

## Diagnostic Trouble Code (DTC) Charts

Note: Before proceeding to the Pinpoint Test, refer to the Diagnostic Trouble Code (DTC) Descriptions for additional information to assist in diagnosis.

### 6.0L Diesel DTCs Chart

Diagnostic Trouble Code (DTC)	Application	Continuous Memory
111	ALL	No errors detected
112	ALL	GO to Powertrain Control Module Power (PCM PWR) Test.
113	ALL	GO to Powertrain Control Module Power (PCM PWR) Test.
114*	ALL	GO to Engine Coolant Temperature (ECT) Sensor Test.
115*	ALL	GO to Engine Coolant Temperature (ECT) Sensor Test.
121*	ALL	GO to Manifold Absolute Pressure (MAP) Sensor Test.
122*	ALL	GO to Manifold Absolute Pressure (MAP) Sensor Test.
123*	ALL	GO to Manifold Absolute Pressure (MAP) Sensor Test.
124*	ALL	GO to Injection Control Pressure (ICP) Sensor Test.
125*	ALL	GO to Injection Control Pressure (ICP) Sensor Test.
131*	ALL	GO to Accelerator Pedal Position Sensor and Idle Validation Switch (APS/IVS) Test.
132*	ALL	GO to Accelerator Pedal Position Sensor and Idle Validation Switch (APS/IVS) Test.
133*	ALL	GO to Accelerator Pedal Position Sensor and Idle Validation Switch (APS/IVS) Test.
134*	ALL	GO to Accelerator Pedal Position Sensor and Idle Validation Switch (APS/IVS) Test.
135*	ALL	GO to Accelerator Pedal Position Sensor and Idle Validation Switch (APS/IVS) Test.
141	ALL	GO to Vehicle Speed Sensor (VSS) Test.
142	ALL	GO to Vehicle Speed Sensor (VSS) Test.
143	ALL	GO to Camshaft Position (CMP) Sensor Test.
145	ALL	GO to Camshaft Position (CMP) Sensor Test.
146	ALL	GO to Crankshaft Position (CKP) Sensor Test.
147	ALL	GO to Crankshaft Position (CKP) Sensor Test.
151*	ALL	GO to Barometric Absolute Pressure (BAP) Sensor Test.
152*	ALL	GO to Barometric Absolute Pressure (BAP) Sensor Test.
154	ALL	GO to Intake Air Temperature (IAT) Sensor Test.
155	ALL	GO to Intake Air Temperature (IAT) Sensor Test.

(Continued)

## Diagnostic Trouble Code (DTC) Charts

### 6.0L Diesel DTCs Chart

Diagnostic Trouble Code (DTC)	Application	Continuous Memory
161*	ALL	GO to Manifold Air Temperature (MAT) Sensor Test.
162*	ALL	GO to Manifold Air Temperature (MAT) Sensor Test.
163*	ALL	GO to Exhaust Gas Recirculation (EGR) Actuator Test.
164*	ALL	GO to Exhaust Gas Recirculation (EGR) Actuator Test.
211*	ALL	GO to Engine Oil Pressure (EOP) Sensor Test.
212*	ALL	GO to Engine Oil Pressure (EOP) Sensor Test.
215	ALL	GO to Vehicle Speed Sensor (VSS) Test.
225	ALL	GO to Engine Oil Pressure (EOP) Sensor Test.
231	ALL	GO to Data Link Test.
236	ALL	GO to Engine Coolant Level (ECL) Sensor Test.
241	ALL	GO to Injection Pressure Regulator (IPR) Test.
246	ALL	GO to Engine Fan Control (EFAN) Test.
251	ALL	GO to Glow Plug Control (GPC) Circuit Test.
256	ALL	See Note 11.
261	ALL	GO to Variable Geometry Turbocharger (VGT) Actuator Test.
264	ALL	GO to Exhaust Gas Recirculation (EGR) Actuator Test.
267	ALL	GO to Engine Crank Inhibit (ECI) System Test.
311*	ALL	GO to Engine Oil Temperature (EOT) Sensor Test.
312*	ALL	GO to Engine Oil Temperature (EOT) Sensor Test.
313	ALL	Refer to <b>Section 3</b> Symptom Charts.
314	ALL	Refer to <b>Section 3</b> Symptom Charts.
315*	ALL	Refer to <b>Section 3</b> Symptom Charts.
316	ALL	See Note 9.
321	ALL	Refer to <b>Section 3</b> Symptom Charts.
322	ALL	Refer to <b>Section 3</b> Symptom Charts.
323	ALL	See note 10.
324	ALL	See Note 3.
325	ALL	Refer to <b>Section 3</b> Symptom Charts.
331*	ALL	GO to Injection Control Pressure (ICP) System Test.
332*	ALL	GO to Injection Control Pressure (ICP) Sensor Test.
333*	ALL	GO to Injection Control Pressure (ICP) System Test.

(Continued)

## Diagnostic Trouble Code (DTC) Charts

### 6.0L Diesel DTCs Chart

Diagnostic Trouble Code (DTC)	Application	Continuous Memory
334	ALL	GO to Injection Control Pressure (ICP) System Test.
335	ALL	GO to Injection Control Pressure (ICP) System Test.
341*	ALL	GO to Exhaust Back Pressure (EBP) Sensor Test.
342*	ALL	GO to Exhaust Back Pressure (EBP) Sensor Test.
343*	ALL	GO to Air Management System Test.
344*	ALL	GO to Exhaust Back Pressure (EBP) Sensor Test.
345	ALL	GO to Air Management System Test.
346	ALL	GO to Air Management System Test.
351	ALL	GO to Air Management System Test.
353	ALL	GO to Air Management System Test.
354	ALL	GO to Air Management System Test.
355	ALL	GO to Air Management System Test.
361	ALL	GO to Air Management System Test.
365*	ALL	GO to Air Management System Test.
366*	ALL	GO to Air Management System Test.
367*	ALL	GO to Air Management System Test.
421-428	ALL	GO to Injector Drive Circuits Test.
431-438	ALL	GO to Injector Drive Circuits Test.
451-458	ALL	GO to Injector Drive Circuits Test.
523	ALL	GO to Injection Driver Module Power (IDM PWR) Test.
525*	ALL	GO to Injection Driver Module Power (IDM PWR) Test.
533	ALL	GO to Injection Driver Module Power (IDM PWR) Test.
534	ALL	GO to Injection Driver Module Power (IDM PWR) Test.
543*	ALL	GO to Powertrain Control Module (PCM)/Injector Driver Module (IDM) Communications Test.
551	ALL	GO to Powertrain Control Module (PCM)/Injector Driver Module (IDM) Communications Test.
552	ALL	GO to Powertrain Control Module (PCM)/Injector Driver Module (IDM) Communications Test.
553	ALL	GO to Powertrain Control Module (PCM)/Injector Driver Module (IDM) Communications Test.
554	ALL	GO to Powertrain Control Module (PCM)/Injector Driver Module (IDM) Communications Test.
571-578*	ALL	See Note 4.

(Continued)

## Diagnostic Trouble Code (DTC) Charts

### 6.0L Diesel DTCs Chart

Diagnostic Trouble Code (DTC)	Application	Continuous Memory
613*	ALL	See Note 5.
614*	ALL	See Note 6.
621*	ALL	See Note 7.
622*	ALL	See Note 7.
623*	ALL	See Note 6.
624	ALL	See Note 7.
626	ALL	GO to Powertrain Control Module Power (PCM PWR) Test.
631	ALL	See Note 8.
632	ALL	See Note 8.
655	ALL	See Note 7.
661	ALL	See Note 8.
664	ALL	See Note 7.
665	ALL	See Note 8.

- (1) Note 1: \* Indicates amber ENGINE indicator on when a Diagnostic Trouble Code (DTC) is set.
- (2) Note 2: \*\* Indicates red ENGINE indicator on if the Engine Warning Protection System (EWPS) is enabled and a DTC is set.
- (3) Note 3: DTC 324 does not indicate any system or circuit fault. Diagnostic tests are not required for this DTC.
- (4) Note 4: When DTCs are set for cylinder balance, perform all Performance Diagnostics Tests. Refer to **Section 4**.
- (5) Note 5: Install correct PCM or IDM.
- (6) Note 6: Check engine family rating code (EFRC) for the current PCM strategy. Reprogram the PCM or change the EFRC as required. Refer to **Section 2**.
- (7) Note 7: Reprogram the PCM. Refer to **Section 2**.
- (8) Note 8: Install a new PCM.
- (9) Note 9: DTC 316 only indicates the engine has not been able to reach operating temperature. It does not indicate a circuit fault. Refer to the Workshop Manual for cooling system diagnostics.
- (10) Note 10: If coolant level is correct, GO to Engine Coolant Level (ECL) Sensor Test.
- (11) Note 11: Refer to the Workshop Manual for cooling system diagnostics.

