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Service Information Bulletin

SUBJECT	DATE
Symptom Diagnostics - Hard Start/No Start	April 2017

Additions, Revisions, or Updates

Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0191	DD Platform - GHG17	Hard Start/No Start - Two-Filter Fuel System (This Test Must Be Done First)	Improvements made to troubleshooting paths.
		Test-A - Two-Filter Fuel System	
		Test-C - Two-Filter Fuel System	
		Test-D - Two-Filter Fuel System	

DiagnosticLink users: Please update the troubleshooting guides in DiagnosticLink with this newest version. To update the tool troubleshooting guide, open DiagnosticLink and from the Help – Troubleshooting Guides menu, select the appropriate troubleshooting manual, then click Update.

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2 Hard Start/No Start - Two-Filter Fuel System (This Test Must Be Done First)

NOTICE: To avoid engine damage, DO NOT use any type of aerosol spray, e.g., ether, starting fluid, or brake cleaner to aid in starting the engine.

NOTE: The fuel system MUST be primed every time the fuel system is opened. Prime the fuel system using the hand priming pump . Refer to section "Priming the Fuel System - KM63 GEN2 - Two-Filter System".

Check as follows:

1. Inspect the Exhaust Gas Recirculation (EGR) hot pipe for fuel, coolant, or oil. Is fuel present in the EGR hot pipe?
   For the DD13, Refer to section "Cleaning of the DD13 Exhaust Gas Recirculation System"
   For the DD15, Refer to section "Cleaning of the DD15 Exhaust Gas Recirculation System"
   For the DD16, Refer to section "Cleaning of the DD16 Exhaust Gas Recirculation System"
   a. Yes; fuel is present. Refer to section "Test-E - Two-Filter Fuel System".
   b. No; Go to step 2.
2. Is coolant present in the EGR hot pipe?
   a. Yes; coolant is present. Pressurize the cooling system according to Original Equipment Manufacturer (OEM) specifications.
   b. No; Go to step 3.
3. Is oil present in the EGR hot pipe?
   a. Yes; oil is present. Inspect turbocharger inlet and outlet for oil. Repair as necessary.
   b. No; reinstall the EGR hot pipe with new sealing gaskets and exhaust clamps. Refer to section "Installation of the Exhaust Gas Recirculation Hot Pipe". Go to step 4.
4. Will the engine rotate with the starter?
   a. Yes; Go to step 5.
   b. No; Refer to section "Test-B - Two-Filter Fuel System".
5. Check fuel tank levels; do both tanks have at least a ¼ tank of fuel?
   a. Yes; Go to step 6.
   b. No; add fuel and retest. If starting concern is still present, Go to step 6.
6. Check for fuel contamination, including DEF, water, gasoline, kerosene, coolant, etc. Is contamination found?
   a. Yes; refer to the Contaminated Fluids section.
   b. No; Go to step 7.
7. Using DiagnosticLink ®, check for other related fault codes. Are any fault codes present?
   a. Yes; correct the additional fault codes first.
   b. No; Go to step 8.
8. Were the fuel filters just replaced?
   a. Yes; inspect the stand pipe, pre-filter check ball and fuel filter O-rings for damage. If damage is found, for the stand pipe and pre-filter check ball, install a new fuel filter module. For the fuel filter O-rings, install new fuel filters.
   b. No; Go to step 9.

NOTE: If at any point during cranking there is an audible knock or hydraulic sounds, do not attempt to restart the engine. Remove the EGR hot pipe to inspect for fuel. If fuel is found, Refer to section "Test-E - Two-Filter Fuel System".

9. Perform a Fuel System Integrity Check routine. For more details on the Fuel System Integrity Check routine, Refer to section "Fuel System Integrity Check Routine Operation Overview - Two-Filter Fuel System". Does the engine start?
   a. Yes; allow the Fuel System Integrity Check routine to complete and Refer to section "Test-D - Two-Filter Fuel System".

b. No; repeat the start attempt with Fuel System Integrity Check routine one more time on the same log file. If the engine still does not start, Refer to section "Test-A - Two-Filter Fuel System".

