lines</li> <li>▪ FRP sensor fault</li> <li>▪ Fuel pump module fault</li> </ul>	Check the fuel level and the condition and correct connection of the low-pressure fuel circuit lines (incorrect connection of the lines to and from the fuel filter can cause serious fuel pressure fluctuations). Check the FRP sensor and circuits. Check the fuel pump module and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation

P0191-24	Fuel Rail Pressure Sensor A Circuit Range /Performance - signal stuck high	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit range/performance - signal stuck high</li> <li>▪ FRP sensor fault</li> </ul>	Check the FRP sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the fuel pressure value using a data logger function. Stop the engine, turn the ignition on, and recheck the fuel pressure. If the pressure is greater than 10 MPa (1,450 lbs/in <sup>2</sup> ) after 0.4 seconds, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0191-65	Fuel Rail Pressure Sensor A Circuit Range /Performance - signal has too few transitions / events	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit range/performance - signal has too few transitions/events</li> <li>▪ FRP sensor fault</li> </ul>	Check the FRP sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the fuel pressure value using a data logger function. Increase the engine speed to 2,000 rpm and recheck the fuel pressure. If the value has changed by more than 40 MPa (5,801 lbs/in <sup>2</sup> ) per 10 ms, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0192-16	Fuel Rail Pressure Sensor A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit low input - voltage below threshold</li> <li>▪ FRP sensor fault</li> </ul>	Check the FRP sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the fuel pressure value using a data logger function. If the value is 0 MPa (0 lbs/in <sup>2</sup> ), install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0193-17	Fuel Rail Pressure Sensor A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit high input - voltage above threshold</li> <li>▪ FRP sensor fault</li> </ul>	Check the FRP sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the fuel pressure value using a data logger function. If the value is greater than 180 MPa (26,106 lbs/in <sup>2</sup> ), install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0194-27	Fuel Rail Pressure Sensor A Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Fuel Rail Pressure (FRP) sensor circuit intermittent/erratic - signal rate of change above threshold</li> <li>▪ FRP sensor fault</li> </ul>	Check the FRP sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the fuel pressure value using a data logger function. Increase the engine speed to 2,000 rpm and recheck the fuel pressure. If the value has changed by more than 40 MPa (5,801 lbs/in <sup>2</sup> ) per 10 ms, install a new sensor. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P0195-00	Engine Oil Temperature Sensor Circuit - no sub type information	<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor circuit high resistance</li> <li>▪ Engine oil temperature sensor circuit short circuit to ground</li> <li>▪ Engine oil temperature sensor circuit short circuit to power</li> </ul>	Check the engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Refer to the warranty policy and procedures manual if a module is suspect

		<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor failure</li> </ul>	
P0196-00	Engine Oil Temperature Sensor Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Engine oil temperature (EOT) sensor circuit high resistance</li> <li>▪ Engine oil temperature sensor circuit short circuit to ground</li> <li>▪ Engine oil temperature sensor circuit short circuit to power</li> <li>▪ Engine oil temperature sensor failure</li> </ul>	Check the engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. From cold, start the engine and check the oil temperature using a data logger function. Allow the engine to idle for ten minutes and recheck the oil temperature. If the value has not increased by more than 5°C in this time, install a new sensor. Clear the DTCs and test for normal operation
P0196-26	Engine Oil Temperature Sensor Range /Performance - signal rate of change below threshold	<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor circuit range /performance- signal rate of change below threshold</li> <li>▪ Engine oil temperature sensor fault</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. From cold, start the engine and check the oil temperature using a data logger function. Allow the engine to idle for ten minutes and recheck the oil temperature. If the value has not increased by more than 5°C in this time, install a new sensor. Clear the DTCs and test for normal operation
P0197-00	Engine Oil Temperature Sensor Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary
P0197-16	Engine Oil Temperature Sensor Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor circuit low input - voltage below threshold</li> <li>▪ Engine oil temperature sensor fault</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary
P0198-00	Engine Oil Temperature Sensor Circuit High - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary
P0198-17	Engine Oil Temperature Sensor Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor circuit high input - voltage above threshold</li> <li>▪ Engine oil temperature sensor circuit short circuit to power</li> <li>▪ Engine oil temperature sensor fault</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary

P0199-27	Engine Oil Temperature Sensor Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Engine oil temperature sensor circuit intermittent - signal rate of change above threshold</li> <li>▪ Engine oil temperature sensor fault</li> </ul>	Check the Engine oil temperature sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to idle. Check the oil temperature using a data logger function. Increase the engine speed to 2,000 rpm and recheck the value after two minutes at this engine speed. If the value has increased by more than 40°C per second, install a new sensor. Clear the DTCs and test for normal operation
P0201-01	Cylinder 1 Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 1 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0202-01	Cylinder 2 Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 2 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0203-01	Cylinder 3 Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 3 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0204-	Cylinder 4		During the following, clear DTCs and

01	Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 4 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P0205-01	Cylinder 5 Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 5 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P0206-01	Cylinder 6 Injector Circuit / Open - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit open cylinder 6 - general electrical fault</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P020A-33	Cylinder 1 Injection Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 1 injection timing - signal low time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to</p>

			the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P020A-35	Cylinder 1 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 1 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P020B-33	Cylinder 2 Injection Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 2 injection timing - signal low time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P020B-35	Cylinder 2 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 2 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P020C-33	Cylinder 3 Injection Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 3 injection timing - signal low time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance

		<ul style="list-style-type: none"> <li>▪ Fuel injector fault</li> </ul>	<p>not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P020C-35	Cylinder 3 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 3 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P020D-33	Cylinder 4 Injection Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 4 injection timing - signal low time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P020D-35	Cylinder 4 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 4 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation</p>
P020E-33	Cylinder 5 Injection	<ul style="list-style-type: none"> <li>▪ Cylinder 5 injection timing - signal low time greater than maximum</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs.</p>

	Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P020E-35	Cylinder 5 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 5 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Rectify as necessary. Clear the DTCs and test for normal operation
P020F-33	Cylinder 6 Injection Timing - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 6 injection timing - signal low time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Rectify as necessary. Clear the DTCs and test for normal operation
P020F-35	Cylinder 6 Injection Timing - signal high time > maximum	<ul style="list-style-type: none"> <li>▪ Cylinder 6 injection timing - signal high time greater than maximum</li> <li>▪ Fuel injector circuit short circuit high resistance, short circuit to ground or power</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections for security. Disconnect the injector and measure the resistance and capacitance of the injector. If the resistance is not between 180 and 220 Kilohms, or the capacitance not greater than 3 microfarad, install a new injector. If the injector is within specification, check the injector circuits for short circuit to ground, short circuit to power and for high resistance. Refer to the electrical circuit diagrams. Rectify as necessary. Clear the DTCs and test for normal operation

P0219-00	Engine Overspeed Condition - no sub type information	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor circuit high resistance, short circuit to ground or power</li> <li>▪ Camshaft position (CMP) sensor circuit high resistance, short circuit to ground or power</li> <li>▪ Crankshaft position sensor failure</li> <li>▪ Camshaft position sensor failure</li> </ul>	<p>Check the crankshaft position and camshaft position sensor circuits. Refer to the electrical guides. Rectify as necessary. If no fault is found in the circuits, install new sensors as necessary. Clear the DTCs and test for normal operation. Check for oil ingestion into the intake air path. Rectify as necessary</p>
P0236-27	Turbocharger /Supercharger Boost Sensor A Circuit Range /Performance - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Right-hand turbocharger boost sensor circuit high - signal rate of change above threshold</li> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor circuit intermittent high resistance</li> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor fault</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Check the MAPT sensor and circuits. Refer to the electrical circuit diagrams. Start the engine and check the manifold air pressure at idle using a data logger function. Increase the engine speed to 1,500 rpm and recheck the manifold air pressure. If the pressure has increased by more than 50 KPa per 10 ms, install a new sensor. Clear the DTCs and test for normal operation</p>
P0237-16	Turbocharger /Supercharger Boost Sensor A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Right-hand turbocharger boost sensor circuit low - voltage below threshold</li> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor circuit short circuit to ground</li> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the manifold absolute pressure and temperature (MAPT) sensor and circuits. If no fault is found in the circuits, install a new sensor. Clear the DTCs and test for normal operation. If the DTC is present on its own then check the turbo, if it's a common fault, then the fault is an manifold absolute pressure and temperature (MAPT) wiring fault, as wiring is common. Refer to the electrical circuit diagrams and check - <b>MAPT</b> - circuit for short circuit to power</p>
P0238-17	Turbocharger /Supercharger Boost Sensor A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Right-hand turbocharger boost sensor circuit high - voltage above threshold</li> <li>▪ Manifold absolute pressure and</li> </ul>	<p>During the following, clear DTCs and recheck after each step. Check the MAPT sensor and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new sensor. Clear the DTCs and test for normal operation</p>

		<p>temperature (MAPT) sensor circuit short circuit to power</p> <ul style="list-style-type: none"> <li>▪ Manifold absolute pressure and temperature (MAPT) sensor fault</li> </ul>	
<p>P023D-21</p>	<p>Manifold Absolute Pressure - Turbocharger /Supercharger Boost Sensor A Correlation - signal amplitude &lt; minimum</p>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> <p><b>Monitor description.</b> MAP sensor, actual boosted manifold pressure falls below target set point. Air Path under boost diagnostic. Manifold pressure cannot reach set point. Under boost definition is the engine cannot make boost pressure, by either component failure, lost compression, or the inability to remove the combusted air from the system. Under boost can occur if this DTC is logged with other air path DTCs they can contribute to this under boost DTC logging. The air path system starts at the air intake point and ends at the exhaust exit. It includes a large number of components and sensors</p> </div> <ul style="list-style-type: none"> <li>▪ Incorrect installed components</li> <li>▪ Other related DTCs</li> <li>▪ Air intake system leakage <ul style="list-style-type: none"> <li>▪ Air intake system component failure, (delaminating hoses), incorrectly</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Check vehicle history, have air intake system components previously been installed. Are they the correct components</li> <li>▪ Using the manufacturer approved diagnostic system check the engine control module for related DTCs and refer to the relevant DTC index</li> <li>▪ Using the manufacturer approved diagnostic system perform the (Turbo, EGR and air path dynamic test) routine</li> <li>▪ The air intake system comprises: <ul style="list-style-type: none"> <li>▪ Intake port deactivation actuator</li> <li>▪ Variable intake actuator</li> <li>▪ Air filter box</li> <li>▪ Porous duct</li> <li>▪ Mass air flow sensors</li> <li>▪ Charge air cooler to intake manifold tube</li> <li>▪ Charge air cooler</li> <li>▪ Turbocharger to charge air cooler tube</li> <li>▪ Charge air cooler to intake manifold tube</li> <li>▪ Air cleaner to turbocharger tube</li> <li>▪ Turbocharger</li> <li>▪ Cylinder head cover</li> <li>▪ Air intake manifolds</li> <li>▪ Exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes</li> </ul> </li> <li>▪ Check air intake system for leakage <ul style="list-style-type: none"> <li>▪ Check all hose clips are correctly installed and secure</li> <li>▪ Check all components are correctly installed and secure</li> <li>▪ Check all hoses for delamination, splitting and are correctly installed and secure</li> <li>▪ Check exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes for leakage and component integrity</li> </ul> </li> </ul>

		<p>installed components, loose hose clips</p> <ul style="list-style-type: none"> <li>▪ Air intake system blockage or restriction</li> <li>▪ Manifold absolute pressure sensor</li> <li>▪ Manifold temperature sensor</li> <li>▪ Mass air flow sensor(s)</li> <li>▪ Exhaust gas recirculation sensor</li> <li>▪ Exhaust gas recirculation valve</li> <li>▪ Exhaust system blockage or restriction</li> <li>▪ Exhaust system catalyst failure</li> <li>▪ Turbocharger mechanical failure</li> <li>▪ Turbocharger actuator position sensor</li> <li>▪ Turbocharger actuator lever failure</li> <li>▪ High engine crankcase pressure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check air intake system for blockage or restriction <ul style="list-style-type: none"> <li>▪ Check the charge air cooler for blockage</li> <li>▪ Remove the exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes and inspect, especially valve heads for air flow past the valve seats</li> </ul> </li> <li>▪ Refer to the electrical circuit diagrams and check the following sensor circuit for short circuit to ground, short circuit to power, high resistance, open circuit. Repair harness as required. Clear DTC and retest <ul style="list-style-type: none"> <li>▪ Manifold absolute pressure sensor</li> <li>▪ Manifold temperature sensor</li> <li>▪ Mass air flow sensor(s)</li> <li>▪ Exhaust gas recirculation sensor</li> </ul> </li> <li>▪ Check exhaust system for blockage or restriction <ul style="list-style-type: none"> <li>▪ Remove exhaust and check for signs of catalyst damage or obstructions</li> </ul> </li> <li>▪ Check turbocharger for mechanical failure</li> <li>▪ Check turbocharger actuator lever for failure</li> <li>▪ Check for high engine crankcase pressure <ul style="list-style-type: none"> <li>▪ Carry out a compression test on the engine</li> <li>▪ Check for correct engine valve timing</li> </ul> </li> <li>▪ Check and install new components as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component</li> </ul>
<p>P023D-22</p>	<p>Manifold Absolute Pressure - Turbocharger /Supercharger Boost Sensor A Correlation - signal amplitude &gt; maximum</p>	<div style="background-color: #e0f2f1; padding: 5px; border: 1px solid black;">  <b>NOTE:</b> </div> <p><b>Monitor description.</b> MAP sensor, actual boosted manifold pressure falls below target set point. Air Path under boost diagnostic. Manifold pressure cannot reach set point. Under boost definition is</p>	<ul style="list-style-type: none"> <li>▪ Check vehicle history, have air intake system components previously been installed. Are they the correct components</li> <li>▪ Using the manufacturer approved diagnostic system check the engine control module for related DTCs and refer to the relevant DTC index</li> <li>▪ Using the manufacturer approved diagnostic system perform the (Turbo, EGR and air path dynamic test) routine</li> <li>▪ The air intake system comprises: <ul style="list-style-type: none"> <li>▪ Intake port deactivation actuator</li> <li>▪ Variable intake actuator</li> </ul> </li> </ul>

the engine cannot make boost pressure, by either component failure, lost compression, or the inability to remove the combusted air from the system. Under boost can occur if this DTC is logged with other air path DTCs they can contribute to this under boost DTC logging. The air path system starts at the air intake point and ends at the exhaust exit. It includes a large number of components and sensors

- Incorrect installed components
- Other related DTCs
- Air intake system leakage
  - Air intake system component failure, (delaminating hoses), incorrectly installed components, loose hose clips
- Air intake system blockage or restriction
- Manifold absolute pressure sensor
- Manifold temperature sensor
- Mass air flow sensor(s)
- Exhaust gas recirculation sensor
- Exhaust gas recirculation valve
- Exhaust system blockage or restriction
- Exhaust system catalyst failure
- Turbocharger mechanical failure

- Air filter box
- Porous duct
- Mass air flow sensors
- Charge air cooler to intake manifold tube
- Charge air cooler
- Turbocharger to charge air cooler tube
- Charge air cooler to intake manifold tube
- Air cleaner to turbocharger tube
- Turbocharger
- Cylinder head cover
- Air intake manifolds
- Exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes
- Check air intake system for leakage
  - Check all hose clips are correctly installed and secure
  - Check all components are correctly installed and secure
  - Check all hoses for delamination, splitting and are correctly installed and secure
  - Check exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes for leakage and component integrity
- Check air intake system for blockage or restriction
  - Check the charge air cooler for blockage
  - Remove the exhaust gas recirculation cooler, exhaust gas recirculation valve and associated connecting pipes and inspect, especially valve heads for air flow past the valve seats
- Refer to the electrical circuit diagrams and check the following sensor circuit for short circuit to ground, short circuit to power, high resistance, open circuit. Repair harness as required. Clear DTC and retest
  - Manifold absolute pressure sensor
  - Manifold temperature sensor
  - Mass air flow sensor(s)
  - Exhaust gas recirculation sensor
- Check exhaust system for blockage or restriction

