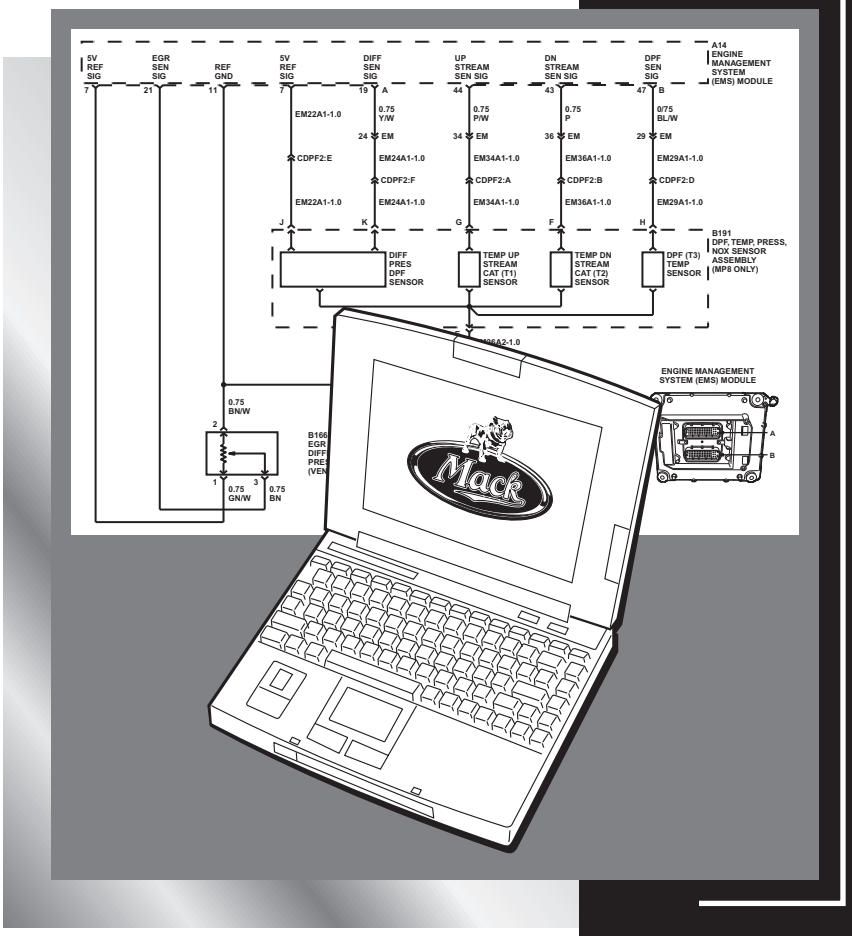
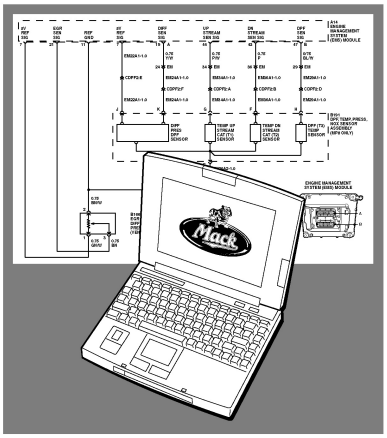


2007 EMISSIONS STANDARD FAULT CODE MANUAL

JANUARY 2009
(REVISED)
8-218

2007 EMISSIONS STANDARD FAULT CODE MANUAL



V-MAC IV Diagnostic Equipment

JANUARY 2009 — REVISED
(SUPERSEDES AUGUST 2008)

ATTENTION

The information in this manual is not all inclusive and cannot take into account all unique situations. Note that some illustrations are typical and may not reflect the exact arrangement of every component installed on a specific chassis.

The information, specifications, and illustrations in this publication are based on information that was current at the time of publication.

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INTRODUCTION

SAFETY INFORMATION

Advisory Labels

Cautionary *signal words* (Danger-Warning-Caution) may appear in various locations throughout this manual. Information accented by one of these signal words must be observed to minimize the risk of personal injury to service personnel, or the possibility of improper service methods which may damage the vehicle or cause it to be unsafe. Additional Notes and Service Hints are used to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these advisory labels as they appear throughout the manual:

⚠ DANGER

Danger *indicates an unsafe practice that could result in death or serious personal injury. Serious personal injury is considered to be permanent injury from which full recovery is NOT expected, resulting in a change in life style.*

⚠ WARNING

***Warning* indicates an unsafe practice that could result in personal injury. Personal injury means that the injury is of a temporary nature and that full recovery is expected.**

⚠ CAUTION

***Caution** indicates an unsafe practice that could result in damage to the product.*

NOTE

Note indicates a procedure, practice, or condition that must be followed in order for the vehicle or component to function in the manner intended.

SERVICE HINT

A helpful suggestion that will make it quicker and/or easier to perform a procedure, while possibly reducing service cost.

ABOUT THIS MANUAL

⚠ DANGER

The "Premium Tech Tool" (PTT) is the preferred tool for performing diagnostic work. Contact your local dealer for more information.

This manual is intended to provide basic information about the V-MAC IV (Vehicle Management and Control) System. Although every effort has been made to ensure that all the information is as accurate as possible, due to our product upgrades, some information may not be applicable to all chassis. Not all chassis are equally equipped, and care should be taken to determine exactly what equipment is installed on the vehicle.

Please pay particular attention to the Notes, Cautions and Warnings which are placed throughout the manual. These are intended to call attention to specific procedures which must be followed.

Please take the time to familiarize yourself with the contents of this manual before attempting to work on a vehicle. Make sure you completely understand the instructions for performing a test before beginning the test procedure.

NOTE

The information in this manual show multiple occurrences of the Instrument Cluster Module (ICM), Engine Management System (EMS) Module or the Vehicle Electronic Control Unit (VECU). The information is formatted in this way for clarity and ease of use, and do not imply that more than one ICM, EMS or VECU is installed on any vehicle.

DESCRIPTION AND OPERATION

V-MAC IV SYSTEM OVERVIEW

Five electronic control modules are used; the Engine Management System (EMS) Module, Instrument Cluster Module (ICM), Vehicle Electronic Control Unit (VECU), Transmission Electronic Control Unit (TECU) and the Gear Selector Electronic Control Unit (GSECU). Together, these modules operate and communicate through the J1939 high speed serial data line to control a variety of engine and vehicle cab functions. The Engine Management System (EMS) Module controls fuel timing and delivery, fan operation, engine protection functions, engine brake operation, the EGR valve, and the turbocharger nozzle. The Vehicle Electronic Control Unit (VECU) controls cruise control functions, accessory relay controls and idle shutdown functions. The Instrument Cluster Module (ICM) primarily displays operational parameters and communicates these to the other ECU's. All have the capability to communicate over the J1587 normal speed data lines primarily for programming, diagnostics and data reporting.

In addition to their control functions, the modules have on-board diagnostic capabilities. The on-board diagnostics are designed to detect faults or abnormal conditions that are not within normal operating parameters. When the system detects a fault or abnormal condition, the fault will be logged in one or both of the modules' memory, and the vehicle operator will be advised that a fault has occurred by illumination of the Malfunction Indicator Lamp. The module will also initiate the engine shutdown procedure if the system determines that the fault will damage the engine.

In some situations when a fault is detected, the system will enter the "limp home" mode. The limp home mode allows continued vehicle operation but the system may substitute a sensor or signal value that may result in poor performance. In some instances, the system will continue to function but engine power may be limited to protect the engine and vehicle. Fault codes logged in the system memory can later be read, to aid in diagnosing the faults, with a diagnostic computer or through the instrument cluster display, if equipped. When diagnosing an intermittent code or condition, it may be necessary to use a diagnostic computer connected to the Serial Communication Port.

Additional data and diagnostic tests are available when a diagnostic computer is connected to the Serial Communication Port. For diagnostic software, contact your local dealer.

The Instrument Cluster Module (ICM) is mounted behind the driver's steering wheel and is the main control center for dashboard functions.

The ICM is used to provide the operator with information via gauges, indicator lamps and a display. Via the three connectors on the rear of the instrument cluster module, information from the whole vehicle is received. Some information is received from sensors directly connected to the instrument panel, and some is received across the J1708/1587 data link. The data link permits other control units in the vehicle to send messages to the instrument panel. The instrument panel receives these messages, processes them and then presents the information in a suitable form to the operator. The operator can use a control stalk on the steering column to cycle through a set of menus to gain a more detailed picture of the vehicle status.

The Vehicle Electronic Control Unit (VECU) is mounted on a panel below the top dash access panel in the center of the dash on conventional models. The VECU is a microprocessor based controller programmed to perform several functions, these include:

- Driver Controls
- Vehicle and engine speed controls
- Starter control
- Cap Power
- Idle controls
- Broadcasting data on the serial data lines
- Trip data logging
- Diagnostic fault logging and password processing

The VECU performs these functions by monitoring the signals from sensors and switches, and data received over the serial data lines from the other ECU's. The VECU directly monitors the Throttle Position (TP) Sensor Vehicle Speed (MPH) Sensor (VSS).

The VECU also monitors the position or state of a number of switches to perform its control and diagnostic functions. They are:

- A/C Pressure Switch
- Air Suspension Height Control Switch
- Clutch Switch
- Differential Lock Switch
- DRL Override Switch
- Engine Brake Switches
- Fan Override Switch
- Ignition Key Switch
- PTO Switches (if equipped)
- Service and Park Brake Switches
- Shutdown Override Switch
- Speed Control Switches (Set/Decel, Resume/Accel)
- 5th Wheel Slide Switch

The Engine Management System (EMS) Module is bolted to a fuel cooled mounting plate which is on the left side of the engine on the air intake manifold. The EMS is a microprocessor based controller programmed to perform fuel injection quantity and timing control, diagnostic fault logging, and to broadcast data to other modules. The fuel quantity and injection timing to each cylinder is precisely controlled to obtain optimal fuel economy and reduced exhaust emissions in all driving situations.

The EMS controls the operation of the Electronic Unit Injectors (EUIs), engine brake solenoid, EGR valve, turbocharger nozzle position, and cooling fan clutch based on input information it receives over the serial data lines and from the following sensors:

- Ambient Air Temperature Sensor
- Ambient (Barometric) Pressure Sensor
- Boost Air Pressure (BAP) Sensor
- Camshaft Position (Engine Position) Sensor
- Cooling Fan Speed (CFS) Sensor
- Crankshaft Position (Engine Speed) Sensor
- Differential Pressure DPF Sensor
- EGR Differential Pressure Sensor
- EGR Temperature Sensor
- Engine Coolant Level (ECL) Sensor
- Engine Coolant Temperature (ECT) Sensor
- Engine Oil Pressure (EOP) Sensor
- Engine Oil Level (EOL) Sensor
- Engine Oil Temperature (EOT) Sensor
- Exhaust Temperature Sensor (DPF Sensors)
- Fuel Pressure Sensor
- Intake Air Temperature And Humidity (IATH) Sensor
- Intake Manifold (Boost) Temperature Sensor
- Throttle Position (TP) Sensor
- Turbo Speed Sensor
- Variable Geometry Turbo (VGT) Position Sensor

The Vehicle Electronic Control Unit (VECU) and Engine Management System (EMS) Module are dependent on each other to perform their specific control functions. In addition to switch and sensor data the broadcast of data between modules also includes various calculations and conclusions each module has developed, based on the input information it has received.

Sensors

AMBIENT AIR TEMPERATURE SENSOR

The Ambient Air Temperature Sensor is used to detect the outside air temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the ambient air temperature. The sensor uses a thermistor that is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

The Ambient Air Temperature Sensor is located in the left front of the vehicle.

AMBIENT (BAROMETRIC) PRESSURE SENSOR

The Ambient (Barometric) Pressure Sensor contains a pressure sensitive diaphragm and an electrical amplifier. Mechanical pressure applied to the diaphragm causes the diaphragm to deflect and the amplifier to produce an electrical signal proportional to the deflection.

The Ambient (Barometric) Pressure Sensor is built into the Engine Management System (EMS) Module.

BOOST AIR PRESSURE (BAP) SENSOR

The Boost Air Pressure Sensor contains a pressure sensitive diaphragm and an electrical amplifier. Mechanical pressure applied to the diaphragm causes the diaphragm to deflect and the amplifier to produce an electrical signal proportional to the deflection.

The Boost Air Pressure Sensor is threaded into the top and to the rear of the intake manifold on the left side of the engine.

CAMSHAFT POSITION (ENGINE POSITION) SENSOR

The Camshaft Position (Engine Position) Sensor is located in the rear face of the timing gear cover at the rear of the engine, near the bottom of the valve cover. It uses magnetic induction to generate a pulsed electrical signal. It senses the passage of seven (7) timing bumps on the edge of the camshaft dampener. Six of the holes correspond to the phasing of the electronic unit injectors, while the seventh hole indicates the top dead center position.

COOLING FAN SPEED (CFS) SENSOR

On engines with an electronically controlled viscous fan drive, the electronic fan drive contains a Hall effect speed sensor. When the engine is running, a series of vanes in the fan drive housing rotates past a magnet in the fan drive solenoid generating a pulsed voltage signal. The Engine Management System (EMS) Module monitors the status if the air conditioning system and signals from the Engine Coolant Temperature (ECT) Sensor, the Engine Oil Temperature (EOT) Sensor, and the Engine Speed/Timing (RPM/TDC) Sensor and calculates the optimal cooling fan speed.

The Cooling Fan Speed Sensor is located in the fan drive on the front of the engine.

CRANKSHAFT POSITION (ENGINE SPEED) SENSOR

The Crankshaft Position (Engine Speed) Sensor uses magnetic induction to generate a pulsed electrical signal. Notches are machined into the edge of the flywheel. When one of the notches passes close to the sensor, electric pulses result.

The Crankshaft Position (Engine Speed) Sensor also indicates when the crankshaft is at the top dead center position. The sensor recognizes the end of one of the group of 18 notches and aligns that to the top dead center mark on the Engine Position (EP) Sensor.

DPF DIFFERENTIAL PRESSURE SENSOR

The function identifies and indicates malfunction of the (DPF) Diesel Particulate Filter by analyzing the pressure drop over the (DPF) Diesel Particulate Filter. This is done by making a check for deviation between sensor value and a model pressure drop. The differential pressure sensor is used to measure difference in pressure across the DPF filter. The sensor connects to tubes which connect to the DPF housing before and after the DPF filter. The sensor output is used as part of the regeneration strategy and also for system fault detection if the filter becomes overloaded. In some extreme cases the engine will derate.

The Differential Pressure DPF Sensor is located on the side of the Diesel Particulate Filter (DPF).

DPF INLET THERMOCOUPLE (A1)

This thermocouple is used to measure exhaust gas temperature as it enters the DPF assembly. The DPF ECU monitors this temperature and will not allow DPF regeneration until the system is sufficiently warmed-up.

The DPF inlet thermocouple is located on the inlet to the DPF.

EGR DIFFERENTIAL PRESSURE SENSOR

The EGR differential pressure sensor is used for flow measurement of the Exhaust Gas Recirculation (EGR) valve. This sensor has two pressure ports and senses the difference in pressure between the two ports. Measurement of the pressure before and after the EGR valve is used to calculate EGR flow.

The EGR Differential Pressure Sensor is located on the left or right side of the engine.

EGR TEMPERATURE SENSOR

The EGR temperature sensor detects exhaust gas temperature for EGR system. The sensor modifies a voltage signal from the control unit. The modified signal returns to the control unit as the exhaust temperature of the EGR system to confirm EGR operation. The sensor uses a thermistor that is sensitive to the change in temperature.

The EGR Temperature Sensor is located near the EGR valve.

ENGINE COOLANT LEVEL (ECL) SENSOR

The Engine Coolant Level (ECL) Sensor is a switch. If engine coolant level falls below a calibrated point the contacts open and the driver will be notified of the low coolant level.

The Engine Coolant Level (ECL) Sensor is located in the cooling system reservoir tank.

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

The Engine Coolant Temperature Sensor is located in the thermostat body at the front of the engine. The sensor will indicate a high coolant temperature caused by problems like radiator blockage, thermostat failure, heavy load, or high ambient temperatures. This sensor is also used for cold start enhancement and for fan clutch engagement.

ENGINE OIL PRESSURE (EOP) SENSOR

The Engine Oil Pressure Sensor contains a pressure sensitive diaphragm and a electrical amplifier. Mechanical pressure applied to the diaphragm causes the diaphragm to deflect and the amplifier to produce an electrical signal proportional to the deflection.

The Engine Oil Pressure Sensor is located on the oil filter assembly. The sensor monitors engine oil pressure to warn of lubrication system failure.

ENGINE OIL LEVEL (EOL) SENSOR

The Engine Oil Level Sensor is located in the oil pan.

ENGINE OIL TEMPERATURE (EOT) SENSOR

The Engine Oil Temperature Sensor is a thermistor whose resistance varies inversely to temperature. The sensor has a negative temperature coefficient, which means the sensor resistance will decrease as the engine oil temperature increases.

The Engine Oil Temperature Sensor is located in the oil pan.

EXHAUST TEMPERATURE SENSOR (DPF SENSORS)

The exhaust gas temperature sensor detects exhaust gas temperature for DPF protection as well as DPF regeneration control. The sensor modifies a voltage signal from the control unit. The modified signal returns to the control unit as the exhaust temperature at that specific location of the exhaust. The sensor uses a thermistor that is sensitive to the change in temperature.

The Exhaust Temperature Sensors are located in the DPF assembly.

FILTER INLET THERMOCOUPLE (A3)

This thermocouple is used to measure exhaust gas temperature at the inlet face of the DPF filter. The amount of fuel injected by the atomization module is metered based on the output of this thermocouple to meet the required temperature profile.

