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Service Information Bulletin

SUBJECT	DATE
SPN 157/FMI 10, 15, 17, 18 - GHG14	July 2013

Additions, Revisions, or Updates

Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0084	DD Platform	SPN 157/FMI 10 - GHG14	Updating diagnostics to add both two and three-filter fuel system section references. Updating step 3b. Updating DDDL version in steps 8 and 22.
		SPN 157/FMI 15 - GHG14	Updating diagnostics to add both two and three-filter fuel system section references.
		SPN 157/FMI 17 - GHG14	
		SPN 157/FMI 18 - EPA10 - GHG14	



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2 SPN 157/FMI 10 – GHG14

This diagnostic is typically Under-Capacity in the High Pressure Circuit.

The Motor Control Module (MCM2.1) monitors the rail pressure and when rail pressure deviation is greater than 200 bar, the MCM2.1 sets the code. This fault can occur due to the conditions listed below:

- External fuel leakage between the high pressure pump and fuel injectors
- Pressure Limiting Valve (PLV) leakage (internal)
- Fuel filter integrity (loose caps, plugged filters)
- Fuel supply issues (fuel level, fuel aeration, leaking fuel lines, fuel restrictions)
- Intermittent loss of engine speed signal
- High pressure pump internal failure
- Fuel injector (amplifier or needle) leakage
- Fuel Contamination
- Rail pressure sensor failure
- Faulty Motor Control Module (MCM2.1)

Table 1.

Service Tools Used in the Procedure	
Tool Number	Description
J-48876	Test Gauge, Primer Port, HDE
J-48704	Caps, HP Fuel Rail, HDE
J-48706	Fuel Diagnostics Gauge Set LP, HDE
DDDL/DDRS 7.09 SP2 or newer	Electronic Diagnostic Tool

NOTE: It is important to obtain information from the customer regarding Check Engine Lamp occurrences, performance concerns, or exhaust smoke.

1. Did SPN 157/FMI 16 or SPN 520268/FMI 18 appear after the fuel system was repaired or fuel filter maintenance was performed?
 - a. Yes; the code may be set due to air in the fuel system. Clear codes and road test to verify complaint. If code does not set, release the vehicle. If code sets, Go to step 2.
 - b. No; Go to step 2.
2. Turn the ignition ON (key ON, engine OFF).

NOTE: Fuel tank level at the time the fault triggered can be viewed in extended data #5, "Enhanced Environmental Data" Fuel Tank Level.

3. Check and record fuel level in all fuel tanks.
 - a. If fuel level is below ¼ tank (or 25%), add fuel and road test vehicle. If code does not become active during road test, release the truck. If the code becomes active during the road test with over ¼ tank (or 25%) of fuel, Go to step 4.
 - b. If the fuel level is over ¼ tank (or 25%), question the driver about the fuel level when the code was set. If the level was under ¼ tank (or 25%), fuel sloshing in the tank could be the cause of aerated fuel that could cause this code. If the fuel level was over ¼ tank (or 25%) when the code was set, Go to step 4.
4. Check for fuel contamination, including Diesel Exhaust Fluid (DEF), water, gasoline, kerosene, coolant, etc.
 - a. If contamination is found, contact the Detroit™ Customer Support Center at 800-445-1980.
 - b. If no contamination is found, Go to step 5.
5. Visually inspect for external fuel leaks on the engine and on the chassis.
 - a. If a leak is found, repair leak. Refer to section "Verify Repairs".
 - b. If no leaks are found, Go to step 6.
6. Using DDDL 7.09 SP2 or newer, check for multiple codes.

- a. If any of the additional fault codes are active, perform the associated diagnostics first:
 - SPN 94/FMI 15 Fuel Filter Plugged
 - SPN 94/FMI 16 Fuel Filter Plugged
 - SPN 97/FMI 15 Water in the Fuel
 - SPN 157/FMI 1 Rail Pressure Too High
 - SPN 164/FMI (All) Rail pressure Sensor Faults
 - SPN 174/FMI 0 Fuel Temperature Too High
 - SPN 679/FMI 7 PLV Stuck Open
 - SPN 723/FMI (all) Cam Sensor Codes
 - SPN 636/FMI (all) Crank Sensor Codes
 - SPN 1077/FMI 5, 6 or 14
- b. If only SPN 1077/7, SPN 157/FMI 16 or SPN 1077/FMI 31 is present, Go to step 7.

