Special Instruction
SPN 731 FMI 16/18 Knock Detected for CAT CT11 and CT13 Engines{7000}
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SPN 731 FMI 16/18 Knock Detected for CAT CT11 and CT13 Engines{7000}

SMCS - 7000

On Highway Truck:
 CT660 (S/N: TGA1-UP; TGD1-UP; TJD1-UP; TEJ1-UP; TRK1-UP; TKL1-UP; TEM1-UP; TEP1-UP; TGR1-UP; TGS1-UP; TJS1-UP; TGT1-UP; TGW1-UP; TSW1-UP; TEY1-UP; TSY1-UP; TEZ1-UP; TGZ1-UP)

Introduction

The following procedure is for troubleshooting the SPN 731 FMI 16/18 knock detected diagnostic code.

Introduction

Table 1

SPN	FMI	Description
731	18	Knock detected: unexpected fueling without demand
731	16	Knock detected: cylinder acceleration above normal

What the driver will see when fault code sets:

- Stop engine lamp illuminated

- Audible alarm sounding due to stop engine lamp

- Engine shutdown without turning the ignition key off

- After a key cycle continued stop engine lamp illumination an audible alarm

SPN 731-18 Knock Detected: Unexpected Fueling without Demand

Table 2

Condition / Description	Setting Criteria	Enable Conditions/ Values

Condition / Description	Setting Criteria	Enable Conditions/ Values
The monitoring of fuel quantity needed to maintain engine speed.	An increase in engine speed with no increase or a drop in fuel quantity demands.	· Vehicle speed = 0 · Engine speed > 500 rpm <1600 rpm and engine low idle speed set point is stable (no rapid accelerations of RPM) · Accelerator pedal = stable (No rapid movements) · Manual transmission clutch pedal = not depressed · Engine coolant temperature is greater than −9° C (15.8° F) and less than 120° C (248° F)
		None of the following active faults can be present: · Engine coolant sensor faults · Accelerator pedal position (APP) sensor faults · Clutch switch faults · Transmission gear faults · Crankshaft position (CKP) / camshaft position (CMP) sensor faults · Vehicle speed sensor (VSS) faults

SPN 731 FMI 16 Knock Detected: Cylinder Acceleration Above Normal

Table 3

Condition / Description	Setting Criteria	Enable Conditions/ Values
		· Vehicle speed = 0 · Engine speed > 500 rpm <1600 rpm and engine low idle speed set point is stable (no rapid accelerations of RPM) · Accelerator pedal = stable (No rapid movements)

The monitoring of crank shaft velocity of power cylinders using crankshaft position (CKP) sensor	An increase in Crankshaft Velocity without an increase in demanded.	· Manual transmission clutch pedal = not depressed · Engine coolant temperature is greater than −9° C (15.8° F) and less than 120° C (248° F)
		Monitor is enabled during the operating modes and conditions listed below · Normal operation · Stationary regeneration · High-altitude operation · Medium-altitude operation · Sea-level operation · Power take-off (PTO) operation
		None of the following active faults can be present: · Engine coolant temperature(ECT) sensor faults · Clutch switch faults · Vehicle speed sensor (VSS) faults

Related Fault Codes

Table 4

SPN	FMI	Description	Decision
190	0	Engine over speed most severe level	Reference media number UENR1846 for troubleshooting this code.
190	11	Engine over speed vehicle event fault	Continue with SPN 731 FMI 16/18 diagnostics
190	15	Engine over speed detected	Continue with SPN 731 FMI 16/18 diagnostics

Troubleshooting

Note: This procedure MUST be followed anytime the SPN 731 FMI 16 or SPN 731 FMI 18 is logged. If DTC was cleared without a key cycle, it will clear the fault display. However the monitor in the ECM can still be active allowing for reappearance of the fault, stop engine lamp, and shut down.

Table 5

Step	Action	Decision
1	Remove boost air piping and inspect piping for signs of oil. Are signs of oil present?	·**Yes**- Using turbocharger cartridge, repair High-Pressure (HP) turbocharger (Refer to REHS9168). ·**No** - Proceed to **Step 2**
2	Verify repair history with truck owner, and by searching the warranty history. Has the truck recently been repaired for a failed turbocharger?	·**Yes** - Go to **Step 3** ·**No**- Go to **Step 4.**
3	Verify that all injectors were replaced at the same time as turbocharger replacement. Were all injectors replaced at the same time as turbocharger replacement?	·**Yes** - Go to **Step 4** ·**No**- Replace injectors not replaced at time of failure and retest for SPN 731 FMI 16 and SPN 731 FMI 18.
4	Test drive vehicle at low-idle creep. In the event that vehicle speed does not register when the vehicle is motion, the monitor for the 731 fault codes will see the vehicle in a parked state. This will cause the fault to set while the vehicle is in motion. · For a manual transmission, select the lowest gear in the transmission. Release the parking brake and slowly let out on the clutch. Only allow engine idle speed to drive the truck (600 - 650 RPM). · For Automatic transmissions, put the gear selector into manual mode and lock it into the lowest gear available. Use the accelerator pedal to engage transmission. Only allow engine idle speed to drive the truck (600 - 650 RPM). · Monitor the vehicle speed using Personal Computer (PC) with engine diagnostic software.	·**Yes** - Go to **Step 5** ·**No**- Troubleshoot the VSS reporting issue.
5	Vehicle build dates within 8/1/2011 and 11/1/2011 are subject to a possible flywheel machining issue.	·**Yes** - Submit a case file referencing the fault code logged and a possible flywheel issue. A tool will need to be shipped out to check the timing.

Is the vehicle build date with this range?	·**No** - Submit a case file to Dealer Solutions Network (DSN)

Clearing SPN 731 FMI 16/18 Fault Codes

- Connect truck to PC with diagnostic engine software through the nine pin diagnostic port

- Turn ignition key ON, engine OFF.

- Clear fault codes

- Turn ignition key OFF

- Wait 30 seconds, allowing Engine Control Module (ECM) to time out (no engine communication on j1939.

- Turn ignition key ON, engine OFF. Verify that there are no DTCs present.

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