The filter inlet thermocouple is located on the side of the DPF and is positioned before the DPF filter.

FILTER OUTLET THERMOCOUPLE (A4)

This thermocouple is used to measure exhaust gas temperature at the outlet face of the DPF filter. The DPF ECU monitors this temperature and uses it for system fault detection.

The filter outlet thermocouple is located on the side of the DPF and is positioned after the DPF filter.

FLAME THERMOCOUPLE (A2)

This thermocouple is used to measure exhaust gas temperature within the flame region of the DPF during regeneration. The DPF ECU monitors this temperature to detect the existence of the flame. Fault codes may result if the system is unable to light the flame or if there are multiple flame losses.

The flame thermocouple is located on the bottom of the DPF.

FUEL PRESSURE SENSOR

The fuel pressure sensor contains a diaphragm that senses fuel pressure. A pressure change causes the diaphragm to flex, inducing a stress or strain in the diaphragm. The resistor values in the sensor change in proportion to the stress applied to the diaphragm and produces an electrical output.

The Fuel Pressure Sensor is located on top of the fuel filter housing.

INTAKE AIR TEMPERATURE AND HUMIDITY (IATH) SENSOR

The Intake Air Temperature and Humidity (IATH) Sensor contains a thermistor and a capacitive sensor. The resistance of the thermistor varies inversely to temperature. The output of the capacitive sensor increases as the humidity of the surrounding air increases. By monitoring the signals from both portions of the sensor, the Engine Management System (EMS) Module calculates the temperature and humidity of the air passing through the air filter housing.

The Intake Air Temperature and Humidity (IATH) Sensor is located in the air intake tube just downstream from the air filter canister.

INTAKE MANIFOLD (BOOST) TEMPERATURE SENSOR

The Intake Manifold (Boost) Temperature Sensor is a thermistor whose resistance varies inversely to temperature. The sensor has a negative temperature coefficient, which means the sensor resistance will decrease as the inlet air temperature increases.

The Intake Manifold (Boost) Temperature Sensor is located in the intake manifold.

MASTER AIR VALVE

The master air valve is located inside of the atomization module and is controlled by the DPF ECU. The valve opens when the engine starts and closes when the engine shuts-down. The compressed air supplied through this valve and is used to keep the non-catalyzed DPF fuel nozzle clean during normal operation. The master air valve is also used to assist with fuel atomization during regeneration.

SERIAL COMMUNICATION PORT

The serial communication port is a six or nine pin connector used to access the system diagnostics and reprogramming functions. This connector conforms to the SAE standards and is located under the dashboard to the left of the steering column.

THROTTLE POSITION (TP) SENSOR

The Throttle Position Sensor is a potentiometer that is mechanically linked to the accelerator pedal. A potentiometer is a variable resistor whose resistance will change as the pedal is pressed. As the resistance changes, the signal voltage of the sensor changes indicating the accelerator pedal position.

The Throttle Position Sensor replaces the mechanical linkage for fuel control. The sensor is located under the accelerator pedal. The “drive by wire” pedal is designed to provide a system that “feels” similar to the standard type of accelerator pedal and mechanical linkage. The sensor is designed to improve the driver's control by reducing sensitivity to chassis motion. This sensor provides the driver's fuel request input to the VECU.

TURBO SPEED SENSOR

The Turbo Speed Sensor informs the EMS of the turbo shaft speed. The sensor does not read from the vanes, but reads from the shaft. The Engine Management System (EMS) Module uses this signal in conjunction with the VGT position sensor signal to control the speed of the turbocharger and therefore optimize the intake manifold pressure.

The Turbo Speed Sensor is mounted in the center of the turbocharger.

VARIABLE TURBINE GEOMETRY (VTG) POSITION SENSOR

The Variable Turbine Geometry Smart Remote Actuator (VGT SRA) takes the position commands from the EMS, moves the nozzle of the turbocharger to the desired position, and performs all of the diagnostics and self checks on the actuator.

SYSTEM CONNECTORS

NOTE

When performing electrical tests, gently wiggle the wires and connectors to find intermittent problems.

The V-MAC IV system utilizes many different connector styles and sizes. The Engine Management System (EMS) Module and the Vehicle Electronic Control Unit (VECU) are some of the largest connectors in the system. These connectors and control units are where the majority of the V-MAC IV system testing is performed. This section illustrates the EMS Module and Vehicle Electronic Control Unit (VECU) connectors and includes charts with connector terminal identification and functions. The charts should not be used as a replacement for the detailed tests that appear in this manual. The charts are intended as an identification reference for use when repairing a connector or terminal.

Engine Management System (EMS) Module

The Engine Management System (EMS) Module has two 62 pin connectors. To disconnect a connector from the EMS Module, pull back on the connector lock and gently pull the connector back on its heel and away from the EMS Module. For easy reference, the following illustration shows each pin number as it appears on the connector. Be sure that the connector is aligned as shown below to avoid confusion when checking pin numbers. The connector numbers and EMS Module orientation are shown as a reference for reconnecting the EMS Module to the engine harness.

The programming of the Engine Management System (EMS) Module should be performed using Vcads Pro.

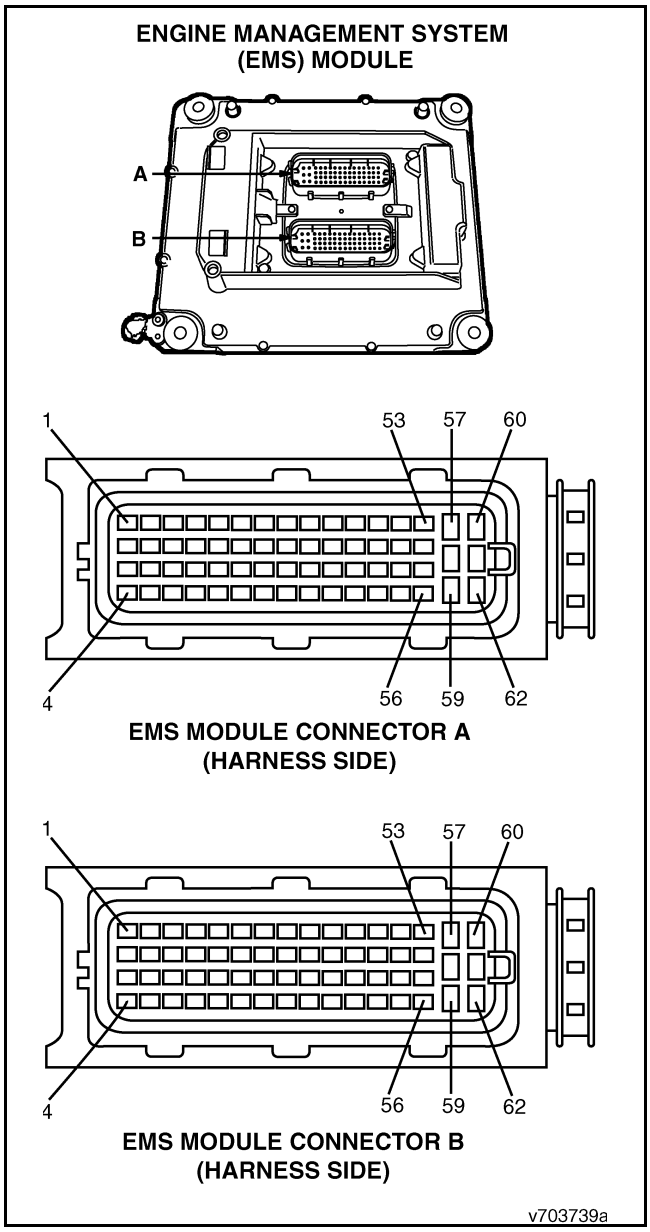

Figure 1 — EMS Connectors

Vehicle Electronic Control Unit (VECU) Connectors

The Vehicle Electronic Control Unit (VECU) has two 30 pin connectors and one 5 pin connector. Each pin is marked on the inside of the connector. To disconnect a connector from the VECU, press down on the tang of the harness connector and gently pull the connector from the VECU. Be sure that the connector is aligned as shown below to avoid confusion when checking pin numbers. The connector number and color are shown as a reference for reconnecting the VECU harness.

The programming of the Vehicle Electronic Control Unit (VECU) should be performed using Vcads Pro.

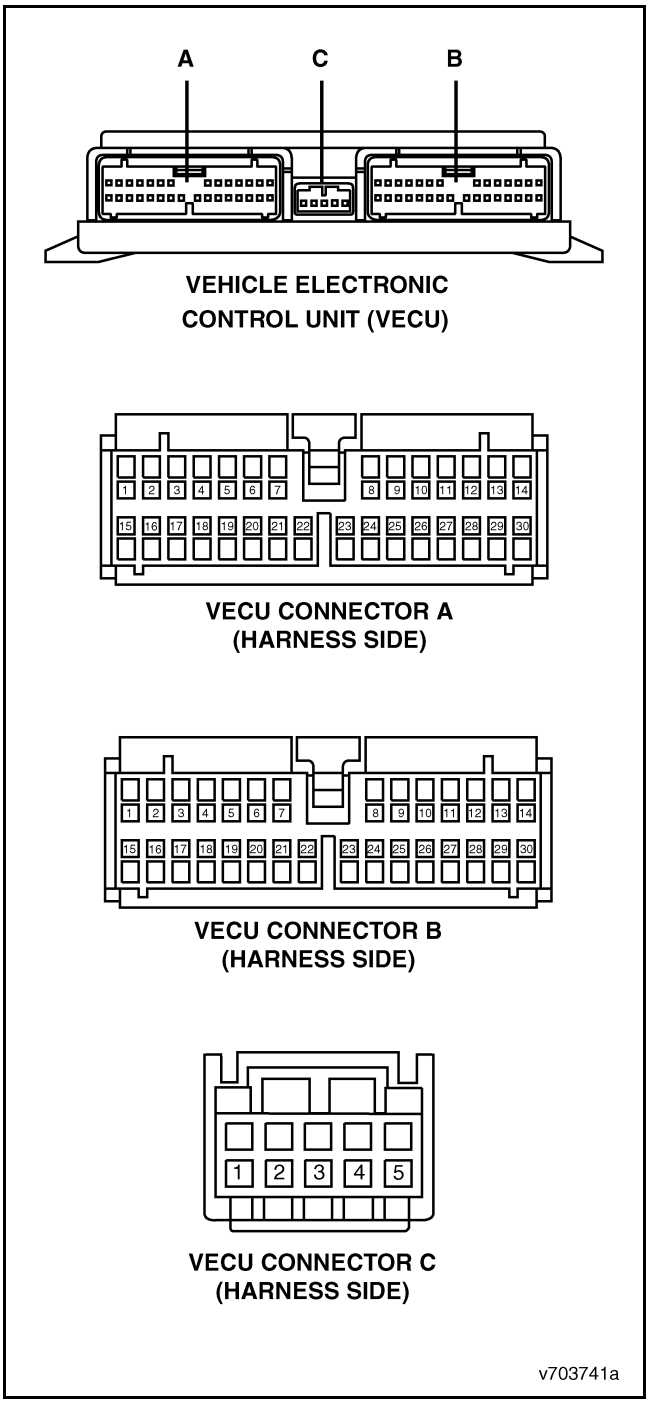

Figure 2 — VECU Connectors

TROUBLESHOOTING

MACK FAULT CODE IDENTIFICATION TABLE

Definitions

MID (Message Identification Description): Identification of ECU

- The MID identifies which ECU is broadcasting the code.

Example: MID 128 indicates that the code is being broadcasted by the Engine Management System (EMS) Module.

SID (Subsystem Identification Description): Identification of component

- The SID describes the fault code.

Example: SID 1 represents a failure with the Fuel Injector Unit #1.

FMI (Failure Mode Identifier): Identification of parameter value

- The FMI specifically defines the fault.

Example: FMI 7 indicates that the mechanical system is not responding or may be out of adjustment.

PID (Parameter Identification Description): MACK identification of parameter value

PPID (Proprietary Parameter Identification Description): MACK unique identification of parameter value

PSID (Proprietary Subsystem Identification Description): MACK unique identification of component

NOTE

The above fault code structure allows the technician to determine the exact cause of the fault. Always use the entire fault code (all 3 components) when fault tracing.

Emissions Fault Code	Component/Function	"FMI Codes"
MID 128 PID 26	Fan Speed Error	3
MID 128 PID 45	Inlet Air Heater Status	3, 4, 5
MID 128 PID 81	Particulate Trap Differential Pressure Sensor	0, 2, 3, 4, 5, 7, 12
MID 128 PID 84	Road Speed	9
MID 128 PID 85	Cruise Control Status	9
MID 128 PID 91	Percent Accelerator Pedal Position	9
MID 128 PID 94	Fuel Pressure (FP) Sensor	1, 3, 5, 7
MID 128 PID 97	Water in Fuel Sensor	3, 4, 5, 14
MID 128 PID 98	Engine Oil Level	1, 4, 5
MID 128 PID 100	Engine Oil Pressure	1, 3, 5
MID 128 PID 102	Boost Air Pressure Sensor	0, 1, 2, 3, 5, 11
MID 128 PID 103	Turbo Speed Sensor	0, 1, 9
MID 128 PID 105	Boost Temperature Sensor	0, 1, 2, 4, 5, 10
MID 128 PID 108	Ambient Pressure Sensor	2, 3, 4
MID 128 PID 110	Engine Coolant Temperature (ECT) Sensor	0, 2, 4, 5, 10
MID 128 PID 111	Coolant Level	1, 3, 4, 5
MID 128 PID 153	Crankcase Pressure	0, 1, 2, 3, 5
MID 128 PID 171	Ambient Air Temperature Status	9
MID 128 PID 173	Exhaust Gas Temperature	0, 2, 3, 4, 5, 10
MID 128 PID 175	Engine Oil Temperature	0, 2, 4, 5

Emissions Fault Code	Component/Function	"FMI Codes"
MID 128 PID 354	Intake Air Temperature and Humidity Sensor	3, 5
MID 128 PID 411	EGR Differential Pressure	2, 3, 5
MID 128 PID 412	EGR Temperature After Cooler	0, 4, 5, 10
MID 128 PPID 35	EGR Mass Flow	0, 1
MID 128 PPID 89	VGT SRA Temperature	0
MID 128 PPID 122	Compression Brake Solenoid	1, 3, 4, 5
MID 128 PPID 270	NOx Sensor	2, 3, 5, 9, 10, 12, 13, 14
MID 128 PPID 326	Soot Level	0, 11, 14
MID 128 PPID 328	After Treatment Injection Shut-off Valve	3, 4, 5, 7, 14
MID 128 PPID 329	After Treatment Fuel Injector	3, 4, 5, 7, 14
MID 128 PPID 330	DRV	3, 4, 5, 7
MID 128 PPID 333	Engine Fan Thermal Switch	3, 4, 5
MID 128 PPID 337	Ash Level	0, 14
MID 128 PPID 340	Thermal Regeneration Unit (TRU): Supplemental Air Valve	3, 4
MID 128 PPID 387	Exhaust Gas Temperature Sensor #2	0, 1, 2, 3, 4, 5, 10, 12, 14
MID 128 PPID 436	Exhaust Gas Temperature Sensor #3	0, 2, 3, 4, 5, 10, 14
MID 128 PPID 437	After Treatment Injector Fuel Pressure Sensor	2, 3, 5, 10
MID 128 PPID 440	Thermal Regeneration Unit (TRU): Flame Temperature	1, 2, 3, 4, 14
MID 128 PPID 442	Thermal Regeneration Unit (TRU): Cold Junction Temperature	3, 4
MID 128 PSID 22	Thermal Regeneration Unit (TRU): After Treatment Combustion System	7, 14
MID 128 PSID 25	Aftertreatment System Conditioning	0, 7
MID 128 PSID 47	Particulate Trap Regeneration	0, 1, 7, 8, 12
MID 128 PSID 49	Thermal Regeneration Unit (TRU): Ignition Switch Voltage	3, 4
MID 128 PSID 57	Thermal Regeneration Unit (TRU): Battery Voltage	0, 1, 3, 4
MID 128 PSID 58	Thermal Regeneration Unit (TRU): Master Air Solenoid	3, 4
MID 128 PSID 59	Thermal Regeneration Unit (TRU): Atomization and Combustion Air Solenoid	3, 4
MID 128 PSID 98	Boost Air System	0, 1
MID 128 PSID 108	After Treatment Injection System	7
MID 128 PSID 109	Engine Coolant Temperature (ECT) Sensor	7, 12
MID 128 PSID 110	Thermal Regeneration Unit (TRU): Ignition Coil	3, 4
MID 128 PSID 111	Thermal Regeneration Unit (TRU): Fuel Pump	3, 4
MID 128 PSID 113	Thermal Regeneration Unit (TRU): Sensor Voltage Supply	0, 1, 3, 4

