

12/6/11

BMC Cranes with Woodward Governor EFI GM supplied Engines

Error Code Retrieval

With the engine OFF. Turn the ignition key ON, do not start the engine, fully cycle the throttle pedal three (3) times within five (5) seconds to enable the display code feature of the SECM. All error codes are three (3) digit codes. When all the error codes have been displayed, code 12 will be given, the error code list will then be repeated. To exit the display mode simply turn the ignition key OFF.

Clearing Error Codes

With the engine OFF. Turn the ignition key ON, do not start the engine, fully cycle the throttle pedal five (5) times within five (5) seconds and then wait ten (10) seconds before turning the ignition key OFF.

Always wait at least five (5) seconds between turning the key OFF then back ON.

Error codes are listed on the following pages.

Table 2. Diagnostic Fault Codes (Flash Codes)

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION
			FIRST CHECK
12	NONE Signifies the end of one pass through the fault list	NONE	None, used as end of fault list identification (THIS IS THE ONLY 2 DIGIT CODE USE WITH THIS SYSTEM)
131	Inj1Open Gasoline Injector 1 open circuit, broken injector 1 wire or defective injector	(1) TurnOnMil (2) DisableLiqO2Ctrl (3) CheckEngineLight	Check INJ ₁ wiring for an open circuit SECM Pin A5 (signal) to Injector 1 Pin A Switched 12V to Injector 1 Pin B Check Injector 1 Resistance, 12 to 14 ohms (cold)
132	Inj2Open Gasoline Injector 2 open circuit, broken injector 2 wire or defective injector	(1) TurnOnMil (2) DisableLiqO2Ctrl (3) CheckEngineLight	Check INJ ₂ wiring for an open circuit SECM Pin A8 (signal) to Injector 2 Pin A Switched 12V to Injector 2 Pin B Check Injector 2 Resistance, 12 to 14 ohms (cold)
133	Inj3Open Gasoline Injector 3 open circuit, broken injector 3 wire or defective injector	(1) TurnOnMil (2) DisableLiqO2Ctrl (3) CheckEngineLight	Check INJ ₃ wiring for an open circuit SECM Pin A4 (signal) to Injector 3 Pin A Switched 12V to Injector 3 Pin B Check Injector 3 Resistance, 12 to 14 ohms (cold)
134	Inj4Open Gasoline Injector 4 open circuit, broken injector 4 wire or defective injector	(1) TurnOnMil (2) DisableLiqO2Ctrl (3) CheckEngineLight	Check INJ ₄ wiring for an open circuit SECM Pin A7 (signal) to Injector 4 Pin A Switched 12V to Injector 3 Pin B Check Injector 4 Resistance, 12 to 14 ohms (cold)
141	ECTRangeLow Coolant Sensor failure or shorted to GND	(1) TurnOnMil (2) DelayedEngine Shutdown	Check ECT sensor connector and wiring for a short to GND SECM Pin B15 (signal) to ECT Pin 1 SECM Pin B1 (Sensor GND) to ECT Pin 2 SECM Pin A16, B17 (System GND) to ECT Pin 1 or Pin 2
151	ECTRangeHigh Coolant sensor disconnected or open circuit	(1) TurnOnMil (2) DelayedEngine Shutdown	Check if ECT sensor connector is disconnected or for an open ECT circuit SECM Pin B15 (signal) to ECT Pin 1 SECM Pin B1 (Sensor GND) to ECT Pin 2
161	ECTOverTempFault Engine coolant temperature is high. The sensor has measured an excessive coolant temperature typically due to the engine overheating.	(1) TurnOnMil (2) DelayedEngine Shutdown	Check coolant system for radiator blockage, proper coolant level and for leaks in the system. Possible ECT short to GND, check ECT signal wiring SECM Pin B15 (signal) to ECT Pin 1 SECM Pin B1 (Sensor GND) to ECT Pin 2 SECM Pin A16, B17 (System GND) to ECT Pin 1 or Pin 2 Check regulator for coolant leaks

