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Service Information Bulletin

SUBJECT	DATE
SPN 102 (MCM) (GHG14)	August 2014

Additions, Revisions, or Updates

Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0084	GHG14 DD Platform	SPN 102/FMI 16 - GHG14	This is an updated section with new diagnostics including software level.
		SPN 102/FMI 18 - GHG14	



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2 SPN 102/FMI 16 – GHG14

Intake Manifold Pressure Too High

Table 1.

SPN 102/FMI 16 - GHG14			
Description	Intake Manifold Pressure Over-boost Detected		
Monitored Parameter	Intake Manifold Pressure		
Typical Enabling Conditions	General Enabling Condition: Engine is in normal mode (not regen), steady state operation (highway cruise operation)		
	Specific Enabling Conditions: See table below		
	Engine Parameter	Min	Max
	Engine Speed (rpm)	1130	1810
	Engine Torque; N·m (lb·ft)	1100 (811)	
	Intake Air Throttle Position (%)		5
	Engine Coolant Outlet Temperature °C (°F)	65 (149)	
	Barometric Pressure (mbar)	755	
	Ambient Temperature °C (°F)	-8 (17.6)	
	Engine Speed Gradient (rpm/s)	-10	10
	Fuel Mass Gradient ((mg/stroke)/s)	-10	10
Monitor Sequence	None		
Execution Frequency	Continuous when enabling conditions met		
Typical Duration	15 Seconds		
Dash Lamps	MIL, CEL		
Engine Reaction	None		
Verification	Once engine is at standard operating temperature, drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes.		

Check as follows:

1. Turn the ignition ON (key ON, engine OFF).
2. Check for other fault codes. Are any other fault codes present?
 - a. Yes; repair those faults first.
 - b. No; Go to step 3.
3. Check the Motor Control Module (MCM) software level. Compare the current MCM software level to the server. Is the MCM software at the latest level?
 - a. Yes; Go to step 4.
 - b. No; update the MCM software level and perform the verification procedure in the table above. If the fault code does not return, release the vehicle. If the fault code returns or if unable to duplicate verification cycle, Go to step 4.
4. Inspect the front grill for air blockage including winter fronts, plows, or large hose reels. Is any blockage found?
 - a. Yes; repair as needed.
 - b. No; Go to step 5.
5. Inspect hood seals. Are seals missing or damaged?
 - a. Yes; repair as needed.
 - b. No; Go to step 6.
6. Using DiagnosticLink[®], measure barometric pressure. Is barometric pressure above 69 kPa (10 psi) and below 110 kPa (16 psi)?

- a. Yes; Go to step 7.
 - b. No; replace the MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
7. Measure the inlet manifold pressure and the barometric pressure. Is the inlet manifold pressure within 10.3 kPa (1.5 psi) of barometric pressure?
 - a. Yes; Go to step 10.
 - b. No; Go to step 8.
8. Disconnect the inlet manifold pressure sensor harness connector.
9. Inspect the inlet manifold pressure sensor and harness connector for signs of damaged, bent, spread, corroded or unseated (pushed out) pins and signs of moisture in the connector or wire damage near the connector. Is any damage present?
 - a. Yes; repair as necessary.
 - b. No; replace the inlet manifold pressure sensor. Refer to section "Installation of the Intake Manifold Pressure/Temperature Sensor".
10. Check for engine type. Is engine equipped with an asymmetrical turbocharger?
 - a. Yes; Go to step 11.
 - b. No; Go to step 19.
11. Turn the ignition OFF.
12. Inspect the wastegate actuator and the plumbing to and from the actuator. Verify wastegate opens and closes. Is any binding or damage found?
 - a. Yes; repair as necessary.
 - b. No; Go to step 13.
13. Inspect the air line connection to the wastegate solenoid for leaks. Are any air leaks found?
 - a. Yes; repair or replace as necessary.
 - b. No; Go to step 14.
14. Turn the ignition ON (key ON, engine OFF).
15. Using DiagnosticLink, activate wastegate control from Service Routines Activate Outputs Panel. Run slide control up to 95% - (Click Set). Wastegate will open with air psi available. Does wastegate open when commanded?
 - a. Yes; Go to step 16.
 - b. No; Go to step 17.

NOTE: Wastegate activates at 0% or 95%. There is no response at 50%.