		<ul style="list-style-type: none"> <li>▪ Turbocharger actuator position sensor</li> <li>▪ Turbocharger actuator lever failure</li> <li>▪ High engine crankcase pressure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Remove exhaust and check for signs of catalyst damage or obstructions</li> <li>▪ Check turbocharger for mechanical failure</li> <li>▪ Check turbocharger actuator lever for failure</li> <li>▪ Check for high engine crankcase pressure <ul style="list-style-type: none"> <li>▪ Carry out a compression test on the engine</li> <li>▪ Check for correct engine valve timing</li> </ul> </li> <li>▪ Check and install new components as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component</li> </ul>
P025C-00	Fuel Pump Module Control Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil Level sensor duty cycle below minimum threshold</li> </ul>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check the oil level sensor circuit
P025D-00	Fuel Pump Module Control Circuit High - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil Level sensor duty cycle above maximum threshold</li> </ul>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check the oil level sensor circuit
P0263-00	Cylinder 1 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P0266-00	Cylinder 2 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector

P0269-00	Cylinder 3 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P0272-00	Cylinder 4 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P0275-00	Cylinder 5 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P0278-00	Cylinder 6 Contribution /Balance - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for blow-by etc and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029A-00	Cylinder 1- Fuel Trim at	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground,</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the

	Max Limit - no sub type information	<p>power or high resistance</p> <ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029B-00	Cylinder 1- Fuel Trim at Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029C-00	Cylinder 1 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029D-00	Cylinder 1- Injector	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the

	Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029E-00	Cylinder 2- Fuel Trim at Max Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P029F-00	Cylinder 2- Fuel Trim at Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A0-00	Cylinder 2 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel

		<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A1-00	Cylinder 2 - Injector Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A2-00	Cylinder 3- Fuel Trim at Max Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A3-00	Cylinder 3- Fuel Trim at	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the

	Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A4-00	Cylinder 3 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A5-00	Cylinder 3 - Injector Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A6-00	Cylinder 4- Fuel Trim at Max Limit - no		Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for

	sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A7-00	Cylinder 4- Fuel Trim at Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A8-00	Cylinder 4 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02A9-00	Cylinder 4 - Injector	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check

	Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AA-00	Cylinder 5 - Fuel Trim at Max Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AB-00	Cylinder 5 - Fuel Trim at Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AC-00	Cylinder 5 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel

		<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AD-00	Cylinder 5 - Injector Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AE-00	Cylinder 6 - Fuel Trim at Max Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02AF-00	Cylinder 6 - Fuel Trim at	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit short circuit to ground, power or high resistance</li> </ul>	Refer to the electrical guides and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the

	Min Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02B0-00	Cylinder 6 - Injector Restricted - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02B1-00	Cylinder 6 - Injector Leaking - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel injector circuit high resistance</li> <li>▪ Fuel injector circuit short circuit to ground</li> <li>▪ Fuel injector circuit short circuit to power</li> <li>▪ Injector leak</li> <li>▪ Cylinder compression low <ul style="list-style-type: none"> <li>▪ Cylinder leakage past the injector</li> <li>▪ Cylinder leakage past the glow plug</li> <li>▪ Mechanical fault, valve, piston/ring, etc</li> </ul> </li> <li>▪ Injector fault</li> </ul>	Refer to the electrical circuit diagrams and check the fuel injector circuit. Check the injector and surrounding area for evidence of fuel leakage. Disconnect the injector and check for evidence of fuel leakage in the connector. Rectify as necessary. Clear the DTCs. Reconnect the injector and start the engine. Allow to warm up to above 60°C (140°F) and allow to idle (cylinder balance diagnosis is now active). If the DTC resets, check for Cylinder leakage and rectify as necessary. Clear the DTCs and recheck. Carry out a compression test only if the DTC resets. If the above tests are all within range, install a new injector
P02CD-00	Cylinder 1 Fuel Injector Offset Learning at	Fuel injector failure	Renew fuel injector for related cylinder

	Max Limit - no sub type information		
P02CF-00	Cylinder 2 Fuel Injector Offset Learning at Max Limit - no sub type information	Fuel injector failure	Renew fuel injector for related cylinder
P02D1-00	Cylinder 3 Fuel Injector Offset Learning at Max Limit - no sub type information	Fuel injector failure	Renew fuel injector for related cylinder
P02D3-00	Cylinder 4 Fuel Injector Offset Learning at Max Limit - no sub type information	Fuel injector failure	Renew fuel injector for related cylinder
P02D5-00	Cylinder 5 Fuel Injector Offset Learning at Max Limit - no sub type information	Fuel injector failure	Renew fuel injector for related cylinder
P02D7-00	Cylinder 6 Fuel Injector Offset Learning at Max Limit - no sub type information	Fuel injector failure	Renew fuel injector for related cylinder
P0326-21	Knock Sensor 1 Circuit Range /Performance (Bank 1) - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Knock sensor 1 circuit range/performance, right-hand bank (rear) - signal amplitude less than minimum</li> <li>▪ Knock sensor incorrectly installed</li> <li>▪ Knock sensor connections reversed</li> <li>▪ Knock sensor circuit short circuit to ground</li> </ul>	Check that the knock sensors are correctly installed and tightened to the correct torque. Check that the knock sensor connections are connected to the correct sensor. Check the knock sensor circuit, Refer to the electrical circuit diagrams. Rectify as necessary
P0326-22	Knock Sensor 1 Circuit Range /Performance (Bank 1) - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Knock sensor 1 circuit range/performance, right-hand bank (rear) - signal amplitude greater than maximum</li> <li>▪ Knock sensor incorrectly installed</li> <li>▪ Knock sensor connections reversed</li> </ul>	Check that the knock sensors are correctly installed and tightened to the correct torque. Check that the knock sensor connections are connected to the correct sensor. Check the knock sensor circuit, Refer to the electrical circuit diagrams. Rectify as necessary

		<ul style="list-style-type: none"> <li>▪ Knock sensor circuit short circuit to ground</li> </ul>	
P0331-21	Knock Sensor 1 Circuit Range /Performance (Bank 2) - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Knock sensor 2 circuit range/performance, left-hand bank (rear) - signal amplitude less than minimum</li> <li>▪ Knock sensor incorrectly installed</li> <li>▪ Knock sensor connections reversed</li> <li>▪ Knock sensor circuit short circuit to ground</li> </ul>	Check that the knock sensors are correctly installed and tightened to the correct torque. Check that the knock sensor connections are connected to the correct sensor. Check the knock sensor circuit, Refer to the electrical circuit diagrams. Rectify as necessary
P0331-22	Knock Sensor 1 Circuit Range /Performance (Bank 2) - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Knock sensor 2 circuit range/performance, left-hand bank (rear) - signal amplitude greater than maximum</li> <li>▪ Knock sensor incorrectly installed</li> <li>▪ Knock sensor connections reversed</li> <li>▪ Knock sensor circuit short circuit to ground</li> </ul>	Check that the knock sensors are correctly installed and tightened to the correct torque. Check that the knock sensor connections are connected to the correct sensor. Check the knock sensor circuit, Refer to the electrical circuit diagrams. Rectify as necessary
P0335-78	Crankshaft Position Sensor A Circuit - alignment or adjustment incorrect	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor - alignment or adjustment incorrect</li> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Crankshaft position sensor wheel fault</li> </ul>	Check the crankshaft position sensor and circuits. Refer to the electrical circuit diagrams. Check the sensor and wheel for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation
P0336-31	Crankshaft Position (CKP) Sensor Circuit Range /Performance - no signal	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor range /performance - signal missing</li> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> </ul>	Check the crankshaft position sensor and circuits. Refer to the electrical circuit diagrams. Check the sensor and wheel for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation

		<ul style="list-style-type: none"> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Crankshaft position sensor wheel fault</li> </ul>	
P0336-38	Crankshaft Position (CKP) Sensor Circuit Range /Performance - signal frequency incorrect	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor range /performance - signal frequency</li> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Crankshaft position sensor wheel fault</li> </ul>	Check the crankshaft position sensor and circuits. Refer to the electrical circuit diagrams. Check the sensor and wheel for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation
P0336-64	Crankshaft position (CKP) sensor circuit range /performance - signal plausibility failure	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor range /performance - signal plausibility fault</li> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Crankshaft position sensor wheel fault</li> </ul>	Check the crankshaft position sensor and circuits. Refer to the electrical circuit diagrams. Check the sensor and wheel for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation
P0336-66	Crankshaft position (CKP) sensor circuit range /performance - signal has too	<ul style="list-style-type: none"> <li>▪ Crankshaft position (CKP) sensor range /performance - signal has too many transitions/events</li> </ul>	Check the crankshaft position sensor and circuits. Refer to the electrical circuit diagrams. Check the sensor and wheel for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation

	many transitions / events	<ul style="list-style-type: none"> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Crankshaft position sensor wheel fault</li> </ul>	
P0341-29	Camshaft Position Sensor A Circuit Range /Performance (Bank 1 or single sensor) - signal invalid	<ul style="list-style-type: none"> <li>▪ Camshaft position (CMP) sensor range /performance - signal invalid</li> <li>▪ Camshaft position sensor circuit short circuit to ground</li> <li>▪ Camshaft position sensor circuit short circuit to power</li> <li>▪ Camshaft position sensor circuit high resistance</li> <li>▪ Camshaft position sensor fault</li> </ul>	Check the camshaft position sensor and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new sensor. Clear the DTCs and test for normal operation
P0341-3A	Camshaft Position Sensor A Circuit Range /Performance (Bank 1 or single sensor) - incorrect has too many pulses	<ul style="list-style-type: none"> <li>▪ Camshaft position (CMP) sensor range /performance - too many pulses</li> <li>▪ Camshaft segment period too short</li> </ul>	Check the camshaft position sensor and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new sensor. Clear the DTCs and test for normal operation
P0342-31	Camshaft Position Sensor A Circuit Low (Bank 1 or single sensor) - no signal	<ul style="list-style-type: none"> <li>▪ Camshaft position (CMP) sensor circuit low input - no signal</li> <li>▪ Camshaft position sensor circuit short circuit to ground</li> <li>▪ Camshaft position sensor circuit short circuit to power</li> <li>▪ Camshaft position sensor circuit high resistance</li> <li>▪ Camshaft position sensor fault</li> </ul>	Check the camshaft position sensor and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new sensor. Clear the DTCs and test for normal operation

P0380-72	Glow Plug /Heater Circuit A - actuator stuck open	<ul style="list-style-type: none"> <li>▪ Right-hand bank glow plug circuit - actuator stuck open</li> <li>▪ Low battery voltage</li> <li>▪ Relay circuit <b>from</b> relay</li> </ul>	Check the battery condition and state of charge. Check the relay and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new relay. Clear the DTCs and test for normal operation
P0380-73	Glow Plug /Heater Circuit A - actuator stuck closed	<ul style="list-style-type: none"> <li>▪ Right-hand bank glow plug circuit - actuator stuck closed</li> <li>▪ Low battery voltage</li> <li>▪ Relay circuit <b>to</b> relay</li> </ul>	Check the battery condition and state of charge. Check the relay and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new relay. Clear the DTCs and test for normal operation
P0383-11	Glow Plug Control Module Control Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Glow plug relay, control circuit short circuit to ground</li> <li>▪ Glow plug relay failure</li> </ul>	Refer to the electrical guides and check the relay and circuits. If no fault is found in the circuits, install a new relay. Clear the DTCs and test for normal operation
P0384-12	Glow Plug Control Module Control Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Glow plug relay, control circuit short circuit to power</li> <li>▪ Glow plug relay failure</li> </ul>	Refer to the electrical guides and check the relay and circuits. If no fault is found in the circuits, install a new relay. Clear the DTCs and test for normal operation
P0401-21	Exhaust Gas Recirculation A Flow Insufficient Detected - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) insufficient flow detected - signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation (EGR) control deviation lower limit right-hand bank (intake manifold tuning (IMT) valve closed) bank specific control of EGR</li> <li>▪ Exhaust gas recirculation (EGR) control deviation lower limit common (Manifold Tuning Valve OPEN - common control of EGR)</li> <li>▪ Engine control module internal fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">  <b>NOTE:</b> </div> <div style="border: 1px solid black; padding: 10px; margin-bottom: 5px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the exhaust gas recirculation (EGR) valve, coolers and pipe-work. Refer to the electrical circuit diagrams</p>
P0402-22	Exhaust Gas Recirculation A Flow Excessive Detected - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) excessive flow detected - signal amplitude greater than maximum</li> <li>▪ EGR control deviation upper limit right-hand</li> </ul>	Allow the engine to warm up, switch off and turn the ignition on. Using a data logger function, check the EGR valve angle. Command the valve actuator to 0% then 100% pulse width modulated (PWM), and recheck the valve angles. The angles should range between 5% and 95%. If this is not the case, install a

		bank (intake manifold tuning (IMT) valve closed) bank specific control of EGR	new valve as necessary. Clear the DTCs and test for normal operation
P0403-00	Exhaust Gas Recirculation A Control Circuit - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit high resistance</li> <li>▪ EGR valve circuit short circuit to ground</li> <li>▪ EGR valve circuit short circuit to power</li> <li>▪ EGR valve failure</li> </ul>	Refer to the relevant workshop manual section. Check the EGR valve, coolers and pipework. Refer to the electrical circuit diagrams and check the MAF sensor and circuits. Allow the engine to warm up, switch off and turn the ignition on. Using a data logger function, check the EGR valve angle. Command the valve actuator to 0% then 100% pulse width modulated (PWM) and recheck the values. The angle should range between 5% and 95%. If this is not the case, install a new valve as necessary. Clear the DTCs and test for normal operation
P0403-19	Exhaust Gas Recirculation A Control Circuit - circuit current above threshold	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) control circuit - current over threshold</li> <li>▪ EGR valve control circuit short circuit to ground</li> <li>▪ EGR valve control circuit short circuit to power</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, turn the ignition on and check the EGR valve values for both banks. Turn the ignition off and make sure the cleaning cycle is performed (the valves should cycle from 0% to 100% approximately 6 times). Turn the ignition on, command the actuators to 0% pulse width modulated (PWM) and check the sensor reading. The value should be 0 - 20%. Command the actuators to 100% pulse width modulated (PWM) and check the sensor reading. The value should be 80 - 95%. If the values are outside this range, install a new valve as necessary. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if an Engine Control Module is suspect
P0404-00	Exhaust Gas Recirculation A Control Circuit Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit high resistance</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to power</li> <li>▪ Exhaust gas recirculation (EGR) valve failure</li> <li>▪ Exhaust gas recirculation (EGR) valve stuck/sticking</li> </ul>	<div style="border: 1px solid black; background-color: #e0f2f1; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the exhaust gas recirculation (EGR) valve, coolers and pipe-work. Refer to the electrical circuit diagrams and check - <b>EGR A</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>

