Solution K47547856
Monday, April 27, 2020 7:28:31 PM CEST

** SOLUTION **

Title	Particulate Matter (PM) Sensor Diagnostic Trouble Codes (DTC) Illuminating The Malfunction Indicator Lamp (MIL) - US14+OBD16, US17+OBD16 And Newer Emissions, Model Year 2017 And Newer - To Be Used For EVERY Visit

Mack Models

Mack Model	LR , MRU - TerraPro , TE - TerraPro , AN - Anthem , CHU - Pinnacle, Axle back , C XU - Pinnacle, Axle front , GR - Granite , GU - Granite , PI - Pinnacle , TD - Titan

Volvo Models

Volvo Model	VNL , VNM , VNR , VNX , VAH , VHD

Emission Standard

Emission Standard	US14+OBD16 , US17+OBD16 , US17+OBD18 , US17+OBD19

Engine family

Engine family	11L Engine , 13L Engine , 16L Engine , MP7 , MP8 , MP10

** SOLUTION **

Cause

With the implementation of US14+OBD16 Emissions controls (Model Year 2017), a new sensor was required to monitor particulate matter (PM)—soot—levels in exhaust that has already passed through the Emissions Aftertreatment System. Excessive particulate levels at this stage can indicate a damaged or failed Diesel Particulate Filter (DPF). **The PM sensor's only purpose is monitoring and is not used in any EATS (regeneration and NOx conversion) functions. Codes set by the sensor will not affect performance or cause a Derate.**

The PM sensor is located after the exhaust muffler (SCR) and very close to NOx sensor after the SCR (NOx2).

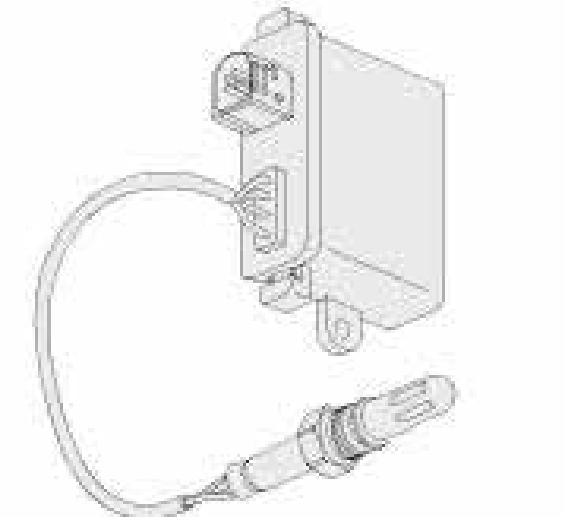
Solution

This Solution is relevant regardless of previous visits and sensor replacements. At this time, multiple sensor failures are not uncommon, regardless of how new the sensor is. The same procedure should be followed for every instance.

PLEASE NOTE: Instructions have been updated as of 20 June 2019. If diagnostics indicate that sensor replacement is required, please follow FSB 284 - 068 Exhaust Particulate Sensor, Repair (2016) or FSB 284 - 069 (2017) Exhaust Particulate Sensor, Repair. An eService case is not required

Precautions

1. The PM sensor is a smart sensor (12V supply and CAN lines) **with an orientation tab as seen below:**



Installation torque of 50 Nm +/- 5 Nm

2. PM sensors need to be handled carefully. Dropping them most likely results in permanent damage to the sensor. Keep cap on the sensor until ready to install the sensor to avoid any contamination.

3. NEVER (DO NOT) apply anti-seize to install the PM sensor. *If for some reason someone applied it before this repair, thoroughly clean the threads and sealing surfaces while replacing the sensor*.

4. A removed PM sensor should be capped immediately (cap from replacement sensor) and packaged carefully, if returning to warranty or investigation purposes.