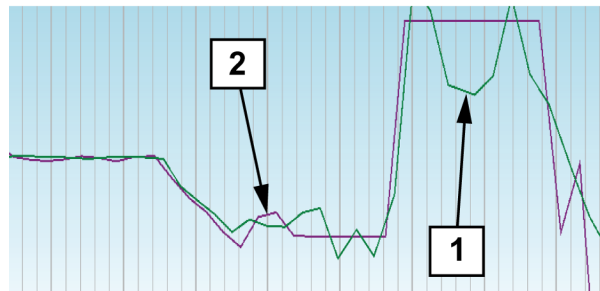
NOTE: Do not reset this counter unless the PLV is being replaced.

7. Using DDDL 7.09 SP2 or newer, check the value of Pressure Limiting Valve (PLV) openings. With the ignition ON (key ON, engine OFF), select the Actions tab in the top tool bar. Select Fuel System, then Pressure Limiting Valve (PLV). Change or view (E2P_RPG_CTR_PLV_OPEN) under “Extended Data Record Number 5th” list. View and record the PLV open counts.
 - a. If the counter is greater than 50, replace the PLV.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".
Verify repairs. Refer to section "Verify Repairs".

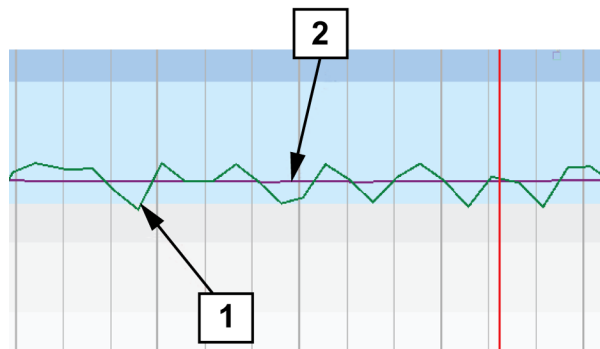
NOTE: Engines not equipped with a Low Pressure Pump Outlet (LPPO) sensor should utilize J-48706 Fuel Diagnostic Gauge Set to monitor LPPO.

- b. If counter is less than 50, Go to step 8.
8. Perform automatic Fuel System Integrity Check (FSIC) routine using DDDL 7.09 SP2 or newer. With the ignition ON (key ON, engine OFF), start the Automatic FSIC. The software/tool will ask to start the engine when required. Once the engine is running, the software will have the engine enter and exit several engine operating conditions. Once the engine shuts down, leave the key on for five minutes. Disconnect DDDL and open the log file. The next part of the troubleshooting will require reviewing the FSIC log file. Go to step 9.
9. Monitor rail pressure bleed-off time.
 - a. If bleed-off time is below 35 seconds, perform a low pressure leak test.
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - b. If bleed-off time is between 35 seconds and 2 minutes 30 seconds, Go to step 10.
 - c. If bleed-off time is greater than 2 minutes 30 seconds with engine warm, Refer to section "Idle Speed Balance Test".
10. Does Kw/Nw show/stay “ON / Enabled / True” while the engine is running during the Automatic FSIC routine?
 - a. Yes; Go to step 11.
 - b. No; refer to troubleshooting for SPN 723/FMI 10.
11. Was the fuel temperature rise greater than 10 degrees?
 - a. Yes; Go to step 13.
 - b. No; Go to step 12.
12. At 600 rpm, is ASL003 Fuel Compensation Pressure within range per the fuel pressure chart?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
 - a. Yes; Go to step 14.
 - b. No; Go to step 13.
13. Monitor AS124 LPPO sensor (if equipped) or use manual gauge J-48706. Is the pressure in range at 600 and 1800 rpm?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
 - a. Yes; Go to step 14.

- b. No; Repair cause of incorrect fuel pressure.
 For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
 For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
- 14. Monitor AS124 LPPO (if equipped) and ASL003 Fuel Compensation Pressure at all engine speeds.
 - a. If pressures are stable with no oscillations, Go to step 15.
 - b. If pressures are unstable WITH oscillations of more than 1.5 psi at a steady rpm, check for aerated fuel.
 For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
 For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
- 15. Check the Idle Speed Balance (ISB) Values. Refer to section "Idle Speed Balance Test". Are there any cylinders above 70% or below -70%?
 - a. Yes; Follow repair procedures in “Idle Speed Balance (ISB) Test” and verify repairs. Refer to section "Verify Repairs".
 - b. No; Go to step 16.
- 16. Is ASL001 Rail Pressure erratic or does it have a saw-tooth pattern?



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- a. Yes; Go to step 17.

