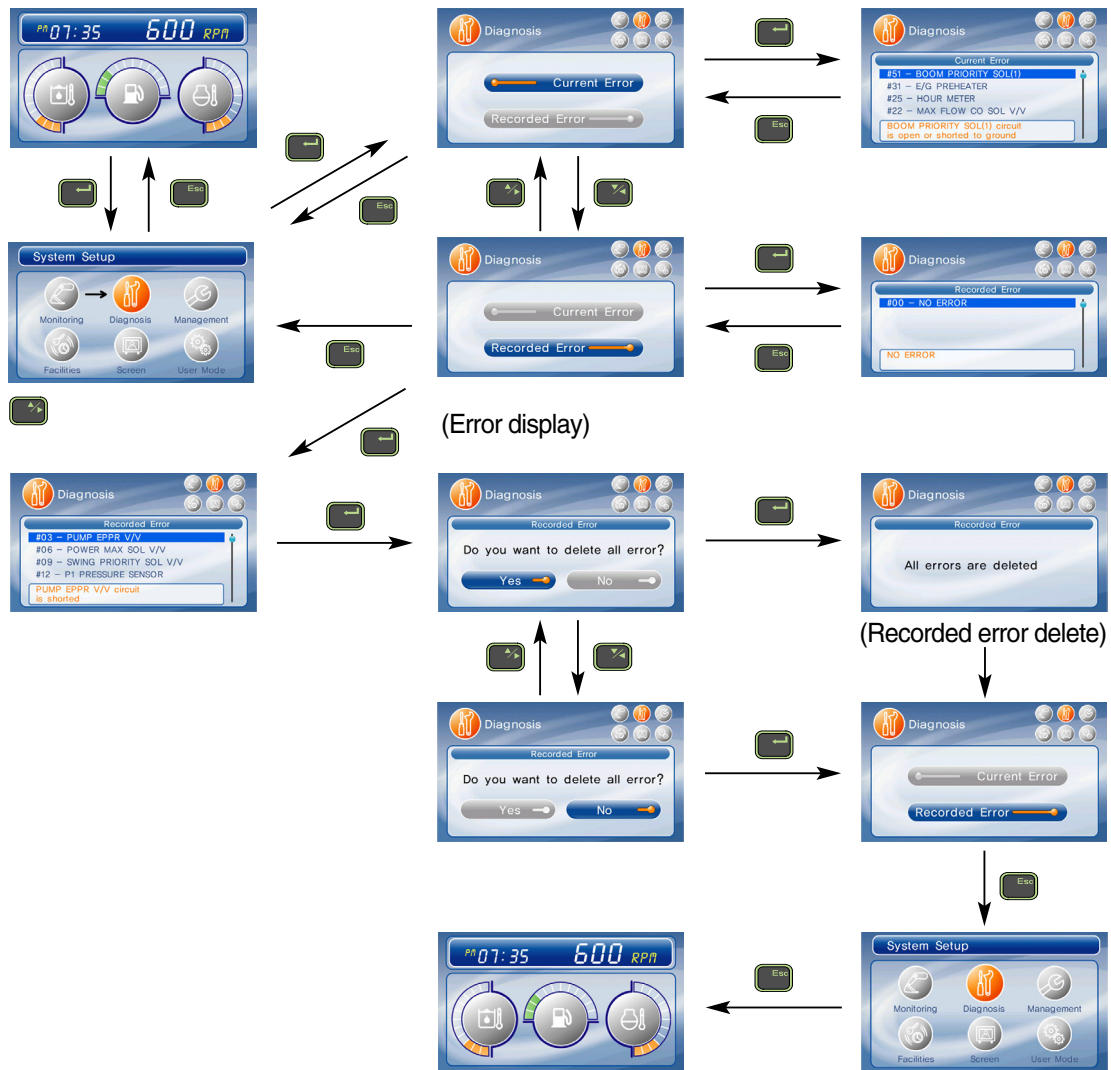


GROUP 9 SELF-DIAGNOSTIC SYSTEM

1. OUTLINE

When any abnormality occurs in the NEW CAPO system caused by electric parts malfunction and by open or short circuit, the MCU controller diagnoses the problem and sends the error codes to the cluster and also stores them in the memory.

