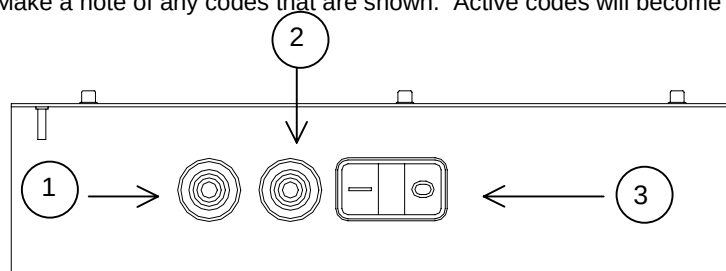


Electronic Engine Fault Detection Flash Codes

Perkins 1306-E87 electronic engines automatically record engine faults in the Electronic Control Module (ECM) to assist the operator or engineer in troubleshooting. The fault codes can be read using the red and amber lamps situated on the top of the relay box. The relay box can be found mounted on the alternator box below the AVR. The relevant codes can be identified using the fault-finding table below.

- Two types of codes may be observed: “active” and “inactive” codes. Active codes are new faults identified which must be rectified before the generating set is operated again. Inactive codes are all codes which have been previously logged.
- To operate the fault finding diagnostic codes, press and hold the red pushbutton. The lamps will flash in the following sequence: amber-red-amber-amber. Once this sequence has finished, while still holding the red button, press and release the green button. Observe the sequence of the flashing lamps.
- If there are no active codes retained in the memory of the ECM, the red lamp will flash once, then the amber lamp will flash three times.
- If there are any active codes retained in the memory of the ECM, the red lamp will flash once. The active codes will then flash on the amber lamp. If there is more than one code there will be a short delay between codes.
- When all of the active codes have been shown, the red lamp will flash twice. Then, if there are any inactive codes retained, the amber lamp will flash a code. If there is more than one code there will be a short delay between codes.
- When the test is complete, the red lamp will flash three times.
- Make a note of any codes that are shown. Active codes will become inactive if the test is done for a second time.



1. Red Lamp
2. Amber Lamp
3. Pushbuttons

Flash code	Condition description	Comments	Probable causes
111	No errors found	-	-
112	Electrical system voltage B+ out of range: high	ECM voltage is continuously more than 18V	Charging system fault
113	Electrical system voltage B+ out of range: low	ECM voltage is continuously less than 6.5V. Cause of no start / misfire	Low battery voltage. Loose connections. High resistance in circuit
114	Engine coolant temperature signal out of range: low	Defaults to 180°F (82°C). Signal voltage less than 0.127V	Short circuit to earth
115	Engine coolant temperature signal out of range: high	Defaults to 180°F (82°C). Signal voltage greater than 4.6V	Open circuit. Sensor failure
121	Manifold air pressure signal out of range: high	Defaults to ECM setting. Low power. Slow acceleration. Signal voltage greater than 4.6V	Sensor failure
122	Manifold air pressure signal out of range: low	Defaults to ECM setting. Low power. Slow acceleration. Signal voltage greater than 4.6v	Short circuit to earth. Sensor failure
123	Manifold air pressure fault: in range	Defaults to ECM setting. Low power. Slow acceleration	Hose or sensor for manifold air pressure blocked
124	Injection control pressure signal out of range: low	Defaults to open-loop control. Underrun at low idle. Signal voltage less than 0.039V	Short circuit to low. Open circuit. Sensor failure
125	Injection control pressure signal out of range: high	Defaults to open loop control Underrun at low idle. Signal voltage greater than 4.897V	Short circuit to high. Sensor failure
131	Speed control signal out of range: low	Signal voltage less than 0.152V. Engine at low idle only	Short circuit to earth. Open circuit. Sensor failure.
132	Speed control signal out of range: high	Signal voltage greater than 4.55V. Engine idle only	Short circuit to reference voltage or 12 volts. Sensor failure
133	Speed control signal fault: in range	Speed control position does not match the idle validation switch. Kept to 0% of Speed control position	Speed control failure.
134*	Speed control position does not match the idle validation switch.	Kept to 0% of Speed control position	Speed control and idle validation switch failure
135*	ECM low idle validation switch faulty.	Speed control position does not match the idle validation switch. Kept to 50% of Speed control position. Engine speed limited	Idle validation switch failure