NOTE: See examples of erratic pressure showing (1) ASL001 Rail pressure and (2) AS098 Desired rail pressure.

- b. No; Go to step 18.
- 17. Perform the aerated fuel test. Was fuel aerated?
For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
 - a. Yes; repair cause of aerated fuel.
 - b. No; replace the Quantity Control Valve (QCV). For the two-filter fuel system,
For the three-filter fuel system, Refer to section "Removal of the Quantity Control Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Quantity Control Valve – Two-Filter System".
- 18. Perform Pressure Limiting Valve (PLV) flow test. Did the PLV flow test pass?
For the three-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test – Two-Filter Fuel System".
 - a. Yes; Go to step 19.
 - b. No; replace the PLV.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".

NOTE: Prime the fuel system after performing the low pressure fuel system leak test.

- 19. Inspect the low pressure fuel system for leaks. Are leaks present?
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - a. Yes; Repair as necessary.
 - b. No; Go to step 20.
- 20. Cap the fuel rail at all six fuel injector feed connections using J-48704 injector rail caps and crank the engine for 10 seconds. Does the ASL001 rail pressure reach AS098 desired rail pressure?
 - a. Yes; Go to step 21.
 - b. No; Replace high pressure fuel pump.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
- 21. With the fuel injectors still capped after cranking engine for 10 seconds, does the rail pressure bleed down under 100 bar in less than five minutes?
 - a. Yes; Replace the high pressure fuel pump and contact the Detroit™ Customer Support Center at 800-445-1980.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
 - b. No; Go to step 22.
- 22. Using DDDL 7.09 SP2 or newer, navigate to Service Routines and Fuel System Integrity Check test and select Manual FSIC. Test drive the truck to see if the code sets.
 - a. If the code comes active, Go to step 23.
 - b. If the code does not come active, call the Detroit™ Customer Support Center at 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
- 23. Remove the MCM2.1 120-pin connector. Inspect for damage including fuel, water corrosion or bent terminals.
 - a. If damage is found, repair as needed.
 - b. If no damage is found, Go to step 24.
- 24. Install a test MCM2.1 using the extension harness and test drive the truck. Does the code come active?
 - a. Yes; contact the Detroit™ Customer Support Center at 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
 - b. No; replace MCM2.1 and verify repair.

3 SPN 157/FMI 15 - GHG14

This diagnostic is typically Rail Pressure Level For Injection Enabling Not Reached.

The Motor Control Module (MCM2.1) monitors the rail pressure and when rail pressure deviation is greater than 200 Bar, while under a load, the MCM2.1 sets the code. This fault can occur due to the conditions listed below:

- External Fuel Leakage between the High Pressure Pump and Fuel Injectors
- Pressure Limiting Valve Leakage (Internal)
- Fuel Filter Integrity (Loose Caps, Plugged Filters)
- Fuel Supply Issues (Fuel Level, Fuel Aeration, Leaking Fuel Lines, Fuel Restrictions)
- Intermittent Loss of Engine Speed Signal
- High Pressure Pump Internal Failure
- Fuel Injector (Amplifier or Needle) Leakage
- Fuel Contamination
- Rail Pressure Sensor
- Motor Control Module (MCM2.1)

Table 2.

Service Tools Used in the Procedure	
Tool Number	Description
J-48876	Test Gauge, Primer Port, HDE
J-48704	Caps, HP Fuel Rail, HDE
J-48706	Fuel Diagnostic Gauge Set LP, HDE
DDDL 7.06 SP2 or newer	Electronic Diagnostic Tool

NOTE: It is important to obtain information from the customer about check engine lamp occurrences, performance concerns, or exhaust smoke.

1. Did SPN 157/FMI 15 or SPN 520268/FMI 18 appear after the fuel system was repaired or fuel filter maintenance was performed?
 - a. Yes; the code may be set due to air in the fuel system. Clear codes and road test to verify complaint. If code does not set, release the vehicle. If code sets, Go to step 2.
 - b. No; Go to step 2.
2. Turn the ignition ON (key ON, engine OFF).

NOTE: Fuel tank level at the time the fault triggered can be viewed in extended data #5, "Enhanced Environmental data" Fuel Tank Level.