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION
			FIRST CHECK
171	ECT_IR_Fault Engine coolant temperature not changing as expected	TurnOnMil	Check for coolant system problems, e.g. defective or stuck thermostat
181	FuelSelectConflict Conflict in fuel select signals, normally set if both of the fuel select signals are shorted to	(1) TurnOnMil (2) DelayedEngine Shutdown	Check fuel select switch connection for a short to GND SECM Pin A12 (LPG signal), SECM Pin A15 (LIQ SIGNAL), and SECM Pin B1 (Sensor GND) to SECM Pin A16, B17 (System GND)
191	CamEdgesFault No CAM signal when engine is known to be rotating, broken crankshaft sensor leads or defective CAM sensor	TurnOnMil	Check CAM sensor connections SECM Pin B10 (signal) to CAM sensor Pin C SECM Pin B1 (Sensor GND) to CAM sensor Pin B SECM Pin B24 (Sensor PWR) to CAM sensor Pin A Check for defective CAM sensor
192	CamSyncFault Loss of synchronization on the CAM sensor, normally due to noise on the signal or an intermittent connection on the CAM sensor	TurnOnMil	Check CAM sensor connections SECM Pin B10 (signal) to CAM sensor Pin C SECM Pin B1 (Sensor GND) to CAM sensor Pin B SECM Pin B24 (Sensor PWR) to CAM sensor Pin A Check for defective CAM sensor
193	CrankEdgesFault No crankshaft signal when engine is known to be rotating, broken crankshaft sensor leads or defective crank sensor	TurnOnMil	Check Crankshaft sensor connections SECM Pin B5 (Crank+) to Crank sensor Pin 1 SECM Pin B6 (Crank-) to Crank sensor Pin 2 Engine GND to Crank sensor Pin 3 Check for defective Crank sensor
194	CrankSyncFault Loss of synchronization on the crankshaft sensor, normally due to noise on the signal or an intermittent connection on the crankshaft sensor	TurnOnMil	Check Crankshaft sensor connections SECM Pin B5 (Crank+) to Crank sensor Pin 1 SECM Pin B6 (Crank-) to Crank sensor Pin 2 Engine GND to Crank sensor Pin 3 Check for defective Crank sensor
199	TSC1RxTimeoutFault Loss of CAN communication with vehicle controller	TurnOnMil	Check wiring from SECM-48 CAN to vehicle controller—check for continuity on CAN Hi and CAN Lo, also confirm 120 ohm termination resistors are present at both ends Confirm vehicle controller is operational Check CAN communication with CAN monitor such as CANalyzer

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION
			FIRST CHECK
221	TPS1RangeLow TPS ₁ sensor voltage out of range low, normally set if the TPS ₁ signal has shorted to ground, circuit has opened or sensor has failed	(1) TurnOnMil (2) CutThrottle	Check throttle connector connection and TPS ₁ sensor for an open circuit or short to GND SECM Pin B23 (signal) to ETC Pin 6 SECM Pin B1 (Sensor GND) to ETC Pin 2 SECM Pin B1 (Sensor GND) to SECM Pin A16, B17 (System GND)
222	TPS2RangeLow TPS ₂ sensor voltage out of range low, normally set if the TPS ₂ signal has shorted to ground, circuit has opened or sensor has failed	(1) TurnOnMil (2) CutThrottle	Check throttle connector connection and TPS ₂ sensor for an open circuit or short to GND SECM Pin B4 (signal) to ETC Pin 5 SECM Pin B1 (Sensor GND) to ETC Pin 2 SECM Pin B1 (Sensor GND) to SECM Pin A16, B17 (System GND)
231	TPS1RangeHigh TPS ₁ sensor voltage out of range high, normally set if the TPS ₁ signal has shorted to power or the ground for the sensor has opened	(1) TurnOnMil (2) CutThrottle	Check throttle connector and TPS ₁ sensor wiring for a shorted circuit SECM Pin B23 (signal) to ETC Pin 6 SECM Pin B1 (Sensor GND) to ETC Pin 2
232	TPS2RangeHigh TPS ₂ sensor voltage out of range high, normally set if the TPS ₂ signal has shorted to power or the ground for the sensor has opened	(1) TurnOnMil (2) CutThrottle	Check throttle connector and TPS ₁ sensor wiring for a shorted circuit SECM Pin B4 (signal) to ETC Pin 5 SECM Pin B1 (Sensor GND) to ETC Pin 2
241	TPS1AdaptLoMin Learned closed throttle end of TPS ₁ sensor range lower than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 6 (signal) ($0.7 \Omega \pm 30\%$) TPS Pin 3 (Sensor PWR) to ETC Pin 6 (signal) ($1.4 \Omega \pm 30\%$)
242	TPS2AdaptLoMin Learned closed throttle end of TPS ₂ sensor range lower than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) ($1.3K \Omega \pm 30\%$) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) ($0.6K \Omega \pm 30\%$)
251	TPS1AdaptHiMax Learned WOT end of TPS ₁ sensor range higher than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) ($1.3K \Omega \pm 30\%$) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) ($0.6K \Omega \pm 30\%$)