Repair

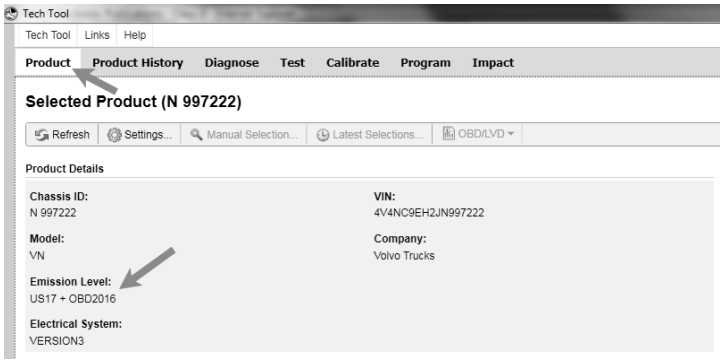
IMPORTANT:

• If a chassis arrives with a derate warning active, the PM sensor is <u>not</u> the source of the derate and there is a separate existing issue.

• Prior to installing a new sensor for any of the steps below, gently shake the sensor and ensure it does not rattle. If noise is heard, another sensor should be used.

1. Verify the chassis emissions level

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



• **For US17+OBD16 (Common Rail Fuel System) Chassis setting DTCs P24DA or P1031 ONLY**:

- Software improvements have been released to address this code. Refer to CBR Solution K00527512.

• **For US17+OBD16 Chassis setting any other codes for the PM Sensor,** Proceed with instructions below.

• **For US14+OBD16 (Commonly 2017 model year):** Proceed with instructions below.

2. Check the DTC Status

Only troubleshoot PM sensor faults if the fault is *Active* or *Confirmed* as shown below.

3. Follow the set of instructions for the relevant DTC(s):

• **P1033, P1034, P24D0 or U02A3 fault codes (*Confirmed* or *Active*)**

- These PM sensor fault codes require connections and wiring harness checks for power supply and CAN communications.

- **If any of the above faults are present:**

1. Ensure that there is no damage to the sections of the DPF the wiring harness that the PM sensor wires run through.
2. Disconnect the PM sensor connector and the FCEIC connector.
3. Ensure there is no damage to the pins in either connector, and check that there is good pin tension (drag test).
4. Thoroughly clean both connectors and reconnect them.
5. Test drive the vehicle to ensure the issue does not return.

- **P1031 and P24DA (both fault codes and only these fault codes *Active*)**

  - **If the vehicle has PM sensor part number 22733524 or older:**

    1. Replace the PM sensor with the latest part. Gently shake the new sensor to ensure it does not rattle.
       NOTE: A sensor that rattles should **not** be installed.
    2. Update the Engine Control Module (EMS) software and clear all codes.
    3. Release the vehicle.

  - **If the PM sensor is the current part number:**

    1. Verify that the EMS software is current.
    2. Remove the sensor from the exhaust.
    3. Obtain a new sensor. Gently shake the new sensor to ensure it does not rattle.
       NOTE: A sensor that rattles should **not** be installed.
    4. Install the new sensor.
    5. Clear the DTCs and release the vehicle.

- **All other PM sensor fault codes (*Confirmed* or *Active*)**

P24B3, **P24AF**, P2AB0, P24B1, P24B0, **P24DA**, P24B7, P24B5, P24D1, P24FC, **P24AE**, P24B4, and P1032. (Highlighted are common faults).

1. Verify that the EMS software is current.
2. Remove the sensor from the exhaust.
3. Obtain a new sensor. Gently shake the new sensor to ensure it does not rattle.
   NOTE: A sensor that rattles should **not** be installed.
4. Install the new sensor.
5. Clear the DTCs and release the vehicle.

Internal comments (BO)	• **If a Diagnostic Monitor fails, DO NOT PERFORM A REGEN . Perform the following steps:** 1. Turn the vehicle's ignition OFF. 2. Restart Premium Tech Tool. 3. Reconnect to the vehicle with PTT. 4. Start the engine. 5. Rerun the Diagnostic Monitor.
NA_Sister solutions	K00527512, K14122525, K59554255
Campaign code	FSB284-067
Solution visibility	Dealer distribution

Function(s)/component(s) affected

Function affected	1 1 0 EMS , 2 1 0 ACM , TT , DPF , SCR

Function Group

Function Group	254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 2846 Sensor

Customer effect

Main customer effect	soot , diagnostics/methodology , fault code/display

Fault Codes And Error Codes

OBDII Diagnostic Trouble Codes (P, U, B Format)	P1031 , P1032-00 , P1033-00 , P1034-00 , P249C-00 , P24AE-13 , P24AF-00 , P24B0-00 , P24B1-00 , P24B3-13 , P24B4-92 , P24B5-00 , P24B7-00 , P24D0-00 , P24D1-00 , P24DA-00 , P24FC-00 , P2AB0-47