2. CURRENT ERROR DISPLAY



5. ERROR CODES TABLE

Error code No.	Description
1	Short circuit in accel actuator system
2	Potentiometer circuit is shorted to Vcc(5V) or battery +
3	Short circuit in pump EPPR valve system
4	Short circuit in boom down EPPR valve system
5	Short circuit in travel speed solenoid system
6	Short circuit in power boost solenoid system
7	Short circuit in max flow solenoid system
10	Short circuit in hour-meter system
11	Accel dial circuit is shorted to Vcc(5V) or battery +
12	P1 pressure sensor circuit is shorted to power supply(24V) line
13	P2 pressure sensor circuit is shorted to power supply(24V) line
14	P3 pressure sensor circuit is shorted to power supply(24V) line
15	Boom down pressure circuit is shorted to power supply(24V) line
16	Accel actuator circuit is open or shorted to ground
17	Potentiometer circuit is open or shorted to ground
18	Pump EPPR valve circuit is open or shorted to ground
19	Boom down EPPR valve circuit is open or shorted to ground
20	Travel speed solenoid circuit is open or shorted to ground
21	Power boost solenoid circuit is open or shorted to ground
22	Max flow solenoid circuit is open or shorted to ground
25	Hour-meter circuit is open or shorted to ground
26	Accel dial circuit is open or shorted to ground
27	P1 pressure sensor circuit is open or shorted to ground
28	P2 pressure sensor circuit is open or shorted to ground
29	P3 pressure sensor circuit is open or shorted to ground
30	Boom down pressure sensor circuit is open or shorted to ground
31	Engine preheater circuit is open or shorted to ground
32	Travel alarm buzzer circuit is open or shorted to ground
33	Alternator circuit is open or shorted to ground
34	Controller input voltage is below 18V
35	Controller input voltage is over 38V
36	Communication error with cluster
37	Engine speed sensor circuit is open or shorted to ground
38	Anti-restart relay circuit is open or shorted to ground
39	Accel actuator does not stop at a target position
40	There is more than 500rpm difference between target speed and actual speed

Error code No.	Description
41	Hydraulic oil temperature sensor circuit is shorted to ground
42	Fuel level sensor circuit is shorted to ground
43	Coolant temperature sensor circuit is shorted to ground
44	Boom up pressure sensor circuit is shorted to power supply(24V) line
45	Hydraulic oil temperature sensor circuit is open or shorted to battery +
46	Fuel level sensor circuit is open or shorted to battery +
47	Coolant temperature sensor circuit is open or shorted to battery +
48	Boom up pressure sensor circuit is open or shorted to ground
49	Engine preheater circuit is shorted to battery +
51	Boom priority solenoid circuit is open or shorted to ground
56	Travel alarm buzzer circuit is shorted to battery +
58	Boom priority solenoid circuit is shorted to battery +

6. ENGINE FAULT CODE INFORMATION (For QSX15)

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
111 629 12	Error internal to the ECM related to the memory hardware failures or internal ECM voltage supply circuits.	Engine will not start.
115 190 2	No engine speed signal detected from the camshaft engine position sensor.	Engine may take longer to start.
121 190 10	No engine speed signal detected from the crankshaft engine position sensor.	Hard starting, low power, rough idle, or possible white smoke.
122 102 3	High voltage detected at the intake manifold pressure sensor circuit.	Derate in power output of the engine.
123 102 4	Low voltage detected on the intake manifold pressure/temperature sensor.	Derate in power output of the engine.
131 91 3	High voltage detected at accelerator position sensor.	Severe derate (power and speed). Limp home power only.
