



S&S DIESEL
M O T O R S P O R T

Installation Instructions

F.00H.LML.CP3 – 50 State LML CP3 Conversion Kit
CARB Exemption EO #D-756

2011 – 2016 GMC Sierra 2500/3500 – Diesel LML

2011 – 2016 Chevrolet Silverado 2500/3500 – Diesel LML



Introduction

On behalf of S&S Diesel Motorsport, we are pleased you have selected our product to improve the reliability and performance of your vehicle. Our engineers have gone to considerable lengths to ensure that the retrofit kit is well thought out and comprised of the highest quality components. Safety, reliability and emissions compliance were key priorities in the development of this product and we are confident it will stand the test of time even the harshest environments.

Proper installation procedures of the S&S Diesel Motorsport 50 State LML CP3 Conversion Kit will maximize reliability of the fuel system and minimize the amount of time it takes to complete the retrofit.

Key Points of Understanding (KPU's)

1. Cleanliness

Modern diesel fuel systems operate at pressures in excess of 30,000 PSI. At this pressure, even small debris can be very destructive to the sensitive components of the fuel pump, rails and injectors. Carefully preparing the installation environment is critical for a successful retrofit. Prior to beginning any repairs, it is advisable to use low pressure water to rinse the engine bay of mud and/or use compressed air to clean fuel system connections.

2. Verify condition of existing fuel system components (pump, rails, injectors)

Damaged fuel injectors or existing contamination will compromise the function of the S&S Diesel HP pump kit. It is **ESSENTIAL** to verify the state of health of the fuel system prior to beginning the retrofit. See page 10 for details.

3. HP fuel line tightening torque.

Fuel leaks due to scratched or loose high-pressure line connections may prevent the engine from starting and could cause a fire hazard. It is highly advisable to double check torque at every high-pressure line connection with a torque wrench to avoid leaks.

General Overview

Removal of the stock fuel injection pump involves the following key steps:

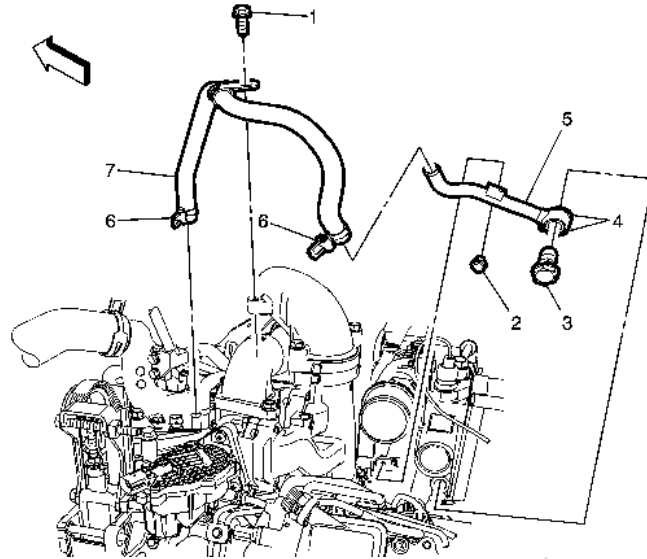
1. Disconnect both batteries, drain coolant system and remove air cleaner.
2. Disconnect black plastic cold side charge air cooler tube from throttle body and blue hot side charge air cooler pipe from turbocharger.
3. Release accessory drive belt tensioner and remove turbocharger air resonator.
4. Unbolt and move aside A/C compressor and alternator(s).
5. Unbolt cooling fan from front of engine, move aside.
6. Remove intake manifold tube
7. Remove EGR bypass pipe, valve and front cooler.
8. Remove center intake manifold (Y bridge) and turbo air inlet adapter.
9. Remove turbocharger coolant return banjo pipe.
10. Remove high- and low-pressure fuel lines.
11. Remove stock injection pump.
12. Swap gear and nut from the old pump to the new pump.

Installation of the S&S Diesel Motorsport 50 State CP3 pump is as follows:

1. Install NEW injection pump (does not need to be timed).
2. Install secondary HP rail plug.
3. Remove old HP pump line anchor bracket from rail-to-rail HP line.
4. Replace low pressure fuel supply tube with NEW tube and install to engine.
5. Install new supplied low pressure fuel supply "L" hose, schrader valve and high-pressure fuel lines. Reuse old low pressure return hose.
6. Install center intake manifold, EGR cooler, turbocharger air inlet adapter.
7. Install EGR bypass pipe, valve and intake manifold tube.
8. Reinstall turbocharger coolant banjo pipe w/ NEW seal.
9. Reinstall cooling fan assembly, alternator(s) and A/C compressor.
10. Install drive belt and turbocharger air resonator.
11. Reconnect cold side charge air cooler duct and hot side charge air cooler pipe.
12. Reconnect air cleaner, chassis fuel line connections, batteries
13. Refill coolant.
14. Prime fuel system