3. Check and record fuel level in all fuel tanks.
 - a. If fuel level is below ¼ tank (or 25%), add fuel and road test vehicle. If code does not become active during road test, release the truck. If the code becomes active during the road test with over ¼ tank (or 25%) of fuel, Go to step 4.
 - b. If the fuel level is over ¼ tank (or 25%), view fuel tank level in extended data (EPA10) or question the driver about the fuel level when the code was set. If the level was under ¼ tank (or 25%), fuel sloshing in the tank could be the cause of aerated fuel that could cause this code. If the fuel level was over ¼ tank (or 25%) when the code was set, Go to step 4.
4. Check for fuel contamination, including Diesel Exhaust Fluid (DEF), water, gasoline, kerosene, coolant, etc.
 - a. If contamination is found, contact the Detroit™ Customer Support Center (800-445-1980).
 - b. If no contamination is found, Go to step 5.
5. Visually inspect for external fuel leaks on the engine and on the chassis.
 - a. If a leak is found, repair leak. Refer to section "Verify Repairs".
 - b. If no leaks are found, Go to step 6.

6. Using DDDL 7.06 SP2 or newer, check for multiple codes.
 - a. If any of the additional fault codes are active, perform the associated diagnostics first:
 - SPN 94/FMI 15 Fuel Filter plugged
 - SPN 94/FMI 16 Fuel Filter plugged
 - SPN 97/FMI 15 Water in the fuel
 - SPN 157/FMI 1 Rail Pressure Too High.
 - SPN 164/FMI (All) Rail pressure sensor faults
 - SPN 174/FMI 0 Fuel Temperature too High
 - SPN 679/FMI 7 PLV Stuck Open
 - SPN 723/FMI (all) Cam Sensor Codes
 - SPN 636/FMI (all) Crank sensor codes
 - SPN 1077/FMI 5, 6 or 14
 - b. If only SPN 1077/FMI 7, SPN 157/FMI 16 or SPN 1077/FMI 31 is present, Go to step 7.

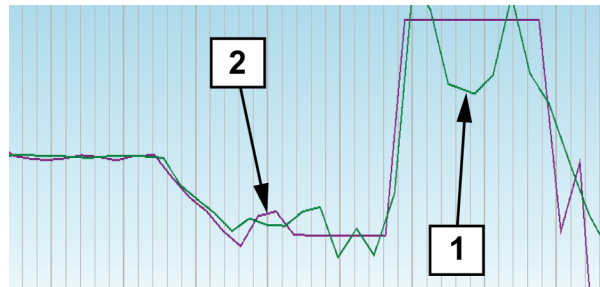
NOTE: Do not reset this counter unless the PLV is being replaced.

7. Using DDDL 7.08 SP2 or newer check the value of Pressure Limiting Valve (PLV) openings. With key ON, engine OFF, select the Actions tab in the top tool bar. Select Fuel System, then Pressure Limiting Valve (PLV) Change or view (E2P_RPG_CTR_PLV_OPEN) under “Extended Data Record Number 5th” list. View and record the PLV open counts.
 - a. If the counter is greater than 50, replace the PLV. Verify repairs.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".
Refer to section "Verify Repairs".

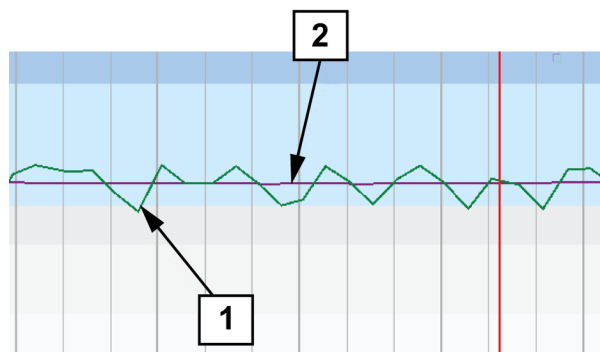
NOTE: Engines not equipped with a Low Pressure Pump Outlet (LPPO) sensor should utilize J-48706 Fuel Diagnostic Gauge Set to monitor LPPO.