132 91 4	Low voltage detected at the accelerator position sensor circuit.	Severe derate (power and speed). Limp home power only.
133 974 3	High voltage detected at the remote throttle position signal circuit.	None on performance if remote throttle is not used.
134 974 4	Low voltage detected at the remote throttle position signal circuit.	None on performance if remote throttle is not used.
135 100 3	High voltage detected at the oil pressure circuit.	No engine protection for oil pressure.
141 100 4	Low voltage detected at the oil pressure circuit.	No engine protection for oil pressure.
143 100 1	Engine Oil Pressure Low - Warning. Engine oil pressure signal indicates engine oil pressure is below the engine protection warning limit.	Progressive power derate increasing in severity from time of alert.
144 110 3	High voltage detected at the coolant temperature circuit.	Possible white smoke. Fan will stay on if controlled by the electronic control module (ECM). No engine protection for coolant temperature.
145 110 4	Low voltage detected at the coolant temperature circuit.	Possible white smoke. Fan will stay on if controlled by the electronic control module (ECM). No engine protection for coolant temperature.
147 91 1	A frequency of less than 100 Hz was detected at frequency throttle signal pin of the actuator harness connector at the ECM.	Calibration-dependent power and speed derate.
148 91 0	A frequency of more than 100 Hz was detected at the frequency throttle signal pin of the actuator harness connector at the ECM.	Calibration-dependent power and speed derate.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
153 105 3	High voltage detected at the intake manifold temperature circuit.	Possible white smoke. Fan will stay on if controlled by the electronic control module (ECM). No engine protection for coolant temperature.
154 105 4	Low voltage detected at the intake manifold temperature circuit.	Possible white smoke. Fan will stay on if controlled by the electronic control module (ECM). No engine protection for coolant temperature.
187 620 4	Low voltage detected on the ECM voltage supply line to some sensors (VSEN2 supply).	Engine will run derated. No engine protection for oil pressure or coolant level.
198 612 3	High voltage detected at the ICON™ lamp circuit when low voltage was expected by the ECM.	The ICON™ idle control system will be disabled. Only mandatory shutdown will be enabled.
199 612 4	Less than (+) 6 VDC (low voltage) detected at the ICON™ lamp circuit when high voltage was expected by the ECM.	The ICON™ idle control system will be disabled. Only mandatory shutdown will be enabled.
212 175 3	High voltage detected at the oil temperature circuit.	No engine protection for oil temperature.
213 175 4	Low voltage detected at the oil temperature circuit.	No engine protection for oil temperature.
216 46 3	High voltage detected at air compressor wet tank pressure signal circuit.	Air compressor will run continuously.
217 46 4	Low voltage detected at air compressor wet tank pressure sensor.	Air compressor will run continuously.
218 46 2	Voltage at wet tank pressure signal indicates wet tank pressure is too high or too low.	Air compressor will run continuously.
221 108 3	High voltage detected at the ambient air pressure sensor circuit.	Derate in power output of engine.
222 108 4	Low voltage detected at the ambient air pressure circuit.	Derate in power output of engine.
223 1265 4	Incorrect voltage detected at the Centinel?actuator circuit by the ECM.	None on performance. Centinel?deactivated.
227 620 3	High voltage detected on the ECM voltage supply line to some sensors.	Engine will run derated. No engine protection for oil pressure or coolant level.
234 190 0	Engine speed signal indicated engine speed is greater than 2650 rpm.	Fuel shutoff valve closed until the engine speed falls to 2000 rpm.
235 111 1	Coolant level signal at pin 22 of the sensor harness connector indicates coolant level is below the normal range.	Progressive power and speed derate with increasing time after alert. If engine protection shutdown is enabled, engine will shut down 30 seconds after the engine protection lamp starts flashing.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
241 84 2	The ECM lost the vehicle speed signal.	Engine speed limited to "Maximum Engine Speed without Vehicle Speed Sensor" parameter value. Cruise control, gear-down protection and road speed governor will not work (automotive only).