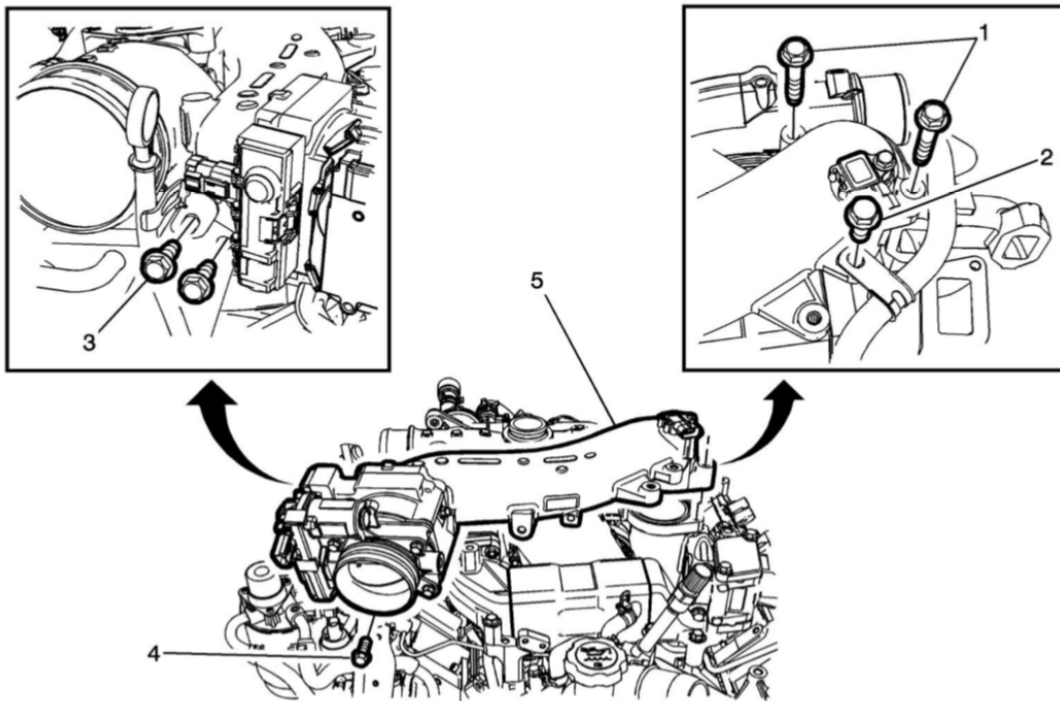
Phase 1: Removal of OLD Injection Pump

1. Disconnect both batteries, drain coolant system and remove air cleaner.
 - a. Be careful not to use impact tools on the battery terminals as they will easily be damaged if they are over loosened.
 - b. Coolant is best drained from the surge tank. Remove the 5/8" hose from the bottom of the tank and run the hose to a large catch can underneath the vehicle.
 - c. Air cleaner can be removed by first loosening the hose clamps and then gently pulling off the duct. The box itself can be removed by lifting up. Be careful not to damage the A/C line during removal.
2. Disconnect black plastic cold side charge air cooler (CAC) tube from throttle body.
 - a. Gently pry on the locking ring tooth with a screw driver a counter clockwise. As the locking ring is rotated, the CAC duct itself can be gently pulled off.
 - b. The blue neoprene charge air cooler can be dislodged using a deep well 11mm socket wrench or a closed 11mm ratcheting box wrench. The pipe does not need to be removed at the CAC itself.
3. Release tension of the accessory drive belt by rotating tensioner using a ½" drive socket wrench.
 - a. The intake manifold cover (embossed with 6.6L Turbo Diesel) can be removed by loosening the two 10mm bolts affixing it to the intake pipe.
4. Unbolt and move aside A/C compressor. The refrigerant does not need to be evacuated. The alternator(s) can be removed and put aside.
5. Remove the 4 cooling fan shroud bolts.
 - a. For 2015 vehicles, it is not necessary to remove the fan shroud, gently adjust the shroud towards the radiator to provide access to the cooling fan center.
 - b. For 2014 and earlier vehicles, the fan shroud is two piece and can be more easily removed.
 - c. Unbolt cooling fan mount from front of engine by loosening three 15mm bolts and two stud nuts. It is not necessary to separate the fan clutch from the fan.
6. Remove turbocharger coolant return banjo pipe from the turbocharger (#5 in diagram below) -



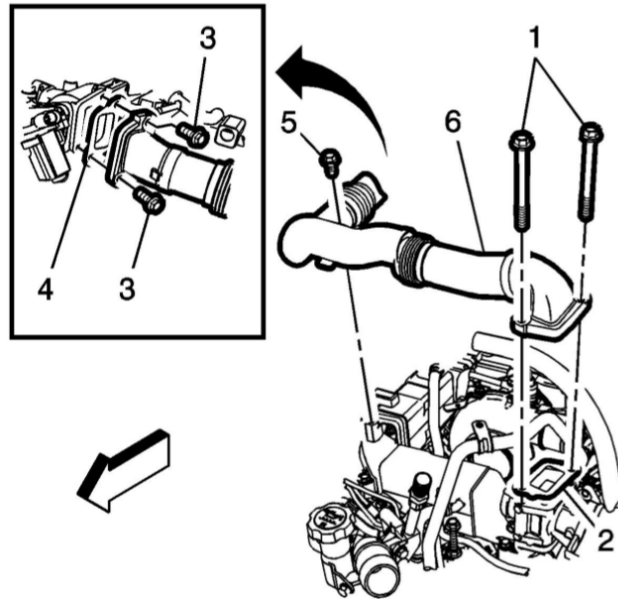
7. Remove intake manifold tube.