Administration

Author	ut01793
Last modified by	RU4469V
Creation date	09-12-2016 22:12
Date of last update	01-04-2020 22:04
Review date	15-04-2018 00:04
Status	Published
Average score	2.3636362552642822
Number of scores	11

Solution K00527512
Monday, April 27, 2020 7:29:14 PM CEST

** SOLUTION **

Title	Mack Chassis - Vehicles Equipped With A Vertical Selective Catalytic Reduction (SCR) System - Diagnostic Trouble Codes (DTC) P1031 With Possible P24DA Lighting The Malfunction Indicator Lamp (MIL) - US17+OBD16 (GHG17, Common Rail Fuel System) Emissions, Commonly Model Year 2018

Mack Models

Mack Model	LR , MRU - TerraPro , CHU - Pinnacle, Axle back , CXU - Pinnacle, Axle front , GU - Granite

Emission Standard

Emission Standard	US17

Engine family

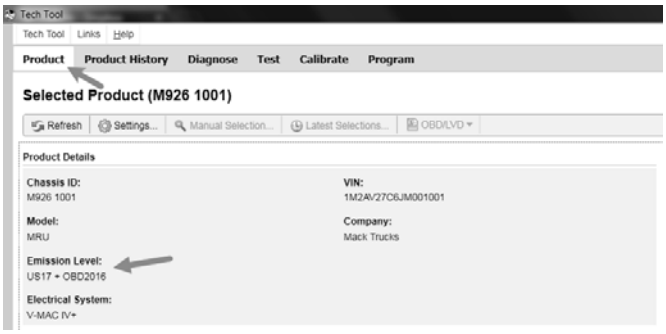
Engine family	MP7 , MP8

** SOLUTION **

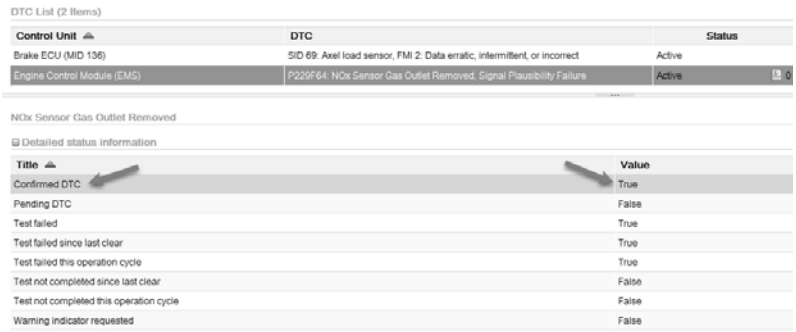
Cause	Fault Code P1031 - Particulate Matter (PM) Sensor Clogged Tip may occur in GHG17 vehicles that are equipped with a vertical SCR catalyst. P1031 may be accompanied by P24DA - PM Sensor Exhaust Sample Error. When the Confirmed DTC status is checked in Detailed Fault Information from the Diagnose screen in Premium Tech Tool (PTT), status will show True.
Solution	**DO NOT Replace the PM sensor for P1031 and/or P24DA on vehicles configured as described above prior to performing the steps below.**

Verify the chassis emissions level

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



Review the Detailed Status Information for the relevant code on the DTC Readout.



DTC List (2 Items)

Control Unit	DTC	Status
Brake ECU (MID 136)	SID 69: Axel load sensor, FMI 2: Data erratic, intermittent, or incorrect	Active
Engine Control Module (EMS)	P229F64: NOx Sensor Gas Outlet Removed, Signal Plausibility Failure	Active

NOx Sensor Gas Outlet Removed

Detailed status information

Title	Value
Confirmed DTC	True
Pending DTC	False
Test failed	True
Test failed since last clear	True
Test failed this operation cycle	True
Test not completed since last clear	False
Test not completed this operation cycle	False
Warning indicator requested	False

Once the chassis is confirmed to be US17+OBD16 or US17+OBD18:

Software improvements have been made that address this DTC. There are two documents that should be reviewed:

1. Product Improvement PI0883 Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Software Updates was released July 2018. This product improvement should appear under the Campaigns section of the Product screen of Premium Tech Tool (PTT) when first connecting to the vehicle. **Applicability to this campaign should be checked first.**

- The Service Program document can be found on the dealer Mack Trucks eMedia.
  - **Note:** There will be a prompt to sign in to the Trucks Dealer Portal site if necessary.
  - Searching for PI0883 will return a link to the bulletin.
- **If the PI applies to the product it is not necessary to proceed to the Field Service Bulletin below.**

2. Field Service Bulletin FSB 284-067 Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Reprogramming has been released and should be reviewed if the Product Improvement does not apply to the vehicle.

