



DTC Summaries

AJ27 Engine Management – 1999 MY

OBD II MONITORING CONDITIONS:

When testing for DTC reoccurrence, it can be determined if the Service Drive Cycle was of sufficient length by performing a PDU “Systems Readiness Test”.

The Systems Readiness Test is accessed via the PDU menu structure. PDU will report if any portion of the Systems Readiness Test has not been completed in the following manner:

The following less frequently performed tests are identified as incomplete:

- Module \$11 (identifies EMS ECM)
- Catalyst
- Evaporative purge system
- O2 sensor
- O2 sensor heaters

Further confirmation of the System Readiness Test status is available by retrieving the logged DTCs.

- If DTC P1000 is logged in memory, the on-board diagnostic tests have not been completed.
- If DTC P1111 is logged in memory, all on-board diagnostic tests have been completed.

Refer to page 2 for important information regarding the use of this Summary.

NOTES

MONITORING CONDITIONS	"SERVICE DRIVE CYCLE" for the particular DTC. Operate the vehicle as described to check for a reoccurrence of the DTC.	
OBD II	Y	YES – indicates that the DTC is an OBD II DTC.
	N	NO – indicates that the DTC is a non OBD II DTC.
CHECK ENGINE MIL (CK ENG)	1	1 TRIP – indicates that the CHECK ENGINE MIL is activated by a fault occurring during ONE "TRIP".
	2	2 TRIPS – indicates that the CHECK ENGINE MIL is activated by a fault occurring during TWO CONSECUTIVE "TRIPS".
	N	NO – indicates that the CHECK ENGINE MIL is not activated.
OTHER	N	None
	1	1 "TRIP" to activate indicator(s).
	2	2 CONSECUTIVE "TRIPS" to activate indicator(s).
	R	RED MIL
	A	AMBER MIL
	M	MESSAGE
DEFAULT ACTION	ECM default action; Logged – DTC stored in memory buffer; Flagged – DTC stored in memory / CHECK ENGINE MIL activated.	
POSSIBLE CAUSES	HIGH VOLTAGE – High voltage can be either EMS sensor supply voltage (5 volts) or B+ voltage.	

REFERENCE: It is recommended that the applicable "Electrical Guide" be referenced when using the information contained in this document.

PDU DATALOGGER ACRONYMS

AACV	Air assist control valve	FANFRLY	Cooling fan relay fast
ACCREQ	A/C compressor clutch request	FANS	Cooling fan slow
ACHPS	A/C refrigerant high pressure switch	FANSRLY	Cooling fan relay slow
ACLPS	A/C refrigerant low pressure switch	FBRAKE2	Brake switch
ADV	Ignition timing advance (Cyl 1, A bank)	FP	Fuel pump
BARO	Barometric pressure sensor	FPRLY	Fuel pump relay
BAT1+	Battery B+ supply to ECM	FTP	Fuel tank pressure
CCV	Canister close valve	HO2SB1D	Heated oxygen sensor (downstream) A bank
CLV	Calculated load value	HO2SB2D	Heated oxygen sensor (downstream) B bank
CRANKREQ	Crank request (from BPM)	HO2SB1U	Heated oxygen sensor (upstream) A bank
CRUISEA	Cruise control accel / decel switch	HO2SB2U	Heated oxygen sensor (upstream) B bank
CRUISEB	Cruise resume / cancel switch	HTDSC	Heated windshield request
CRUISEC	Cruise cancel switch	IAT	Intake air temperature
CRUISED	Cruise control set / inch / decel switch	KS1A	Knock sensor 1 A bank
CRUISEO	Cruise control ON / OFF switch	KS1B	Knock sensor 1 B bank
CRUISER	Cruise control resume switch	KS4A	Knock sensor 4 A bank
CRUISES	Cruise control set / inch / accel switch	KS4B	Knock sensor 4 B bank
CRUISEC1	Cruise control cancel switch	KSFA	Knock sensor fail A bank
DTC1	Number of DTCs logged this trip	KSFB	Knock sensor fail B bank
DTCS	Number of permanent DTCs logged	LTFT1	Long term fuel trim A bank
ECT	Engine coolant temperature	LTFT2	Long term fuel trim B bank
EOT	Engine oil temperature	MAF	Mass air flow
EVAP	Evaporative emission system monitor	MAFGND1	MAFS ground
FANF	Cooling fan fast	MAFS1	Mass air flow sensor

PDU DATALOGGER ACRONYMS

MPROBE	Measurement probe (RED)
PKBRAKE	Park brake switch
PNPS	Park / neutral position switch (rotary switch)
PPS	Pedal position sensor
PPS1	Pedal position sensor track 1
PPS2	Pedal position sensor track 2
RPM	Engine speed
SPS	Sensor power supply monitor
STFT1	Short term fuel trim A bank
STFT2	Short term fuel trim B bank
STFTB1D	Short term fuel trim A bank downstream
STFTB1U	Short term fuel trim A bank upstream
STFTB2D	Short term fuel trim B bank downstream
STFTB2U	Short term fuel trim B bank upstream
TPS	Throttle position sensor
TPS1	Throttle position sensor track 1
TPS2	Throttle position sensor track 2
TTP	Target throttle position
VSS	Vehicle speed
VVTAM	Variable valve timing (A bank) monitor
VVTBM	Variable valve timing (B bank) monitor