P0405-00	Exhaust Gas Recirculation Sensor A Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit high resistance</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve failure</li> <li>▪ Signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation (EGR) valve potentiometer less than minimum (sensor A)</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; border: 1px solid #ccc; margin-bottom: 10px;">  <b>NOTE:</b> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the exhaust gas recirculation (EGR) valve, coolers and pipe-work. Refer to the electrical circuit diagrams and check - <b>EGR Valve Position Sensor Bank A - Signal</b> - circuit for short circuit to ground, high resistance</p>
P0405-21	Exhaust Gas Recirculation Sensor A Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) sensor circuit low - signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation (EGR) valve position sensor circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve position sensor fault</li> <li>▪ Exhaust gas recirculation (EGR) valve potentiometer (sensor A) &lt; minimum</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; border: 1px solid #ccc; margin-bottom: 10px;">  <b>NOTE:</b> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the right-hand EGR sensor and circuits. Refer to the electrical circuit diagrams and check - <b>EGR Valve Position Sensor Bank A - Signal</b> - circuit for short circuit to ground</p>
P0406-22	Exhaust Gas Recirculation Sensor A Circuit High - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) sensor circuit high - signal amplitude greater than maximum</li> <li>▪ EGR valve position sensor circuit short circuit to power</li> <li>▪ EGR valve position sensor fault</li> </ul>	<p>Check the right-hand Exhaust Gas Recirculation (EGR) sensor and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR valve angle. With the ignition on, engine off, command the valve actuator to 0% pulse width modulated (PWM), and then to 100% pulse width modulated (PWM) and recheck the EGR valve angle. The value should range from 0 - 20% to 80 - 95%. If this is not the case, install a new sensor. Clear the DTCs and test for normal operation</p>
P0407-21	Exhaust Gas Recirculation Sensor B Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) throttle position sensor circuit low - signal amplitude less than minimum</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; border: 1px solid #ccc; margin-bottom: 10px;">  <b>NOTE:</b> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div>

		<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) throttle position sensor circuit short circuit to ground</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> <li>▪ Exhaust gas recirculation (EGR) throttle potentiometer &lt; minimum</li> </ul>	<p>Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams and check - <b>Throttle Valve Position Sensor 1-Signal</b> - circuit for short circuit to ground</p>
P0408-22	Exhaust Gas Recirculation Sensor B Circuit High - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) throttle position sensor circuit low - signal amplitude greater than maximum</li> <li>▪ EGR throttle position sensor circuit short circuit to power</li> <li>▪ EGR throttle position sensor fault</li> </ul>	<p>Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new EGR valve. Clear the DTCs and test for normal operation</p>
P0425-62	Catalyst Temperature Sensor Circuit (Bank 1, Sensor Circuit 1) - signal compare failure	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor signal compare failure (right-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor correlation compare with at least two other sensors</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> </ul>	<p>Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Check pre-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor</p>
P0426-00	Catalyst Temperature Sensor Circuit Range /Performance (Bank 1, Sensor Circuit 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor gradient check (right hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> </ul>	<p>Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power and intermittent poor or dirty connections. Renew the sensor</p>

		<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit high resistance</li> </ul>	
P0426-1A	Catalyst Temperature Sensor Circuit Range /Performance (Bank 1, Sensor Circuit 1) - circuit resistance below threshold	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit resistance below threshold (right-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor plausibility at cold start, temperature difference too high</li> <li>▪ Pre-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for low resistance, short to ground. Renew the sensor
P0426-1B	Catalyst Temperature Sensor Circuit Range /Performance (Bank 1, Sensor Circuit 1) - circuit resistance above threshold	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit resistance above threshold (right-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor plausibility at cold start, temperature difference too low</li> <li>▪ Pre-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for high resistance, open circuit. Renew the sensor
P0426-1E	Catalyst Temperature Sensor Circuit Range /Performance (Bank 1, Sensor Circuit 1) - circuit resistance out of range	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit resistance out of range (right-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor plausibility at engine running, temperature too low</li> <li>▪ Pre-catalytic converter temperature sensor stuck at low temperature value</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Check pre-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor
P0427-00	Catalyst Temperature Sensor Circuit Low (Bank 1, Sensor Circuit 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor signal below minimum threshold voltage (right-hand bank sensor 1)</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for short to ground. Renew the sensor

		<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground</li> </ul>	
P0428-00	Catalyst Temperature Sensor Circuit High (Bank 1, Sensor Circuit 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor signal above maximum threshold voltage (right-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short power, open circuit</li> </ul>	Refer to the electrical circuit diagrams and check Pre-catalytic converter temperature sensor circuit for short to power, open circuit. Renew the sensor
P042A-62	Catalyst Temperature Sensor Circuit (Bank 1, Sensor Circuit 2) - signal compare failure	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor signal compare failure(right-hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor correlation compare with at least two other sensors</li> <li>▪ Post-catalytic converter temperature sensor failure</li> <li>▪ Post-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check post-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. check post-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor
P042B-00	Catalyst Temperature Sensor Circuit Range /Performance (Bank1, Sensor Circuit 2) - no sub type information	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor gradient check (right-hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor failure</li> <li>▪ Post-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> <li>▪ Post-catalytic converter temperature sensor circuit - high resistance</li> </ul>	Refer to the electrical circuit diagrams and check post-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Intermittent poor or dirty connections. Renew the sensor

P042B-1A	Catalyst Temperature Sensor Circuit Range /Performance (Bank1, Sensor Circuit 2) - circuit resistance below threshold	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor circuit resistance below threshold (right-hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor plausibility at cold start, temperature difference too high</li> <li>▪ Post-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	Refer to the electrical circuit diagrams and check post-catalytic converter temperature sensor circuit for low resistance, short to ground. Renew the sensor
P042B-1B	Catalyst Temperature Sensor Circuit Range /Performance (Bank1, Sensor Circuit 2) - circuit resistance above threshold	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor circuit resistance above threshold (right-hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor plausibility at cold start, temperature difference too low</li> <li>▪ Post-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	Refer to the electrical circuit diagrams and check post-catalytic converter temperature sensor circuit for high resistance, open circuit. Renew the sensor
P042B-1E	Catalyst Temperature Sensor Circuit Range /Performance (Bank1, Sensor Circuit 2) - circuit resistance out of range	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor circuit resistance out of range (right-hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor plausibility at engine running, temperature too low</li> <li>▪ Post-catalytic converter temperature sensor stuck at low temperature value</li> </ul>	Refer to the electrical circuit diagrams and check post-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. check post-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor
P042C-00	Catalyst Temperature Sensor Circuit Low (Bank 1, Sensor Circuit 2) - no sub type information	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor signal below minimum threshold voltage (right hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor failure</li> </ul>	Refer to the electrical guides and check post-catalytic converter temperature sensor circuit for short to ground. Install a new sensor as required

		<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor circuit - short to ground</li> </ul>	
P042D-00	Catalyst Temperature Sensor Circuit High (Bank 1, Sensor Circuit 2) - no sub type information	<ul style="list-style-type: none"> <li>▪ Post-catalytic converter temperature sensor signal above maximum threshold voltage (right hand bank sensor 2)</li> <li>▪ Post-catalytic converter temperature sensor failure</li> <li>▪ Post-catalytic converter temperature sensor circuit - short to power, open circuit</li> </ul>	Refer to the electrical guides and check post-catalytic converter temperature sensor circuit for short to power, open circuit. Install a new sensor as required
P0435-62	Catalyst Temperature Sensor Circuit (Bank 2 Sensor 1) - signal compare failure	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor signal compare failure (left-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor correlation compare with at least two other sensors</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Check pre-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew pre-catalytic converter temperature sensor
P0436-00	Catalyst Temperature Sensor Circuit Range /Performance (Bank 2 Sensor 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor gradient check (left-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground, power or open circuit</li> <li>▪ Pre-catalytic converter temperature sensor circuit high resistance</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Intermittent poor or dirty connections. Renew the sensor
P0436-1A	Catalyst Temperature	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter

	Sensor Circuit Range /Performance (Bank 2 Sensor 1) - circuit resistance below threshold	<p>circuit resistance below threshold (left-hand bank sensor 1)</p> <ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor plausibility at cold start, temperature difference too high</li> <li>▪ Pre-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	temperature sensor circuit for low resistance, short to ground. Renew pre-catalytic converter temperature sensor
P0436-1B	Catalyst Temperature Sensor Circuit Range /Performance (Bank 2 Sensor 1) - circuit resistance above threshold	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit resistance above threshold (left-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor plausibility at cold start, temperature difference too low</li> <li>▪ Pre-catalytic converter temperature sensor stuck at high temperature value</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for high resistance, open circuit. Renew pre-catalytic converter temperature sensor
P0436-1E	Catalyst Temperature Sensor Circuit Range /Performance (Bank 2 Sensor 1) - circuit resistance out of range	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor circuit resistance out of range (left-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor plausibility at engine running, temperature too low</li> <li>▪ Pre-catalytic converter temperature sensor stuck at low temperature value</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for open circuit, short to ground, short to power. Check pre-catalytic converter temperature sensor for dirt contamination, corrosion, water ingress damage. Renew pre-catalytic converter temperature sensor
P0437-00	Catalyst Temperature Sensor Circuit Low (Bank 2 Sensor 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor signal below minimum threshold voltage (left-hand bank sensor 1)</li> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to ground</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for short to ground. Renew the sensor
P0438-00	Catalyst Temperature	<ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor</li> </ul>	Refer to the electrical circuit diagrams and check pre-catalytic converter

	Sensor Circuit High (Bank 2 Sensor 1) - no sub type information	<p>signal above maximum threshold voltage (left-hand bank sensor 1)</p> <ul style="list-style-type: none"> <li>▪ Pre-catalytic converter temperature sensor failure</li> <li>▪ Pre-catalytic converter temperature sensor circuit - short to power, open circuit</li> </ul>	temperature sensor circuit for short to power, open circuit. Renew the sensor
P0513-00	Incorrect immobilizer Key - no sub type information	<ul style="list-style-type: none"> <li>▪ Security key invalid</li> </ul>	Programme all keys using the manufacturer approved diagnostic system. Repair/renew as necessary. Clear the DTCs and test for normal operation. If the DTC resets, contact the technical help desk
P0A14-13	Engine Mount Control A Circuit / Open - circuit open	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit high resistance</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0A15-11	Engine Mount Control A Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit short circuit to ground</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0A16-12	Engine Mount Control A Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit short circuit to power</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0AB6-13	Engine Mount Control B Circuit / Open - circuit open	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit high resistance</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0AB7-11	Engine Mount Control B Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit short circuit to ground</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0AB8-12	Engine Mount Control B Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Engine mount control circuit short circuit to power</li> <li>▪ Engine mount fault</li> </ul>	Check the engine mounts and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P045A-00	Exhaust Gas Recirculation B Control Circuit - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) valve circuit fault</li> <li>▪ EGR valve fault</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, turn the ignition on and check the EGR valve values for both banks. Turn the ignition off and make sure the cleaning cycle is performed (the

		<ul style="list-style-type: none"> <li>Engine Control Module (ECM) fault</li> </ul>	<p>valves should cycle from 0% to 100% approximately 6 times). Turn the ignition on, command the actuators to 0% pulse width modulated (PWM) and check the sensor reading. The value should be 0 - 20%. Command the actuators to 100% pulse width modulated (PWM) and check the sensor reading. The value should be 80 - 95%. If the values are outside this range, install a new valve as necessary. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect</p>
P045A-19	Exhaust Gas Recirculation B Control Circuit - circuit current above threshold	<ul style="list-style-type: none"> <li>Left-hand Exhaust Gas Recirculation (EGR) control circuit - current over threshold</li> <li>EGR valve control circuit short circuit to ground</li> <li>EGR valve control circuit short circuit to power</li> </ul>	<p>Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, turn the ignition on and check the EGR valve values for both banks. Turn the ignition off and make sure the cleaning cycle is performed (the valves should cycle from 0% to 100% approximately 6 times). Turn the ignition on, command the actuators to 0% pulse width modulated (PWM) and check the sensor reading. The value should be 0 - 20%. Command the actuators to 100% pulse width modulated (PWM) and check the sensor reading. The value should be 80 - 95%. If the values are outside this range, install a new valve as necessary. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect</p>
P045C-00	Exhaust Gas Recirculation B Control Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>Left-hand exhaust gas recirculation (EGR) control circuit low</li> <li>Exhaust gas recirculation (EGR) valve sticking</li> <li>Exhaust gas recirculation (EGR) sensor circuit fault</li> <li>Exhaust gas recirculation (EGR) valve control 1 fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check for DTCs indicating a sensor fault. Check the EGR sensor circuits. Refer to the electrical circuit diagrams and check - <b>E-EGR Valve Actuator Bank B- (H-bridge)</b> - circuit for short circuit to ground</p>
P045D-00	Exhaust Gas Recirculation B Control Circuit High - no sub type information	<ul style="list-style-type: none"> <li>Left-hand Exhaust Gas Recirculation (EGR) control circuit high</li> <li>Exhaust gas recirculation (EGR) valve sticking</li> <li>Exhaust gas recirculation (EGR) sensor circuit fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check for DTCs indicating a sensor fault. Check the EGR sensor circuits. Refer to</p>

		<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve control 1 fault</li> </ul>	<p>the electrical circuit diagrams and check - <b>E-EGR Valve Actuator Bank B+ (H-bridge)</b> - circuit for short circuit to power</p>
P0488-00	Exhaust Gas Recirculation Throttle Control Circuit A Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) throttle position sensor circuit high resistance</li> <li>▪ Exhaust gas recirculation (EGR) throttle position sensor circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) throttle position sensor circuit short circuit to power</li> <li>▪ EGR modulator failure</li> </ul>	<p>Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position with the ignition on, engine off and record the value. Command the actuator to 100% pulse width modulated (PWM) and recheck the position reading. The value should be 80 - 95%. Command the actuator to 0% pulse width modulated (PWM) and recheck the position reading. The value should be 5 - 20%. Manually close and open the throttle and check the resistance. The resistance should range from 300 - 2,500 ohms. If the values are not in this range, install a new EGR valve. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect</p>
P0488-11	Exhaust gas recirculation (EGR) - intake air shut off throttle range /performance - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) throttle position sensor circuit short circuit to ground</li> <li>▪ EGR modulator failure</li> </ul>	<p>Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position with the ignition on, engine off and record the value. Command the actuator to 100% pulse width modulated (PWM) and recheck the position reading. The value should be 80 - 95%. Command the actuator to 0% pulse width modulated (PWM) and recheck the position reading. The value should be 5 - 20%. Manually close and open the throttle and check the resistance. The resistance should range from 300 - 2,500 ohms. If the values are not in this range, install a new EGR valve. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect</p>
P0488-12	Exhaust gas recirculation (EGR) - intake air shut off throttle range /performance - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) throttle position sensor circuit short circuit to power</li> <li>▪ EGR modulator failure</li> </ul>	<p>Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position with the ignition on, engine off and record the value. Command the actuator to 100% pulse width modulated (PWM) and recheck the position reading. The value should be 80 - 95%. Command the actuator to 0% pulse width modulated (PWM) and recheck the position reading. The value should be 5 - 20%. Manually close and open the throttle and check the resistance. The resistance should range from 300 - 2,500 ohms. If the values are not in this range, install a new EGR valve. Clear the DTCs and test for normal</p>

			operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0488-13	Exhaust gas recirculation (EGR) - intake air shut off throttle range /performance - circuit open	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) throttle position sensor circuit high resistance</li> <li>▪ Exhaust gas recirculation (EGR) throttle position sensor circuit open circuit</li> <li>▪ EGR modulator failure</li> </ul>	Check the EGR throttle position sensor and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position with the ignition on, engine off and record the value. Command the actuator to 100% pulse width modulated (PWM) and recheck the position reading. The value should be 80 - 95%. Command the actuator to 0% pulse width modulated (PWM) and recheck the position reading. The value should be 5 - 20%. Manually close and open the throttle and check the resistance. The resistance should range from 300 - 2,500 ohms. If the values are not in this range, install a new EGR valve. Clear the DTCs and test for normal operation. If there is still an issue, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0488-21	Exhaust Gas Recirculation Throttle Control Circuit A Range /Performance - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) throttle control circuit range /performance - signal amplitude less than minimum</li> <li>▪ Right-hand EGR throttle adaption is at the bottom limit</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position then command the throttle position set point to 0% pulse width modulated (PWM) and recheck the position. If the 0% pulse width modulated (PWM) position is not between 0% and 20%, install a new EGR valve. Clear the DTCs and test for normal operation
P0488-22	Exhaust Gas Recirculation Throttle Control Circuit A Range /Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) throttle control circuit range /performance - signal amplitude greater than maximum</li> <li>▪ Right-hand EGR throttle adaption is at the top limit</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR throttle position then command the throttle position set point to 0% pulse width modulated (PWM) and recheck the position. If the 0% pulse width modulated (PWM) position is not between 0% and 20%, install a new EGR valve. Clear the DTCs and test for normal operation
P0489-00	Exhaust Gas Recirculation Control Circuit A Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Right-hand exhaust gas recirculation (EGR) control circuit low</li> <li>▪ Exhaust gas recirculation (EGR) valve control circuit fault</li> <li>▪ Mass Air Flow (MAF) sensor circuit fault</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuit fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">  <b>NOTE:</b> </div> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> <p>Check for DTCs indicating a sensor fault. Check the exhaust gas recirculation (EGR) sensor circuits. Refer to the</p>