141*	Vehicle speed signal out of range: low	Speed sensor signal is less than 0.48V (0 Km/h/mph). Cruise control nor PTO not engaged. Engine speed limited	Sensor open circuit or short circuit to earth
142*	Vehicle speed signal out of range: high	Speed sensor signal is greater than 4.492V (0 Km/h/mph). Cruise control nor PTO not engaged	Short circuit to reference voltage or 12 volts
143	Wrong number of pulses per revolution from the camshaft position sensor	Intermittent signal	Poor connection or camshaft position sensor failure
144	Interference found at the camshaft position sensor	ECM found excessive external inputs	Interference. Injector unit voltage short circuit to earth
145	No signal from the camshaft position sensor but the injection control pressure has increased	Found by the ECM	Short circuit to earth. Open circuit. Sensor failure
151*	Barometric pressure signal out of range: high	Signal voltage greater than 4.9V for more than 1 second. Defaults to 101 kPa (14.7 lbf/in ²) 1,0 kgf/cm ²	Short circuit high or open circuit. Sensor failure
152*	Barometric pressure signal out of range: low	Signal voltage less than 1.0V for more than 1 second. Defaults to 101 kPa (14.7 lb/in ²) 1,0 kgf/cm ²	Short circuit to earth low
154	Intake air temperature signal out of range: low	Signal voltage less than 0.127V. Defaults to 170°F (77°C)	Short circuit to earth
155	Intake air temperature signal out of range: high	Signal voltage greater than 4.6V. Defaults to 170°F (77°C)	Open circuit
211	Engine oil pressure signal out of range: low	Signal voltage less than 0.039V	Short circuit to earth low
212	Engine oil pressure signal out of range: high	Signal voltage greater than 4.9V	Short circuit to earth high or open circuit
213*	Remote speed control out of range: low	Remote speed control signal less than 0.249V	Open circuit
214*	Remote speed control out of range: high	Remote speed control signal greater than 4.5V	Short circuit to earth
221*	Cruise / PTO (or remote PTO) switch fault	Signal voltage incorrect, does not match the switch position	Short circuit or high resistance in the speed control circuit
222*	Brake switch circuit fault	Voltage to pins 43 and 44 on the ECM are not the same	Switch or relay faulty or incorrectly adjusted
225	Sensor for engine oil pressure faulty: in range	Signal greater than 276 kPa (40 lbf/in ²) 2,8 kgf/cm ² with the engine start key in the "ON" position. Engine protection disabled	Faulty circuit connection. Sensor failure
231	ATA data link fault	ATA link open or short circuit. VPM fault	ATA device earthed or overloaded
236*	Engine coolant level switch fault	-	Sort circuit to earth or open circuit
241	Regulator for injection control pressure failed the output circuit test	Output circuit test in engine-off test only	Open circuit or short circuit to earth
244	Engine data link failed open circuit test	Output circuit test in engine-off test only	Open circuit or short circuit to earth
254	Open circuit test out of range: high	-	High voltage during open circuit test
255	Open circuit test out of range: low	-	Low voltage during open circuit test
311	Engine oil temperature signal out of range: low	Signal voltage less greater 4.8v Defaults to 212°F (100°C) No fast idle	Short circuit to earth
312	Engine oil temperature signal out of range: high	Signal voltage less than 0.2v Defaults to 212°F (100°C) No fast idle	Open circuit
313	Engine oil pressure below warning level	Oil warning light on	No oil or low oil level. Faulty regulator. Suction pipe blocked or damaged. Worn main bearings. Worn oil pump.
314	Engine oil pressure below critical level	Engine will stop, if this option is fitted	No oil or low oil level. Fault in regulator. Suction pipe blocked or damaged. Worn main bearings. Worn oil pump.
315*	Engine speed exceeded warning limit	ECM recorded an engine speed greater than 3000 rev/min	Incorrect use of gears in automotive application