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0010	VVT Circuit malfunction – A bank	Drive vehicle; accelerate rapidly to cruise, decelerate to stop, repeat several times	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: Sets VVT drive PWM duty cycle to 0 (intake camshaft fully retarded)	VVT solenoid valve to ECM PWM drive circuit fault VVT solenoid valve to ECM ground circuit fault VVT solenoid failure
P0020	VVT Circuit malfunction – B bank	Drive vehicle; accelerate rapidly to cruise, decelerate to stop, repeat several times	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Sets VVT drive PWM duty cycle to 0 (intake camshaft fully retarded)	VVT solenoid valve to ECM PWM drive circuit fault VVT solenoid valve to ECM ground circuit fault VVT solenoid failure
P0101	MAFS range / performance	Engine at normal operating temperature; drive at steady speed on level surface 43 – 59 mph (70 – 95 km/h); 1500 – 2500 rpm; > 10 seconds Fuel level > 10%; surface elevation < 8,000 ft (2,438 m)	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Substitutes throttle angle for engine load measurement – Limits engine speed to 3000 rpm – Inhibits canister purge	Blocked air cleaner Air intake leak Engine breather leak Throttle control malfunction MAFS to ECM sensing circuit high resistance MAFS to ECM sensing circuit intermittent short circuit to ground MAFS supply circuit high resistance MAFS failure
P0102	MAFS sense circuit low voltage	Ignition ON > 5 seconds	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged; first trip), ECM: – Substitutes throttle angle for engine load measurement – Limits engine speed to 3000 rpm – Inhibits canister purge	Blocked air filter MAFS to ECM sensing circuit high resistance or open circuit MAFS to ECM sensing circuit intermittent short circuit to ground MAFS supply circuit open circuit or short circuit to ground MAFS failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0103	MAFS sense circuit high voltage	Ignition ON > 5 seconds	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Substitutes throttle angle for engine load measurement - Limits engine speed to 3000 rpm - Inhibits canister purge 	MAFS to ECM reference ground circuit open circuit MAFS to ECM sensing circuit short circuit to B+ voltage MAFS failure
P0107	BARO circuit low voltage	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: <ul style="list-style-type: none"> - Substitutes fixed value of 1013 mBar (29.92 in hg) 	BARO failure (internal ECM fault)
P0108	BARO circuit high voltage	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: <ul style="list-style-type: none"> - Substitutes fixed value of 1013 mBar (29.92 in hg) 	BARO failure (internal ECM fault)
P0111	IATS range / performance (Two part monitoring)	1 Ignition ON > 5 seconds 2 Drive above idle >1000 rpm; ECT < 104 °F (40 °C); > 20 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: <ul style="list-style-type: none"> - Substitutes fixed temperature of 50° C (122° F) 	Blocked air cleaner Air intake leak Engine breather leak IATS to ECM wiring open circuit or high resistance IATS to ECM sensing circuit short circuit to high voltage IATS failure
P0112	IATS sense circuit high voltage (low air temperature)	Ignition ON > 5 seconds	Y	2	N	When DTC is logged (first trip), ECM: <ul style="list-style-type: none"> - Substitutes fixed temperature of 50° C (122° F) 	IATS to ECM wiring open circuit or high resistance IATS to ECM sensing circuit short circuit to B+ voltage IATS failure
P0113	IATS sense circuit low voltage (high air temperature)	Ignition ON > 5 seconds	Y	2	N	When DTC is logged (first trip), ECM: <ul style="list-style-type: none"> - Substitutes fixed temperature of 50° C (122° F) 	IATS to ECM wiring short circuit to ground IATS failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0116	ECTS range / performance (Two part monitoring)	1 Ignition ON > 5 seconds 2 ECT ambient; IAT > 18 °F (-8 °C); start engine; bring to normal operating temperature; drive > 1500 rpm; > 3 minutes	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Substitutes transmission fluid temperature (via CAN) - Limits engine speed to 3000 rpm - Inhibits canister purge	Low coolant level Contaminated coolant Engine thermostat failure ECTS to ECM sensing circuit high resistance when hot ECTS to ECM sensing circuit intermittent high resistance ECTS failure
P0117	ECTS sense circuit high voltage (low coolant temperature)	Ignition ON > 5 seconds	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged; first trip), ECM: - Substitutes transmission fluid temperature (via CAN) - Limits engine speed to 3000 rpm - Inhibits canister purge	ECTS disconnected ECTS to ECM sensing circuit high resistance, open circuit or short circuit to B+ voltage ECTS failure
P0118	ECTS sense circuit low voltage (high coolant temperature)	Ignition ON > 5 seconds	Y	2	1 [A, M]	Refer to P0117 Default Action	Engine overheat condition ECTS to ECM wiring short circuit to ground ECTS failure
P0121	TPS circuit range / performance (TPS1 compared to TPS2)	Ignition ON; battery > 9v; slowly move accelerator pedal through full range; > 40 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode – engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control	TPS to ECM wiring open circuit or high resistance TPS to ECM sensing circuits (*1" or *2") short circuit to B+ voltage TPS failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0122	TPS circuit "1" low voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P0121 Default Action	TPS to ECM sensing circuit "1" (TPS pin 3) open circuit or high resistance TPS failure
P0123	TPS circuit "1" high voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P0121 Default Action	TPS to ECM sensing circuit "1" (TPS pin 3) short circuit to high voltage TPS failure
P0125	ECTS response (for closed loop fuel control)	ECT ambient; IAT > 18 °F (-8 °C); start engine; bring to normal operating temperature; drive > 1500 rpm; > 3 minutes	Y	2	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Substitutes transmission fluid temperature (via CAN) – Limits engine speed to 3000 rpm – Inhibits canister purge	Low coolant level Contaminated coolant Engine coolant thermostat failure ECTS to ECM sensing circuit high resistance, open circuit or short circuit to high voltage
P0131	HO2S sense circuit low current – A bank, upstream (1) (Universal oxygen sensor: lean condition at ECM – high current at sensor)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM variable current circuit fault (HO2S pin 3) ECM to HO2S constant current circuit fault (HO2S pin 4) HO2S failure
P0132	HO2S sense circuit high current – A bank, upstream (1) (Universal oxygen sensor: rich condition at ECM – low current at sensor)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM variable current circuit fault (HO2S pin 3) ECM to HO2S constant current circuit fault (HO2S pin 4) HO2S failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0133	HO2S sense circuit slow response – A bank, upstream (1)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at 37 – 59 mph (60 – 95 km/h); engine speed 1500 – 2000 rpm >30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits A bank closed loop fuel metering – Inhibits A bank adaptive fuel metering – Inhibits A bank downstream HO2S control	Engine misfire HO2S disconnected HO2S mechanical damage HO2S to ECM wiring fault HO2S short circuit to ground HO2S to ECM variable current circuit shielding open circuit HO2S heater circuit fault Exhaust leak Low exhaust temperature Injector flow partially blocked Catalyst efficiency decrease HO2S failure
P0135	HO2S heater circuit malfunction – A bank, upstream (1)	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits A bank closed loop fuel metering – Inhibits A bank adaptive fuel metering – Inhibits A bank downstream HO2S control	HO2S disconnected HO2S heater power supply open circuit HO2S heater to ECM wiring short circuit or open circuit HO2S heater failure
P0137	HO2S sense circuit low voltage – A bank, downstream (2)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM wiring open circuit HO2S short circuit to ground HO2S failure
P0138	HO2S sense circuit high voltage – A bank, downstream (2)	Start and run engine; bring to normal operating temperature; IAT > 18 °F (-8 °C); run engine > 1 minute	Y	2	N	None	HO2S sensing circuit short circuit to high voltage HO2S ground (BRD – braided shield) open circuit HO2S failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0140	HO2S sense circuit no activity – A bank, downstream (2)	Engine at normal operating temperature; drive > 40 mph (64 km/h); > 2 minute 30 seconds	Y	2	N	None	HO2S disconnected HO2S mechanical damage HO2S to ECM wiring open circuit HO2S sensing circuit short circuit to high voltage HO2S short circuit to ground HO2S ground (BRD – braided shield) open circuit Exhaust leak Low exhaust temperature HO2S failure
P0141	HO2S Heater circuit malfunction – A bank, downstream (2)	Ignition ON > 5 seconds	Y	2	N	None	HO2S disconnected HO2S mechanical damage HO2S to ECM wiring fault HO2S heater failure
P0151	HO2S sense circuit low current – B bank, upstream (1) (Universal oxygen sensor: lean condition at ECM – high current at sensor)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM variable current circuit fault (HO2S pin 3) ECM to HO2S constant current circuit fault (HO2S pin 4) HO2S failure
P0152	HO2S sense circuit high current – B bank, upstream (1) (Universal oxygen sensor: rich condition at ECM – low current at sensor)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM variable current circuit fault (HO2S pin 3) ECM to HO2S constant current circuit fault (HO2S pin 4) HO2S failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0153	HO2S sense circuit slow response – B bank, upstream (1)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at 37 – 59 mph (60 – 95 km/h); engine speed 1500 – 2000 rpm >30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits B bank closed loop fuel metering – Inhibits B bank adaptive fuel metering – Inhibits B bank downstream HO2S control	Engine misfire HO2S disconnected HO2S mechanical damage HO2S to ECM wiring fault HO2S short circuit to ground HO2S to ECM variable current circuit shielding open circuit HO2S heater circuit fault Exhaust leak Low exhaust temperature Injector flow partially blocked Catalyst efficiency decrease HO2S failure
P0155	HO2S heater circuit malfunction – B bank, upstream (1)	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits B bank closed loop fuel metering – Inhibits B bank adaptive fuel metering – Inhibits B bank downstream HO2S control	HO2S disconnected HO2S heater power supply open circuit HO2S heater to ECM wiring short circuit or open circuit HO2S heater failure
P0157	HO2S sense circuit low voltage – B bank, downstream (2)	Start and run engine > 5 seconds	Y	2	N	None	HO2S disconnected HO2S to ECM wiring open circuit HO2S short circuit to ground HO2S failure
P0158	HO2S sense circuit high voltage – B bank, downstream (2)	Start and run engine; bring to normal operating temperature; IAT > 18 °F (-8 °C); run engine > 1 minute	Y	2	N	None	HO2S sensing circuit short circuit to high voltage HO2S ground (BRD – braided shield) open circuit HO2S failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0160	HO2S sense circuit no activity – B bank, downstream (2)	Engine at normal operating temperature; drive > 40 mph (64 km/h); > 2 minute 30 seconds	Y	2	N	None	HO2S disconnected HO2S mechanical damage HO2S to ECM wiring open circuit HO2S sensing circuit short circuit to high voltage HO2S short circuit to ground HO2S ground (BRD – braided shield) open circuit Exhaust leak Low exhaust temperature HO2S failure
P0161	HO2S Heater circuit malfunction – B bank, downstream (2)	Ignition ON > 5 seconds	Y	2	N	None	HO2S disconnected HO2S mechanical damage HO2S to ECM wiring fault HO2S heater failure
P0171	A bank combustion too lean	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed > 40 mph; > 1 minute	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits downstream HO2S control If DTC P0174 is also flagged, ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge* * Inhibited when "lean" fault is first detected	Engine misfire Air intake leak between MAFS and throttle Fuel filter, system blockage Fuel injector blockage Fuel pressure regulator failure (low fuel pressure) Low fuel pump output HO2S harness wiring condition fault Exhaust leak (before catalyst) ECM receiving incorrect signal from one or more of the following components: ECTS, MAFS, IATS, TPS