- b. If counter is less than 50, Go to step 8.
8. Perform Automatic Fuel System Integrity Check (FSIC) routine using DDDL 7.08 SP2 or newer. With key ON, Engine OFF, start the Automatic FSIC routine. The software/tool will ask to start the engine when required. Once the engine is running, the software will have the engine enter and exit several engine operating conditions. Once the engine shuts down, leave the key on for five minutes. Disconnect DDDL and open the log file. The next part of the troubleshooting will require reviewing the FSIC log file. Go to step 9.
9. Monitor rail pressure bleed-off time.
 - a. If bleed-off time is below 35 seconds, perform a low pressure leak test.
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - b. If bleed-off time is between 35 seconds and 2 minutes 30 seconds, Go to step 10.
 - c. If bleed-off time is greater than 2 minutes 30 seconds with engine warm, Refer to section "Idle Speed Balance Test".
10. Does Kw/Nw show/stay “ON / Enabled / True” while the engine is running during the Automatic FSIC routine?
 - a. Yes; Go to step 11.
 - b. No; refer to troubleshooting for SPN 723/FMI 10.
11. Was the fuel temperature rise greater than 10 degrees?
 - a. Yes; Go to step 13.
 - b. No; Go to step 12.
12. At 600 rpm, is ASL003 Fuel Compensation Pressure within range per the fuel pressure chart?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
 - a. Yes; Go to step 14.
 - b. No; Go to step 13.
13. Monitor AS124 LPPO sensor (if equipped) or use manual gauge J-48706. Is the pressure in range at 600 and 1800 rpm?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".

- a. Yes; Go to step 14.
 - b. No; Repair cause of incorrect fuel pressure.
14. Monitor AS124 LPPO (if equipped) and ASL003 Fuel Compensation Pressure at all engine speeds.
- a. If pressures are stable with no oscillations, Go to step 15.
 - b. If pressures are unstable WITH oscillations of more than 1.5 psi at a steady rpm check for aerated fuel.
 For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
 For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
15. Check the Idle Speed Balance (ISB) Values. Refer to section "Idle Speed Balance Test". Are there any cylinders above 70% or below -70%?
- a. Yes; Follow repair procedures in Idle Speed Balance (ISB) test and verify repairs. Refer to section "Verify Repairs".
 - b. No; Go to step 16.
16. Is ASL001 Rail Pressure erratic or does it have a saw-tooth pattern?



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- a. Yes; Go to step 17.

NOTE: See examples of erratic pressure showing (1) ASL001 Rail pressure and (2) AS098 Desired rail pressure.

- b. No; Go to step 18.
- 17. Perform the aerated fuel test. Was fuel aerated?
For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
 - a. Yes; repair cause of aerated fuel.
 - b. No; replace the Quantity Control Valve.
For the three-filter fuel system, Refer to section "Removal of the Quantity Control Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Quantity Control Valve – Two-Filter System".
- 18. Perform Pressure Limiting Valve (PLV) flow test. Did the PLV flow test pass?
For the three-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test – Two-Filter Fuel System".
 - a. Yes; Go to step 19.
 - b. No; replace the PLV.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".

NOTE: Prime the fuel system after performing the low pressure fuel system leak test.

- 19. Inspect the low pressure fuel system for leaks. Are leaks present?
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - a. Yes; Repair as necessary.
 - b. No; Go to step 20.
- 20. Cap the rail at all six injector feed connections using J-48704 injector rail caps and crank the engine for 10 seconds. Does the ASL001 rail pressure reach AS098 desired rail pressure?
 - a. Yes; Go to step 21.
 - b. No; Replace high pressure pump.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
- 21. With the injectors still capped after cranking engine for 10 seconds, does the rail pressure bleed down under 100 bar in less than five minutes?
 - a. Yes; Replace the high pressure fuel pump and contact the Detroit™ Customer Support Center at 800-445-1980.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
 - b. No; Go to step 22.
- 22. Using DDDL 7.x or newer navigate to Service Routines and Fuel System Integrity Check test and select Manual FSIC. Test drive the truck to see if the code sets.
 - a. If the code comes active, Go to step 23.
 - b. If the code does not come active, call the Detroit™ Customer Support Center 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
- 23. Remove the MCM2.1 120-pin connector. Inspect for damage including fuel, water corrosion or bent terminals.
 - a. If damage is found, repair as needed.
 - b. If no damage is found, Go to step 24.
- 24. Install a test MCM2.1 using the extension harness and test drive the truck. Does the Code come active?
 - a. Yes; contact the Detroit™ Customer Support Center at 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
 - b. No; replace MCM2.1 and verify repair.

4 SPN 157/FMI 17 - GHG14

This diagnostic is typically Rail Pressure Level For Injection Enabling Not Reached.

The Motor Control Module (MCM2.1) monitors the rail pressure and when rail pressure deviation is greater than 200 bar for eight seconds, the MCM2.1 sets the code. This fault can occur due to the conditions listed below:

- External Fuel Leakage Between the High Pressure Pump and Fuel Injectors
- Pressure Limiting Valve Leakage (Internal)
- Fuel Filter Integrity (Loose Caps, Plugged Filters)
- Fuel Supply Issues (Fuel Level, Fuel Aeration, Leaking Fuel Lines, Fuel Restrictions)
- Intermittent Loss of Engine Speed Signal
- High Pressure Pump Internal Failure
- Fuel Injector (Amplifier or Needle) Leakage
- Fuel Contamination
- Rail Pressure Sensor
- Motor Control Module (MCM2.1)

Table 3.