16. Move slide control down to 0. Does wastegate close when commanded?
 - a. Yes; Go to step 23.
 - b. No; Go to step 17.
17. Disconnect the wastegate solenoid harness connector.
18. Inspect the wastegate solenoid and harness connector for signs of damaged, bent, spread, corroded or unseated (pushed out) pins and signs of moisture in the connector or wire damage near the connector. Is any damage found?
 - a. Yes; repair as necessary. Verify repair.
 - b. No; replace the wastegate solenoid.
Refer to section "Removal of the DD13 Wastegate Solenoid".
Refer to section "Removal of the GHG14 DD15 Asymmetrical Turbocharger Wastegate Solenoid".
Verify repairs. If fault code returns, Go to step 24.
19. Monitor Exhaust Gas Recirculation (EGR) delta P voltage (pin 109) (Turbo-Compound [TC] engine only).
20. Is the EGR delta P voltage between 0.55 and 0.83 volts (TC engine only)?
 - a. Yes; Go to step 23.
 - b. No; Go to step 21.
21. Remove the EGR delta P sensor from the mounting pad; leave electrical harness connected.
22. Is the EGR delta P voltage between 0.55 and 0.83 volts (TC engine only)?
 - a. Yes; Go to step 23.
 - b. a. No; replace the EGR delta P sensor. Refer to section "Removal of the Delta P Sensor". Verify repairs.
23. Turn the ignition OFF.
24. Inspect the EGR delivery pipe delta P pressure ports for blockage. Is any blockage found?

- a. Yes; clean the venturi pipe and reinstall the sensor. Go to step 26.
 - b. No; Go to step 25.
- 25. Remove the EGR cooler hot pipe, EGR crossover pipe and delivery pipe and inspect for excessive build-up or blockage. Is any excessive build-up or blockage found?
Refer to section "Removal of the Exhaust Gas Recirculation Hot Pipe".
Refer to section "Removal of the Exhaust Gas Recirculation Crossover Tube".
 - a. Yes; clean piping and replace EGR cooler. Verify repairs.
 - b. No; Go to step 26.
- 26. Disconnect the EGR valve actuator pull rod. Inspect the ball sockets on the pull rod for free movement. Do the sockets rotate or move freely?
 - a. Yes; Go to step 27.
 - b. No; replace the EGR valve actuator pull rod. Verify repairs.
For the DD13: Refer to section "Removal of the Exhaust Gas Recirculation Valve Actuator Pull Rod".
For the DD15 and DD16: Refer to section "Removal of the Exhaust Gas Recirculation Valve Actuator Pull Rod".

NOTE: Some resistance is normal; however, the actuator should not bind in any particular spot.

- 27. Physically move the EGR butterfly from stop-to-stop to check for full travel (some drag is normal). Verify EGR valve closes. Does the EGR butterfly move stop-to-stop?
 - a. Yes; reconnect the EGR valve actuator pull rod to the EGR valve and EGR actuator. Clear codes and retest vehicle. If fault returns, Go to step 28.
 - b. No; replace the EGR valve.
For the DD13: Refer to section "Removal of the Exhaust Manifold".
For the DD15 and DD16: Refer to section "Removal of the DD15 and DD16 Exhaust Gas Recirculation Valve".
- 28. Disconnect the MCM 120-pin connector.
- 29. Inspect the MCM 120-pin connector and the 120-pin harness connector for signs of corrosion, spread, unseated (pushed out) or damaged pins, connector seal for damage (signs of water or oil intrusion) or signs of wire damage. Is any damage found?
 - a. Yes; repair as necessary.
 - b. No; Go to step 30.
- 30. Install a test MCM and retest with verification cycle. Does fault code return?
 - a. Yes; Go to step 31.
 - b. No; replace MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
- 31. Install original MCM. Bring to operating temperature of 71°C (160°F). Road test the vehicle. Drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes. Does fault become active?
 - a. Yes; replace the MCM. Refer to section "Removal of the Motor Control Module".
 - b. No; release vehicle.

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Intake Manifold Pressure Too Low

Table 2.

SPN 102/FMI 18 - GHG14			
Description	Intake Manifold Pressure Lower than Expected Under a Load		
Monitored Parameter	Intake Manifold Pressure		
Typical Enabling Conditions	General Enabling Condition: Engine is in normal mode(not regen), steady state operation(highway cruise operation)		
	Specific Enabling Conditions: See table below		
	Engine Parameter	Min	Max
	Engine Speed (rpm)	1130	1810
	Engine Torque; N·m (lb·ft)	1100 (811)	
	Intake Air Throttle Position (%)		5
	Engine Coolant Outlet Temperature °C (°F)	65 (149)	
	Barometric Pressure (mbar)	755	
	Ambient Temperature °C (°F)	-8 (17.6)	
	Engine Speed Gradient (rpm/s)	-10	10
	Fuel Mass Gradient ((mg/stroke)/s)	-10	10
Monitor Sequence	None		
Execution Frequency	Continuous when enabling conditions met		
Typical Duration	15 Seconds		
Dash Lamps	MIL, CEL		
Engine Reaction	None		
Verification	Once engine is at standard operating temperature, drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes.		