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>111 — No Errors Detected</b>	PCM	No errors detected	No errors detected
<b>112 — Electrical System Voltage B+ Out Of Range High</b>	The PCM internally monitors battery voltage. When the PCM continuously receives greater than 23 volts a DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 112 is set when the PCM detects a generator output greater than 23 volts at pin X3-3 for more than 0.5 seconds.</li> <li>• DTC 112 can be set when jump starting the engine and additional voltage is introduced. Incorrect external battery connections can cause the voltage increase.</li> <li>• If the condition causing DTC 112 is intermittent, the code will change from active to inactive status. DTC 112 will not cause the amber ENGINE indicator to turn on.</li> </ul>	The PCM monitors the VREF voltage and will adjust the signal values for the sensors that use VREF for operation. If a sensor or circuit pulls VREF lower than 5 volts, the PCM may set out of range high DTCs for the sensors that operate on VREF (APS, BAP, B+, and VSS).
<b>113 — Electrical System Voltage B+ Out Of Range Low</b>	The PCM internally monitors battery voltage. When the PCM continuously receives less than 7.0 volts, a DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 113 can be set by a defective generator or PCM power relay, discharged batteries, or increased resistance in the battery feed circuits.</li> <li>• If the condition causing DTC 113 is intermittent, the code will change from active to inactive status. DTC 113 will not cause the amber ENGINE indicator to turn on.</li> </ul>	DTC 113 is set when the PCM detects less than 7.0 volts at pin X3-3 for more than 0.5 seconds.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>114 — Engine Coolant Temperature Signal Out Of Range Low</b>	The PCM continuously monitors the signal of the ECT sensor to determine if the signal is within an expected range. If the PCM detects an out of range high or low, the PCM will ignore the ECT signal and assume an engine coolant temperature of -34°C (-29°F) for starting and 82°C (180°F) for engine running conditions. When this occurs, the EWPS, CAP, IST, cold idle advance, and coolant compensation features are disabled.	<ul style="list-style-type: none"> <li>• DTC 114 is set by the PCM when the ECT signal is less than 0.127 volts for more than 0.35 seconds.</li> <li>• DTC 114 can set due to a short to ground in the signal circuit or a defective sensor.</li> <li>• When DTC 114 is set the amber ENGINE indicator is illuminated.</li> </ul>	Signal voltage was less than 0.127 volts for more than 0.35 seconds.
<b>115 — Engine Coolant Temperature Signal Out Of Range High</b>	The PCM continuously monitors the signal of the ECT sensor to determine if the signal is within an expected range. If the PCM detects an out of range high or low, the PCM will ignore the ECT signal and assume an engine coolant temperature of -34°C (-29°F) for starting and 82°C (180°F) for engine running conditions. When this occurs, the EWPS, CAP, IST, cold idle advance, and coolant compensation features are disabled.	<ul style="list-style-type: none"> <li>• DTC 115 is set by the PCM when the ECT signal is greater than 4.6 volts for more than 0.35 seconds.</li> <li>• DTC 115 can set due to an open signal or ground circuit, a short to a voltage source, or a defective sensor.</li> <li>• When DTC 115 is set the amber ENGINE indicator is illuminated.</li> </ul>	Signal voltage was greater than 4.6 volts for more than 0.35 seconds.
<b>121 — Intake Manifold Absolute Pressure Signal Out Of Range High</b>	The PCM will ignore the MAP signal when the signal is detected to be out of range or an incorrect value is read. The engine will continue to operate based on estimated values.	<ul style="list-style-type: none"> <li>• DTC 121 can be set due to a sensor signal wire short to VREF or B+ or a defective MAP sensor</li> <li>• When DTC 121 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 121 is set by the PCM when the MAP signal is greater than 4.9 volts for more than 0.4 seconds.
<b>122 — Intake Manifold Absolute Pressure Signal Out Of Range Low</b>	The PCM will ignore the MAP signal when the signal is detected to be out of range or an incorrect value is read. The engine will continue to operate based on estimated values.	<ul style="list-style-type: none"> <li>• DTC 122 can be set due to a sensor signal circuit open or shorted to ground or a defective MAP sensor. DTC 122 can also be set due to an extremely restricted CAC/intake system.</li> <li>• When DTC 122 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 122 is set by the PCM when the MAP signal is less than 0.039 volts for more than 0.4 seconds.

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>123 — Intake Manifold Absolute Pressure Signal In-Range Fault</b>	The PCM will ignore the MAP signal when the signal is detected to be out of range or an incorrect value is read. The engine will continue to operate based on estimated values.	<ul style="list-style-type: none"> <li>• DTC 123 can be set due to a restricted or plugged sensor inlet, VREF shorted to a voltage source greater than 5.5 volts, or a defective MAP sensor.</li> <li>• When DTC 123 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 123 is set by PCM when the MAP signal is greater than 120 kPa (2 psi) absolute at low idle.
<b>124 — Injection Control Pressure Signal Out Of Range Low</b>	The PCM continuously monitors the signal of the ICP sensor to determine if the signal is within an expected range. If the PCM detects a higher or lower voltage than expected, the PCM will set a DTC, illuminate the amber ENGINE indicator, ignore the ICP sensor signal, and use a preset value based on engine operating conditions.	<ul style="list-style-type: none"> <li>• DTC 124 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open VREF circuit or a VREF circuit short to ground.</li> <li>• When DTC 124 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 124 is set by the PCM if signal voltage is less than 0.039 volts for more than 0.1 seconds.
<b>125 — Injection Control Pressure Signal Out Of Range High</b>	The PCM continuously monitors the signal of the ICP sensor to determine if the signal is within an expected range. If the PCM detects a higher or lower voltage than expected, the PCM will set a DTC, illuminate the amber ENGINE indicator, ignore the ICP sensor signal, and use a preset value based on engine operating conditions.	<ul style="list-style-type: none"> <li>• DTC 125 can be set due to an open signal ground circuit, short to a voltage source on the ICP signal circuit, or a defective sensor.</li> <li>• When DTC 125 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 125 is set by the PCM if the signal voltage is greater than 4.9 volts for more than 0.1 seconds.