Service Tools Used in the Procedure	
Tool Number	Description
J-48876	Test Gauge, Primer Port, HDE
J-48704	Caps, HP Fuel Rail, HDE
J-48706	Fuel Diagnostic Gauge Set LP, HDE
DDDL 7.06 SP2 or newer	Electronic Diagnostic Tool

NOTE: It is important to obtain information from the customer about check engine lamp occurrences, performance concerns, or exhaust smoke.

1. Did SPN 157/FMI 17 appear after the fuel system was repaired or fuel filter maintenance was performed?
 - a. Yes; the code may be set due to air in the fuel system. Clear codes and road test to verify complaint. If code does not set, release the vehicle. If code sets, Go to step 2.
 - b. No; Go to step 2.
2. Turn the ignition ON (key ON, engine OFF).

NOTE: Fuel tank level at the time the fault triggered can be viewed in extended data #5, "Enhanced Environmental data" Fuel Tank Level.

3. Check and record fuel level in all fuel tanks.
 - a. If fuel level is below ¼ tank (or 25%), add fuel and road test vehicle. If code does not become active during road test, release the truck. If the code becomes active during the road test with over ¼ tank (or 25%) of fuel, Go to step 4.
 - b. If the fuel level is over ¼ tank (or 25%), view fuel tank level in extended data (EPA10) or question the driver about the fuel level when the code was set. If the level was under ¼ tank (or 25%), fuel sloshing in the tank could be the cause of aerated fuel that could cause this code. If the fuel level was over ¼ tank (or 25%) when the code was set, Go to step 4.
4. Check for fuel contamination, including Diesel Exhaust Fluid (DEF), water, gasoline, kerosene, coolant, etc.
 - a. If contamination is found, contact the Detroit™ Customer Support Center at 800-445-1980.
 - b. If no contamination is found, Go to step 5.
5. Visually inspect for external fuel leaks on the engine and on the chassis.
 - a. If a leak is found, repair leak. Refer to section "Verify Repairs"
 - b. If no leaks are found, Go to step 6.
6. Using DDDL 7.06 SP2 or newer, check for multiple codes.

- a. If any of the additional fault codes are active, perform the associated diagnostics first:
 - SPN 94/FMI 15 Fuel Filter Plugged
 - SPN 94/FMI 16 Fuel Filter Plugged
 - SPN 97/FMI 15 Water in the Fuel
 - SPN 157/FMI 1 Rail Pressure too High.
 - SPN 164/FMI (All) Rail Pressure Sensor Faults
 - SPN 174/FMI 0 Fuel Temperature too High
 - SPN 679/FMI 7 PLV Stuck Open
 - SPN 723/FMI (all) Cam Sensor Codes
 - SPN 636/FMI (all) Crank sensor codes
 - SPN 1077/FMI 5, 6 or 14
- b. If only SPN 1077/FMI 7, SPN 157/FMI 16 or SPN 1077/FMI 31 is present, Go to step 7.

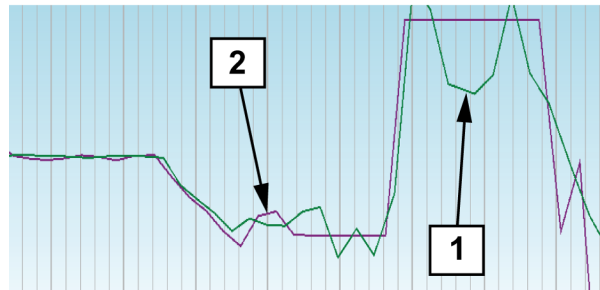
NOTE: Do not reset this counter unless the PLV is being replaced.

7. Using DDDL 7.06 SP2 or newer, check the value of Pressure Limiting Valve (PLV) openings. With key ON, engine OFF, select the Actions tab in the top tool bar. Select Fuel System, then Pressure Limiting Valve (PLV) Change or view (E2P_RPG_CTR_PLV_OPEN) under “Extended Data Record Number 5th” list. View and record the PLV open counts.
 - a. If the counter is greater than 50, replace the PLV.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".
Verify repairs. Refer to section "Verify Repairs".
 - b. If counter is less than 50, Go to step 8.