Emissions Fault Code	Component/Function	"FMI Codes"
MID 128 PSID 114	Diesel Particulate Filter (DPF) Switch	9, 12
MID 128 PSID 161	VIN (Chassis ID) Check 1	12
MID 128 PSID 162	VIN (Chassis ID) Check 2	2
MID 128 PSID 201	CAN J1939 Communication, Time-out	9
MID 128 PSID 202	Diesel Particulate Filter (DPF) Switch	9
MID 128 PSID 205	TECU Status	9
MID 128 PSID 232	CAN 2 J1939 Communication Link	2
MID 128 PSID 249 (CAN)	CAN Frames from Thermal Regeneration Unit (TRU)	9
MID 128 PSID 249 (TRU)	Thermal Regeneration Unit (TRU): Watchdog Time-out	12, 14
MID 128 SID 1	Injector #1	3, 5, 7, 12, 14
MID 128 SID 2	Injector #2	3, 5, 7, 12, 14
MID 128 SID 3	Injector #3	3, 5, 7, 12, 14
MID 128 SID 4	Injector #4	3, 5, 7, 12, 14
MID 128 SID 5	Injector #5	3, 5, 7, 12, 14
MID 128 SID 6	Injector #6	3, 5, 7, 12, 14
MID 128 SID 18	Water in Fuel Drainage Valve	3, 4, 5
MID 128 SID 21	Camshaft Speed Sensor	2, 3, 8
MID 128 SID 22	Crankshaft Speed Sensor	2, 3, 8
MID 128 SID 27	Variable Geometry Turbocharger Actuator #1	2, 4, 7, 9, 13
MID 128 SID 33	Cooling Fan Control	3, 4, 5
MID 128 SID 70	Air Inlet Heater Driver #1	3, 4, 5
MID 128 SID 71	Air Inlet Heater Driver #2	3, 4, 5
MID 128 SID 146	EGR Control Valve	3, 5, 7, 12
MID 128 SID 211	Sensor Supply Voltage #2	3, 4
MID 128 SID 230	Buffered IVS	3, 5
MID 128 SID 232	Sensor Supply Voltage #1	3, 4
MID 140 PID 77	Front Rear Axle Temperature Sensor	0, 5, 6
MID 140 PID 78	Rear Rear Axle Temperature Sensor	0, 5, 6
MID 140 PID 96	Fuel Level	5, 6
MID 140 PID 100	Engine Oil Pressure Watchdog	9
MID 140 PID 110	Engine Coolant Watchdog	9
MID 140 PID 116	Air Application Transducer	3, 4
MID 140 PID 117	Primary Air Pressure Transducer	3, 4
MID 140 PID 118	Secondary Air Pressure Transducer	3, 4
MID 140 PID 170	Interior Temperature	5, 6
MID 140 PID 171	Ambient Temperature	5, 6
MID 140 PID 173	Exhaust Temperature	5, 6
MID 140 PID 177	Transmission Oil Temperature	5, 6, 9
MID 140 PID 358	Air Suspension Pressure Transducer	3, 4
MID 140 PID 439	Boost Pressure Watchdog	9

Emissions Fault Code	Component/Function	"FMI Codes"
MID 140 PPID 119	Engine Coolant Watchdog	9
MID 140 PSID 47	Steering Stalk Escape Button	12
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MID 144 SID 231	J1939 Data Link	2
MID 144 SID 240	J1939 Program Memory	2
MID 144 SID 243	Cruise Control Set Switch	7
MID 144 SID 246	Brake Pedal Switch	4
MID 144 SID 250	J1708/1587 Data Link	2
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MID 128 PID 26 — FAN SPEED ERROR

Failure Mode Identifier (FMI): 3 (Voltage Above Normal or Shorted to High)

Parameter Identification (PID): P26

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Missing signal from Fan Speed Sensor
- Short Circuit +, Measuring line
- Short Circuit -, Measuring line
- Open Circuit, Measuring line
- Open Circuit, Ground line

Possible causes:

- Cooling Fan Speed (CFS) sensor failure
- Faulty Cooling Fan Speed (CFS) sensor harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Higher fuel consumption
- Will work as on/off fan, 100% fan speed if cooling is needed

MID 128 PID 45 — INLET AIR HEATER STATUS

Failure Mode Identifier (FMI): 3 (Voltage Above Normal or Shorted to High), 4 (Voltage Below Normal or Shorted to Low), 5 (Current Below Normal or Open Circuit)

Parameter Identification (PID): P45

Message Identification (MID): 128

FMI 3

Voltage Above Normal or Shorted to High

Conditions for fault code:

- Short Circuit+, Measuring line

Possible causes:

- Preheat relay solenoid shorted

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Preheat relay not activated
- White smoke for cold start
- Start problems in cold climate

FMI 4

Voltage Below Normal or Shorted to Low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Induction air is hot
- Preheat relay is impossible to turn off

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty Preheat relay
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Preheat relay not activated
- White smoke for cold start
- Start problems in cold climate

MID 128 PID 81 — PARTICULATE TRAP DIFFERENTIAL PRESSURE SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Intelligent Device or Component)

Parameter Identification (PPID): P81

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Moderately high pressure

Possible causes:

- Particulate Trap Pressure (PTP) Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Sensor is not rational
- Particulate differential pressure is out of range

Possible causes:

- Particulate Trap Pressure (PTP) Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short to battery on the metering side of the circuit
- Open circuit in the ground line

Possible causes:

- Particulate Trap Pressure (PTP) Sensor failure
- Faulty Particulate Trap Pressure (PTP) Sensor connector
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- Excessive pollution from exhaust

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on the metering side of the circuit
- Open circuit in the metering line

Possible causes:

- Particulate Trap Pressure (PTP) Sensor failure
- Faulty Particulate Trap Pressure (PTP) Sensor connector
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- Excessive pollution from exhaust

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit in 5 volt supply line
- Short to ground in metering line
- Open circuit in the metering line

Possible causes:

- Particulate Trap Pressure (PTP) Sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- Default value substituted

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Particulate Trap Pressure (PTP) Sensor signal is the same below and above the Diesel Particulate Filter (DPF) filter

Possible causes:

- Diesel Particulate Filter (DPF) is missing
- Particulate Trap Pressure (PTP) Sensor failure
- Diesel Particulate Filter (DPF) casing/housing is cracked or damaged
- Particulate Trap Pressure (PTP) Sensor tubing or hose failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Particulate Trap Pressure (PTP) Sensor signal high or low but still within range

Possible causes:

- Diesel Particulate Filter (DPF) is damaged, filled with soot or missing

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate

MID 128 PID 84 — ROAD SPEED

Failure Mode Identifier (FMI): 9 (Abnormal update rate)

Parameter Identification (PID): P84

Message Identification (MID): 128

FMI 9

Abnormal update rate

Conditions for fault code:

- Missing signal from VECU

Possible causes:

- J1708 vehicle speed message does not exist, (VECU error)

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate

MID 128 PID 85 — CRUISE CONTROL STATUS

Failure Mode Identifier (FMI): 9 (Abnormal update rate)

Parameter Identification (PID): P85

Message Identification (MID): 128

FMI 9

Abnormal update rate

Conditions for fault code:

- Missing (Cruise Control) signal from VECU

Possible causes:

- No clutch info to EMS (J1939)

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Cruise Control does not work

MID 128 PID 91 — PERCENT ACCELERATOR PEDAL POSITION

Failure Mode Identifier (FMI): 9 (Abnormal update rate)

Parameter Identification (PID): P91

Message Identification (MID): 128

FMI 9

Abnormal update rate

Conditions for fault code:

- Missing signal from VECU

Possible causes:

- J1708 pedal information not available

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

MID 128 PID 94 — FUEL PRESSURE (FP) SENSOR

Failure Mode Identifier (FMI): 1 (Data Valid But Below Normal Operational Range - Most Severe Level), 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjust)

Parameter Identification (PID): P94

Message Identification (MID): 128

Circuit Description: The Fuel Pressure (FP) Sensor is used to detect low fuel pressure system failures. The sensor consists of a pressure sensitive diaphragm and amplifier. Fuel pressure causes the sensor's diaphragm to deflect and produce an electrical signal proportional to the pressure. The diaphragm deflection signal is amplified in the sensor. The sensor's signal is monitored by the Engine Management System (EMS) Module. The EMS Module will set a fault code if the sensor signal is not within predetermined limits.

Location: The Fuel Pressure (FP) Sensor is located on the right side of the engine near the fuel filters.

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- The EMS module detects a low fuel pressure reading from the Fuel Pressure (FP) Sensor.

Possible causes:

- A clogged fuel filter.
- Fuel leaking from a fuel line or fitting.
- Poor fuel pump pressure.

Reaction from EMS module:

- Illuminate MIL if fault is present for 2 or more drive cycles

Noticeable external symptoms:

- Rough idle
- Uneven running
- Engine derate

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- The Malfunction Indicator Lamp (MIL) will illuminate when the Fuel Pressure (FP) Sensor signal line voltage is low.

Possible causes:

- Poor connector contacts in harness
- Faulty Fuel Pressure (FP) Sensor
- Short to battery

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- Uneven running
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- The Malfunction Indicator Lamp (MIL) will illuminate when the Fuel Pressure (FP) Sensor signal line voltage is low.

Possible causes:

- Poor connector contacts in harness
- Faulty Fuel Pressure (FP) Sensor

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- Uneven running
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjust

Conditions for fault code:

- FMI 7 will set if the fuel pressure drops

Possible causes:

- A clogged fuel filter.
- Fuel leaking from a fuel line or fitting.
- Poor fuel pump pressure.

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- Uneven running
- MIL lamp illuminated

MID 128 PID 97 — WATER IN FUEL SENSOR

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 14 (Special Instructions)

Parameter Identification (PID): P97

Message Identification (MID): 128

Circuit Description: Voltage from the Engine Management System (EMS) Module is applied to the Water In Fuel (WIF) Sensor when the ignition switch is in the ON position. If water is detected, the WIF sensor will notify the driver to drain the water from the bowl by illuminating a lamp on the dash of the vehicle.

Location: The Water In Fuel (WIF) Sensor is located in the transparent plastic bowl under the fuel filter. The fuel filter is located on the left side of the engine.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- This fault will become active when the EMS Module detects that the Water In Fuel supply voltage is above 4.75 volts. Actual water in the fuel filter will not produce a fault.

Possible causes:

- Harness is shorted to battery
- Open circuit in the harness

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Possible undetected water in the fuel supply. This can cause the engine to stop.
- Uneven running
- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on measuring line
- Voltage on measuring line is below normal

Possible causes:

- Harness is shorted to ground
- Open circuit in the harness

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Will give water in fuel indication

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit

Possible causes:

- Open circuit in the harness

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- N/A

FMI 14

Special Instructions

Conditions for fault code:

- Priming pump active (no error)

Possible causes:

- No error; used for indication when priming pump is active

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- N/A

MID 128 PID 98 — ENGINE OIL LEVEL

Failure Mode Identifier (FMI): 1 (Data valid but below normal operational range), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): P98

Message Identification (MID): 128

FMI 1

Data valid but below normal operational range

Conditions for fault code:

- Moderately below range
- Critically below range

Possible causes:

- Critically low oil level
- Leakage

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit - Positive side

Possible causes:

- Engine Oil Level (EOL) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Oil level cannot be measured

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Short Circuit+, Positive side
- Open Circuit+, Positive side
- Open Circuit-, Negative side

Possible causes:

- Engine Oil Level (EOL) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Oil level cannot be measured

MID 128 PID 100 — ENGINE OIL PRESSURE

Failure Mode Identifier (FMI): 1 (Data valid but below normal operational range), 3 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): P100

Message Identification (MID): 128

FMI 1

Data valid but below normal operational range

Conditions for fault code:

- Critically below range

Possible causes:

- Oil leakage
- Broken oil pump
- Clogged oil system

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate
- Low pressure

FMI 3

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit +, Measuring line
- Open Circuit, Ground line

Possible causes:

- Engine Oil Pressure (EOP) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Oil pressure shows 0 in the cluster, engine is running

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit+, 5V Supply line
- Short Circuit-, Measuring line
- Open Circuit, Measuring line

Possible causes:

- Engine Oil Pressure (EOP) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Oil pressure shows 0 in the cluster, engine is running

MID 128 PID 102 — BOOST AIR PRESSURE SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range — Most Severe Level), 1 (Data Valid But Below Normal Operational Range — Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 11 (Root Cause Not Known)

Parameter Identification (PID): P102

Message Identification (MID): 128

Circuit Description: The Boost Air Pressure Sensor is used to monitor the pressure of the air in the intake system downstream from the turbocharger. The sensor consists of a pressure sensitive diaphragm/amplifier. Air pressure causes the sensor's diaphragm to deflect and produce an electrical signal proportional to the pressure. The diaphragm deflection signal is amplified in the sensor. The sensor's signal is monitored by the EMS Module. The EMS Module will set a fault code if the sensor signal is not within predetermined limits, or the signal is not rational.

Location: The Boost Pressure Sensor is located in the air intake manifold.

FMI 0

Data Valid But Above Normal Operational Range — Most Severe Level

Conditions for fault code:

- This fault will become active when the EMS Module detects that the Boost Air Pressure Sensor output is high.
- The Boost Air Pressure Sensor is indicating an unphysical value.

Possible causes:

- Variable Geometry Turbo (VGT) actuator stuck.
- Wastegate stuck
- Faulty Boost Air Pressure Sensor harness
- Inlet air leakage
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 1

Data Valid But Below Normal Operational Range — Most Severe Level

Conditions for fault code:

- The Boost Air Pressure Sensor is indicating an unphysical value.

Possible causes:

- Intermittent fault in the Boost Air Pressure Sensor harness
- Faulty Boost Air Pressure Sensor connector
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- The Boost Air Pressure Sensor output is too high or too low.

Possible causes:

- Intermittent fault in the Boost Air Pressure Sensor harness failure.
- Faulty Boost Air Pressure Sensor connector
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 3

Voltage Above Normal, or Shorted to High Source

Conditions for fault code:

- A short to battery in the metering circuit
- An open in the ground circuit of the Boost Air Pressure Sensor

Possible causes:

- Intermittent fault in the Boost Air Pressure Sensor harness
- Faulty Boost Air Pressure Sensor connector
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- A short to ground
- An open in the 5 volt supply circuit
- An open in the metering circuit

Possible causes:

- Intermittent fault in the Boost Air Pressure Sensor harness
- Faulty Boost Air Pressure Sensor connector
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 11

Root Cause Not Known (Data Incorrect)

Conditions for fault code:

- The Boost Air Pressure Sensor output is too high or too low.

Possible causes:

- Faulty Boost Air Pressure Sensor harness
- Inlet air leakage
- Boost Air Pressure Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

MID 128 PID 103 — TURBO SPEED SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid but Above Normal Operational Range), 1 (Data Valid but Below Normal Operational Range), 9 (Abnormal Update Rate)

Parameter Identification (PID): P103

Message Identification (MID): 128

Circuit Description: The Turbo Speed Sensor is an inductive sensor. When the engine is running, the turbocharger shaft rotates past the Turbo Speed Sensor tip and a pulsed voltage signal is generated. The Engine Management System (EMS) Module monitors the frequency of the signal generated by the Turbo Speed Sensor to calculate the turbo speed.

Location: The Turbo Speed Sensor is located on the right side of the engine and mounted in the turbocharger.

FMI 0

Data Valid But Above Normal Operational Range

Conditions for fault code:

- A fault is logged if the measured turbocharger speed is at least 25% greater than the target wheel speed for the measured boost.

Possible causes:

- Miss detection
- Faulty Turbo Speed Sensor harness
- Faulty Turbo Speed Sensor connector
- Turbo Speed Sensor failure

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 1

Data Valid But Below Normal Operational Range

Conditions for fault code:

- A fault is logged if the measured turbocharger speed is at least 25% less than the target wheel speed for the measured boost.

Possible causes:

- Miss detection
- Faulty Turbo Speed Sensor harness
- Turbo Speed Sensor failure
- Faulty Turbo Speed Sensor connector

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 9

Abnormal Update Rate (Missing Sensor Signal)

Conditions for fault code:

- A fault is logged if the Turbo Speed Sensor signal is lost.

Possible causes:

- Short to battery in the measuring line of the Turbo Speed Sensor circuit
- Short to ground in the metering line of the Turbo Speed Sensor circuit
- An open in the metering line of the Turbo Speed Sensor circuit

Reaction from EMS module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

MID 128 PID 105 — BOOST TEMPERATURE SENSOR

Failure Mode Identifier (FMI):0 (Data Valid But Above Normal Operational Range), 1 (Data Valid But Below Normal Operational Range), 2 (Data Erratic, Intermittent or Incorrect), 4 (Voltage Below Normal, or Shorted Low), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change)

Parameter Identification (PID): P105

Message Identification (MID): 128

Circuit Description: The Boost Temperature Sensor is used to monitor the temperature of the air in the intake system downstream from the turbocharger. The sensor's signal is monitored by the EMS Module. The EMS Module will set a fault code if the sensor signal is not within predetermined limits, or the signal is not rational.

Location: The Boost Temperature Sensor is located in the air intake manifold.

FMI 0

Data Valid But Above Normal Operational Range

Conditions for fault code:

- The Boost Temperature Sensor is indicating an unphysical value.

Possible causes:

- Faulty Boost Temperature Sensor or Engine Management System (EMS) Module connector.
- Break in the Boost Temperature Sensor harness
- Malfunctioning Boost Temperature Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 1

Data Valid But Below Normal Operational Range

Conditions for fault code:

- The Boost Temperature Sensor is indicating an unphysical value.

Possible causes:

- Faulty Boost Temperature Sensor or Engine Management System (EMS) Module connector.
- Break in the Boost Temperature Sensor harness
- Malfunctioning Boost Temperature Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- The Boost Temperature Sensor output is too high or too low.

Possible causes:

- Faulty Boost Temperature Sensor or Engine Management System (EMS) Module connector.
- Break in the Boost Temperature Sensor harness
- Malfunctioning Boost Temperature Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted Low

Possible causes:

- A short to ground
- Intermittent fault in the Boost Temperature Sensor harness
- Faulty Boost Temperature Sensor connector
- Boost Temperature Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Difficult to start in cold climates
- Engine derate
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- A short to battery
- An open in the 5 volt supply circuit

Possible causes:

- A short to ground in the metering circuit
- Intermittent fault in the Boost Temperature Sensor harness
- Faulty Boost Temperature Sensor connector
- Boost Temperature Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Difficult to start in cold climates
- Engine derate
- MIL lamp illuminated

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- The Boost Temperature Sensor output is showing a constant value.

