DAIMLER TRUCK NORTH AMERICA
AFTERMARKET

18SP747Rev2 – Detroit™ Fuel Injector Cleaning Machine

KIT DESCRIPTION

The Fuel Injector Cleaning Machine (FICM) is used to clean deposits from fuel injectors and test fuel injector performance. The FICM uses Detroit™ Injector Cleaning Fluid to clean fuel injectors.

KIT CONTENTS

The FICM is can be ordered using tool number DDE DKI001E21003. The table below list the serviceable parts within the FICM. Detroit™ Injector Cleaning Fluid can be ordered using part number NDX NQ301009FLD.

Part Number	Quantity	Description
DDE DKI001E21003	1	Fuel Injector Cleaning Machine
DDE DKI001E21003-1	1	Fluid Filter
DDE DKI001E21003-2	1	Pump Assembly
DDE DKI001E21003-3	1	Control/Switch Box Assembly
DDE DKI001E21003-4	1	Pressure Gauge
DDE DSN001E21003-2	1	Fuel Return Fitting (Gen5)
DDE DKI001E21003-7	1	Fuel Return Fitting (GHG17, GHG14, EPA10)
DDE DSN001E21003-1	1	Fuel Return Fitting (EPA07)
DDE DKI001E21003-8	1	Banjo Fitting Adapter
DDE DKI001E21003-9	1	Injector Harness
DDE DKI001E21003-10	1	Fresh Fluid Draw Tube
DDE DKI001E21003-11	1	Waste Tank Cap
DDE DKI001E21003-12	1	1/8 " Compucheck Socket Fitting
DDE DKI001E21003-13	1	1/8 " Compucheck Socket Coupler
DDE DKI001E21003-14	1	3/8" Quick Disconnect Gold Plug Fitting
DDE DKI001E21003-15	1	3/8" Quick Disconnect Gold Socket Coupler
DDE DKI001E21003-16	1	3/8" Quick Disconnect Red Plug Coupler
DDE DKI001E21003-17	1	3/8" Quick Disconnect Red Socket Coupler
DDE DKI001E21003-18	1	1/4" Hydraulic Plug Fitting
DDE DKI001E21003-19	1	1/4" Hydraulic Socket Coupler
DDE DKI001E21003-20	1	9" X 5" Magnetic Tray
DDE DKI001E21003-21	1	96" Pressure Line with Couplers
DDE DKI001E21003-22	1	96" Return Line with Couplers
DDE DKI001E21003-23	1	11" Line From Fresh Tank To Pump
DDE DKI001E21003-24	1	13" Line From Pump To Filter
DDE DKI001E21003-25	1	28" Line From Manifold To Waste Tank
DDE DKI001E21003-26	1	28" Line From Filter To Manifold
DDE DKI001E21003-27	1	Fuel Rail Supply Adaptor

Table1

REQUIRED TOOLS AND MATERIALS

Detroit™ Injector Cleaning Fluid Ordering Information		
Part Description	**Part Number**	**Quantity**
Detroit™ Injector Cleaning Fluid, 5 Gallons	NDX NQ301009FLD	1

Table 2

Note: Dispose the used injector cleaning fluid in an environmentally responsible manner according to state and/or federal recommendations.

Service Tools Used in the Procedure		
Tool Number	**Tool Name**	**Tool Graphic**
DDE DKI001E21003	Fuel Injector Cleaning Machine	
DAVCO FXP95, ESOC 250E or 250EXL	Fuel Primer	

Table 3

Note: After cleaning fuel injectors, injector cleaning fluid residue may cause some exhaust smoke during initial operation.

FICM SERVICE PROCEDURES

Updated FICM replace the two high pressure fuel line fittings (DKI001E21003-5 and DKI001E21003-6) with fuel rail fittings DKI001E21003-27 and DKI001E21003-28. If the FICM was updated or came with updated fittings, follow the procedures for use on FICM with Fuel Rail Fittings. If the FICM that was not updated, follow the procedures for use on FICM with High Pressure Fuel Line Fittings.
This document contains the following service procedures:

- Testing and Cleaning Gen 5 Engine Fuel Injectors Using Updated Fuel Rail Fittings
- Testing and Cleaning Gen 5 Engine Fuel Injectors Using High Pressure Fuel Line Fittings
- Testing and Cleaning GHG17/GHG14/EPA10/EPA07 Engine Fuel Injectors Using Updated Fuel Rail Fittings
- Testing and Cleaning GHG17/GHG14/EPA10/EPA07 Engine Fuel Injectors Using High Pressure Fuel Line Fittings
- Priming the Fuel Injector Cleaning Machine.

CONTACT INFORMATION

Please email DTNASSD@DaimlerTruck.com if you have any questions.

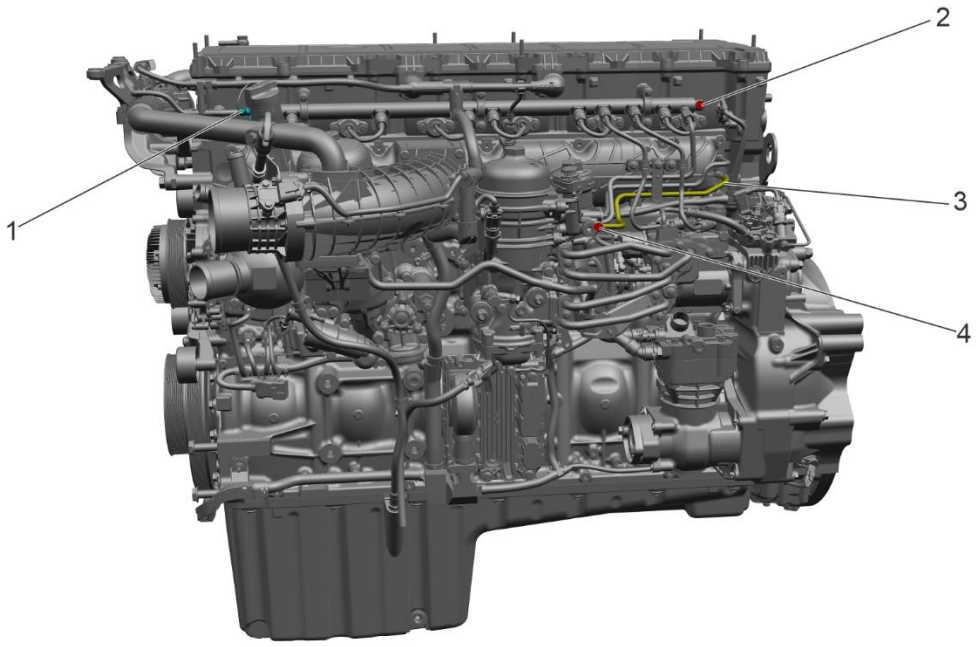
Testing and Cleaning Gen 5 Engine Fuel Injectors Using Updated Fuel Rail Fittings