- a. First loosen the two 13mm bolts affixing the pipe to the intake manifold near the MAP sensor.
- b. Next, loosen the oil dipstick tube bracket bolts and the hidden 10mm bolt affixing the intake air heater ground bracket to the intake pipe. This 10mm is critical for proper operation of the intake air heater.

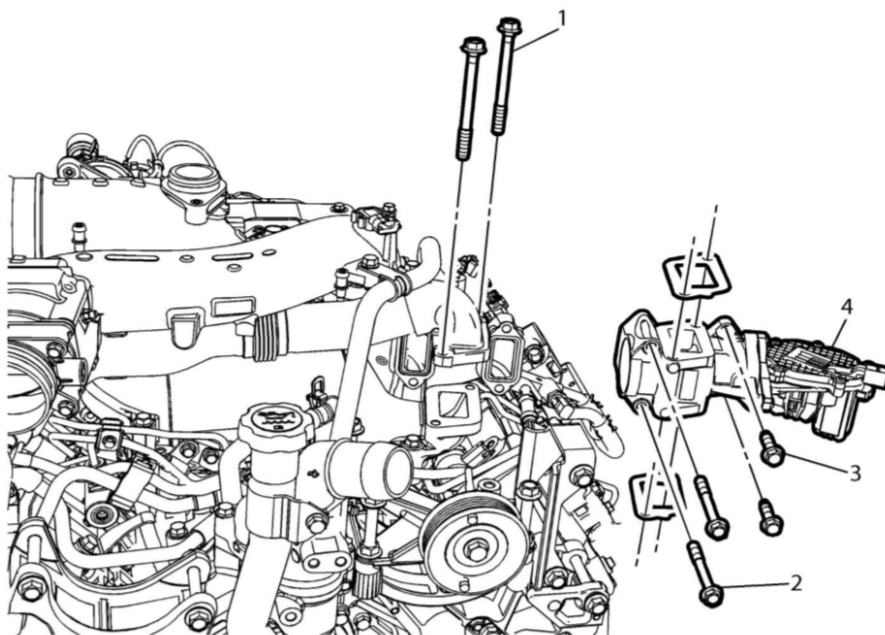


8. Remove EGR bypass pipe, valve and front cooler.

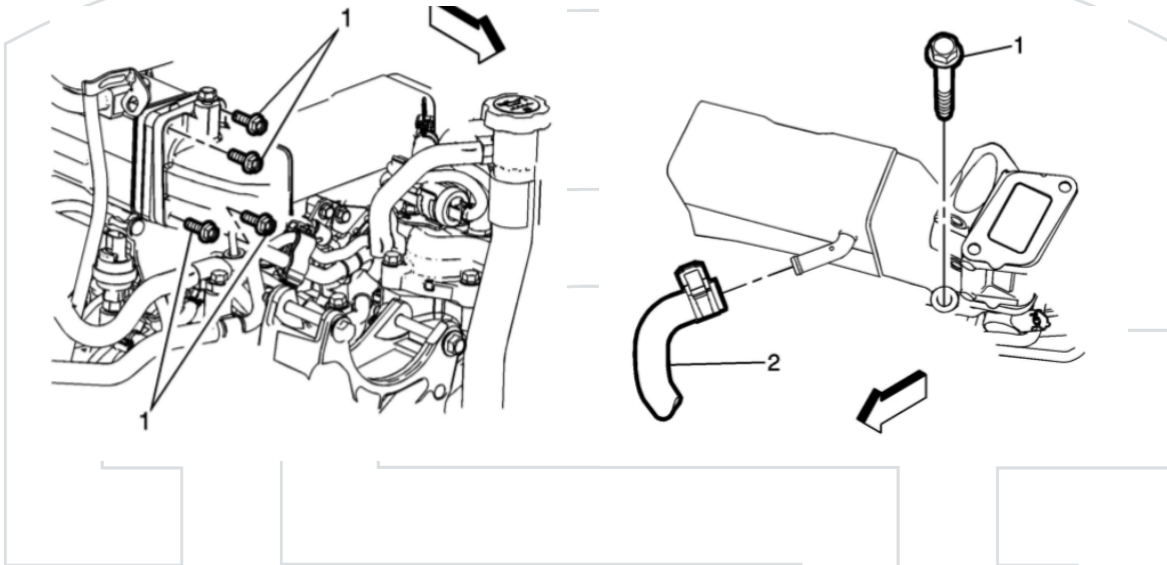
- a. Remove the EGR bypass pipe that connects the EGR bypass valve to the EGR valve.