Check as follows:

1. Turn the ignition ON (key ON, engine OFF).
2. Check for other codes. Are any other fault codes present?
 - a. Yes; repair those faults first.
 - b. No; Go to step 3.
3. Check the Motor Control Module (MCM) software level. Compare the current MCM software level to the server. Is the MCM software at the latest level?
 - a. Yes; Go to step 4.
 - b. No; update the MCM software level and perform the verification procedure in the table above. If the fault code does not return, release the vehicle. If the fault code returns, Go to step 4.
4. Inspect the front grill for air blockage including winter fronts, plows, or large hose reels. Is any blockage found?
 - a. Yes; repair as needed.
 - b. No; Go to step 5.
5. Inspect hood seals. Are seals missing or damaged?
 - a. Yes; repair as needed.
 - b. No; Go to step 6.
6. Inspect the entire air intake system, including the Charge Air Cooler (CAC), for leaks and/or restrictions. Are any air intake system leaks or restrictions found?

- a. Yes; repair as necessary. Verify repairs. Retest with verification cycle; once engine is at standard operating temperature, drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes.
 - b. No; Go to step 7.
7. Using DiagnosticLink[®], measure barometric pressure. Is barometric pressure above 69 kPa (10 psi) and below 110 kPa (16 psi)?
 - a. Yes; Go to step 8.
 - b. No; replace the MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
8. Using DiagnosticLink, compare inlet manifold pressure to barometric pressure. Is the inlet manifold pressure within 10.3 kPa (1.5 psi) of barometric pressure?
 - a. Yes; Go to step 11.
 - b. No; Go to step 9.
9. Disconnect the inlet manifold pressure sensor harness connector.
10. Inspect the inlet manifold pressure sensor and harness connector for signs of damaged, bent, spread, corroded or unseated (pushed out) pins and signs of moisture in the connector or wire damage near the connector. Is any damage found?
 - a. Yes; repair as necessary. Verify repairs.
 - b. No; replace the inlet manifold pressure sensor. Refer to section "Removal of the Intake Pressure/Temperature Sensor". Verify repairs.
11. Visually inspect exhaust system for leaks or damage, including manifold, gaskets, turbine housing, Exhaust Gas Recirculation (EGR) valve, and Aftertreatment Device (ATD). Are any leaks found?
 - a. Yes; repair as necessary. Verify repairs. Retest with verification cycle; once engine is at standard operating temperature, drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes. If fault code returns, Go to step 12.
 - b. No; Go to step 12.
12. Check for engine type. Is engine equipped with an asymmetrical turbocharger?
 - a. Yes; Go to step 13.
 - b. No; Go to step 21.
13. Turn the ignition OFF.
14. Inspect the wastegate actuator and the plumbing to and from the actuator. Verify wastegate opens and closes. Is any binding or damage is found?
 - a. Yes; repair as necessary. Verify repairs.
 - b. No; Go to step 15.
15. Inspect the air line connection to the wastegate solenoid for leaks. Are any air leaks found?
 - a. Yes; repair or replace as necessary. Verify repairs.
 - b. No; Go to step 16.
16. Turn the ignition ON (key ON, engine OFF).
17. Using DiagnosticLink, activate wastegate control from Service Routines Activate Outputs Panel. Run slide control up to 95% - (Click Set). Wastegate will open with air psi available. Does wastegate open when commanded?
 - a. Yes; Go to step 18.
 - b. No; Go to step 19.

NOTE: Wastegate activates at 0% or 95%. There is no response at 50%.

18. Move slide control down to 0. Does wastegate close when commanded?
 - a. Yes; Go to step 25.
 - b. No; Go to step 19.
19. Disconnect the wastegate solenoid harness connector.
20. Inspect the wastegate solenoid and harness connector for signs of damaged, bent, spread, corroded or unseated (pushed out) pins and signs of moisture in the connector or wire damage near the connector. Is any damage found?
 - a. Yes; repair as necessary. Verify repairs.
 - b. No; replace the wastegate solenoid.
Refer to section "Removal of the DD13 Wastegate Solenoid".
Refer to section "Removal of the GHG14 DD15 Asymmetrical Turbocharger Wastegate Solenoid".
Verify repairs. If fault code returns, Go to step 25.