FICM Fittings Used in the Procedure		
Tool Number	**Tool Name**	**Tool Graphic**
DKI001E21003-27	FICM Fuel Rail Supply Fitting	
DSN001E21003-2	FICM Fuel Return Fitting	

Table 4

Test and Clean as follows:

1. Turn ignition OFF, apply parking brake, chock wheels, and perform any other applicable safety steps.
2. Open the hood
3. Remove the bumper. Refer to Original Equipment Manufacturer (OEM) procedures



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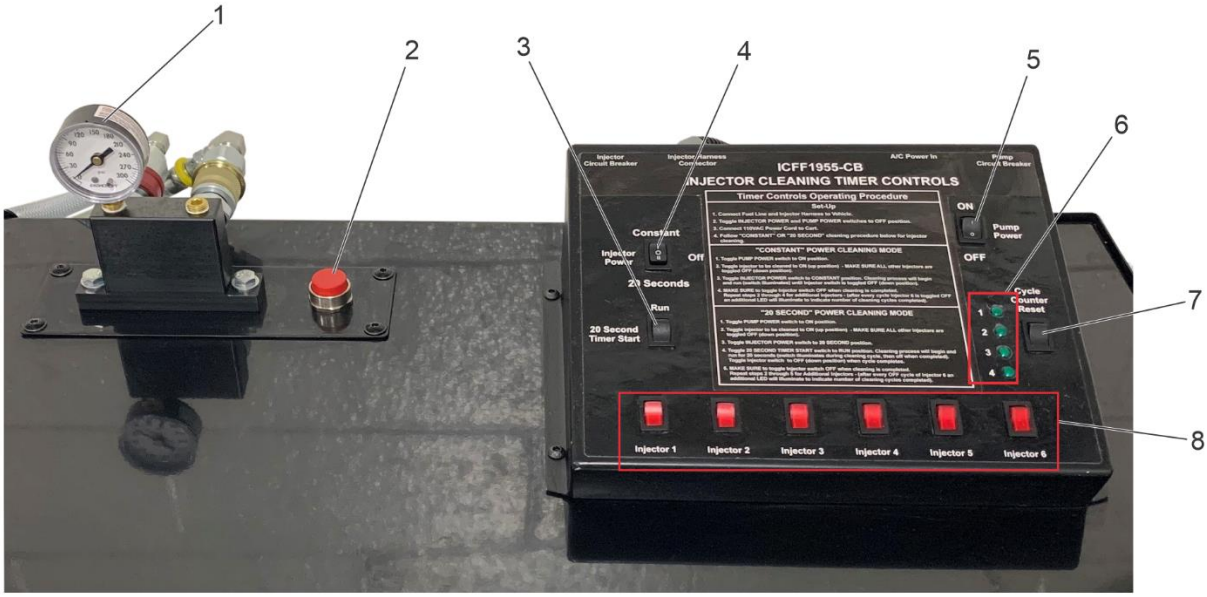
4. Loosen the pressure limiting valve (2) (see above graphic). Allow fuel to drain from the fuel rail. Once the fuel has drained, torque the pressure limiting valve to 100 N·m (74 lb·ft).
5. Remove the triple-clip bolt retaining the needle amplifier and pressure limiting valve return lines.
6. Remove the bolt retaining the needle return line (3) to the fuel filter module and the bolt retaining the amplifier and needle return line to the cylinder head (see above graphic).

7. Position the needle return line (disconnected from the fuel filter module and connected to the cylinder head) so it leaves room for installation of the Fuel Injector Cleaning Machine (FICM) fuel return fitting onto the needle return line. Torque the retaining bolt at the cylinder head to 30 N·m (22 lb·ft)
8. Disconnect the engine wiring harness from the fuel injector wiring harness connectors.
9. Remove the fuel rail pressure sensor (1) (see above graphic).
10. Install the FICM fuel rail supply fitting onto the fuel rail pressure sensor connection point at the fuel rail (1) (see above graphic), Torque to 40 N·m (30 lb·ft).
11. Install the FICM fuel return fitting onto the needle return line (4) (see above graphic). Torque to 10 N·m (7 lb·ft).
12. Connect the supply line from the FICM to the fuel rail, supply fitting (1) (see above graphic).
13. Connect the return line from the FICM to the fuel return fitting (4) (see above graphic).
14. Connect the FICM wiring harness to fuel injector wiring harness connectors at the camshaft housing.
15. Stir the injector cleaning fluid and then fill the FICM supply tank with at least one gallon of injector cleaning fluid. Injector cleaning fluid can turn yellow after being opened and this is a normal condition).
16. Turn Injector Power (4) and Pump Power (5) switches to the OFF position (see below graphic).



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17. Connect 110 AC volts power supply to the FICM.
18. Turn the Pump Power switch (5) to the ON position (see above graphic).
19. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). All other injectors should be turned off.
20. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).
21. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
22. Monitor the pressure on the FICM gauge (1) (see above graphic). The pressure should bleed down during the 20 second process. A fuel injector pressure stuck at 2062 kPa (200 psi) after a fourth cleaning cycle indicates the tested fuel injector has failed. Do not replace the fuel injector at this time.

23. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
24. Repeat steps 19 through 23 to clean the remaining fuel injectors. Clean each fuel injector four times. The Cycle Counter (6) tracks the number of cleaning cycles completed. After all fuel injectors have been cleaned four times, reset the cycle counter (7) (see above graphic).
25. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
26. Replace any fuel injector that failed testing in step 23 (should this be step 22? –mpa). Refer to workshop manual section “Removal of the Fuel Injector”. After replacement, continue to step 28. (what about Step 27? –mpa)
27. Loosen the pressure limiting valve and allow the cleaning fluid to drain from the fuel rail. Once the cleaning fluid has drained, torque the pressure limiting valve to 100 N·m (74 lb·ft).
28. Disconnect the FICM supply line from the fuel rail supply fitting.
29. Connect a Detroit™ approved fuel primer to the fuel rail supply fitting at the fuel rail.
30. Using the fuel primer, pressurize the fuel rail to 655 kPa (95psi).
31. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). This will clean the fuel injectors with diesel fuel. All other fuel injectors should be turned off.
32. Turn the Injector Power (4) switch to 20 Second position (see above graphic).
33. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
34. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light turns off, turn the injector switch (8) off.
35. Repeat steps 31 through 34 to clean the remaining fuel injectors with diesel fuel.
36. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
37. Turn the fuel priming tool off, and turn Injector Power (4) and Pump Power (5) switches to the OFF position (see above graphic).
38. Disconnect the FICM wiring harness from the fuel injector wiring harness connectors.
39. Disconnect the fuel primer from the fuel rail supply fitting and the FICM return line from the needle return line.
40. Remove the FICM fuel return fitting from the needle return line.
41. Remove the FICM fuel rail supply fitting from the fuel rail.
42. Lubricate the fuel rail pressure sensor seal ring and threads. Install the fuel rail pressure sensor. Torque to 65 N·m (48 lb·ft).
43. Connect the engine wiring harness to the fuel injector wiring harness connectors.
44. Remove the bolt retaining the amplifier and needle return line to the cylinder head.
45. Install the needle return line onto the fuel filter module and the cylinder head. Torque to 30 N·m (22 lb·ft).
46. Install the triple-clip bolt retaining the needle, amplifier and pressure limiting valve lines. Torque to 14 N·m (11 lb·ft).
47. Using a Detroit™ approved fuel primer, prime the fuel system. Refer to workshop manual section “Priming The Fuel System”.
48. Use DiagnosticLink® to perform the FICM Routine (or run the engine at 1200 RPM for 10 minutes).
49. Install the front bumper. Refer to OEM procedures.
50. Close the hood.

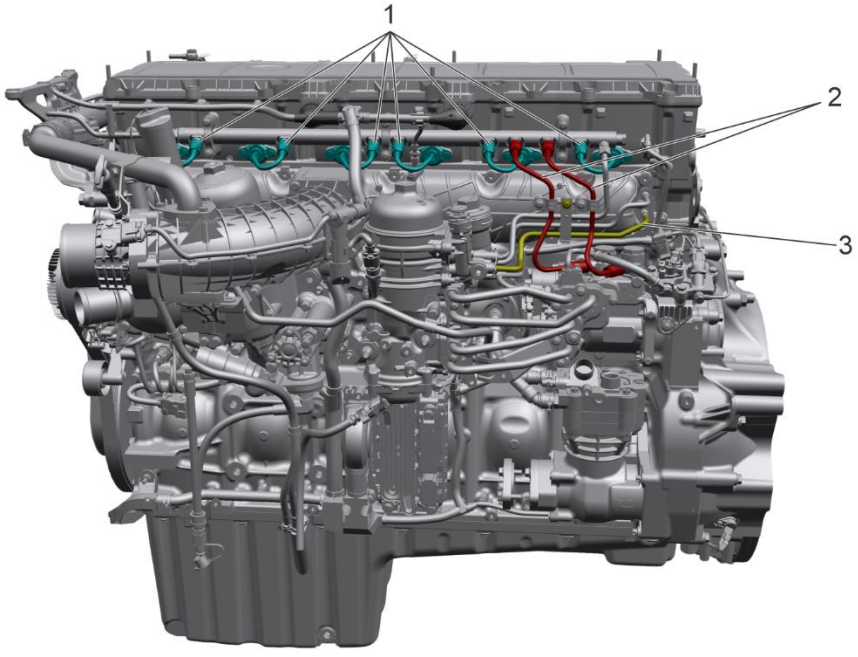
Testing and Cleaning Gen 5 Engine Fuel Injectors Using High Pressure Fuel Line Fittings

FICM Fittings Used in the Procedure		
Tool Number	**Tool Name**	**Tool Graphic**
DKI001E21003-5	FICM High Pressure Fuel Line Supply Fitting	
DKI001E21003-6	FICM High Pressure Fuel Line Block Off Fitting	
DSN001E21003-2	FICM Fuel Return Fitting	

Table 5

Test and Clean as follows:

1. Turn ignition OFF, apply parking brake, chock wheels, and perform any other applicable safety steps.
2. Open the hood
3. Remove the bumper. Refer to Original Equipment Manufacturer (OEM) procedures
4. Remove the high pressure fuel rail supply lines (2) (see below graphic). Refer to workshop manual section “*Removal of the High Pressure Fuel Rail Supply Lines*” (single use part).



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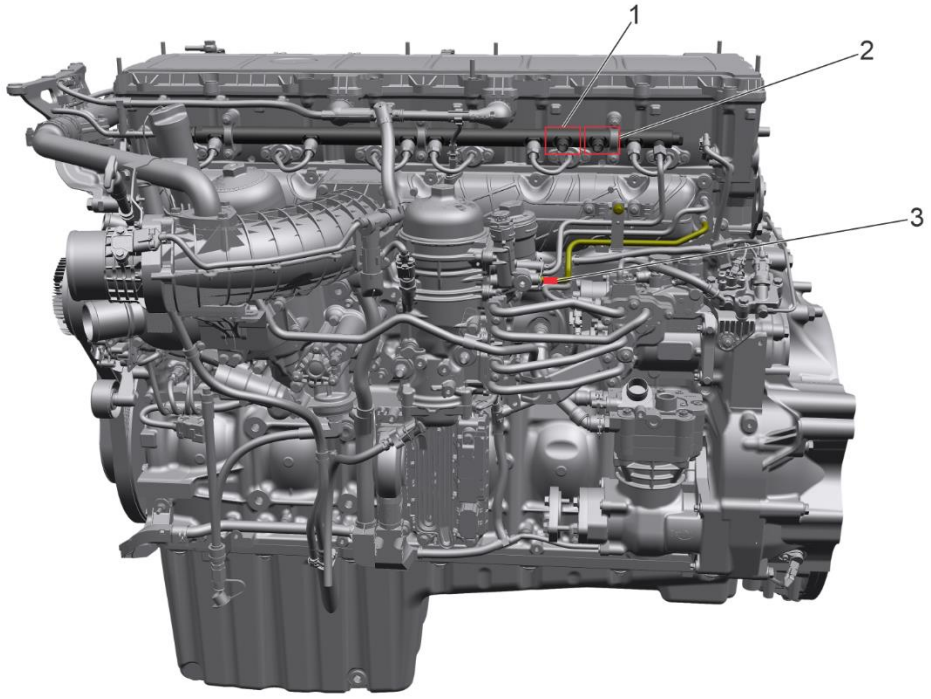
5. Using a fuel line socket, loosen all six high pressure fuel injector lines (1) at the fuel rail only (see above graphic). Allow the fuel to drain from the high pressure fuel injector lines. Once all lines have been drained, torque the fuel injector line nuts to 40 N·m (30 lb·ft).
6. Remove the triple-clip bolt retaining the needle amplifier and pressure limiting valve return lines.
7. Remove the bolt retaining the needle return line (3) to the fuel filter module and the bolt retaining the amplifier and needle return line to the cylinder head (see above graphic).
8. Position the needle return line (disconnected from the fuel filter module and connected to the cylinder head) so it leaves room for installation of the Fuel Injector Cleaning Machine (FICM) fuel return fitting onto the needle return line. Torque the retaining bolt at the cylinder head to 30 N·m (22 lb·ft)
9. Disconnect the engine wiring harness from the fuel injector wiring harness connectors.
10. Install the FICM fuel rail supply fitting onto the high pressure fuel rail supply line front connection point (1) at the fuel rail (see below graphic). Torque to 40 N·m (30 lb·ft).