242 84 10	Invalid or inappropriate vehicle speed signal detected. Signal indicates an intermittent connection or vehicle speed sensor tampering.	Engine speed limited to maximum engine speed without vehicle speed sensor parameter value. Cruise control, progressive shifting, gear-down protection, and road speed governor will not work.
245 647 4	Less than 6 VDC detected at fan clutch when on. Indicates an excessive current draw from the electronic control module (ECM) or a faulty ECM output circuit.	The fan can stay on all the time.
249 171 3	High voltage detected at the ambient air temperature circuit.	No effect on engine performance. The idle shutdown ambient air temperature override feature will use the intake manifold air temperature sensor value to determine idle shutdown and availability of override (automotive only).
254 632 4	Less than (+) 6 VDC detected at fuel shutoff circuit or an excessive current draw from the electronic control module (ECM) or faulty ECM output circuit.	The ECM turns off the fuel shutoff supply voltage. The engine will shut down.
255 632 3	Externally supplied voltage detected going to fuel shutoff valve solenoid supply circuit.	None on performance. Fuel shutoff valve stays on.
256 171 4	Low voltage detected at the ambient air temperature circuit.	No effect on engine performance. The idle shutdown ambient air temperature override feature will use the intake manifold air temperature sensor value to determine idle shutdown and availability of override (automotive only).
259 632 7	The ECM detected that the fuel shutoff valve is stuck open mechanically or leaking.	Engine will run derated.
284 1043 4	Incorrect voltage detected on the electronic control module (ECM) voltage supply wire to the crankshaft engine position sensor.	Engine can possibly not run or will run derated. Possible hard starting, low power, or white smoke.
285 639 9	The ECM expected information from a multiplexed device but did not receive it soon enough, or did not receive it at all.	At least one multiplexed device will not operate properly.
286 639 13	The ECM expected information from a multiplexed device but only received a portion of the necessary information.	At least one multiplexed device will not operate properly.
293 1083 3	High voltage detected on the OEM temperature sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM temperature.
294 1083 4	Low voltage detected on the OEM temperature sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM temperature.
295 108 2	An error in the ambient air pressure sensor signal was detected by the ECM.	Engine is derated to no air setting.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
297 1084 3	High voltage detected at the OEM pressure sensor signal pin.	No engine protection for OEM pressure.
298 1084 4	Low voltage detected at the OEM pressure sensor signal pin of the 31-pin OEM connector.	No engine protection for OEM temperature.
319 251 2	Real-time clock lost power.	None on performance. Data in the ECM will not have accurate time and date information.
338 1267 3	Voltage detected on the idle shutdown vehicle accessory/ignition bus relay circuit when no voltage was being supplied by the ECM or an open circuit was detected.	Vehicle accessories or ignition bus loads controlled by the idle shutdown vehicle accessory relay will not power up.
339 1267 4	Less than (+) 6 VDC detected on the idle shutdown vehicle accessory/ignition bus relay circuit when on indicates an excessive current draw from the ECM or faulty ECM output circuit.	Vehicle accessories or ignition bus loads controlled by the idle shutdown vehicle accessory relay will not power down.
341 630 2	Severe loss of data from the ECM.	Possibly no noticeable performance effects, or engine dying, or difficulty in starting the engine. Fault information, trip information, and maintenance monitor data can be inaccurate.
343 629 12	Internal ECM error.	Possibly none on performance, or severe derate.
349 0 16	A frequency greater than calibrated threshold was detected at the tailshaft governor signal pin of the 31-pin connector.	Calibration-dependent power and speed derate.
352 620 4	Low voltage detected on the electronic control module (ECM) voltage supply line to some of the sensors.	Engine is derated to no-air setting
359 613 11	ICON™ has failed to start the engine automatically.	ICON™ will be disabled. Only mandatory shutdown will be enabled. You may or may not be able to start the engine normally.
378 633 5	Low current or open circuit detected at front fueling actuator circuit.	Engine will run using only the rear three cylinders.