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>131 — APS Signal Out Of Range Low</b>	The PCM continuously monitors the APS/IVS circuits for expected voltages. It also compares the APS and IVS signals for conflict. If the PCM detects an APS signal out of range low, the engine will ignore the APS signal and operate at low idle.	<ul style="list-style-type: none"> <li>• Possible causes include a short to ground or an open in the APS signal circuit.</li> <li>• DTC 131 can be set due to a short to ground or an open VREF or signal circuits. If the condition causing DTC 131 is intermittent and the condition is no longer present, the code will become inactive and normal engine operation will resume.</li> <li>• When DTC 131 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 131 is set if the PCM detects voltage less than 0.147 volts.
<b>132 — APS Signal Out Of Range High</b>	The PCM continuously monitors the APS/IVS circuits for expected voltages. It also compares the APS and IVS signals for conflict. If the PCM detects an APS signal out of range high, the engine will ignore the APS signal and operate at low idle.	<ul style="list-style-type: none"> <li>• DTC 132 can be set due to a short to VREF or B+ in the APS signal circuit.</li> <li>• When DTC 132 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 132 is set if the PCM detects a voltage greater than 4.55 volts. The PCM monitors voltage on VREF A and will adjust signal values for the sensors that use VREF A for operation. If a sensor or circuit pulls VREF less than 5 volts, the PCM may set out of range high DTCs for the sensors that operate on VREF B (APS, BAP, B+, and VSS).
<b>133 — APS Signal In Range DTC</b>	<p>The PCM checks the voltage output of the APS by comparing the APS signal with the IVS signal. APS and IVS signals can disagree in two cases:</p> <ul style="list-style-type: none"> <li>• The APS signal indicates the pedal is pressed down to accelerate, but the IVS signal indicates idle position.</li> <li>• The APS signal indicates the pedal has been released to allow the engine to return to idle, but the IVS signal indicates off-idle position of the pedal.</li> </ul> <p>If the PCM detects either of the above conditions, the PCM attempts to isolate the source of conflict and set the appropriate DTC.</p>	<ul style="list-style-type: none"> <li>• If the IVS signal is changing and the APS signal is constant, the PCM assumes the APS is the conflict source and sets DTC 133. The engine rpm is restricted to idle.</li> <li>• When DTC 133 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 133 is caused by intermittent conditions. The DTC will remain active until the vehicle has been shutdown and restarted. The DTC does not recover without cycling the key switch.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>134 — APS Signal And IVS Disagree</b>	<p>The PCM checks the voltage output of the APS by comparing the APS signal with the IVS signal. APS and IVS signals can disagree in two cases:</p> <ul style="list-style-type: none"> <li>• The APS signal indicates the pedal is pressed down to accelerate, but the IVS signal indicates idle position.</li> <li>• The APS signal indicates the pedal has been released to allow the engine to return to idle, but the IVS signal indicates off-idle position of the pedal.</li> </ul> <p>If the PCM detects either of the above conditions, the PCM attempts to isolate the source of conflict and set the appropriate DTC.</p>	<ul style="list-style-type: none"> <li>• If neither the APS or IVS is changing, or both are changing, or the PCM cannot determine the DTC in specified time, DTC 134 is set and engine rpm is restricted to idle.</li> <li>• When DTC 134 is active the amber ENGINE indicator is illuminated.</li> </ul>	<p>DTC 134 is caused by intermittent conditions. The DTC will remain active until the vehicle has been shutdown and restarted. The DTC does not recover without cycling the key switch.</p>
<b>135 — Idle Validation Switch Circuit Fault</b>	<p>The PCM checks the voltage output of the APS by comparing the APS signal with the IVS signal. APS and IVS signals can disagree in two cases:</p> <ul style="list-style-type: none"> <li>• The APS signal indicates the pedal is pressed down to accelerate, but the IVS signal indicates idle position</li> <li>• The APS signal indicates the pedal has been released to allow the engine to return to idle, but the IVS signal indicates off-idle position of the pedal.</li> </ul> <p>If the PCM detects either of the above conditions, the PCM attempts to isolate the source of conflict and set the appropriate DTC.</p>	<ul style="list-style-type: none"> <li>• If the APS is changing but IVS is constant, the PCM assumes the IVS is the conflict source and sets DTC 135. In this case the PCM limits the APS signal to a lower value that provides less than full rpm, but does not limit engine rpm to idle.</li> <li>• When DTC 135 is active the amber ENGINE indicator is illuminated.</li> </ul>	<p>DTC 135 is caused by intermittent conditions. The DTC will remain active until the vehicle has been shutdown and restarted. The DTC does not recover without cycling the key switch.</p>

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>141 — Vehicle Speed Sensor Signal Out Of Range Low</b>	The PCM performs diagnostic checks on the VSS circuit when the engine is operating at 0 mph. The PCM transmits a voltage signal on the VSS circuit and determines if the return voltage is out of range high or low. When a fault condition is detected, the PCM disables the cruise control and power takeoff. If the road speed limiting option is enabled, the PCM will limit engine rpm for all gears.	<ul style="list-style-type: none"> <li>• DTC 141 is set by the PCM when an out of range low condition is detected in the VSS circuit.</li> <li>• When DTC 141 is active the amber ENGINE indicator is not illuminated.</li> </ul>	The PCM will not set DTCs for VSS circuit failure for vehicles equipped with Allison MD (WTEC) and 2000 series transmissions. For vehicles equipped with MD transmissions, diagnose the communication circuit (CAN 1) between the engine and transmission module.
<b>142 — Vehicle Speed Sensor Signal Out Of Range High</b>	The PCM performs diagnostic checks on the VSS circuit when the engine is operating at 0 mph. The PCM transmits a voltage signal on the VSS circuit and determines if the return voltage is out of range high or low. When a fault condition is detected, the PCM disables the cruise control and power takeoff. If the road speed limiting option is enabled, the PCM will limit engine rpm for all gears.	<ul style="list-style-type: none"> <li>• DTC 142 is set by the PCM when an out of range high condition is detected in the VSS circuit.</li> <li>• When DTC 142 is active the amber ENGINE indicator is not illuminated.</li> </ul>	The PCM monitors voltage on VREF A and will adjust signal values for the sensors that use VREF A for operation. If a sensor or circuit pulls VREF A less than 5 volts, the PCM may set out of range high DTCs for the sensors that operate on VREF B (APS, BAP, B+, and VSS).
<b>143 — Incorrect CMP Signal Signature</b>	An inactive CMP signal during cranking is detectable by the PCM. During engine cranking the PCM monitors the CKP signal and Injection Control Pressure (ICP) to verify the engine is rotating. If the CMP signal is inactive during this time a DTC will be set. Electrical noise can also be detected by the PCM. When the level is sufficient to affect engine operation, a corresponding DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 143 is set by the PCM when the CMP transition occurs at the wrong CKP location.</li> <li>• DTC 143 can be set due to a mistimed CMP to CKP signal, electrical noise in the CMP circuit, or a defective CMP sensor.</li> </ul>	An inactive CMP signal will cause a no start condition.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>145 — CMP Signal Inactive</b>	An inactive CMP signal during cranking is detectable by the PCM. During engine cranking the PCM monitors the CKP signal and Injection Control Pressure (ICP) to verify the engine is rotating. If the CMP signal is inactive during this time a DTC will be set. Electrical noise can also be detected by the PCM. When the level is sufficient to affect engine operation, a corresponding DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 145 is set by the PCM when the CMP signal is inactive, the CKP signal is active, and the ICP has increased.</li> <li>• DTC 145 can be set due to an open short to ground or open voltage source in the CMP circuit. A defective sensor can cause DTC 145 to be set.</li> </ul>	An inactive CMP signal will cause a no start condition.
<b>146 — CKP Signal Inactive</b>	An inactive CKP signal during cranking is detectable by the PCM. During engine cranking the PCM monitors the CMP signal and injection control pressure to verify the engine is rotating. If the CKP signal is inactive during this time a DTC will be set. Electrical noise can also be detected by the PCM, if the level is sufficient to effect engine operation, a corresponding DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 146 is set by the PCM when no CKP signal is detected while the CMP signal is active and ICP has increased.</li> <li>• DTC 146 can be set due to an open short to ground or voltage source in the CKP circuit. A defective CKP sensor can also set DTC 146.</li> </ul>	An inactive CKP signal will cause a no start condition.
<b>147 — Incorrect CKP Signal Signature</b>	An inactive CKP signal during cranking is detectable by the PCM. During engine cranking the PCM monitors the CMP signal and injection control pressure to verify the engine is rotating. If the CKP signal is inactive during this time a DTC will be set. Electrical noise can also be detected by the PCM. If the level is sufficient to affect engine operation, a corresponding DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 147 is set by the PCM when the CKP signal has too few or many transitions per engine rotation.</li> <li>• DTC 147 can be set due to an electrical noise in the CKP circuit or a defective CKP sensor.</li> </ul>	An inactive CKP signal will cause a no start condition.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>151 — Barometric Absolute Pressure Signal Out Of Range High</b>	When the PCM detects the BAP voltage signal out of range high, the PCM will ignore the BAP signal and use the Manifold Absolute Pressure (MAP) signal generated at low idle as an indication of barometric pressure. When a MAP fault is detected, the BAP signal will default to barometric pressure at sea level, 100.24 kPa (29.6 in Hg).	<ul style="list-style-type: none"> <li>• DTC 151 is set when the BAP signal is greater than 4.95 volts for more than 0.5 seconds.</li> <li>• DTC 151 can be set when the signal circuit is shorted to VREF or B+. A defective BAP sensor can also set DTC 151.</li> <li>• When DTC 151 is set the amber ENGINE indicator is illuminated.</li> </ul>	The PCM monitors voltage on VREF A and will adjust signal values for the sensors that use VREF A for operation. If a sensor or circuit pulls VREF less than 5 volts, the PCM may set out of range high DTCs for the sensors that operate on VREF B (APS, BAP, B+, and VSS).
<b>152 — Barometric Absolute Pressure Signal Out Of Range Low</b>	When the PCM detects the BAP voltage signal out of range low, the PCM will ignore the BAP signal and use the Manifold Absolute Pressure (MAP) signal generated at low idle as an indication of barometric pressure. When a MAP fault is detected, the BAP signal will default to barometric pressure at sea level, 100.24 kPa (29.6 in Hg).	<ul style="list-style-type: none"> <li>• DTC 152 can be set when the signal circuit is shorted to ground or open. If VREF is shorted to ground, DTC 152 can be set. A defective BAP sensor can set DTC 152.</li> <li>• When DTC 152 is set the amber ENGINE indicator is illuminated.</li> </ul>	DTC 152 is set when the BAP signal is less than 1.0 volts for more than 0.5 seconds.
<b>154 — Inlet Air Temperature Signal Out Of Range Low</b>	When the PCM detects an IAT signal out of range low, the PCM will ignore the IAT signal and assume an ambient temperature of 25°C (77°F).	<ul style="list-style-type: none"> <li>• DTC 154 can be set due to a short to ground in the signal circuit or a defective IAT sensor.</li> <li>• When DTC 154 is set, the amber ENGINE indicator is illuminated.</li> </ul>	DTC 154 is set by the PCM if signal voltage is less than 0.127 volts for more than 0.35 seconds. When DTC 154 is set, the PCM will default to 25°C (77°F) for starting
<b>155 — Inlet Air temperature Signal Out Of Range High</b>	When the PCM detects an IAT signal out of range high, the PCM will ignore the IAT signal and assume an ambient temperature of 25°C (77°F).	<ul style="list-style-type: none"> <li>• DTC 155 can set due to an open signal or ground circuit, a short to a voltage source, or a defective sensor.</li> <li>• When DTC 155 is active, the amber ENGINE indicator is illuminated.</li> </ul>	DTC 155 is set by the PCM if signal voltage is greater than 4.6 volts for more than 0.35 seconds. When DTC 155 is set, the PCM will default to a value of 25°C (77°F) for starting.
<b>161 — Manifold Air Temperature Signal Out Of Range Low</b>	The PCM continuously monitors the signal of the MAT sensor to determine if the signal is within an expected range. If the PCM detects the signal voltage is higher or lower than expected, the PCM will set a DTC.	<ul style="list-style-type: none"> <li>• DTC 161 can be set due to a short to ground in the signal circuit or a defective sensor.</li> <li>• When DTC 161 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 161 is set by the PCM when the signal voltage is less than 0.098 volts for more than 0.35 seconds.