			electrical circuit diagrams and check exhaust gas recirculation (EGR) valve for short circuit ground
P0490-00	Exhaust Gas Recirculation A Control Circuit A High - no sub type information	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) control circuit high</li> <li>▪ Exhaust gas recirculation (EGR) valve control circuit fault</li> <li>▪ Mass Air Flow (MAF) sensor circuit fault</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuit fault</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">  <b>NOTE:</b> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check for DTCs indicating a sensor fault. Check the exhaust gas recirculation (EGR) sensor circuits. Refer to the electrical circuit diagrams and check exhaust gas recirculation (EGR) valve for short circuit to power</p>
P0493-13	Fan Overspeed (clutch locked) - circuit open	<ul style="list-style-type: none"> <li>▪ Fan circuit open circuit</li> </ul>	Refer to the electrical circuit diagrams and check the viscous fan speed sensor circuit. Repair/renew as necessary
P0494-11	Fan Speed Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Viscous fan solenoid circuit short circuit to ground</li> <li>▪ Viscous fan solenoid failure</li> </ul>	Refer to the electrical circuit diagrams and check the viscous fan solenoid and circuits. Refer to the relevant workshop manual section
P0495-12	Fan Speed High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Viscous fan solenoid circuit short circuit to power</li> <li>▪ Viscous fan solenoid failure</li> </ul>	Refer to the electrical circuit diagrams and check the viscous fan solenoid and circuits. Refer to the relevant workshop manual section
P0501-00	Vehicle Speed Sensor A Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Vehicle speed sensor 1 range/performance - signal out of range</li> <li>▪ Investigate for anti-lock braking system (ABS) faults <ul style="list-style-type: none"> <li>▪ the signal from the wheel speed sensors is not plausible</li> </ul> </li> </ul>	Check for DTCs indicating an ABS fault. Speed sensor codes are listed at the head of this table
P0504-62	Brake Switch A / B Correlation - signal compare failure	<ul style="list-style-type: none"> <li>▪ Brake switch A/B correlation - signal compare fault</li> <li>▪ Brake lamp switch fault</li> <li>▪ Brake lamp switch circuit fault</li> </ul>	Check the brake switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P0527-21	Fan Speed Sensor Circuit Range	<ul style="list-style-type: none"> <li>▪ Fan speed sensor circuit range /performance - signal</li> </ul>	Check the fan and circuits, including the pulse width modulated (PWM) signal circuit. Refer to the electrical circuit

	/Performance - signal amplitude < minimum	<p>amplitude less than minimum</p> <ul style="list-style-type: none"> <li>▪ Fan circuit short circuit to ground</li> <li>▪ Fan circuit short circuit to power</li> <li>▪ Fan circuit high resistance</li> <li>▪ Fan fault</li> </ul>	diagrams. Check the motor for sticking. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0527-22	Fan Speed Sensor Circuit Range /Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Fan speed sensor circuit range /performance - signal amplitude greater than maximum</li> <li>▪ Fan circuit short circuit to ground</li> <li>▪ Fan circuit short circuit to power</li> <li>▪ Fan circuit high resistance</li> <li>▪ Fan fault</li> </ul>	Check the fan and circuits, including the pulse width modulated (PWM) signal circuit. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0527-27	Fan Speed Sensor Circuit Range /Performance - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Fan speed sensor circuit range /performance - signal rate of change above threshold</li> <li>▪ Fan circuit intermittent high resistance <ul style="list-style-type: none"> <li>▪ Loose connections</li> </ul> </li> </ul>	Check the fan and circuits, including the pulse width modulated (PWM) signal circuit. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0562-16	System Voltage Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ System voltage below threshold</li> <li>▪ Battery condition/state of charge</li> <li>▪ Battery ground cable high resistance</li> <li>▪ Battery connections loose/corroded</li> <li>▪ Battery current drain</li> <li>▪ Battery power distribution circuits</li> </ul>	Check the battery connections and condition and charge as necessary. Refer to the electrical circuit diagrams and check the battery power supplies to the Engine Control Module, etc. Repair/renew as necessary. Refer to the relevant workshop manual section
P0563-17	System Voltage High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ System voltage above threshold</li> <li>▪ Battery voltage greater than maximum threshold</li> </ul>	Check the battery connections and condition and charge as necessary. Check the battery power supplies to the Engine Control Module, etc. Repair/renew as necessary

P0565-00	Cruise Control ON Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control (ON) switch signal circuit short circuit to power</li> <li>▪ Speed control resume switch stuck/jammed</li> <li>▪ Speed control resume switch failure</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P0566-00	Cruise Control OFF Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control (CANCEL) switch signal circuit short circuit to power</li> <li>▪ Speed control cancel switch stuck/jammed</li> <li>▪ Speed control cancel switch failure</li> </ul>	Check the operation of the cancel switch. Refer to the electrical guides and check the circuit. Repair/renew as necessary. Refer to the relevant workshop manual section
P0567-00	Cruise Control RESUME Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control (RESUME) switch signal circuit short circuit to power</li> <li>▪ Speed control resume switch stuck/jammed</li> <li>▪ Speed control resume switch failure</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical guides. Repair/renew as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P0569-00	Cruise Control COAST Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control (-) switch signal circuit short circuit to power</li> <li>▪ Speed control - switch stuck/jammed</li> <li>▪ Speed control - switch failure</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical guides. Repair/renew as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P056A-00	Cruise Control INCREASE DISTANCE Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control switch 3 stuck closed (HEADDOWN)</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P056B-00	Cruise Control DECREASE DISTANCE Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control switch 4 stuck closed (HEADUP)</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0570-00	Cruise Control ACCEL Signal - no sub type information	<ul style="list-style-type: none"> <li>▪ Speed control + switch signal circuit short circuit to power</li> <li>▪ Speed control + switch stuck/jammed</li> <li>▪ Speed control + switch failure</li> </ul>	Check the switch operation. Check the switch circuits. Refer to the electrical guides. Repair/renew as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation

P0571-62	Brake Switch A Circuit - signal compare failure	<ul style="list-style-type: none"> <li>▪ Brake switch A circuit signal compare fault</li> <li>▪ Brake lamp switch circuit fault</li> </ul>	Check the brake switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P0574-52	Cruise Control System - Vehicle speed too high - not activated	<ul style="list-style-type: none"> <li>▪ Not activated</li> </ul>	Check for Anti-lock Braking System DTCs. Refer to the relevant workshop manual section. Configure the system using the manufacturers approved diagnostic system
P0575-52	Cruise Control Input Circuit - not activated	<ul style="list-style-type: none"> <li>▪ Not activated</li> </ul>	Check for Anti-lock Braking System DTCs. Refer to the relevant workshop manual section. Configure the system using the manufacturers approved diagnostic system
P0576-52	Cruise Control Input Circuit Low - not activated	<ul style="list-style-type: none"> <li>▪ Not activated</li> </ul>	Check for Anti-lock Braking System DTCs. Refer to the relevant workshop manual section. Configure the system using the manufacturers approved diagnostic system
P0577-52	Cruise Control Input Circuit High - not activated	<ul style="list-style-type: none"> <li>▪ Not activated</li> </ul>	Check for Anti-lock Braking System DTCs. Refer to the relevant workshop manual section. Configure the system using the manufacturers approved diagnostic system
P0578-1C	Cruise Control Multi-Function Input A Circuit Stuck - circuit voltage out of range	<ul style="list-style-type: none"> <li>▪ Speed control multi-function input A circuit stuck - circuit voltage out of range</li> <li>▪ Switch circuit high resistance</li> <li>▪ Switch fault</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P0578-81	Cruise Control Multi-Function Input A Circuit Stuck - invalid serial data received	<ul style="list-style-type: none"> <li>▪ Invalid serial data received</li> <li>▪ CAN signal voltage out of range</li> </ul>	Refer to the electrical circuit diagrams and check the speed control circuit between the engine control module and switch. Check the CAN circuits. Complete a CAN integrity test using the manufacturers approved diagnostic system
P0579-29	Cruise Control Multi-Function Input A Circuit Range /Performance - signal invalid	<ul style="list-style-type: none"> <li>▪ Speed control multi-function input A circuit range/performance - signal invalid</li> <li>▪ Switch circuit short circuit to ground</li> <li>▪ Switch circuit short circuit to power</li> <li>▪ Switch fault</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P0579-1C	Cruise Control Multi-Function	<ul style="list-style-type: none"> <li>▪ Speed control multi-function input A circuit</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Clear the

	Input A Circuit Stuck - circuit voltage out of range	<p>stuck - circuit voltage out of range</p> <ul style="list-style-type: none"> <li>▪ Switch circuit high resistance</li> <li>▪ Switch fault</li> </ul>	DTCs and test for normal operation
P0604-48	Internal Control Module Random Access Memory (RAM) Error - supervision software failure	<ul style="list-style-type: none"> <li>▪ Engine Control Module supervision software fault</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0605-48	Internal Control Module Read Only Memory (ROM) Error - supervision software failure	<ul style="list-style-type: none"> <li>▪ Engine Control Module supervision software fault</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0606-49	Control Module Processor - Internal electronic failure	<ul style="list-style-type: none"> <li>▪ Engine Control Module processor controller test /processor - internal electronic failure</li> </ul>	Clear DTC and retest. If the problem persists, renew the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0607-68	Control Module Performance - event information	<ul style="list-style-type: none"> <li>▪ Engine Control Module (ECM) performance - event information</li> <li>▪ Engine Control Module circuits short circuit to ground</li> <li>▪ Engine Control Module circuits short circuit to power</li> <li>▪ Engine Control Module circuits high resistance</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P060A-48	Internal Control Module Monitoring Processor Performance - supervision software failure	<ul style="list-style-type: none"> <li>▪ Engine Control Module (ECM) monitoring processor performance - supervision software fault</li> <li>▪ Engine Control Module circuits short circuit to ground</li> <li>▪ Engine Control Module circuits short circuit to power</li> <li>▪ Engine Control Module circuits high resistance</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect

P060B-48	Internal Control Module A/D Processing Performance - supervision software failure	<ul style="list-style-type: none"> <li>▪ Engine Control Module A/D processing performance - supervision software fault</li> <li>▪ Engine Control Module circuits short circuit to ground, power or high resistance</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P060D-27	Internal Control Module Accelerator Pedal Position Performance - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Signal rate of change above threshold</li> </ul>	Check and repair/renew other DTCs first. If this code still sets, contact the technical help desk
P060D-46	Internal Control Module Accelerator Pedal Position Performance - calibration / parameter memory failure	<ul style="list-style-type: none"> <li>▪ Internal control module accelerator pedal position performance - calibration/parameter memory fault</li> <li>▪ Pedal value not plausible</li> <li>▪ Engine Control Module circuits short circuit to ground, power or high resistance</li> </ul>	Check and repair/renew other DTCs first. If this code still sets, contact the technical help desk
P0610-00	Control Module Vehicle Options Error - no sub type information	<ul style="list-style-type: none"> <li>▪ Car Configuration File (CCF) settings mismatch</li> </ul>	Configure the module using the approved diagnostic system
P0617-12	Starter - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Starter relay drive circuit short circuit to power</li> <li>▪ Starter relay fault</li> </ul>	Check the starter circuits. Refer to the electrical circuit diagrams. Activate the relay and listen for an audible 'click'. Repair/renew as necessary. Clear the DTCs and test for normal operation
P061A-46	Internal Control Module Torque Performance - calibration / parameter memory failure	<ul style="list-style-type: none"> <li>▪ Calibration/parameter memory fault</li> <li>▪ Torque not plausible</li> <li>▪ Monitoring of driveability functions</li> </ul>	Retrieve the flight recorder data using the approved diagnostic system and the customer statement relating to the concern. Check and rectify other DTCs first. If this code still sets, contact the technical help desk
P061C-48	Internal Control Module Engine RPM Performance - supervision software failure	<ul style="list-style-type: none"> <li>▪ Supervision software fault</li> <li>▪ Processor monitoring speed not plausible</li> </ul>	Retrieve the flight recorder data using the approved diagnostic system and the customer statement relating to the concern. Check and rectify other DTCs first. If this code still sets, contact the technical help desk
P061E-46	Internal Control Module	<ul style="list-style-type: none"> <li>▪ Calibration/parameter memory fault</li> </ul>	Retrieve the flight recorder data using the approved diagnostic system and the

	Brake Signal Performance - calibration / parameter memory failure	<ul style="list-style-type: none"> <li>▪ Cruise intervention not plausible</li> </ul>	customer statement relating to the concern. Check and rectify other DTCs first. If this code still sets, contact the technical help desk
P0621-01	Generator Lamp Terminal Circuit - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Generator brushes low</li> </ul>	Check the charging voltage. Check the charging system circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new generator. Clear the DTCs and test for normal operation
P0621-16	Generator Lamp Terminal Circuit - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Generator system voltage low</li> </ul>	Check the charging voltage. Check the charging system circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new generator. Clear the DTCs and test for normal operation
P0622-29	Generator Lamp Terminal Circuit - signal invalid	<ul style="list-style-type: none"> <li>▪ Charging circuit fault</li> <li>▪ Generator fault</li> </ul>	Check the charging voltage. Check the charging system circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new generator. Clear the DTCs and test for normal operation
P0625-11	Generator Field Terminal Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Generator field terminal (altmon) circuit short circuit to ground</li> <li>▪ Generator control (altcom) circuit short circuit to ground</li> <li>▪ Generator control (altcom) circuit high resistance</li> <li>▪ Generator fault</li> </ul>	Check the charging voltage. Check the charging system circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new generator. Clear the DTCs and test for normal operation
P0626-15	Generator Field Terminal Circuit High - circuit short to battery or open	<ul style="list-style-type: none"> <li>▪ Generator field terminal (altmon) circuit short circuit to power</li> <li>▪ Generator field terminal (altmon) circuit high resistance</li> <li>▪ Generator fault</li> </ul>	Check the charging voltage. Check the charging system circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new generator. Clear the DTCs and test for normal operation
P0627-12	Fuel Pump A Control Circuit /Open - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Fuel lift pump relay control circuit - short to power</li> <li>▪ Fuel lift pump relay failure</li> </ul>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check fuel lift pump relay control circuit for short to power. Check and install a new fuel lift pump relay as required
P0628-11	Fuel Pump A Control Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Fuel lift pump relay control circuit - short to ground</li> </ul>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check fuel lift pump relay control circuit for short to

