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Service Information System

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Troubleshooting

793F and 797F Off-Highway Trucks VIMS, Monitoring, and Payload

Media Number -KENR9023-08

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i06546188

Diagnostic Code List

SMCS - 7569

Use the Cat® Electronic Technician (Cat ET) service tool or the Advisor to determine the diagnostic codes. After determining the diagnostic codes, refer to the corresponding test procedure for more information. Perform the procedure that corresponds to the Component Identifier (CID) and the Failure Mode Identifier (FMI) of the diagnostic code. Table 1 is a list of possible diagnostic codes for the VIMS™ 3G Main Electronic Control Module (ECM). Table 2 is a list of possible diagnostic codes for the VIMS 3G Application ECM.

Table 1	
Diagnostic Codes For the VIMS 3G Main ECM (MID 161) <sup>(1)</sup>	
Perform the procedure that corresponds to the CID and the FMI of the diagnostic code during troubleshooting.	
CID / FMI	Description
CID 0168 Electrical System Voltage	
FMI 01	Data valid but below normal operating range
FMI 03	Voltage Above Normal
CID 0246 Proprietary CAN Data Link	
FMI 09	Abnormal Update Rate
CID 296 Transmission Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 0533 Brake Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 0590 Engine Control	
FMI 09	Abnormal Update Rate
FMI 12	Bad device or component
CID 768 RS-485 Data Link	
FMI 09	Abnormal Update Rate
CID 800 VIMS Main Control	
FMI 11	Configuration File Needed
CID 0890 Telemetry Data Link	
FMI 09	Abnormal Update Rate
CID 1089 VIMS Application Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 1273 Chassis Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 2448 Graphical Display Module	
FMI 02	Data erratic, intermittent, or incorrect
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction

<sup>(1)</sup> The MID for the VIMS 3G Main ECM is 161. This table pertains only to faults with a MID of 161.

Table 2	
Diagnostic Codes For the VIMS 3G Application ECM (MID 162) <sup>(1)</sup>	
Perform the procedure that corresponds to the CID and the FMI of the diagnostic code during troubleshooting.	
CID / FMI	Description
CID 0246 Proprietary CAN Data Link	
FMI 09	Abnormal Update Rate
CID 0296 Transmission Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 0533 Brake Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 0590 Engine Control	

FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 768 RS-485 Data Link	
FMI 09	Abnormal Update Rate
CID 800 VIMS Main Control	
09	Abnormal Update Rate
14	Special Instruction
CID 0838 Left Front Strut Pressure Sensor	
FMI 03	Voltage Above Normal
FMI 04	Voltage Below Normal
FMI 08	Abnormal Frequency, Pulse Width, or Period
CID 0839 Right Front Strut Pressure Sensor	
FMI 03	Voltage Above Normal
FMI 04	Voltage Below Normal
FMI 08	Abnormal Frequency, Pulse Width, or Period
CID 0840 Left Rear Strut Pressure Sensor	
FMI 03	Voltage Above Normal
FMI 04	Voltage Below Normal
FMI 08	Abnormal Frequency, Pulse Width, or Period
CID 0841 Right Rear Strut Pressure Sensor	
FMI 03	Voltage Above Normal
FMI 04	Voltage Below Normal
FMI 08	Abnormal Frequency, Pulse Width, or Period
CID 0890 Telemetry Data Link	
FMI 09	Abnormal Update Rate
CID 1089 VIMS Application Control	
FMI 11	Configuration File Needed
CID 1273 chassis Control	
FMI 09	Abnormal Update Rate
FMI 14	Special Instruction
CID 2183 Payload Monitoring System	
FMI 13	Out of Calibration

(1) The MID for the VIMS 3G Application ECM is 162. This table pertains only to faults with a MID of 162.

Module Identifier (MID)

Diagnostics from other ECM are read by the monitoring system. Other ECM will transfer diagnostic information on the Cat Data Link to the monitoring system.

The Module Identifier (MID) identifies the ECM that detected the fault. Each ECM on the machine has a unique MID. Use Table 3 to match the MID for each diagnostic code to a specific ECM. The chart for the Module Identifier (MID) is on the Electrical System Schematic for your machine. Refer to the chart on the schematic if the MID is not shown on the display of your machine. After the operator determines the ECM that has detected the failure, refer to the service manual module for that particular ECM for more troubleshooting information. The Service Manual for the machine will include troubleshooting information for the ECM.

Table 3

Description of the Module Identifier	
MID	Description
036	Engine ECM
053	Advisor
087	Chassis ECM
116	Brake ECM
161	VIMS Main ECM
162	VIMS Application ECM

Failure Mode Identifier

The codes for the Failure Mode Identifier (FMI) are defined by the Society Of Automotive Engineers Inc. (SAE). The Table 4 contains the CAT definitions for the FMI. Diagram 1 illustrates FMI codes that can be generated from a sensor that has failed.

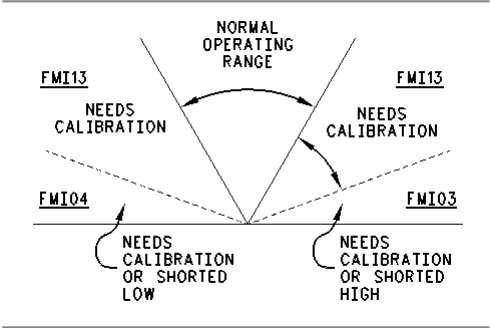


Illustration 1  
Range of possible FMI codes generated from a failed sensor.