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>162 — Manifold Air Temperature Signal Out Of Range High</b>	The PCM continuously monitors the signal of the MAT sensor to determine if the signal is within an expected range. If the PCM detects the signal voltage is higher or lower than expected, the PCM will set a DTC.	<ul style="list-style-type: none"> <li>• DTC 162 can be set due to an open signal or ground circuit, short to a voltage source, or a defective sensor.</li> <li>• When DTC 162 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 162 is set by PCM when the signal voltage is greater than 4.58 volts for more than 0.35 seconds.
<b>163 — Exhaust Gas Recirculation Valve Position Signal Out Of Range Low</b>	The EGRP sensor is calibrated to zero position each time the key is cycled to allow compensation if carbon deposits develop on the valve. If the deposits get so heavy that the position is out of range to zero, a DTC will be set, the valve will close. When the EGRP signal voltage is detected out of range high or low, the PCM will cause the engine to ignore the EGRP signal and the EGR valve will close.	<ul style="list-style-type: none"> <li>• DTC 163 is set by the PCM when the EGRP voltage is greater than 0.3 volts for more than 0.35 seconds.</li> <li>• DTC 163 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open VREF circuit or a VREF circuit short to ground.</li> <li>• When DTC 163 is active the amber ENGINE indicator is illuminated.</li> </ul>	The EGR actuator can be tested for a stuck or sticking valve by performing an Output State Low Test while monitoring EGRP percentage. Refer to <b>Section 4</b> Performance Diagnostics.
<b>164 — Exhaust Gas Recirculation Valve Position Signal Out Of Range High</b>	The EGRP sensor is calibrated to zero position each time the key is cycled to allow compensation if carbon deposits develop on the valve. If the deposits get so heavy that the position is out of range to zero, a DTC will be set, the valve will close. When the EGRP signal voltage is detected out of range high or low, the PCM will cause the engine to ignore the EGRP signal and the EGR valve will close.	<ul style="list-style-type: none"> <li>• DTC 164 is set by the PCM when the EGRP voltage is greater than 4.5 volts for more than 0.35 seconds.</li> <li>• DTC 164 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open VREF circuit or VREF short to ground.</li> <li>• When DTC 164 is active the amber ENGINE indicator is illuminated.</li> </ul>	The EGR actuator can be tested for a stuck or sticking valve by performing an Output State Low Test while monitoring EGRP percentage. Refer to <b>Section 4</b> Performance Diagnostics.
<b>211 — Engine Oil Pressure Signal Out Of Range Low</b>	When the EOP signal voltage is detected out of range low, the PCM will cause the engine to ignore the EOP signal and disable the Engine Warning and Protection System (EWPS).	<ul style="list-style-type: none"> <li>• DTC 211 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open VREF circuit or VREF short to ground.</li> <li>• When DTC 211 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 211 is set by the PCM when the EOP signal is less than 0.039 volts for more than 0.35 seconds.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>212 — Engine Oil Pressure Signal Out Of Range High</b>	When the EOP signal voltage is detected out of range high, the PCM will cause the engine to ignore the EOP signal and disable the Engine Warning and Protection System (EWPS).	<ul style="list-style-type: none"> <li>• DTC 212 can be set due to an open signal ground circuit, short to a voltage source on the ICP signal circuit, or a defective sensor.</li> <li>• When DTC 212 is set the amber ENGINE indicator is illuminated.</li> </ul>	DTC 212 is set by the PCM when the EOP signal is greater than 4.9 volts for more than 0.35 seconds.
<b>215 — Vehicle Speed Sensor Signal Frequency Out Of Range High</b>	The PCM performs diagnostic checks on the VSS circuit when the engine is operating at 0 mph. The PCM transmits a voltage signal on the VSS circuit and determines if the return voltage is out of range high or low. When a fault condition is detected, the PCM disables the cruise control and power takeoff. If the road speed limiting option is enabled, the PCM will limit engine rpm for all gears.	<ul style="list-style-type: none"> <li>• DTC 215 is set by the PCM when the PCM detects a VSS signal greater than 4365 Hz.</li> </ul>	The PCM will not set DTCs for VSS circuit failure for vehicles equipped with Allison MD (WTEC) and 2000 series transmissions. Vehicles equipped with MD transmissions only diagnose the communication circuit (CAN 1) between the engine and transmission module.
<b>225 — EOP Sensor Signal In Range Fault</b>	When the EOP signal voltage is detected out of range high, the PCM will cause the engine to ignore the EOP signal and disable the Engine Warning and Protection System (EWPS).	<ul style="list-style-type: none"> <li>• DTC 225 is set by the PCM when the EOP signal voltage is higher than expected with the key ON and the engine OFF.</li> <li>• DTC 225 can be set due to a biased circuit or a defective EOP sensor.</li> <li>• When DTC 225 is active the amber ENGINE indicator is illuminated.</li> </ul>	KOEO Engine oil pressure is greater than 15 psi.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>231 Data Communication Link Error</b>	The PCM continuously monitors the datalink for an open, short or intermittent connection. If an active DTC occurs on the datalink, the diagnostic software will not display correct data.	<ul style="list-style-type: none"> <li>• DTC 231 is set when the PCM cannot access the datalink. When this occurs, data cannot be retrieved using the scan tool. DTCs can only be retrieved using the cruise control feature.</li> <li>• DTC 231 can be set when the any of the following conditions occur:               <ul style="list-style-type: none"> <li>• Defective device (transmission controller or anti-lock brake controller) is connected to the bus and pulls signal to ground.</li> <li>• Number of devices exceeds limit</li> <li>• Defective PCM</li> </ul> </li> <li>• When DTC 231 is active the amber ENGINE indicator is not illuminated.</li> </ul>	Vehicles equipped with the Allison WTEC transmission may display DTC 231 when attempting to program the PCM. The WTEC controller must be disconnected when programming the engine PCM.
<b>236 ECL Switch Circuit Fault</b>	The PCM continuously monitors the ECL circuit for in-range faults. The PCM does not detect open or short circuits in the ECL system. When the PCM detects an in-range fault, DTC 236 will be set.	<ul style="list-style-type: none"> <li>• DTC 236 can be set when a high resistance connection or intermittent short to ground in the circuit exists.</li> <li>• DTC 236 will not cause the red ENGINE indicator to illuminate. If the condition is intermittent, the DTC will be logged as inactive.</li> </ul>	Signal voltage was greater than 3.4 volts or less than 4.3 volts more than 2.0 seconds.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>241 — Injection Control Pressure Regulator Output Circuit Check (OCC) Self-test Failed</b>	An open or short to ground in the EGR control circuit can be detected by an on demand output circuit check during KOEO Standard tests. If there is a circuit fault detected a DTC will be set. When the engine is running, the PCM can detect if the injection control pressure is equal to the desired pressure. When the measured injection control pressure does not compare to the desired pressure, the PCM will ignore the measured ICP signal and control the engine with the desired value.	<ul style="list-style-type: none"> <li>• DTC 241 is set by the PCM when the OCC test has failed after the KOEO Standard test has been run.</li> <li>• DTC 241 can be set when a poor connection to the IPR solenoid or defective IPR coil exists.</li> <li>• When DTC 241 is set the engine will not run and the amber ENGINE indicator will not be illuminated.</li> </ul>	Output Circuit Check detected indicates high or low resistance in circuit.
<b>246 — Engine Fan Output Circuit Check (OCC) Self-test Failed</b>	An open or short to ground in the EFAN can be detected by the PCM during an on-demand engine standard test. The IAT and ECT are monitored continuously. If a DTC is detected in the IAT or ECT, the EFAN control is disabled and the engine fan is on all the time.	<ul style="list-style-type: none"> <li>• DTC 246 is set by the PCM only during the KOEO Standard test. During this test the PCM performs an output circuit test that momentarily enables the EFAN solenoid and measures the voltage drop across the relay</li> </ul>	Before diagnosing, verify the PCM is programmed correctly. Verify the vehicle has an electronic fan.
<b>251 — Glow Plug Control Output Circuit Check (OCC) Self-test Failed</b>	An open or short to ground in the glow plug relay circuit can be detected by an on demand output circuit check performed during the KOEO Standard tests. When a circuit fault is detected, a DTC will be set.	<ul style="list-style-type: none"> <li>• DTC 251 can be set for an open or shorted GPC signal circuit, an open feed circuit, or an open glow plug relay coil.</li> </ul>	Glow plug and glow plug harness problems cannot be detected by the PCM.
<b>256 — Radiator Shutter Enable Output Circuit Check (OCC) Self-test Failed</b>	A fault in the Radiator Shutter Enable (RSE) circuit can be detected by an on demand output circuit check during KOEO Standard test.	<ul style="list-style-type: none"> <li>• DTC 256 can be set when an open, short to a voltage source or short to ground in the RSE circuit exists.</li> <li>• DTC 256 can be set due to a defective relay.</li> </ul>	RSE output circuit check self-test failed.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>261 — Variable Geometry Turbo Output Circuit Check (OCC) Self-test Failed</b>	An open or short to ground in the VGT control circuit can be detected by an on demand output circuit check during KOEO Standard tests. If there is a circuit fault detected a DTC will be set. When the engine is running, the PCM can detect if the exhaust back pressure is equal to the desired pressure. When the measured exhaust back pressure does not compare to the desired pressure, the PCM will ignore the measured EBP signal and will control the engine with the desired value.	<ul style="list-style-type: none"> <li>DTC 261 can be set when an open or short to ground in the VGT control circuit or a defective VGT coil exists.</li> </ul>	DTC 261 can be set when a poor connection to the VGT solenoid exists.
<b>264 — Exhaust Gas Recirculation Output Circuit Check (OCC) Self-test Failed</b>	An open or short to ground in the EGR control circuit can be detected by an on demand output circuit check during KOEO standard test. If there is a circuit fault detected a DTC will be set.	<ul style="list-style-type: none"> <li>DTC 264 can be set due to open or short to ground, short to a voltage source in the EGR control circuit, or a defective coil.</li> </ul>	EGR output circuit check self-test failed.
<b>267 — Engine Crank Inhibit Output Circuit Check (OCC) Self-test Failed</b>	When the on demand engine on standard test is performed, an open or short to ground can be detected on the coil side of the ECI relay.	<ul style="list-style-type: none"> <li>DTC 267 can be set due to an open or short to ground on the coil side of the ECI relay.</li> </ul>	If the engine cranks when the start switch is engaged, check for failed ECI relay or problems with the PCM or PCM wiring harness.
<b>311 — Engine Oil Temperature Signal Out Of Range Low</b>	The EOT sensor provides a feedback signal to the PCM indicating engine oil temperature. The PCM monitors the EOT signal to control fuel quantity and timing throughout the operating range of the engine. During engine operation, if the PCM recognizes that the EOT signal is lower or higher than the expected value it will set a DTC.	<ul style="list-style-type: none"> <li>DTC 311 can be set due to a sensor signal wire short to ground or a defective EOT sensor.</li> <li>When DTC 311 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 311 is set by the PCM when the EOT signal is less than 0.2 volts for more than 0.35 seconds.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>312 — Engine Oil Temperature Signal Out Of Range High</b>	The EOT sensor provides a feedback signal to the PCM indicating engine oil temperature. The PCM monitors the EOT signal to control fuel quantity and timing throughout the operating range of the engine. During engine operation, if the PCM recognizes that the EOT signal is lower or higher than the expected value it will set a DTC.	<ul style="list-style-type: none"> <li>• DTC 312 can be set due to a signal or ground circuit open, a short to a voltage source, or a defective EOT sensor.</li> <li>• When DTC 312 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 312 is set by the PCM when the EOT signal is greater than 4.8 volts for more than 0.35 seconds.
<b>313 — Engine Oil Pressure Below Warning Level</b>	<ul style="list-style-type: none"> <li>• DTC 313 is set by the PCM when the oil pressure has dropped below the warning level. The specifications for the warning level are :                             <ul style="list-style-type: none"> <li>• 34 kPa (5.0 psi) @ 700 rpm</li> <li>• 69 kPa (10.0 psi) @ 1400 rpm</li> <li>• 138 kPa (20.0 psi) @ 2000 rpm</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• DTC 313 can be set due to a defective sensor sending an incorrect signal. Low oil pressure due to defective mechanical components will also set DTC 313.</li> <li>• The PCM illuminates the red ENGINE indicator and sounds an audible alarm.</li> </ul>	Compare the actual oil pressure to the reading on the data list of the scan tool.
<b>314 — Engine Oil Pressure Below Critical Level</b>	<ul style="list-style-type: none"> <li>• DTC 314 is set by the PCM when the oil pressure has dropped below the critical level. The specification for the critical level is:                             <ul style="list-style-type: none"> <li>• 14 kPa (2.0 psi) @ 700 rpm</li> <li>• 34 kPa (5.0 psi) @ 1400 rpm</li> <li>• 152 kPa (12.0 psi) @ 2000 rpm</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• DTC 314 can be set due to a defective sensor sending an incorrect signal. Low oil pressure due to defective mechanical components will also set DTC 314.</li> <li>• The PCM illuminates the red ENGINE indicator and sounds an audible alarm.</li> </ul>	Compare the actual oil pressure to the reading on the data list of the scan tool.