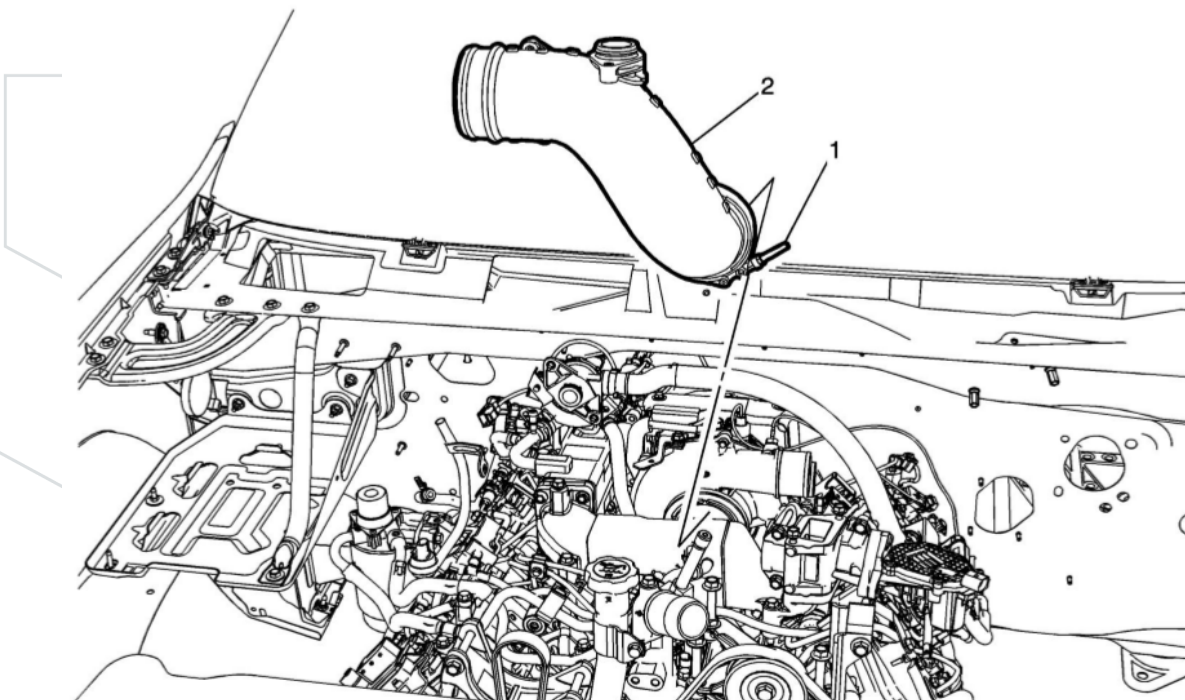
- b. The EGR valve can then be removed by loosening the four bolts that attach it to the intake manifold.



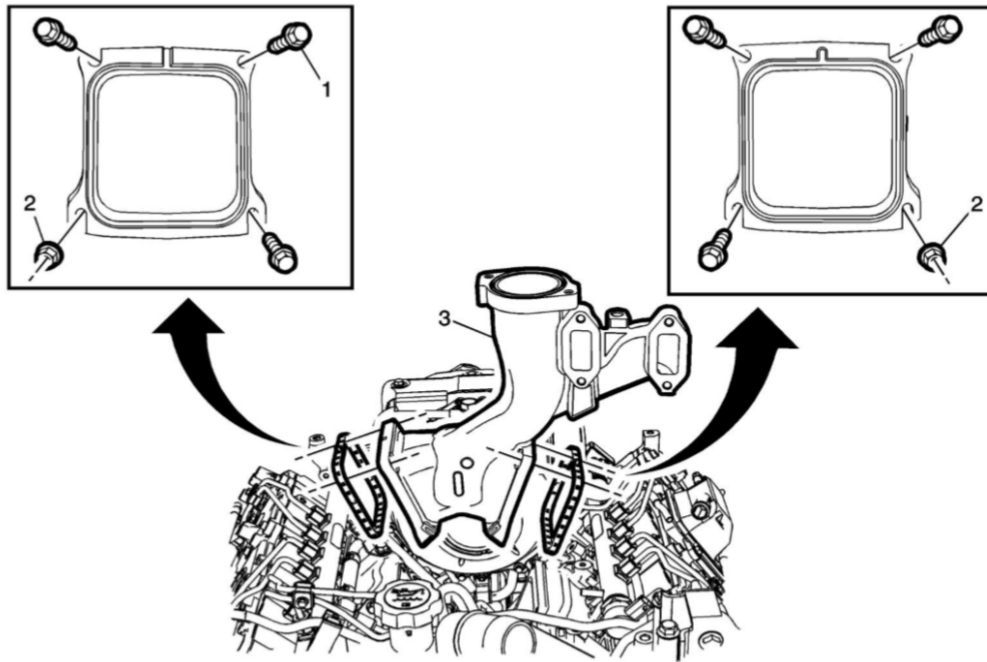
- c. The 4 front EGR cooler bolts can be accessed by carefully threading through a ¼" drive socket extension and a swivel socket.