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION
			FIRST CHECK
252	TPS2AdaptHiMax Learned WOT end of TPS ₂ sensor range higher than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)
271	TPS1AdaptHiMin Learned WOT end of TPS ₁ sensor range lower than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)
272	TPS2AdaptHiMin Learned WOT end of TPS ₂ sensor range lower than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)
281	TPS1AdaptLoMax Learned closed throttle end of TPS ₁ sensor range higher than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)
282	TPS2AdaptLoMax Learned closed throttle end of TPS ₂ sensor range higher than expected	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)
291	TPS_Sensors_Conflict TPS sensors differ by more than expected amount NOTE: The TPS is not a serviceable item and can only be repaired by replacing the DV-EV throttle assembly.	(1) TurnOnMil (2) CutThrottle	Check the throttle connector and pins for corrosion. To check the TPS, disconnect the throttle connector and measure the resistance from: TPS Pin 2 (Sensor GND) to ETC Pin 5 (signal) (1.3K Ω ± 30%) TPS Pin 3 (Sensor PWR) to ETC Pin 5 (signal) (0.6K Ω ± 30%)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
331	MAPTimeRangeLow Manifold Absolute Pressure sensor input is low, normally set if the TMAP pressure signal wire has been disconnected or shorted to ground or the circuit has opened to the SECM	TurnOnMil	Check TMAP connector and MAP signal wiring for an open circuit TMAP Pin 4 (signal) to SECM Pin B18 TMAP Pin 1 (Sensor GND) to SECM Pin B1 TMAP Pin 3 (Sensor PWR) to SECM Pin B24 Check the MAP sensor by disconnecting the TMAP connector and measuring at the sensor: TMAP Pin 1(Sensor GND) to Pin 4 (pressure signal KPA) (2.4kW - 8.2kW) TMAP Pin 3 (Sensor PWR) to Pin 4 (pressure signal KPA) (3.4kW - 8.2kW)
332	MAPRangeLow Manifold Absolute Pressure sensor input is low, normally set if the TMAP pressure signal wire has been disconnected or shorted to ground or the circuit has opened to the SECM	(1) TurnOnMil (2) EngineShutdown	Check TMAP connector and MAP signal wiring for an open circuit TMAP Pin 4 (signal) to SECM Pin B18 TMAP Pin 1 (Sensor GND) to SECM Pin B1 TMAP Pin 3 (Sensor PWR) to SECM Pin B24 Check the MAP sensor by disconnecting the TMAP connector and measuring at the sensor: TMAP Pin 1(Sensor GND) to Pin 4 (pressure signal KPA) (2.4kW - 8.2kW)
341	MAPTimeRangeHigh Manifold Absolute Pressure Sensor Input is High, normally set if the TMAP pressure signal wire has become shorted to power, shorted to the IAT signal, the TMAP has failed or the SECM has failed.	TurnOnMil	Check TMAP connector and MAP signal wiring for a shorted circuit TMAP Pin 4 (signal) to SECM Pin B18 TMAP Pin 1 (Sensor GND) to SECM Pin B1 TMAP Pin 3 (Sensor PWR) to SECM Pin B24 Check the MAP sensor by disconnecting the TMAP connector and measuring at the sensor: TMAP Pin 1(Sensor GND) to Pin 4 (pressure signal KPA) (2.4kW - 8.2kW) TMAP Pin 3 (Sensor PWR) to Pin 4 (pressure signal KPA) (3.4kW - 8.2kW)
342	MAPRangeHigh Manifold Absolute Pressure Sensor Input is High, normally set if the TMAP pressure signal wire has become shorted to power, shorted to the IAT signal, the TMAP has failed or the SECM has failed	(1) TurnOnMil (2) EngineShutdown	Check TMAP connector and MAP signal wiring for a shorted circuit TMAP Pin 4 (signal) to SECM Pin B18 TMAP Pin 1 (Sensor GND) to SECM Pin B1 TMAP Pin 3 (Sensor PWR) to SECM Pin B24 Check the MAP sensor by disconnecting the TMAP connector and measuring at the sensor: TMAP Pin 1 (Sensor GND) to Pin 4 (pressure signal KPA) (2.4kW - 8.2kW) TMAP Pin 3 (Sensor PWR) to Pin 4 (pressure signal KPA) (3.4kW - 8.2kW)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
351	MAP_IR_HI MAP sensor indicates higher pressure than expected	TurnOnMil	Check for vacuum leaks. Check that TMAP sensor is mounted properly. Possible defective TMAP sensor.
352	MAP_IR_LO MAP sensor indicates lower pressure than expected	TurnOnMil	Possible defective TMAP sensor.
353	MAP_STICKING MAP sensor not changing as expected	TurnOnMil	Check that TMAP sensor is mounted properly. Possible defective TMAP sensor.
371	IATRangeLow Intake Air Temperature Sensor Input is Low normally set if the IAT temperature sensor wire has shorted to chassis ground or the sensor has failed.	TurnOnMil	Check TMAP connector and IAT signal wiring for a shorted circuit TMAP Pin 2 (signal) to SECM Pin B12 TMAP Pin 1 (Sensor GND) to SECM Pin B1 To check the IAT sensor of the TMAP disconnect the TMAP connector and measure the IAT resistance Resistance is approx 2400 ohms at room temperature.
381	IATRangeHigh Intake Air Temperature Sensor Input is High normally set if the IAT temperature sensor wire has been disconnected or the circuit has opened to the SECM.	TurnOnMil	Check TMAP connector and IAT signal wiring for a shorted circuit TMAP Pin 2 (signal) to SECM Pin B12 TMAP Pin 1 (Sensor GND) to SECM Pin B1 To check the IAT sensor of the TMAP disconnect the TMAP connector and measure the IAT resistance Resistance is approx 2400 ohms at room temperature.
391	IAT_IR_Fault Intake Air Temperature not changing as expected	TurnOnMil	Check connections to TMAP sensor. Check that TMAP sensor is properly mounted to manifold.
421	EST1_Open EST ₁ output open, possibly open EST ₁ signal or defective spark module	TurnOnMil	Check coil driver wiring and connector for open circuit SECM Pin A9 (EST ₁) to ignition module Pin B. Verify GND on ignition module Pin C (of both connectors) Verify +12 Vdc on ignition module Pin D. Refer to application manual for specific engine details.