<b>315 — Engine Speed Above Warning level</b>	DTC 315 is set by the PCM when the engine rpm has exceeded 3350 rpm.	<ul style="list-style-type: none"> <li>• DTC 315 can be set due to any of the following conditions:                             <ul style="list-style-type: none"> <li>• Excessive engine speed in an unintended downshift.</li> <li>• Steep acceleration downhill without correct brake application.</li> <li>• External fuel source being ingested into air intake system.</li> </ul> </li> <li>• When DTC 315 is active the amber ENGINE indicator is illuminated.</li> </ul>	The engine hours and miles of the last two over speed occurrences will be recorded in the Engine Event Log.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>316 — Engine Coolant Temperature Unable To Reach Commanded Set Point</b>	<ul style="list-style-type: none"> <li>• DTC 316 is set if the engine does not reach operating temperature. DTC 316 will only be set with engines that have cold ambient protection (CAP) strategy enabled. DTC 316 is set after the engine has run for more than 120 minutes and has not exceeded the following specifications for engine coolant temperature:                             <ul style="list-style-type: none"> <li>• Manual transmission 65° C (149° F)</li> <li>• Automatic transmission 60° C (140° F)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• DTC 316 can be set due to any of the following conditions:                             <ul style="list-style-type: none"> <li>• Extended idle time.</li> <li>• Cold ambient temperatures (may require use of winter front).</li> <li>• Thermostat stuck in open position.</li> <li>• Incorrectly plumbed cooling system (thermostat bypassed).</li> <li>• Fan clutch locked on.</li> </ul> </li> </ul>	DTC 316 only indicates the engine has not been able to reach operating temperature. It does not indicate an electronic fault.
<b>321 — Engine Coolant Temperature Above Warning Level</b>	DTC 321 is set by the PCM when the engine coolant temperature is above 109°C (228°F).	<ul style="list-style-type: none"> <li>• The PCM illuminates the red ENGINE indicator and sounds the audible alarm.</li> <li>• When the temperature drops below 109°C (228°F) the DTC will become inactive.</li> </ul>	The PCM will log the engine hours and odometer reading at the time of occurrence.
<b>322 — Engine Coolant Temperature Above Critical Level</b>	DTC 322 is set by the PCM when the engine coolant temperature is above 112.5°C (234.5°F).	<ul style="list-style-type: none"> <li>• The PCM illuminates the red ENGINE indicator and sounds the audible alarm.</li> <li>• When the temperature drops below 112.5°C (234.5°F) the DTC will become inactive.</li> </ul>	The PCM will log the engine hours and odometer reading at the time of occurrence.
<b>323 — Engine Coolant Level Below Warning/Critical Level</b>	DTC 323 is set by the PCM when coolant is low. When the EWPS mode is 3-way protection and DTC 323 is active, the engine will shutdown.	<ul style="list-style-type: none"> <li>• When the coolant has returned to correct levels, DTC 323 will become inactive. The PCM will log the engine hours and odometer reading at the time of occurrence. After the shutdown, the engine can be restarted for thirty seconds.</li> </ul>	If coolant level is correct, an ECL signal shorted to ground can cause DTC 323.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>324 — Idle Shutdown Timer Enabled Engine Shutdown</b>	The IST feature is internal to the PCM. The subsystems that contribute to the IST strategy have their own fault codes. The fault code for the IST is not a system diagnostic trouble code. The IST fault code is only set to indicate that the IST has been activated and the engine has shutdown.	<ul style="list-style-type: none"> <li>DTC 324 is set by the PCM when the engine has been shutdown due to exceeding the programmed idle time criteria. The IST feature must be enabled for DTC 324 to be displayed.</li> </ul>	DTC 324 does not indicate any system or circuit DTCs. Diagnostic checks are not required for DTC 324.
<b>DTC 325 — Power Reduced - Matched To Cooling System Performance</b>	DTC 325 is set by the PCM when the cooling system temperature exceeds 107°C (225°C). At this temperature the PCM will reduce the fuel delivered to the engine.	<ul style="list-style-type: none"> <li>When the temperature drops below 107°C (225°C ) the DTC will become inactive and the engine will return to normal operation.</li> </ul>	For each Celsius degree of temperature the fuel will be reduced 6%. This reduces the heat produced by the engine and reduces the burden on the cooling system. The vehicle speed will also be reduced and allow the operator to downshift and increase the efficiency of the cooling system. As the temperature is reduced the compensation level is reduced until the temperature drops below 107°C (225°F ) and normal operation is resumed.
<b>DTC 331 - Injection Control Pressure Above System Working Range</b>	DTC 331 is set by the PCM when the injection control pressure is above normal working range of 25 MPa (3675 psi). When DTC 331 is active, the PCM will ignore feedback from the ICP sensor and control the IPR valve from programmed default values.	<p>DTC 331 can be an indicator of a problem in the mechanical injection control pressure system, wiring, or ICP sensor. Possible causes for DTC 331 include the following:</p> <ul style="list-style-type: none"> <li>Debris in engine</li> <li>Incorrect grade of oil</li> <li>Defective, stuck or plugged inlet on the IPR valve</li> <li>IPR control wire shorted to ground</li> <li>ICP sensor or circuit causing signal to be biased high</li> </ul> <p>The amber ENGINE indicator will be illuminated when DTC 331 is active.</p>	Check oil level for contamination, debris, and correct API classification.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>332 — Injection Control Pressure Above Specification With Engine Not Running</b>	DTC 332 is set by the PCM, if the voltage signal from the ICP sensor is higher than expected with the key on engine off.	<ul style="list-style-type: none"> <li>• DTC 332 can be caused by a defective sensor, a biased circuit, or momentary loss of the CMP/CKP signal.</li> <li>• When DTC 332 is active the amber ENGINE indicator is illuminated.</li> </ul>	If the PCM sets DTC 332, the PCM will ignore the ICP signal and operate the IPR with fixed values based on engine operating conditions.
<b>333 — Injection Control Pressure Above/below Desired Level</b>	DTC 333 is set by the PCM when the measured pressure does not match the pressure expected by the PCM. DTC 333 will be set if the measured value is less than or greater than 2.5 MPa (362 psi) of desired injection control pressure for a period greater than 7 seconds. When DTC 333 is active, the PCM will ignore feedback from the ICP sensor and control the IPR valve from programmed default values.	<ul style="list-style-type: none"> <li>• Low oil level in crankcase.</li> <li>• Contaminated engine oil.</li> <li>• Debris in engine oil.</li> <li>• Aerated engine oil.</li> <li>• Trapped air in the ICP system (particularly after an injector or high pressure pump replacement).</li> <li>• Intermittent IPR valve wiring connection. Spread IPR harness terminals at valve, poorly crimped terminals, or pulled back pins.</li> <li>• Defective or stuck injection pressure regulator.</li> <li>• Leaks in ICP system.</li> <li>• Problem with ICP sensor or sensor circuit, incorrect sensor, system biased high or low.</li> <li>• Defective high pressure hydraulic pump.</li> <li>• The amber ENGINE indicator will be illuminated when DTC 333 is active.</li> </ul>	If ICP system was serviced, vehicle should be operated 20 miles to validate system performance.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>334 — ICP Unable To Reach Set Point (Poor Performance)</b>	DTC 334 indicates an injection control system response time fault and may be set during normal engine operation through the continuous monitor function or during the Engine Running Standard Test. DTC 334 compares measured ICP to desired ICP and looks for a large pressure difference of 9 MPa (1300 psi) for a period of 3 seconds. When DTC 334 is active, the PCM ignores the ICP sensor and controls the IPR valve operation from programmed default values.	<ul style="list-style-type: none"> <li>• Low oil level in crankcase.</li> <li>• Contaminated engine oil.</li> <li>• Debris in engine oil.</li> <li>• Aerated engine oil.</li> <li>• Trapped air in the ICP system (particularly after an injector or high pressure pump replacement)</li> <li>• Intermittent IPR valve wiring connection. Spread IPR harness terminals at valve, poorly crimped terminals, or pulled-back pins.</li> <li>• Defective or stuck injection pressure regulator.</li> <li>• Leaks in ICP system.</li> <li>• Problem with ICP sensor or sensor circuit, incorrect sensor, system biased high or low.</li> <li>• Defective high pressure hydraulic pump.</li> </ul>	DTC 344 can be set due to a plugged EBP sensor or a restriction in the tube leading to the sensor. To check for this condition, remove the sensor and tube and inspect for carbon deposits.
<b>335 — ICP Unable To Build Pressure During Cranking</b>	DTC 335 is set after the PCM detects 8 to 10 seconds of engine cranking with less than 5 MPa (725 psi) of ICP. Engine cranking speed must be greater than 130 rpm before diagnostic trouble code detection can begin.	<ul style="list-style-type: none"> <li>• Low oil level in crankcase</li> <li>• No lube oil pressure or lube oil delivery (reservoir empty or not filling)</li> <li>• Trapped air in the ICP system (particularly after an injector or high pressure pump replacement)</li> <li>• Leaks in ICP system</li> <li>• Defective or stuck injection pressure regulator</li> <li>• Loose high pressure hydraulic pump gear</li> <li>• Defective high pressure hydraulic pump</li> </ul>	Engine cranking time varies with engine temperature. Verify ICP sensor and IPR wiring is connected. Check for oil leaks. Verify if system has been recently serviced (air entrapment). If ICP system was serviced, vehicle should be operated 20 miles to validate system performance.
<b>341 — Exhaust Back Pressure Signal Out Of Range Low</b>	When the EBP signal voltage is detected out of range low, the PCM will cause the engine to ignore the EBP signal. The EGR valve will close and the PCM will rely on the VGT pre-programmed values.	<ul style="list-style-type: none"> <li>• DTC 341 can be set due to an open or short to ground on the signal circuit, a defective sensor or an open VREF circuit or VREF short to ground.</li> <li>• When DTC 341 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 341 is set by the PCM when the EBP signal is less than 0.039 volts for more than 0.5 seconds.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>342 — Exhaust Back Pressure Signal Out Of Range High</b>	When the EBP signal voltage is detected out of range high, the PCM will cause the engine to ignore the EBP signal. The EGR valve will close and the PCM will rely on the VGT pre-programmed values.	<ul style="list-style-type: none"> <li>• DTC 342 can be set due to an open signal ground circuit, short to a voltage source on the EBP signal circuit, or a defective sensor.</li> <li>• When DTC 342 is active the amber ENGINE indicator is illuminated.</li> </ul>	DTC 342 is set by the PCM when the EBP signal is greater than 4.9 volts for more than 0.5 seconds.
<b>343 — Excessive Exhaust Back Pressure (Gauge)</b>	DTC 343 is set by the PCM when the exhaust backpressure is greater than 260 kPa (37.7 psi).	<ul style="list-style-type: none"> <li>• EBP sensor bias high</li> <li>• EBP signal ground open</li> <li>• Exhaust restriction (muffler or catalytic converter)</li> <li>• VGT valve or vanes stuck closed</li> <li>• VGT Control Circuit short to B</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>344 — Exhaust Back Pressure Above Specification When Engine Off</b>	DTC 344 is set by the PCM when the EBP is greater than 300 kPa (43.5 psi) when engine is off or being cranked.	<ul style="list-style-type: none"> <li>• EBP sensor bias high</li> <li>• EBP sensor or tube line plugged</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>345 — Faults Detected During VGT Portion Of The AMS Test</b>	DTC 345 is set by the PCM during the AMS test when the PCM measures the EBP and does not see the expected response in pressures.	<ul style="list-style-type: none"> <li>• Oil pressure and quality</li> <li>• High intake restriction</li> <li>• Intake/CAC system leak (pipes, loose clamps, hoses)</li> <li>• Exhaust system leak</li> <li>• MAP sensor bias</li> <li>• EBP sensor bias</li> <li>• EGR stuck open</li> <li>• VGT valve or vanes sticking</li> <li>• EBP sensor or tube plugged</li> <li>• Power cylinder integrity</li> <li>• VGT control circuit</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>346 - Faults Detected During EGR Portion Of AMS Test</b>	DTC 346 is set by the PCM during AMS test when the PCM measures EBP and EGRP and does not see the expected response in pressures versus position.	<ul style="list-style-type: none"> <li>• EGR valve stuck or sticking</li> <li>• EGR valve position sensor bias</li> <li>• EBP sensor bias</li> <li>• EBP sensor or tube plugged</li> <li>• EGR control circuit</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>351 - Change In Exhaust Back Pressure Did Not Occur When Expected</b>	DTC 351 is set by the PCM when less than 14.5 kPa (2.1 psi) is detected between key ON and 2500 rpm.	<ul style="list-style-type: none"> <li>• EBP tube or sensor plugged</li> <li>• EBP sensor bias</li> <li>• EGR valve stuck open</li> <li>• Exhaust system leak</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>353 - Variable Geometry Turbo Control Over Duty Cycle</b>	DTC 353 is set when the PCM overcompensates by increasing duty cycle to the VGT to achieve desired boost/backpressure	<ul style="list-style-type: none"> <li>• Oil pressure and quality</li> <li>• High intake restriction</li> <li>• Intake/CAC system leak (pipes, loose clamps, hoses)</li> <li>• Exhaust system leak</li> <li>• BAP sensor bias low</li> <li>• MAP sensor bias low</li> <li>• EBP sensor bias low</li> <li>• ICP sensor bias high</li> <li>• Power cylinder integrity</li> <li>• ICP system integrity</li> <li>• Injector operation/part number</li> <li>• EGR valve stuck open</li> <li>• VGT valve or vanes sticking</li> <li>• VGT control circuit open</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>354 — Variable Geometry Turbo Control Under Duty Cycle</b>	DTC 354 is set when the PCM overcompensates by decreasing duty cycle to the VGT to achieve the desired boost/backpressure.	<ul style="list-style-type: none"> <li>• Oil pressure and quality.</li> <li>• BAP sensor bias high.</li> <li>• MAP sensor bias high.</li> <li>• EBP sensor bias high.</li> <li>• Open exhaust (no muffler).</li> <li>• ICP sensor bias low.</li> <li>• ICP system integrity.</li> <li>• Injector operation/part number</li> <li>• Exhaust restriction (muffler or catalytic converter)</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>355 — Variable Geometry Turbo Overspeed</b>	DTC 355 is set when the PCM detects turbo over speed several times in a specific period of time (dependent on PCM calibration). Turbo speed is estimated by engine speed, boost pressure, and barometric pressure.	<ul style="list-style-type: none"> <li>• High intake restriction</li> <li>• Intake/CAC system leak (pipes, loose clamps, hoses)</li> <li>• Restricted CAC system</li> <li>• VGT valves or vanes sticking</li> <li>• Open exhaust (no muffler)</li> <li>• BAP sensor bias</li> <li>• MAP sensor bias high</li> <li>• EBP sensor bias low</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.