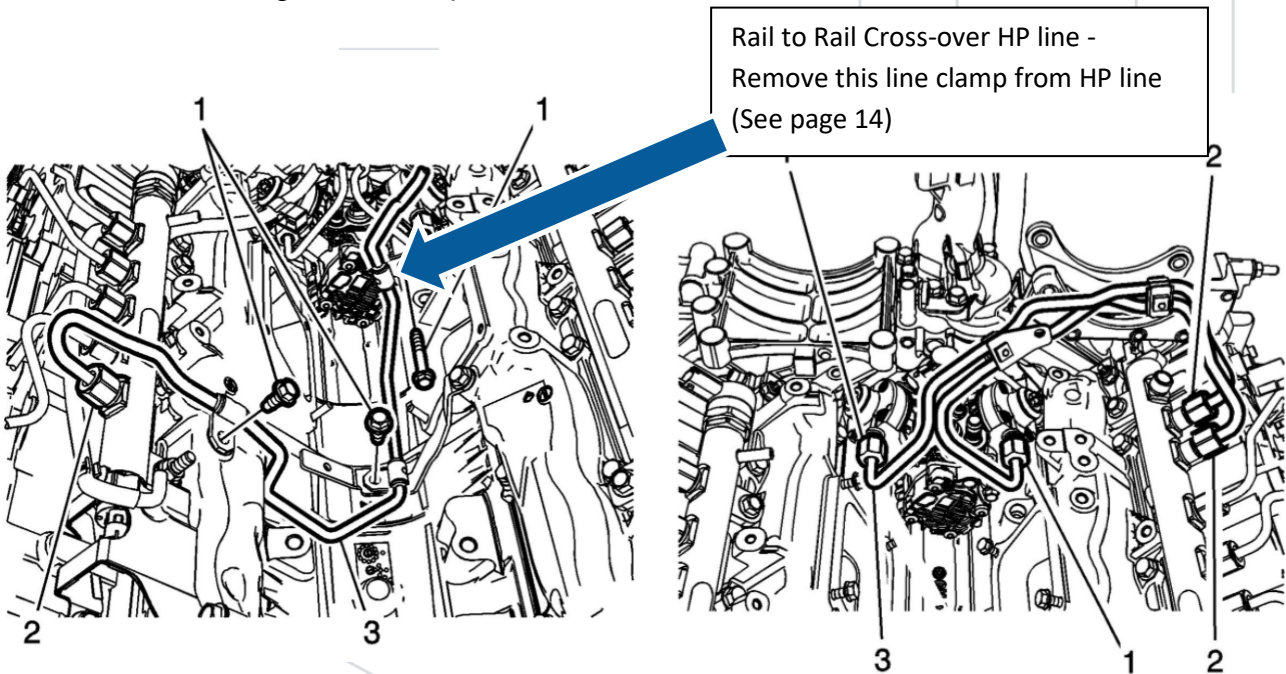
9. Remove the turbocharger air inlet adapter

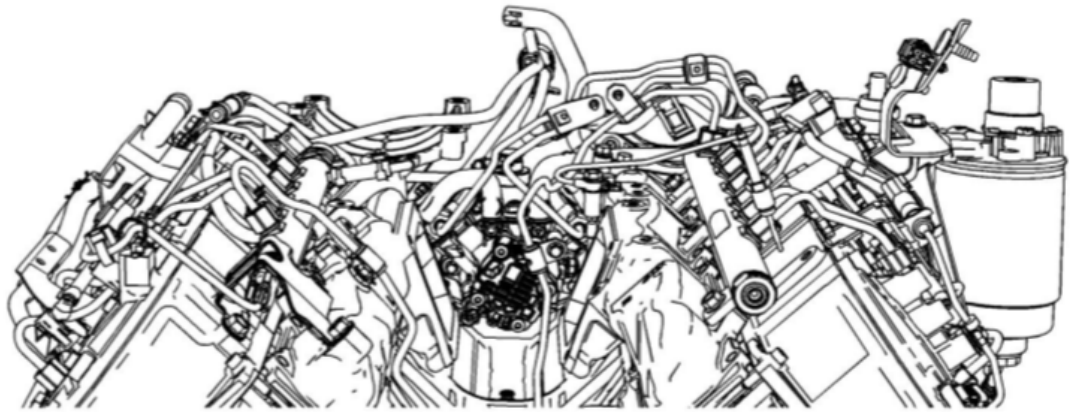
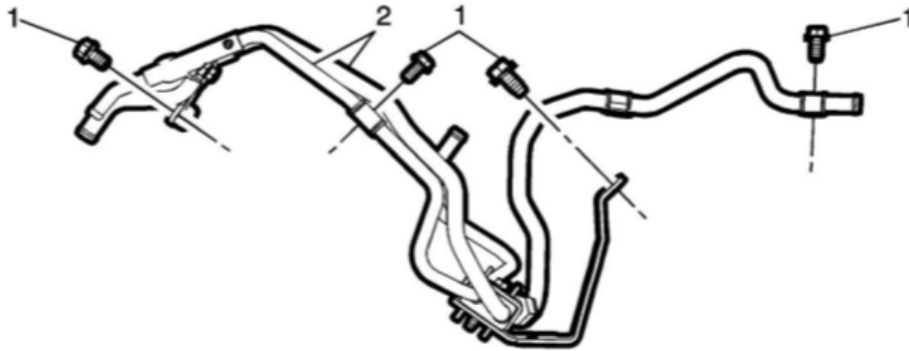