Possible causes:

- Faulty Boost Temperature Sensor harness
- Boost Temperature Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Engine derate
- MIL lamp illuminated

MID 128 PID 108 — AMBIENT PRESSURE SENSOR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P108

Message Identification (MID): 128

Location: The Ambient Pressure Sensor is located inside the Engine Management System (EMS) Module.

NOTE

The Ambient Pressure Sensor is shorted to another circuit. If the code is active, attempt to clear the code from memory and check if the code resets. If PID 108 resets, replace the Engine Management System (EMS) Module and retest the system.

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Ambient air pressure is showing too high or too low a value (abnormal value)

Possible causes:

- Faulty Ambient Pressure sensor
- Faulty Engine Management System (EMS) Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate
- Black smoke (minor)

FMI 3

Voltage Above Normal, or Shorted to High Source

Conditions for fault code:

- Short to battery on the metering side

Possible causes:

- Internal fault in Engine Management System (EMS) Module
- Faulty Ambient Pressure sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- Pressure is set to default value

FMI 4

Voltage Below Normal, or Shorted to Low Source

Conditions for fault code:

- Short to ground on the metering side

Possible causes:

- Internal fault in Engine Management System (EMS) Module
- Faulty Ambient Pressure sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- Pressure is set to default value

MID 128 PID 110 — ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range), 2 (Data Erratic, Intermittent or Incorrect), 4 (Voltage Below Normal, or Shorted Low), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change)

Parameter Identification (PID): P110

Message Identification (MID): 128

Circuit Description: The Engine Coolant Temperature (ECT) Sensor is a thermistor. The resistance of the ECT Sensor changes inversely to the temperature of the engine coolant. When the coolant is cold, the sensor resistance is high. As the temperature of the coolant increases, the sensor resistance decreases. The Engine Management System (EMS) Module monitors the voltage drop across the ECT Sensor. The coolant temperature signal is used to calculate fuel injection and to evaluate operating conditions of the engine coolant temperature. Examples of conditions that may cause high coolant temperature are: thermostat failure, fan failure, heavy load, high ambient temperatures and radiator blockage.

Location: The Engine Coolant Temperature (ECT) Sensor is located on the right front side of the engine.

FMI 0

Data Valid But Above Normal Operational Range

Conditions for fault code:

- The Boost Temperature Sensor is indicating an unphysical value.

Possible causes:

- Extreme driving conditions
- Faulty coolant thermostat
- Malfunctioning fan
- Blocked radiator

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate
- Illuminate red lamp when coolant temperature is critically high
- Illuminate yellow lamp when coolant temperature is moderately high

Noticeable external symptoms:

- MIL lamp illuminated

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- The Engine Coolant Temperature (ECT) Sensor output is too high or too low.

Possible causes:

- Faulty Engine Coolant Temperature (ECT) Sensor or Engine Management System (EMS) Module connector.
- Break in the Engine Coolant Temperature (ECT) Sensor harness
- Malfunctioning Engine Coolant Temperature (ECT) Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- May affect vehicle driveability in some extreme cases
- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted Low

Possible causes:

- Intermittent fault in the Engine Coolant Temperature (ECT) Sensor harness
- Faulty Engine Coolant Temperature (ECT) Sensor connector
- Engine Coolant Temperature (ECT) Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Difficult to start in cold climates
- Idle run regulation is deteriorated
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Possible causes:

- An open in the Engine Coolant Temperature (ECT) Sensor circuit
- An open in the Engine Coolant Temperature (ECT) Sensor)
- Intermittent fault in the Engine Coolant Temperature (ECT) Sensor harness
- Faulty Engine Coolant Temperature (ECT) Sensor connector
- Engine Coolant Temperature (ECT) Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Difficult to start in cold climates
- Idle run regulation is deteriorated
- MIL lamp illuminated

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- The Engine Coolant Temperature (ECT) Sensor output is showing a constant value.

Possible causes:

- Faulty Engine Coolant Temperature (ECT) Sensor harness
- Engine Coolant Temperature (ECT) Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- May affect vehicle driveability

MID 128 PID 111 — COOLANT LEVEL

Failure Mode Identifier (FMI): 1 (Data valid but below normal operational range), 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): P111

Message Identification (MID): 128

FMI 1

Data valid but below normal operational range

Conditions for fault code:

- Moderately below range
- Short Circuit-, Measuring line

Possible causes:

- Coolant level below range
- Engine shutdown
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit +, Measuring line

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Coolant level cannot be detected

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Coolant level cannot be detected

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Coolant level cannot be detected

MID 128 PID 153 — CRANKCASE PRESSURE

Failure Mode Identifier (FMI): 0 (Data valid but above normal operational range), 1 (Data valid but below normal operational range), 2 (Data erratic, intermittent or incorrect), 3 (Voltage above normal or shorted to high source), 5 (Current below normal or open circuit)

Parameter Identification (PID): P153

Message Identification (MID): 128

FMI 0

Data valid but above normal operational range

Conditions for fault code:

- Out of range, max voltage, illegal
- Critically Above Range

Possible causes:

- The non-filtered pressure difference (between crankcase pressure and ambient air pressure) is/was above limit. (The fault code will remain during the entire driving cycle (unless reset)

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Forced idle
- Engine shut down

FMI 1

Data valid but below normal operational range

Conditions for fault code:

- Out of range, min voltage, illegal

Possible causes:

- Crankcase Pressure Sensor out of range

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 2

Data erratic, intermittent or incorrect

Conditions for fault code:

- Plausibility

Possible causes:

- The crankcase pressure is showing either too high or too low value (abnormal value)

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit+, Measuring line
- Open Circuit, Ground line

Possible causes:

- Crankcase Pressure Sensor failures
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit+, 5V Supply Line
- Short Circuit-, Measuring line
- Open Circuit, Measuring line

Possible causes:

- Crankcase Pressure Sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PID 171 — AMBIENT AIR TEMPERATURE STATUS

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PID): P171

Message Identification (MID): 128

Circuit Description: The V-MAC IV system uses the J1939 data lines is used to control functions and communicates between the Vehicle Electronic Control Unit (VECU), Engine Management System (EMS) Module, Instrument Cluster Module (ICM) and accessory systems, depending on vehicle model and option content. The J1939 data lines consist of an expandable data bus allowing the addition of accessory control modules. The J1939 data lines are the primary data bus. Data is prioritized and then transmitted across the J1939 data lines to the appropriate control module. The V-MAC IV system is designed to allow limp home engine operation with the loss of the J1939 data signal as long as the J1587 data lines are still operational. The ambient air temperature signal is sent to the Instrument Cluster Module (ICM). The ICM then transmits the ambient air temperature data to the EMS Module via the J1939 data lines.

Location: The Instrument Cluster Module (ICM) is located near left side of the dash. The EMS module is located on the left side of the engine block.

Normal Engine Coolant Temperature Sensor Parameters: The Ambient Air Temperature Status code will set when a fault is detected in the Ambient Air Temperature Sensor, the J1507/J1708 Data Lines or the Instrument Cluster Module (ICM).

FMI 9

Abnormal Update Rate

Conditions for fault code:

- This fault will become active when the Engine Management System (EMS) Module detects that the Ambient Air Temperature message from the Instrument Cluster Module does not exist.

Possible causes:

- Faulty Ambient Air Temperature Sensor harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- MIL lamp illuminated

MID 128 PID 173 — EXHAUST GAS TEMPERATURE

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change)

Parameter Identification (PPID): P173

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Exhaust Gas Temperature is too high

Possible causes:

- Faulty Exhaust Gas Temperature (EGT) system
- Faulty harness or connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate
- Poor driveability

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Sensor is not rational

Possible causes:

- Harness connected to incorrect sensor
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short to battery on the metering side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on the metering side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Short to battery on the metering side of the circuit
- Open in the metering side of the circuit
- Open in the ground side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- Sensor is stuck

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

MID 128 PID 175 — ENGINE OIL TEMPERATURE

Failure Mode Identifier (FMI): 0 (Data valid but above normal operational range), 2 (Data erratic, intermittent or incorrect), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): P175

Message Identification (MID): 128

FMI 0

Data valid but above normal operational range

Conditions for fault code:

- Moderately Above range
- Critically Above Range

Possible causes:

- Extreme driving conditions

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate

FMI 2

Data erratic, intermittent or incorrect

Conditions for fault code:

- Plausibility

Possible causes:

- The oil temperature sensor output is showing either too high or to low value (abnormal value)

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- In some cases may have an effect on driveability

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Engine Oil Temperature (EOT) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Short Circuit+, Measuring line
- Open Circuit

Possible causes:

- Engine Oil Temperature (EOT) sensor failure
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PID 354 — INTAKE AIR TEMPERATURE AND HUMIDITY SENSOR

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted to High Source), 5 (Current Below Normal or Open Circuit)

Parameter Identification (PID): P354

Message Identification (MID): 128

Circuit Description: The Intake Air Temperature and Humidity (IATH) Sensor contains two thermistors, and the resistance of each thermistor varies inversely to temperature. By monitoring the current flow through each thermistor, the Engine Management System (EMS) Module calculates the temperature and humidity of the air entering the turbocharger.

Location: The Intake Air Temperature and Humidity (IATH) Sensor is located in the air intake tube.

FMI 3

Voltage Above Normal, or Shorted to High Source

Conditions for fault code:

- Short to battery in the metering circuit of the Intake Air Temperature and Humidity (IATH) Sensor
- Open in the ground circuit of the Intake Air Temperature and Humidity (IATH) Sensor

Possible causes:

- Faulty connector
- Faulty Intake Air Temperature and Humidity (IATH) Sensor harness
- Faulty Intake Air Temperature and Humidity (IATH) Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate
- Humidity value is set to 100 percent

Noticeable external symptoms:

- MIL lamp illuminated
- Turbocharger noise

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open in the metering circuit of the Intake Air Temperature and Humidity (IATH) Sensor
- Open in the 5 volt supply circuit of the Intake Air Temperature and Humidity (IATH) Sensor
- Short to ground in the metering circuit of the Intake Air Temperature and Humidity (IATH) Sensor

Possible causes:

- Faulty connector
- Faulty Intake Air Temperature and Humidity (IATH) Sensor harness
- Faulty Intake Air Temperature and Humidity (IATH) Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate
- Humidity value is set to 100 percent

Noticeable external symptoms:

- MIL lamp illuminated
- Turbocharger noise

MID 128 PID 411 — EGR DIFFERENTIAL PRESSURE

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit)

Parameter Identification (PID): P411

Message Identification (MID): 128

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- EGR differential pressure sensor output is too high or too low

Possible causes:

- Faulty EGR Differential Pressure Sensor connector
- Faulty EGR Differential Pressure Sensor harness
- Faulty EGR Differential Pressure Sensor
- EGR leakage
- Clogged EGR cooler
- Clogged EGR venturi

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Uneven running
- Engine derate

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short to battery in metering line
- Open in the ground circuit

Possible causes:

- Faulty EGR Differential Pressure Sensor connector
- Faulty EGR Differential Pressure Sensor harness
- Faulty EGR Differential Pressure Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- EGR Valve is closed

Noticeable external symptoms:

- Engine responds poorly
- Engine derate

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open in the 5 volt supply line
- Short to ground in metering line
- Open in the metering line

Possible causes:

- Faulty EGR Differential Pressure Sensor connector
- Faulty EGR Differential Pressure Sensor harness
- Faulty EGR Differential Pressure Sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- EGR Valve is closed

Noticeable external symptoms:

- Engine responds poorly
- Engine derate

MID 128 PID 412 — EGR TEMPERATURE AFTER COOLER

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change)

Parameter Identification (PID): P412

Message Identification (MID): 128

Location: The EGR temperature probe and heater probe are located in the EGR tube between the EGR cooler and the intake manifold. The EGR Sensor assembly is supplied from the manufacturer as a single calibrated unit. The components of the sensor are not to be replaced individually.

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Possible causes:

- Extreme driving conditions
- EGR cooler failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate
- Engine power will be derated according to the error torque map

Noticeable external symptoms:

- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on the metering side of the EGR Sensor circuit

Possible causes:

- Faulty connector
- Faulty harness
- Faulty sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate
- Engine power will be derated according to the error torque map

Noticeable external symptoms:

- MIL lamp illuminated
- Engine unresponsive

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Short to battery in the metering side of the EGR Sensor circuit
- Open in the metering side of the EGR Sensor circuit
- Open circuit in the ground line of the EGR Sensor circuit

Possible causes:

- Faulty connector
- Faulty harness
- Faulty sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- MIL lamp illuminated
- Engine unresponsive

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- EGR Sensor is shows a constant value that will not change.

Possible causes:

- Faulty sensor
- Faulty harness
- EGR system leakage

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- MIL lamp illuminated

MID 128 PPID 35 — EGR MASS FLOW

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 1 (Data Valid But Below Normal Operational Range - Most Severe Level)

Parameter Identification (PPID): P35

Message Identification (MID): 128

Circuit Description:

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- EGR is too high

Possible causes:

- Faulty EGR system
- Faulty harness or connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- EGR flow is too low

Possible causes:

- Faulty EGR system
- Clogged EGR cooler
- Faulty harness or connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

MID 128 PPID 89 — VARIABLE GEOMETRY TURBOCHARGER SMART REMOTE ACTUATOR TEMPERATURE

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level)

Parameter Identification (PPID): P89

Message Identification (MID): 128

Circuit Description: The Variable Geometry Turbocharger Smart Remote Actuator (VGT SRA) is a self-contained component with motors, sensors and a control unit. The VGT SRA uses a movable nozzle to adjust the intake manifold pressure for various operating conditions. Nozzle movement is controlled by an actuator mounted on the tubocharger. Information to and from the VGT SRA is communicated over the J1939 serial data lines. These data lines communicate with the Engine Management System (EMS) Module.

Location: The Variable Geometry Turbocharger Smart Remote Actuator (VGT SRA) is located on the right side of the engine at the turbocharger.

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- VGT SRA temperature is moderately too high

Possible causes:

- Coolant systems malfunctions
- Extreme driving conditions
- Overheated VGT actuator

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate (major)

MID 128 PPID 122 — COMPRESSION BRAKE SOLENOID

Failure Mode Identifier (FMI): 1 (Data valid but above normal operational range), 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): P122

Message Identification (MID): 128

FMI 1

Data valid but above normal operational range

Conditions for fault code:

- Below range

Possible causes:

- Low engine oil temperature

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- No Volvo Compression Brake (VCB)

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit+

Possible causes:

- Faulty Volvo Compression Brake (VCB) actuator
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Volvo Compression Brake (VCB) cannot be turned on
- Engine break function derated
- Gear shift performance derated for some automatic transmission boxes

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-

Possible causes:

- Faulty Volvo Compression Brake (VCB) actuator
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Volvo Compression Brake (VCB) cannot be turned off
- Engine stops running
- Engine impossible to restart

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty Volvo Compression Brake (VCB) actuator
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Volvo Compression Brake (VCB) cannot be turned on
- Engine break function derated
- Gear shift performance derated for some automatic transmission boxes

MID 128 PPID 270 — NOx SENSOR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 9 (Abnormal Update Rate), 10 (Abnormal Rate of Change), 12 (Bad Intelligent Device or Component), 13 (Out of Calibration), 14 (Special Instructions)

Parameter Identification (PID): P270

Message Identification (MID): 128

FMI 2

Data erratic, intermittent or incorrect

Conditions for fault code:

- NOx sensor removed
- Plausibility

Possible causes:

- NOx sensor removed (measures surround air)
- Exhaust system leakage
- Air intake leakage
- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- MIL lamp illuminated

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit, NOx signal

Possible causes:

- Faulty cabling between NOx sensor and NOx sensor ECU
- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit, NOx signal

Possible causes:

- Faulty cabling between NOx sensor and NOx sensor ECU
- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 9

Abnormal update rate (missing sensor signal

Conditions for fault code:

- Abnormal update

Possible causes:

- Missing signal from NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 10

Abnormal rate of change

Conditions for fault code:

- Stuck

Possible causes:

- Exhaust system leakage
- Air intake leakage
- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Incorrect value

Possible causes:

- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 13

Out of calibration

Conditions for fault code:

- Range check

Possible causes:

- Faulty NOx sensor

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 14

Special instructions

Conditions for fault code:

- Missing signal from sensor due to battery voltage

Possible causes:

- Voltage to NOx sensor is too high

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PPID 326 — SOOT LEVEL

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 11 (Root Cause Not Known), 14 (Special Instructions)

Parameter Identification (PPID): P326

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Moderately high soot load

Possible causes:

- Diesel Particulate Filter (DPF) clogged
- Injector AFI clogged

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- Manual regeneration required

Noticeable external symptoms:

- Engine derate

FMI 11

Critically high soot load

Conditions for fault code:

- High soot level in Diesel Particulate Filter (DPF)

Possible causes:

- Diesel Particulate Filter (DPF) clogged
- Injector AFI clogged

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated
- Replace or clean Diesel Particulate Filter (DPF)

Noticeable external symptoms:

- Engine derate

FMI 14

Special Instructions

Conditions for fault code:

- Ash level too high

Possible causes:

- Diesel Particulate Filter (DPF) needs service

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate
- Manual regeneration needed

MID 128 PPID 328 — AFTER TREATMENT INJECTION SHUT OFF VALVE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 14 (Special Instructions)

Parameter Identification (PPID): P328

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Circuit shorted to battery

Possible causes:

- Faulty harness
- Actuator failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Circuit shorted to ground

Possible causes:

- Faulty harness
- Actuator failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit

Possible causes:

- Faulty harness
- Actuator failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- After Treatment Fuel Injector stuck closed

Possible causes:

- Shut off valve stuck closed

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 14

Special Instructions

Conditions for fault code:

- After Treatment Fuel Injector leaking

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

MID 128 PPID 329 — AFTER TREATMENT FUEL INJECTOR

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 14 (Special Instructions)

Parameter Identification (PPID): P329

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Circuit shorted to battery

Possible causes:

- Faulty harness
- Injector failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Circuit shorted to ground

Possible causes:

- Faulty harness
- Injector failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit

Possible causes:

- Faulty harness
- Injector failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- After Treatment Fuel Injector clogged

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 14

Special Instructions

Conditions for fault code:

- After Treatment Fuel Injector leaking

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

MID 128 PPID 330 — DRV

Failure Mode Identifier (FMI): 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit), 7 (Mechanical system not responding or out of adjustment)

Parameter Identification (PID): P330

Message Identification (MID): 128

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short circuit+

Possible causes:

- Faulty Discharge Recirculator Valve (DRV) Solenoid
- Faulty harness
- Faulty Discharge Recirculator Valve (DRV) Solenoid connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- On/off valve can't be activated
- Regeneration not possible
- High engine braking without request
- Driveability affected

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short circuit-

Possible causes:

- Faulty Discharge Recirculator Valve (DRV) Solenoid
- Faulty harness
- Faulty Discharge Recirculator Valve (DRV) Solenoid connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Valve constantly activated
- Major powerloss
- Major smoke
- Exhaust manifold overheating
- Engine shut down

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open circuit

Possible causes:

- Faulty Discharge Recirculator Valve (DRV) Solenoid
- Faulty harness
- Faulty Discharge Recirculator Valve (DRV) Solenoid connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- On/off valve can't be activated
- Regeneration not possible
- High engine braking without request
- Driveability affected

FMI 7

Mechanical system not responding or out of adjustment

Conditions for fault code:

- Mechanically stuck

Possible causes:

- Leaking pipes
- Faulty Discharge Recirculator Valve (DRV) Solenoid

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- On/off valve can't be activated
- Regeneration not possible
- High engine braking without request
- Driveability affected
- Valve constantly activated
- Major powerloss
- Major smoke
- Exhaust manifold overheating
- Engine shut down

MID 128 PPID 333 — ENGINE FAN THERMAL SWITCH

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit)

Parameter Identification (PPID): P333

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Engine Fan Thermal Switch shorted high

Possible causes:

- Faulty Engine Fan Thermal Switch harness
- Faulty connector
- Faulty Engine Fan Thermal Switch

Reaction from Engine Management System (EMS) Module

- MIL lamp illuminated

Noticeable external symptoms:

- Cooling fan continuously engaged

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Engine Fan Thermal Switch shorted to ground

Possible causes:

- Faulty Aftermarket Treatment System Control Module
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Cooling fan continuously engaged

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open in the Engine Fan Thermal Switch circuit

Possible causes:

- Faulty Fan Clutch Actuator
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Cooling fan continuously engaged

MID 128 PPID 337 — ASH LEVEL

Failure Mode Identifier (FMI): 0 (Data valid but above normal operational range), 14 (Special instructions)

Parameter Identification (PID): P337

Message Identification (MID): 128

FMI 0

Data valid but above normal operational range

Conditions for fault code:

- Ash level too high

Possible causes:

- Short intervals between filter regenerations

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Need service

FMI 14

Special instructions

Conditions for fault code:

- Ignitors or fuel nozzle needs cleaning

Possible causes:

- Time and driving conditions require component service

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Need service

MID 128 PPID 340 — THERMAL REGENERATION UNIT (TRU): SUPPLEMENTAL AIR VALVE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P340

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- TRU Supplemental Air Valve shorted to high source

Possible causes:

- Faulty electrical harness between Chassis Air Solenoid and Aftermarket Treatment System Control Module
- Faulty Chassis Air Solenoid
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- TRU Supplemental Air Valve shorted to low source

Possible causes:

- Faulty electrical harness between Chassis Air Solenoid and Aftermarket Treatment System Control Module
- Faulty Chassis Air Solenoid
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PPID 387 — EXHAUST GAS TEMPERATURE SENSOR #2/TRU: FILTER INLET TEMPERATURE

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 1 (Data Valid But Below Normal Operational Range - Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (PPID): P387

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Too high multiple times

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- Control temperature error multiple times

Possible causes:

- Cannot achieve control temperature multiple times

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Sensor is not rational
- Plausability

Possible causes:

- Harness connected to incorrect sensor
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability
- Ceased regeneration

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short circuit high

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on the metering side of the circuit
- Short circuit low

Possible causes:

- Faulty harness
- Sensor failure
- Cannot achieve control temperature

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration
- Regeneration not possible

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Short to battery on the metering side of the circuit
- Open in the metering side of the circuit
- Open in the ground side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- Sensor is stuck

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Control temperature error

Possible causes:

- Cannot achieve control temperature

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration

FMI 14

Special Instructions

Conditions for fault code:

- Too high

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration

MID 128 PPID 436 — EXHAUST GAS TEMPERATURE SENSOR #3/TRU: FILTER OUTLET TEMPERATURE

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change), 14 (Special Instructions)

Parameter Identification (PPID): P436

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Too high

Too high multiple times

Possible causes:

- To high temperature
- Regeneration temperature to high

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Sensor is not rational
- Plausability

Possible causes:

- Harness connected to incorrect sensor
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Poor driveability

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short to battery on the metering side of the circuit

Possible causes:

- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground on the metering side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Short to battery on the metering side of the circuit
- Open in the metering side of the circuit
- Open in the ground side of the circuit

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- Sensor is stuck

Possible causes:

- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

FMI 14

Special Instructions

Conditions for fault code:

- Too high

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration

MID 128 PPID 437 — AFTER TREATMENT INJECTOR FUEL PRESSURE SENSOR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 10 (Abnormal Rate of Change)

Parameter Identification (PPID): P437

Message Identification (MID): 128

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Sensor is not rational

Possible causes:

- Faulty shut off valve
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short circuit to battery on the metering side
- Open circuit in the ground line

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit in the 5 volt supply
- Short circuit to ground in the metering line
- Open circuit in the metering line

Possible causes:

- Faulty harness
- Sensor failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

FMI 10

Abnormal Rate of Change

Conditions for fault code:

- After Treatment Injector Fuel Pressure Sensor stuck

Possible causes:

- Sensor failure
- Faulty shut off valve
- Injector failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

MID 128 PPID 440 — THERMAL REGENERATION UNIT (TRU): FLAME TEMPERATURE

Failure Mode Identifier (FMI): 1 (Data Valid But Below Normal Operational Range - Most Severe Level), 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 14 (Special Instructions)

Parameter Identification (PPID): P440

Message Identification (MID): 128

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- Lost flame multiple times
- Manual regeneration not possible

Possible causes:

- Ignition wire connection to igniters and ignition coils
- Faulty Fuel Nozzle
- Faulty fuel pump supply, valve and fittings
- Faulty Ignition Coil
- Faulty Combustion Air Solenoid
- Faulty Supplemental Air Valve
- Faulty Combustion Line Check Valve
- Faulty Atomization Module
- Faulty Flame Temperature Sensor
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Flame Temperature Sensor In-range failure

Possible causes:

- Faulty electrical harness between Flame Temperature Sensor and Cold Junction Compensation Board
- Faulty electrical harness between Cold Junction Compensation Board and Aftermarket Treatment System Control Module
- Faulty Flame Temperature Sensor
- Faulty Cold Junction Compensation Board
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Flame temperature open or shorted high

Possible causes:

- Faulty electrical harness between Flame Temperature Sensor and Cold Junction Compensation Board
- Faulty electrical harness between Cold Junction Compensation Board and Aftermarket Treatment System Control Module
- Faulty Flame Temperature Sensor
- Faulty Cold Junction Compensation Board
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Flame temperature shorted low

Possible causes:

- Faulty electrical harness between Flame Temperature Sensor and Cold Junction Compensation Board
- Faulty electrical harness between Cold Junction Compensation Board and Aftermarket Treatment System Control Module
- Faulty Flame Temperature Sensor
- Faulty Cold Junction Compensation Board
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 14

Special Instructions

Conditions for fault code:

- Lost Flame
- Manual regeneration not possible

Possible causes:

- Ignition wire connection to igniters and ignition coils
- Faulty Fuel Nozzle
- Faulty fuel pump supply, valve and fittings
- Faulty Ignition Coil
- Faulty Combustion Air Solenoid
- Faulty Supplemental Air Valve
- Faulty Combustion Line Check Valve
- Faulty Atomization Module
- Faulty Flame Temperature Sensor
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration

MID 128 PPID 442 — THERMAL REGENERATION UNIT (TRU): COLD JUNCTION TEMPERATURE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P442

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Cold junction temperature is open or shorted high

Possible causes:

- Incorrect reference voltage
- Faulty electrical harness between Cold Junction Compensation Board and Aftermarket Treatment System Control Module
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Cold junction temperature is shorted low

Possible causes:

- Incorrect reference voltage
- Faulty electrical harness between Cold Junction Compensation Board and Aftermarket Treatment System Control Module
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PSID 22 — THERMAL REGENERATION UNIT (TRU): AFTERTREATMENT COMBUSTION SYSTEM

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment), 14 (Special Instructions)

Parameter Identification (PID): P22

Message Identification (MID): 128

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Multiple failed ignitions

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 14

Special Instructions

Conditions for fault code:

- Failed ignitions

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted regeneration

MID 128 PSID 25 — AFTERTREATMENT SYSTEM CONDITIONING

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (PID): P25

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Idle timer critically too high
- Truck has idled to long without completing a periodic heat mode

Possible causes:

- Extreme cold ambient temperature conditions
- PTO operation with limited exhaust temperatures
- Driver intervention
- DRV
- Turbocharger

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derate
- Driver message indicating heat mode failure
- White smoke
- High temperature spike in DPF upon resuming driving
- High temperature spike in DPF upon stationary regeneration

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Idle timer moderately too high
- Truck has idled to long without completing a periodic heat mode

Possible causes:

- Extreme cold ambient temperature conditions
- PTO operation with limited exhaust temperatures
- Driver intervention
- DRV
- Turbocharger

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Driver message indicating heat mode failure
- White smoke
- High temperature spike in DPF upon resuming driving
- High temperature spike in DPF upon stationary regeneration

MID 128 PSID 47 — PARTICULATE TRAP REGENERATION

Failure Mode Identifier (FMI): 0 (Data valid but above normal operational range), 1 (Data valid but below normal operational range), 7 (Mechanical System Not Responding or Out Of Adjustment), 8 (Abnormal frequency, pulse width or period), 12 (Bad Intelligent Device or Component)

Parameter Identification (PID): P47

Message Identification (MID): 128

FMI 0

Data valid but above normal operational range

Conditions for fault code:

- Plausability, too high
- Regeneration active

Possible causes:

- Faulty After Treatment Injector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Regeneration not possible

FMI 1

Data valid but below normal operational range

Conditions for fault code:

- Plausability, too low
- Regeneration active

Possible causes:

- Faulty After Treatment Injector
- Faulty Diesel Particulate Filter (DPF) catalyst

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Regeneration not possible

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Mechanical problem
- A1 sensor goes above 1004 degrees F (540 degrees C)

Possible causes:

- Exhaust pipe disconnected before Diesel Particulate Filter (DPF)
- Reverse exhaust flow out of DPF

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration
- Regeneration not possible

FMI 8

Abnormal frequency, pulse width or period

Conditions for fault code:

- Regeneration period too long

Possible causes:

- N/A

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Regeneration efficiency too low
- Manual regeneration

Possible causes:

- Clogged After Treatment Injector
- Diesel Particulate Filter (DPF) catalyst damaged
- Diesel Particulate Filter (DPF) catalyst clogged

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PSID 49 — THERMAL REGENERATION UNIT (TRU): IGNITION SWITCH VOLTAGE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P49

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Ignition switch voltage shorted high

Possible causes:

- Faulty electrical harness between TRU Aftermarket Treatment System Control Module and vehicle
- Battery voltage above 16.0 volts
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Ignition switch voltage shorted low

Possible causes:

- Faulty electrical harness between TRU Aftermarket Treatment System Control Module and vehicle
- Battery voltage below 8.0 volts
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PSID 57 — THERMAL REGENERATION UNIT (TRU): BATTERY VOLTAGE

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 1 (Data Valid But Below Normal Operational Range - Most Severe Level), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P57

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Battery voltage too high

Possible causes:

- Battery voltage at or above 16 volts
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- Battery voltage too low

Possible causes:

- Battery voltage less than 8 volts
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Battery voltage too high

Possible causes:

- Battery voltage too high
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Battery voltage too low

Possible causes:

- Battery voltage too low
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 PSID 58 — THERMAL REGENERATION UNIT (TRU): MASTER AIR SOLENOID

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P58

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Master Air Valve output open or shorted high

Possible causes:

- Faulty electrical harness between Air Atomization Module and Aftermarket Treatment System Control Module
- Faulty Air Atomization Module
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Master Air Valve output shorted low

Possible causes:

- Faulty electrical harness between Air Atomization Module and Aftermarket Treatment System Control Module
- Faulty Air Atomization Module
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 PSID 59 — THERMAL REGENERATION UNIT (TRU): ATOMIZATION AND COMBUSTION AIR SOLENOIDS

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P59

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Atomization and combustion signal high

Possible causes:

- Faulty electrical harness between Air Atomization Module and Exhaust Aftertreatment System Control Module
- Faulty electrical harness between Combustion Air Solenoid and Exhaust Aftertreatment System Control Module
- Faulty Air Atomization Module
- Faulty Combustion Air Solenoid
- Faulty Exhaust Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Atomization and combustion signal low

Possible causes:

- Faulty electrical harness between Air Atomization Module and Exhaust Aftertreatment System Control Module
- Faulty electrical harness between Combustion Air Solenoid and Exhaust Aftertreatment System Control Module
- Faulty Air Atomization Module
- Faulty Combustion Air Solenoid
- Faulty Exhaust Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 PSID 98 — BOOST AIR SYSTEM

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 1 (Data Valid But Below Normal Operational Range - Most Severe Level)

Parameter Identification (PSID): P98

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Boost pressure is too high

Possible causes:

- EGR system failure
- Faulty turbocharger actuator

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Turbocharger surge

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- Boost pressure is too low

Possible causes:

- Faulty Boost Air System hoses, pipes, brackets, cooler, EGR system components and turbo components

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Powerloss
- Engine slow to respond

MID 128 PSID 108 — AFTER TREATMENT INJECTION SYSTEM

Failure Mode Identifier (FMI): 7 (Mechanical system not responding, or out of adjustment)

Parameter Identification (PID): P108

Message Identification (MID): 128

FMI 7

Mechanical system not responding, or out of adjustment

Conditions for fault code:

- Mechanical problem

Possible causes:

- Aftertreatment fuel injector
- Aftertreatment injection shut-off valve
- Aftertreatment injection fuel pressure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Regeneration not possible
- Powerloss
- Engine shut down

MID 128 PSID 109 — ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Failure Mode Identifier (FMI): 7 (Thermostat Blocked Closed), 12 (Thermostat Blocked Open)

Parameter Identification (PSID): P109

Message Identification (MID): 128

Circuit Description: The Engine Coolant Temperature (ECT) Sensor is a thermistor. The resistance of the ECT Sensor changes inversely to the temperature of the engine coolant. When the coolant is cold, the sensor resistance is high. As the temperature of the coolant increases, the sensor resistance decreases. The Engine Management System (EMS) Module monitors the voltage drop across the ECT Sensor. The coolant temperature signal is used to calculate fuel injection and to evaluate operating conditions of the engine coolant temperature. Examples of conditions that may cause high coolant temperature are: thermostat failure, fan failure, heavy load, high ambient temperatures and radiator blockage.

Location: The Engine Coolant Temperature (ECT) Sensor is located on the right front side of the engine.

FMI 7

Thermostat Blocked Closed

Conditions for fault code:

- This fault will become active when the Engine Management System (EMS) Module detects that the Engine Coolant Temperature (ECT) Sensor output is high but still with in the acceptable range for the sensor.
- The Coolant Temperature Sensor is indicating a high coolant temperature.

Possible causes:

- Thermostat Blocked Closed
- Faulty radiator fan
- Clogged radiator

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- MIL lamp illuminated

FMI 12

Thermostat Blocked Open

Conditions for fault code:

- This fault will become active when the Engine Management System (EMS) Module detects that the Engine Coolant Temperature (ECT) Sensor output is low but still with in the acceptable range for the sensor.

