

# Service Manual Trucks

Group **28**

Engine Control Module (ECM), Diagnostic Trouble Code  
(DTC), Guide  
2010 Emissions  
MRU, LEU



PV776-88969578

# Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to April 2010.

The products are under continuous development. Vehicles and components produced after the above date may therefore have different specifications and repair methods. When this is believed to have a significant bearing on this manual, supplementary service bulletins will be issued to cover the changes.

The new edition of this manual will update the changes.

In service procedures where the title incorporates an operation number, this is a reference to a Labor Code (Standard Time).

Service procedures which do not include an operation number in the title are for general information and no reference is made to a Labor Code (Standard Time).

Each section of this manual contains specific safety information and warnings which must be reviewed before performing any procedure. If a printed copy of a procedure is made, be sure to also make a printed copy of the safety information and warnings that relate to that procedure. The following levels of observations, cautions and warnings are used in this Service Documentation:

**Note:** Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

**Caution:** Indicates an unsafe practice where damage to the product could occur.

**Warning:** Indicates an unsafe practice where personal injury or severe damage to the product could occur.

**Danger:** Indicates an unsafe practice where serious personal injury or death could occur.

**Mack Trucks, Inc.**

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# Troubleshooting

## Engine Control Module (ECM) Diagnostic Trouble Codes (DTCs)

The manufacturer scan tool is the preferred tool for performing diagnostic work. Contact your local dealer for more information or visit "www.premiumtechttool.com".

**Note:** The use of a scan tool is necessary to perform diagnostic work as well as clearing of any diagnostic trouble codes (DTCs). DTC(s) can no longer be cleared using the vehicles instrument cluster digital display and stalk switch control.

### System Overview

Six electronic control units (ECUs) are used; the engine control module (ECM), instrument control module (ICM), Vehicle Electronic Control Unit (VECU), transmission control module (TCM), the gear selector control module (GSCM) and the aftertreatment control module (ACM). Together, these modules operate and communicate through the SAE J1939 data links to control a variety of engine and vehicle cab functions. The ECM controls such things as fuel timing and delivery, fan operation, engine protection functions, engine brake operation, the exhaust gas recirculation (EGR) valve and the turbocharger nozzle. The VECU controls cruise control functions, accessory relay controls and idle shutdown functions. The ICM primarily displays operational parameters and communicates these to the other ECUs. All have the capability to communicate over the SAE J1587 data link primarily for programming, diagnostics and data reporting.

In addition to their control functions, the modules have on board diagnostic (OBD) capabilities. The OBD is 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, the vehicle operator will be advised that a fault has occurred by illumination a malfunction indicator lamp (MIL) and a message in the driver information display, if equipped. The module may initiate the engine shutdown procedure if the system determines that the fault could damage the engine.

In some situations when a fault is detected, the system will enter a "derate" mode. The derate mode allows continued vehicle operation but the system may substitute a sensor or signal value that may result in reduced performance. In some instances, the system will continue to function but engine power may be limited to protect the engine and vehicle. Diagnostic trouble codes (DTCs) logged in the system memory can later be read, to aid in diagnosing the problem using a diagnostic computer or through the instrument cluster display, if equipped. When diagnosing an intermittent DTC or condition, it may be necessary to use a scan tool connected to the Serial Communication Port.

The use of a scan tool is necessary to perform diagnostic work as well as clearing of any diagnostic trouble codes (DTCs). DTC(s) can no longer be cleared using the vehicles instrument cluster digital display and stalk switch control. Additional data and diagnostic tests are available when a scan tool is connected to the Serial Communication Port.

For diagnostic software, contact your local dealer.

The ECM is a microprocessor based controller programmed to perform fuel injection quantity and timing control, diagnostic fault logging, and to broadcast data to other ECUs. 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 ECM controls the operation of the injectors, engine brake solenoid, EGR valve, turbocharger nozzle position, and cooling fan clutch based on inputs from many sensors and information received over the data links from other ECUs.

The VECU and ECM 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 that each module has developed, based on the input information it has received.

## System Electronic Control Unit (ECU) Overview

The engine control module (ECM) monitors and models (using physical principles) engine parameters to monitor the engine system's performance in real time. This is performed to aid the ECM with its self diagnostic capabilities. Many sensors are used for input to the emission control system.

The system contains the following "emission critical" ECUs that are monitored;

- Engine Control Module (ECM)
- Vehicle Electronic Control Unit (VECU)
- Aftertreatment Control Module (ACM)
- Aftertreatment Nitrogen Oxides (NOx) Sensors
- Engine Variable Geometry Turbocharger (VGT) Smart Remote Actuator (SRA)

These ECUs all communicate with the ECM via data links. The VECU communicates across the SAE J1939 (CAN1) data link while the others use the SAE J1939-7 (CAN2) data link. The OBD systems use SAE J1939 data link protocol for communication with scan tools but, MACK trucks still are capable of communicating via the SAE J1587 data link for diagnostics. The use of a scan tool is necessary to perform diagnostic work as well as clearing of any diagnostic trouble codes (DTCs). DTC(s) can no longer be cleared using the vehicles instrument cluster digital display and stalk switch control.

There are other ECUs such as the Instrument Control Module (ICM), Transmission Control Module (TCM) and Anti-lock Brake System (ABS) Module that provide data to the emission control system or the diagnostic system but are not "emission critical".

## Malfunction Indicator Lamp (MIL), Description and Location

A MIL located in the instrument cluster. This amber colored lamp is used to inform the driver that a "emission critical" malfunction signal has occurred.



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## SAE J1939 Data Link Communication

The electronic control units (ECUs) that communicate on the SAE J1939 data link, communicate according to the SAE J1587 standard. The diagnostic trouble codes (DTCs) set by the ECUs contain information that is described by the following abbreviations.

SA	Source Address: Identification of a control module.
SPN	Suspect Parameter Number: Identification of a parameter (value).
FMI	Failure Mode Identifier: Identification of fault types.

**SAE J1939 FMI Table**

<b>FMI</b>	<b>SAE Text</b>
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
6	Current above normal or grounded circuit
7	Mechanical system not responding or out of adjustment
8	Abnormal frequency or pulse width or period
9	Abnormal update rate
10	Abnormal rate of change
11	Root cause not known
12	Bad intelligent device or component
13	Out of calibration
14	Special instructions
15	Data valid but above normal operating range - Least severe level
16	Data valid but above normal operating range - Moderately severe level
17	Data valid but below normal operating range - Least severe level
18	Data valid but below normal operating range - Moderately severe level
19	Received network data in error
20	Reserved for SAE assignment
21	Reserved for SAE assignment
22	Reserved for SAE assignment
23	Reserved for SAE assignment
24	Reserved for SAE assignment
25	Reserved for SAE assignment
26	Reserved for SAE assignment
27	Reserved for SAE assignment
28	Reserved for SAE assignment
29	Reserved for SAE assignment
30	Reserved for SAE assignment
31	Condition exists

## SAE J1587 Data Link Communication

The electronic control units (ECUs) also communicate on the SAE J1587 data link. These ECUs communicate according to the SAE J1587 standard. The standard has been extended with MACK's supplement (PPID, PSID). The diagnostic trouble codes (DTCs) set by the ECUs contain information that is described by the following abbreviations.

MID Message Identification Description:  
Identification of a control module.

PID Parameter Identification Description:  
Identification of a parameter (value).

PPID

Proprietary Parameter Identification  
Description Mack:  
Unique identification of a parameter (value).

SID

Subsystem Identification Description:  
Identification of a component.

PSID

Proprietary Subsystem Identification  
Description Mack:  
Unique identification of a component.

FMI

Failure Mode Identifier:  
Identification of fault types.

### SAE J1587 FMI Table

FMI	SAE Text
0	Data valid, but above the normal working range
1	Data valid, but below the normal working range
2	Intermittent or incorrect data
3	Abnormally high voltage or short circuit to higher voltage
4	Abnormally low voltage or short circuit to lower voltage
5	Abnormally low current or open circuit
6	Abnormally high current or short circuit to ground
7	Incorrect response from a mechanical system
8	Abnormal frequency
9	Abnormal update rate
10	Abnormally strong vibrations
11	Non-identifiable fault
12	Faulty module or component
13	Calibration values outside limits
14	Special instructions
15	Reserved for future use



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## ECM SPN 84, Wheel-Based Vehicle Speed – MID 128 PID 84

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from VECU</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1587 data link vehicle speed message does not exist, (VECU error)</li> <li>VECU</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed deemed inaccurate by VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed sensor (VSS)</li> <li>VECU</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>No vehicle speed available to VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed sensor (VSS)</li> <li>VECU</li> </ul>
FMI 19	<ul style="list-style-type: none"> <li>Received network data in error</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed deemed inaccurate by VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed sensor (VSS)</li> <li>VECU</li> </ul>

## ECM SPN 91, Accelerator Pedal Position 1 – MID 128 PID 91

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from VECU</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1587 data link pedal information not available</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Pedal not connected to VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Accelerator pedal sensor fault</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Pedal position deemed inaccurate by VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Accelerator pedal sensor fault</li> </ul>
FMI 19	<ul style="list-style-type: none"> <li>Received network data in error</li> </ul>	<ul style="list-style-type: none"> <li>Pedal position deemed inaccurate by VECU</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Accelerator pedal sensor fault</li> </ul>

## ECM SPN 94, Engine Fuel Delivery Pressure – MID 128 PID 94

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Low fuel pressure sensor signal line voltage</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Damaged contacts in harness</li> <li>Faulty fuel pressure sensor</li> <li>Open circuit.</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Low fuel pressure sensor signal line voltage</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Damaged contacts in harness</li> <li>Faulty fuel pressure sensor</li> </ul>



FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Drop in fuel pressure</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Clogged fuel filter</li> <li>Faulty fuel pressure sensor</li> <li>Leaking fuel line or fitting</li> <li>Poor fuel pump response</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Wiring harness</li> <li>Faulty fuel pressure sensor</li> <li>Clogged fuel filter</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Wiring harness</li> <li>Faulty fuel pressure sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Wiring harness</li> <li>Faulty fuel pressure sensor</li> <li>Clogged fuel filter</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Drop in fuel pressure</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Clogged fuel filter</li> <li>Faulty fuel pressure sensor</li> <li>Leaking fuel line or fitting</li> <li>Poor fuel pump response</li> </ul>

## ECM SPN 97, Water in Fuel Indicator – MID 128 PID 97

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Water in fuel is indicated</li> </ul>	<ul style="list-style-type: none"> <li>Uneven running</li> <li>Engine stalling</li> </ul>	<ul style="list-style-type: none"> <li>Water in fuel</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Undetected water in fuel supply</li> <li>Uneven running</li> <li>Engine stalling</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Undetected water in fuel supply</li> <li>Uneven running</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground</li> <li>Open circuit</li> <li>Faulty sensor</li> </ul>

## ECM SPN 98, Engine Oil Level – MID 128 PID 98

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Critically below range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown or yellow electronic malfunction lamps illuminated dependent of severity</li> </ul>	<ul style="list-style-type: none"> <li>Low oil level leakage</li> <li>Critically low oil level</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit - Positive side</li> </ul>	<ul style="list-style-type: none"> <li>Oil level can not be measured</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Level (EOL) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +, Positive side</li> <li>Open Circuit +, Positive side</li> <li>Open Circuit- Negative side</li> </ul>	<ul style="list-style-type: none"> <li>Oil level can not be measured</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Level (EOL) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Moderately below range</li> <li>Critically below range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown or Yellow electronic malfunction lamps illuminated dependent of severity</li> </ul>	<ul style="list-style-type: none"> <li>Low oil level leakage</li> <li>Moderately low oil level</li> </ul>

## ECM SPN 100, Engine Oil Pressure – MID 128 PID 100

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Critically below range</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Low pressure</li> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Oil leakage</li> <li>Broken oil pump</li> <li>Clogged oil system</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage below normal or shorted low</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +, Measuring line</li> <li>Open Circuit, Ground line</li> </ul>	<ul style="list-style-type: none"> <li>Oil pressure shows 0 in the cluster, engine is running</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Pressure (EOP) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit +, 5V Supply line</li> <li>Short Circuit -, Measuring line</li> <li>Open Circuit, Measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Oil pressure shows 0 in the cluster, engine is running</li> <li>Yellow electronic malfunction lamps illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Pressure (EOP) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Oil pressure shows 0 in the cluster, engine is running</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Pressure (EOP) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Oil pressure shows 0 in the cluster, engine is running</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Pressure (EOP) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Oil pressure shows 0 in the cluster, engine is running</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Pressure (EOP) sensor failure</li> <li>Faulty harness</li> </ul>

## ECM SPN 102, Engine Intake Manifold 1 Pressure – MID 128 PID 102

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Intake Manifold Pressure Sensor output is too high or too low</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Intake Manifold Pressure sensor</li> </ul>

FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>A short to battery in the metering circuit</li> <li>An open in the ground circuit of the Intake Manifold Pressure Sensor</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Harness connectors</li> <li>Intake Manifold Pressure sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>A short to ground in the harness</li> <li>An open in the 5 volt supply circuit</li> <li>An open in the metering circuit</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Harness connectors</li> <li>Intake Manifold Pressure sensor</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Intake Manifold Pressure sensor output is too high</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Intake Manifold Pressure sensor</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Harness connectors</li> <li>Intake Manifold Pressure sensor</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Intake Manifold Pressure sensor output is too low</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Intake Manifold Pressure sensor</li> <li>Inlet air leakage</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Intake Manifold Pressure sensor output is too high</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Harness connectors</li> <li>Intake Manifold Pressure sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Harness connectors</li> <li>Intake Manifold Pressure sensor</li> </ul>

## ECM SPN 103, Engine Turbocharger 1 Speed – MID 128 PID 103

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Turbocharger speed is at least 25% greater than the target wheel speed for the measured boost</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Miss detection</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Turbocharger Speed Sensor</li> </ul>

FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Turbocharger speed is at least 25% less than the target wheel speed for the measured boost</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Miss detection</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Turbocharger Speed Sensor</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>A fault is logged if the Turbocharger Speed Sensor signal is lost</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Turbocharger Speed Sensor</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Turbocharger speed is at least 25% greater than the target wheel speed for the measured boost</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Miss detection</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Turbocharger Speed Sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Turbocharger speed is at least 25% less than the target wheel speed for the measured boost</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Miss detection</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Turbocharger Speed Sensor</li> </ul>

## ECM SPN 105, Engine Intake Manifold 1 Temperature – MID 128 PID 105

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Poor cooling</li> <li>Extreme running conditions</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>The Intake Manifold Temperature sensor output is too high or too low</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Poor cooling</li> <li>Extreme running conditions</li> <li>Engine Intake Manifold sensor</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Ambient Air Temperature sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to start in cold climates</li> <li>Minor cold engine smoke</li> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Intake Manifold sensor</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Possible short to sensor</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to start in cold climates</li> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Intake Manifold sensor</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>

FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>The sensor output is showing a constant value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Minor cold engine smoke</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Intake Manifold sensor</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>The sensor output is showing a constant value</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Minor cold engine smoke</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Intake Manifold sensor</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>

## ECM SPN 108, Barometric Pressure – MID 128 PID 108

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Barometric Pressure sensor output is too high or too low</li> </ul>	<ul style="list-style-type: none"> <li>Minor engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> <li>Faulty Engine Control Module</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Internal fault in the Engine Control Module</li> <li>Faulty Sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>A short to ground on the metering side</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Internal fault in the Engine Control Module</li> <li>Faulty Sensor</li> </ul>

## ECM SPN 110, Engine Coolant Temperature – MID 128 PID 110

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Coolant temperature indicates critical limit</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving condition</li> <li>Faulty coolant thermostat</li> <li>Malfunctioning fan</li> <li>Blocked radiator</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Engine Coolant Temperature sensor output is too high or too low</li> </ul>	<ul style="list-style-type: none"> <li>May affect driveability in extreme cases</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> <li>Faulty harness</li> <li>Faulty coolant thermostat</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal or shorted low</li> </ul>	<ul style="list-style-type: none"> <li>Engine Coolant Temperature sensor voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to start in cold climates</li> <li>Idle run regulation is deteriorated</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to start in cold climates</li> <li>Idle run regulation is deteriorated</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> <li>Faulty harness</li> </ul>

FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Engine Coolant Temperature sensor output is showing a constant value</li> </ul>	<ul style="list-style-type: none"> <li>May affect vehicle driveability</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> <li>Faulty harness</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Coolant temperature indicates moderate upper limit</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving condition</li> <li>Faulty coolant thermostat</li> <li>Malfunctioning fan</li> <li>Blocked radiator</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> </ul>

## ECM SPN 111, Engine Coolant Level – MID 128 PID 111

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Critically below range</li> <li>Coolant level can not be detected</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Red engine shutdown lamp illuminated</li> <li>Coolant level can not be detected</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level below range</li> <li>Faulty harness</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +, measuring line</li> <li>Coolant level can not be detected</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level can not be detected</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty level sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit -, measuring line</li> <li>Coolant level can not be detected</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level can not be detected</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty level sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit</li> <li>Coolant level can not be detected</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level can not be detected</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty level sensor</li> </ul>

FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level can not be detected</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty level sensor</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>Coolant level can not be detected</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty level sensor</li> </ul>

## ECM SPN 153, Engine High Resolution Crankcase Pressure – MID 128 PID 153/PSID 23

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Out of range, max voltage, illegal</li> <li>Critically Above Range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Forced idle</li> <li>Engine shut down</li> </ul>	<ul style="list-style-type: none"> <li>Piston ring blow-by</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Crankcase pressure indication to high or to low a value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Crank Case Pressure sensor</li> <li>Faulty harness</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +, Measuring line</li> <li>Open Circuit, Ground line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Crank Case Pressure sensor</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit +, 5V Supply Line</li> <li>Short Circuit -, measuring line</li> <li>Open Circuit, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Crank Case Pressure sensor</li> <li>Faulty harness</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Leakage detected in the crankcase ventilation system</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty separator, hoses or pipes</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> </ul>



FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Sensor</li> </ul>

## ECM SPN 158, Keyswitch Battery Potential – MID 128 PID 158/PSID 124

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>External charger</li> <li>Engine control module (ECM)</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>Starter will not crank</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>Battery</li> <li>Ground connection</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>External charger</li> <li>Engine control module (ECM)</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>Starter will not crank</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>Battery</li> <li>Ground connection</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>External charger</li> <li>Engine control module (ECM)</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module battery voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>Starter will not crank</li> </ul>	<ul style="list-style-type: none"> <li>Charging system fault</li> <li>Battery</li> <li>Ground connection</li> </ul>

## ECM SPN 171, Ambient Air Temperature – MID 128 PID 171

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Key ON, Ambient Air Temperature message missing on SAE J1939 and SAE J1587 data links</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster</li> <li>Faulty harness</li> </ul>

FMI 9	<ul style="list-style-type: none"> <li>Abnormal Update Rate</li> </ul>	<ul style="list-style-type: none"> <li>Key ON, Ambient Air Temperature message missing on SAE J1587 data link</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster</li> <li>Faulty harness</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Ambient Temperature sensor signal fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Loss of SAE J1939 data link communication between Engine Control Module and Instrument Cluster Control Module</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster</li> <li>Faulty harness</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Ambient Temperature sensor signal fault</li> <li>No ambient temperature calculated by Vehicle ECU</li> <li>No valid ambient temperature received by Engine Control Module</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster/harness or cluster harness connectors</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Ambient Temperature sensor signal fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Ambient Temperature sensor signal missing from Vehicle ECU</li> </ul>
FMI 19	<ul style="list-style-type: none"> <li>Received network data in error</li> </ul>	<ul style="list-style-type: none"> <li>Ambient Temperature sensor signal fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty instrument cluster</li> </ul>