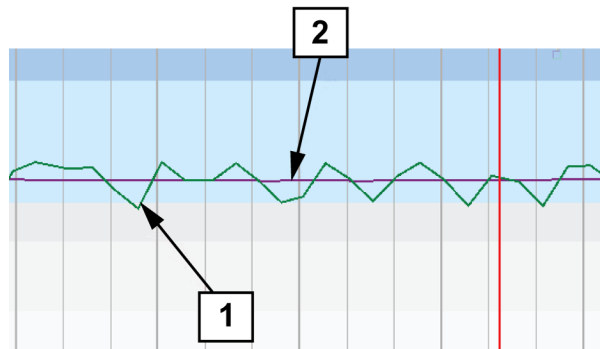
NOTE: Engines not equipped with a Low Pressure Pump Outlet (LPPO) sensor should utilize J-48706 Fuel Diagnostic Gauge Set to monitor LPPO.

8. Perform automatic Fuel System Integrity Check (FSIC) routine using DDDL 7.06 SP2 or newer. With key ON, Engine OFF, start the automatic FSIC. The software/tool will ask to start the engine when required. Once the engine is running, the software will have the engine enter and exit several engine operating conditions. Once the engine shuts down, leave the key on for five minutes. Disconnect DDDL and open the log file. The next part of the troubleshooting will require reviewing the FSIC log file. Go to step 9.
9. Monitor rail pressure bleed-off time.
 - a. If bleed-off time is below 35 seconds, perform a low pressure leak test.
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - b. If bleed-off time is between 35 seconds and 2 minutes 30 seconds, Go to step 10.
 - c. If bleed-off time is greater than 2 minutes 30 seconds with engine warm, Refer to section "Idle Speed Balance Test".
10. Does Kw/Nw show/stay “ON / Enabled / True” while the engine is running during the Automatic FSIC routine?
 - a. Yes; Go to step 11.
 - b. No; refer to troubleshooting for SPN 723/FMI 10.
11. Was the fuel temperature rise greater than 10 degrees?
 - a. Yes; Go to step 13.
 - b. No; Go to step 12.
12. At 600 rpm, is ASL003 Fuel Compensation Pressure within range per the fuel pressure chart?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
 - a. Yes; Go to step 14.
 - b. No; Go to step 13.
13. Monitor AS124 LPPO sensor (if equipped) or use manual gauge J-48706. Is the pressure in range at 600 and 1800 rpm?
For the three-filter fuel system, Refer to section "Normal Fuel System Pressures - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Normal Fuel System Pressures- Two-Filter System".
 - a. Yes; Go to step 14.

- b. No; Repair cause of incorrect fuel pressure.
- 14. Monitor AS124 LPPO (if equipped) and ASL003 Fuel Compensation Pressure at all engine speeds,
 - a. If pressures are stable with no oscillations, Go to step 15.
 - b. If pressures are unstable WITH oscillations of more than 1.5 psi at a steady rpm, check for aerated fuel.
 For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
 For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
- 15. Check the Idle Speed Balance (ISB) Values. Refer to section "Idle Speed Balance Test". Are there any cylinders above 70% or below -70%?
 - a. Yes; Follow repair procedures in Idle Speed Balance (ISB) test and verify repairs. Refer to section "Verify Repairs".
 - b. No; Go to step 16.
- 16. Is ASL001 Rail Pressure erratic or have a saw-tooth pattern?



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- a. Yes; Go to step 17.
- b. No; Go to step 18.

NOTE: See examples of erratic pressure showing (1) ASL001 Rail pressure and (2) AS098 Desired rail pressure.

17. Perform the aerated fuel test. Was fuel aerated?
For the three-filter fuel system, Refer to section "Aerated Fuel Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
 - a. Yes; repair cause of aerated fuel.
 - b. No; replace the Quantity Control Valve.
For the three-filter fuel system, Refer to section "Removal of the Quantity Control Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Quantity Control Valve – Two-Filter System".
18. Perform Pressure Limiting Valve (PLV) flow test. Did the PLV flow test pass?
For the three-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test - Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "Pressure Limiting Valve Flow Test – Two-Filter Fuel System".
 - a. Yes; Go to step 19.
 - b. No; replace the PLV.
For the three-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".

NOTE: Prime the fuel system after performing the low pressure fuel system leak test.