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0172	A bank combustion too rich	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed > 40 mph; > 1 minute	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits downstream HO2S control If DTC P0175 is also flagged, ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge	Blocked air filter Fuel system return blockage Leaking fuel injector(s) Fuel pressure regulator failure (high fuel pressure) ECM receiving incorrect signal from one or more of the following components: ECTS, MAFS, IATS, TPS
P0174	B bank combustion too lean	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed > 40 mph; > 1 minute	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits downstream HO2S control If DTC P0171 is also flagged, ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge* * Inhibited when "lean" fault is first detected	Engine misfire Air intake leak between MAFS and throttle Fuel filter, system blockage Fuel injector blockage Fuel pressure regulator failure (low fuel pressure) Low fuel pump output HO2S harness wiring condition fault Exhaust leak (before catalyst) ECM receiving incorrect signal from one or more of the following components: ECTS, MAFS, IATS, TPS
P0175	B bank combustion too rich	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed > 40 mph; > 1 minute	Y	2	2 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits downstream HO2S control If DTC P0172 is also flagged, ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge	Blocked air filter Fuel system return blockage Leaking fuel injector(s) Fuel pressure regulator failure (high fuel pressure) ECM receiving incorrect signal from one or more of the following components: ECTS, MAFS, IATS, TPS

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0196	EOTS range / performance	EOT and ECT ambient; IAT > 18 °F (-8 °C); start engine; bring to normal operating temperature	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Substitutes engine coolant temperature	EOTS to ECM sensing circuit high resistance when hot EOTS to ECM sensing circuit intermittent high resistance EOTS failure
P0197	EOTS sense circuit low voltage (high oil temperature)	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Substitutes engine coolant temperature	EOTS to ECM wiring short circuit to ground EOTS failure
P0198	EOTS sense circuit high voltage (low oil temperature)	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Substitutes engine coolant temperature	EOTS disconnected EOTS to ECM sensing circuit high resistance, open circuit or short circuit to B+ voltage EOTS failure
P0201	Fuel injector circuit malfunction cylinder A1 (1)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge If DTCs for all A bank injectors are flagged: – Inhibits A bank closed loop fuel metering – Inhibits A bank adaptive fuel metering – Inhibits A bank downstream HO2S control	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0202	Fuel injector circuit malfunction cylinder A2 (2)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0201 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0203	Fuel injector circuit malfunction cylinder A3 (3)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0201 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0204	Fuel injector circuit malfunction cylinder A4 (4)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0201 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0205	Fuel injector circuit malfunction cylinder B1 (5)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits canister purge If DTCs for all B bank injectors are flagged: – Inhibits B bank closed loop fuel metering – Inhibits B bank adaptive fuel metering – Inhibits B bank downstream HO2S control	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0206	Fuel injector circuit malfunction cylinder B2 (6)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0205 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0207	Fuel injector circuit malfunction cylinder B3 (7)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0205 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0208	Fuel injector circuit malfunction cylinder B4 (8)	Start engine, bring to normal operating temperature; vary engine speed between idle – 2500 rpm > 10 times	Y	2	1 [A, M]	Refer to P0205 Default Action	Injector disconnected Injector harness wiring open or short circuit Injector failure
P0222	TPS circuit "2" low voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: – Switches off throttle motor (via relay) – Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders – Inhibits idle speed control – Inhibits cruise control – Inhibits traction control / stability control	TPS to ECM sensing circuit "2" (TPS pin 2) open circuit or high resistance TPS failure
P0223	TPS circuit "2" high voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P0222 Default Action	TPS to ECM sensing circuit "2" (TPS pin 2) short circuit to B+ voltage TPS failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0300	Random misfire detected	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits closed loop fuel metering – Inhibits adaptive fuel metering – Inhibits canister purge	Cylinder compression low Worn camshaft / broken valve spring(s) Fuel delivery pressure (low / high) Fuel injector(s) blocked / leaking Fuel injector(s) continuously open Fuel contamination Fuel injector circuit fault(s) (Injector DTCs also flagged) Spark plug failure / fouled / incorrect gap ECM to ignition module primary circuit fault (Cylinder misfire detected DTC also flagged) Ignition module ground circuit open circuit, high resistance Ignition module / coil failure
P0301	Misfire detected – cylinder A1 (1)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits A bank closed loop fuel metering – Inhibits A bank adaptive fuel metering – Inhibits canister purge	Refer to P0300 Possible Faults
P0302	Misfire detected – cylinder A2 (2)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0301 Default Action	Refer to P0300 Possible Faults

** If, on the first trip, the misfire is severe enough to cause excess exhaust emission, individual cylinder DTC plus DTC P1316 will be flagged; CHECK ENGINE MIL will flash.