		<ul style="list-style-type: none"> <li>▪ Fuel lift pump relay failure</li> </ul>	ground. Check and install a new fuel lift pump relay as required
P0629-13	Fuel Pump A Control Circuit High - circuit open	<ul style="list-style-type: none"> <li>▪ Fuel lift pump relay control circuit - open circuit</li> <li>▪ Fuel lift pump relay failure</li> </ul>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check fuel lift pump relay control circuit for open circuit. Check and install a new fuel lift pump relay as required
P062B-00	Internal Control Module Fuel Injector Control Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel cut not plausible</li> <li>▪ Monitoring of post injection</li> <li>▪ Monitoring of fuel mass adaption</li> <li>▪ Monitoring of accelerator pedal position</li> </ul>	Check and repair/renew other DTCs first. If this code still sets, contact the technical help desk
P062B-46	Internal Control Module Fuel Injector Control Performance - Signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Fuel cut not plausible</li> <li>▪ Monitoring of post injection</li> <li>▪ Monitoring of fuel mass adaption</li> <li>▪ Monitoring of accelerator pedal position</li> </ul>	Check and repair/renew other DTCs first. If this code still sets, contact the technical help desk
P062D-01	Fuel Injector Driver Circuit Performance Bank 1 - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuits short circuit to ground</li> <li>▪ Fuel injector circuits short circuit to power</li> <li>▪ Fuel injector circuits high resistance</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition switch off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections at fuel injectors 1, 2, 3 and 4. Disconnect the injectors and measure the resistance and capacitance of each injector. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68°F). If one or more injectors are outside this range, install new injectors as necessary. Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Clear the DTCs and test for normal operation
P062E-01	Fuel Injector Driver Circuit Performance Bank 2 - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Fuel injector circuits short circuit to ground</li> <li>▪ Fuel injector circuits short circuit to power</li> <li>▪ Fuel injector circuits high resistance</li> <li>▪ Fuel injector fault</li> </ul>	During the following, clear DTCs and recheck after each step. Turn the ignition switch off and wait 20 seconds before turning the ignition back on to recheck DTCs. Check the connections at fuel injectors 5, 6, 7 and 8. Disconnect the injectors and measure the resistance and capacitance of each injector. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68°F). If one or

			more injectors are outside this range, install new injectors as necessary. Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Clear the DTCs and test for normal operation
P0630-00	VIN Not Programmed or Incompatible - ECM/PCM - no sub type information	<ul style="list-style-type: none"> <li>▪ VIN not programmed</li> <li>▪ VIN incompatible with vehicle specification</li> </ul>	Configure the module using the approved diagnostic system
P0634-68	PCM / ECM / TCM Internal Temperature A Too High - event information	<ul style="list-style-type: none"> <li>▪ Engine Control Module internal temperature too high</li> <li>▪ E-Box cooling fan obstruction</li> <li>▪ E-Box cooling fan operation</li> <li>▪ Engine Control Module internal sensor error</li> </ul>	Consider atmospheric and customer driving conditions before carrying out any other action. Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the Engine Control Module temperature. If the temperature value is greater than 130°C (266°F) suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0642-16	Sensor Reference Voltage A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage below threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Check the Engine Control Module power supply and relay circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0643-17	Sensor Reference Voltage A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage above threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Check the Engine Control Module power supply and relay circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0652-16	Sensor Refer - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage below threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Check the Engine Control Module power supply and relay circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0653-17	Sensor Reference Voltage B Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage above threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Check the Engine Control Module power supply and relay circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTC. Cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect

P065B-11	Generator Control Circuit Range /Performance - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Generator control circuit (altcom) short circuit to ground</li> <li>▪ Generator fault</li> </ul>	Check the generator and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P065B-12	Generator Control Circuit Range /Performance - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Generator control circuit (altcom) short circuit to power</li> <li>▪ Generator fault</li> </ul>	Check the generator and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0667-27	PCM / ECM / TCM Internal Temperature Sensor A Range /Performance - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module temperature sensor signal rate of change above threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the Engine Control Module internal temperature. Start the engine and allow to idle for five minutes before rechecking the temperature. If the temperature has increased by more than 10°C per 100 ms suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0668-16	PCM / ECM / TCM Internal Temperature Sensor A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage below threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Clear the DTC, cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the Engine Control Module internal temperature. If the value is less than -40°C (-40°F), suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0669-17	PCM / ECM / TCM Internal Temperature Sensor A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine Control Module circuit voltage above threshold</li> <li>▪ Engine Control Module fault</li> </ul>	Clear the DTC, cycle the ignition, allow sufficient time for the module to power down and retest. If the DTC resets, check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the Engine Control Module internal temperature. If the value is greater than 130°C (266°F), suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0670-13	Glow Plug Control Module Control Circuit / Open - circuit open	<ul style="list-style-type: none"> <li>▪ Glow plug relay control circuit open circuit</li> <li>▪ Glow plug relay failure</li> </ul>	Check the glow plug relay circuits. Refer to the electrical circuit diagrams. Check the relay operation. Activate the relay and listen for an audible 'click'. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0693-11	Fan 2 Control Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Viscous fan control circuit short circuit to ground</li> <li>▪ Viscous fan solenoid fault</li> </ul>	Check the viscous fan solenoid and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0693-	Fan 2 Control		Check the viscous fan solenoid and

13	Circuit Low - circuit open	<ul style="list-style-type: none"> <li>▪ Viscous fan control circuit open circuit</li> <li>▪ Viscous fan solenoid fault</li> </ul>	circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0694-12	Fan 2 C - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Viscous fan control circuit short circuit to power</li> <li>▪ Viscous fan solenoid fault</li> </ul>	Check the viscous fan solenoid and circuits. Refer to the electrical circuit diagrams. Repair/renew as necessary. Clear the DTCs and test for normal operation
P0831-00	Clutch Pedal Switch A Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams and repair /renew as necessary. Clear the DTCs and test for normal operation
P0832-00	Clutch Pedal Switch A Circuit High - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams and repair /renew as necessary. Clear the DTCs and test for normal operation
P0850-62	Park/Neutral Switch Input Circuit - signal compare failure	<ul style="list-style-type: none"> <li>▪ Park/Neutral switch plausibility check - signal compare fault</li> <li>▪ Controller area network (CAN) circuit fault</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Check for DTCs indicating a CAN fault. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0852-12	Park / Neutral Switch Input Circuit High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Park/Neutral switch circuit short circuit to power</li> </ul>	Check the switch and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P0A09-16	DC/DC Converter Status Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage below threshold</li> </ul>	Clear the DTCs, turn the ignition off and allow sufficient time for the module to power down. Check for DTCs. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P0A10-17	DC/DC Converter Status Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage above threshold</li> </ul>	Clear the DTCs, turn the ignition off and allow sufficient time for the module to power down. Check for DTCs. If the DTC resets, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P115A-68	Low Fuel level - Forced Limited Power - event information	<ul style="list-style-type: none"> <li>▪ Low fuel level - forced limited power - event information (anti air suction intervention occurred)</li> <li>▪ Low level fuel condition</li> <li>▪ Fuel level sensor circuit short circuit to ground</li> </ul>	Check that there is sufficient fuel in the tank. Check the fuel level sensor and circuits. Refer to the electrical circuit diagrams. Run pinpoint test, clear DTC and retest system

		<ul style="list-style-type: none"> <li>▪ Fuel level sensor circuit high resistance</li> <li>▪ Fuel level sensor fault</li> </ul>	
P115B-68	Low fuel Level - Forced Engine Shutdown - event information	<ul style="list-style-type: none"> <li>▪ Low fuel level - forced engine shutdown - event information (anti air suction intervention occurred)</li> <li>▪ Low level fuel condition</li> <li>▪ Fuel level sensor circuit short circuit to ground</li> <li>▪ Fuel level sensor circuit high resistance</li> <li>▪ Fuel level sensor fault</li> </ul>	Check that there is sufficient fuel in the tank. Check the fuel level sensor and circuits. Refer to the electrical circuit diagrams. Run pinpoint test, clear DTC and retest system
P115F-11	Electronic Control Module Cooling Fan Circuit - circuit short to ground	<ul style="list-style-type: none"> <li>▪ E-box fan circuits short circuit to ground</li> <li>▪ E-box fan fault</li> </ul>	Check the E-box fan and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new fan. Clear the DTCs and test for normal operation
P115F-12	Electronic Control Module Cooling Fan Circuit - circuit short to battery	<ul style="list-style-type: none"> <li>▪ E-box fan circuits short circuit to power</li> <li>▪ E-box fan fault</li> </ul>	Check the E-box fan and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new fan. Clear the DTCs and test for normal operation
P115F-13	Electronic Control Module Cooling Fan Circuit - circuit open	<ul style="list-style-type: none"> <li>▪ E-box fan circuits high resistance</li> <li>▪ E-box fan fault</li> </ul>	Check the E-box fan and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new fan. Clear the DTCs and test for normal operation
P116F-2F	Fuel Volume Regulator Control Exceeded Control Limits - signal erratic	<ul style="list-style-type: none"> <li>▪ Fuel volume control valve circuit fault - signal erratic</li> <li>▪ Fuel volume control valve fault</li> </ul>	Check the fuel volume control valve and circuits. Refer to the electrical circuit diagrams. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation
P117D-00	Fuel Volume Regulator Control Exceeded Maximum Control Limit - no sub type information	<ul style="list-style-type: none"> <li>▪ Fuel volume control valve circuit fault</li> <li>▪ Fuel volume control valve fault</li> </ul>	Check the fuel volume control valve and circuits. Refer to the electrical circuit diagrams. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately). Clear the DTCs and test for normal operation
P117E-00	Fuel Volume Regulator Control Exceeded Minimum	<ul style="list-style-type: none"> <li>▪ Fuel volume control valve circuit fault</li> <li>▪ Fuel volume control valve fault</li> </ul>	Check the fuel volume control valve and circuits. Refer to the electrical circuit diagrams. Check the resistance of the valve and install a new high pressure fuel pump if the resistance is not between 1.5 and 15 ohms (the fuel volume control valve cannot be serviced separately).

	Control Limit - no sub type information		Clear the DTCs and test for normal operation
P123A-21	BARO - Turbocharger /Supercharger Boost Sensor A Correlation - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Barometric (Ambient Pressure [AMP] sensor) versus turbocharger boost sensor A (Manifold Absolute Pressure and Temperature [MAPT] sensor) correlation - signal amplitude less than minimum <ul style="list-style-type: none"> <li>▪ Manifold absolute pressure too high versus ambient pressure before engine start, at idle or after engine stop</li> </ul> </li> <li>▪ MAPT sensor circuit fault</li> <li>▪ MAPT sensor fault</li> <li>▪ Engine Control Module (ECM) fault</li> </ul>	Recover the freeze-frame data to determine when the code was set. Check the MAPT sensor and circuits. Refer to the electrical circuit diagrams. Make sure the coolant temperature is above 0°C (32°F) and with the ignition on, engine not running, check the manifold absolute pressure using a data logger function. If the values are significantly different from ambient pressure, install a new MAPT sensor. Clear the DTCs and test for normal operation. Start the engine and allow to idle. Check the manifold absolute pressure and compare with the values at ignition on, engine not running. The pressure should have increased to between 52.7 Kpa and 120 Kpa (7.64 and 17.40 lbs/in <sup>2</sup> ). If this is not the case, install a new MAPT sensor. Refer to the relevant section of the workshop manual. If the problem persists, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P123A-22	BARO - Turbocharger /Supercharger Boost Sensor A Correlation - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Barometric (Ambient Pressure [AMP] sensor) versus turbocharger boost sensor A (Manifold Absolute Pressure and Temperature [MAPT] sensor) correlation - signal amplitude greater than maximum <ul style="list-style-type: none"> <li>▪ Manifold absolute pressure too high versus ambient pressure before engine start, at idle or after engine stop</li> </ul> </li> <li>▪ MAPT sensor circuit fault</li> <li>▪ MAPT sensor fault</li> <li>▪ Engine Control Module (ECM) fault</li> </ul>	Recover the freeze-frame data to determine when the code was set. Check the MAPT sensor and circuits. Refer to the electrical circuit diagrams. Make sure the coolant temperature is above 0°C (32°F) and with the ignition on, engine not running, check the manifold absolute pressure using a data logger function. If the values are significantly different from ambient pressure, install a new MAPT sensor. Clear the DTCs and test for normal operation. Start the engine and allow to idle. Check the manifold absolute pressure and compare with the values at ignition on, engine not running. The pressure should have increased to between 52.7 Kpa and 120 Kpa (7.64 and 17.40 lbs/in <sup>2</sup> ). If this is not the case, install a new MAPT sensor. Refer to the relevant section of the workshop manual. If the problem persists, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P1259-00	Immobilizer to PCM Signal Error - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the circuits between the modules. Refer to the electrical circuit diagrams. Check for network DTCs. Repair/renew as necessary. Clear the DTCs and test for normal operation. If the DTC resets, contact the Technical Help Desk for further information
P1259-87	Immobilizer to PCM Signal Error - missing	<ul style="list-style-type: none"> <li>▪ Engine Control Module ID timeout occurred</li> </ul>	Check the circuits between the modules. Refer to the electrical circuit diagrams. Check for network DTCs. Repair/renew as

	message		necessary. Clear the DTCs and test for normal operation. If the DTC resets, contact the Technical Help Desk for further information
P1286-27	Fuel pulse Width Range But Lower Than expected - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Fuel pulse width signal rate of change above threshold</li> </ul>	Check the fuel circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P132A-00	Turbocharger /Supercharger Boost Control A Electrical - no sub type information	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control A electrical</li> <li>▪ Turbocharger circuit fault</li> <li>▪ Turbocharger fault</li> <li>▪ Engine Control Module (ECM) fault</li> </ul>	Check the turbocharger and circuits. Refer to the electrical circuit diagrams. Turn the ignition on and using a data logger function, record the turbocharger actuator angles. Command the turbocharger actuator to 5% pulse width modulated (PWM), then 95% pulse width modulated (PWM) and recheck the recorded angles. The value at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95% pulse width modulated (PWM), 80 - 95%. If the angles are within these ranges, clear the codes and retest. If the angles are outside the range, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P132A-19	Turbocharger /Supercharger Boost Control A Electrical - circuit current above threshold	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control A electrical - circuit current above threshold</li> <li>▪ Turbocharger circuit fault</li> <li>▪ Turbocharger fault</li> <li>▪ Engine Control Module (ECM) fault</li> </ul>	Check the turbocharger and circuits. Refer to the electrical circuit diagrams. Turn the ignition on and using a data logger function, record the turbocharger actuator angles. Command the turbocharger actuator to 5% pulse width modulated (PWM), then 95% pulse width modulated (PWM) and recheck the recorded angles. The value at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95% pulse width modulated (PWM), 80 - 95%. If the angles are within these ranges, clear the codes and retest. If the angles are outside the range, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P132B-00	Turbocharger /Supercharger Boost Control A Electrical - no sub type information	<ul style="list-style-type: none"> <li>▪ VGT circuit short circuit to ground</li> <li>▪ VGT circuit short circuit to power</li> <li>▪ VGT circuit open circuit</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Refer to the electrical circuit diagrams and check - <b>E-VGT Vane Actuator Bank A+/- (H-bridge)</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
P132B-21	Turbocharger /Supercharger	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control A performance</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> </div>

	<p>Boost Control A Performance</p> <ul style="list-style-type: none"> <li>- signal amplitude &lt; minimum</li> </ul>	<ul style="list-style-type: none"> <li>- signal amplitude less than minimum</li> <li>▪ Turbocharger connections: water ingress, poor contacts</li> <li>▪ Turbocharger actuator circuits short circuit to ground</li> <li>▪ Turbocharger actuator circuits short circuit to power</li> <li>▪ Turbocharger actuator circuits high resistance</li> <li>▪ Turbocharger actuator fault <ul style="list-style-type: none"> <li>▪ Turbocharger actuator control deviation below minimum threshold - Bank 1</li> </ul> </li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the turbocharger and circuits. Refer to the electrical circuit diagrams and check - <b>E-VGT Vane Actuator Bank A+/- (H-bridge)</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
<p>P132B-22</p>	<p>Turbocharger /Supercharger Boost Control A Performance</p> <ul style="list-style-type: none"> <li>- signal amplitude &gt; maximum</li> </ul>	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control A performance - signal amplitude greater than maximum</li> <li>▪ Turbocharger connections: water ingress, poor contacts</li> <li>▪ Turbocharger actuator circuits short circuit to ground</li> <li>▪ Turbocharger actuator circuits short circuit to power</li> <li>▪ Turbocharger actuator circuits high resistance</li> <li>▪ Turbocharger actuator signal amplitude greater than maximum</li> <li>▪ Turbocharger actuator fault <ul style="list-style-type: none"> <li>▪ Turbocharger actuator control deviation above maximum threshold - Bank 1</li> </ul> </li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the turbocharger and circuits. Refer to the electrical circuit diagrams and check - <b>E-VGT Vane Actuator Bank A+/- (H-bridge)</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
<p>P1335-00</p>	<p>EGR Position Sensor Minimum /Maximum Stop Performance - no sub type information</p>	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to power</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div>