(Continued)

## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>361 - VGT Control Input (MAP/EBP) Above/Below Desired Level</b>	DTC 361 is set when the PCM detects an in range error in the MAP/EBP signal.	<ul style="list-style-type: none"> <li>• High intake restriction</li> <li>• Intake/CAC system leak (pipes, loose clamps, hoses)</li> <li>• BAP sensor bias</li> <li>• MAP sensor bias</li> <li>• EBP sensor bias</li> <li>• Power cylinder integrity</li> <li>• ICP system integrity.</li> <li>• Injector operation/part number</li> <li>• EGR valve stuck open</li> <li>• VGT valve or vanes sticking</li> <li>• VGT control circuit open</li> <li>• Open exhaust (no muffler)</li> <li>• Exhaust restriction or leak (muffler or catalytic converter)</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>DTC 365 - EGR Valve Position Above/Below Desired Level</b>	DTC 365 is set when the actual EGR valve position does not match desired position.	<ul style="list-style-type: none"> <li>• EGR valve stuck or sticking</li> <li>• EGR valve position sensor bias</li> <li>• EBP sensor or tube plugged</li> <li>• EBP sensor bias</li> <li>• EGR control circuit</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>DTC 366 - EGR Valve Duty Operating Out Of Expected Range</b>	DTC 366 is set when the PCM has overcompensated by increasing or decreasing EGR duty to achieve the desired EGRP.	<ul style="list-style-type: none"> <li>• EGR valve stuck</li> <li>• EGR valve sluggish</li> <li>• EGR valve position sensor error</li> <li>• Exhaust leak</li> <li>• BAP sensor bias</li> <li>• EBP sensor bias</li> <li>• MAP sensor bias</li> <li>• EGR cooler restriction/leak</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>DTC 367 - Improper Position Signal When EGR Valve Is Expected Closed</b>	DTC 367 is set when the PCM detects the EGR valve position is out of desired range during initial key ON (signal voltage greater than 2.5 volts).	<ul style="list-style-type: none"> <li>• EGR valve stuck open</li> <li>• EGR valve position sensor bias high</li> </ul>	Make sure all sensor, injector and actuator electrical DTCs have been repaired.
<b>421 through 428 — Cylinder #1 through Cylinder #8 High Side To Low Side Open</b>	DTC 421-428 is set by the PCM when the rising time is too long on open or close coil.	<ul style="list-style-type: none"> <li>• DTC 421-428 usually indicates a harness or coil is open.</li> </ul>	The last digit in the injector DTC corresponds to the cylinder where a fault has been detected.
<b>431 through 438 — Cylinder #1 through Cylinder #8 High Side Shorted To Low Side</b>	DTC 431-438 is set by the PCM when the rising time to 20 amps is short, but not zero on the open or close coil.	<ul style="list-style-type: none"> <li>• DTC 431-438 usually indicates an internally shorted coil</li> </ul>	The last digit in the injector DTC corresponds to the cylinder where a fault has been detected.