10. Remove the center intake manifold aka "Y" Bridge



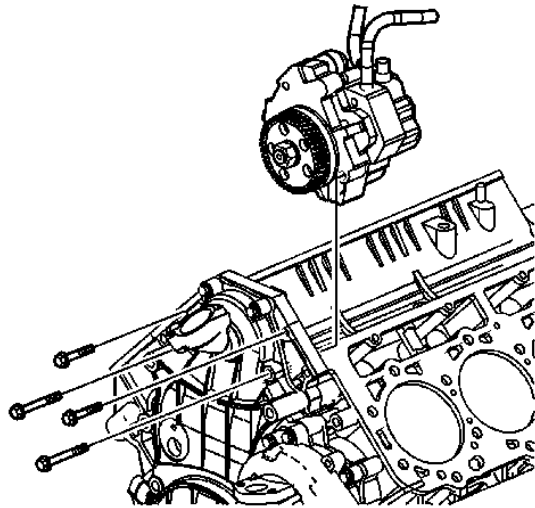
11. Remove high- and low-pressure fuel lines.





12. Disconnect electrical harness connectors for the fuel injection pump temperature sensor and pressure regulator.

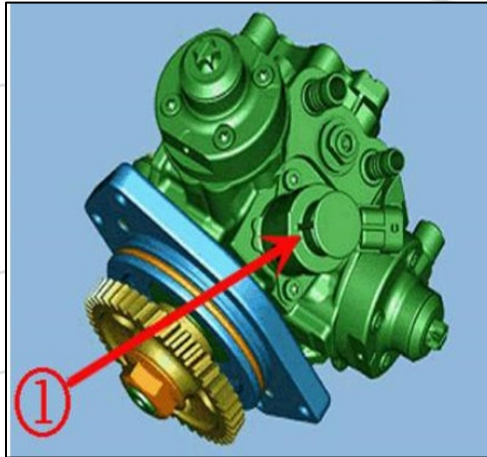
13. Remove the four bolts that secure the injection pump to the cylinder block.



14. Remove stock injection pump.

Phase 2: Inspect the existing injection pump for signs of catastrophic failure.

1. Remove the old pump metering unit and inspect for signs of metal contamination.



2. If any contamination is found, the entire fuel system will need to be replaced.



Image 2 – Example of condition from pump failure



Image 1 – Example of normal condition

If there is evidence of pump failure, the fuel injectors, fuel rails and all high- and low-pressure fuel lines must be replaced. In addition, the fuel return line, hydrocarbon injector (after treatment injector) and fuel filter must be replaced. Contact S&S Diesel Motorsport for details on a cost savings kit if these additional components are required.

Phase 3: Prepare Injection Pump for Installation

1. Remove the green temperature sensor from the OLD injection pump and reconnect it to the proper engine wiring harness connector. This sensor will need to be connected and secured to the engine with the provided mount and bolt (see Image 3).

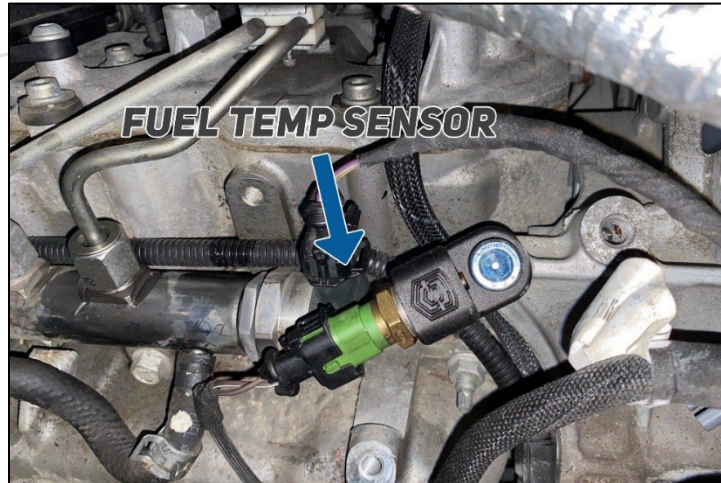


Image 3 – Fuel temperature sensor slides inside plastic mount and is attached to the engine with the provided bolt

2. Hold the OLD injection pump by the drive gear with an adjustable spanner wrench.
3. Loosen the gear nut until the nut is even with the end of the gear shaft.
4. Remove the gear from the tapered shaft of the old fuel pump.
5. Separate the injection and adapter flange by removing the 3 bolts.
6. Inspect the O-ring for damage on the pump adapter and replace, if necessary.
7. Clean all mating surfaces.
8. Install supplied low-pressure fuel feed fitting into the CP3 pump aluminum flange and torque to 27 Nm or 20 lb ft (see Image 4).
9. Install supplied low-pressure fuel return fitting into the CP3 pump body and torque to 27 Nm or 20 lb ft (see Image 4).