		<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit high resistance</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> <li>▪ Engine control module internal fault</li> </ul>	<p>Check the EGR valve and circuits. If the DTC is present on its own then check the turbo, if it's a common fault, then the fault is an EGR wiring fault, as wiring is common. Refer to the electrical circuit diagrams and check - <b>EGR A</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
P1335-21	EGR Position Sensor Minimum /Maximum Stop Performance - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) position sensor - signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve adaption bottom limit check</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> <li>▪ Engine control module internal fault</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the EGR valve and circuits. Refer to the electrical circuit diagrams and check - <b>EGR A</b> - circuit for short circuit to ground</p>
P1335-22	EGR Position Sensor Minimum /Maximum Stop Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Right-hand Exhaust Gas Recirculation (EGR) position sensor minimum/maximum stop performance - signal amplitude greater than maximum</li> <li>▪ EGR valve circuit short circuit to power</li> <li>▪ EGR valve fault</li> </ul>	<p>Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the EGR valve angles and command the valve to 0% pulse width modulated (PWM). Recheck the angle. The value should be 0 - 20%. If the value is outside this range, install a new valve. Clear the DTCs and test for normal operation</p>
P1336-00	Crankshaft /Camshaft Sensor Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Crankshaft position sensor circuit high resistance</li> <li>▪ Crankshaft position sensor circuit short circuit to ground</li> <li>▪ Crankshaft position sensor circuit short circuit to power</li> <li>▪ Camshaft position sensor circuit high resistance</li> <li>▪ Camshaft position sensor circuit short circuit to ground</li> </ul>	<p>Check the camshaft and crankshaft position sensors and circuits. Refer to the electrical guides. If no fault is found in the circuits, install new sensors as necessary. Clear the DTCs and test for normal operation</p>

		<ul style="list-style-type: none"> <li>▪ Camshaft position sensor circuit short circuit to power</li> <li>▪ Crankshaft position sensor failure</li> <li>▪ Camshaft position sensor failure</li> </ul>	
P1336-76	Crankshaft /Camshaft Sensor Range /Performance	<ul style="list-style-type: none"> <li>▪ Crankshaft position sensor incorrectly installed/damaged</li> <li>▪ Camshaft position sensor incorrectly installed/damaged</li> <li>▪ Crankshaft position sensor fault</li> <li>▪ Camshaft position sensor fault</li> </ul>	Check the camshaft position and crankshaft position sensors and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install new sensors as necessary. Clear the DTCs and test for normal operation
P1336-78	Crankshaft /Camshaft Sensor Range /Performance - alignment or adjustment incorrect	<ul style="list-style-type: none"> <li>▪ Camshaft - one tooth off</li> </ul>	Check the camshaft position and crankshaft position sensors and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install new sensors as necessary. Clear the DTCs and test for normal operation.
P138E-21	Turbocharger Boost Control Position Sensor A Minimum /Maximum Stop Performance - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Signal amplitude less than minimum</li> <li>▪ Right-hand turbocharger boost control position sensor A adaption diagnosis below bottom limit</li> </ul>	Check the turbocharger and circuits. Refer to the electrical circuit diagrams. Using a data logger function, record the turbocharger actuator angles. Command the turbocharger actuator to 5% pulse width modulated (PWM), then 95% pulse width modulated (PWM) and recheck the recorded angles. The value at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95% pulse width modulated (PWM), 80 - 95%. If the angles are outside these ranges, install a new turbocharger. Clear the DTCs and test for normal operation
P138E-22	Turbocharger Boost Control Position Sensor A Minimum /Maximum Stop Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Signal amplitude greater than maximum</li> <li>▪ Right-hand turbocharger boost control position sensor A adaption diagnosis above top limit</li> </ul>	Check the turbocharger and circuits. Refer to the electrical circuit diagrams. Using a data logger function, record the turbocharger actuator angles. Command the turbocharger actuator to 5% pulse width modulated (PWM), then 95% pulse width modulated (PWM) and recheck the recorded angles. The value at 5% pulse width modulated (PWM) should be 0 - 20%, and at 95% pulse width modulated (PWM), 80 - 95%. If the angles are outside these ranges, install a new turbocharger. Clear the DTCs and test for normal operation
P140A-00	Exhaust Gas Recirculation Sensor C Circuit Low -	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit (left-hand bank) high resistance</li> </ul>	 <b>NOTE:</b> 

	no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> <li>▪ Exhaust gas recirculation (EGR) valve potentiometer signal less than minimum (sensor B)</li> </ul>	<p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> <p>Check the exhaust gas recirculation valve and circuits. If the DTC is present on its own then check the turbo, if it's a common fault, then the fault is an EGR wiring fault, as wiring is common. Refer to the electrical circuit diagrams and check - <b>EGR Valve Position Sensor Bank B - Signal</b> - circuit for short circuit to ground, high resistance</p>
P140A-21	Exhaust Gas Recirculation Sensor C Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Signal amplitude less than minimum</li> <li>▪ Exhaust gas recirculation valve Potentiometer signal less than minimum (sensor B)</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Refer to the electrical circuit diagrams and check - <b>EGR Valve Position Sensor Bank B - Signal</b> - circuit for short circuit to ground</p>
P140B-21	Exhaust Gas Recirculation Sensor C Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Signal amplitude less than minimum</li> <li>▪ Exhaust Gas Recirculation (EGR) valve failure</li> </ul>	<p>Check the EGR valve and circuits. Refer to the electrical guides. Using a datalogger function, check the EGR valve angle with the ignition on and the engine off. Command the valve angle to 0% pulse width modulated (PWM), then to 100% pulse width modulated (PWM) and recheck the angles. The angles should range between 0 - 20% and 80 - 95%. If this is not the case, install a new valve. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation</p>
P140B-22	Exhaust Gas Recirculation Sensor C Circuit High - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Signal amplitude greater than maximum</li> <li>▪ Exhaust Gas Recirculation (EGR) valve failure</li> </ul>	<p>Check the EGR valve and circuits. Refer to the electrical guides. Using a datalogger function, check the EGR valve angle with the ignition on and the engine off. Command the valve angle to 0% pulse width modulated (PWM), then to 100% pulse width modulated (PWM) and recheck the angles. The angles should range between 0 - 20% and 80 - 95%. If this is not the case, install a new valve. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation</p>
P140D-00	Exhaust Gas Recirculation Control Circuit B Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) control circuit range /performance (left-hand bank)</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b></p> </div>

		<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to power</li> <li>▪ Exhaust gas recirculation (EGR) valve high resistance</li> <li>▪ Exhaust gas recirculation (EGR) valve fault</li> <li>▪ Exhaust gas recirculation (EGR) valve stuck closed, blocked</li> <li>▪ Check Intake air temperature (IAT) sensor fault</li> <li>▪ Check Mass air flow (MAF) sensor fault</li> <li>▪ Check Fan-E-Box</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the IAT, Fan-E-Box and MAF sensors and circuits. Refer to the electrical circuit diagrams and check - <b>EGR B</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
P140E-00	Exhaust gas recirculation Position Sensor C Minimum /Maximum Stop Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust gas recirculation (EGR) valve circuit (left-hand bank) high resistance</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to ground</li> <li>▪ Exhaust gas recirculation (EGR) valve circuit short circuit to power</li> <li>▪ Engine control module internal fault</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; margin-bottom: 10px;">  <b>NOTE:</b> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the Exhaust gas recirculation (EGR) valve and circuits. Refer to the electrical circuit diagrams and check - <b>EGR C</b> - circuit for short circuit to ground, short circuit to power, high resistance</p>
P140E-21	EGR Position Sensor C Minimum /Maximum Stop Performance - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Signal amplitude less than minimum</li> <li>▪ Exhaust Gas Recirculation (EGR) valve adaption 1 bottom limit check</li> <li>▪ Engine control module internal fault</li> </ul>	<div style="background-color: #e0f2f1; padding: 5px; margin-bottom: 10px;">  <b>NOTE:</b> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Using the manufacturer approved diagnostic system perform the <b>Turbo, EGR and air path dynamic test</b> routine</p> </div> <p>Check the Exhaust gas recirculation (EGR) valve and circuits. Refer to the electrical circuit diagrams and check - <b>EGR C</b> - circuit for short circuit to ground</p>
P140E-22	EGR Position Sensor C	<ul style="list-style-type: none"> <li>▪ Signal amplitude greater than maximum</li> </ul>	<p>Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Using a</p>

	Minimum /Maximum Stop Performance - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) valve adaption 1 top limit check</li> </ul>	data logger function, check the EGR valve angles and command the valve to 0% pulse width modulated (PWM). Recheck the angle. The value should be between 0 - 20%. If the value is outside this range, install a new valve. Clear the DTCs and test for normal operation
P141A-27	Exhaust Gas Recirculation Sensor A Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Signal rate of change above threshold</li> <li>▪ Exhaust Gas Recirculation (EGR) valve position sensor circuit intermittent high resistance</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Using a data logger function, check the EGR valve position. After a further 5 seconds, recheck the position. If the value has increased by more than 80% per 10 ms, recheck the circuits. If no fault is found in the circuits, install a new EGR valve. Clear the DTCs and test for normal operation
P141B-1C	Exhaust Gas Recirculation Sensor B Circuit Intermittent /Erratic - circuit voltage out of range	<ul style="list-style-type: none"> <li>▪ Circuit voltage out of range</li> <li>▪ Exhaust Gas Recirculation (EGR) throttle position sensor circuit intermittent high resistance</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Using a data logger function, check the EGR valve position. After a further 5 seconds, recheck the position. If the value has increased by more than 80% per 10 ms, recheck the circuits. If no fault is found in the circuits, install a new EGR valve. Clear the DTCs and test for normal operation
P141C-27	Exhaust Gas Recirculation Sensor C Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ signal rate of change above threshold</li> <li>▪ Exhaust Gas Recirculation (EGR) valve position sensor circuit intermittent high resistance</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> </ul>	Check the EGR valve and circuits. Refer to the electrical circuit diagrams. Start the engine and allow to warm up. Using a data logger function, check the EGR valve position. After a further 5 seconds, recheck the position. If the value has increased by more than 80% per 10 ms, recheck the circuits. If no fault is found in the circuits, install a new EGR valve. Clear the DTCs and test for normal operation
P150A-01	Cylinder 1 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P150B-01	Cylinder 2 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68°

		<ul style="list-style-type: none"> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	F). If the values are outside this range, install a new injector as necessary
P150C-01	Cylinder 3 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P150F-68	Electronic Control Module Cooling Fan Performance - event information	<ul style="list-style-type: none"> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P151B-00	Idle Speed Control - RPM Lower Than Expected - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil level</li> <li>▪ Intake air restriction</li> <li>▪ Accessory drive overload (defective /seized component)</li> <li>▪ Engine compression</li> </ul>	Check the engine oil level and condition. Check the driven components (generator, air conditioning compressor, etc). Repair /renew as necessary. Check the engine compressions only once other options are ruled out. Repair/renew as necessary. Clear the DTCs and test for normal operation
P151C-00	Idle Speed Control - RPM Higher Than Expected - no sub type information	<ul style="list-style-type: none"> <li>▪ Intake air leak between mass air flow sensor and intake air shut off throttle</li> <li>▪ Intake air leak between intake air shut off throttle and engine</li> <li>▪ Engine crankcase breather leak</li> </ul>	Inspect the engine intake AND breather system, refer to the relevant workshop manual section
P1551-01	Cylinder 1 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector disconnected</li> <li>▪ Injector circuit high resistance, short circuit to ground, short circuit to power</li> <li>▪ Injector failure</li> </ul>	Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Refer to the relevant workshop manual section
P1552-01	Cylinder 2 Injector Circuit Range /Performance -	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector disconnected</li> </ul>	Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Refer to the relevant workshop manual section

	General Electrical Failure	<ul style="list-style-type: none"> <li>▪ Injector circuit high resistance, short circuit to ground, short circuit to power</li> <li>▪ Injector failure</li> </ul>	
P1553-01	Cylinder 3 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector disconnected</li> <li>▪ Injector circuit high resistance, short circuit to ground, short circuit to power</li> <li>▪ Injector failure</li> </ul>	Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Refer to the relevant workshop manual section
P1554-01	Cylinder 4 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P1555-01	Cylinder 5 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P1556-01	Cylinder 6 Injector Circuit Range /Performance - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electric failure</li> <li>▪ Injector circuit short circuit to ground</li> <li>▪ Injector circuit short circuit to power</li> <li>▪ Injector circuit high resistance</li> <li>▪ Injector fault</li> </ul>	Check the injector circuits. Refer to the electrical circuit diagrams. Rectify as necessary. Disconnect the injector and measure the resistance and capacitance of the component. Resistance should be 180 - 220 Kilohms, capacitance should be greater than 3 microfarad at 20°C (68° F). If the values are outside this range, install a new injector as necessary
P1572-62	Brake Pedal Switch Circuit - signal compare failure	<ul style="list-style-type: none"> <li>▪ Brake lamp switch /brake travel switch circuit fault - signal compare fault</li> </ul>	Check the brake lamp switch/brake travel switch and circuits. Refer to the electrical circuit diagrams. Clear the DTCs and test for normal operation
P1572-68	Brake Pedal Switch Circuit -		Check the brake lamp switch/brake travel switch and circuits. Refer to the electrical

	event information	<ul style="list-style-type: none"> <li>▪ Brake lamp switch /brake travel switch circuit fault</li> </ul>	circuit diagrams. Clear the DTCs and test for normal operation
P1593-00	Cruise Control Monitor Fault - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Refer to the electrical circuit diagrams and check the cruise control circuits. Repair/renew as necessary. Clear the DTCs and test for normal operation. If any DTCs reset, recheck the circuits
P1623-00	Immobilizer Code Word/ID Number Write failure- no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check for other DTCs and rectify those first
P167C-00	CAN Link PCM /PCM Circuit /Network - no sub type information	<ul style="list-style-type: none"> <li>▪ Controller Area Network (CAN) link to Engine Control Module (ECM) circuit network</li> <li>▪ Engine Control Module circuits short circuit to ground</li> <li>▪ Engine Control Module circuits short circuit to power</li> <li>▪ Engine Control Module circuits high resistance</li> <li>▪ Engine Control Module fault</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network. If no fault is found in the circuits, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P169F-00	Control Module - Unused Fault Code- no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Clear/ignore this DTC
P193A-68	Invalid Scan Tool Communication /Request - event information	<ul style="list-style-type: none"> <li>▪ Invalid scan tool communication request</li> </ul>	This is not a fault, but event information of the communication between the scan tool and Engine Control Module. Clear /ignore this DTC
P2008-13	Intake Manifold Runner Control Circuit / Open (Bank 1) - circuit open	<ul style="list-style-type: none"> <li>▪ Port de-activation solenoid circuit open</li> <li>▪ Port de-activation solenoid failure</li> </ul>	Check the port deactivation valve and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new valve. Clear the DTCs and test for normal operation
P2009-11	Intake Manifold Runner Control Circuit Low (Bank 1) - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Port de-activation solenoid circuit short circuit to ground</li> <li>▪ Port de-activation solenoid failure</li> </ul>	Check the port deactivation valve and circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new valve. Clear the DTCs and test for normal operation
P2010-	Intake Manifold		Check the port deactivation valve and