If, on the first trip, the misfire is severe enough to cause catalyst damage, individual cylinder DTC plus DTC P1313 (A bank) P1314 (B bank) will be flagged; CHECK ENGINE MIL will flash.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0303	Misfire detected – cylinder A3 (3)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0301 Default Action	Refer to P0300 Possible Faults
P0304	Misfire detected – cylinder A4 (4)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0301 Default Action	Refer to P0300 Possible Faults
P0305	Misfire detected – cylinder B1 (5)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits B bank closed loop fuel metering – Inhibits B bank adaptive fuel metering – Inhibits canister purge	Refer to P0300 Possible Faults
P0306	Misfire detected – cylinder B2 (6)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0305 Default Action	Refer to P0300 Possible Faults
P0307	Misfire detected – cylinder B3 (7)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0305 Default Action	Refer to P0300 Possible Faults

** If, on the first trip, the misfire is severe enough to cause excess exhaust emission, individual cylinder DTC plus DTC P1316 will be flagged; CHECK ENGINE MIL will flash.

If, on the first trip, the misfire is severe enough to cause catalyst damage, individual cylinder DTC plus DTC P1313 (A bank) P1314 (B bank) will be flagged; CHECK ENGINE MIL will flash.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0308	Misfire detected – cylinder B4 (8)	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1 or 2 **	1 [A, M]	Refer to P0305 Default Action	Refer to P0300 Possible Faults
P0327	KS sense circuit out of range (low voltage) A bank	Start engine; run > 5 seconds	Y	2	1 [A, M]	When DTC is logged (first trip), ECM: – Sets ignition retard to maximum – Limits engine speed to 3000 rpm	Poor sensor contact with the cylinder block KS to ECM sense circuit short circuit to ground KS failure
P0328	KS sense circuit out of range (high voltage) A bank	Start engine; run > 5 seconds	Y	2	1 [A, M]	When DTC is logged (first trip), ECM: – Sets ignition retard to maximum – Limits engine speed to 3000 rpm	Poor sensor contact with the cylinder block KS to ECM sense circuit high resistance or open circuit KS to ECM sense circuit short circuit to high voltage KS failure
P0332	KS sense circuit out of range (low voltage) B bank	Start engine; run > 5 seconds	Y	2	1 [A, M]	When DTC is logged (first trip), ECM: – Sets ignition retard to maximum – Limits engine speed to 3000 rpm	Poor sensor contact with the cylinder block KS to ECM sense circuit short circuit to ground KS failure
P0333	KS sense circuit out of range (high voltage) B bank	Start engine; run > 5 seconds	Y	2	1 [A, M]	When DTC is logged (first trip), ECM: – Sets ignition retard to maximum – Limits engine speed to 3000 rpm	Poor sensor contact with the cylinder block KS to ECM sense circuit high resistance or open circuit KS to ECM sense circuit short circuit to high voltage KS failure

** If, on the first trip, the misfire is severe enough to cause excess exhaust emission, individual cylinder DTC plus DTC P1316 will be flagged; CHECK ENGINE MIL will flash.

If, on the first trip, the misfire is severe enough to cause catalyst damage, individual cylinder DTC plus DTC P1313 (A bank) P1314 (B bank) will be flagged; CHECK ENGINE MIL will flash.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0335	CKPS circuit malfunction	Crank engine > 2 seconds – engine will not start; or start engine, run steady > 1000 rpm; or engine stall, ignition ON	Y	2	1 [A, M]	When CK ENG MIL is activated (DTC flagged; first trip), ECM: – Limits engine speed to 3000 rpm	CKPS disconnected CKPS gap incorrect / foreign matter on sensor face CKPS sensing circuit open circuit, short circuit to ground, short circuit to high voltage CKPS failure
P0336	CKPS range / performance	Start engine; idle > 5 seconds (If the CKPS signal is not present, the engine will not start. The engine will stop if the CKPS signal is lost while running.)	Y	2	1 [A, M]	None	CKPS reluctor (on drive plate) foreign matter / damaged teeth CKPS sensing circuit intermittent open circuit, short circuit to ground, short circuit to high voltage CKPS failure
P0340	CMPS circuit malfunction – A bank	Crank engine > 5 seconds (battery v 6 – 10.5 during cranking); or start engine, idle > 600 rpm (If the A bank CMPS signal is not present, the engine may start – 50% chance. The engine will run normally if the A bank CMPS signal is lost while running.)	Y	2	N	None	CMPS disconnected CMPS gap incorrect / foreign matter on sensor face CMPS sensing circuit open circuit, short circuit to ground, short circuit to high voltage CMPS failure
P0341	CMPS range / performance – A bank (CMPS pulse not detected at CKPS missing tooth)	Start engine; idle > 5 seconds (If the A bank CMPS signal is not present, the engine may start – 50% chance. The engine will run normally if the A bank CMPS signal is lost while running.)	Y	2	N	None	CMPS disconnected CMPS gap incorrect / foreign matter on sensor face CMPS sensing circuit open circuit, short circuit to ground, short circuit to high voltage CMPS failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0351	Ignition coil (A1) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	When fault is detected, ECM: <ul style="list-style-type: none"> - Limits engine speed to 3000 rpm - Inhibits individual cylinder fuel injection - Inhibits A bank closed loop fuel metering - Inhibits A bank downstream HO2S control 	ECM to ignition module primary circuit open circuit, short circuit to ground, high resistance Ignition module ground circuit open circuit, high resistance Ignition module / coil failure
P0352	Ignition coil (A2) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0351 Default Action	Refer to P0351 Possible Causes
P0353	Ignition coil (A3) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0351 Default Action	Refer to P0351 Possible Causes
P0354	Ignition coil (A4) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0351 Default Action	Refer to P0351 Possible Causes
P0355	Ignition coil (B1) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	When fault is detected, ECM: <ul style="list-style-type: none"> - Limits engine speed to 3000 rpm - Inhibits individual cylinder fuel injection - Inhibits B bank closed loop fuel metering - Inhibits B bank downstream HO2S control 	Refer to P0351 Possible Causes
P0356	Ignition coil (B2) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0355 Default Action	Refer to P0351 Possible Causes
P0357	Ignition coil (B3) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0355 Default Action	Refer to P0351 Possible Causes
P0358	Ignition coil (B4) primary / secondary circuit malfunction	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	Refer to P0355 Default Action	Refer to P0351 Possible Causes