379 633 6	High current detected at front fueling actuator circuit.	Engine will run using only the rear three cylinders.
386 1079 3	High voltage detected on the electronic control module (ECM) voltage supply wire to the sensors (VSEN1 supply).	Engine is derated to no-air setting.
387 1043 3	High voltage detected on the ECM voltage supply line to the throttle(s) (VTP supply).	Engine will only idle.
388 1072 11	Less than (+) 6 VDC detected at engine brake circuit 1 when on. Indicates an excessive current draw from the ECM or a faulty ECM output circuit.	Engine brake on cylinder number 1 can not be activated.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
392 1073 11	Less than (+) 6 VDC detected at engine brake circuit 2 when on indicates an excessive current draw from the electronic control module (ECM) or a faulty ECM output circuit.	Engine brakes on cylinders number 2 and 3 can not be activated.
393 1112 11	Less than (+) 6 VDC detected at engine brake circuit 3 when on; this indicates an excessive current draw from the ECM or a faulty ECM output circuit.	The engine brakes can not be activated on cylinders Number 4, 5, and 6 (for six-level engine brake harness), or engine brakes can not be activated on cylinders Number 1, 4, 5, and 6 (for three-level engine brake harness).
394 635 5	Low current or open circuit detected at front timing actuator circuit.	Engine is run using only the rear three cylinders.
395 635 6	High current detected at front timing actuator circuit.	Engine is run using only the rear three cylinders.
396 1244 5	Low current or open circuit detected at rear fueling actuator circuit.	Engine will run using only the front three cylinders.
397 1244 6	High current detected at rear fueling actuator circuit.	Engine will run using only the front three cylinders.
398 1245 5	Low current or open circuit detected at rear timing actuator circuit.	Engine is run using only the front three cylinders.
399 1245 6	High current detected at rear timing actuator circuit.	Engine is run using only the front three cylinders.
415 100 1	Engine Oil Pressure Low - Critical. Engine oil pressure signal indicates engine oil pressure below the engine protection critical limit	Progressive engine speed derate increasing in severity from time of alert. If Engine Protection Shutdown feature is enabled, engine will shut down 30 seconds after red Stop lamp starts flashing.
419 1319 2	An error in the intake manifold pressure sensor signal was detected by the ECM.	Engine is derated to no-air setting.
422 111 2	Voltage detected simultaneously on both the coolant level high and low signal circuits or no voltage detected on both circuits.	No engine protection for coolant level.
426 639 2	Communication between the electronic control module (ECM) and another device on the J1939 datalink has been lost.	None on performance. J1939 devices possibly do not operate.
428 97 3	High voltage detected at water-in-fuel (WIF) sensor circuit.	None on performance.
429 97 4	Low voltage detected at water-in-fuel (WIF) sensor circuit.	None on performance.
431 91 2	Voltage detected simultaneously on both the idle validation off-idle and on-idle signal pins.	None on performance.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
432 558 13	Voltage detected at idle validation on-idle circuit when voltage at throttle position circuit indicates the pedal is not at idle or voltage detected at idle validation off-idle circuit when voltage at throttle position circuit indicates the pedal is at rest.	Engine will only idle.
433 102 2	Voltage signal at the intake manifold pressure circuit indicates high intake manifold pressure, but other engine characteristics indicate that intake manifold pressure must be low.	Derate to no-air setting.
434 627 2	Supply voltage to the electronic control module (ECM) fell below (+) 6.2 VDC for a fraction of a second or the ECM was not allowed to power down correctly (retain battery voltage for 30 seconds after keyswitch is turned off).	Possible no noticeable performance effects or engine dying or hard starting. Fault information, trip information, and maintenance monitor data can be inaccurate.
435 100 2	An error in the oil pressure sensor signal was detected by the ECM.	None on performance; no engine protection for oil pressure.
441 168 1	Battery voltage below normal operating level.	Possible no noticeable performance effects or possible rough idle.