12	Runner Control Circuit High (Bank 1) - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Port deactivation control circuit short circuit to power</li> <li>▪ Port de-activation solenoid failure</li> </ul>	circuits. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new valve. Clear the DTCs and test for normal operation
P2105-02	Throttle Actuator Control System - Forced Engine Shutdown - General signal failure	<ul style="list-style-type: none"> <li>▪ General signal failure</li> </ul>	Check for associated DTCs and Repair /renew as necessary. If this DTC resets, contact the technical help desk
P2122-16	Throttle/Pedal Position Sensor /Switch D Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage below threshold - track 1</li> <li>▪ Accelerator pedal position (APP) sensor circuits short circuit to ground</li> <li>▪ APP sensor circuits short circuit to power</li> <li>▪ APP sensor fault</li> </ul>	Check the APP sensor circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the APP sensor track 1 value with the pedal in the rest position. If the value is not approximately 0%, install a new pedal. Clear the DTCs and test for normal operation
P2123-17	Throttle/Pedal Position Sensor /Switch D Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage above threshold - track 1</li> <li>▪ Accelerator pedal position (APP) sensor circuits short circuit to ground</li> <li>▪ APP sensor circuits short circuit to power</li> <li>▪ APP sensor fault</li> </ul>	Check the APP sensor circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the APP sensor track 1 value with the pedal in the wide open position. If the value is not approximately 99%, install a new pedal. Clear the DTCs and test for normal operation
P2127-16	Throttle/Pedal Position Sensor /Switch E Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage below threshold - track 2</li> <li>▪ Accelerator pedal position (APP) sensor circuits short circuit to ground</li> <li>▪ APP sensor circuits short circuit to power</li> <li>▪ APP sensor fault</li> </ul>	Check the APP sensor circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the APP sensor track 2 value with the pedal in the rest position. If the value is not approximately 0%, install a new pedal. Clear the DTCs and test for normal operation
P2128-17	Throttle/Pedal Position Sensor /Switch E Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage above threshold - track 2</li> <li>▪ Accelerator pedal position (APP) sensor circuits short circuit to ground</li> <li>▪ APP sensor circuits short circuit to power</li> </ul>	Check the APP sensor circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the APP sensor track 2 value with the pedal in the wide open position. If the value is not approximately 99%, install a new pedal. Clear the DTCs and test for normal operation

		<ul style="list-style-type: none"> <li>▪ APP sensor fault</li> </ul>	
P2138-62	Throttle/Pedal Position Sensor /Switch D / E Voltage Correlation) - signal compare failure	<ul style="list-style-type: none"> <li>▪ Signal compare fault (the value difference between channels is greater than it should be</li> <li>▪ Accelerator pedal position (APP) sensor circuits short circuit to ground</li> <li>▪ APP sensor circuits short circuit to power</li> <li>▪ APP sensor fault</li> </ul>	Check the APP sensor circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the APP sensor values for tracks 1 and 2 with the pedal in the idle position, and again in the wide open position. Both tracks should read approximately 0% in the idle position and 99% in the wide open position. If any of the values are incorrect, install a new pedal. Clear the DTCs and test for normal operation
P2138-64	Throttle/Pedal Position Sensor /Switch D / E Voltage Correlation - signal plausibility failure	<ul style="list-style-type: none"> <li>▪ Accelerator pedal position sensor - signal plausibility fault</li> <li>▪ Accelerator pedal position sensor circuits short circuit to ground</li> <li>▪ Accelerator pedal position sensor circuits short circuit to power</li> <li>▪ Accelerator pedal position sensor circuits high resistance</li> <li>▪ Accelerator pedal position sensor fault</li> </ul>	Check the accelerator pedal position sensor circuits. Refer to the electrical circuit diagrams. Check the sensor for correct installation and condition. Rectify as necessary. Clear the DTCs and test for normal operation
P213E-01	Fuel Injection System Fault Forced Engine Shutdown - General Electrical Failure	<ul style="list-style-type: none"> <li>▪ General electrical failure, engine stop by electrical</li> </ul>	Check for associated DTCs and Repair /renew as necessary. If this DTC resets, contact the technical help desk
P213F-07	Fuel Injection System Fault Forced Engine Shutdown - Mechanical Failures	<ul style="list-style-type: none"> <li>▪ Engine stop by hydraulic</li> </ul>	Check for associated DTCs and Repair /renew as necessary. If this DTC resets, contact the technical help desk
P2141-00	Exhaust Gas Recirculation Throttle Control Circuit A Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuits short circuit (to ground /power/other circuits</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuits high resistance</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> </ul>	Check the Exhaust Gas Recirculation (EGR) sensor circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and test for normal operation. Using a datalogger function, read the difference between the EGR throttle set point and the actual throttle position, and the EGR throttle position. Check that the throttle is open and command the throttle closed. Check that the throttle position value increases to above 90%. Check the difference between set point and actual. This value

			should not exceed either maximum 5% or minimum -15%. Check that the EGR throttle is not sticking. Install a new right-hand valve as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P2142-00	Exhaust Gas Recirculation Throttle Control Circuit A High - no sub type information	<ul style="list-style-type: none"> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuits short circuit (to ground /power/other circuits</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor circuits high resistance</li> <li>▪ Exhaust Gas Recirculation (EGR) sensor fault</li> </ul>	Check the Exhaust Gas Recirculation (EGR) sensor circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and test for normal operation. Using a datalogger function, read the difference between the EGR throttle set point and the actual throttle position, and the EGR throttle position. Check that the throttle is open and command the throttle closed. Check that the throttle position value increases to above 90%. Check the difference between set point and actual. This value should not exceed either maximum 5% or minimum -15%. Check that the EGR throttle is not sticking. Install a new right-hand valve as necessary. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation
P215A-00	Vehicle Speed /Wheel Speed Correlation - No sub type information	<ul style="list-style-type: none"> <li>▪ Wheel speed sensor fault</li> <li>▪ Anti-lock Braking System fault</li> </ul>	Check for related Anti-lock Braking System DTCs and rectify first, clear this DTC and retest.
P2184-16	Engine Coolant temperature sensor 2 Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Engine coolant temperature sensor 2 circuit voltage below threshold</li> <li>▪ Engine coolant temperature sensor 2 circuit short circuit to ground</li> <li>▪ Engine coolant temperature sensor 2 fault</li> </ul>	Check the engine coolant temperature sensor 2 and circuits. Refer to the electrical circuit diagrams. Install a new engine coolant temperature sensor if necessary. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P2185-17	Engine Coolant temperature sensor 2 Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Engine coolant temperature sensor 2 circuit voltage above threshold</li> <li>▪ Engine coolant temperature sensor 2 fault</li> </ul>	Check the engine coolant temperature sensor 2 and circuits. Refer to the electrical circuit diagrams. Install a new engine coolant temperature sensor if necessary. Refer to the relevant section of the workshop manual. Clear the DTCs and test for normal operation
P2199-21	Intake Air Temperature ½ Correlation - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Sensor signal amplitude below minimum threshold</li> <li>▪ Intake Air Temperature (IAT) sensor circuit high resistance, short circuit to ground</li> </ul>	Refer to the electrical circuit diagrams and check the intake air temperature and air charge temperature sensors and circuits

		<ul style="list-style-type: none"> <li>▪ Air Charge Temperature (ACT) sensor circuit high resistance, short circuit to ground</li> <li>▪ Intake air temperature sensor failure</li> <li>▪ ACT sensor failure</li> </ul>	
P2199-22	Intake Air Temperature ½ Correlation - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Sensor signal amplitude above maximum threshold</li> <li>▪ Intake air temperature (IAT) sensor circuit short circuit to power</li> <li>▪ Sensor Temperature Air Charge / Air charge temperature (ACT) sensor circuit short circuit to power</li> <li>▪ MAP fault</li> <li>▪ MAFT fault</li> <li>▪ Intake air temperature (IAT) sensor signal amplitude greater than maximum</li> </ul>	Refer to the electrical circuit diagrams and check the IAT sensor and circuits. Correlation between MAP, MAFT. Refer to the electrical circuit diagrams and check <b>MAF</b> circuit for short circuit to power and <b>Temperature Air Charge sensor</b> circuit for short circuit to power
P2228-16	Barometric Pressure Sensor A Circuit Low - circuit voltage below threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage below threshold</li> <li>▪ Sensor fault <ul style="list-style-type: none"> <li>▪ The BARO sensor is internal to the Engine Control Module (ECM)</li> </ul> </li> </ul>	Using a data logger function, check the ambient pressure and the manifold absolute pressure with the engine off. If the ambient pressure is significantly different to the manifold pressure suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P2229-17	Barometric Pressure Sensor A Circuit High - circuit voltage above threshold	<ul style="list-style-type: none"> <li>▪ Circuit voltage above threshold</li> <li>▪ Sensor fault <ul style="list-style-type: none"> <li>▪ The BARO sensor is internal to the Engine Control Module (ECM)</li> </ul> </li> </ul>	Using a data logger function, check the ambient pressure and the manifold absolute pressure with the engine off. If the ambient pressure is significantly different to the manifold pressure suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P2230-27	Barometric Pressure Sensor A Circuit Intermittent /Erratic - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Signal rate of change above threshold</li> <li>▪ Engine Control Module (ECM) fault</li> </ul>	Check the Engine Control Module circuits. Refer to the electrical circuit diagrams. Using a data logger function, check the ambient pressure. Increase the engine speed to 1,500 rpm and recheck the pressure. If the pressure has increased by more than 30 KPa (4.35 lbs/in <sup>2</sup> ) per 100 ms, suspect the Engine Control Module. Refer to the warranty policy and procedures manual if a module is suspect
P2264-13	Water in Fuel Sensor Circuit	<ul style="list-style-type: none"> <li>▪ Sensor circuit high resistance</li> </ul>	Check the sensor and circuits. Refer to the electrical circuit diagrams. Repair

	- circuit open		/renew as necessary. Clear the DTCs and test for normal operation
P2265-32	Water in Fuel Sensor Circuit Range /Performance	<ul style="list-style-type: none"> <li>▪ Water in fuel sensor connector fault - signal low time less than minimum - Initialization error, edge too short</li> <li>▪ Water in fuel sensor circuit fault</li> </ul>	Check the sensor and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P2265-33	Water in Fuel Sensor Circuit Range /Performance - signal low time > maximum	<ul style="list-style-type: none"> <li>▪ Water in fuel sensor connector fault - signal low time greater than maximum</li> <li>▪ Water in fuel sensor circuit fault</li> </ul>	Check the sensor and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P2266-11	Water in Fuel Sensor Circuit Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Sensor circuit short circuit to ground</li> </ul>	Check the sensor and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P2267-11	Water in Fuel Sensor Circuit High - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Sensor circuit short circuit to ground</li> </ul>	Check the sensor and circuits. Refer to the electrical circuit diagrams. Repair /renew as necessary. Clear the DTCs and test for normal operation
P2269-68	Water in Fuel Condition - event information	<ul style="list-style-type: none"> <li>▪ Water in fuel condition</li> <li>▪ Water in fuel sensor circuit short circuit to ground</li> <li>▪ Water in fuel sensor fault</li> </ul>	Drain the water from the fuel filter. Clear the DTC and retest. If the DTC resets, check the sensor circuit. Refer to the electrical circuit diagrams. If no fault is found in the circuits, install a new water in fuel sensor
P2290-00	Injector Control Pressure Too Low - no subtype information	<ul style="list-style-type: none"> <li>▪ Fuel pressure control valve (FPCV) maximum limit reached</li> <li>▪ Fuel injector control pressure too low</li> <li>▪ Fuel line leak</li> <li>▪ Fuel filter/system restriction</li> <li>▪ Fuel pressure control valve circuit fault</li> <li>▪ Fuel pressure control valve failure</li> <li>▪ Fuel pump module circuit short circuit to ground</li> <li>▪ Fuel pump module failure</li> <li>▪ Fuel injection pump failure</li> </ul>	Check the fuel pressure, refer to the relevant section of the workshop manual. Check the fuel pump module circuits and the fuel pressure control valve circuits. Refer to the electrical guides. For fuel pressure control valve and fuel injection pump, refer to the relevant workshop manual section

P2299-68	Brake Pedal Position /Accelerator Pedal Position Incompatible - event information	<ul style="list-style-type: none"> <li>▪ Event information (this code indicates unexpected simultaneous operation of the accelerator and brake pedals)</li> <li>▪ Brake lamp switch fault</li> <li>▪ Accelerator pedal position (APP) sensor fault</li> <li>▪ APP sensor circuits short circuit to ground, power or high resistance</li> <li>▪ Brake lamp switch circuits short circuit to ground, power or high resistance</li> </ul>	<p>Check the brake lamp function. If the brake lights function correctly, check the accelerator pedal position sensor using a datalogger function. Check both accelerator pedal position sensor tracks with the pedal in the rest position. Recheck the values with the pedal in the wide-open position. Both tracks should range between 0% at idle to 99% at wide open throttle. If the values are correct, check the APP sensor and brake lamp switch circuits. Refer to the electrical guides. Also note that the driver may have been left-foot-braking. If the values are incorrect, install a new pedal. Refer to the relevant workshop manual section. Clear the DTCs and test for normal operation</p>
P242A-62	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 3) - signal compare failure	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor signal compare failure (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor correlation compare with at least two other sensors</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor circuit open circuit, short to ground or short to power</li> </ul>	<p>Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Check the sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor</p>
P242B-1A	Exhaust Gas Temperature Sensor Circuit Range /Performance (Bank 1 Sensor 3) - circuit resistance below threshold	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor circuit resistance below threshold (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor plausibility at cold start, temperature difference too high</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor stuck at high temperature value</li> </ul>	<p>Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Renew the sensor</p>

		<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor circuit low resistance or short to ground</li> </ul>	
P242B-1B	Exhaust Gas Temperature Sensor Circuit Range /Performance (Bank 1 Sensor 3) - circuit resistance above threshold	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor circuit resistance above threshold (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor plausibility at cold start, temperature difference too low</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor stuck at high temperature value</li> <li>▪ Post diesel particulate filter temperature sensor circuit high resistance or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Renew the sensor
P242B-1E	Exhaust Gas Temperature Sensor Circuit Range /Performance (Bank 1 Sensor 3) - circuit resistance out of range	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor circuit resistance out of range (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor plausibility at engine running, temperature too low</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor stuck at low temperature value</li> <li>▪ Post diesel particulate filter temperature sensor circuit open circuit, short to ground, short to power</li> </ul>	Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Check the sensor for dirt contamination, corrosion, water ingress damage. Renew the sensor
P242C-00	Exhaust Gas Temperature Sensor Circuit Low (Bank 1	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor signal below minimum threshold</li> </ul>	Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Renew the sensor

	Sensor 3) - no sub type information	<p>voltage (right-hand bank sensor 3)</p> <ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor circuit short to ground or high resistance</li> </ul>	
P242D-00	Exhaust Gas Temperature Sensor Circuit High (Bank 1 Sensor 3) - no sub type information	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor signal above max threshold voltage (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor circuit short to power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Renew the sensor
P242E-00	Exhaust Gas Temperature Sensor Circuit Intermittent /Erratic (Bank 1 Sensor 3) - no sub type information	<ul style="list-style-type: none"> <li>▪ Post diesel particulate filter temperature sensor gradient check (right-hand bank sensor 3)</li> <li>▪ Post diesel particulate filter temperature sensor failure</li> <li>▪ Post diesel particulate filter temperature sensor circuit - short to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check post diesel particulate filter temperature sensor circuit. Intermittent poor or dirty connections. Renew the sensor
P242F-68	Diesel Particulate Filter Restriction - Ash Accumulation - event information	<ul style="list-style-type: none"> <li>▪ Diesel Particulate Filter (DPF) event information</li> <li>▪ DPF partially blocked</li> <li>▪ DPF circuit internal to Engine Control Module</li> </ul>	Diesel Particulate Filter regeneration required. Refer to driver handbook
P244A-00	Diesel Particulate Filter Differential Pressure Too Low (Bank 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure on particulate filter too low right-hand bank</li> <li>▪ Differential pressure sensor circuit open circuit, short to ground or short to power</li> <li>▪ Diesel particulate filter internal failure</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor circuit. Check differential pressure system external pipework for breakage or leakage. Check diesel particulate filter internal filter brick for failure. Install new diesel particulate filter as required