Possible causes:

- Thermostat Blocked Open

Reaction from Engine Management System (EMS) Module:

- MIL lamp will illuminate

Noticeable external symptoms:

- Poor heat in cab
- MIL lamp illuminated

MID 128 PSID 110 — THERMAL REGENERATION UNIT (TRU): IGNITION COIL

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P110

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Ignition Coil output is shorted high

Possible causes:

- Faulty electrical harness between Ignition Coil and TRU Electronic Control Module
- Faulty Ignition Wires
- Faulty Ignition Coil
- Faulty Igniters
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Ignition coil output is open or shorted low

Possible causes:

- Faulty electrical harness between Ignition Coil and TRU Electronic Control Module
- Faulty Ignition Wires
- Faulty Ignition Coil
- Faulty Igniters
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Ceased regeneration
- Aborted regeneration

MID 128 PSID 111 — THERMAL REGENERATION UNIT (TRU): FUEL PUMP

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P111

Message Identification (MID): 128

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Fuel enable output is open or shorted high

Possible causes:

- Faulty electrical harness
- Faulty Fuel Pump
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Fuel enable output is shorted low

Possible causes:

- Faulty electrical harness
- Faulty Fuel Pump
- Faulty Aftermarket Treatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 PSID 113 — THERMAL REGENERATION UNIT (TRU): SENSOR VOLTAGE SUPPLY

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 1 (Data Valid But Below Normal Operational Range - Most Severe Level), 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P113

Message Identification (MID): 128

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Sensor supply voltage is greater than 5.3 volts

Possible causes:

- Sensor signal shorted high
- Faulty Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 1

Data Valid But Below Normal Operational Range - Most Severe Level

Conditions for fault code:

- Sensor supply voltage is less than 4.5 volts

Possible causes:

- Sensor signal shorted low
- Faulty Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Sensor supply voltage is greater than 5.3 volts

Possible causes:

- Differential Pressure Sensor, harness, fittings and tubing
- Incorrect Differential Pressure Sensor voltage supply from Aftertreatment System Control Module
- Faulty Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Sensor supply voltage is 0 volts

Possible causes:

- Differential Pressure Sensor, harness, fittings and tubing
- Incorrect Differential Pressure Sensor voltage supply from TRU Aftertreatment System Control Module
- Faulty Aftertreatment System Control Module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 PSID 114 — DIESEL PARTICULATE FILTER (DPF) SWITCH

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate), 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P114

Message Identification (MID): 128

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Missing signal
- CM1 signal missing from Mack DPF smartswitch

Possible causes:

- Faulty harness
- Faulty connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Regeneration not possible

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Switch will transmit "Start Regen" and "Inhibit" status
- Illegal operation

Possible causes:

- Bad device

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Regeneration not possible

MID 128 PSID 161 — VIN (CHASSIS ID) CHECK 1

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P161

Message Identification (MID): 128

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- VIN (chassis id) number does not agree in EMS and two other control units

Possible causes:

- Bad device

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Fueling disabled and engine starting is not allowed

MID 128 PSID 162 — VIN (CHASSIS ID) CHECK 2

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect)

Parameter Identification (PSID): P162

Message Identification (MID): 128

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Data erratic

Possible causes:

- VIN number does not agree in EMS and two other control units

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Fueling disabled and engine starting is not allowed

MID 128 PSID 201 — CAN J1939 COMMUNICATION, TIME-OUT

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P201

Message Identification (MID): 128

FMI 9

Abnormal Update Rate

Conditions for fault code:

- No contact with the VECU
- Missing data from VECU

Possible causes:

- Faulty electrical harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- PTO or Cruise Control, Engine Brake or Compression Brake does not work anymore

MID 128 PSID 202 — DIESEL PARTICULATE FILTER (DPF) SWITCH

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P202

Message Identification (MID): 128

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Missing signal from cluster
- No contact with MID 140

Possible causes:

- CM1 signal/data missing from cluster
- Faulty harness
- Faulty cluster

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- None

MID 128 PSID 205 — TECU STATUS

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P205

Message Identification (MID): 128

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Missing signal from TECU
- Signal unavailable from TECU
- Signal not regularly updated from TECU

Possible causes:

- ETC2 not responding

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- N/A

MID 128 PSID 232 — CAN 2 J1939 COMMUNICATION LINK

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect)

Parameter Identification (PSID): P232

Message Identification (MID): 128

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Short circuit +, high side
- Short circuit -, high side
- Short circuit +, low side
- Short circuit -, low side
- Open circuit, high side
- Open circuit, low side

Possible causes:

- Faulty electrical harness or connector

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- No VGT control
- Powerloss

MID 128 PSID 249 — CAN FRAMES FROM THERMAL REGENERATION UNIT (TRU)

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P249

Message Identification (MID): 128

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Can frames are not present for greater than 5 seconds
- Time out

Possible causes:

- CAN cables
- CAN connectors
- TRU module

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- No regeneration
- TRU does not start

MID 128 PSID 249 — THERMAL REGENERATION UNIT (TRU): WATCHDOG TIMEOUT

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (PSID): P249

Message Identification (MID): 128

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Multiple timeouts

Possible causes:

- Engine Management System (EMS) Module failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

FMI 14

Special Instructions

Conditions for fault code:

- Timeout

Possible causes:

- Engine Management System (EMS) Module failure

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Aborted and ceased regeneration

MID 128 SID 1 — FUEL INJECTOR UNIT #1

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S1

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #'s 1 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 1 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #1 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #1 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- Poor Compression

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instructions

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 2 — FUEL INJECTOR UNIT #2

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S2

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #2 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 2 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #2 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #2 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- High fuel pressure
- Poor compression
- Improper valve adjustment

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instructions

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 3 — FUEL INJECTOR UNIT #3

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S3

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #3 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 3 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #3 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #3 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- High fuel pressure
- Poor compression
- Improper valve adjustment

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instruction

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 4 — FUEL INJECTOR UNIT #4

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S4

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #4 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 4 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #4 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #4 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- High fuel pressure
- Poor compression
- Improper valve adjustment

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instruction

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 5 — FUEL INJECTOR UNIT #5

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S5

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #5 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 5 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #5 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #5 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- High fuel pressure
- Poor compression
- Improper valve adjustment

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instruction

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 6 — FUEL INJECTOR UNIT #6

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component), 14 (Special Instructions)

Parameter Identification (SID): S6

Message Identification (MID): 128

Circuit Description: Fuel Injector Unit #6 operation is controlled by the Engine Management System (EMS) Module. This module provides supply voltage and output transistor drivers to control the ground circuits. There are two solenoid circuits within the injector; a Needle Control Valve (NCV) and a Spill Valve (SV).

Location: The Fuel Injector Units are located under the valve cover.

Code Setting Conditions: If the Engine Management System (EMS) Module detects a fault in the electrical circuit while attempting to operate the Fuel Injector Unit, the Malfunction Indicator Lamp (MIL) will turn ON and code SID 6 will set.

Additional Symptoms: Poor performance, low power or no start.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- EMS module detects a short circuit to battery on the low side of the Spill Valve (SV)/Needle Control Valve (NCV).

Possible causes:

- Harness shorted to battery

Reaction from EMS module:

- Injector #6 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- EMS detects a short circuit to battery positive, a short circuit to ground, or an open circuit on the high side of the SV/Needle Control Valve (NCV) or a Short Circuit to ground on the low side of the SV/NCV.

Possible causes:

- Harness shorted or open
- Faulty fuel injector solenoid

Reaction from EMS module:

- Injector #6 is shut off
- Enter limp home mode

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Cylinder balancing data is above the limit

Possible causes:

- Clogged fuel injector(s)
- Low fuel pressure
- High fuel pressure
- Poor compression
- Improper valve adjustment

Reaction from EMS module:

- Software compensation is stopped
- EMS module will store freeze frame data

Noticeable external symptoms:

- Erratic engine idle speed

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Injector or harness resistance too high

Possible causes:

- Injector solenoid resistance out of specification
- Harness resistance too high

Reaction from EMS module:

- Turbocharger boost reduction

Noticeable external symptoms:

- Loss of power
- Uneven running
- MIL lamp illuminated

FMI 14

Special Instruction

Conditions for fault code:

- Fuel injector flow is too low or high. Cylinder compression is low.

Possible causes:

- Low injector flow
- High injector flow
- Poor compression

Reaction from EMS module:

- Uneven cylinder balancing

Noticeable external symptoms:

- Loss of power
- Uneven running
- Running on 3 to 5 cylinders
- MIL lamp illuminated

MID 128 SID 18 — WATER IN FUEL DRAINAGE VALVE

Failure Mode Identifier (FMI): 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): S18

Message Identification (MID): 128

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit+ Measuring line

Possible causes:

- Faulty Water In Fuel (WIF) Solenoid Valve
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Valve constantly shut

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Faulty Water In Fuel (WIF) Solenoid Valve
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- High fuel consumption due to fuel leakage

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty Water In Fuel (WIF) Solenoid Valve
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Valve constantly shut

MID 128 SID 21 — CAM SPEED SENSOR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), or 8 (Abnormal Frequency or Pulse Width or Period)

Parameter Identification (PID): S21

Message Identification (MID): 128

Circuit Description: The CAM Speed Sensor is an inductive device. As the camshaft turns, the tip of the CAM Speed Sensor senses the holes in the camshaft drive gear and sends a series of voltage pulses to the Engine Management System (EMS) Module. The frequency of the pulses is translated into engine speed and position by the EMS Module. The EMS Module uses this information along with the information from Crank Speed Sensor to synchronize fuel injection.

Location: The CAM Speed Sensor is located on top right rear of engine.

NOTE

Electrical problems can cause this fault to be generated, and electrical diagnostics are provided in this section. Mechanical problems can also cause temporary or permanent speed signal errors. After all electrical possibilities have been ruled out, check mechanical conditions that could cause vibration or signal errors. Such conditions include but are not limited to:

- Faulty Engine Vibration Damper
- Contaminated sensor tips
- Contaminated Cam Gear face
- Excessive Camshaft end play
- Improperly adjusted sensor
- Improperly balanced engine components
- Faulty engine timing cover.

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Phase Error - Incorrect correlation between CAM and Crank Sensor

Possible causes:

- Faulty connector
- Faulty CAM Sensor harness
- Faulty CAM Sensor

Reaction from Engine Management System (EMS) Module:

- Engine will be started using Crank Speed (Flywheel) signal

Noticeable external symptoms:

- Increased fuel consumption

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Missing Signal from CAM Sensor
- Open in the CAM Sensor Circuit
- Short to battery in the CAM Sensor Circuit
- Short to ground in the CAM Sensor Circuit

Possible causes:

- Faulty CAM Sensor harness

Reaction from Engine Management System (EMS) Module:

- Engine will be started using Crank Speed (Flywheel) signal

Noticeable external symptoms:

- Increased engine start time
- Loss of engine power

FMI 8

Abnormal Frequency or Pulse Width or Period

Conditions for fault code:

- Noisy Signal from CAM Sensor
- Open in the CAM Sensor Circuit

Possible causes:

- Faulty CAM Sensor harness
- Faulty CAM Sensor mounting

Reaction from Engine Management System (EMS) Module:

- Engine will be started using Crank Speed (Flywheel) signal

Noticeable external symptoms:

- Increased engine start time
- Loss of engine power

MID 128 SID 22 — CRANK SPEED SENSOR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 3 (Voltage Above Normal, or Shorted To High Source), or 8 (Abnormal Frequency or Pulse Width or Period)

Parameter Identification (PID): S22

Message Identification (MID): 128

Circuit Description: The Crank Speed Sensor is an inductive sensor that will generate a variable voltage signal when the sensor's magnetic field is excited. The Crank Speed Sensor is installed near the flywheel. When the engine is running the flywheel's teeth rotate past the sensor's tip and voltage pulses are generated. The Engine Management System (EMS Module) monitors the frequency of the signal generated by the Crank Speed Sensor and calculates the engine RPM. The air gap between the sensor tip and the flywheel teeth can influence the sensor's output signal and should be checked if SID 22 is set or is setting intermittently.

Location: The Crank Speed Sensor is located on the left side of the engine on the flywheel housing.

NOTE

Electrical problems can cause this fault to be generated, and electrical diagnostics are provided in this section. Mechanical problems can also cause temporary or permanent speed signal errors. After all electrical possibilities have been ruled out, check mechanical conditions that could cause vibration or signal errors. Such conditions include but are not limited to:

- Faulty Engine Vibration Damper
- Contaminated sensor tips
- Missing or chipped gear teeth
- Improperly installed Flywheel Ring Gear
- Incorrect Flywheel
- Contaminated Flywheel Ring Gear
- Improperly adjusted sensor
- Excessive driveshaft backlash
- Improperly balanced engine components.

NOTE

FMI 3 will only be seen as active with the engine OFF. In all cases the SID 22 FMI will change to 2 when the engine is started.

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Intermittent or weak signal

Possible causes:

- Faulty connector
- Faulty Crank Sensor harness
- Faulty Crank Sensor

Reaction from Engine Management System (EMS) Module:

- Engine will be started using Crank Speed signal

Noticeable external symptoms:

- Increased fuel consumption
- Imprecise engine timing
- High fuel consumption
- Uneven cylinder balancing
- Power loss
- Smoke

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Missing Signal from Crank Sensor
- Open in the Crank Sensor Circuit
- Short to battery in the Crank Sensor Circuit
- Short to ground in the Crank Sensor Circuit

Possible causes:

- Faulty Crank Sensor harness
- Faulty Crank Sensor mounting

Reaction from Engine Management System (EMS) Module:

- Engine will be started using CAM Speed signal

Noticeable external symptoms:

- Increased engine start time
- Vehicle may be in limp home mode
- Loss of engine power

FMI 8

Abnormal Frequency or Pulse Width or Period

Conditions for fault code:

- Erratic or intermittent signal from Crank Sensor
- Open in the Crank Sensor Circuit

Possible causes:

- Faulty Crank Sensor harness
- Faulty Crank Sensor mounting

Reaction from Engine Management System (EMS) Module:

- Engine will be started using Crank Speed (Flywheel) signal

Noticeable external symptoms:

- Increased fuel consumption
- Imprecise engine timing
- High fuel consumption
- Uneven cylinder balancing
- Power loss
- Smoke

MID 128 SID 27 — VARIABLE GEOMETRY TURBOCHARGER ACTUATOR #1

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 4 (Voltage Below Normal, or Shorted To Low Source), 7 (Mechanical System Not Responding or Out Of Adjustment), 9 (Abnormal Update Rate), 13 (Out of Calibration)

Parameter Identification (SID): S27

Message Identification (MID): 128

Circuit Description: The Variable Geometry Turbocharger Smart Remote Actuator (VGT SRA) is a self-contained component with motors, sensors and a control unit. The VGT SRA uses a movable nozzle to adjust the intake manifold pressure for various operating conditions. Nozzle movement is controlled by an actuator mounted on the tubocharger. Battery voltage is supplied to the VGT SRA and the unit is grounded by means of the engine block. Information to and from the VGT SRA is communicated over the J1939 serial data lines.

Location: The Variable Geometry Turbocharger Smart Remote Actuator (VGT SRA) is located on the right side of the engine at the turbocharger.

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Smart remote actuator has not seen a valid command on CAN2
- Incorrect data

Possible causes:

- Disturbance on CAN2 data lines

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

Noticeable external symptoms:

- Low boost
- Low power
- Nozzle opens
- Smoke from engine

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground

Possible causes:

- Faulty SRA VGT connector
- Faulty SRA VGT harness
- Low battery voltage

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

Noticeable external symptoms:

- Nozzle will open resulting in low power and low boost
- SRA will continue to attempt and maintain target nozzle position

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Mechanical problem with the VGT SRA

Possible causes:

- Actuator motor effort is temporarily limited to prevent overheating
- Restrictions detected when running learn sequence
- SRA is slow to follow commands
- SRA position is not tracking command

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

Noticeable external symptoms:

- Low boost and smoke
- Possible engine derate
- Power loss in some cases when actuator motor has been disabled

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Data from the SRA has been missing for 2-seconds

Possible causes:

- Data line harness
- No supply to VGT actuator
- VGT actuator
- VGT SRA connector

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

Noticeable external symptoms:

- Engine derated (major)
- EGR valve closed

FMI 13

Out of Calibration

Conditions for fault code:

- Failed self-calibration

Possible causes:

- Smart remote actuator

Reaction from Engine Management System (EMS):

- MIL lamp illuminated

MID 128 SID 33 — COOLING FAN CONTROL

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit)

Parameter Identification (PID): S33

Message Identification (MID): 128

Circuit Description (On/Off Fan): The Fan Clutch Solenoid controls the operation of the cooling fan by using a solenoid. The Fan Clutch Solenoid is supplied battery voltage and is grounded by the Engine Management System (EMS) Module. When the EMS System Module determines fan operation is needed, based on coolant temperature, intake air temperature or A/C load, the EMS Module will de-energize the Fan Clutch Solenoid allowing the fan clutch to engage.

Circuit Description (Electronic Viscous Fan): The Electronic Fan Drive contains a solenoid that controls the flow of fluid between reservoirs in the fan drive housing and cover. The EMS Module provides power to the solenoid and controls solenoid operation to optimize fan speed, based on coolant temperature, intake air temperature and A/C load.

Location: The On/Off Fan Clutch Solenoid is located on the lower left side of the radiator shroud. The Electronic Fan Drive is bolted to the drive pulley on the front of the engine.

Code Setting Conditions: When the Engine Management System (EMS) Module detects there is a short to voltage in the cooling fan control circuit, FMI 3 will set and the fan will operate continuously. When there is a short to ground, FMI 4 will set and the fan will not operate. If there is an open circuit, FMI 5 will be set and the fan will operate continuously.

NOTE

If code SID 33 sets with FMI 4, there may be additional active codes. If this is the case, follow the diagnostic procedures for the other codes first, then check to make sure code SID 33 is no longer active.

Additional Symptoms: Higher than normal coolant temperatures, poor air conditioning performance or lower than normal coolant temperatures may be experienced.

NOTE

If a customer complains that the fan clutch does not disengage and code SID 33 has not been logged in the EMS Module, the problem may be due to a mechanical failure in the chassis air system.