442 168 0	Battery voltage above normal operating level.	None on performance.
443 1043 4	Low voltage detected on the electronic control module (ECM) voltage supply line to the throttle(s).	Engine will only idle.
449 94 0	Excessive fuel supply pressure was detected at the fuel pressure sensor.	Engine will have black smoke and will run derated.
451 157 3	High voltage detected on the front rail pressure sensor circuit.	Engine will run derated.
452 157 4	Low voltage detected on the front rail pressure sensor circuit.	Engine will run derated.
465 1188 3	High voltage detected at the wastegate actuator number 1 circuit when no voltage was being supplied by the electronic control module (ECM).	Engine will run derated.
466 1188 4	Less than (+) 6 VDC detected at the wastegate actuator number 1 circuit when on indicates an excessive current draw from the electronic control module (ECM) or faulty ECM output circuit.	Engine will run derated.
469 614 2	The ICON?cab thermostat has logged a fault (displayed on thermostat as E3) or cab thermostat signal to the electronic control module (ECM) is lost.	E3 will cycle the engine between 20 minutes RUN and 15 minutes OFF, or will not autostart the engine for Cab Comfort mode. ICON?will not be disabled. Engine mode will remain active.
472 1380 2	Either high or low voltage detected on the crankcase oil level sensor circuit by the electronic control module (ECM).	None on performance. Centinel?system deactivated.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
474 1321 2	Either low voltage detected when (+) 12 VDC are commanded or voltage detected when no voltage is commanded.	Either the engine will not start or the engine will not have starter lockout protection.
475 1351 4	Low voltage was detected on the electronic air compressor circuit when high voltage was expected.	Air compressor will not shut off.
476 1351 3	High voltage or an open circuit detected at the electronic air compressor governor actuator circuit.	Air compressor runs continuously or not at all.
482 94 1	Low fuel supply pressure was detected at the fuel pressure sensor.	Engine does not start, has low power, can possibly have white smoke, or runs rough.
483 1349 3	High voltage detected on the rear rail pressure sensor circuit.	Engine will run derated.
484 1349 4	Low voltage detected on the rear rail pressure sensor circuit.	Engine will run derated.
485 1349 0	Unexpectedly high rail pressure was detected on the rear three cylinders.	Engine will return to idle speed, then only idle or shut down.
486 1349 1	Unexpectedly low rail pressure was detected on the rear three cylinders.	Low power or rough idle.
489 191 1	Auxiliary speed frequency on input pin indicates the frequency is below a calibration-dependent threshold.	Engine will only idle.
491 1189 3	High voltage detected at the wastegate actuator number 2 circuit when no voltage was being supplied by the electronic control module (ECM).	Engine will run derated.
492 1189 4	Less than (+) 6 VDC detected at the wastegate actuator number 2 circuit when activated indicates an excessive current draw from the electronic control module (ECM) or faulty ECM output circuit.	Engine will run derated.
496 1043 11	Incorrect voltage detected on the electronic control module (ECM) voltage supply line to the camshaft engine position sensor.	Engine does not run, is hard to start, or will run derated.
527 702 3	Less than (+) 17.0 VDC detected at the switched output A signal pin of the 31-pin OEM connector.	No action taken by the electronic control module (ECM).
528 93 2	Less than (+) 17.0 VDC detected at the switch output B signal pin of the 31-pin OEM connector.	No action taken by the electronic control module (ECM).
529 703 3	Less than (+) 17 VDC detected at the switched output B signal pin at the electronic control module (ECM).	No action taken by the ECM.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
536 718 11	Either low voltage detected on autoshift low gear actuator circuit when (+) 12 VDC are commanded or voltage detected when no voltage is commanded.	Top 2 lockout solenoid will not function properly. Transmission will not shift properly.
537 717 11	Either low voltage detected on autoshift high gear actuator circuit when (+) 12 VDC are commanded or voltage detected when no voltage is commanded.	Top 2 shift solenoid will not function properly. Transmission will not shift properly.