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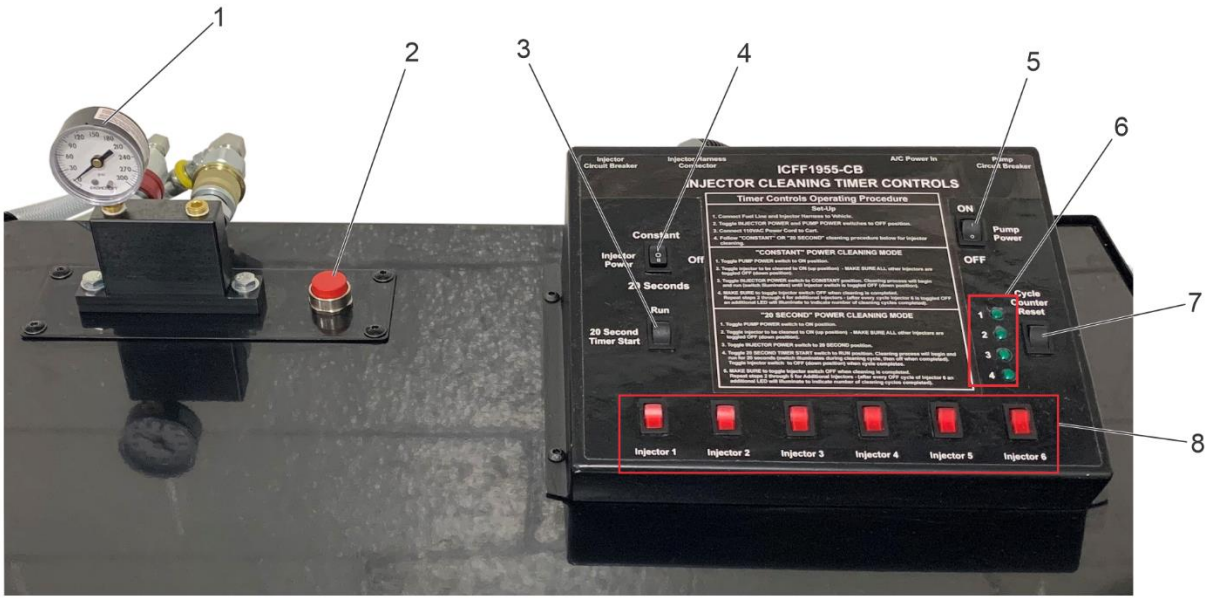
11. Install the FICM fuel rail block off fitting onto the high pressure fuel rail supply line's rear connection point (2) at the fuel rail (see above graphic). Torque to 40 N·m (30 lb·ft).
12. Install the FICM fuel return fitting onto the needle return line (3) (see above graphic). Torque to 10 N·m (7 lb·ft).
13. Connect the supply line from the FICM to the high pressure fuel rail, supply fitting (1) (see above graphic).
14. Connect the return line from the FICM to the fuel return fitting (3) (see above graphic).
15. Connect the FICM wiring harness to fuel injector wiring harness connectors at the camshaft housing.
16. Stir the injector cleaning fluid and then fill the FICM supply tank with at least one gallon of injector cleaning fluid. Injector cleaning fluid can turn yellow after being opened, which is a normal condition.
17. Turn Injector Power (4) and Pump Power (5) switches to the OFF position (see below graphic).



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18. Connect 110 AC volts power supply to the FICM.
19. Turn the Pump Power switch (5) to the ON position (see above graphic).
20. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). All other injectors should be turned off.
21. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).
22. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
23. Monitor the pressure on the FICM gauge (1) (see above graphic). The pressure should bleed down during the 20 second process. A fuel injector pressure stuck at 2062 kPa (200 psi), after a fourth cleaning cycle, indicates the tested fuel injector has failed. Do not replace the fuel injector at this time.
24. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
25. Repeat steps 20 through 24 to clean the remaining fuel injectors. Clean each fuel injector four times. The Cycle Counter (6) tracks of the number of cleaning cycles completed. After all fuel injectors have been cleaned four times, reset the cycle counter (7) (see above graphic).
26. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
27. Replace any fuel injectors that failed testing in step 23. Refer to workshop manual section “Removal of the Fuel Injector”. Continue to step 28 after injector replacement.
28. Using a fuel line socket, loosen all six high pressure fuel injector lines at the fuel rail only. Allow the cleaning fluid to drain from the high pressure fuel injector lines. Once all lines have drained, torque the fuel injector line nut to 40 N·m (30 lb·ft).
29. Disconnect the FICM supply line from the fuel rail supply fitting.
30. Connect a Detroit™ approved fuel primer to the fuel rail supply fitting at the fuel rail.
31. Using the fuel primer, pressurize the fuel rail to 655 kPa (95psi).
32. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). This will clean the fuel injectors with fuel. All other fuel injectors should be turned off.
33. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).

34. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
35. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
36. Repeat steps 32 through 35 to clean the remaining fuel injectors with diesel fuel.
37. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
38. Turn the fuel priming tool off, and turn Injector Power (4) and Pump Power (5) switches to the OFF position (see above graphic).
39. Disconnect the FICM wiring harness from the fuel injector wiring harness connectors.
40. Disconnect the fuel primer from the fuel rail supply fitting and the FICM return line from the needle return line.
41. Remove the FICM fuel return fitting from the needle return line.
42. Remove the FICM fuel rail supply fitting from the fuel rail.
43. Remove the FICM fuel rail block off fitting from the fuel rail.
44. Connect the engine wiring harness to the fuel injector wiring harness connectors.
45. Remove the bolt retaining the amplifier and needle return line to the cylinder head.
46. Install the needle return line onto the fuel filter module and the cylinder head. Torque to 30 N·m (22 lb·ft).
47. Install the triple-clip bolt retaining the needle, amplifier and pressure limiting valve lines. Torque to 14 N·m (11 lb·ft).
48. Install new high pressure fuel rail supply lines and prime the fuel system. Refer to workshop manual section "*Installation of the High Pressure Fuel Rail Supply Lines*" (single use part).
49. Using a Detroit™ approved fuel primer, prime the fuel system. Refer to workshop manual section "Priming The Fuel System".
50. Use DiagnosticLink® to perform the FICM Routine (or run the engine at 1200 RPM for 10 minutes).
51. Install the front bumper. Refer to OEM procedures.
52. Close the hood.