Image 4 - Large barbed fitting is the fuel feed and small barbed fitting is the fuel return

10. Install the NEW adapter (included in the kit) to the NEW injection pump the 3 bolts supplied in the kit. Be sure to lubricate the flange O-ring with engine oil prior to installation or an oil leak could occur. Tighten the bolts to 34 Nm or 25 lb ft.
11. Install the gear and tighten the gear nut to 79 Nm or 58 lb ft.

Important Notes:

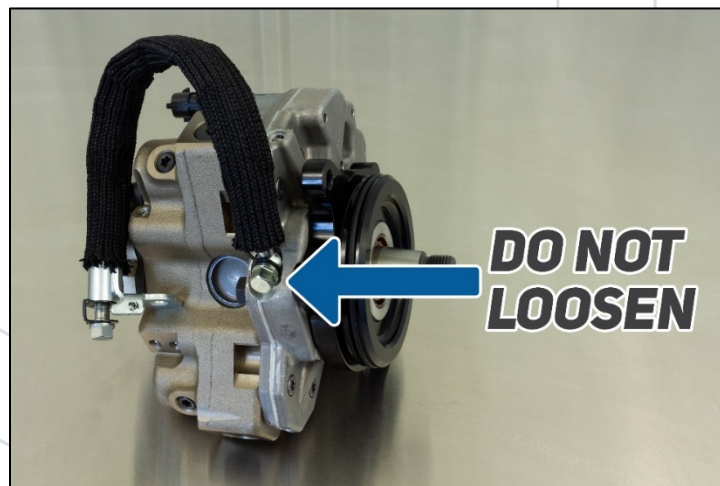
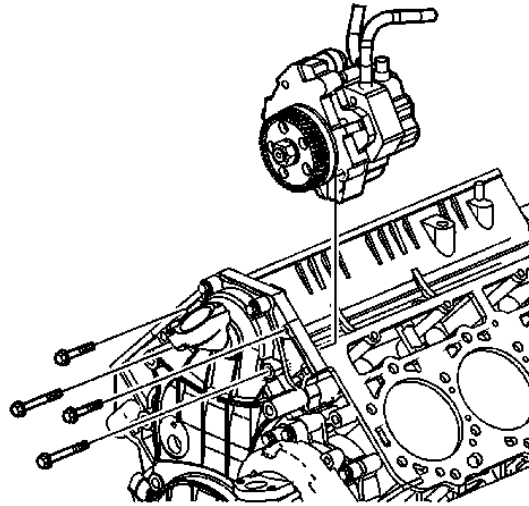


Image 5 - Pump has a feed line for the HCl dosing system attached to side. DO NOT loosen this fitting on the pump (blue arrow)

Phase 4: Installation of the NEW S&S Diesel Motorsport 50 State CP3 Pump

1. Lubricate the o-rings on the NEW injection pump adapter with engine oil and install onto the cylinder block. Note the CP3 pump does not need to be timed to the camshaft. Tighten the four bolts to 25 Nm (18 lb ft) Do not draw the pump into the block using the attachment bolts or they may strip out of the aluminum mounting plate, it must be pushed into position.



2. Use the provided extension harness (see Image 6) to connect the metering unit on the pump to the engine harness.



Image 6 - Metering Unit Extension Harness

3. Before re-installing the rail-to-rail cross-over HP fuel line, remove the line clamp shown on page 8 by holding the flat portion in a vice and using a screwdriver to pry up (see Image 7). Do not nick or damage HP line in any way. Install cross-over HP line and secondary HP rail plug and tighten fittings to 30 Nm (22 lb ft).

The high-pressure rail plug provided goes towards the open feed port toward rear of vehicle while the NEW supplied HP feed line from the CP3 goes toward the front. Note: torque is critical. Under or over torque will result in fuel leaks



Image 7- Remove clamp from rail-to-rail cross-over HP fuel line.

4. Replace low pressure fuel supply line with NEW adapter line (see Image 8) and install to engine. Tighten the compression fitting to 35Nm (26 lb ft). TIP- clean and lightly lubricate low pressure feed tune compression fitting to ease installation in the valley.



Image 8 – Line A should be used with the stock fuel filter housing. Line B should be used when the stock fuel filter housing has been removed (fuel supply hose for Cp3 is not included).

5. Attach supplied fuel hose to the OEM fuel pump supply pipe and secure with constant tension clamps. Reuse existing fuel hose on return line (see Image 9). Be sure the return hose does not make contact with the high-pressure line. Bend the steel return line if necessary to ensure there is no contact.