⚠ DANGER

The fan can engage without warning. Hands, arms and personal items can easily be entangled in the belts or fan blades. Keep arms, hair, clothing, jewelry, etc. clear from the fan and belts when the engine is running.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Short to positive in the Cooling Fan control circuit

Possible causes:

- Broken Cooling Fan Actuator
- Faulty Cooling Fan Actuator harness or connector

Reaction from Engine Management System (EMS) Module:

- Fan runs at full speed
- Increased fuel consumption

Noticeable external symptoms:

- MIL lamp illuminated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Short to ground in the Cooling Fan control circuit
- Output voltage is 1/3 the supply voltage

Possible causes:

- Broken Cooling Fan Actuator
- Faulty Cooling Fan Actuator harness or connector

Reaction from Engine Management System (EMS) Module:

- Fan always deactivated
- Engine may be overheated

Noticeable external symptoms:

- MIL lamp illuminated

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open in the Cooling Fan control circuit

Possible causes:

- Broken Cooling Fan Actuator
- Faulty Cooling Fan Actuator harness or connector

Reaction from Engine Management System (EMS) Module:

- Fan runs at full speed
- Increased fuel consumption

Noticeable external symptoms:

- MIL lamp illuminated

MID 128 SID 70 — AIR INLET HEATER DRIVER #1

Failure Mode Identifier (FMI): 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): S70

Message Identification (MID): 128

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit+, Measuring line

Possible causes:

- Faulty Preheat Relay
- Short in high side of Preheat Sense 1 circuit

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Fuse for shorting wire blown

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Preheat relay problem
- Sense 1, Short Circuit-, Measuring line

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Shorting wire may break

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty Heating element
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- May experience starting problems in cold climates

MID 128 SID 71 — AIR INLET HEATER DRIVER #2

Failure Mode Identifier (FMI): 3 (Voltage above normal or shorted to high source), 4 (Voltage below normal or shorted low), 5 (Current below normal or open circuit)

Parameter Identification (PID): S71

Message Identification (MID): 128

FMI 3

Voltage above normal or shorted to high source

Conditions for fault code:

- Short Circuit+, Measuring line

Possible causes:

- Faulty Preheat Relay
- Short in high side of Preheat Sense 2 circuit

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Fuse for shorting wire blown

FMI 4

Voltage below normal or shorted low

Conditions for fault code:

- Short Circuit-, Measuring line

Possible causes:

- Preheat relay problem
- Sense 2, Short Circuit-, Measuring line

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Shorting wire may break

FMI 5

Current below normal or open circuit

Conditions for fault code:

- Open Circuit

Possible causes:

- Faulty Heating element
- Faulty harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- May experience starting problems in cold climates

MID 128 SID 146 — EGR CONTROL VALVE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit), 7 (Mechanical System Not Responding or Out Of Adjustment), 12 (Bad Intelligent Device or Component)

Parameter Identification (PID): S146

Message Identification (MID): 128

Circuit Description: The EGR Valve operation is controlled by the Engine Management System (EMS) Module using output transistor drivers that provide the power and ground circuits.

Location: The EGR Control Valve is located on the right rear side of the engine.

N O T E

If the Engine Management System (EMS) Module detects a short circuit to ground in the EGR Control Valve high side drive circuit, the EMS Module will turn OFF the high side driver and the driver will remain OFF until the key is cycled.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Stuck EGR Control Valve
- EGR Control Valve circuit shorted to positive
- EGR Control Valve circuit shorted to ground

Possible causes:

- Faulty EGR Control Valve actuator
- EGR Control Valve harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Powerloss

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open EGR Control Valve Circuit

Possible causes:

- Faulty EGR Control Valve actuator
- EGR Control Valve harness

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Powerloss

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- EGR Valve stuck closed

Possible causes:

- Faulty EGR Valve

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Powerloss

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- EGR Valve stuck open

Possible causes:

- Faulty EGR Valve

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Powerloss

MID 128 SID 211 — SENSOR SUPPLY VOLTAGE #2

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): S211

Message Identification (MID): 128

Circuit Description: This fault code is used to detect a short circuit in the 5 volt supply to the Fuel Pressure Sensor, Crankcase Pressure Sensor and the Oil Pressure Sensor.

Location: Internal to the Engine Management System (EMS) Module.

FMI 3

Voltage Above Normal, or Shorted To High Source

Possible causes:

- 5 volt reference circuit shorted to positive
- Faulty harness or connector
- Faulty sensor power supply
- MID 128 PID's 27, 94, 100, 153 and 362 may also be set

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Strange information displayed on cluster
- Poor driveability

FMI 4

Voltage Below Normal, or Shorted To Low Source

Possible causes:

- 5 volt reference circuit shorted to ground
- Faulty harness or connector
- Faulty sensor power supply
- MID 128 PID's 27, 94, 100, 153 and 362 may also be set

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Strange information displayed on cluster
- Poor driveability

MID 128 SID 230 — BUFFERED IDLE VALIDATION SWITCH SIGNAL

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 5 (Current Below Normal or Open Circuit)

Parameter Identification (SID): S230

Message Identification (MID): 128

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied to the Idle Validation Switch (IVS) signal input. At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Engine Management System (EMS) Module is located on the left side of the engine block and the Vehicle Electronic Control Unit (VECU) is located behind the center of the dash.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- IVS buffered signal shorted to voltage

Possible causes:

- Faulty connector
- Faulty VECU
- Short to voltage in signal circuit harness

Reaction from Vehicle Electronic Control Unit (VECU):

- MIL lamp illuminated

Noticeable external symptoms:

- No IVS limp home function for pedal position

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- IVS buffered signal shorted to ground or open

Possible causes:

- Faulty connector
- Faulty VECU
- Short to ground or open in signal circuit harness

Reaction from Vehicle Electronic Control Unit (VECU):

- MIL lamp illuminated

Noticeable external symptoms:

- No IVS limp home function for pedal position

MID 128 SID 232 — SENSOR SUPPLY VOLTAGE #1

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): S232

Message Identification (MID): 128

Circuit Description: This fault code is used to detect a short circuit in the 5 volt supply to the Electronic Fan Controller, Boost Pressure Sensor and Intake Air Temperature and Humidity Sensor.

Location: Internal to the Engine Management System (EMS) Module.

FMI 3

Voltage Above Normal, or Shorted To High Source

Possible causes:

- 5 volt reference circuit shorted to positive
- Faulty harness or connector
- Faulty sensor power supply
- MID 128 PID's 26, 102, 132, 164 and 411 may also be set

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Strange information displayed on cluster
- Poor driveability

FMI 4

Voltage Below Normal, or Shorted To Low Source

Possible causes:

- 5 volt reference circuit shorted to ground
- Faulty harness or connector
- Faulty sensor power supply
- MID 128 PID's 26, 102, 132, 164 and 411 may also be set

Reaction from Engine Management System (EMS) Module:

- MIL lamp illuminated

Noticeable external symptoms:

- Strange information displayed on cluster
- Poor driveability

MID 140 PID 77 — FRONT REAR AXLE TEMPERATURE SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P77

Message Identification (MID): 140

Circuit Description: The axle temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the axle oil. When the axle oil temperature is cold, the sensor resistance is high. As the temperature of the axle oil increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the axle temperature sensor.

Location: The axle temperature sensor is located on the axle housing.

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Temperature over warning threshold
- Axle temperature above 240°F (120°C)

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Red lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 40 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 5 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 78 — REAR REAR AXLE TEMPERATURE SENSOR

Failure Mode Identifier (FMI): 0 (Data Valid But Above Normal Operational Range - Most Severe Level), 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P78

Message Identification (MID): 140

Circuit Description: The axle temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the axle oil. When the axle oil temperature is cold, the sensor resistance is high. As the temperature of the axle oil increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the axle temperature sensor.

Location: The axle temperature sensor is located on the axle housing.

FMI 0

Data Valid But Above Normal Operational Range - Most Severe Level

Conditions for fault code:

- Temperature over warning threshold
- Axle temperature above 240°F (120°C)

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Red lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 40 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 5 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 96 — FUEL LEVEL

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P96

Message Identification (MID): 140

Circuit Description: The fuel level sensor is a variable resistor called a potentiometer. The resistance through the sensor changes as the fuel level changes.

Location: The fuel level sensor is located in the fuel tank.

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Abnormally low current
- Open circuit

Possible causes:

- Sensor resistance above 1 kOhm
- Faulty harness
- Faulty sensor
- Faulty fuel level sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 20 Ohm

Possible causes:

- Faulty harness
- Faulty sensor
- Faulty fuel level sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 100 — ENGINE OIL PRESSURE WATCHDOG

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PID): P100

Message Identification (MID): 140

Circuit Description: Communication interference or data link issues

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- PID 100 from Engine Management System (EMS) not received

Possible causes:

- J1587 communication down
- Faulty harness
- Faulty engine management system control unit

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PID 110 — ENGINE COOLANT WATCHDOG

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PID): P110

Message Identification (MID): 140

Circuit Description: Communication interference or data link issues

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- PID 110 from Engine Management System (EMS) not received

Possible causes:

- J1587 communication down
- Faulty harness
- Faulty engine management system control unit

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PID 116 — AIR APPLICATION TRANSDUCER

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P116

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Voltage above 5.0 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Voltage below .25 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 117 — PRIMARY AIR PRESSURE TRANSDUCER

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P117

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Voltage above 5.0 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Voltage below .25 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 118 — SECONDARY AIR PRESSURE TRANSDUCER

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P118

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Voltage above 5.0 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Voltage below .25 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 170 — INTERIOR TEMPERATURE

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P170

Message Identification (MID): 140

Circuit Description: The temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the interior air. When the temperature is cold, the sensor resistance is high. As the temperature of the interior increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the temperature sensor.

Location: N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 38 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 140 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 171 — AMBIENT TEMPERATURE

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P171

Message Identification (MID): 140

Circuit Description: The temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the ambient air. When the temperature is cold, the sensor resistance is high. As the temperature of the ambient air increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the temperature sensor.

Location: N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 40 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 130 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 173 — EXHAUST TEMPERATURE

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P173

Message Identification (MID): 140

Circuit Description: The temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the ambient air. When the temperature is cold, the sensor resistance is high. As the temperature of the ambient air increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the temperature sensor.

Location: N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 40 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 10 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 177 — TRANSMISSION OIL TEMPERATURE

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit), 9 (Abnormal Update Rate)

Parameter Identification (PID): P177

Message Identification (MID): 140

Circuit Description: The temperature sensor is a thermistor. The resistance of the sensor changes inversely to the temperature of the transmission oil. When the temperature is cold, the sensor resistance is high. As the temperature of the transmission oil increases, the sensor resistance decreases. The Instrument Cluster Module (ICM) monitors the voltage drop across the temperature sensor.

Location: The transmission oil temperature sensor is located inside of the transmission.

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Open circuit
- Sensor resistance above 70 kOhm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Circuit shorted to ground
- Sensor resistance below 10 Ohm

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Expected Transmission Electronic Control Unit (TECU) message(s) not received

Possible causes:

- J1939 communication down
- Faulty harness
- Faulty transmission electronic control unit

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PID 358 — AIR SUSPENSION PRESSURE TRANSDUCER

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P358

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Voltage above 5.0 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Voltage below .25 volts

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- Gauge needle moves to zero position

MID 140 PID 439 — BOOST PRESSURE WATCHDOG

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PID): P439

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- PID 439 from Engine Management System (EMS) Module not received

Possible causes:

- J1587 communication down
- Faulty harness
- Faulty engine management system module

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PPID 119 — ENGINE COOLANT WATCHDOG

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PPID): P119

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- PPID 119 from Engine Management System (EMS) module not received
- J1587 EMS fault

Possible causes:

- J1587 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 47 — STEERING STALK ESCAPE BUTTON

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P47

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Active signal (button) for more than sixty seconds

Possible causes:

- Faulty harness
- Faulty control unit
- Faulty stalk switch

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 48 — STEERING STALK ENTER BUTTON

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P48

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Active signal (button) for more than sixty seconds

Possible causes:

- Faulty harness
- Faulty control unit
- Faulty stalk switch

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 49 — STEERING STALK UP BUTTON

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P49

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Active signal (button) for more than sixty seconds

Possible causes:

- Faulty harness
- Faulty control unit
- Faulty stalk switch

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 50 — STEERING STALK DOWN BUTTON

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P50

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Active signal (button) for more than sixty seconds

Possible causes:

- Faulty harness
- Faulty control unit
- Faulty stalk switch

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 53 — ENGINE SPEED, HIGH VOLTAGE/LOW VOLTAGE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P53

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Fault when engine speed stays high

Possible causes:

- Faulty harness
- Faulty control unit

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Fault when engine speed stays low

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 54 — VEHICLE SPEED, HIGH VOLTAGE/LOW VOLTAGE

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P54

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Fault when vehicle speed stays high

Possible causes:

- Faulty harness
- Faulty control unit

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Fault when vehicle speed stays low

Possible causes:

- Faulty harness
- Faulty sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 200 — J1939 DATALINK, MID 128

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P200

Message Identification (MID): 140

Circuit Description: Timeout on J1939 communication from the Engine Management System (EMS) module (MID 128)

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Expected EMS message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 201 — J1939 DATALINK, MID 144

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P201

Message Identification (MID): 140

Circuit Description: Timeout on J1939 communication from the Vehicle Electronic Control Unit (VECU) (MID 144)

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Expected VECU message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 204 — J1939 DATALINK, MID 136

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P204

Message Identification (MID): 140

Circuit Description: Timeout on J1939 communication from the Anti-Lock Brake System (ABS) module (MID 136)

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Expected ABS message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 PSID 205 — J1939 DATALINK, MID 130

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P205

Message Identification (MID): 140

Circuit Description: Timeout on J1939 communication from the Transmission Control Unit (TCU) module (MID 130)

NOTE

This MID applies to automated manual transmission and Allison™ transmissions

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Expected TCU message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 SID 231 — J1939 LINK

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (SID): S231

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- No communication on J1939 datalink
- Message(s) not received on J1939 datalink

Possible causes:

- CAN 1 communication down
- J1939 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 140 SID 250 — J1708/1587 LINK

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (SID): S250

Message Identification (MID): 140

Circuit Description: N/A

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- No communication on J1587 datalink
- Message(s) not received on J1587 datalink

Possible causes:

- J1587 communication down
- Faulty harness

Reaction from Instrument Cluster Module (ICM):

- Electronic malfunction lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PID 84 — ROAD SPEED

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent or Incorrect), 14 (Special Instructions)

Parameter Identification (PID): P84

Message Identification (MID): 144

Circuit Description: The Vehicle Speed Sensor (VSS) is an inductive sensor. When the vehicle is moving, the transmission output shaft speedometer gear teeth rotate past the VSS tip and a pulsed signal voltage is generated. The Vehicle Electronic Control Unit (VECU) monitors the frequency of the signal generated by the VSS, to calculate the road speed. The air gap between the sensor and the toothed gear influences the VSS signal output and should be checked if erratic or inaccurate speedometer readings are reported.

Location: The Vehicle Speed Sensor (VSS) is located in the rear of transmission, near the output shaft.

FMI 2

Data Erratic, Intermittent or Incorrect

Conditions for fault code:

- Intermittent faulty data
- Speed signal from speedometer and ABS differs too much

Possible causes:

- ABS Harness
- ABS Sensor
- Tachometer
- Tachometer harness

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 14

Special Instructions

Conditions for fault code:

- Intermittent faulty data
- Speed signal from tachometer was updated incorrectly

Possible causes:

- Faulty information from tachometer
- J1939 dataline link
- Tachometer harness

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PID 86 — CRUISE CONTROL SET SPEED

Failure Mode Identifier (FMI): 14 (Special Instructions)

Parameter Identification (PID): P84

Message Identification (MID): 144

Circuit Description: The Vehicle Speed Sensor (VSS) is an inductive sensor. When the vehicle is moving, the transmission output shaft speedometer gear teeth rotate past the VSS tip and a pulsed signal voltage is generated. The Vehicle Electronic Control Unit (VECU) monitors the frequency of the signal generated by the VSS, to calculate the road speed. The air gap between the sensor and the toothed gear influences the VSS signal output and should be checked if erratic or inaccurate speedometer readings are reported.

Location: The Vehicle Speed Sensor (VSS) is located in the rear of transmission, near the output shaft.

FMI 14

Special Instructions

Conditions for fault code:

- Timeout on ACC1 message with adaptive cruise installed
- No information from the ACC (VORAD)

Possible causes:

- Faulty or no information from the ACC (VORAD)
- Faulty wiring harness
- Faulty VORAD ECU

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PID 91 — PERCENT ACCELERATOR PEDAL POSITION

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit), 14 (Special Instructions)

Parameter Identification (PID): P91

Message Identification (MID): 144

Circuit Description: The Accelerator Pedal Position (APP) Sensor is a potentiometer that is mechanically linked to the accelerator pedal. When the accelerator pedal is depressed during normal operation, the Accelerator Pedal Position (APP) Sensor signal voltage to the Vehicle Electronic Control Unit (VECU) increases. The Vehicle Electronic Control Unit (VECU) monitors the Accelerator Pedal Position (APP) Sensor signal voltage and uses the signal to calculate engine fuel requirements.