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
422	EST2_Open EST ₂ output open, possibly open EST ₂ signal or defective spark module	TurnOnMil	Check coil driver wiring and connector for open circuit SECM Pin A10 (EST ₂) to ignition module Pin A. Verify GND on ignition module Pin C Verify +12 Vdc on ignition module Pin D Refer to application manual for specific engine details.
423	EST3_Open EST ₃ output open, possibly open EST ₃ signal or defective spark module	TurnOnMil	Check coil driver wiring and connector for open circuit SECM Pin A3 (EST ₃) to ignition module Pin A. Verify GND on ignition module Pin C Verify +12 Vdc on ignition module Pin D Refer to application manual for specific engine details.
424	EST4_Open EST ₄ output open, possibly open EST ₄ signal or defective spark module	TurnOnMil	Check coil driver wiring and connector for open circuit SECM Pin A6 (EST ₄) to ignition module Pin A. Verify GND on ignition module Pin C Verify +12 Vdc on ignition module Pin D Refer to application manual for specific engine details.
425	EST5_Open EST ₅ output open, possibly open EST ₅ signal or defective spark module	NONE	N/A
426	EST6_Open EST ₆ output open, possibly open EST ₆ signal or defective spark module	NONE	N/A
427	EST7_Open EST ₇ output open, possibly open EST ₇ signal or defective spark module	NONE	N/A
428	EST8_Open EST ₈ output open, possibly open EST ₈ signal or defective spark module	NONE	N/A
431	EST1_Short EST ₁ output shorted high or low, EST ₁ signal shorted to ground or power or defective spark module	NONE	N/A
432	EST2_Short EST ₂ output shorted high or low, EST ₂ signal shorted to ground or power or defective spark module	NONE	N/A

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
433	EST3_Short EST ₃ output shorted high or low, EST ₃ signal shorted to ground or power or defective spark module	NONE	N/A
434	EST4_Short EST ₄ output shorted high or low, EST ₄ signal shorted to ground or power or defective spark module	NONE	N/A
435	EST5_Short EST ₅ output shorted high or low, EST ₅ signal shorted to ground or power or defective spark module	NONE	N/A
436	EST6_Short EST ₆ output shorted high or low, EST ₆ signal shorted to ground or power or defective spark module	NONE	N/A
437	EST7_Short EST ₇ output shorted high or low, EST ₇ signal shorted to ground or power or defective spark module	NONE	N/A
438	EST8_Short EST ₈ output shorted high or low, EST ₈ signal shorted to ground or power or defective spark module	NONE	N/A
440	AutocrankNoCrank No crank rpm was found during commanded autocrank	(1) TurnOnMil (2) EngineShutdown	Check wiring from SECM-48 LSO pin to low side of autocrank relay coil. Check wiring from Master Power Relay to high side of autocrank relay coil. Check wiring from autocrank relay switch contacts. Check starter motor.
441	AutocrankNoStart Starting rpm was not seem during commanded autocrank	TurnOnMil	Make sure engine is getting fuel (fuel supply OK, fuel shutoff open, fuel lockoff working). Make sure there are no MIL faults. Make sure there are no problems with the load on the engine that would prevent starting.

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
461	<p>ETC_Sticking</p> <p>Electronic Throttle Control is sticking. This can occur if the throttle plate (butterfly valve) inside the throttle bore is sticking. The plate sticking can be due to some type of obstruction, a loose throttle plate, or worn components shaft bearings.</p> <p>NOTE: The throttle assembly is not a serviceable item and can only be repaired by replacing the DV-EV throttle assembly.</p>	<p>(1) TurnOnMil (2) EngineShutdown (3) CutThrottle</p>	<p>Check for debris or obstructions inside the throttle body</p> <p>Check throttle-plate shaft for bearing wear</p> <p>Check the ETC driver wiring for an open circuit</p> <p>SECM Pin A17 (H1+) to ETC Pin 1</p> <p>SECM Pin A18 (H1-) to ETC Pin 4</p> <p>Check the ETC internal motor drive by disconnecting the throttle connector and measuring the motor drive resistance at the throttle</p> <p>ETC Pin 1 (H1+) to Pin ETC 4 (H1-) ~3.0-4.0Ω</p>
471	<p>ETC_Open_Fault</p> <p>Electronic Throttle Control Driver has failed, normally set if driver signals have failed open or become disconnected, electronic throttle or SECM is defective.</p>	<p>(1) TurnOnMIL (2) CutThrottle</p>	<p>Check the ETC driver wiring for an open circuit</p> <p>SECM Pin (H1+) A17 to ETC Pin 1</p> <p>SECM Pin A18 (H1-) to ETC Pin 4</p> <p>Check the ETC internal motor drive by disconnecting the throttle connector and measuring the motor drive resistance at the throttle</p> <p>ETC Pin 1 (H1+) to Pin 4 (H1-) ~3.0-4.0Ω</p>
481	<p>ETCSpringTest</p> <p>Electronic Throttle Control Spring Return Test has failed. The SECM will perform a safety test of the throttle return spring following engine shutdown. If the drive mechanism is damaged, or the return spring has lost tension the throttle will fail the test and set the fault.</p> <p>NOTE: The throttle assembly is not a serviceable item and can only be repaired by replacing the DV-EV throttle assembly.</p>	<p>(1) TurnOnMil (2) EngineShutdown (3) CutThrottle</p>	<p>Perform throttle spring test by cycling the ignition key and re-check for fault</p>