3 Test-A - Two-Filter Fuel System

NOTICE: “Hard Start/No Start – Two Filter Fuel System” test MUST be completed before performing this test. Refer to section "Hard Start/No Start - Two-Filter Fuel System (This Test Must Be Done First)".

Table 1.

Service Tools Used in the Procedure	
Tool Number	Description
J-48704	HP Fuel Rail Test Caps

NOTE: KM63 GEN2 fuel filter module return lines are secured to the module with a mounting plate attached to the Pressure Limiting Valve (PLV) return line.

WARNING: PERSONAL INJURY

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: PERSONAL INJURY

To avoid injury from hot surfaces, wear protective gloves, or allow engine to cool before removing any component.

Check as follows:

1. Review Fuel System Integrity Check (FSIC) routine log file using DiagnosticLink ® 8.0 or higher. Is the engine speed over 150 rpm while cranking?
   a. Yes; Go to step 2.
   b. No; perform the following checks. If any are the cause of cranking speed under 150 rpm, fix the issue and attempt to start the engine using FSIC. If cranking speed is now above 150 rpm and engine does not start, Go to step 2.
      - Verify battery voltage; refer to Original Equipment Manufacturer (OEM) specifications.
      - Perform a cranking compression test.
      - Remove the accessory drive belt and check cranking speed.
      - Remove the air compressor and check cranking speed.
2. Is fuel compensation pressure over 241 kPa (35 psi) while cranking?
   a. Yes; Go to step 3.
   b. No; Go to step 10.
3. Does “Engine State” equal “Start” while cranking?
   a. Yes; Go to step 4.

b. No; correct status of the AUX shutdown switch or starter type.

4. Does Kw/Nw show or stay “ON / Enabled / True” while cranking the engine?
   a. Yes; Go to step 5.
   b. No; repair the camshaft or crankshaft sensor failure; refer to appropriate troubleshooting.
5. Is the actual fuel rail pressure over 150 bar (2176 psi)?
   a. Yes; Go to step 6.
   b. No; Go to step 7.
6. Is the actual fuel mass over 0 mg/St?
   a. Yes; Refer to section "Removal of the Fuel Injector - Two-Filter System".
   b. No; Go to step 8.
7. Does it take more than two minutes and 30 seconds for fuel rail pressure to drop below 10 bar (145 psi) after cranking?
   a. Yes; replace the fuel injectors. Refer to section "Removal of the Fuel Injector - Two-Filter System".
   b. No; Go to step 8.
8. Perform the PLV flow test. Refer to section "Pressure Limiting Valve Flow Test – Two-Filter Fuel System". Was PLV flow greater than 25 mL (0.84 oz.) while cranking?
   a. Yes; replace PLV. Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".
   b. No; Go to step 9.
9. Is the correct PLV installed on the engine? Refer to section "Inspection of the Pressure Limiting Valve - Two-Filter System".
   a. Yes; contact the Detroit™ Customer Support Center at 800-445-1980.
   b. No; install correct PLV.

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- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: ENGINE EXHAUST

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

10. Install Detroit-approved priming tool. Start priming, and attempt to start the engine with Automatic FSIC. Does the engine start?
    a. Yes; after one minute, remove the priming source and allow Fuel System Integrity Check routine to complete. Refer to section "Test-C - Two-Filter Fuel System".
    b. No; Go to step 11.
11. During start attempt, does fuel compensation pressure increase to more than 241 kPa (35 psi)?
    a. Yes; Go to step 15.
    b. No; Go to step 12.
12. Remove and inspect the two-stage valve. Refer to section "Removal of the Two-Stage Valve - Two-Filter System ". Was damage found?

a. Yes; replace the two-stage valve. Refer to section "Installation of the Two-Stage Valve - Two-Filter System".
b. No; Go to step 13.