Location: The Accelerator Pedal Position (APP) Sensor is part of the Accelerator Pedal Assembly.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Voltage above 4.3 volts

Possible causes:

- APP harness shorted high
- Faulty APP sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Voltage below 0.4 volts

Possible causes:

- APP harness shorted low
- Faulty APP sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Abnormally low current
- Input is not correct compared to IVS 1 & IVS 2

Possible causes:

- Faulty APP sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel increase

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

- Abnormally high current
- Input is not correct compared to IVS 1 & IVS 2

Possible causes:

- Faulty APP sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel increase

FMI 14

Special Instructions

Conditions for fault code:

- Supply error from PPID 72
- Supply error

Possible causes:

- Faulty APP sensor harness

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel increase

MID 144 PID 152 — VECU, NUMBER OF RESETS

Failure Mode Identifier (FMI): 12 (Bad Intelligent Device or Component)

Parameter Identification (PID): P152

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Faulty unit or component
- Internal software fault causing a reset
- Internal switch error

Possible causes:

- VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- System restarted

MID 144 PID 191 — OUTPUT SHAFT SPEED

Failure Mode Identifier (FMI): 5 (Current Below Normal or Open Circuit), 6 (Current Above Normal or Grounded Circuit)

Parameter Identification (PID): P191

Message Identification (MID): 144

Circuit Description: The vehicle speed sensor circuit is open or shorted to ground.

Location: The Output Shaft Speed (OSS) sensor is located at the rear of the transmission.

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Abnormally low current

Possible causes:

- Faulty harness
- Faulty Output Shaft Speed (OSS) sensor
- Faulty Vehicle Speed Sensor (VSS)

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- NA

FMI 6

Current Above Normal or Grounded Circuit

Conditions for fault code:

Possible causes:

- Faulty harness
- Faulty Output Shaft Speed (OSS) sensor
- Faulty Vehicle Speed Sensor (VSS)

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- NA

MID 144 PPID 3 — STARTER OUTPUT

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P3

Message Identification (MID): 144

Circuit Description: There is abnormally high voltage or a short circuit to a higher voltage. There may also be a abnormally low voltage or short circuit to ground.

Location: The starter motor is located on the side of the engine.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage
- Short circuit to a higher voltage
- Excessively high current through the drive state

Possible causes:

- Faulty harness or cables
- Starter circuit relay

Reaction from Vehicle Electronic Control Unit (VECU):

- Red lamp is illuminated
- Speaker signal sounds

Noticeable external symptoms:

- Starter motor does not activate when requested

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Short circuit to ground
- Output not activated, key not in starter motor position

Possible causes:

- Faulty harness or cables
- Starter circuit relay

Reaction from Vehicle Electronic Control Unit (VECU):

- Red lamp is illuminated
- Speaker signal sounds

Noticeable external symptoms:

- Starter motor does not activate when requested

MID 144 PPID 60 — IDLE VALIDATION SWITCH SUPPLY

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PID): P60

Message Identification (MID): 144

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied to the Idle Validation Switch (IVS) signal. At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Idle Validation Switch is integral to the Accelerator Pedal Position (APP) Sensor. The Accelerator Pedal Position (APP) Sensor is part of the accelerator pedal assembly.

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage
- Short circuit to ground

Possible causes:

- Faulty harness
- Vehicle Electronic Control Unit (VECU)

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PPID 61 — ENGINE RETARDER SWITCH

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (PPID): P61

Message Identification (MID): 144

Circuit Description: The engine retarder switch sends a battery voltage signal to the Vehicle Electronic Control Unit (VECU) depending on the position of the switch. The VECU activates the engine brake system to assist in slowing the vehicle.

Location: The engine brake selector switch is located on the dashboard of the vehicle.

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- SET+ and SET- signal received at the same time

Possible causes:

- Engine retarder switch harness
- Engine retarder switch

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine retarder brake will not activate

MID 144 PPID 69 — BUFFERED IDLE VALIDATION SWITCH

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P69

Message Identification (MID): 144

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied. At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Idle Validation Switch is integral to the Accelerator Pedal Position (APP) Sensor. The Accelerator Pedal Position (APP) Sensor is part of the accelerator pedal assembly.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short to higher voltage
- Buffered IVS1 too high compared to IVS1 signal

Possible causes:

- Signal shorted high
- Faulty harness

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short to ground
- Buffered IVS1 too low compared to IVS1 signal

Possible causes:

- Signal shorted low
- Faulty harness

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PPID 70 — OUTPUT SUPPLY #3

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P70

Message Identification (MID): 144

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied to the Idle Validation Switch (IVS) signal input. At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Idle Validation Switch is integral to the Accelerator Pedal Position (APP) Sensor.

Normal Idle Validation Switch Parameters: The IVS should pass 12 volts through the switch when the throttle is off the idle position.

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage below 3 volts

Possible causes:

- Faulty connector
- Faulty harness
- Supply voltage shorted low

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PPID 71 — OUTPUT SUPPLY #4

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P71

Message Identification (MID): 144

Circuit Description: The Vehicle Electronic Control Unit (VECU) monitors the switched voltage through the SET/RESUME, SPEED CONTROL and ENGINE BRAKE SELECTOR switch.

Location: The SET/RESUME switch, SPEED CONTROL switch and ENGINE BRAKE SELECTOR switch are located on the dash of the vehicle.

Normal Set/Resume Switch, Speed Control Switch and Engine Brake Selector Switch Parameters: The switches should pass battery voltage through the switch when the switch is closed.

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage below 3 volts

Possible causes:

- Faulty connector
- Faulty harness
- Supply voltage shorted low

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine won't supply the requested fuel increase
- Cruise control functions deactivated

MID 144 PPID 72 — OUTPUT SUPPLY #1

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P72

Message Identification (MID): 144

Circuit Description: The Accelerator Pedal Position (APP) Sensor is a potentiometer that is mechanically linked to the accelerator pedal. When the accelerator pedal is depressed during normal operation, the Accelerator Pedal Position (APP) Sensor signal voltage to the Vehicle Electronic Control Unit (VECU) increases. The Vehicle Electronic Control Unit (VECU) monitors the Accelerator Pedal Position (APP) Sensor signal voltage and uses the signal to calculate engine fuel requirements.

Location: The Accelerator Pedal Position (APP) Sensor is part of the Accelerator Pedal Assembly.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Voltage above 5.7 volts

Possible causes:

- Accelerator Pedal Position (APP) harness shorted high
- Accelerator Pedal Position (APP) sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine
- Engine brake retarder is disabled

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage below 4.7 volts

Possible causes:

- Accelerator Pedal Position (APP) harness shorted low
- Accelerator Pedal Position (APP) sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine
- Engine brake retarder is disabled

MID 144 PPID 73 — OUTPUT SUPPLY #2

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P73

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

Normal APP Sensor Parameters: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Voltage above 5.3 volts

Possible causes:

- Air applied pressure transducer shorted high
- Air applied pressure transducer sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine
- Display show minimum wet tank pressure

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage below 4.7 volts

Possible causes:

- Air applied pressure transducer shorted low
- Air applied pressure transducer sensor

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine
- Display show minimum wet tank pressure

MID 144 PPID 74 — VECU SUPPLY RELAY

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P74

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage low or equal to 0 volts

Possible causes:

- Relay shorted low
- Faulty relay
-

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PPID 265 — VEHICLE SPEED SENSOR SUPPLY

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): P265

Message Identification (MID): 144

Circuit Description: The Vehicle Speed Sensor (VSS) is an inductive sensor. When the vehicle is moving, the transmission output shaft speedometer gear teeth rotate past the VSS tip and a pulsed signal voltage is generated. The Vehicle Electronic Control Unit (VECU) monitors the frequency of the signal generated by the VSS, to calculate the road speed. The air gap between the sensor and the toothed gear influences the VSS signal output and should be checked if erratic or inaccurate speedometer readings are reported.

Location: The Vehicle Speed Sensor (VSS) is located in the rear of transmission, near the output shaft.

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage

Possible causes:

- VSS harness shorted high
- Faulty VSS

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage

Possible causes:

- VSS harness shorted low
- Faulty VSS

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 1 — RETARDER BRAKE CONTROL SET SWITCH

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (PSID): P1

Message Identification (MID): 144

Circuit Description: N/A

Location: The retarder brake control set switch is located on the dashboard.

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Signals SET + and SET- are received at the same time

Possible causes:

- Faulty harness
- Faulty connector
- Faulty retarder brake control set switch

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Retarder control deactivated

MID 144 PSID 2 — IDLE VALIDATION SWITCH #2

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (PSID): P2

Message Identification (MID): 144

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied to the Idle Validation Switch (IVS) signal. At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Idle Validation Switch is integral to the Accelerator Pedal Position (APP) Sensor. The Accelerator Pedal Position (APP) Sensor is part of the accelerator pedal assembly.

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Faulty reading from IVS #2

Possible causes:

- Faulty Idle Validation Switch (IVS)
- Faulty IVS connector
- Faulty IVS harness

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine

MID 144 PSID 4 — CRUISE BRAKE CONTROL LEVER

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P4

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Voltage above 4.8 volts

Possible causes:

- Faulty harness
- Faulty connector

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Retarder deactivated

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage below 0.2 volts

Possible causes:

- Faulty harness
- Faulty connector

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Retarder deactivated

MID 144 PSID 8 — NEUTRAL POSITION ERROR

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent, or Incorrect), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P8

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 2

Data Erratic, Intermittent, or Incorrect

Conditions for fault code:

- Intermittent faulty data
- Switch data does not match datalink data

Possible causes:

- Faulty harness
- Faulty neutral switch

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Neutral input shorted high or switch is stuck closed

Possible causes:

- Faulty harness
- Faulty neutral switch

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 9 — CLUTCH ERROR

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P9

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Clutch circuit shorted to battery

Possible causes:

- Faulty harness
- Faulty clutch switch

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Clutch circuit shorted to ground or open

Possible causes:

- Faulty harness
- Faulty clutch switch

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 14 — DATAMAX GENERAL ERROR

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P14

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Clock or other data missing

Possible causes:

- N/A

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 16 — POWER RELAY 1

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P16

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Power relay 1 shorted to battery

Possible causes:

- Faulty harness
- Faulty relay

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Power relay 1 shorted to ground

Possible causes:

- Faulty harness
- Faulty relay

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 17 — POWER RELAY 2

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P17

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Power relay 2 shorted to battery

Possible causes:

- Faulty harness
- Faulty relay

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Power relay 2 shorted to ground

Possible causes:

- Faulty harness
- Faulty relay

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 20 — PTO OUTPUT

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P20

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Voltage too high

Possible causes:

- Faulty harness
- Faulty valve

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Voltage is below 2.3 volts

Possible causes:

- Faulty harness
- Faulty valve

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 26 — DATAMAX TRIP LOG

Failure Mode Identifier (FMI): 14 (Special Instructions)

Parameter Identification (SID): P26

Message Identification (MID): 144

Circuit Description: The datamax trip log is an internal calculation of the control unit

Location: The VECU is located in the center of the dash

FMI 14

Special Instructions

Conditions for fault code:

- Special instructions

Possible causes:

- Datamax trip log overflowed

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 28 — DATAMAX GPS LOG

Failure Mode Identifier (FMI): 14 (Special Instructions)

Parameter Identification (SID): P28

Message Identification (MID): 144

Circuit Description: The datamax GPS log is an internal calculation of the control unit

Location: The VECU is located in the center of the dash

FMI 14

Special Instructions

Conditions for fault code:

- Special instructions

Possible causes:

- Datamax GPS log overflowed

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 34 — FIFTH WHEEL SLIDE SOLENOID

Failure Mode Identifier (FMI): 3 (Voltage Above Normal, or Shorted To High Source), 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PSID): P34

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 3

Voltage Above Normal, or Shorted To High Source

Conditions for fault code:

- Abnormally high voltage or short circuit to higher voltage
- Fifth wheel slide solenoid circuit shorted to battery

Possible causes:

- Faulty harness
- Faulty solenoid

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Fifth wheel slide solenoid circuit shorted to ground

Possible causes:

- Faulty harness
- Faulty solenoid

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

MID 144 PSID 200 — SAE J1939 DATA LINK, MID 128

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P200

Message Identification (MID): 144

Circuit Description: Communication interference, data link, engine control unit

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Expected EMS message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 Down/Shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 202 — SAE J1939 DATA LINK, MID 140

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P202

Message Identification (MID): 144

Circuit Description: Communication interference, data link, instrumentation

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Expected cluster message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 Down/Shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 204 — SAE J1939 DATA LINK, MID 136

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P204

Message Identification (MID): 144

Circuit Description: Communication interference, data link, brake control unit

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Expected ABS message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 Down/Shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 205 — SAE J1939 DATA LINK, MID 130

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P205

Message Identification (MID): 144

Circuit Description: Communication interference, data link, transmission control unit

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Expected TECU message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 Down/Shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 206 — SAE J1939 DATA LINK, MID 222

Failure Mode Identifier (FMI): 9 (Abnormal Update Rate)

Parameter Identification (PSID): P206

Message Identification (MID): 144

Circuit Description: Communication interference, data link, retarder control unit

Location: N/A

FMI 9

Abnormal Update Rate

Conditions for fault code:

- Incorrect update rate
- Expected EECU-Retarder message(s) not received

Possible causes:

- CAN 1 communication down
- J1939 Down/Shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 PSID 230 — SOFTWARE ERROR

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source), 5 (Current Below Normal or Open Circuit), 12 (Bad Intelligent Device or Component)

Parameter Identification (PSID): P230

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground
- Uncontrolled reset of SW

Possible causes:

- Faulty harness
- Supply voltage drop
- Faulty software
- Faulty VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

FMI 5

Current Below Normal or Open Circuit

Conditions for fault code:

- Software has been shutdown because of voltage too low

Possible causes:

- Faulty harness
- Voltage supply interrupted
- Faulty VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- N/A

Noticeable external symptoms:

- N/A

FMI 12

Bad Intelligent Device or Component

Conditions for fault code:

- Faulty component
- Severe error reset the software

Possible causes:

- Faulty software
- Faulty VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 SID 230 — IDLE VALIDATION SWITCH #1

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (SID): S230

Message Identification (MID): 144

Circuit Description: The Idle Validation Switch (IVS) updates the Vehicle Electronic Control Unit (VECU) with the idle status. At idle, the Idle Validation Switch (IVS) is open and no voltage is applied to the Idle Validation Switch (IVS). At approximately 5% - 100% pedal position the Idle Validation Switch (IVS) closes.

Location: The Idle Validation Switch is integral to the Accelerator Pedal Position (APP) Sensor. The Accelerator Pedal Position (APP) Sensor is part of the accelerator pedal assembly.

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- Faulty readout from IVS #1

Possible causes:

- Idle Validation Switch (IVS)
- IVS connector
- IVS harness

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Engine will not supply requested fuel to engine

MID 144 SID 231 — J1939 DATA LINK

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent, or Incorrect)

Parameter Identification (SID): S231

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 2

Data Erratic, Intermittent, or Incorrect

Conditions for fault code:

- VECU does not get acknowledge on sent messages

Possible causes:

- CAN communication
- J1939 is down or shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 SID 240 — PROGRAM MEMORY

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent, or Incorrect)

Parameter Identification (SID): S240

Message Identification (MID): 144

Circuit Description: The Vehicle Electronic Control Unit (VECU) has internal faulty information. The Engine Control Unit (ECU) keeps resetting and the vehicle is not drivable.

Location: The VECU is located in the center of the dash.

FMI 2

Data Erratic, Intermittent, or Incorrect

Conditions for fault code:

- Intermittent faulty data
- Checksum calculated at start-up differs from the stored one

Possible causes:

- Software error
- Faulty flash hardware
- Vehicle Electronic Control Unit (VECU)

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Vehicle is not drivable

MID 144 SID 243 — CRUISE CONTROL SET SWITCH

Failure Mode Identifier (FMI): 7 (Mechanical System Not Responding or Out Of Adjustment)

Parameter Identification (PPID): S243

Message Identification (MID): 144

Circuit Description: N/A

Location: The cruise control set switch is located on the dashboard of the vehicle.

FMI 7

Mechanical System Not Responding or Out Of Adjustment

Conditions for fault code:

- SET+ and SET- signal received at the same time

Possible causes:

- Faulty harness
- Faulty connector
- Cruise control set switch

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Cruise control will not activate

MID 144 SID 246 — BRAKE PEDAL SWITCH

Failure Mode Identifier (FMI): 4 (Voltage Below Normal, or Shorted To Low Source)

Parameter Identification (PPID): S246

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 4

Voltage Below Normal, or Shorted To Low Source

Conditions for fault code:

- Abnormally low voltage or short circuit to ground

Possible causes:

- Faulty harness
- Faulty brake pedal switch
-

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 SID 250 — J1708/J1587 DATA LINK

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent, or Incorrect)

Parameter Identification (SID): S250

Message Identification (MID): 144

Circuit Description: N/A

Location: N/A

FMI 2

Data Erratic, Intermittent, or Incorrect

Conditions for fault code:

- Faulty messages on the link received
- Some disturbances may occur

Possible causes:

- Some ECU's do not follow the priority rules on sending information.
- J1708 is down or shorted
- J1587 is down or shorted

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- N/A

MID 144 SID 253 — CALIBRATION MEMORY EEPROM

Failure Mode Identifier (FMI): 2 (Data Erratic, Intermittent, or Incorrect), 14 (Special Instructions)

Parameter Identification (SID): S253

Message Identification (MID): 144

Circuit Description: Dataset information in the Vehicle Electronic Control Unit (VECU) does not have correct checksum

Location: The VECU is located in the center of the dash

FMI 2

Data Erratic, Intermittent, or Incorrect

Conditions for fault code:

- Intermittent faulty data
- Datasets have incorrect checksum

Possible causes:

- Error when programming
- Faulty EEPROM
- VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Dataset default values used
- Some functions may be deactivated

FMI 14

Special Instructions

Conditions for fault code:

- Special instructions
- Incorrect data found in datasets

Possible causes:

- Error when programming
- Faulty EEPROM
- VECU

Reaction from Vehicle Electronic Control Unit (VECU):

- Yellow lamp is illuminated

Noticeable external symptoms:

- Dataset default values used
- Some functions may be deactivated

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