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>451 through 458 — Cylinder #1 through Cylinder #8 High Side Short To Ground Or VPWR</b>	DTC 451-458 is set by the PCM when the rising time to 20 amps is zero on the open or close coil.	<ul style="list-style-type: none"> <li>DTC 451-458 usually indicates the harness or coil is shorted to ground</li> </ul>	The last digit in the injector DTC corresponds to the cylinder where a fault has been detected.
<b>523 — IDM VPWR Voltage Low</b>	The IDM internally monitors battery voltage. When the IDM continuously receives less than 7 volts, a DTC will be set.	<ul style="list-style-type: none"> <li>DTC 523 can be set due to poor connections between the IDM terminal X3-7 and the ignition switch.</li> </ul>	DTC 523 is set by the PCM when the voltage from the ignition switch is less than 7 volts.
<b>525 — IDM Fault</b>	DTC 525 is set by the PCM when there is an internal IDM failure.	<ul style="list-style-type: none"> <li>IDM</li> </ul>	When DTC 525 is set, install a new IDM.
<b>533 — IDM Relay Voltage High</b>	DTC 533 is set by the PCM when the voltage from the IDM power relay exceeds 16 volts.	<ul style="list-style-type: none"> <li>DTC 533 can be set due to a generator voltage output of greater than 16 volts or an incorrect external battery connections exist.</li> </ul>	DTC 533 can be set when jump starting the engine
<b>534 — IDM Relay Voltage Low<sup>a</sup></b>	DTC 534 is set by the PCM when the voltage from the IDM power relay is less than 7 volts.	<ul style="list-style-type: none"> <li>DTC 534 can be set due to a defective generator, IDM power relay, discharged batteries or increased resistance in the battery feed circuits</li> </ul>	IDM relay voltage is less than 7 volts.
<b>543 — PCM/IDM Communications Fault</b>	DTC 543 is set by the PCM when the PCM is not communicating with the IDM.	<ul style="list-style-type: none"> <li>DTC 543 can be set when the CAN 2 lines between the PCM and IDM are shorted to ground, VREF, battery or the current is open.</li> <li>When DTC 543 is active the amber ENGINE indicator is illuminated.</li> </ul>	If IDM power is low, DTC 543 can be set.
<b>551 — IDM/CMPO Signal Inactive</b>	DTC 551 is set by the PCM when no CMPO signal is present while the CKPO is active.	<ul style="list-style-type: none"> <li>DTC 551 can be set when the CMPO is open, or shorted to ground or shorted to a voltage source. If logic power is low, DTC 551 can be set.</li> </ul>	DTC 551 can also be set when no CMPO/CKPO is present while the PCM reports it is in the run mode.
<b>552 — IDM Incorrect CMPO Signal Signature</b>	DTC 552 is set when the CMPO transition occurs at the wrong CKPO tooth.	<ul style="list-style-type: none"> <li>DTC 552 can be set due to a camshaft incorrectly timed to crankshaft or an electrical noise creating a miscount on CMP location.</li> </ul>	The PCM continuously monitors the IDM. When the PCM fails to receive required continuous communication from the IDM, the PCM will set a DTC