## ECM SPN 173, Engine Exhaust Gas Temperature (EGT) – MID 128 PID 173

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust Gas Temperature is critically high</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Poor driveability</li> <li>Regeneration is not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Intake air leak</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Sensor is not rational</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration is not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Exhaust leak</li> <li>Intake air leak</li> <li>Sensor failure</li> </ul>

FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground on the metering side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration is not possible</li> </ul>	<ul style="list-style-type: none"> <li>Sensor failure</li> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Aftertreatment control module (ACM)</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side of the circuit</li> <li>Open in the metering side of the circuit</li> <li>Open in the ground side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Sensor failure</li> <li>Faulty harness connector</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Sensor failure</li> <li>Faulty harness</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust Gas Temperature is moderately too high</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Poor driveability</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Intake air leak</li> </ul>

## ECM SPN 175, Engine Oil Temperature 1 – MID 128 PID 175

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>Engine oil temperature critically above range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>Engine cooling fan</li> <li>Oil thermostat</li> <li>Coolant system</li> <li>Clogged oil cooler</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Engine oil temperature sensor indicating too high or too low a value (abnormal value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>In some cases may have an effect on driveability</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Temperature (EOT) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit -, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Temperature (EOT) sensor failure</li> <li>Faulty harness</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit +, measuring line</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Temperature (EOT) sensor failure</li> <li>Faulty harness</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Temperature (EOT) sensor failure</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>Engine oil temperature is moderately too high</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>Engine cooling fan</li> <li>Oil thermostat</li> <li>Coolant system</li> <li>Clogged oil cooler</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine Oil Temperature (EOT) sensor failure</li> </ul>

## ECM SPN 177, Transmission Oil Temperature – MID 128 PID 177

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Oil temperature critically above range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Transmission oil cooler</li> <li>Coolant system</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Oil temperature is moderately too high</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>Engine cooling fan</li> <li>Oil thermostat</li> <li>Coolant system</li> <li>Clogged oil cooler</li> </ul>

## ECM SPN 188, Engine Speed At Idle, Point 1 (Engine Configurations) – MID 128 PID 188

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine idle speed above desired speed</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>High engine oil consumption</li> <li>High fuel consumption</li> </ul>	<ul style="list-style-type: none"> <li>Engine oil entering cylinders</li> <li>Leaking or faulty fuel injector</li> </ul>

FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine idle speed below desired speed</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>High fuel consumption</li> </ul>	<ul style="list-style-type: none"> <li>Low engine torque production</li> <li>Faulty fuel injector</li> <li>Low cylinder compression</li> <li>Engine friction is too high</li> </ul>
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### ECM SPN 190, Engine Speed – MID 128 PID 190

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine is/was overspeeding</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine oil entering cylinders</li> <li>Faulty crankcase oil filter</li> <li>Possible engine brake engaged causing engine overspeeding</li> <li>Possible transmission downshift causing engine overspeeding</li> </ul>

### ECM SPN 228, Speed Sensor Calibration – MID 128 PID 228

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1587 data link calibration factor message does not exist. (VECU error).</li> </ul>	<ul style="list-style-type: none"> <li>Wrong trip data</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle ECU</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Failure mode not identifiable</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1587 data link calibration factor message does not exist. (VECU error).</li> </ul>	<ul style="list-style-type: none"> <li>Wrong trip data</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle ECU</li> </ul>

### ECM SPN 237, Vehicle Identification Number – MID 128 PSID 161/162

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>No answer from VIN</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Data link error</li> <li>ECM</li> <li>Missing VIN in other ECM's (commonly VECU, LCM)</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Bad answer from VIN</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>ECM</li> <li>Mismatched VIN sent from other ECM's (commonly VECU, LCM)</li> </ul>

## ECM SPN 245, Total Vehicle Distance – MID 128 PID 245

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1587 data link total vehicle distance message does not exist. (VECU error).</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle ECU</li> </ul>

## ECM SPN 251, Time – MID 128 PID 251

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Time data message missing on SAE J1587 and J1939 data links. (Cluster error).</li> <li>Time stamp from cluster isn't available.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Time data message didn't arrive when expected. (Cluster error).</li> <li>Time stamp from cluster isn't available.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Soak time too long.</li> <li>Time data fault, data deemed inaccurate.</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine makes warm start but cold start needed.</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Time and date data missing on J1939 data link.</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Time/date fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 19	<ul style="list-style-type: none"> <li>Received network data in error</li> </ul>	<ul style="list-style-type: none"> <li>Soaktime too long.</li> <li>Time data fault, data deemed inaccurate.</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> </ul>

## ECM SPN 252, Date – MID 128 PID 252

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Time stamp from cluster isn't available.</li> <li>Date data message missing on SAE J1587 data link. (Cluster error).</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Instrument Cluster</li> </ul>

## ECM SPN 411, Engine Exhaust Gas Recirculation Differential Pressure – MID 128 PID 411

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust Gas Recirculation (EGR) differential pressure sensor output reading too high. (abnormal value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty sensor</li> <li>EGR leakage</li> <li>Clogged EGR cooler</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust Gas Recirculation (EGR) differential pressure sensor output reading too low. (abnormal value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty sensor</li> <li>Clogged venturi</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Only used to control EGR valve.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery in metering line</li> <li>Open in the ground circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR differential pressure sensor connector</li> <li>Faulty EGR differential pressure sensor harness</li> <li>Faulty EGR differential pressure sensor</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open in the 5 volt supply line</li> <li>• Short to ground in metering line</li> <li>• Open in the metering line</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty EGR differential pressure sensor connector</li> <li>• Faulty EGR differential pressure sensor harness</li> <li>• Faulty EGR differential pressure sensor</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>• Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>• EGR differential pressure sensor is read either to high or too low. (Abnormal value).</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty EGR differential pressure sensor connector</li> <li>• Faulty EGR differential pressure sensor harness</li> <li>• Faulty EGR differential pressure sensor</li> <li>• EGR valve</li> <li>• EGR valve leak</li> <li>• Clogged venturi</li> </ul>

## ECM SPN 412, Engine Exhaust Gas Recirculation Temperature – MID 128 PID 412

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>• Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>• Engine Exhaust Gas Recirculation Temperature is above range</li> </ul>	<ul style="list-style-type: none"> <li>• Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>• Extreme driving conditions</li> <li>• EGR cooler failure</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>• Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>• EGR temperate signal, believed to be not valid (plausibility fault)</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>• Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>• Short to ground on the metering side of the EGR Sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Engine power will be derated according to the error torque map</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty EGR Temperature Sensor connector</li> <li>• Faulty EGR Temperature Sensor harness</li> <li>• Faulty EGR Temperature Sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Short to battery in the metering side of the EGR Sensor circuit</li> <li>• Open in the metering side of the EGR Sensor circuit</li> <li>• Open circuit in the ground line of the EGR Sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty EGR Temperature Sensor connector</li> <li>• Faulty EGR Temperature Sensor harness</li> <li>• Faulty EGR Temperature Sensor</li> </ul>



FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Engine Exhaust Gas Recirculation Temperature sensor is out of range (low)</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR Temperature Sensor connector</li> <li>Faulty EGR Temperature Sensor harness</li> <li>Faulty EGR Temperature Sensor</li> </ul>
FMI 13 )	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Engine Exhaust Gas Recirculation Temperature sensor is above range</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>EGR cooler failure</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Exhaust Gas Recirculation Temperature sensor is out of range (high)</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR Temperature Sensor connector</li> <li>Faulty EGR Temperature Sensor harness</li> <li>Faulty EGR Temperature Sensor</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Exhaust Gas Recirculation Temperature is above range</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Extreme driving conditions</li> <li>EGR cooler failure</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Exhaust Gas Recirculation Temperature is out of range (low)</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR Temperature Sensor connector</li> <li>Faulty EGR Temperature Sensor harness</li> <li>Faulty EGR Temperature Sensor</li> </ul>

## ECM SPN 558, Accelerator Pedal 1 Idle Validation Switch – MID 128 SID 230

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Idle Validation Switch (IVS) signal shorted to voltage</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Idle Validation Switch (IVS) signal shorted to ground or open</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>

## ECM SPN 626, Intake Air Heater (IAH) Relay – MID 128 PID 45

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +, Measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Preheat relay not activated</li> <li>White smoke for cold start</li> <li>Start problems in cold climate</li> </ul>	<ul style="list-style-type: none"> <li>Preheat relay solenoid shorted</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit -, Measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated (13L engine CXU, CHU and GU only)</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Induction air is hot</li> <li>Preheat relay is impossible to turn off</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit</li> </ul>	<ul style="list-style-type: none"> <li>Preheat relay not activated</li> <li>White smoke for cold start</li> <li>Start problems in cold climate</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Preheat relay</li> <li>Faulty harness</li> </ul>

## ECM SPN 628, Program Memory – MID 128 SID 240

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Check sum error</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM) software</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>Bad software configuration</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM) software</li> </ul>

FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Error on code-part of flash RAM or erased vendor area</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Nothing functions</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM) software</li> <li>Engine Control Module (ECM)</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>VIN not loaded yet</li> </ul>	<ul style="list-style-type: none"> <li>Flashing MIL</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>VIN missing</li> </ul>

## ECM SPN 629, Electronic Control Unit (ECU) 1 – MID 128 SID 254

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>Self test failure</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Not possible to program Engine Control Module (ECM)</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM)</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Self test failure</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM)</li> </ul>