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
491	HbridgeFault_ETC Electronic Throttle Control Driver has failed. Indeterminate fault on Hbridge driver for electronic throttle control. Possibly either ETC+ or ETC- driver signals have been shorted to ground	(1) TurnOnMil (2) CutThrottle	Check ETC driver wiring for a shorted circuit SECM Pin A17 (H1+) to ETC Pin 1 SECM Pin A18 (H1-) to ETC Pin 4 Check the ETC internal motor drive by disconnecting the throttle connector and measuring the motor drive resistance at the throttle ETC Pin 1 (H1+) to ETC Pin 4 (H1-) ~3.0-4.0Ω
521	LowOilPressureFault Low engine oil pressure	(1) TurnOnMil (2) DelayedEngine Shutdown	Check engine oil level Check electrical connection to the oil pressure switch SECM Pin B9 (signal) to Oil Pressure Switch
522	OilPressureRangeLow Low engine oil pressure	(1) TurnOnMil (2) DelayedEngine Shutdown	Check engine oil level Check electrical connection to the oil pressure switch SECM Pin B9 (signal) to Oil Pressure Switch
523	OilPressureRangeHigh High engine oil pressure	(1) TurnOnMil (2) DelayedEngine Shutdown	Check engine oil level Check electrical connection to the oil pressure switch SECM Pin B9 (signal) to Oil Pressure Switch
531	SysVoltRangeLow System voltage too low	TurnOnMil	Check battery voltage Perform maintenance check on electrical connections to the battery and chassis ground Check battery voltage during starting and with the engine running to verify charging system and alternator function Measure battery power at SECM with a multimeter (with key on) SECM Pin A23 (Switched 12V) to SECM Pin A16 (Engine GND) SECM Pin A23 (Switched 12V) to SECM Pin B17 (Engine GND)
541	SysVoltRangeHigh System voltage too high	(1) TurnOnMil (2) DelayedEngine Shutdown	Check battery and charging system voltage Check battery voltage during starting and with the engine running Check voltage regulator, alternator, and charging system Check battery and wiring for overheating and damage Measure battery power at SECM with a multimeter (with key on) SECM Pin A23 (Switched 12V) to SECM Pin A16 (Engine GND) SECM Pin A23 (Switched 12V) to SECM Pin B17 (Engine GND)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
551	SensVoltRangeLow Sensor reference voltage XDRP too low	(1) TurnOnMil (2) DelayedEngine Shutdown	Measure transducer power at the TMAP connector with a multimeter TMAP Pin 3 (Sensor PWR) to TMAP Pin 1 (Sensor GND) Verify transducer power at the SECM with a multimeter SECM Pin B24 (Sensor PWR) to SECM Pin B1 (Sensor GND) Verify transducer power at ETC with a multimeter ETC Pin 3 (Sensor PWR) to ETC Pin 2 (Sensor GND) Verify transducer power to the foot pedal with a multimeter.
561	SensVoltRangeHigh Sensor reference voltage XDRP too high	(1) TurnOnMil (2) DelayedEngine Shutdown	Measure transducer power at the TMAP connector with a multimeter TMAP Pin 3 (Sensor PWR) to TMAP Pin 1 (Sensor GND) Verify transducer power at the SECM with a multimeter SECM Pin B24 (Sensor PWR) to SECM Pin B1 (Sensor GND) Verify transducer power at ETC with a multimeter ETC Pin 3 (Sensor PWR) to ETC Pin 2 (Sensor GND) Verify transducer power to the foot pedal with a multimeter.
571	HardOverspeed Engine speed has exceeded the third level (3 of 3) of overspeed protection	(1) TurnOnMil (2) HardRevLimit	Usually associated with additional ETC faults Check for ETC Sticking or other ETC faults Verify if the lift truck was motored down a steep grade
572	MediumOverspeed Engine speed has exceeded the second level (2 of 3) of overspeed protection	(1) TurnOnMil (2) MediumRevLimit	Usually associated with additional ETC faults Check for ETC Sticking or other ETC faults Verify if the lift truck was motored down a steep grade
573	SoftOverspeed Engine speed has exceeded the first level (1 of 3) of overspeed protection	(1) TurnOnMil (2) SoftRevLimit	Usually associated with additional ETC faults Check for ETC Sticking or other ETC faults Verify if the lift truck was motored down a steep grade
611	APP1RangeLow APP1 sensor voltage out of range low, normally set if the APP1 signal has shorted to ground, circuit has opened or sensor has failed	TurnOnMil	Check foot pedal connector Check APP1 signal at SECM PIN B7 (signal)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
612	APP2RangeLow APP2 sensor voltage out of range low, normally set if the APP2 signal has shorted to ground, circuit has opened or sensor has failed	TurnOnMil	Check foot pedal connector Check APP2 signal at SECM PIN B16 (signal)
621	APP1RangeHigh APP1 sensor voltage out of range high, normally set if the APP1 signal has shorted to power or the ground for the sensor has opened	TurnOnMil	Check foot pedal connector Check APP1 signal at SECM PIN B7 (signal)
622	APP2RangeHigh APP2 sensor voltage out of range high, normally set if the APP2 signal has shorted to power or the ground for the sensor has opened	TurnOnMil	Check foot pedal connector Check APP2 signal at SECM PIN B16 (signal)
631	APP1AdaptLoMin Learned idle end of APP1 sensor range lower than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP1 signal at SECM Pin B7 (signal)
632	APP2AdaptLoMin Learned idle end of APP2 sensor range lower than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP2 signal at SECM Pin B16 (signal)
641	APP1AdaptHiMax Learned full pedal end of APP1 sensor range higher than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP1 signal at SECM Pin B7 (signal)
642	APP2AdaptHiMax Learned full pedal end of APP2 sensor range higher than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP2 signal at SECM Pin B16 (signal)
651	APP1AdaptHiMin Learned full pedal end of APP1 sensor range lower than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP1 signal at SECM Pin B7 (signal)
652	APP2AdaptHiMin Learned full pedal end of APP2 sensor range lower than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP2 signal at SECM Pin B16 (signal)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
661	APP1AdaptLoMax Learned idle end of APP1 sensor range higher than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP1 signal at SECM Pin B7 (signal)
662	APP2AdaptLoMax Learned idle end of APP2 sensor range higher than expected	TurnOnMil	Check APP connector and pins for corrosion Cycle the pedal several times and check APP2 signal at SECM Pin B16 (signal)
691	APP_Sensors_Conflict APP position sensors do not track well, intermittent connections to APP or defective pedal assembly	1) TurnOnMil 2) CutThrottle	Check APP connector and pins for corrosion Cycle the pedal several times and check APP1 signal at SECM Pin B7 (signal) Cycle the pedal several times and check APP2 signal at SECM Pin B16 (signal)
711	LSDFault_Dither1 Dither Valve 1 Fault, signal has opened or shorted to ground or power or defective dither 1 valve	(1) TurnOnMil (2) DisableGasO2Ctrl (3) DisableGasPostO2Ctrl	Check FTV1 for an open wire or FTV connector being disconnected FTV1 Pin 1 (signal) to SECM Pin A1 FTV1 Pin 2 (Switched 12V) to SECM Pin A23 Check FTV1 for an open coil by disconnecting the FTV connector and measuring resistance (~26W ± 2W)
712	LSDFault_Dither2 Dither Valve 2 Fault, signal has opened or shorted to ground or power or defective dither 2 valve	(1) TurnOnMil (2) DisableGasO2Ctrl (3) DisableGasPostO2Ctrl	Check FTV2 for an open wire or FTV connector being disconnected or signal shorted to GND FTV2 Pin 1 (signal) to SECM Pin A2 FTV2 Pin 2 (Switched 12V) to SECM Pin A23 Check FTV2 for an open coil by disconnecting the FTV connector and measuring resistance (~26W ± 2W)
713	LSDFault_CSValve	NONE	N/A
714	LSDFault_CheckEngine	NONE	N/A
715	LSDFault_CrankDisable Crank Disable Fault, signal has opened or shorted to ground or power or defective crank disable relay	NONE	N/A
716	LSDFault_FuelPump Fuel pump circuit fault, signal has opened, shorted to ground or power, or defective relay or fuel pump	TurnOnMil	Check fuel pump circuit for an open wire or connector being disconnected or signal shorted to GND Fuel Pump Pin B (signal) from SECM Pin A13 Fuel Pump Pin A (power) from main relay 1 Pin A23 Check fuel pump circuit for an open coil by disconnecting fuel pump connector and measuring resistance (~26W ± 3W) Check for 12V to fuel pump