19. Inspect the low pressure fuel system for leaks. Are leaks present?
For the three-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Three-Filter Fuel System".
For the two-filter fuel system, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - a. Yes; Repair as necessary.
 - b. No; Go to step 20.
20. Cap the fuel rail at all six fuel injector feed connections using J-48704 injector rail caps and crank the engine for 10 seconds. Does the ASL001 rail pressure reach AS098 desired rail pressure?
 - a. Yes; Go to step 21.
 - b. No; Replace high pressure pump.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
21. With the injectors still capped after cranking engine for 10 seconds, does the rail pressure bleed down under 100 bar in less than five minutes?
 - a. Yes; Replace the high pressure fuel pump and contact the Detroit™ Customer Support Center at 800-445-1980.
For the three-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the High Pressure Fuel Pump – Two-Filter System".
 - b. No; Go to step 22.
22. Using DDDL 7.x or newer, navigate to Service Routines and Fuel System Integrity Check test and select Manual FSIC. Test drive the truck to see if the code sets.
 - a. If the code comes active, Go to step 23.
 - b. If the code does not come active, call the Detroit™ Customer Support Center at 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
23. Remove the MCM2.1 120-pin connector. Inspect for damage including fuel, water corrosion or bent terminals.
 - a. If damage is found, repair as needed.
 - b. If no damage is found, Go to step 24.
24. Install a test MCM2.1 using the extension harness and test drive the truck. Does the code come active?
 - a. Yes; contact the Detroit™ Customer Support Center at 800-445-1980. Be prepared to provide the FSIC log files and completed troubleshooting.
 - b. No; replace MCM2.1 and verify repair.

5 SPN 157/FMI 18 - EPA10 - GHG14

This diagnostic is typically Fault of the Fuel Rail Pressure Sensor, Wiring or Quantity Control Valve (QCV).

The motor control module (MCM) monitors the fuel rail pressure and when fuel rail pressure deviation is greater than 200 bar higher than requested fuel rail pressure for eight seconds, the MCM sets the code. This fault can occur due to the conditions listed below:

- Faulty fuel rail pressure sensor
- Faulty QCV
- Faulty MCM
- Faulty wiring

Table 4.

SPN 157/FMI 18	
Description	Fuel Rail Pressure High
Monitored Parameter	Fuel Rail Pressure
Typical Enabling Conditions	Closed Loop & Actual RP > 200 Bar of Desired RP
Monitor Sequence	None
Execution Frequency	Continuous when enabling conditions met
Typical Duration	8 Seconds
Dash Lamps	MIL, CEL
Engine Reaction	Derate 25%
Verification	Steady Engine rpm 1400 - 1500 (2 minute)

1. Turn the ignition ON (key ON, engine OFF).
2. Using DDDL 7.X, check for multiple codes.
 - a. If additional codes (with the exception of DPF codes) are present along with SPN 157/FMI 18, service the additional codes first.
 - b. If only SPN 157/FMI 18 is present, Go to step 3.
3. Check actual fuel rail pressure (key ON, engine OFF).
 - a. If actual fuel rail pressure is greater than 5 bar, Go to step 4.
 - b. If actual rail pressure is less than 5 bar, Go to step 5.
4. Remove the fuel rail pressure sensor and reconnect the sensor to the harness. Refer to section "Removal of the Fuel Rail Pressure Sensor". Is the fuel rail pressure sensor reading greater than 5 bar with sensor removed from rail?
 - a. Yes; replace the fuel rail pressure sensor. Refer to section "Installation of the Fuel Rail Pressure Sensor".
 - b. No; install the removed fuel rail pressure sensor. Refer to section "Installation of the Fuel Rail Pressure Sensor". Go to step 5.
5. Perform the fuel system integrity check (FSIC) test using DDDL 7.X.
6. Is the actual fuel rail pressure (ASL001) 200 bar higher than the desired rail pressure (AS098) at any point during the FSIC test?
 - a. Yes; replace the quantity control valve.
For the three-filter fuel system, Refer to section "Removal of the Quantity Control Valve - Three-Filter System".
For the two-filter fuel system, Refer to section "Removal of the Quantity Control Valve – Two-Filter System".
 - b. No; the deviation is less than 200 bar, Go to step 7.
7. Does the fuel rail pressure bleed down below 5 bar after the test is complete?
 - a. Yes; fuel rail pressure is below 5 bar. Check the fuel rail pressure sensor connector and 120-pin connector for corrosion. If OK, replace the fuel rail pressure sensor. Refer to section "Removal of the Fuel Rail Pressure Sensor".
 - b. No; fuel rail pressure will not drop below 5 bar. Contact the Customer Support Center (CSC).