P244B-00	Diesel Particulate Filter Differential Pressure Too High (Bank 1) - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure on particulate filter too high right-hand bank</li> <li>▪ Diesel particulate filter internal failure</li> </ul>	Contact Dealer Technical Support for further assistance
P2453-00	Diesel Particulate Filter Pressure Sensor A Circuit Range /Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure on particulate filter sensor (right-hand) plausibility before start</li> <li>▪ Differential pressure system contaminated or blocked</li> <li>▪ Differential pressure sensor stuck</li> <li>▪ Differential pressure sensor circuit short to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor circuit. Check differential pressure system for contamination or blockage. Check differential pressure sensor for sticking. Renew the sensor
P2453-29	Diesel Particulate Filter Pressure Sensor A Circuit Range /Performance - signal invalid	<ul style="list-style-type: none"> <li>▪ Differential pressure sensor (right-hand) signal invalid</li> <li>▪ Differential pressure on particulate filter sensor plausibility check at engine running</li> <li>▪ Differential pressure sensor system contaminated or blocked</li> <li>▪ Differential pressure sensor stuck</li> <li>▪ Differential pressure sensor circuit short to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor circuit. Check differential pressure system for contamination or blockage. Check differential pressure system external pipework for breakage or leakage. Check differential pressure sensor for sticking. Renew the sensor
P2454-00	Diesel Particulate Filter Pressure Sensor A Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure sensor (right-hand) signal below minimum threshold</li> <li>▪ Differential pressure sensor failure</li> <li>▪ Differential pressure sensor circuit short to ground or high resistance</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor circuit. Renew the sensor
P2455-00	Diesel Particulate Filter Pressure Sensor A	<ul style="list-style-type: none"> <li>▪ Differential pressure sensor (right-hand) signal above maximum threshold</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor circuit. Renew the sensor

	Circuit High - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure sensor failure</li> <li>▪ Differential pressure sensor circuit short to power or open circuit</li> </ul>	
P2456-00	Diesel Particulate Filter Pressure Sensor A Circuit Intermittent /Erratic - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure sensor (right-hand) signal gradient not plausible</li> <li>▪ Differential pressure sensor failure</li> <li>▪ Differential pressure sensor circuit hork to ground, power or open circuit</li> </ul>	Refer to the electrical circuit diagrams and check differential pressure sensor. Renew the sensor
P2458-00	Diesel Particulate Filter Regeneration Duration - no sub type information	<ul style="list-style-type: none"> <li>▪ Delay timer for regeneration exceeds threshold</li> <li>▪ Diesel Particulate Filter circuit internal to Engine Control Module</li> </ul>	Contact Dealer Technical Support
P2459-00	Diesel Particulate Filter Regeneration Frequency - no sub type information	<ul style="list-style-type: none"> <li>▪ Driving conditions have not allowed the DPF regeneration procedure to take place automatically</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p> <b>NOTE:</b></p> <p>Ensure the driver is aware of the DPF regeneration procedure as described in the owners handbook</p> </div> <p>Carry out DPF regeneration procedure using manufacturer approved diagnostic system if driver has not completed DPF regeneration procedure as described in the owners handbook</p>
P2465-00	Diesel Particulate Filter Differential Pressure Too High (Bank 2) - no sub type information	<ul style="list-style-type: none"> <li>▪ Differential pressure on particulate filter too high left-hand bank</li> <li>▪ Diesel particulate filter internal failure</li> </ul>	Contact Dealer Technical Support for further assistance
P2505-13	ECM / PCM Power Input Signal - circuit open	<ul style="list-style-type: none"> <li>▪ Engine Control Module main relay open circuit</li> <li>▪ Engine Control Module main relay failure</li> </ul>	Refer to the electrical circuit diagrams and check the Engine Control Module main relay circuits. Activate the relay and check for an audible 'click'. Install a new relay as necessary. Clear the DTCs and test for normal operation
P2507-11	ECM / PCM Power Input Signal Low - circuit short to ground	<ul style="list-style-type: none"> <li>▪ Engine Control Module main relay circuit short circuit to ground</li> </ul>	Refer to the electrical circuit diagrams and check the Engine Control Module main relay circuits. Activate the relay and

		<ul style="list-style-type: none"> <li>▪ Engine Control Module main relay failure</li> </ul>	check for an audible 'click'. Install a new relay as necessary. Clear the DTCs and test for normal operation
P2508-12	ECM / PCM Power Input Signal High - circuit short to battery	<ul style="list-style-type: none"> <li>▪ Main relay short circuit to power</li> </ul>	Refer to the electrical circuit diagrams and check the Engine Control Module main relay circuits. Activate the relay and check for an audible 'click'. Install a new relay as necessary. Clear the DTCs and test for normal operation
P250E-00	Engine Oil Level Sensor Circuit Intermittent /Erratic - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> <li>▪ Oil level sensor signal gradient not plausible</li> </ul>	Refer to the electrical circuit diagrams and check the sensor circuit. Renew the sensor
P252C-00	Engine Oil Quality Sensor Circuit Low - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil quality sensor duty cycle below minimum threshold</li> </ul>	Refer to the electrical circuit diagrams and check the sensor circuit. Renew the sensor
P252D-00	Engine Oil Quality Sensor Circuit High - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil quality sensor duty cycle above maximum threshold</li> </ul>	Refer to the electrical circuit diagrams and check the sensor circuit. Renew the sensor
P252E-00	Engine Oil Quality Circuit Intermittent /Erratic - no sub type information	<ul style="list-style-type: none"> <li>▪ Oil quality sensor signal gradient not plausible</li> </ul>	Refer to the electrical circuit diagrams and check the sensor circuit. Renew the sensor
P2563-27	Turbocharger Boost Control Position Sensor A Circuit - signal rate of change above threshold	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control position sensor A circuit range /performance - signal rate of change above threshold</li> <li>▪ Turbocharger position sensor circuit high resistance</li> </ul>	Refer to the electrical circuit diagrams and check the turbocharger circuits. Repair/renew as necessary. Clear the DTCs and test for normal operation. If any DTCs reset, recheck the circuits
P2564-21	Turbocharger Boost Control Position Sensor A Circuit Low - signal amplitude < minimum	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control position sensor A circuit low - signal amplitude less than minimum</li> <li>▪ Turbocharger position sensor circuit short circuit to ground</li> <li>▪ Turbocharger fault</li> </ul>	Refer to the electrical circuit diagrams and check the turbocharger circuits. Repair/renew as necessary. Clear the DTCs and test for normal operation. If any DTCs reset, recheck the circuits
P2565-00	Turbocharger Boost Control Position Sensor	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Refer to the electrical circuit diagrams and check the turbocharger circuits. Repair/renew as necessary. Clear the

	A Circuit High - no sub type information		DTCs and test for normal operation. If any DTCs reset, recheck the circuits
P2565-22	Turbocharger Boost Control Position Sensor A Circuit High - signal amplitude > maximum	<ul style="list-style-type: none"> <li>▪ Turbocharger boost control position sensor A circuit high - signal amplitude greater than maximum</li> <li>▪ Turbocharger position sensor circuit short circuit to power</li> <li>▪ Turbocharger fault</li> </ul>	Refer to the electrical circuit diagrams and check the turbocharger circuits. Repair/renew as necessary. Clear the DTCs and test for normal operation. If any DTCs reset, recheck the circuits
U0001-00	High Speed - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network
U0002-00	High Speed CAN Communication Bus Performance - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network
U0073-00	Control Module Communication Bus "A" Off - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network
U0101-00	Lost Communication With TCM - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Transmission Control Module for related DTCs and refer to the relevant DTC index
U0102-00	Lost Communication With Transfer Case Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Transmission Control Module for related DTCs and refer to the relevant DTC index
U0104-00	Lost Communication With Cruise Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Cruise Control Module for related DTCs and refer to the relevant DTC index
U0126-00	Lost Communication	<ul style="list-style-type: none"> <li>▪ CAN network malfunction</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground

	with Steering Angle Sensor Module - no sub type information		connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network between the steering angle sensor module and engine control module
U0128-00	Lost Communication With Park Brake Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Park Brake Control Module for related DTCs and refer to the relevant DTC index
U0133-00	Lost Communication With Suspension Control Module "A" - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Suspension Control Module for related DTCs and refer to the relevant DTC index
U0138-00	Lost Communication with All Terrain Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Terrain Control Module for related DTCs and refer to the relevant DTC index
U0140-00	Lost Communication with Body Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ CAN network malfunction</li> </ul>	Refer to the electrical circuit diagrams and check the power and ground connections to the module. Using the manufacturer approved diagnostic system, complete a CAN network integrity test. Refer to the electrical circuit diagrams and check the CAN network between the body control module and engine control module
U0151-00	Lost Communication With Restraints Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Restraints Control Module for related DTCs and refer to the relevant DTC index
U0155-00	Lost Communication With Instrument Panel Cluster (IPC) Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Instrument Panel Cluster Control Module for related DTCs and refer to the relevant DTC index
U0164-00	Lost Communication With HVAC Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Heating and Ventilation Control Module for related DTCs and refer to the relevant DTC index
U0167-	Lost	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Vehicle Immobilizer Control

00	Communication With Vehicle Immobilizer Control Module - no sub type information		Module for related DTCs and refer to the relevant DTC index
U0121-00	Lost Communication With Anti-Lock Brake System (ABS) Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the ABS Control Module for related DTCs and refer to the relevant DTC index
U0300-00	Internal Control Module Software Incompatibility - No sub type information	<ul style="list-style-type: none"> <li>▪ Engine control module is not configured correctly</li> </ul>	Using the manufacturer approved diagnostic system check and install latest relevant level of software to the engine control module
U0402-67	Invalid Data Received from TCM - signal incorrect after event	<ul style="list-style-type: none"> <li>▪ Invalid data received from transmission control module - gear shifter position status</li> </ul>	Check the Transmission Control Module for related DTCs and refer to the relevant DTC index
U0402-68	Invalid Data Received from TCM - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from transmission control module</li> </ul>	Check the transmission control module for related DTCs and refer to the relevant DTC index
U0402-92	Invalid Data Received from TCM - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from transmission control module</li> </ul>	Check the transmission control module for related DTCs and refer to the relevant DTC index
U0403-68	Invalid Data Received from Transfer Case Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from transfer case control module</li> </ul>	Check the transfer case control module for related DTCs and refer to the relevant DTC index
U0403-92	Invalid Data Received from Transfer Case Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from transfer case control module</li> </ul>	Check the transfer case control module for related DTCs and refer to the relevant DTC index
U0405-68	Invalid Data Received from Cruise Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from cruise control module - vehicle speed set point delivered by CAN is invalid</li> </ul>	Check the cruise control module for related DTCs and refer to the relevant DTC index
U0405-81	Invalid Data Received From Cruise Control	<ul style="list-style-type: none"> <li>▪ Invalid serial data received</li> </ul>	Check the Cruise Control Module for related DTCs and refer to the relevant DTC index

	Module - invalid serial data received		
U0405- 82	Invalid Data Received From Cruise Control Module - alive / sequence counter incorrect / not updated	<ul style="list-style-type: none"> <li>▪ Alive / sequence counter incorrect / not updated</li> </ul>	Check the Cruise Control Module for related DTCs and refer to the relevant DTC index
U0405- 85	Invalid Data Received From Cruise Control Module - signal above allowable range	<ul style="list-style-type: none"> <li>▪ Signal received is above maximum allowable range, the vehicle speed set point delivered by CAN is invalid</li> </ul>	Check the Cruise Control Module for related DTCs and refer to the relevant DTC index
U0405- 92	Invalid Data Received From Cruise Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from cruise control module - vehicle speed set point delivered by CAN is invalid</li> </ul>	Check the cruise control module for related DTCs and refer to the relevant DTC index
U0415- 68	Invalid Data Received from Anti Lock Brake System (ABS) Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from anti lock brake system control module</li> </ul>	Check the anti lock brake system control module for related DTCs and refer to the relevant DTC index
U0415- 92	Invalid Data Received from Anti Lock Brake System (ABS) Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from anti lock brake system control module</li> </ul>	Check the anti lock brake system control module for related DTCs and refer to the relevant DTC index
U0416- 00	Invalid Data Received From Vehicle Dynamics Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ No sub type information</li> </ul>	Check the Vehicle Dynamics Control Module for related DTCs and refer to the relevant DTC index
U0416- 68	Invalid Data Received From Vehicle Dynamics Control Module - event information	<ul style="list-style-type: none"> <li>▪ Event information</li> </ul>	Check the Vehicle Dynamics Control Module for related DTCs and refer to the relevant DTC index
U0416- 92	Invalid Data Received From Vehicle	<ul style="list-style-type: none"> <li>▪ Performance or incorrect operation</li> </ul>	Check the Vehicle Dynamics Control Module for related DTCs and refer to the relevant DTC index

	Dynamics Control Module - performance or incorrect operation		
U0417-00	Invalid Data Received From Park Brake Control Module - no sub type information	<ul style="list-style-type: none"> <li>▪ Invalid data received from park brake control module</li> </ul>	Check the Park Brake Control Module for related DTCs and refer to the relevant DTC index
U0417-68	Invalid Data Received From Park Brake Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from park brake control module - error signal over CAN</li> </ul>	Check the park brake control module for related DTCs and refer to the relevant DTC index
U0417-92	Invalid Data Received From Park Brake Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from park brake control module - error signal over CAN</li> </ul>	Check the park brake control module for related DTCs and refer to the relevant DTC index
U0422-68	Invalid Data Received from Body Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from body control module</li> </ul>	Check the body control module for related DTCs and refer to the relevant DTC index
U0422-92	Invalid Data Received from Body Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from body control module</li> </ul>	Check the body control module for related DTCs and refer to the relevant DTC index
U0423-68	Invalid Data Received from Instrument Panel Cluster Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from instrument panel cluster control module</li> </ul>	Check the instrument panel cluster control module for related DTCs and refer to the relevant DTC index
U0426-68	Invalid Data Received from Vehicle Immobilizer Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from vehicle immobilizer control module</li> </ul>	Check the vehicle immobilizer control module for related DTCs and refer to the relevant DTC index
U0426-92	Invalid Data Received from Vehicle Immobilizer Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from vehicle immobilizer control module</li> </ul>	Check the vehicle immobilizer control module for related DTCs and refer to the relevant DTC index

U0428-68	Invalid Data Received from Steering Angle Sensor Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from steering angle sensor module</li> </ul>	Check the steering angle sensor module for related DTCs and refer to the relevant DTC index
U0428-92	Invalid Data Received from Steering Angle Sensor Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from steering angle sensor module</li> </ul>	Check the steering angle sensor module for related DTCs and refer to the relevant DTC index
U0439-68	Invalid Data Received from All Terrain Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from all terrain control module</li> </ul>	Check the all terrain control module for related DTCs and refer to the relevant DTC index
U0439-92	Invalid Data Received from All Terrain Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from all terrain control module</li> </ul>	Check the all terrain control module for related DTCs and refer to the relevant DTC index
U0452-68	Invalid Data Received from Restraints Control Module - event information	<ul style="list-style-type: none"> <li>▪ Invalid data received from restraints control module</li> </ul>	Check the restraints control module for related DTCs and refer to the relevant DTC index
U0439-92	Invalid Data Received from All Terrain Control Module - performance or incorrect operation	<ul style="list-style-type: none"> <li>▪ Invalid data received from restraints control module</li> </ul>	Check the restraints control module for related DTCs and refer to the relevant DTC index
U3003-62	Battery Voltage - signal compare failure	<ul style="list-style-type: none"> <li>▪ Restraints control module measured voltage is lower than battery voltage</li> </ul>	Refer to the electrical circuit diagrams and check input voltage to the restraints control module compared to battery voltage