321	Engine coolant temperature above warning level	Coolant temperature greater than 224.6°F (107°C)	Cooling system fault
322	Engine coolant temperature too high	Coolant temperature greater than 233.6°F (112.5°C)	Cooling system fault
323*	Engine coolant level below warning level	ECM finds low coolant level	Coolant level low. Leakage of coolant
325	Power reduced to match cooling system performance	Engine power reduced	High altitude or high ambient temperature
326	Gen Set speed control faults	Engine goes to idle on start up or no longer responds to a load/speed control	Wiring loom fault or out of range speed control signal
331	Injection control pressure too high	Injection control pressure above 25 Mpa (3675 lbf/in2) 2250 kgf/cm2	Short circuit to earth. Regulator valve stuck
332	Injection control pressure above specification with the engine off	Sensor signal voltage higher than expected with the engine off	Short circuit to voltage. Sensor fault
333	Injection control pressure below best value	Pressure does not match the output signal for a long period of time	Incorrect specification lubricating oil. Air in the lubricating oil. Leakage at the 'O' ring for the injector unit. Regulator fault.
334	Injection control pressure does not reach the correct pressure in the time allowed	Pressure does not match the output signal for a short period of time	Incorrect specification lubricating oil. Air in the lubricating oil. Leakage at the 'O' ring for the injector unit. Regulator fault.
335	Injection control pressure does not increase during engine Cranking	Less than 5,1 Mpa (725 lbf/in2) 51 kgf/cm2 after 10 seconds of cranking	Air in the lubricating oil. Fault in the high –pressure lubricating oil system
336	Injection control pressure does not reach the correct pressure	-	A leakage of lubricating oil or fault in the high –pressure lubricating oil system
421	Number 1 injector unit open circuit: high or low	Found by the ECM	Injector unit electrical wiring loom open circuit
422	Number 2 injector unit open circuit: high or low	Found by the ECM	Injector unit electrical wiring loom open circuit
423	Number 3 injector unit open circuit: high or low	Found by the ECM	Injector unit electrical wiring loom open circuit
424	Number 4 injector unit open circuit: high or low	Found by the ECM	Injector unit electrical wiring loom open circuit
425	Number 5 injector unit open circuit: high or low	Found by the ECM	Injector unit electrical wiring loom open circuit
426	Number 6 injector unit open circuit: high or low	Found by the ECM	Injector unit wiring loom open circuit
431	Number 1 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
432	Number 2 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
433	Number 3 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
434	Number 4 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
435	Number 5 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
436	Number 6 injector unit short circuit: high or low	Found by the ECM	Injector unit electrical wiring loom shorted high to low
451	Number 1 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
452	Number 2 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
453	Number 3 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
454	Number 4 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
455	Number 5 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
456	Number 6 injector unit short circuit to B+ or earth: high	Found by the ECM	Injector unit electrical wiring loom shorted to earth: low
451	Number 1 injector unit short circuit to earth	Found by the ECM	-
452	Number 2 injector unit short circuit	Found by the ECM	-

	to earth		
453	Number 3 injector unit short circuit to earth	Found by the ECM	-
454	Number 4 injector unit short circuit to earth	Found by the ECM	-
455	Number 5 injector unit short circuit to earth	Found by the ECM	-
456	Number 6 injector unit short circuit to earth	Found by the ECM	-
461	Number 1 injector unit failed the contribution test	Found by the ECM	-
462	Number 2 injector unit failed the contribution test	Found by the ECM	-
463	Number 3 injector unit failed the contribution test	Found by the ECM	-
464	Number 4 injector unit failed the contribution test	Found by the ECM	-
465	Number 5 injector unit failed the contribution test	Found by the ECM	-
466	Number 6 injector unit failed the contribution test	Found by the ECM	-
513	Bank 1 open circuit: low	Injector units for cylinders 1,2 and 3 have an open circuit in the high voltage supply	Open circuit
514	Bank 2 open circuit: low	Injector units for cylinders 4, 5 and 6 have an open circuit in the high voltage supply	Open circuit
515	Bank 1 short circuit to earth or B+: low	Injector units for cylinders 1,2 and 3 have short circuit to earth or B+	Short circuit in wiring loom
521	Bank 2 short circuit to earth or B+: low	Injector units for cylinders 4, 5 and 6 have short circuit to earth or B+	Short circuit in wiring loom
524	Short circuit between bank 1 and bank 2	Short circuit between bank 1 and bank 2	Short circuit in wiring loom
525	Injector unit driver circuit fault ECM unable to supply sufficient voltage to injector units	Engine wiring loom fault.	Injector unit wiring loom fault. ECM fault
612	Incorrect ECM installed for the camshaft timing plate	No match between the ECM and the camshaft position sensor	Incorrect ECM fitted
614	Engine family rating code and ECM do not match	ECM programming fault	Components not compatible
621	Engine using default rating	Engine operates AL25 HP, default	ECM installed but not programmed
622	Engine using field default rating	Engine limited to 160 HP Options not available	ECM installed but not programmed
623	Invalid engine rating code	-	ECM not programmed correctly
624	Field default active	Programming problem	ECM fault
625	ECM fault	ECM software fault	Replace ECM
626	Unexpected ECM reset fault	Temporary ECM power failure	Battery connection fault
631	ROM self test fault	ECM failure	Internal ECM fault
632	RAM self test fault	ECM failure	Internal ECM fault
655	Programmable parameter list level incompatible	Programming problem. ECM memory problem	Programming fault
661	RAM programmable parameter list corrupt	Programming problem ECM memory problem	Programming fault
664	Calibration level incompatible	Programming problem	Programming problem
665	Programmable parameter memory content corrupt	ECM failure	Internal ECM fault

* These codes, if flashed, will not affect the operation of the engine in a generating set application:

Note:

The engine protection systems e.g. low oil pressure, high coolant temperature, are within the control of the generating set control panel. These sensors will shut the engine down before the ECM sensors.