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
717	LSDFault_LockOff Fuel lock off Valve Fault, signal has opened or shorted to ground or power or defective Fuel lock off valve	TurnOnMil	Check fuel lock off valve for an open wire or connector being disconnected or signal shorted to GND Lockoff Pin B (signal) to SECM Pin A11 Lockoff Pin A (Switched 12V) to SECM Pin A23 Check Lockoff for an open coil by disconnecting the Lockoff connector and measuring the resistance (~26W ± 3W)
718	LSDFault_MIL Malfunction Indicator Lamp Fault, signal has opened or shorted to ground or power or defective MIL lamp	NONE	N/A
721	GasFuelAdaptRangeLo In LPG mode, system had to adapt rich more than expected	(1) TurnOnMil (2) DisableGasO2Ctrl (3) DisablePostGasO2Ctrl	Check for vacuum leaks. Check fuel trim valves, e.g. leaking valve or hose Check for missing orifice(s).
722	GasDesEquivLo In LPG mode, system had to adapt rich more than expected	NONE	N/A
731	GasFuelAdaptRangeHi In LPG mode, system had to adapt lean more than expected	(1) TurnOnMil (2) DisableGasO2Ctrl (3) DisablePostGasO2Ctrl	
732	GasDesEquivHi In LPG mode, system had to adapt lean more than expected	NONE	N/A
741	GasO2NotActive Pre-catalyst O2 sensor inactive on LPG, open O2 sensor signal or heater leads, defective O2 sensor	(1) TurnOnMil (2) DisableGas O2Ctrl (3) DisableGasPostO2Ctrl	Check that Pre-catalyst O2 sensor connections are OK. O2 Pin A (Sensor GND) to SECM Pin B1 O2 Pin B (signal) to SECM Pin B13 O2 Pin C (Engine GND) to SECM Pins A16, B17 O2 Pin 1 (Switched 12V) to SECM Pin A23 Verify O2 sensor heater circuit is operating by measuring heater resistance (2.1W ± 0.4W) O2 Pin C (Engine GND) to O2 Pin D (Switched 12V)