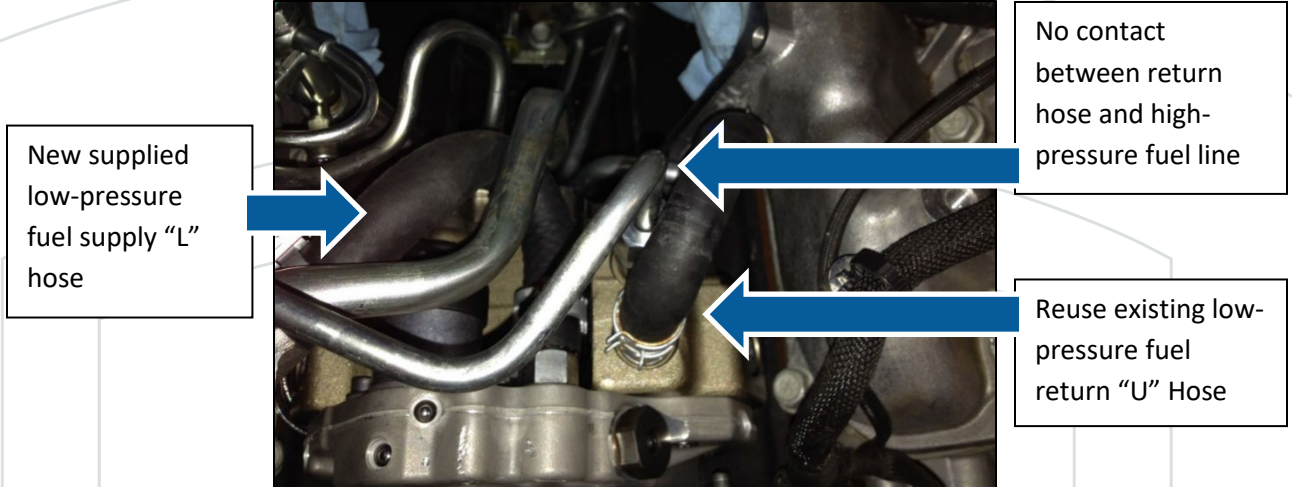


Image 9 – CP3 supply, return, and high-pressure connections

6. Install NEW supplied HP line from pump outlet to RH rail. Tighten pump connection fittings to 38 Nm and rail connection fitting to 30 Nm.
7. Install hydrocarbon injector line to intake manifold (see Image 10). Tighten to 10 Nm (89 lb in)



Image 10 – hydrocarbon injector line installed

8. Install center manifold (Y-bridge). Tighten bolts and nuts to 10 Nm (89 lb in)
9. Install turbocharger air inlet adapter. Tighten clamp to 10 Nm (89 lb in)
10. Install EGR cooler. TIP: hand-start all EGR fasteners prior to tightening. Tighten bolts to 25 Nm (18 lb ft).
11. Install EGR bypass pipe and EGR valve. Tighten all EGR bolts to 25 Nm (18 lb ft)
12. Install intake manifold tube to engine. Tighten all fasteners to 25 Nm (18 lb ft)
13. Reinstall turbo coolant banjo pipe. Tighten to 35 Nm (26 lb ft)

14. Reinstall cooling fan / pulley assembly. Tighten to 56 Nm (41 lb ft)
15. Reinstall fan shroud assembly. Tighten fan shroud bolts to 8 Nm (71 lb in)
16. Reinstall alternator(s) Tighten generator bolts to 58 Nm (43 lb ft). Battery cable nut should be tightened to 12 Nm (106 lb in)
17. Reinstall A/C compressor. Tighten bolts to 58 Nm (43 lb ft)
18. Install drive belt and center intake manifold cover.
19. Reconnect cold side charge air cooler duct and hot side charge air cooler pipe.
20. Reconnect air cleaner,
21. Reconnect chassis fuel line connections,
22. Reconnect battery cables. Tighten to 5 Nm (44 lb in)
23. Refill coolant using vacuum fill system or GM static fill procedure. Be sure to fill slowly so that overflow side of tank is at least ½ full.
24. Replace fuel filter cartridge. NEW GM AC DELCO P/N 12664429 is recommended to ensure reliability of the fuel system.
25. Prime fuel system
 - a. Open the fuel filter vent valve screw by turning screw counter clockwise.
 - b. Pump the priming pump repeatedly until fuel escapes from the vent valve.
 - c. Close the vent valve
 - d. Pump the priming pump repeatedly until it becomes hard.
 - e. Check the fuel system for leaks.
 - f. Engage the starter and crank the engine for 10 secs or until the engine fires.
 - g. If the engine does not start and no leaks are observed, pump the priming pump repeatedly until it becomes hard again. Then engage the starter again for 10 second intervals until the engine starts. It may take 3-4 priming events to get the engine started.

Important Notes:

Image 11 - Plug for injector return harness not used in the 50 State Kit