## ECM SPN 630, Calibration Memory – MID 128 SID 253

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Check sum error</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM) software</li> </ul>

FMI 12	<ul style="list-style-type: none"> <li>• Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>• Check sum error</li> </ul>	<ul style="list-style-type: none"> <li>• Red engine shutdown lamp illuminated</li> <li>• Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>• Engine Control Module (ECM)</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>• Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>• VIN not loaded yet</li> </ul>	<ul style="list-style-type: none"> <li>• Red engine shutdown lamp illuminated</li> <li>• Loss of log data and some user configurable data</li> </ul>	<ul style="list-style-type: none"> <li>• Engine Control Module (ECM) software</li> </ul>

### ECM SPN 631, Calibration Module – MID 128 PSID 77/PSID 124

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Check sum error</li> </ul>	<ul style="list-style-type: none"> <li>• Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>• Software error</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>• Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>• Reset of ECM does not work</li> </ul>	<ul style="list-style-type: none"> <li>• Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>• Software error</li> </ul>

### ECM SPN 633, Engine Fuel Actuator 1 Control Command – MID 128 SID 18

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Valve constantly shut</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty solenoid</li> <li>• Faulty harness</li> <li>• Faulty ECM driver</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>• Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• High fuel consumption due to fuel leakage</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty solenoid</li> <li>• Faulty harness</li> <li>• Faulty ECM driver</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Valve constantly shut</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty solenoid</li> <li>• Faulty harness</li> </ul>

## ECM SPN 636, Camshaft Position Sensor (CMP) – MID 128 SID 21

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Phase Error - Incorrect correlation between CMP and crankshaft position (CKP) sensor</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Increase in fuel consumption</li> </ul>	<ul style="list-style-type: none"> <li>Engine timing</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Missing Signal from CMP sensor</li> <li>Open in the CMP sensor circuit</li> <li>Short to battery in the CMP sensor circuit</li> <li>Short to ground in the CMP sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible loss of engine power</li> <li>Increased engine start time</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>Noisy Signal from CMP sensor</li> <li>Open in the CMP sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible loss of engine power</li> <li>Increased engine start time</li> </ul>	<ul style="list-style-type: none"> <li>Faulty CMP sensor</li> <li>Faulty harness</li> </ul>

## ECM SPN 637, Crankshaft Position Sensor (CKP) – MID 128 SID 22

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Intermittent or weak signal</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Increased fuel consumption</li> <li>Imprecise engine timing</li> <li>Increased fuel consumption</li> <li>Uneven cylinder balancing</li> <li>Power loss</li> <li>Smoke</li> </ul>	<ul style="list-style-type: none"> <li>Faulty CKP sensor harness</li> <li>Faulty CKP sensor</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Missing Signal CKP sensor</li> <li>Open in the CKP sensor circuit</li> <li>Short to battery in the CKP sensor circuit</li> <li>Short to ground in the CKP sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Possible loss of engine power</li> <li>Increased fuel consumption</li> </ul>	<ul style="list-style-type: none"> <li>Faulty CKP sensor harness</li> <li>Faulty CKP sensor</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>Erratic or intermittent signal from CKP sensor</li> <li>Open in the CKP sensor</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Possible loss of engine power</li> <li>Increased engine start time</li> <li>Increased fuel consumption</li> <li>Uneven cylinder balancing</li> <li>Power loss</li> <li>Smoke</li> </ul>	<ul style="list-style-type: none"> <li>Faulty CKP sensor harness</li> <li>Faulty CKP sensor mounting</li> </ul>

## ECM SPN 639, SAE J1939 Data Link 1 – MID 128 SID 231

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1939 high or low circuit shorted +</li> <li>SAE J1939 high or low circuit shorted –</li> <li>SAE J1939 high or low circuit open</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>

## ECM SPN 641, Engine Variable Geometry Turbocharger (VGT) Actuator 1 – MID 128 SID 27

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Variable Geometry Turbocharger (VGT) actuator temperature out of range</li> </ul>	<ul style="list-style-type: none"> <li>Possible Red engine shutdown lamp illuminated (dependant on severity)</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Possible engine derate</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Engine Variable Geometry Turbocharger (VGT) actuator has not seen a valid command on CAN2 data link</li> <li>Incorrect data</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Low boost</li> <li>Low power</li> <li>Nozzle opens</li> <li>Smoke from engine</li> </ul>	<ul style="list-style-type: none"> <li>Disturbance on CAN2 data link</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Nozzle will open resulting in low power and low boost</li> <li>VGT actuator will continue to attempt and maintain target nozzle position</li> </ul>	<ul style="list-style-type: none"> <li>Faulty VGT actuator connector</li> <li>Faulty VGT actuator harness</li> <li>Low battery voltage</li> </ul>

FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical problem with the Engine Variable Geometry Turbocharger (VGT) actuator</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Low boost and smoke</li> <li>Possible engine derate</li> <li>Power loss in some cases when actuator motor has been disabled</li> </ul>	<ul style="list-style-type: none"> <li>VGT actuator motor effort is temporarily limited to prevent overheating</li> <li>Restrictions detected when running learn sequence</li> <li>VGT actuator is slow to follow commands</li> <li>VGT actuator position is not tracking command</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Data from the Engine Variable Geometry Turbocharger (VGT) actuator has been missing for 2-seconds</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derated (major)</li> <li>EGR valve closed</li> </ul>	<ul style="list-style-type: none"> <li>Data link harness</li> <li>No supply to VGT actuator</li> <li>VGT actuator</li> <li>VGT actuator connector</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Failed self-calibration</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>VGT actuator</li> </ul>

## ECM SPN 642, Engine Variable Geometry Turbocharger (VGT) Actuator 2 – MID 128 PPID 89

Type of fault	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>VGT SRA temperature is critically high</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Coolant system malfunction</li> <li>Extreme driving conditions</li> <li>Overheated VGT actuator</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>VGT SRA temperature is moderately too high</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Coolant system malfunction</li> <li>Extreme driving conditions</li> <li>Overheated VGT actuator</li> </ul>

## ECM SPN 647, Engine Fan Clutch Output Device Driver – MID 128 SID 33

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short to positive in the cooling fan control circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Increased fuel consumption</li> <li>Fan runs at full speed</li> </ul>	<ul style="list-style-type: none"> <li>Faulty cooling fan actuator</li> <li>Faulty cooling fan actuator harness or connector</li> </ul>



FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground in the cooling fan control circuit</li> <li>Output voltage is 1/3 the supply voltage</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Fan always deactivated or always activated if fault is intermittent</li> </ul>	<ul style="list-style-type: none"> <li>Faulty cooling fan actuator</li> <li>Faulty cooling fan actuator harness or connector</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open in the cooling fan control circuit</li> </ul>	<ul style="list-style-type: none"> <li>Increased fuel consumption</li> <li>Fan runs at full speed</li> </ul>	<ul style="list-style-type: none"> <li>Faulty cooling fan actuator</li> <li>Faulty cooling fan actuator harness or connector</li> </ul>

## ECM SPN 651, Engine Injector Cylinder 1 – MID 128 SID 1

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted +, – or open high side circuit</li> <li>Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 652, Engine Injector Cylinder 2 – MID 128 SID 2

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted +, – or open high side circuit</li> <li>Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 653, Engine Injector Cylinder 3 – MID 128 SID 3

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Harness shorted +, – or open high side circuit</li> <li>• Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Engine power loss</li> <li>• Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>• Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>• Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• PTO engaged without ECM knowing</li> <li>• Faulty engine fuel injector</li> <li>• Low cylinder compression</li> <li>• Damaged or flywheel</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>• Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>• Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>• Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>• Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• PTO engaged without ECM knowing</li> <li>• Faulty engine fuel injector</li> <li>• Low cylinder compression</li> <li>• Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>• Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>• Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 654, Engine Injector Cylinder 4 – MID 128 SID 4

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Engine power loss</li> <li>• Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Harness shorted +, – or open high side circuit</li> <li>• Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Engine power loss</li> <li>• Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>• Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>• Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• PTO engaged without ECM knowing</li> <li>• Faulty engine fuel injector</li> <li>• Low cylinder compression</li> <li>• Damaged or flywheel</li> </ul>

FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 655, Engine Injector Cylinder 5 – MID 128 SID 5

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted +, – or open high side circuit</li> <li>Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 656, Engine Injector Cylinder 6 – MID 128 SID 6

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted + low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Harness shorted +, – or open high side circuit</li> <li>Harness shorted – low side circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine power loss</li> <li>Engine running uneven (misfire)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty engine fuel injector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency, pulse width, or period</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder balancing data above limit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>PTO engaged without ECM knowing</li> <li>Faulty engine fuel injector</li> <li>Low cylinder compression</li> <li>Damaged or flywheel</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Misfire detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough engine idle</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine fuel injector (possibly clogged)</li> </ul>

## ECM SPN 677, Engine Starter Motor Relay – MID 128 SID 39

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Faulty starter relay</li> <li>Fault harness</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Faulty starter relay</li> <li>Fault harness</li> </ul>
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### ECM SPN 729, Intake Air Heater (IAH) 1 – MID 128 SID 70

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty preheat relay</li> <li>Faulty intake air heater (IAH) 1</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty preheat relay</li> <li>Faulty intake air heater (IAH) 1</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty intake air heater (IAH) 1</li> </ul>

### ECM SPN 730, Intake Air Heater (IAH) 2 – MID 128 SID 71

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty preheat relay</li> <li>Faulty intake air heater (IAH) 2</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty preheat relay</li> <li>Faulty intake air heater (IAH) 2</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty intake air heater (IAH) 2</li> </ul>
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### ECM SPN 975, Estimated Percent Fan Speed – (MID 128 PID 26)