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
742	GasPostO2NotActive Post-catalyst O2 sensor inactive on LPG, open O2 sensor signal or heater leads, defective O2 sensor.	(1) TurnOnMil (2) DisableGasPost O2Ctrl	Check that Post-catalyst O2 sensor connections are OK. O2 Pin A (Sensor GND) to SECM Pin B1 O2 Pin B (signal) to SECM Pin B19 O2 Pin C (Engine GND) to SECM Pins A16, B17 O2 Pin D (Heater PWR) to Post O2 Heater Relay Pin 87. This relay only turns on after engine has been running for some time and SECM has calculated that water condensation in exhaust has been removed by exhaust heat. Post O2 Heater Relay has switched 12V applied to the relay Pins 85, 30. The relay coil ground is controlled by SECM Pin A20 to activate the relay to flow current through the post O2 heater. Verify O2 sensor heater circuit is operating by measuring heater resistance (2.1W ± 0.4W) O2 Pin C (Engine GND) to Relay Pin 30 (Switched 12V)
743	GasCatInactive	NONE	N/A
751	GasO2FailedLean Pre-catalyst O2 sensor indicates extended lean operation on LPG	(1) TurnOnMil (2) DisableGas O2Ctrl (3) DisableGasPostO2Ctrl	Check for vacuum leaks. Check fuel trim valves, e.g. leaking valve or hose. Check for missing orifice(s).
752	GasPostO2FailedLean Pre-catalyst O2 sensor indicates extended lean operation on LPG	(1) TurnOnMil (2) DisableGasPost O2Ctrl	Correct other faults that may contribute to 752 (e.g. faults pertaining to fuel trim valves, Pre-Cat O2, Post Cat O2 sensor) Check for vacuum leaks Check for leaks in exhaust, catalytic converter, HEGO sensors; repair leaks. Check all sensor connections (see fault 742 corrective actions).
771		(1) TurnOnMil (2) DisableGas O2Ctrl (3) DisableGasPostO2Ctrl	Check fuel trim valves, e.g. plugged valve or hose. Check for plugged orifice(s).
772		(1) TurnOnMil (2) DisableGasPostO2Ctrl	Correct other faults that may contribute to 772 (e.g. faults pertaining to FTVs, Pre-Cat O2, Post Cat O2 sensor) Look for leaks in exhaust, catalytic converter, HEGO sensors; repair leaks. Check all sensor connections (see fault 742 corrective actions).

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
821		(1) TurnOnMil (2) DisableLiquidO2Ctrl (3) DisableLiqPostO2Ctrl	Check for vacuum leaks. Low gasoline fuel pressure, perform gasoline pressure test. Injector problems, e.g. plugged, defective injector.
831		(1) TurnOnMil (2) DisableLiquidO2Ctrl (3) DisableLiqPostO2Ctrl	Low gasoline fuel pressure, perform gasoline pressure test Injector problems, e.g. leaking, defective injector.
832	LiqDesEquivLo In gasoline mode, system had to adapt rich more than expected	NONE	N/A
841	LiqO2NotActive Pre-catalyst O ₂ sensor inactive on gasoline, open O ₂ sensor signal or heater leads, defective O ₂ sensor	(1) TurnOnMil (2) DisableLiquid O2Ctrl (3) DisableLiqPostO2Ctrl	Check that Pre-catalyst O ₂ sensor connections are OK. O ₂ Pin A (Sensor GND) to SECM Pin B1 O ₂ Pin A (Sensor GND) to SECM Pin B1 O ₂ Pin C (Engine GND) to SECM Pins A16, B17 O ₂ Pin D (Switched 12V) to SECM Pin A23 Verify O ₂ sensor heater circuit is operating by measuring heater resistance (2.1W ± 0.4W) O ₂ Pin C (Engine GND) to Pin D (Switched 12V)
842	LiqPostO2NotActive Post-catalyst O ₂ sensor inactive on gasoline, open O ₂ sensor signal or heater leads, defective O ₂ sensor.	(1) TurnOnMil (2) DisableLiqPost O2Ctrl	Check that Post-catalyst O ₂ sensor connections are OK. O ₂ Pin A (Sensor GND) to SECM Pin B1 O ₂ Pin B (signal) to SECM Pin B19 O ₂ Pin C (Engine GND) to SECM Pins A16, B17 O ₂ Pin D (Switched 12V) to Post O ₂ Heater Relay Pin 87. This relay only turns on after engine has been running for some time and SECM has calculated that water condensation in exhaust has been removed by exhaust heat. Post O ₂ Heater Relay has SECM switched 12V applied to the relay Pins 86, 30. The relay coil ground is controlled by SECM Pin A20 to activate the relay to flow current through the post O ₂ heater. Verify O ₂ sensor heater circuit is operating by measuring heater resistance (2.1Ω ± 0.4Ω) O ₂ Pin C (Engine GND) to Relay Pin 30 (Switched 12V)
843	LiqCatInactive	NONE	N/A
851	LiqO2FailedLean Pre-catalyst O ₂ sensor indicates extended lean operation on gasoline	(1) TurnOnMil (2) DisableLiquid O2Ctrl (3) DisableLiqPostO2Ctrl	Check for vacuum leaks. Low gasoline fuel pressure, perform gasoline pressure test. Injector problems, e.g. plugged, defective injector

