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Service Information Bulletin

SUBJECT	DATE
SPN 102 (MCM) (GHG14)	January 2015

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 turbocharger wastegate.
		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 "Removal of the Intake 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 30.
 11. Turn the ignition OFF.
 12. Inspect the wastegate actuator and the plumbing to and from the actuator. Verify wastegate linkage. Is any damage found?
 - a. Yes; repair as necessary. Verify repair.
 - 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. Verify repair.
 - b. No; Go to step 14.
 14. Turn the ignition ON (key ON, engine OFF).

NOTE: Wastegate will not remain open if DiagnosticLink slide control is set above 95%.

15. Using DiagnosticLink, activate turbo control (wastegate) from the I/O Control window. Run slide control up to 95% - adjust Duration to 20 seconds- (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.
16. Does wastegate close when the duration timer expires?
 - a. Yes; Go to step 30.
 - b. No; Go to step 17.
17. Drain air tanks. Refer to OEM literature for details.
18. Install a suitable air pressure gauge in the inlet air pressure line to the wastegate solenoid from the vehicle.



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.

19. Start engine to stabilize the vehicle air pressure.
20. With a suitable air pressure gauge installed, measure the inlet air pressure to the wastegate solenoid from the vehicle. Is the pressure at least 599 kPa (87psi)?
 - a. Yes; restore air hose connection. Go to step 21.
 - b. No; refer to OEM troubleshooting for air pressure issues.
21. Turn the ignition OFF.
22. With the vehicle air pressure stabilized, use a suitable air pressure gauge to measure the outlet air pressure from the solenoid to the turbocharger wastegate.
23. Turn the ignition ON (key ON, engine OFF).
24. Is the pressure out of the wastegate solenoid less than one psi?
 - a. Yes; Go to step 25.
 - b. No; Go to step 27.
25. Using DiagnosticLink, activate turbo control (wastegate) from I/O Control window. Run slide control up to 50% - adjust Duration to 20 seconds- (Click Set). Is the pressure out of the wastegate solenoid between 117 and 158 kPa (17-23 psi)?
 - a. Yes; Go to step 26.
 - b. No; Go to step 27.
26. Using DiagnosticLink, activate turbo control (wastegate) from I/O Control window. Run slide control up to 95% - adjust Duration to 20 seconds- (Click Set). Is the pressure out of the wastegate solenoid between 241 and 275 kPa (35-40 psi)?
 - a. Yes; Go to step 30.
 - b. No; Go to step 27.
27. Turn the ignition OFF.
28. Disconnect the wastegate solenoid harness connector.
29. 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.
30. Turn the ignition OFF.
31. Disconnect the MCM 120-pin connector.
32. 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. Verify repair.
 - b. No; Go to step 33.
33. Install a test MCM and retest with verification cycle. Does fault code return?
 - a. Yes; Go to step 34.
 - b. No; replace MCM.
Refer to section "Removal of the Motor Control Module". Verify repairs.
34. 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 turbocharger.
Refer to section "Removal of the DD13 Turbocharger".
Refer to section "Removal of the DD15 and the DD16 Turbocharger".
 - b. No; replace the MCM.

Refer to section "Removal of the Motor Control Module".

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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 30.
 13. Turn the ignition OFF.
 14. Inspect the wastegate actuator and the plumbing to and from the actuator. Verify wastegate linkage. Is any damage 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).

NOTE: Wastegate will not remain open if DiagnosticLink slide control is set above 95%.

17. Using DiagnosticLink, activate turbo control (wastegate) from I/O Control window. Run slide control up to 95% - adjust Duration to 20 seconds- (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.
18. Does wastegate close when the duration timer expires?
 - a. Yes; Go to step 30.
 - b. No; Go to step 19.
19. Drain air tanks. Refer to OEM literature for details.
20. Install a suitable air pressure gauge in the inlet air pressure line to the wastegate solenoid from the vehicle.

**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.

21. Start engine to stabilize vehicle air pressure.
22. With a suitable air pressure gauge installed, measure the inlet air pressure to the wastegate solenoid from the vehicle. Is the pressure at least 599 kPa (87psi)?
 - a. Yes; restore air hose connection. Go to step 23.
 - b. No; refer to OEM troubleshooting for air pressure issues.
23. Turn the ignition OFF.
24. With the vehicle air pressure stabilized, use a suitable air pressure gauge to measure the outlet air pressure from the solenoid to the turbocharger wastegate.
25. Turn the ignition ON (key ON, engine OFF). Is the pressure out of the wastegate solenoid less than one psi?
 - a. Yes; Go to step 26.
 - b. No; Go to step 28.
26. Using DiagnosticLink, activate turbo control (wastegate) from I/O Control window. Run slide control up to 50% - adjust Duration to 20 seconds- (Click Set). Is the pressure out of the wastegate solenoid between 117 and 158- kPa (17-23 psi)?
 - a. Yes; Go to step 27.
 - b. No; Go to step 28.
27. Using DiagnosticLink, activate turbo control (wastegate) from I/O Control window. Run slide control up to 95% - adjust Duration to 20 seconds- (Click Set). Is the pressure out of the wastegate solenoid between 241 and 275- kPa (35-40 psi)?
 - a. Yes; Go to step 30.
 - b. No; Go to step 28.
28. Disconnect the wastegate solenoid harness connector.
29. 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.
30. Turn the ignition OFF.
31. 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 33.
If fault returns, for Turbo-Compound (TC) engines, Go to step 32.
 - b. No; for AT engines, Go to step 33.
For TC engines, Go to step 32.
32. 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 33.
 - b. No; Go to step 33.
33. Turn the ignition ON (key ON, engine OFF).
34. 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 35.

**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.

35. 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 Two-Box option.

36. Using DiagnosticLink, monitor DOC Inlet Pressure while performing a parked regeneration. Refer to section "Performing a Parked Regeneration Using DiagnosticLink®". Does the DOC Inlet Pressure start out high and stay high?
- a. Yes; the DOC(s) are plugged. Refer to [13TS-15 \(http://ddcsn-ddc.freightliner.com/cps/rde/xbcr/ddcsn/13TS15Rev.pdf\)](http://ddcsn-ddc.freightliner.com/cps/rde/xbcr/ddcsn/13TS15Rev.pdf) for DOC inspection, cleaning, and replacement procedures.
 - b. No; if DOC Inlet Pressure starts out high and then decreases, the DPF(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 37.
37. Turn the ignition OFF.
38. Disconnect the MCM 120-pin connector.
39. 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?
- a. Yes; repair as necessary. Verify repairs.
 - b. No; Go to step 40.
40. Install a test MCM and retest with verification cycle. Does fault code return?
- a. Yes; Go to step 41.
 - b. No; replace MCM. Refer to section "Removal of the Motor Control Module". Verify repairs.
41. 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 turbocharger.
Refer to section "Removal of the DD13 Turbocharger"
Refer to section "Removal of the GHG14 DD15 Asymmetrical Turbocharger"

- b. No; replace the MCM.
Refer to section "Removal of the Motor Control Module". Verify repairs.