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0420	Catalyst efficiency below threshold A bank	Engine at normal operating temperature; IAT > 18 °F (-8 °C); varied driving for 3 minutes; then, constant steady throttle 30 – 38 mph (50 – 60 km/h), 1100 – 1475 rpm > 25 seconds Surface elevation < 8,000 ft (2,438 m)	Y	2	N	None	HO2S disconnected HO2S to ECM wiring fault HO2S heater to ECM wiring fault HO2S heater failure Upstream HO2S failure Downstream HO2S failure Catalyst failure
P0430	Catalyst efficiency below threshold B bank	Engine at normal operating temperature; IAT > 18 °F (-8 °C); varied driving for 3 minutes; then, constant steady throttle 30 – 38 mph (50 – 60 km/h), 1100 – 1475 rpm > 25 seconds Surface elevation < 8,000 ft (2,438 m)	Y	2	N	None	HO2S disconnected HO2S to ECM wiring fault HO2S heater to ECM wiring fault HO2S heater failure Upstream HO2S failure Downstream HO2S failure Catalyst failure
P0442	EVAP (system) leak detected – small	Fuel tank level between 15 % – 85 % full; after start-up, run engine 13 minutes. Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive vehicle 12 – 60 mph (20 – 100 km/h) > 6 minutes Surface elevation < 8,000 ft (2,438 m)	Y	2	N	When CK ENG MIL is activated (DTC flagged: second trip), ECM: – Inhibits adaptive fuel metering – Inhibits canister purge	Fuel cap seal defective EVAP system leak (canister damage, pipework damage) EVAPP valve to ECM drive circuit open circuit, short circuit, high resistance EVAPP valve power supply circuit open circuit EVAPP valve to engine purge pipe damaged / blocked / leaking EVAPP valve operating vacuum hose leak / blockage EVAPP valve failure Fuel tank leak

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0443	EVAP purge valve control malfunction	Occurs during "EVAP leak check". Refer to P0442, P0455	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Inhibits EGR diagnostic monitoring	EVAPP valve to ECM drive circuit open circuit, short circuit, high resistance EVAPP valve power supply circuit open circuit EVAPP valve operating vacuum hose leak / blockage EVAPP valve failure
P0444	EVAPP valve circuit open circuit	Engine at normal operating temperature; vehicle stationary; brakes applied; gear "D"; idle > 10 seconds	Y	2	N	None	EVAPP to ECM drive circuit open circuit or high resistance EVAPP failure
P0445	EVAPP valve circuit short circuit	Engine at normal operating temperature; drive vehicle 12 – 60 mph (20 – 100 km/h) > 6 minutes	Y	2	N	None	EVAPP to ECM drive circuit short circuit to ground EVAPP failure
P0446	CCV (canister close valve) malfunction	Occurs during "EVAP leak check". Refer to P0442, P0455	Y	2	N	None	CCV B+ power supply circuit fault CCV to ECM drive circuit open circuit, high resistance or short circuit to B+ voltage CCV failure
P0447	CCV (canister close valve) opened failure	Ignition ON > 5 seconds (ECM CCV drive inactive – valve open)	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Inhibits EVAP leak check monitoring - Inhibits adaptive fuel metering - Inhibits canister purge	CCV B+ power supply circuit fault CCV to ECM drive circuit open circuit, high resistance or short circuit to B+ voltage CCV failure
P0448	CCV (canister close valve) closed failure	Occurs during "EVAP leak check". Refer to P0442, P0455	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Inhibits EVAP leak check monitoring - Inhibits adaptive fuel metering - Inhibits canister purge	CCV to ECM drive circuit short circuit to ground CCV failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0450	FTP (fuel tank pressure) sensor malfunction	Occurs during "EVAP leak check". Refer to P0442, P0455	Y	2	N	None	FTP sensor disconnected FTP sensor to ECM sense circuit open circuit, short circuit to ground, short circuit to B+ voltage FTP sensor to ECM power supply circuit open circuit or short circuit to ground FTP sensor to ECM wiring (supply, sense, signal ground) short circuit to each other FTP sensor failure
P0452	FTP (fuel tank pressure) sensor circuit low voltage	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Inhibits EVAP leak check monitoring	FTP sensor disconnected FTP sensor to ECM sense circuit open circuit or short circuit to ground FTP sensor to ECM power supply circuit open circuit or short circuit to ground FTP sensor failure
P0453	FTP (fuel tank pressure) sensor circuit high voltage	Ignition ON > 5 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: - Inhibits EVAP leak check monitoring	FTP sensor to ECM signal ground circuit open circuit FTP sensor to ECM wiring (supply, sense, signal ground) short circuit to each other FTP sensor to ECM sense circuit short circuit to B+ voltage FTP sensor failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0455	EVAP (system) leak detected – large	Fuel tank level between 15 % – 85 % full; after start-up, run engine 13 minutes. Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive vehicle 12 – 60 mph (20 – 100 km/h) > 6 minutes. Surface elevation < 8,000 ft (2,438 m)	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits adaptive fuel metering – Inhibits canister purge	Fuel cap off Fuel cap seal defective EVAP system leak (canister damage, pipework damage) EVAPP valve to ECM drive circuit open circuit, short circuit, high resistance EVAPP valve power supply circuit open circuit EVAPP valve to engine purge pipe damaged / blocked / leaking EVAPP valve operating vacuum hose leak / blockage EVAPP valve failure Fuel tank leak
P0460	Fuel level sense signal performance	Drive > 30 miles (48 km)	Y	2	N	None	Fuel level sensor to instrument pack circuits intermittent short or open circuit, high resistance Fuel level sensor failure Instrument pack fault (incorrect fuel level data)
P0480	Radiator fans slow (series) circuit malfunction	Engine at normal operating temperature; fans cycle ON / OFF	N	N	N	None	Radiator fan control relay module to ECM “series” drive circuit (relay pin 9) fault Relay coil ignition power supply open circuit ECM ground circuit fault (relay coil drive) ECTS circuit malfunction (refer to P0116)
P0482	Radiator fans fast (parallel) circuit malfunction	Engine at normal operating temperature; fans cycle ON / OFF	N	N	N	None	Radiator fan control relay module to ECM “parallel” drive circuit (relay pin 7) fault Relay coil ignition power supply open circuit ECM ground circuit fault (relay coil drive) ECTS circuit malfunction (refer to P0116)