13. Remove and inspect the fuel filters and fuel filter stand pipe. Refer to section "Removal of the Coalescer/Final Filter – Two Filter System ". Was any damage found to the fuel filters?
    a. Yes; replace the damaged filter. Refer to section "Installation of the Coalescer/Final Filter - Two Filter System".
    b. No; re-install fuel filters, ensuring that the filter is seated correctly. Refer to section "Installation of the Coalescer/Final Filter - Two Filter System". Go to step 14.

WARNING: PERSONAL INJURY

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- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: ENGINE EXHAUST

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

14. Attempt to start the engine. Does the engine start?
    a. Yes; release vehicle to customer.
    b. No; replace the fuel filter module. Refer to section "Removal of the Fuel Filter Module - Two-Filter System".
15. Perform the PLV flow test. Refer to section "Pressure Limiting Valve Flow Test – Two-Filter Fuel System". Was PLV flow greater than 25 mL (0.84 oz.) while cranking?
    a. Yes; Refer to section "Removal of the Pressure Limiting Valve - Two-Filter System".
    b. No; Go to step 16.
16. Check for aerated fuel. Is the fuel aerated?
    a. Yes; determine cause of aerated fuel and repair as necessary. Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
    b. No; Go to step 17.
17. Cap the fuel rail at all six fuel injector feed connections using J-48704 tool (HP Fuel Rail Test Caps) and attempt to start the engine. Does the fuel rail pressure reach the desired rail pressure?
    a. Yes; Go to step 18.
    b. No; replace the high pressure fuel pump. Refer to section "Removal of the High Pressure Fuel Pump - Two-Filter System".
18. Does the fuel rail pressure bleed down under 100 bar (1450 psi) in less than two minutes?
    a. Yes; replace the high pressure fuel pump. Refer to section "Removal of the High Pressure Fuel Pump - Two-Filter System".
    b. No; replace the fuel injectors. Refer to section "Removal of the Fuel Injector - Two-Filter System".

4 Test-C - Two-Filter Fuel System

NOTICE: Hard Start/No Start - Two-Filter Fuel System test MUST be complete before performing this test. Refer to section "Hard Start/No Start - Two-Filter Fuel System (This Test Must Be Done First)".

Check as follows:

WARNING: PERSONAL INJURY

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: PERSONAL INJURY

To avoid injury from hot surfaces, wear protective gloves, or allow engine to cool before removing any component.

1. After removing the Detroit-approved priming tool, does the engine quit running?
    a. Yes; remove and inspect the pressure relief valve for damage. If damage is found, replace the pressure relief valve. Refer to section "Removal of the Pressure Relief Valve - Two-Filter System". If no air or damage is found, Go to step 5.
    b. No; Go to step 2.
2. Is the two-stage valve stuck in stage 1?
    a. Yes; remove and inspect the two-stage valve (stuck in stage 1). Refer to section "Removal of the Two-Stage Valve - Two-Filter System ".
    b. No; Go to step 3.
3. Is the low pressure pump and drive coupler damaged?
    a. Yes; remove and inspect the low pressure pump and drive coupler. Refer to section "Removal of the Low Pressure Fuel Pump - Two-Filter System".
    b. No; Go to step 4.
4. Check for air in the system. Is the fuel aerated?
    a. Yes; Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
    b. No; allow the Fuel System Integrity Check routine to complete. Go to step 5.

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- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: PERSONAL INJURY

To avoid injury from hot surfaces, wear protective gloves, or allow engine to cool before removing any component.