538 719 11	Either low voltage detected on autoshift neutral gear actuator circuit when (+) 12 VDC are commanded or voltage detected when no voltage is commanded.	Top 2 neutral actuator will not function properly. Transmission will not shift properly.
541 615 11	Incorrect voltage detected at the ICON?starter relay/interlock circuit by the electronic control module (ECM).	The ICON?idle control system will be disabled. Only mandatory shutdown will be enabled. Engine can be started normally.
544 611 7	Autoshift failure; at least three shift attempts were missed.	Top 2 transmission will not be controlled correctly. Transmission remains in manual mode.
546 94 3	High voltage detected on the fuel pressure sensor circuit.	Engine will run derated.
547 94 4	Low voltage detected on the fuel pressure sensor circuit.	Engine will run derated.
551 558 4	No voltage detected simultaneously on both the idle validation off-idle and on-idle circuits.	Engine will only idle.
553 157 0	Unexpectedly high rail pressure was detected on the front three cylinders.	Engine will return to idle speed, then only idle or shut down.
559 157 1	Unexpectedly low rail pressure was detected on the front three cylinders.	Low power or rough idle.
581 1381 3	High voltage detected on fuel inlet restriction sensor signal pin.	Fuel inlet restriction monitor deactivated.
582 1381 4	Low voltage detected at the fuel inlet restriction sensor signal pin.	Fuel inlet restriction monitor deactivated.
583 1381 1	Restriction has been detected by the fuel inlet restriction sensor.	Fuel inlet restriction monitor warning is set.
588 611 3	High voltage detected at the engine start alarm circuit when low voltage was expected by the electronic control module (ECM).	The ICON™ idle control system will be disabled. Only mandatory shutdown will be enabled. The engine start alarm can sound continuously.

Fault code J1939 SPN J1939 FMI	Reason	Effect(only when fault code is active)
589 611 4	Less than (+) 6 VDC detected at the engine start alarm circuit when high voltage was expected by the ICON™ ECM.	The ICON™ idle control system will be disabled. Only mandatory shutdown will be enabled. The engine start alarm can sound continuously, or not at all.
595 103 16	Turbocharger Speed High (Calculated). Turbocharger speed calculation indicates turbocharger speed is above the engine protection warning limit.	Engine will run derated.
596 167 0	High battery voltage detected by the battery voltage monitor feature.	Yellow lamp will be lit until high battery voltage condition is corrected.
597 167 1	ICON?has restarted the engine three times within 3 hours due to low battery voltage (automotive only) or low battery voltage detected by the battery voltage monitor feature.	Yellow lamp will be lit until low battery voltage condition is corrected. The electronic control module (ECM) can increase idle speed and deactivate idle decrement switch if idle speedup is enabled. The engine will run continuously if ICON™ is active (automotive only).
598 167 1	Very low battery voltage detected by the battery voltage monitor feature.	Red lamp lit until very low battery voltage condition is corrected. The electronic control module (ECM) can increase idle speed and deactivate idle decrement switch if idle speedup is enabled. The engine will run continuously if ICON™ is active (automotive only).
731 723 7	Engine Speed Sensor and Camshaft Position Sensor - Mechanical Misalignment Between Camshaft and Crankshaft Sensors. Engine position signal from the engine speed sensor and camshaft position sensor do not match.	Engine will run derated. Excessive smoke, hard start, and rough idle possible.
753 723 2	Engine position signal from the camshaft and crankshaft engine position sensors do not match up.	Low power, rough idle, or possible white smoke.
755 157 7	Incorrect fueling was detected on the front three cylinders.	Engine will misfire.
758 1349 7	Incorrect fueling was detected on the rear three cylinders.	Engine will misfire.
784 1590 2	Adaptive Cruise Control Circuit Loss of communication with adaptive cruise control.	Adaptive cruise control will not operate. Standard cruise control may not operate.