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Missing signal from Fan Speed Sensor</li> <li>• Short Circuit +, Measuring line</li> <li>• Short Circuit -, Measuring line</li> <li>• Open Circuit, Measuring line</li> <li>• Open Circuit, Ground line</li> </ul>	<ul style="list-style-type: none"> <li>• Higher fuel consumption</li> <li>• Will work as on/off fan, 100%fan speed if cooling is needed</li> </ul>	<ul style="list-style-type: none"> <li>• Cooling Fan Speed (CFS) sensor failure</li> <li>• Faulty Cooling Fan Speed (CFS) sensor harness</li> </ul>

## ECM SPN 1072, Engine Compression Brake Output #1 – MID 128 PPID 122

Type of fault	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Below range</li> </ul>	<ul style="list-style-type: none"> <li>No Engine Compression Brake</li> </ul>	<ul style="list-style-type: none"> <li>Low engine oil temperature</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine Compression Brake can not be turned on</li> <li>Engine brake function derated</li> <li>Gear shift performance derated for some automatic transmissions</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Engine Compression Brake actuator</li> <li>Faulty harness</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit -</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Compression brake can not be turned off</li> <li>Engine stops running</li> <li>Engine impossible to restart</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Engine Compression Brake actuator</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Compression rake can not be turned on</li> <li>Engine brake function derated</li> <li>Gear shift performance derated for some automatic transmission boxes</li> </ul>	<ul style="list-style-type: none"> <li>Faulty Engine Compression Brake actuator</li> <li>Faulty harness</li> </ul>



## ECM SPN 1127, Engine Turbocharger Intake Manifold Pressure (IMP) – MID 128 PSID 98

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Engine Turbocharger boost pressure is too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Turbocharger surge</li> </ul>	<ul style="list-style-type: none"> <li>EGR system failure</li> <li>Faulty Turbocharger outlet pressure sensor</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Engine Turbocharger boost pressure is too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Engine derate</li> <li>Engine slow to respond</li> </ul>	<ul style="list-style-type: none"> <li>Air leak in turbocharger hoses, pipes, brackets, cooler or components</li> <li>EGR system fault</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Poor Engine Turbocharger boost pressure response</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine power loss/re-sponse/drivability</li> </ul>	<ul style="list-style-type: none"> <li>Turbocharger inlet air system leak</li> <li>Faulty Turbocharger</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>Variable Geometry Turbocharger control mode fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Variable Geometry Turbocharger fault</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Variable Geometry Turbocharger control mode adjustment exceeded</li> </ul>	<ul style="list-style-type: none"> <li>Engine power loss/re-sponse/drivability</li> </ul>	<ul style="list-style-type: none"> <li>Air leak in turbocharger hoses, pipes, brackets, cooler or components</li> <li>EGR system fault</li> <li>Faulty Turbocharger outlet pressure sensor</li> <li>Exhaust back pressure too high</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Poor Engine Turbocharger boost pressure response</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Air leak in turbocharger hoses, pipes, brackets, cooler or components</li> <li>Variable Geometry Turbocharger fault</li> <li>Oil pressure fault</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Turbocharger boost pressure is too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Turbocharger surge</li> </ul>	<ul style="list-style-type: none"> <li>EGR system failure</li> <li>Faulty sensor</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Engine Turbocharger boost pressure is too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> <li>Engine derate</li> <li>Engine slow to respond</li> </ul>	<ul style="list-style-type: none"> <li>Air leak in turbocharger hoses, pipes, brackets, cooler or components</li> <li>EGR system failure</li> </ul>

## ECM SPN 1136, Engine Control Module (ECM) Temperature – MID 128 PPID 55

Type of fault	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground on the metering circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM)</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery in the metering circuit</li> <li>Open in the metering circuit</li> <li>Open circuit in the ground circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module (ECM)</li> </ul>

## ECM SPN 1198, Anti-theft Random Number – MID 128 PID 224

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Engine Control Module and Instrument Control Module security codes do not match</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Can start engine</li> </ul>	<ul style="list-style-type: none"> <li>Security system failure</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Security system not installed</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Can start engine</li> </ul>	<ul style="list-style-type: none"> <li>Security system failure</li> </ul>

## ECM SPN 1231, SAE J1939 Data Link 2 – MID 128 PSID 229/232

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> <li>Circuit shorted –</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine power loss</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> <li>No variable geometry engine turbocharger control</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from Transmission Control Module (TCM)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>SAE J1939 data link</li> <li>Faulty harness or connectors</li> <li>DEF pump</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) control module</li> </ul>

## ECM SPN 1265, Engine Piston Cooling Oil Pressure Actuator – MID 128 SID 85

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Possible smoke during start up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty actuator</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine damage can occur without piston cooling</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty actuator</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Possible smoke during start up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty actuator</li> </ul>

## ECM SPN 1322, Engine Misfire for Multiple Cylinders – MID 128 PSID 27

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder misfires detected in multiple cylinders</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough idle</li> </ul>	<ul style="list-style-type: none"> <li>Engine fuel injectors</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Cylinder misfires detected in multiple cylinders</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Rough idle</li> </ul>	<ul style="list-style-type: none"> <li>Engine fuel injectors</li> </ul>

## ECM SPN 1659, Engine Coolant System Thermostat – MID 128 PSID 109

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Thermostat stuck closed</li> </ul>	<ul style="list-style-type: none"> <li>Possible poor drivability</li> </ul>	<ul style="list-style-type: none"> <li>Coolant thermostat</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Thermostat is leaking or stuck open</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Longer engine warm up time</li> <li>Poor heat in cab</li> </ul>	<ul style="list-style-type: none"> <li>Coolant thermostat</li> </ul>

## ECM SPN 1675, Engine Starter Mode – MID 128 SID 39

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Starter overheating</li> </ul>	<ul style="list-style-type: none"> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Starter is deactivated due to overheating</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Transmission not in neutral</li> </ul>	<ul style="list-style-type: none"> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Starter is deactivated due to overheating</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Starter gear is stuck, engaged with engine</li> </ul>	<ul style="list-style-type: none"> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Starter is deactivated due to overheating</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>PTO is engaged or switch on</li> </ul>	<ul style="list-style-type: none"> <li>Engine will not start</li> </ul>	<ul style="list-style-type: none"> <li>Starter is deactivated due to overheating</li> </ul>

## ECM SPN 1677, Aftertreatment DPF Auxiliary Heater Mode – MID 128 PSID 25

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range — most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Truck has idled too long without completing a periodic heat mode</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>Engine derate</li> <li>High temperature spikes in DPF when driving is resumed or during stationary regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Extremely cold ambient temperatures</li> <li>PTO operated with limited exhaust temperatures</li> <li>Engine turbocharger</li> <li>Engine turbocharger compressor bypass valve</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Truck has idled too long without completing a periodic heat mode</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>White exhaust smoke</li> <li>High temperature spikes in DPF when driving is resumed or during stationary regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Extremely cold ambient temperatures</li> <li>PTO operated with limited exhaust temperatures</li> <li>Engine turbocharger</li> <li>Engine turbocharger compressor bypass valve</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Truck has idled too long without completing a periodic heat mode</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>White exhaust smoke</li> <li>High temperature spikes in DPF when driving is resumed or during stationary regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Extremely cold ambient temperatures</li> <li>PTO operated with limited exhaust temperatures</li> <li>Engine turbocharger</li> <li>Engine turbocharger compressor bypass valve</li> </ul>

## ECM SPN 1761, Aftertreatment Diesel Exhaust Fluid (DEF) Tank Level – PPID 278

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit high side</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit +</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> </ul>

FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank level low (driver warning)</li> </ul>	<ul style="list-style-type: none"> <li>Low DEF fluid lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special Instructions</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank almost empty (driver warning)</li> </ul>	<ul style="list-style-type: none"> <li>Low DEF fluid lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank almost empty (driver warning)</li> </ul>	<ul style="list-style-type: none"> <li>Low DEF fluid lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

### ECM SPN 2003, Transmission Control Module (TCM) Status – MID 128 PSID 205

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from Transmission Control Module (TCM)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Data link error</li> </ul>

### ECM SPN 2017, Cruise Control Status – MID 128 PID 85

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing (Cruise Control) signal from VECU</li> </ul>	<ul style="list-style-type: none"> <li>Cruise Control does not work</li> </ul>	<ul style="list-style-type: none"> <li>No clutch information to Engine Control Module (ECM) from SAE J1939 data link</li> </ul>

### ECM SPN 2029, Invalid or Missing Data from Vehicle ECU – MID 128 PSID 201

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>No contact with VECU</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>PTO, engine compression brake and cruise control do not work</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from cluster</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>

## ECM SPN 2629, Engine Turbocharger Compressor Outlet Temperature – MID 128 PID 404

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Estimated engine turbocharger discharge temperature error.</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>High ambient temperature</li> <li>Low barometric pressure</li> <li>Leak in engine turbocharger inlet tube</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Engine turbocharger outlet temperature signal believed to be not valid (high) (plausibility fault)</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine turbocharger outlet temperature sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit -, measuring line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit +, measuring line</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> <li>Faulty harness</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Sensor out of range</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> </ul>

## ECM SPN 2659, Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate – MID 128 PPID 35

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>EGR flow is too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Exhaust smoke</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR system</li> </ul>

FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>EGR flow is too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR system</li> <li>Clogged EGR cooler</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>EGR flow is too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Exhaust smoke</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR system</li> <li>Faulty harness or connector</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>EGR flow is too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty EGR system</li> <li>Clogged EGR cooler</li> <li>Faulty harness or connector</li> </ul>

### ECM SPN 2791, Engine Exhaust Gas Recirculation (EGR) Valve Control – MID 128 SID 146

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Stuck EGR valve</li> <li>EGR valve circuit shorted +</li> <li>EGR valve circuit shorted to –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> <li>Faulty EGR valve</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open EGR valve circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> <li>Faulty EGR valve</li> </ul>