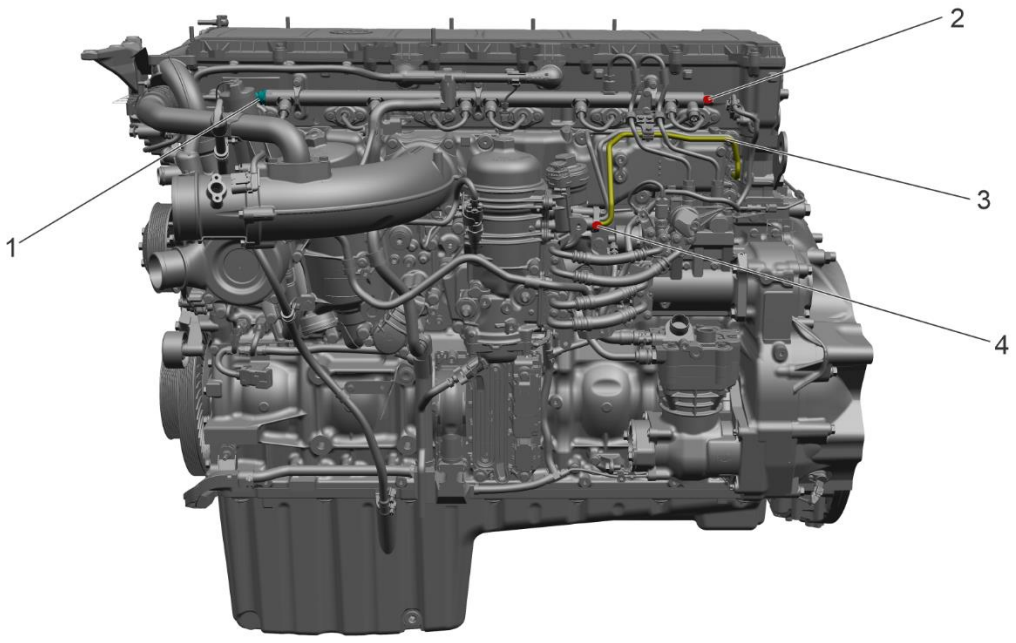
Testing and Cleaning GHG17/GHG14/EPA10/EPA07 Engine Fuel Injectors Using Updated Fuel Rail Fittings

FICM Fittings Used in the Procedure		
Tool Number	**Tool Name**	**Tool Graphic**
DKI001E21003-27	FICM Fuel Rail Supply Fitting	
DKI001E21003-7 (GHG17,GHG14, EPA10)	FICM Fuel Return Fitting	
DSN001E21003-1 (EPA07)		

Table 6

Test and Clean as follows:

1. Turn ignition OFF, apply parking brake, chock wheels, and perform any other applicable safety steps.
2. Open the hood
3. Remove the bumper. Refer to Original Equipment Manufacturer (OEM) procedures



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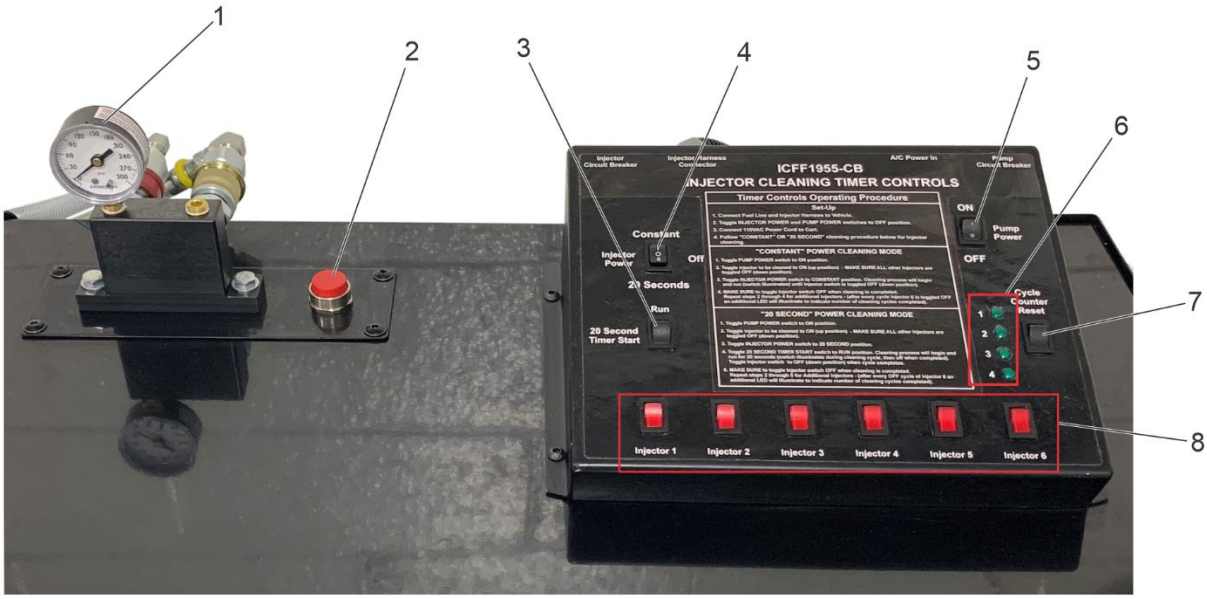
4. Loosen the pressure limiting valve (2) (see above graphic). Allow the fuel to drain from the fuel rail. Once the fuel has drained, torque the pressure limiting valve to 100 N·m (74 lb·ft).
5. Remove the needle return line (3) from the fuel filter module and position aside (see above graphic). Leave the line connected to the cylinder head.
6. Disconnect the engine wiring harness from the fuel injector wiring harness connectors.