21. Monitor EGR delta P voltage (pin 109).
22. Is the EGR delta P voltage between 0.55 and 0.83 volts?
 - a. Yes; Go to step 25.
 - b. No; Go to step 23.
23. Remove the EGR delta P sensor from the mounting pad; leave electrical harness connected.
24. Is the EGR delta P voltage between 0.55 and 0.83 volts?
 - a. Yes; Go to step 25.
 - b. No; replace the EGR delta P sensor. Refer to section "Removal of the Delta P Sensor". Verify repairs.
25. Turn the ignition OFF.
26. Inspect the EGR delivery pipe delta P pressure ports for blockage. Is any blockage found?
 - a. Yes; clean the venturi pipe and reinstall the sensor. Verify repairs.
 - b. No; Go to step 27.
27. Remove the EGR cooler hot pipe, EGR crossover pipe and delivery pipe and inspect for excessive build-up or blockage. Is any excessive build-up or blockage found?
 Refer to section "Removal of the Exhaust Gas Recirculation Hot Pipe".
 Refer to section "Removal of the Exhaust Gas Recirculation Crossover Tube".
 - a. Yes; clean piping and replace EGR cooler. Verify repairs.
 - b. No; Go to step 28.
28. Disconnect the EGR valve actuator pull rod. Inspect the ball sockets on the pull rod for free movement. Do the sockets rotate or move freely?
 - a. Yes; Go to step 29.
 - b. No; replace the EGR valve actuator pull rod. Verify repairs.
 For the DD13: Refer to section "Removal of the Exhaust Gas Recirculation Valve Actuator Pull Rod".
 For the DD15 and DD16: Refer to section "Removal of the Exhaust Gas Recirculation Valve Actuator Pull Rod".

NOTE: Some resistance is normal; however, the actuator should not bind in any particular spot.

29. Physically move the EGR butterfly from stop-to-stop to check for full travel (some drag is normal). Verify EGR valve moves. Does the EGR butterfly move stop-to-stop?
 - a. Yes; reconnect the EGR valve actuator pull rod to the EGR valve and EGR actuator. Clear codes and verify repairs. If fault returns, Go to step 30.
 - b. No; replace the EGR valve. Verify repairs.
 For the DD13: Refer to section "Removal of the Exhaust Manifold".
 For the DD15 and DD16: Refer to section "Removal of the DD15 and DD16 Exhaust Gas Recirculation Valve".
30. Inspect the turbocharger for damage. Is any damage present?
 - a. Yes; repair as necessary. Verify repairs.
 If fault returns, for AT engines, Go to step 32.
 If fault returns, for Turbo-Compound (TC) engines, Go to step 31.
 - b. No; for AT engines, Go to step 32.
 For TC engines, Go to step 31.
31. Inspect the axial power turbine for damage. Is any damage present?
 - a. Yes; repair as necessary. Clear codes and verify repairs. Retest with verification cycle; once engine is at standard operating temperature, drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes.
 If fault returns, Go to step 32.
 - b. No; Go to step 32.
32. Turn the ignition ON (key ON, engine OFF).
33. Inspect the Diesel Oxidation Catalyst (DOC) pressure sensor tube and elbow and the Diesel Particulate Filter (DPF) pressure sensor tube and elbow for leaks, kinks, or blockages. Are any leaks, kinks, or blockages found?
 - a. Yes; repair as necessary.
 - b. No; Go to step 34.

**WARNING: ENGINE EXHAUST**

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

**WARNING: PERSONAL INJURY**

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

**WARNING: HOT EXHAUST**

During parked regeneration the exhaust gases will be extremely HOT and could cause a fire if directed at combustible materials. The vehicle must be parked outside.

34. Start engine, allow to warm-up until coolant temperature is greater than 65°C (149°F).

NOTE: Normal DOC pressure is less than 10 kPa (1.5 psi) for a 1-Box™ emissions package and 13 kPa (1.9 psi) for a 2-Box option.

35. Using DiagnosticLink, monitor DOC Inlet Pressure while performing a parked regeneration. Refer to section "Performing a Parked Regeneration Using DiagnosticLink® Standard". Does the DOC Inlet Pressure start out high and stay high?
- Yes; the DOC(s) are plugged. Refer to **13TS-15** (<http://ddcsn-ddc.freightliner.com/cps/rde/xbc/ddcsn/13TS15Rev.pdf>) for DOC inspection, cleaning, and replacement procedures.
 - No; if DOC Inlet Pressure starts out high and then decreases, the DOC(s) were plugged and the parked regen cleared them. Clear any fault codes. Verify repairs. If DOC pressure reading is low or fault code returns, Go to step 36.
36. Turn the ignition OFF.
37. Disconnect the MCM 120-pin connector.
38. Inspect the MCM 120-pin connector and the 120-pin harness connector for signs of corrosion, spread, unseated (pushed out) or damaged pins, connector seal for damage (signs of water or oil intrusion) or signs of wire damage. Are any signs of damage found?
- Yes; repair as necessary. Verify repairs.
 - No; Go to step 39.
39. Install a test MCM and retest with verification cycle. Does fault code return?
- Yes; Go to step 40.
 - No; replace MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
40. Install original MCM. Bring to operating temperature of 71°C (160°F). Road test the vehicle. Drive at highway speed with loaded trailer above 1130 rpm continuously for five minutes. Does fault become active?
- Yes; replace the MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
 - No; release vehicle.