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>DTC 553 — IDM CKPO Signal Inactive</b>	DTC 553 is set by the PCM when no CKPO signal is present while the CMPO is active.	<ul style="list-style-type: none"> <li>DTC 553 can be set when CKPO is open, shorted to ground, or shorted to a voltage source. DTC 553 can also be set if logic power is low.</li> </ul>	DTC 552 can also be set when no CMPO/CKPO is present while the PCM reports it is in the run mode.
<b>554 — IDM Incorrect CKPO Signal Signature</b>	DTC 554 is set by the PCM when CKPO signal has too few or too many transitions per engine rotation.	<ul style="list-style-type: none"> <li>DTC 554 can be set due to an electrical noise or a defective CKP sensor.</li> </ul>	The PCM continuously monitors the IDM. When the PCM fails to receive required continuous communication from the IDM, the PCM will set a DTC.
<b>571 through 578 — Cylinder #1 through Cylinder #8 Cylinder Balance Limit Exceeded</b>	DTC 571 through 578 is set by the PCM when the IDM is unable to adjust fuel quantity to compensate for rough idle.	<ul style="list-style-type: none"> <li>Oil pressure and quality</li> <li>Fuel pressure</li> <li>Intake restriction</li> <li>EGR system</li> <li>Exhaust system restriction</li> </ul>	When DTCs are set for Cylinder Balance all Performance Diagnostics should be performed.
<b>613 — PCM/IDM Software Not Compatible</b>	PCM/IDM software is incompatible	<ul style="list-style-type: none"> <li>Replacement of PCM or IDM</li> </ul>	Install correct PCM or IDM.
<b>614 — EFRC/PCM Configuration Mismatch</b>	Engine Family Rating Code (EFRC) does not match PCM strategy level.	<ul style="list-style-type: none"> <li>Incorrect Engine Family Rating Code (EFRC) selected for the PCM strategy programmed in the module.</li> </ul>	Check EFRC and verify that it matches the PCM strategy level. Reprogram the PCM or change the EFRC as required.
<b>621 — Engine Using Mfg. Default Rating</b>	Manufacturing defaults selected. Very low power (25 hp).	<ul style="list-style-type: none"> <li>Programmable parameters for the PCM were never programmed in module. (Usually occurs in new vehicle or new module).</li> </ul>	Program PCM.
<b>622 — Engine Using Field Default Rating</b>	Engine using Field Default Rating. Low power (lowest rating in engine class) and vehicle features not working.	<ul style="list-style-type: none"> <li>Programmable parameters for the PCM incorrectly programmed in module.</li> </ul>	Program PCM.
<b>623 — Invalid Engine Family Rating Code (EFRC)</b>	Invalid EFRC.	<ul style="list-style-type: none"> <li>Wrong EFRC selected for the PCM strategy programmed in the module</li> </ul>	Check the EFRC and verify that it matches the PCM strategy level. Reprogram the PCM or change the EFRC as necessary.
<b>624 — Field Default Active</b>	Vehicle features not functioning (Low power - lowest rating in engine class).	<ul style="list-style-type: none"> <li>Programmable parameters for the PCM incorrectly programmed in module</li> </ul>	Program PCM.

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## 6.0L Diesel Diagnostic Trouble Code (DTC) Descriptions

DTC	Description	Possible Causes	Diagnostic Aids
<b>626 — Unexpected Reset Fault</b>	DTC 626 is set when power is interrupted to the PCM. Turning the ignition OFF and then ON will cause the code to change from active to inactive status.	<ul style="list-style-type: none"> <li>• Loose or dirty connections at battery or ground cables can cause the PCM to power down</li> <li>• DTC 626 will not turn the amber ENGINE indicator on</li> <li>• Intermittent connections in the power feed wiring</li> </ul>	The scan tool can be used to display the ignition switch voltage measured by the PCM. Monitor the voltage at PCM pins X4-1 and X4-2.
<b>DTC 631 - Read Only Memory (ROM) Self-Test Fault</b>	Internal ROM fault.	<ul style="list-style-type: none"> <li>• Internal PCM fault</li> </ul>	Install a new PCM.
<b>DTC 632 - Random Access Memory (RAM) - CPU Self-Test Fault</b>	Internal RAM fault.	<ul style="list-style-type: none"> <li>• Internal PCM fault.</li> </ul>	Install a new PCM.
<b>655 — Programmable Parameter List Level Incompatible</b>	Programmable parameter list level incompatible.	<ul style="list-style-type: none"> <li>• Programming problem or internal PCM problem.</li> </ul>	Program PCM.
<b>661 — RAM Programmable Parameter List Corrupt</b>	RAM programmable parameter list corrupt. The DTC will cause a no start or the engine to run in field defaults.	<ul style="list-style-type: none"> <li>• Internal PCM problem.</li> </ul>	Install a new PCM.
<b>664 — Calibration Level Incompatible.</b>	Calibration level incompatible. The DTC will cause a no start or the engine to run in field defaults.	<ul style="list-style-type: none"> <li>• Programmable problem or internal PCM problem.</li> </ul>	Program PCM.
<b>665 — Programmable Parameter Memory Content Corrupt</b>	Programmable parameter memory content corrupt. The DTC will cause a no start or the engine to run in field defaults.	<ul style="list-style-type: none"> <li>• Internal PCM problem.</li> </ul>	Install a new PCM.