7. Remove the fuel rail pressure sensor (1) (see above graphic).
8. Install the Fuel Injector Cleaning Machine (FICM) fuel rail supply fitting onto the fuel rail pressure sensor connection point at the fuel rail (1) (see above graphic). Torque to 40 N·m (30 lb·ft).
9. Install the FICM fuel return fitting onto the needle return line (4) (see above graphic).
10. Connect the supply line from the FICM to the fuel rail, supply fitting (1) (see above graphic).
11. Connect the return line from the FICM to the fuel return fitting (4) (see above graphic).
12. Connect the FICM wiring harness to fuel injector wiring harness connectors at the camshaft housing.
13. Stir the injector cleaning fluid and then fill the FICM supply tank with at least one gallon of injector cleaning fluid. Injector cleaning fluid can turn yellow after being opened and this is a normal condition.
14. Turn Injector Power (4) and Pump Power (5) switches to the OFF position (see below graphic).



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15. Connect 110 AC volts power supply to the FICM.
16. Turn the Pump Power switch (5) to the ON position (see above graphic).
17. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). All other injectors should be turned off.
18. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).
19. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
20. Monitor the pressure on the FICM gauge (1) (see above graphic). The pressure should bleed down during the 20 second process. A fuel injector pressure stuck at 2062 kPa (200 psi) after a fourth cleaning cycle indicates the tested fuel injector has failed. Do not replace the fuel injector at this time.
21. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
22. Repeat steps 17 through 21 to clean the remaining fuel injectors. Clean each fuel injector four times. The Cycle Counter (6) tracks the number of cleaning cycles completed. After all fuel injectors have been cleaned four times, reset the cycle counter (7) (see above graphic).
23. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).

24. Replace any injectors that failed testing in step 20. Refer to workshop manual section “Removal of the Fuel Injector” Continue to step 26 after replacing all failed injectors.
25. Loosen the pressure limiting valve. Allow the cleaning fluid to drain from the fuel rail. Once the cleaning fluid has drained, torque the pressure limiting valve to 100 N·m (74 lb·ft).
26. Disconnect the FICM supply line from the fuel rail supply fitting.
27. Connect a Detroit™ approved fuel primer to the fuel rail supply fitting at the fuel rail.
28. Using the fuel primer, pressurize the fuel rail to 655 kPa (95 psi).
29. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). This will clean the fuel injectors with diesel fuel. All other fuel injectors should be turned off.
30. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).
31. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
32. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
33. Repeat steps 29 through 32 to clean the remaining fuel injectors with diesel fuel.
34. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
35. Turn the fuel priming tool off, and turn Injector Power (4) and Pump Power (5) switches to the OFF position (see above graphic).
36. Disconnect the FICM wiring harness from the fuel injector wiring harness connectors.
37. Disconnect the fuel primer from the fuel rail supply fitting and the FICM return line from the needle return line.
38. Remove the FICM fuel return fitting from the needle return line.
39. Remove the FICM fuel rail supply fitting from the fuel rail.
40. Lubricate the fuel rail pressure sensor seal ring and threads. Install the fuel rail pressure sensor. Torque to 65 N·m (48 lb·ft).
41. Connect the engine wiring harness to the fuel injector wiring harness connectors.
42. Install the needle return line onto the fuel filter module. Torque to 30 N·m (22 lb·ft).
43. Using a Detroit™ approved fuel primer, prime the fuel system. Refer to workshop manual section “Priming The Fuel System”
44. Use DiagnosticLink® to perform the FICM Routine (or run the engine at 1200 RPM for 10 minutes).
45. Install the front bumper. Refer to OEM procedures.
46. Close the hood.

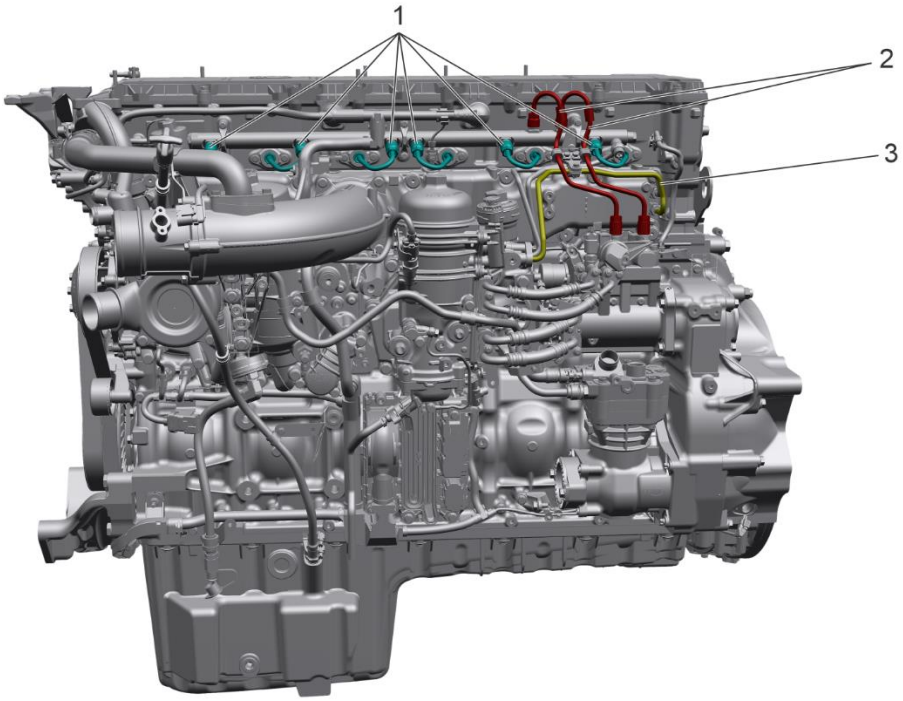
Testing and Cleaning GHG17/GHG14/EPA10/EPA07 Engine Fuel Injectors Using High Pressure Fuel Line Fittings

FICM Fittings Used in the Procedure		
Tool Number	**Tool Name**	**Tool Graphic**
DKI001E21003-5	FICM High Pressure Fuel Line Supply Fitting	
DKI001E21003-6	FICM High Pressure Fuel Line Block Off Fitting	
DKI001E21003-7 (GHG17,GHG14, EPA10) DSN001E21003-1 (EPA07)	FICM Fuel Return Fitting	

Table 7

Test and Clean as follows:

1. Turn ignition OFF, apply parking brake, chock wheels, and perform any other applicable safety steps.
2. Open the hood
3. Remove the bumper. Refer to Original Equipment Manufacturer (OEM) procedures
4. Remove the high pressure fuel rail supply lines (2) (see below graphic). Refer to workshop manual section '*Removal of the High Pressure Fuel Rail Supply Lines*' (single use part).