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0506	Idle rpm lower than expected	Engine and transmission at normal operating temperature; IAT > 18 °F (-8 °C); gear "N"; idle > 30 seconds (no electrical load, A/C compressor, radiator fans, brake pedal switching during period) Surface elevation < 8,000 ft (2,438 m)	Y	2	N	None	Air intake blockage Accessory drive overload (defective / seized component) Throttle valve stuck closed Throttle assembly failure
P0507	Idle rpm higher than expected	Engine and transmission at normal operating temperature; IAT > 18 °F (-8 °C); gear "N"; idle > 30 seconds (no electrical load, A/C compressor, radiator fans, brake pedal switching during period) Surface elevation < 8,000 ft (2,438 m)	Y	2	N	None	Intake air leak between MAFS and throttle Intake air leak between throttle and engine Engine breather leak Throttle valve stuck open Throttle assembly failure
P0560	Vehicle voltage malfunction	Ignition ON > 35 seconds	Y	2	N	None	ECM battery power supply open circuit, high resistance ECM ignition power supply open circuit, high resistance
P0566	Cruise control CANCEL switch ON fault	Ignition ON > 75 seconds	N	N	1 [A, M]	When fault is detected, ECM: – Inhibits cruise control	Cruise control switches internal steering wheel short circuit to ground Steering wheel cassette reel short circuit to ground Cassette reel to ECM circuit short circuit to ground CANCEL switch failure (stuck ON)
P0567	Cruise control RESUME switch ON fault	Ignition ON > 75 seconds	N	N	1 [A, M]	When fault is detected, ECM: – Inhibits cruise control	Cruise control switches internal steering wheel short circuit to ground Steering wheel cassette reel short circuit to ground Cassette reel to ECM circuit short circuit to ground RESUME switch failure (stuck ON)

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P0568	Cruise control switch ground malfunction	Ignition ON > 5 seconds	N	N	1 [A, M]	When fault is detected, ECM: – Inhibits cruise control	Cruise control switches internal steering wheel open circuit Steering wheel cassette reel open circuit or high resistance Cassette reel to ECM circuit (ACCEL / DECEL) open circuit or high resistance ACCEL / DECEL switch failure
P0569	Cruise control DECEL / SET (SET-) switch ON fault	Ignition ON > 10 minutes	N	N	1 [A, M]	When fault is detected, ECM: – Inhibits cruise control	Cruise control switches internal steering wheel short circuit to ground Steering wheel cassette reel short circuit to ground Cassette reel to ECM circuit short circuit to ground DECEL / set switch failure (stuck ON)
P0570	Cruise control ACCEL / SET (SET+) switch ON fault	Ignition ON > 10 minutes	N	N	1 [A, M]	When fault is detected, ECM: – Inhibits cruise control	Cruise control switches internal steering wheel short circuit to ground Steering wheel cassette reel short circuit to ground Cassette reel to ECM circuit short circuit to ground ACCEL / set failure (stuck ON)
P0603	ECM data corrupted	Ignition ON > 5 seconds	Y	1	N	When CK ENG MIL is activated (DTC flagged; first trip), ECM: – Inhibits all diagnostic monitoring except: <ul style="list-style-type: none"> • throttle control monitoring • upstream HO2S control monitoring • CPU 1 and 2 monitoring 	ECM failure
P1000	System checks not complete since last memory clear	"System Readiness Test"	N	N	N	None	See page 1

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1104	MAFS ground malfunction	Ignition ON > 5 seconds	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Limits engine speed to 3000 rpm - Substitutes throttle angle for engine load measurement - Inhibits canister purge 	MAFS to ECM reference ground circuit open circuit, short circuit to high voltage, high resistance MAFS to ECM sensing circuit open circuit MAFS failure
P1111	System checks complete since last memory clear	"System Readiness Test"	N	N	N	None	See page 1
P1121	PPS circuit range / performance (PPS1 compared to PPS2)	Ignition ON; battery > 9v; slowly move accelerator pedal through full range; > 40 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	Pedal position sensor to ECM sense circuits 1 and 2 open circuit, short circuit or high resistance Sensor power supply fault Sensor reference ground fault Pedal position sensor failure
P1122	Pedal position sensor circuit "1" low voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1121 Default Action	Pedal position sensor to ECM sense circuit "1" (sensor pin 4) wire open circuit or high resistance Sensor power supply fault Pedal position sensor failure
P1123	Pedal position sensor circuit "1" high voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1121 Default Action	Pedal position sensor to ECM sense circuit "1" (sensor pin 4) wire short circuit to B+ voltage Pedal position sensor failure
P1136	"Cool box" fan malfunction	Ignition ON; fan operating	N	N	N	None	Cooling fan power supply (fuse) fault Cooling fan drive circuit fault Cooling fan motor failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1143	AACV (air assist close valve) range / performance	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive and accelerate to 60 mph (100 km/h); release the accelerator and coast to 37 mph (60 km/h); engine rpm 1000 – 3000 during coast	Y	2	N	None	AAI piping blocked Throttle body air channel blocked AACV stuck
P1144	AACV (air assist close valve) circuit malfunction	ECT ambient; start engine and bring to normal operating temperature	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits AACV range / performance diagnostic monitoring	AACV B+ power supply circuit fault AACV ground circuit fault AACV to ECM PWM drive circuit open circuit, short circuit or high resistance AACV failure
P1222	Pedal position sensor circuit "2" low voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: – Switches off throttle motor (via relay) – Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders – Inhibits idle speed control – Inhibits cruise control – Inhibits traction control / stability control	Pedal position sensor to ECM sense circuit "2" (sensor pin 2) wire open circuit or high resistance Sensor power supply fault Pedal position sensor failure
P1223	Pedal position sensor circuit "2" high voltage	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1222 Default Action	Pedal position sensor to ECM sense circuit "2" (sensor pin 2) wire short circuit to B+ voltage Pedal position sensor failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1224	Throttle control position error	Ignition ON > 3 minutes	Y	2	1 [R, A, M]	Refer to P1222 Default Action	Throttle adaptations not performed after battery disconnect TPS disconnected TPS to ECM sense circuits open circuit, high resistance Throttle motor power relay failure Throttle motor power relay to ECM circuit fault Throttle motor power relay power supply open circuit ECM ground circuit fault (relay coil drive) Throttle motor to ECM drive circuits open circuit, short circuit, high resistance Throttle motor failure Throttle assembly failure
P1229	Throttle motor control circuit malfunction	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1222 Default Action	Throttle motor disconnected Throttle motor to ECM drive circuits short circuit or open circuit Throttle motor failure
P1230	Fuel pump relay malfunction	Ignition OFF; Ignition ON > 5 seconds	Y	2	N	None	Fuel pump relay failure Fuel pump relay to ECM circuit fault Fuel pump relay coil power supply open circuit ECM ground circuit fault (relay coil drive)