- The FSB document can be found on Mack Trucks eMedia or under the Service tab in Impact.
  - Searching for 284-067 will return a link to the document in either application.

3. If either of the above documents applied and there are no other issues present, the vehicle should be released when software updates have been completed.

If software is current according to the bulletin, refer to CBR Solution K59554255 for more information.

If other symptoms or related codes are present, normal diagnostics will need to be performed to determine the cause.

NA_Sister solutions	K14122525, K47547856, K59554255
Campaign code	FSB284-067
Solution visibility	Dealer distribution

Function(s)/component(s) affected

Function affected	1 1 0 EMS , 2 1 0 ACM , Diagnostic tool , FSB , DPF , SCR

Function Group

Function Group	254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 284 control system, fuel supply

Customer effect

Main customer effect	soot , calibration/programming/pairing/missing operation , diagnostics/methodology , f ault code/display

Fault Codes And Error Codes

OBDII Diagnostic Trouble Codes (P, U, B Format)	P1031 , P1031-00 , P24DA-00

Conditions

Vehicle operating mode	when driving , when stationary
Frequency of occurrence of problem	random

Administration

Author	RU4469V
Dealer ID	RU4469V
Last modified by	RU4469V
Creation date	30-04-2018 16:04
Date of last update	13-07-2018 21:07
Review date	31-03-2019 00:03
Status	Published
Average score	0
Number of scores	2
NA_Reviewer	ut0031h
NA_Author_Group	GTT

Solution K14122525
Monday, April 27, 2020 7:34:00 PM CEST

** SOLUTION **

Title	Volvo Chassis - Vehicles Equipped With A Vertical Selective Catalytic Reduction (SCR) System - Diagnostic Trouble Codes (DTC) P1031 With Possible P24DA Lighting The Malfunction Indicator Lamp (MIL) - US17+OBD16 (GHG17, Common Rail Fuel System) Emissions, Commonly Model Year 2018