### ECM SPN 2836, Battery Potential/Switched Voltage – MID 128 PSID 49

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Battery voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty cab or chassis harness</li> <li>Charging system fault</li> <li>External charger</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Battery voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>Starter will not crank</li> </ul>	<ul style="list-style-type: none"> <li>Faulty cab or chassis harness</li> <li>Charging system fault</li> <li>Battery</li> <li>Fuse</li> </ul>



## ECM SPN 3031, Aftertreatment Diesel Exhaust Fluid (DEF) Tank Temperature – MID 128 PPID 274

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) tank temperature too high</li> <li>Date data message missing on SAE J1587 data link. (Cluster error).</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit -</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> <li>DEF tank pickup assembly/sensor wiring or connectors</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +</li> <li>Open Circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> <li>DEF tank pickup assembly/sensor wiring or connectors</li> </ul>
FMI 8	<ul style="list-style-type: none"> <li>Abnormal frequency or pulse width or period</li> </ul>	<ul style="list-style-type: none"> <li>Sensor ripple is not too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank pickup assembly/sensor failure</li> <li>DEF tank pickup assembly/sensor wiring or connectors</li> </ul>

## ECM SPN 3064, Aftertreatment DPF System Monitor – MID 128 PPID 326

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Moderately high soot load</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Medium to high engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Diesel Particulate Filter (DPF) clogged</li> <li>After Treatment Fuel Injector clogged</li> <li>Regeneration disabled by driver or other component</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Soot loading high due to heavy load or use (no problem)</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>No error, condition occurs during heavy load or use with high soot loading</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>Critically high soot load</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> <li>High engine derate</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Diesel Particulate Filter (DPF) clogged</li> <li>Aftertreatment hydrocarbon doser (injector)</li> <li>Regeneration disabled by driver or other component</li> </ul>

## ECM SPN 3216, Aftertreatment Intake NOx – MID 128 PPID 348

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Inlet NOx sensor error (plausibility)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine out NOx high</li> <li>Faulty NOx sensor</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit, NOx signal</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty wiring between NOx sensor and NOx sensor ECU</li> <li>Faulty NOx sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit, NOx signal</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty wiring between NOx sensor and NOx sensor ECU</li> <li>Faulty NOx sensor</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from NOx sensor</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Loss of communication from NOx sensor ECU and Engine Control Module (ECM)</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor measures near zero for long time with high load</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>NOx-sensor signal corrupt (incorrect value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>NOx-sensor activation (incorrect value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from sensor due to battery voltage</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Voltage to NOx sensor is too high or too low</li> <li>Faulty harness to sensor</li> </ul>

## ECM SPN 3226, Aftertreatment Outlet NOx – MID 128 PPID 270/ PSID 90

MID 233 Fault code sent by MID 128 Engine control unit

Type of fault	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Inlet NOx sensor error (plausibility)</li> <li>Mismatch between sensors</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine out NOx high</li> <li>Faulty NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) quality</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit, NOx signal</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty wiring between NOx sensor and NOx sensor ECU</li> <li>Faulty NOx sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open Circuit, NOx signal</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty wiring between NOx sensor and NOx sensor ECU</li> <li>Faulty NOx sensor</li> </ul>

MID 233 Fault code sent by MID 128 Engine control unit (cont'd.)

FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from NOx sensor</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Loss of communication from NOx sensor ECU and Engine Control Module (ECM)</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor measures near zero for long time with high load</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>NOx-sensor signal corrupt (incorrect value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>NOx-sensor activation (incorrect value)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty NOx sensor</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Missing signal from sensor due to battery voltage</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Voltage to NOx sensor is too high or too low</li> <li>Faulty harness to sensor</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Inlet NOx sensor error</li> <li>Mismatch between sensors</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Engine out NOx high</li> <li>Faulty NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) quality</li> </ul>

## ECM SPN 3245, Aftertreatment DPF Outlet Temperature – MID 128 PPID 436

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Temperature critically too high</li> </ul>	<ul style="list-style-type: none"> <li>Low engine power</li> </ul>	<ul style="list-style-type: none"> <li>Restricted Catalyst</li> <li>Intake air leak</li> <li>Faulty sensor</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Sensor is not rational (plausibility)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> <li>Exhaust system leak</li> <li>Faulty harness connectors or connections</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground on the metering side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> <li>Aftertreatment control module (ACM)</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side of the circuit</li> <li>Open in the metering side of the circuit</li> <li>Open in the ground side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> <li>Aftertreatment control module (ACM)</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Temperature sensor is out of range (high)</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> </ul>

## ECM SPN 3249, Aftertreatment DPF Intake Temperature – MID 128 PPID 387

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Sensor is not rational (plausibility)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connectors or connections</li> <li>Exhaust system leak</li> <li>Faulty sensor</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground on the metering side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> <li>Aftertreatment control module (ACM)</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side of the circuit</li> <li>Open in the metering side of the circuit</li> <li>Open in the ground side of the circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> <li>Aftertreatment control module (ACM)</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Temperature sensor is out of range (high)</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> </ul>

## ECM SPN 3250, Aftertreatment Diesel Particulate Filter (DPF) Intermediate Gas Temperature – MID 128 PPID 440/ PSID 22

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Maximum allowed multiple aftertreatment DPF burner flame loses</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible, need scab tool to reset</li> </ul>	<ul style="list-style-type: none"> <li>Malfunction in aftertreatment DPF burner hydrocarbon dosing system</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment spark assisted DPF flame temperature sensor value deemed not plausible</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty sensor</li> </ul>
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF burner flame temperature not controllable</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty in Aftertreatment DPF burner fuel system</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Maximum allowed multiple aftertreatment DPF burner flame loses</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible, need scab tool to reset</li> </ul>	<ul style="list-style-type: none"> <li>Malfunction in aftertreatment DPF burner dosing system</li> </ul>
FMI 11	<ul style="list-style-type: none"> <li>Failure mode not identifiable</li> </ul>	<ul style="list-style-type: none"> <li>Single aftertreatment DPF burner flame lose</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Malfunction in aftertreatment DPF burner dosing system</li> </ul>

FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment spark assisted DPF flame temperature not controllable</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty in aftertreatment DPF burner air system</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Single aftertreatment DPF burner flame lose</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Malfunction in aftertreatment DPF burner dosing system</li> </ul>

## ECM SPN 3251, Aftertreatment DPF Differential Pressure – MID 128 PID 81

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Critically high pressure</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment diesel particulate filter (DPF) differential pressure sensor failure</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Sensor is not rational</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment diesel particulate filter (DPF) differential pressure sensor failure</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side</li> <li>Open in the ground line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment diesel particulate filter (DPF) differential pressure sensor failure</li> <li>Faulty aftertreatment diesel particulate filter (DPF) differential pressure sensor connector</li> <li>Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open in 5 volt supply line</li> <li>Short to ground in metering line</li> <li>Open in metering line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment diesel particulate filter (DPF) differential pressure sensor failure</li> <li>Faulty harness</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Moderately high pressure</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment diesel particulate filter (DPF) differential pressure sensor failure</li> </ul>

## ECM SPN 3363, Aftertreatment Diesel Exhaust Fluid (DEF) Tank Heater – MID 128 PSID 75

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Commanded valve position is not plausible</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connectors</li> <li>Aftertreatment DEF tank temperature sensor</li> <li>Aftertreatment DEF tank heating valve</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF pump assembly</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF pump assembly</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF pump assembly</li> </ul>

## ECM SPN 3471, Aftertreatment Fuel Pressure Control Actuator/ MP8 Engine– MID 128 PPID 328

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to battery</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Actuator failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to ground</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Actuator failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Actuator failure</li> </ul>

FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser fuel pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Fuel shut off valve stuck open</li> <li>Faulty fuel pressure sensor</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser fuel pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Fuel shut off valve leakage</li> </ul>

## ECM SPN 3471, Aftertreatment Fuel Pressure Control Actuator/ MP7 Engine – MID 128 PSID 111

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to battery</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty aftertreatment fuel pump</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to ground</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty aftertreatment fuel pump</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty aftertreatment fuel pump</li> </ul>



FMI 12	<ul style="list-style-type: none"> <li>• Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>• Aftertreatment DPF fuel control valve fuel pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty aftertreatment fuel pump</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>• Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>• Aftertreatment DPF fuel control valve fuel pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty aftertreatment fuel pump</li> </ul>

## ECM SPN 3472, Aftertreatment Diesel Particulate Filter (DPF) Air Pressure Control Actuator– MID 128 PSID 58

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Aborted regeneration</li> <li>• Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty air shutoff valve</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>• Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted to -</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty air shutoff valve</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• MIL illuminated</li> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Aborted regeneration</li> <li>• Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty air shutoff valve</li> </ul>

## ECM SPN 3473, Aftertreatment Failed to Ignite – MID 128 PSID 22

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Multiple failed aftertreatment diesel particulate filter (DPF) ignition failures</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty aftertreatment DPF ignition coil</li> <li>Aftertreatment DPF burner system malfunction</li> <li>Hardware failure</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment ignition system malfunction</li> </ul>

## ECM SPN 3480, Aftertreatment Diesel Particulate Filter (DPF) Fuel Pressure/ MP8 Engine – MID 128 PPID 437/PSID 108

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>DPF fuel pressure sensor is not rational (plausibility)</li> <li>Aftertreatment hydrocarbon doser fuel pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty aftertreatment fuel shut off valve</li> <li>Faulty DPF fuel pressure sensor</li> <li>Air in fuel</li> <li>Fuel filter</li> <li>Aftertreatment fuel pump</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Short to battery on the metering side</li> <li>Open in the ground line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty DPF fuel pressure sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit in the 5 volt supply</li> <li>Short circuit to ground in the metering line</li> <li>Open circuit in the metering line</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty DPF fuel pressure sensor</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical problem</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Engine derate</li> <li>Possible engine shutdown</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty aftertreatment hydrocarbon doser system</li> <li>Aftertreatment hydrocarbon doser</li> <li>Faulty aftertreatment fuel shut off valve</li> <li>Aftertreatment fuel pump</li> </ul>

FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser fuel pressure sensor stuck</li> <li>Aftertreatment hydrocarbon doser fuel pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty DPF fuel pressure sensor</li> <li>Faulty aftertreatment fuel shut off valve</li> <li>Aftertreatment hydrocarbon doser</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Fuel pressure sensor is out of range</li> <li>Sensor indicates a invalid value</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty fuel pressure sensor</li> <li>Faulty harness</li> </ul>

## ECM SPN 3480, Aftertreatment Diesel Particulate Filter (DPF) Fuel Pressure/ MP7 Engine – MID 128 PPID 437

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF fuel control valve pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty DPF fuel pressure sensor</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty DPF fuel pressure sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty DPF fuel pressure sensor</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Fuel pressure either too high or low</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Possible soot buildup</li> </ul>	<ul style="list-style-type: none"> <li>Faulty fuel pressure regulator</li> <li>Aftertreatment DPF atomization module (fuel pressure regulator)</li> </ul>

## ECM SPN 3482, Aftertreatment Diesel Particulate Filter (DPF) Fuel Shutoff Valve – MID 128 PPID 328

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Failed regeneration</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty fuel shutoff valve</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty fuel shut off valve</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Failed regeneration</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty fuel shut off valve</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Fuel pressure &gt;620 kPa (90 psi)</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty fuel pressure sensor</li> <li>Fuel shutoff valve stuck open</li> </ul>

## ECM SPN 3483, Aftertreatment Regeneration Status – MID 128 PSID 47

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Unable to achieve needed aftertreatment temperature</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible incomplete regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> <li>Aftertreatment hydrocarbon doser fuel pressure too low</li> </ul>

FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment temperature too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible incomplete regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> <li>Aftertreatment hydrocarbon doser fuel pressure too high</li> <li>Injector leakage (engine)</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Regeneration period too long</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration frequency too high</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser</li> <li>Air leakage</li> <li>Faulty injector(s) (engine)</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Regeneration efficiency too low</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> <li>Diesel Particulate Filter (DPF) catalyst damaged</li> <li>Diesel Particulate Filter (DPF) catalyst clogged</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of Calibration</li> </ul>	<ul style="list-style-type: none"> <li>Regeneration period too long</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration frequency too high</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser</li> <li>Air leakage</li> <li>Fuel line clogged</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Unable to achieve needed temperature</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible incomplete regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> <li>Aftertreatment hydrocarbon doser fuel pressure too low</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment temperature too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Possible incomplete regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> <li>Aftertreatment hydrocarbon doser fuel pressure too high</li> <li>Injector leakage (engine)</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Regeneration period too long</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Regeneration frequency too high</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser</li> <li>Air leakage</li> <li>Fuel line clogged</li> </ul>

## ECM SPN 3484, Aftertreatment Ignition – MID 128 PSID 110/PSID 127

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>

FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to -</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty aftertreatment DPF coil</li> </ul>

## ECM SPN 3485, Aftertreatment Diesel Particulate Filter (DPF) Atomization Air Pressure – MID 128 PPID 277

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF differential pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty sensor</li> <li>Aftertreatment DPF air shutoff valve stuck</li> </ul>

FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty sensor</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Air pressure mechanical regulator fault</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Faulty aftertreatment DPF atomization module air pressure regulator</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF atomization module, air bleed orifice fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Clogged internal bleed orifice</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Air pressure sensor or aftertreatment DPF atomization module air valve fault</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Soot build up</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF air shutoff valve</li> <li>Faulty air pressure sensor</li> <li>Faulty atomization air valve</li> </ul>

### ECM SPN 3489, Aftertreatment Air Enable Actuator – MID 128 PSID 122

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	<ul style="list-style-type: none"> <li>Data erratic, intermittent or incorrect</li> </ul>	<ul style="list-style-type: none"> <li>Exhaust oxygen deemed too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Possible soot buildup</li> </ul>	<ul style="list-style-type: none"> <li>Faulty combustion air valve</li> </ul>

FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty combustion air valve</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to -</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty combustion air valve</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Failed regeneration</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Faulty combustion air valve</li> </ul>

## ECM SPN 3491, Aftertreatment Diesel Particulate Filter (DPF) Atomization Air Actuator – MID 128 PSID 59

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty atomization air valve</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to -</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty atomization air valve</li> </ul>



FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Aborted regeneration</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty atomization air valve</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Air pressure difference between atomization air valve opened and closed, too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>Possible soot buildup</li> </ul>	<ul style="list-style-type: none"> <li>Faulty atomization air valve</li> </ul>

### ECM SPN 3509, Sensor Supply Voltage 1 – MID 128 SID 232

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Sensor supply voltage out of range (high)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Sensor supply voltage out of range (low)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>

### ECM SPN 3510, Sensor Supply Voltage 2 – MID 128 SID 211

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness or connector</li> </ul>

## ECM SPN 3511, Sensor Supply Voltage 3 – MID 128 PSID 113

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>

## ECM SPN 3512, Sensor Supply Voltage 4 – MID 128 PSID 126

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Sensor supply circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Sensor supply circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Incorrect sensor values</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>

## ECM SPN 3522, Aftertreatment Total Fuel Used – MID 128 PSID 91

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) level change too much</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF system leak</li> <li>Wrong DEF tank</li> <li>Aftertreatment DEF Dosing Module failure or wrong module</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) level change too little</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank level sensor stuck</li> <li>DEF system clog</li> <li>Wrong DEF tank</li> <li>Aftertreatment DEF Dosing Module failure or wrong module</li> </ul>

FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) level change too much</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF system leak</li> <li>Wrong DEF tank</li> <li>Aftertreatment DEF Dosing Module failure or wrong module</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) level change too little</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>DEF tank level sensor stuck</li> <li>DEF system clog</li> <li>Wrong DEF tank</li> <li>Aftertreatment DEF Dosing Module failure or wrong module</li> </ul>

## ECM SPN 3556, Aftertreatment Hydrocarbon Doser/ MP8 Engine – MID 128 PPID 329

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to battery</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Aftertreatment hydrocarbon doser failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to ground</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Aftertreatment hydrocarbon doser failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Aftertreatment hydrocarbon doser failure</li> </ul>
FMI 13	<ul style="list-style-type: none"> <li>Out of calibration</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser clogged</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser failure</li> <li>Fuel shut off valve</li> <li>Fuel supply failure</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser leaking</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment hydrocarbon doser failure</li> </ul>

## ECM SPN 3556, Aftertreatment Hydrocarbon Doser/ MP7 Engine – MID 128 PPID 329

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DPF control valve failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted to –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DPF control valve failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DPF control valve failure</li> </ul>

## ECM SPN 3597, Aftertreatment Diesel Particulate Filter (DPF) Regeneration too Frequent – MID 128 PSID 119

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 or 3 failure</li> <li>Aftertreatment DEF pump assembly failure</li> <li>Aftertreatment DEF tank heating valve failure</li> <li>Aftertreatment Control Module (ACM)</li> </ul>

FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 or 3 failure</li> <li>Aftertreatment DEF pump assembly failure</li> <li>Aftertreatment DEF tank heating valve failure</li> <li>Aftertreatment Control Module (ACM)</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 or 3 failure</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>

- Aftertreatment DEF tank heating valve failure
- Aftertreatment Control Module (ACM)

### ECM SPN 3675, Engine Turbocharger Compressor Bypass Valve Position – MID 128 PPID 330

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> <li>On/off valve can't be activated</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>High engine braking without request</li> <li>Driveability affected</li> </ul>	<ul style="list-style-type: none"> <li>Faulty bypass valve solenoid</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit -</li> <li>Valve constantly activated</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Major engine derate</li> <li>Exhaust manifold overheating</li> <li>Engine shut down</li> </ul>	<ul style="list-style-type: none"> <li>Faulty bypass valve solenoid</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>

FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> <li>On/off valve can't be activated</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>High engine braking without request</li> <li>Driveability affected</li> </ul>	<ul style="list-style-type: none"> <li>Faulty bypass valve solenoid</li> <li>Faulty harness</li> <li>Faulty harness connector</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Mechanically Stuck</li> <li>On/off valve can't be activated</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>Regeneration not possible</li> <li>High engine braking without request</li> <li>Driveability affected</li> <li>Valve constantly activated</li> <li>Major engine derate</li> <li>Exhaust manifold overheating</li> <li>Engine shut down</li> </ul>	<ul style="list-style-type: none"> <li>Leaking pipes</li> <li>Faulty bypass valve solenoid</li> </ul>

### ECM SPN 3695, Aftertreatment Diesel Particulate Filter (DPF) Switch/MP8 Engine – MID 128 PSID 114

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	<ul style="list-style-type: none"> <li>Abnormal update rate</li> </ul>	<ul style="list-style-type: none"> <li>Signal missing from aftertreatment DPF switch</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> </ul>

### ECM SPN 3720, Aftertreatment DPF Ash Load Percent – MID 128 PPID 337

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Ash level too high</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Need service, ash level is too high</li> </ul>

## ECM SPN 3936, Aftertreatment DPF System – MID 128 PSID 28

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF differential pressure sensor value too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF differential pressure sensor</li> <li>Aftertreatment particulate filter</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF differential pressure sensor value too low</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DPF differential pressure sensor</li> <li>Aftertreatment particulate filter</li> </ul>