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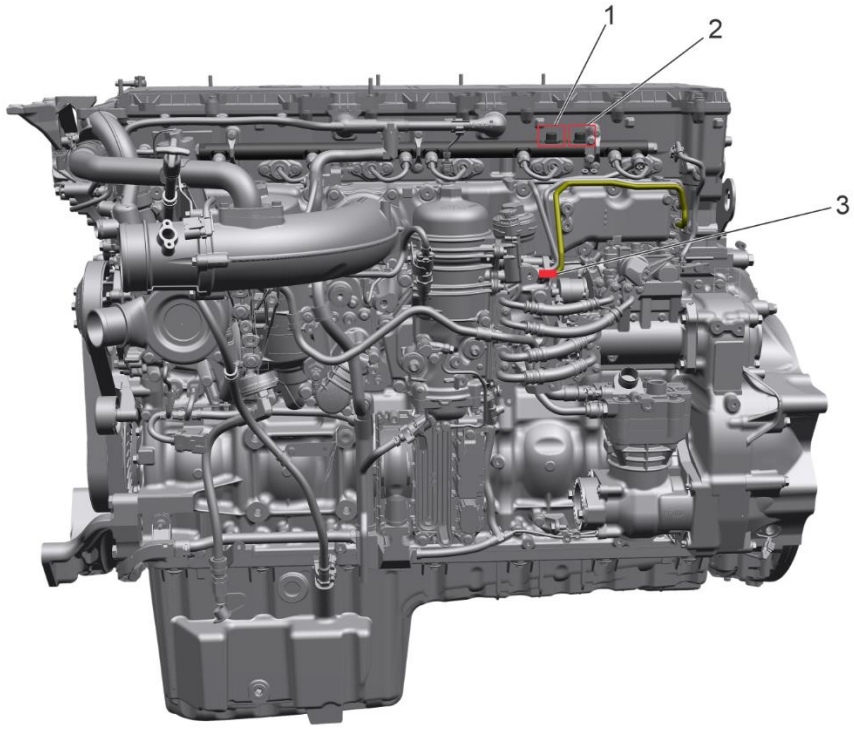
5. Using a fuel line socket, loosen all six high pressure fuel injector lines (1) at the fuel rail only (see above graphic). Allow the fuel to drain from the high pressure fuel injector lines. Once all lines have been drained, torque the fuel injector line nuts to 40 N·m (30 lb·ft).
6. Remove the needle return line (3) from the fuel filter module and position aside (see above graphic). Leave the line connected to the cylinder head.
7. Disconnect the engine wiring harness from the fuel injector wiring harness connectors.
8. Install the Fuel Injector Cleaning Machine (FICM), fuel rail supply fitting onto the high pressure fuel rail supply line, front connection point (1) at the fuel rail (see below graphic). Torque to 40 N·m (30 lb·ft).



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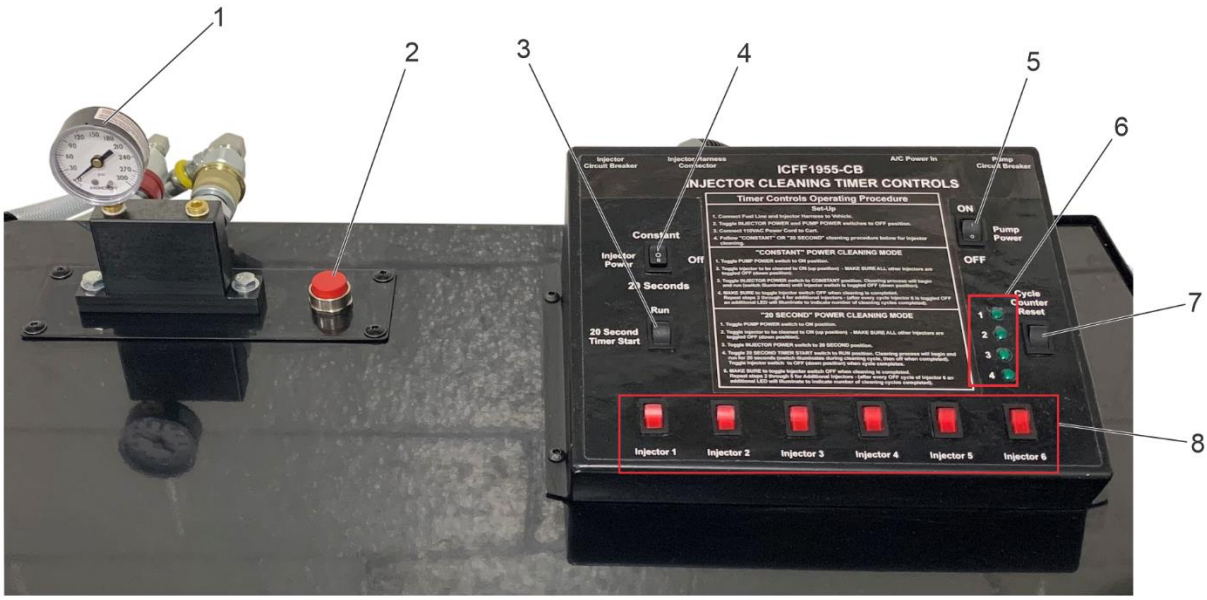
9. Install the FICM fuel rail block off fitting onto the high pressure fuel rail supply line, rear connection point (2) at the fuel rail (see above graphic). Torque to 40 N·m (30 lb·ft).
10. Install the FICM fuel return fitting onto the needle return line (3) (see above graphic).
11. Connect the supply line from the FICM to the high pressure fuel rail, supply fitting (1) (see above graphic).
12. Connect the return line from the FICM to the fuel return fitting (3) (see above graphic).
13. Connect the FICM wiring harness to fuel injector wiring harness connectors at the camshaft housing.
14. Stir the injector cleaning fluid and then fill the FICM supply tank with at least one gallon of injector cleaning fluid. Injector cleaning fluid can turn yellow after being opened which is a normal condition.
15. Turn Injector Power (4) and Pump Power (5) switches to the OFF position (see below graphic).