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
852	LiqPostO2FailedLean Pre-catalyst O ₂ sensor indicates extended lean operation on gasoline	(1) TurnOnMil (2) DisableLiqPost O2Ctrl	Correct other faults that may contribute to 852 (e.g. faults pertaining to Injectors, MAP, IAT, Pre-Cat O ₂ , Post Cat O ₂ sensor. Look for leaks in exhaust, catalytic converter, HEGO sensors; repair leaks. Check all sensor connections (see fault 842 corrective actions).
871	LiqO2FailedRich Pre-catalyst O ₂ sensor indicates extended rich operation on gasoline	(1) TurnOnMil (2) DisableLiquid O2Ctrl (3) DisableLiqPostO2Ctrl	High gasoline fuel pressure, perform gasoline pressure test Injector problems, e.g. leaking, defective injector
872	LiqPostO2FailedRich Pre-catalyst O ₂ sensor indicates extended rich operation on gasoline	(1) TurnOnMil (2) DisableLiqPostO2Ctrl	Correct other faults that may contribute to 872 (e.g. faults pertaining to Injectors, MAP, IAT, Pre-Cat O ₂ , Post Cat O ₂ sensor. Look for leaks in exhaust, catalytic converter, HEGO sensors; repair leaks. Check all sensor connections (see fault 842 corrective actions).
911	O2RangeLow Pre-catalyst O ₂ sensor voltage out of range low, sensor signal shorted to ground	NONE	N/A
912	O2_PostCatRangeLow Post-catalyst O ₂ sensor voltage out of range low, sensor signal shorted to ground	NONE	N/A
921	O2RangeHigh Pre-catalyst O ₂ sensor voltage out of range high, sensor signal shorted to power	(1) TurnOnMil (2) DisableLiquid O2Ctrl (3) DisableGas O2Ctrl	Check if O ₂ sensor installed before catalyst is shorted to +5Vdc or battery. O ₂ Pin B (signal) to SECM Pin B13 SECM Pin B24 (Sensor PWR) to SECM Pin B13 SECM Pin A23 (Switched 12V) to SECM Pin B13
922	O2_PostCatRangeHigh Post-catalyst O ₂ sensor voltage out of range low, sensor signal shorted to ground	(1) TurnOnMil (2) DisableGasPostO2Ctrl (3) DisableLiqPostO2Ctrl	Check if O ₂ sensor installed after catalyst is shorted to +5Vdc or battery. O ₂ Pin B (signal) to SECM Pin B19 SECM Pin B24 (Sensor PWR) to SECM Pin B19 SECM Pin A23 (switched 12V) to SECM Pin B19
931	FuelTempRangeLow Fuel Temperature Sensor Input is Low normally set if the fuel temperature sensor wire has shorted to chassis ground or the sensor has failed.	TurnOnMil	Check fuel temp sensor connector and wiring for a short to GND SECM Pin B14 (signal) to FTS Pin 1 SECM Pin B1 (Sensor GND) to FTS Pin 2 and SECM (Engine GND) Pin A16, B17

(*) Fault actions shown are default values specified by the OEM.

Table 2. Diagnostic Fault Codes (Flash Codes) cont'd

DFC	PROBABLE FAULT	FAULT ACTION *	CORRECTIVE ACTION FIRST CHECK
932	FuelTempRangeHigh Fuel Temperature Sensor Input is High normally set if the fuel temperature sensor wire has been disconnected or the circuit has opened to the SECM.	TurnOnMil	Check if fuel temp sensor connector is disconnected or for an open FTS circuit SECM Pin B14 (signal) to FTS Pin 1 SECM Pin B1 (Sensor GND) to FTS Pin 2
933	TransOilTemp Excessive transmission oil temperature	(1) TurnOnMil (2) Delayed EngineShutdown	Refer to drivetrain manufacturer's transmission service procedures.
942	PostO2Inactive PostCatO2 is not varying enough, sensor has been disconnected or the circuit has been opened to the SECM	None	Check for other faults: Confirm Post Cat HEGO is wired into wiring harness Confirm Post Cat HEGO heater is wired and turned on Confirm Post Cat HEGO is properly positioned in exhaust and no leaks in exhaust system.
991	ServiceFault1 Service Interval 1 has been reached	None	N/A
992	ServiceFault2 Service Interval 2 has been reached	None	N/A
993	ServiceFault3 Service Interval 3 has been reached	None	N/A
994	ServiceFault4 Service Interval 4 has been reached—replace HEGO sensors	None	N/A
995	ServiceFault5 Service Interval 5 has been reached	None	N/A

(*) Fault actions shown are default values specified by the OEM.