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Table 4

Failure Mode Identifier Definitions	
FMI	"Failure Description"
00	"Data valid but above normal operating range"
01	"Data valid but below normal operating range"
02	"Data erratic, intermittent, or incorrect"
03	"Voltage above normal or shorted high"
04	"Voltage below normal or shorted low"
05	"Current below normal or open circuit"
06	"Current above normal or grounded circuit"
07	"Mechanical system not responding properly"
08	"Abnormal frequency, pulse, or period"
09	"Abnormal update"
10	"Abnormal rate of change"
11	"Failure mode not identifiable"
12	"Bad device or component"
13	"Out of calibration"
14	Special Instruction

Detailed FMI Explanation

**FMI 00 Data Valid But Above Normal Operating Range** - Every electronic control system has a high limit setting for the expected operating range of the signal. The high limit includes over range signals. A sensor that is still operating but sending a signal above the expected limit will cause an FMI 00 to be recorded.

Following are some of the possible causes of an FMI 00:

- Signal is above normal
- Signal is shorted to the +battery circuit
- Sensor is out of calibration

The following is an example of a sensor that needs calibration. A PWM signal with an 80% duty cycle is a valid signal. If the PWM signal exceeds 80%, the sensor is still working but the signal from the sensor is above range.

**FMI 01 Data Valid But Below Normal Operating Range** - Every electronic control system sets a low limit for the expected operating range of the signal. A sensor may still be working but is sending a signal below the minimum range.

Following are some of the possible causes of an FMI 01:

- Signal is below the normal range
- Timing is incorrect

The following is an example of a PWM sensor. This sensor is not expected to generate a PWM signal below a duty cycle of 5% with 0 psi air pressure. A sensor that generates a signal with a duty cycle of 4% at 0 psi will work but the signal is below range. FMI 01 will be recorded for this condition.

**FMI 02 Data Erratic, Intermittent, or Incorrect** - The signal from a component is present. The control that reads the diagnostic information cannot read the signal properly. The signal appears to be unstable or invalid. The data can be intermittent. This condition can relate to communication between controls.

Following are some of the possible causes of an FMI 02:

- Failed connection.
- Signal is intermittent or erratic.
- Software has been changed.
- Signal is noisy.
- Signal is out of range.

**FMI 03 Voltage Above Normal or Shorted High** - The component or system voltage is higher than the limit. FMI 03 most often relates to a signal circuit.

Following are some of the conditions that could cause an FMI 03:

- Sensor or switch failure
- Harness damage
- ECM failure

Following are some of the possible causes of an FMI 03:

- Sensor has failed and the voltage output is high.
- Wiring harness has a sensor signal wire shorted to a high voltage.
- Wiring harness has an open circuit in the sensor signal wire.
- Control failure.

**FMI 04 The Voltage is Below Normal or the Voltage is Shorted Low** - The component or system voltage is lower than the limit. FMI 04 most often relates to a signal circuit.

Following are some of the conditions that could cause an FMI 04:

- Sensor or switch failure
- Harness damage
- ECM failure

Following are some of the possible causes of an FMI 04:

- Sensor has failed and the voltage output is low.

- Wiring harness has a sensor signal wire shorted to ground.
- ECM failure.

**FMI 05 Current Below Normal or Open Circuit** - The current through the component or the system is lower than the limit. FMI 05 is most often related to a driver circuit.

Following are some of the possible causes of an FMI 05:

- Open circuit or a poor harness connection.
- Open relay.
- Switch in the open position.

**FMI 06 Current Above Normal or Grounded Circuit** - The current through the component or the system is higher than the limit. FMI 06 is most often related to a driver circuit. This fault is like the FMI 04.

Following are some of the possible causes of an FMI 06:

- Harness connection short to ground
- Shorted relay
- Failed control

**FMI 07 Mechanical System Not Responding Properly** - The control detects a signal that is sent to a mechanical system and the response is not correct.

Following are some of the possible causes of an FMI 07:

- Component responds improperly.
- Component is stuck in a position.
- Component failure.
- Engine shutdown.
- Machine being used improperly.

**FMI 08 Abnormal Frequency, Pulse Width, or Period** - FMI 08 occurs when the signal is not in the expected range. FMI 08 can also relate to a faulty sensor.

Following are some of the possible causes of an FMI 08:

- Harness connections are intermittent or poor.
- Engine misfire.
- Signal is noisy due to nearby interference.
- Loose mechanical devices.

**FMI 09 Abnormal Update** - FMI 09 relates to communications on the data link. FMI 09 occurs when a control is not able to get information from another control.

Following are some of the possible causes of an FMI 09:

- Control module not communicating on the data link correctly.
- Rate of data transmission is abnormal.
- Data link failure.
- Software mismatch.

**FMI 10 Abnormal Rate of Change** - FMI 10 relates to a signal that changes too fast. The rate of change is outside of the expected limit.

**FMI 11 Failure Mode Not Identifiable** - The control identifies more than one FMI as being responsible for a single failure.

Following are some of the possible causes of an FMI 11:

- Mechanical failure
- Damage to multiple circuits

**FMI 12 Bad Device or Component** - The electronic control sends a signal and the electronic control expects a response. The control receives no response or the response is incorrect.

Following are some of the possible causes of an FMI 12:

- Electronic control failure
- Data link failure
- Software mismatch on one or more controls

**FMI 13 Out of Calibration** - The electrical signal is not within limits for a specific mechanical condition.

Following are some of the possible causes of an FMI 13:

- Calibration required.
- Out-of-range data

**FMI 14 Special Instruction** - FMI 14 is used to report a problem in the configuration between two ECMs. FMI 14 may occur even when the two ECMs are sending and receiving all the correct parameters. The software in the two ECMs may not be correct. The software for the ECMs must be updated.