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1240	Sensor reference voltage malfunction (throttle sensors, fuel tank pressure sensor) (ECM pins EM82-01, EM83-05)	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged: first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	ECM to sensors reference voltage circuit short circuit to ground, short circuit to high voltage, open circuit, high resistance TPS, PPS, FTP sensor failure(s)
P1241	Sensor reference voltage low (throttle sensors, fuel tank pressure sensor) (ECM pins EM82-01, EM83-05)	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1240 Default Action	ECM to sensors reference voltage circuit short circuit to ground TPS, PPS, FTP sensor failure(s)
P1242	Sensor reference voltage high (throttle sensors, fuel tank pressure sensor) (ECM pins EM82-01, EM83-05)	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1240 Default Action	ECM to sensors reference voltage circuit open circuit, high resistance, short circuit to high voltage TPS, PPS, FTP sensor failure(s)
P1243	Sensor reference ground malfunction (throttle sensors, fuel tank pressure sensor, ECTS, IATS) (ECM pins EM82-07, EM83-13)	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	Refer to P1240 Default Action	ECM to sensors reference ground circuit open circuit, high resistance TPS, PPS, ECTS, IATS, FTP sensor failure(s)
P1245	Engine crank signal low voltage	Start engine: idle	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged: first trip), ECM: <ul style="list-style-type: none"> - Limits engine speed to 3000 rpm 	Starter relay coil to ECM / BPM circuit open circuit
P1246	Engine crank signal high voltage	Start engine: drive / accelerate > 13 mph (20 km/h) 1200 – 3000 rpm; decelerate to stop; repeat (5 times total)	Y	2	1 [A, M]	When AMBER MIL is activated (DTC logged: first trip), ECM: <ul style="list-style-type: none"> - Limits engine speed to 3000 rpm 	Starter relay coil to ECM / BPM circuit short circuit to B+ voltage BPM failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1250	Throttle valve return spring malfunction	Ignition ON; Ignition OFF > 3 seconds; Ignition ON	N	N	1 [R, M]	When fault is detected, ECM: <ul style="list-style-type: none"> - Limited throttle valve movement in response to normal accelerator pedal movement - Limits vehicle speed to 80 mph (129 km/h) - Inhibits cruise control 	Throttle return spring failure (throttle failure)
P1251	Throttle motor power relay malfunction	Ignition ON > 10 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	Throttle motor power relay failure Throttle motor power relay to ECM circuit fault Throttle motor power relay coil power supply open circuit ECM ground circuit fault (relay coil drive)
P1254	Throttle "limp home" spring malfunction	Ignition ON; Ignition OFF > 3 seconds; Ignition ON	N	N	1 [R, M]	When fault is detected, ECM: <ul style="list-style-type: none"> - Limited throttle valve movement in response to normal accelerator pedal movement - Limits vehicle speed to 80 mph (129 km/h) - Inhibits cruise control 	Throttle limp home spring failure (throttle failure)
P1260	Security input malfunction	Ignition ON > 10 seconds	N	N	N	None	KTM to ECM circuit short circuit, high resistance or open circuit Loss of ignition switched power supply to the ECM PIN EM82-09 for greater than 16 milliseconds KTM failure Security system incorrectly configured (KTM / ECM)

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1313	Misfire rate catalyst damage A bank (1) NOTE: This DTC will flag only when accompanied by an individual cylinder misfire DTC: P0300 – P0308.	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits A bank closed loop fuel metering – Inhibits A bank adaptive fuel metering – Inhibits canister purge	Cylinder compression low Worn camshaft / broken valve spring(s) Fuel delivery pressure (low / high) Fuel injector(s) blocked / leaking Fuel injector(s) continuously open Fuel contamination Fuel injector circuit fault(s) (Injector DTCs also flagged) Spark plug failure / fouled / incorrect gap ECM to ignition module primary circuit fault(s) (Cylinder misfire detected DTC also flagged) Ignition module ground circuit open circuit, high resistance Ignition module / coil failure
P1314	Misfire rate catalyst damage B bank (2) NOTE: This DTC will flag only when accompanied by an individual cylinder misfire DTC: P0300 – P0308.	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits B bank closed loop fuel metering – Inhibits B bank adaptive fuel metering – Inhibits canister purge	Refer to P1313 Possible Causes
P1316	Misfire excess emission NOTE: This DTC will flag only when accompanied by an individual cylinder misfire DTC: P0300 – P0308.	Engine at normal operating temperature; IAT > 18 °F (-8 °C); drive at steady speed between idle – 2500 rpm; > 2 minutes 30 seconds Surface elevation < 8,000 ft (2,438 m)	Y	1	1 [A, M]	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Limits engine speed to 3000 rpm – Inhibits closed loop fuel metering – Inhibits adaptive fuel metering – Inhibits canister purge	Refer to P1313 Possible Causes

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1340	CMPS circuit malfunction – B bank	Crank engine > 5 seconds (battery v 6 – 10.5 during cranking); or start engine, idle > 600 rpm (If the A bank CMPS signal is not present, the engine may start – 50% chance. The engine will run normally if the A bank CMPS signal is lost while running.)	Y	2	N	None	CMPS disconnected CMPS gap incorrect / foreign matter on sensor face CMPS sensing circuit open circuit, short circuit to ground, short circuit to high voltage CMPS failure
P1341	CMPS range / performance – B bank (CMPS pulse not detected at CKPS missing tooth)	Start engine; idle > 5 seconds (If the A bank CMPS signal is not present, the engine may start – 50% chance. The engine will run normally if the A bank CMPS signal is lost while running.)	Y	2	N	None	CMPS disconnected CMPS gap incorrect / foreign matter on sensor face CMPS sensing circuit open circuit, short circuit to ground, short circuit to high voltage CMPS failure
P1367	Ignition monitor – Group One (1A, 2B, 3B, 4A)	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	When ECM detects fault: – Limits engine speed to 3000 rpm	Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground or short circuit to B+ voltage Ignition module / coil group ground circuit fault Ignition coil relay failure
P1368	Ignition monitor – Group Two (1B, 2A, 3A, 4B)	Run engine steady < 2500 rpm > 5 seconds	Y	2	1 [A, M]	When ECM detects fault: – Limits engine speed to 3000 rpm	Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground or short circuit to B+ voltage Ignition module / coil group ground circuit fault Ignition coil relay failure
P1384	VVT solenoid malfunction – A bank	Drive vehicle; accelerate rapidly to cruise, decelerate to stop, repeat several times	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: Sets VVT drive PWM duty cycle to 0 (intake camshaft fully retarded)	VVT solenoid valve to ECM PWM drive circuit fault VVT solenoid valve to ECM ground circuit fault VVT solenoid failure VVT oil flow fault VVT / camshaft mechanical failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1396	VVT solenoid malfunction – B bank	Drive vehicle; accelerate rapidly to cruise, decelerate to stop, repeat several times	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: Sets VVT drive PWM duty cycle to 0 (intake camshaft fully retarded)	VVT solenoid valve to ECM PWM drive circuit fault VVT solenoid valve to ECM ground circuit fault VVT solenoid failure VVT oil flow fault VVT / camshaft mechanical failure
P1516	Gear change PARK / NEUTRAL driving malfunction	Engine at normal operating temperature; drive 50 – 63 mph (80 – 100 km/h) 1800 – 2200 rpm > 35 seconds	Y	2	N	None	Gear selector cable setting incorrect Transmission rotary switch to ECM circuit open circuit or high resistance Rotary switch failure D – 4 switch to TCM circuit open circuit or high resistance D – 4 switch fault
P1517	Engine cranking PARK / NEUTRAL malfunction	Start engine	N	N*	N	When ECM detects fault: – Fuel injection inhibited	Gear selector cable setting incorrect Transmission rotary switch to ECM circuit open circuit or high resistance Rotary switch failure
P1571	Brake switch malfunction	Drive vehicle; engage cruise control > 10 seconds disengage cruise control; repeat (5 total cycles)	N	N	1 [A, M]	When ECM detects fault: – Inhibits cruise control	Brake switch to ECM circuit open circuit, short circuit to ground, high resistance Brake switch ignition switched ground circuit open circuit Brake switch failure Brake cancel switch to ECM circuit open circuit, short circuit to ground, high resistance Brake cancel switch to cruise control switch to ECM circuit open circuit, short circuit to ground, high resistance Brake cancel switch ignition switched power supply open circuit Brake cancel switch failure Cruise control switch failure