## ECM SPN 4094, NOx Limits Exceeded Due to Insufficient Diesel Exhaust Fluid (DEF) Quality – MID 128 PSID 90

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing too low</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>DEF quality</li> <li>Aftertreatment DEF line clogged</li> <li>Aftertreatment doser</li> <li>Aftertreatment control module failure</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special Instructions</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing too low</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>DEF quality</li> <li>Aftertreatment DEF line clogged</li> <li>Aftertreatment DEF dosing</li> <li>Aftertreatment control module failure</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing too low</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>DEF quality</li> <li>Aftertreatment DEF line clogged</li> <li>Aftertreatment DEF dosing</li> <li>Aftertreatment control module failure</li> </ul>

## ECM SPN 4095, NOx Limits Exceeded Due to Interrupted Diesel Exhaust Fluid (DEF) Dosing – MID 128 PSID 90

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Dosing failure</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) low usage</li> </ul>	<ul style="list-style-type: none"> <li>DEF level</li> <li>Faulty DEF pump</li> <li>Leak in DEF hose</li> </ul>

## ECM SPN 4334, Aftertreatment Diesel Exhaust Fluid (DEF) Dosing Absolute Pressure – MID 128 PPID 273

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>DEF system leakage detected</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>DEF pump</li> <li>DEF hose</li> <li>Aftertreatment DEF dosing (injector)</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit -</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>DEF pump assembly</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Short Circuit +</li> <li>Open Circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>DEF pump assembly</li> </ul>

## ECM SPN 4339, Aftertreatment SCR Feedback Control Status – MID 128 PSID 90

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing system failure</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation too low</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing system failure</li> <li>DEF quality</li> </ul>
FMI 10	<ul style="list-style-type: none"> <li>Abnormal rate of change</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation too high</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing system failure</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation too low</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing system failure</li> <li>DEF quality</li> </ul>



## ECM SPN 4354, Aftertreatment Diesel Exhaust Fluid (DEF) Line Heater 1 – MID 128 PSID 103

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 1 failure</li> </ul>

## ECM SPN 4356, Aftertreatment Diesel Exhaust Fluid (DEF) Line Heater 3 – MID 128 PSID 102

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 3 failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 3 failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF line heater 3 failure</li> </ul>

## ECM SPN 4374, Aftertreatment Diesel Exhaust Fluid (DEF) Pump Motor Speed – MID 128 PSID 87

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Slow pump speed</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>

## ECM SPN 4375, Aftertreatment Diesel Exhaust Fluid Pump (DEF) Drive Percentage – MID 128 PSID 121

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 12	<ul style="list-style-type: none"> <li>Bad intelligent device or component</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Voltage to pump out of range</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>

## ECM SPN 4376, Aftertreatment Diesel Exhaust Fluid (DEF) Return Valve – MID 128 PSID 105

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Not possible to perform afterrun</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Not possible to perform afterrun</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Not possible to perform afterrun</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty connector</li> <li>Aftertreatment DEF pump assembly failure</li> </ul>
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Possible mechanical problem with aftertreatment diesel exhaust fluid (DEF) return valve</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Not possible to perform afterrun</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical fault – DEF return line restricted between DEF pump and DEF tank</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) pump assembly</li> </ul>

## ECM SPN 4752, Engine Exhaust Gas Recirculation (EGR) Cooler Efficiency – MID 128 SID 282

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding or out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Low EGR cooler efficiency</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>EGR cooler clogged or damaged</li> </ul>

## ECM SPN 4811, Engine Piston Cooling Oil Pressure – MID 128 PPID 8

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Pressure below range</li> </ul>	<ul style="list-style-type: none"> <li>Red engine shutdown lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Short to battery in metering line</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open in the metering side sensor circuit</li> <li>• Open circuit in the ground line sensor circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty sensor</li> <li>• Faulty harness</li> </ul>

## ECM SPN 4813, Engine Oil Thermostat Bypass Valve Opening – MID 128 PSID 72

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Oil thermostat is always open</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty actuator</li> <li>• Faulty harness</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>• Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Oil thermostat is always closed</li> <li>• Engine may overheat</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty actuator</li> <li>• Faulty harness</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>• Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> <li>• Oil thermostat is always open</li> <li>• May have increased fuel consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty actuator</li> <li>• Faulty harness</li> </ul>

## ECM SPN 4815, Engine Cooling Fan Thermal Switch Position – MID 128 PPID 333

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	<ul style="list-style-type: none"> <li>• Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>• Circuit shorted to battery</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>• Faulty harness</li> <li>• Faulty harness connector</li> <li>• Faulty sensor</li> </ul>

FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Short circuit -</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty sensor</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Faulty harness</li> <li>Faulty harness connector</li> <li>Faulty sensor</li> </ul>

## ECM SPN 5246, Aftertreatment SCR Operator Inducement Severity – MID 128 PSID 46

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Severe SCR system fault detected – Warning fault</li> </ul>	<ul style="list-style-type: none"> <li>Severe engine derate</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 15	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Moderate SCR system fault detected – Warning fault</li> </ul>	<ul style="list-style-type: none"> <li>Moderate engine derate</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
FMI 16	<ul style="list-style-type: none"> <li>Data valid but above normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>SCR system fault detected – Warning fault</li> </ul>	<ul style="list-style-type: none"> <li>Engine derate</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

## ECM SPN 5285, Charge Air Cooler (CAC) Temperature – MID 128 PID 52

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Boost temperature too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Air flow through charge air cooler (CAC) too low</li> <li>Charge air cooler (CAC)</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range</li> </ul>	<ul style="list-style-type: none"> <li>Boost temperature too high</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated (13L engine only)</li> </ul>	<ul style="list-style-type: none"> <li>Air flow through charge air cooler (CAC) too low</li> <li>Charge air cooler (CAC)</li> </ul>

## ECM SPN 5298, Aftertreatment Diesel Oxidation Catalyst (DOC) Conversion Efficiency – MID 128 PSID 99

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Hydrocarbon conversion is too low in the Diesel Oxidation Catalyst (DOC)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Catalyst failure</li> <li>DOC temperature sensor</li> </ul>
FMI 18	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Moderately severe level</li> </ul>	<ul style="list-style-type: none"> <li>Hydrocarbon conversion is too low in the Diesel Oxidation Catalyst (DOC)</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Catalyst failure</li> <li>DOC temperature sensor</li> </ul>

## ECM SPN 5392, Aftertreatment Diesel Exhaust Fluid (DEF) Dosing Valve Loss of Prime – MID 128 PSID 121

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	<ul style="list-style-type: none"> <li>Mechanical system not responding properly</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) pressure build up failure</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Empty DEF tank</li> <li>DEF filter clogged</li> <li>DEF inlet pipe leak or blockage</li> <li>DEF pump assembly</li> </ul>
FMI 31	<ul style="list-style-type: none"> <li>Condition exists</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) pressure build up failure</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Empty DEF tank</li> <li>DEF filter clogged</li> <li>DEF inlet pipe leak or blockage</li> <li>DEF pump assembly</li> </ul>

## ECM SPN 5394, Aftertreatment Diesel Exhaust Fluid (DEF) Dosing Valve – MID 128 PSID 89

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	<ul style="list-style-type: none"> <li>Data valid but above normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Low side circuit shorted to +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing pump assembly</li> </ul>
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range - Most severe level</li> </ul>	<ul style="list-style-type: none"> <li>Short to ground</li> <li>Low side circuit open</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing pump assembly</li> </ul>
FMI 3	<ul style="list-style-type: none"> <li>Voltage above normal, or shorted to high source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted +</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing pump assembly</li> </ul>
FMI 4	<ul style="list-style-type: none"> <li>Voltage below normal, or shorted to low source</li> </ul>	<ul style="list-style-type: none"> <li>Circuit shorted –</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing pump assembly</li> </ul>
FMI 5	<ul style="list-style-type: none"> <li>Current below normal or open circuit</li> </ul>	<ul style="list-style-type: none"> <li>Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing</li> <li>Aftertreatment DEF dosing pump assembly</li> </ul>
FMI 14	<ul style="list-style-type: none"> <li>Special instructions</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF dosing clogged or hose clogged</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment DEF doser clogged</li> <li>Hose clogged</li> </ul>

## ECM SPN 5394, Aftertreatment Diesel Exhaust Fluid (DEF) Dosing Valve – MID 128 PSID 90

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	<ul style="list-style-type: none"> <li>Data valid but below normal operational range</li> </ul>	<ul style="list-style-type: none"> <li>Dosing failure</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing amount too low or DEF quality</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>NOx emissions too high</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>SCR catalyst malfunction</li> <li>EGR mass flow failure</li> <li>SCR inlet temperature sensor</li> </ul>
FMI 17	<ul style="list-style-type: none"> <li>Data valid but below normal operating range - Least severe level</li> </ul>	<ul style="list-style-type: none"> <li>Dosing failure</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) dosing amount too low or DEF quality</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>NOx emissions too high</li> </ul>	<ul style="list-style-type: none"> <li>NOx sensor</li> <li>SCR catalyst malfunction</li> <li>EGR mass flow failure</li> <li>SCR inlet temperature sensor</li> </ul>

## ECM SPN 5485, Aftertreatment Diesel Exhaust Fluid (DEF) Pump Orifice – MID 128 PSID 121

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 11	<ul style="list-style-type: none"> <li>Root cause not known</li> </ul>	<ul style="list-style-type: none"> <li>Aftertreatment Diesel Exhaust Fluid (DEF) bleed orifice clogged</li> </ul>	<ul style="list-style-type: none"> <li>MIL illuminated</li> <li>Yellow electronic malfunction lamp illuminated</li> <li>No Aftertreatment Diesel Exhaust Fluid (DEF) dosing</li> </ul>	<ul style="list-style-type: none"> <li>Bleed orifice</li> <li>Aftertreatment Diesel Exhaust Fluid (DEF) pressure sensor</li> </ul>







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