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16. Connect 110 AC volts power supply to the FICM.
17. Turn the Pump Power switch (5) to the ON position (see above graphic).
18. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). All other injectors should be turned off.
19. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).
20. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
21. Monitor the pressure on the FICM gauge (1) (see above graphic). The pressure should bleed down during the 20 second process. A fuel injector pressure stuck at 2062 kPa (200 psi), after a fourth cleaning cycle, indicates the tested fuel injector has failed. Do not replace the fuel injector at this time.
22. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
23. Repeat steps 18 through 22 to clean the remaining fuel injectors. Clean each fuel injector four times. The cycle counter (6) tracks the number of cleaning cycles completed. After all fuel injectors have been cleaned four times, reset the cycle counter (7) (see above graphic).
24. Push the round red button (2) on FICM to remove all pressure from the system (see above graphic).
25. Replace any fuel injectors that failed testing in step 21. Refer to workshop manual section '*Removal of the Fuel Injector*'. Continue to step 26 after replacing the failed injectors.
26. Using a fuel line socket, loosen all six high pressure fuel injector lines at the fuel rail only. Allow the cleaning fluid to drain from the high pressure fuel injector lines. Once all lines have been drained, torque the fuel injector line nut to 40 N·m (30 lb·ft).
27. Disconnect the FICM supply line from the fuel rail supply fitting.
28. Connect a Detroit™ approved fuel primer to the fuel rail supply fitting at the fuel rail.
29. Using the fuel primer, pressurize the fuel rail to 655 kPa (95psi).
30. Turn the fuel injector to be cleaned (8) to the ON position (see above graphic). This will clean the fuel injectors with fuel. All other fuel injectors should be turned off.
31. Turn the Injector Power (4) switch to the 20 Second position (see above graphic).

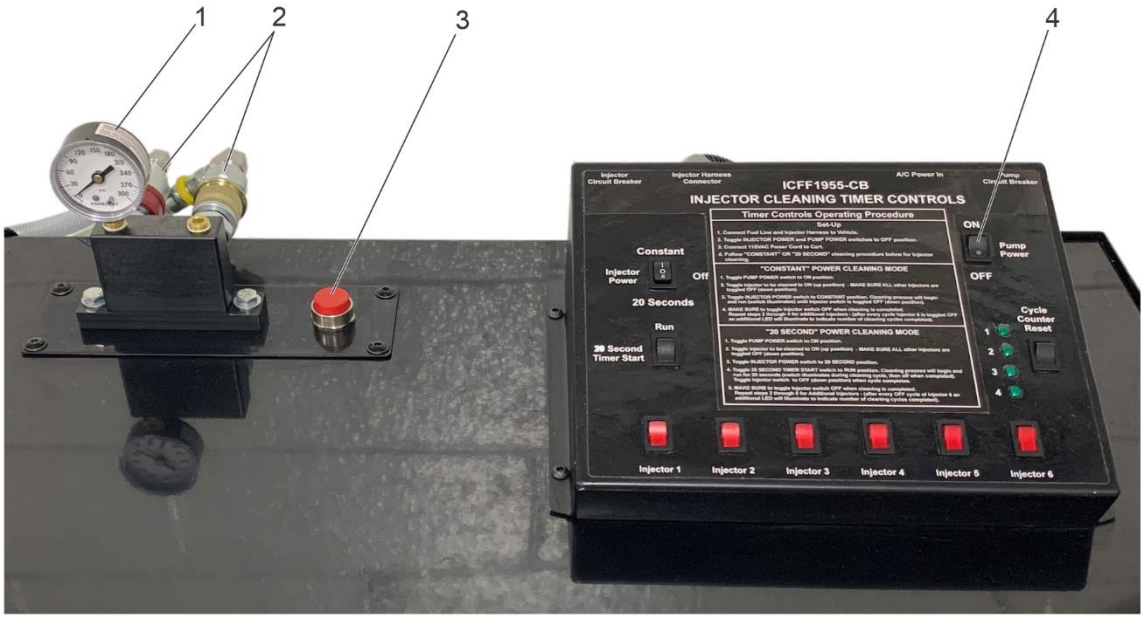
32. Turn the 20 Second Timer Start (3) switch to the RUN position (see above graphic).
33. Once fuel injector cleaning begins for the chosen fuel injector, the injector switch (8) illuminates. The injector switch turns off (see above graphic) after cleaning is complete. After the injector light has turned off, turn the injector switch (8) off (see above graphic).
34. Repeat steps 30 through 33 to clean the remaining fuel injectors with diesel fuel.
35. Push the FICM's round red button (2) to remove all pressure from the system (see above graphic).
36. Turn the fuel priming tool off, and turn Injector Power (4) and Pump Power (5) switches to the OFF position (see above graphic).
37. Disconnect the FICM wiring harness from the fuel injector wiring harness connectors.
38. Disconnect the fuel primer from the fuel rail supply fitting and the FICM return line from the needle return line.
39. Remove the FICM fuel return fitting from the needle return line.
40. Remove the FICM fuel rail supply fitting from the fuel rail.
41. Remove the FICM fuel rail block off fitting from the fuel rail.
42. Connect the engine wiring harness to the fuel injector wiring harness connectors.
43. Install the needle return line onto the fuel filter module. Torque to 30 N·m (22 lb·ft).
44. Install new high pressure fuel rail supply lines and prime the fuel system. Refer to workshop manual section '*Installation of the High Pressure Fuel Rail Feed Lines'* (single use part).
45. Using a Detroit™ approved fuel primer, prime the fuel system. Refer to workshop manual section 'Priming The Fuel System'.
46. Use DiagnosticLink® to perform the FICM Routine (or run the engine at 1200 RPM for 10 minutes).
47. Install the front bumper. Refer to OEM procedures.
48. Close the hood.

Priming the Fuel Injector Cleaning Machine

During normal operation of the Fuel Injector Cleaning Machine (FICM), the pressure gauge reads above 999 kPA (145 psi). Once maximum pressure is reached, the pump shuts off. If pressure drops below a minimum set point, the pump turns back on to maintain pressure. If the FICM is unable to reach and maintain 999 kPA (145 psi), priming the FICM may be necessary.

Prime as follows:

1. Loosen both vent caps on the FICM clean fluid tank and the waste tank.
2. Remove both return and supply quick connect lines (2) from the fuel injector machine.



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3. Connect 110 AC volts power supply to the FICM.
4. Turn the pump power switch (4) to the CONSTANT position.
5. While the pump is running, hold down the red pressure relief button (3) next to the pressure gauge for 30 seconds until all air is purged out of the system and the system is properly primed.
6. After priming the FICM the pressure gauge (1) should read above 999 kPA (145 psi) during operation.
7. If the pressure gauge does not read above 999 KPA (145 psi), air is still trapped in the system. Repeat steps four through six.
8. If the pressure gauge fails to build pressure after repeating steps four through six, the FICM pump assembly needs replacing.