* If engine will not start, CHECK ENGINE MIL will remain on.

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1582	Throttle monitor data available or Inertia switch malfunction	Ignition ON	N	N	N	None	DTC indicates that the inertia switch has tripped (vehicle impact) If no vehicle impact: Inertia switch to ECM circuit, short circuit to ground Inertia switch failure
P1606	EMS control relay malfunction	Ignition ON; ignition OFF; ignition ON > 5 seconds	N	N	N	None	ECM control relay failure ECM control relay to ECM circuit fault ECM control relay coil power supply open circuit ECM ground circuit fault (relay coil drive)
P1609	ECM microprocessor-to-microprocessor communication failure	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control	ECM FCCP (programming) circuit (ECM pin EM80-19 or EM80-27) short circuit to ground ECM failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1611	ECM CPU 2 failure	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	ECM failure
P1631	Throttle motor power relay coil activation circuit failure	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	Throttle motor relay coil to ECM circuit open circuit, short circuit to ground or short circuit to B+ voltage ECM failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1633	ECM CPU 1 memory failure	Ignition ON > 5 seconds	Y	2	1 [R, A, M]	When RED MIL is activated (DTC logged; first trip), ECM: <ul style="list-style-type: none"> - Switches off throttle motor (via relay) - Initiates throttle "limp home" mode: engine speed controlled to between 1000-1250 rpm by fuel cutoff to cylinders - Inhibits idle speed control - Inhibits cruise control - Inhibits traction control / stability control 	ECM failure
P1634	Throttle "watchdog" circuit malfunction	Ignition ON; Ignition OFF > 3 seconds; Ignition ON; Ignition OFF > 3 seconds; Ignition ON	N	N	1 [R, A, M]	When fault is detected, ECM: <ul style="list-style-type: none"> - Limited throttle valve movement in response to normal accelerator pedal movement - Limits vehicle speed to 80 mph (129 km/h) - Inhibits cruise control 	ECM failure
P1637	CAN ABS/TCCM token message missing	Ignition ON > 5 seconds	Y	2	1 [M]	When ECM detects fault: <ul style="list-style-type: none"> - Inhibits cruise control - (Idle speed control quality deteriorates) 	CAN open circuit fault - ABS/TCCM to ECM CAN short circuit fault ABS/TCCM failure ECM failure
P1638	CAN INST token message missing	Ignition ON > 5 seconds	Y	1	N	None (Engine speed and coolant temperature data missing at instrument pack)	CAN open circuit fault - INST to ECM CAN short circuit fault INST failure ECM failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1642	CAN circuit malfunction	Ignition ON > 5 seconds	Y	1	1 [M]	When ECM detects fault: – Limits throttle to approximately 30% – Inhibits cruise control (All CAN data unavailable)	CAN short circuit fault Control module failure – check for additional flagged DTC(s) to locate control module source
P1643	CAN TCM token message missing	Ignition ON > 5 seconds	Y	2	1 [M]	When ECM detects fault: – Limits throttle to approximately 30% – Inhibits cruise control (Torque reduction request data missing; results in harsh transmission shifts)	CAN open circuit fault – TCM to ECM CAN short circuit fault TCM failure ECM failure
P1646	ECM HO2S control malfunction – A bank, upstream	Ignition ON > 8 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits A bank upstream HO2S operation	HO2S heater failure HO2S sensing circuit short circuit to ground or high voltage HO2S sensing circuit open circuit ECM failure
P1647	ECM HO2S control malfunction – B bank, upstream	Ignition ON > 8 seconds	Y	2	N	When CK ENG MIL is activated (DTC flagged; second trip), ECM: – Inhibits B bank upstream HO2S operation	HO2S heater failure HO2S sensing circuit short circuit to ground or high voltage HO2S sensing circuit open circuit ECM failure
P1648	ECM KS self test failure	Start engine; run > 5 seconds	Y	2	1 [A, M]	When DTC is logged (first trip), ECM: – Sets ignition retard to maximum – Limits engine speed to 3000 rpm	ECM failure
P1649	ECM flash programming circuit malfunction	Ignition ON	N	N	N	None	ECM to DLC circuit, short circuit to ground or short circuit to B+ voltage
P1656	TPS amplifier circuit malfunction	Ignition ON > 5 seconds	N	N	1 [A]	None	ECM failure

DTC	FAULT DESCRIPTION	MONITORING CONDITIONS	OBD II	CK ENG	OTHER	DEFAULT ACTION	POSSIBLE CAUSES
P1657	Throttle motor power relay coil circuit ON failure	Ignition ON; Ignition OFF > 3 seconds; Ignition ON; Ignition OFF > 3 seconds; Ignition ON	N	N	1 [A, M]	When fault is detected, ECM: - Limited throttle valve movement in response to normal accelerator pedal movement - Limits vehicle speed to 80 mph (129 km/h) - Inhibits cruise control	ECM failure
P1658	Throttle motor power relay ON failure	Ignition ON; Ignition OFF > 3 seconds; Ignition ON; Ignition OFF > 3 seconds; Ignition ON	N	N	1 [A, M]	When fault is detected, ECM: - Limited throttle valve movement in response to normal accelerator pedal movement - Limits vehicle speed to 80 mph (129 km/h) - Inhibits cruise control	Throttle motor power relay failure (contacts stuck on) Throttle motor power relay to ECM coil circuit, short circuit to ground Throttle motor power relay to ECM supply circuit, short circuit to B+ voltage