5. Once the rail pressure drops below 10 bar (145 psi), restart the Fuel System Integrity Check routine and attempt to restart the engine without using a priming source. Does the engine restart?
    a. Yes; Go to step 6.
    b. No; remove and inspect the pressure relief valve for damage. If damage is found, replace the pressure relief valve. Refer to section "Removal of the Pressure Relief Valve - Two-Filter System". If no damage is found, Go to step 6.
6. Perform a Fuel Injection System (FIS) Low Pressure Leak Test routine. Refer to section "FIS Low Pressure Leak Test". Did the fuel system pass the FIS Low Pressure Leak Test routine?
    a. Yes; Go to step 7.
    b. No; inspect fuel system for leaks. Refer to section "FIS Low Pressure Leak Test".
7. Check for aerated fuel. Is the fuel aerated?
    a. Yes; determine cause of aerated fuel and repair as necessary. Refer to section "Aerated Fuel Test – Two-Filter Fuel System".
    b. No; Inspect the vehicle side fuel system return line for leaks/loose fittings.

5 Test-D - Two-Filter Fuel System

NOTICE: “Hard Start/No Start – Two-Filter Fuel System” test MUST be completed before performing this test. Refer to section "Hard Start/No Start - Two-Filter Fuel System (This Test Must Be Done First)".

Table 2.

Service Tools Used in the Procedure	
Tool Number	Description
DiagnosticLink ® 8.0 or higher	
W470589099100	Fuel Doser Test Plug

NOTE: KM63 GEN2 fuel filter module return lines are secured to the module with a mounting plate attached to the Pressure Limiting Valve (PLV) return line.

WARNING: PERSONAL INJURY

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- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

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: PERSONAL INJURY

To avoid injury from hot surfaces, wear protective gloves, or allow engine to cool before removing any component.

Check as follows:

1. Review Fuel System Integrity Check (FSIC) routine log file using DiagnosticLink 8.0 or higher. Is engine speed over 150 rpm while cranking?
   a. Yes; Go to step 2.
   b. No; perform the following checks. If any are the cause of cranking speed under 150 rpm, fix the issue and attempt to start the engine using the Fuel System Integrity Check (FSIC). If cranking speed is now above 150 rpm and engine does not start, Go to step 2.
      - Verify battery voltage; refer to Original Equipment Manufacturer (OEM) specifications.
      - Perform a cranking compression test.
      - Remove the accessory drive belt and check cranking speed.
      - Remove the air compressor and check cranking speed.
2. Review the FSIC routine log file using DiagnosticLink 8.0 or higher and monitor fuel compensation pressure and Low Pressure Pump Outlet (LPPO) pressure. Refer to section "Normal Fuel System Pressures - Two-Filter System". Is LPPO or Fuel Compensation pressure out of spec?
   a. Yes; replace fuel filters.

Refer to section "Removal of the Fuel Prefilter – Two Filter System".
Refer to section "Removal of the Coalescer/Final Filter – Two Filter System ".

b. No; Go to step 3.

3. Check for aerated fuel; Refer to section "Aerated Fuel Test – Two-Filter Fuel System". Is the fuel aerated?
   a. Yes; repair the cause of air in the fuel system and retest. Verify the repair.
   b. No; Go to step 4.
4. Perform a Fuel Injection System (FIS) Low Pressure Leak Test routine. Refer to section "FIS Low Pressure Leak Test". Did the FIS Low Pressure Leak Test fail?
   a. Yes; inspect the fuel system for leaks. Refer to section "Potential Fuel Leak Points - Two-Filter Fuel System".
   b. No; Go to step 5.
5. Perform the Chassis Fuel System Isolation Test. Refer to section "Chassis Fuel System Isolation Test." Is the starting difficulty still present?
   a. Yes; Go to step 6.
   b. No; check chassis fuel system lines per OEM procedures.
6. Remove and inspect the needle return pressure control valve. Refer to section "Removal of the Needle Return Pressure Control Valve – Two-Filter System ". Was damage found?
   a. Yes; replace the needle return pressure control valve. Refer to section "Installation of the Needle Return Pressure Control Valve - Two-Filter System".
   b. No; replace the Fuel Filter Module. Refer to section "Removal of the Fuel Filter Module - Two-Filter System".