Volvo Models

Volvo Model	VNL , VNR , VNX , VAH , VHD

Emission Standard

Emission Standard	US17

Engine family

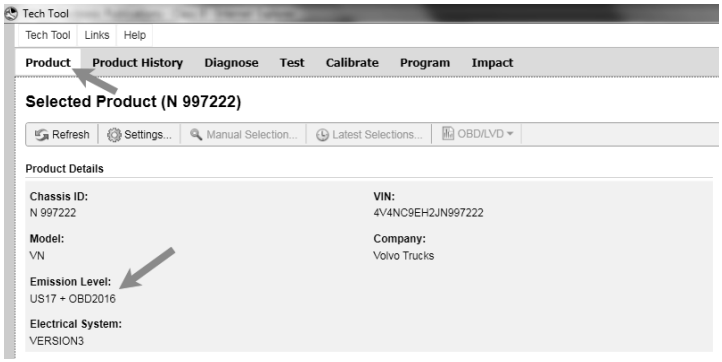
Engine family	11L Engine , 13L Engine

** SOLUTION **

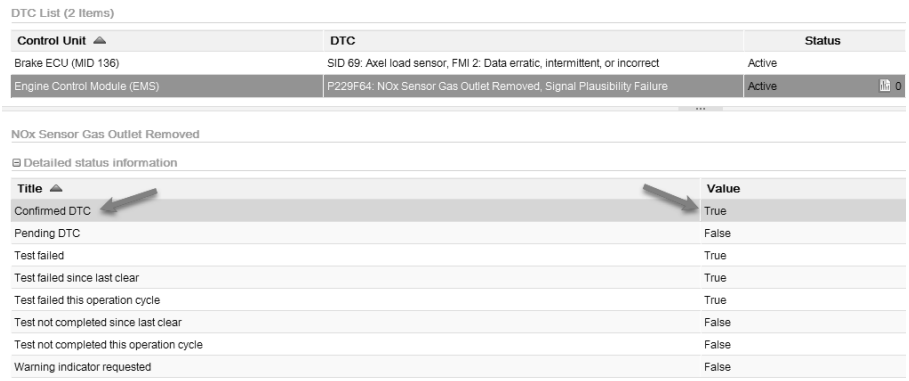
Cause	Fault Code P1031 - Particulate Matter (PM) Sensor Clogged Tip may occur in GHG17 vehicles that are equipped with a vertical SCR catalyst. P1031 may be accompanied by P24DA - PM Sensor Exhaust Sample Error. When the Confirmed DTC status is checked in Detailed Fault Information from the Diagnose screen in Premium Tech Tool (PTT), status will show True.
Solution	**DO NOT Replace the PM sensor for P1031 and/or P24DA prior to performing the steps below.**

Verify the chassis emissions level

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



Review the Detailed Status Information for the relevant code on the DTC Readout.



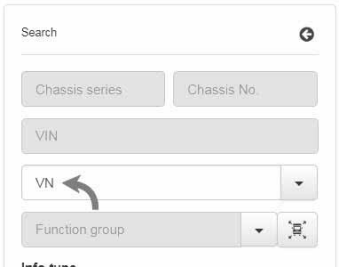
Once the chassis is confirmed to be US17+OBD16 or US17+OBD18:

- Software improvements have been released to address this code.
- Refer to FSB 284-067 Engine Control Module (EMS) and Aftertreatment Control Module (ACM), Reprogramming.

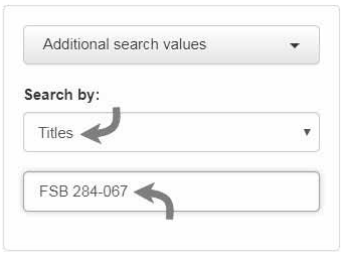
• The bulletin can be found under the Service tab in Impact by searching for either the FSB number, or by reviewing the articles under Function Group 284.

• If the article does not appear when searched with either VIN or Chassis information entered, search by model:

1. Clear any chassis information from the Search box.
2. Select or enter VN as the model.



3. Make sure Title is selected in the Search By field. Enter "FSB 284-067" in the text entry field.



4. Press the Search button. The operation will appear in the results window.

Fgrp	Title	Info type	ID/Operation
284	FSB 284-067, Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Reprogramming	Repair	2841-22-09-19

5. Mutiple article choices will appear. Find the Operation for the correct Chassis.

Note: It is possible that more than one choice will have the same title (as shown below). Despite having the same title, the Operations are different and should be reviewed to locate the correct procedure.

6. Following software updates, perform Operation 2589-08-03-17 After-treatment Particulate Sensor, Diagnostic Monitor found under the Test tab in Premium Tech Tool (PTT) to verify that there are no further issues.

If software is current according to the bulletin, refer to CBR Solution K47547856 for further information.

If other symptoms or related codes are present, normal diagnostics will need to be performed to determine the cause.

NA_Sister solutions	K00527512, K59554255, K47547856
Campaign code	FSB284-067
Solution visibility	Dealer distribution

Function(s)/component(s) affected

Function affected	1 1 0 EMS , 2 1 0 ACM , Diagnostic tool , FSB , DPF , SCR

Function Group

Function Group	254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 284 control system, fuel supply

Customer effect

Main customer effect	soot , calibration/programming/pairing/missing operation , diagnostics/methodology , f ault code/display

Fault Codes And Error Codes

OBDII Diagnostic Trouble Codes (P, U, B Format)	P1031 , P1031-00 , P24DA-00

Conditions

Vehicle operating mode	when driving , when stationary
Frequency of occurrence of problem	random

Administration

Author	UT0031H
Dealer ID	UT0031H
Last modified by	RU4469V
Creation date	27-04-2018 16:04
Date of last update	18-06-2018 15:06
Review date	31-03-2019 00:03
Status	Published
Average score	3
Number of scores	1
NA_Reviewer	ut0031h
NA_Author_Group	GTT