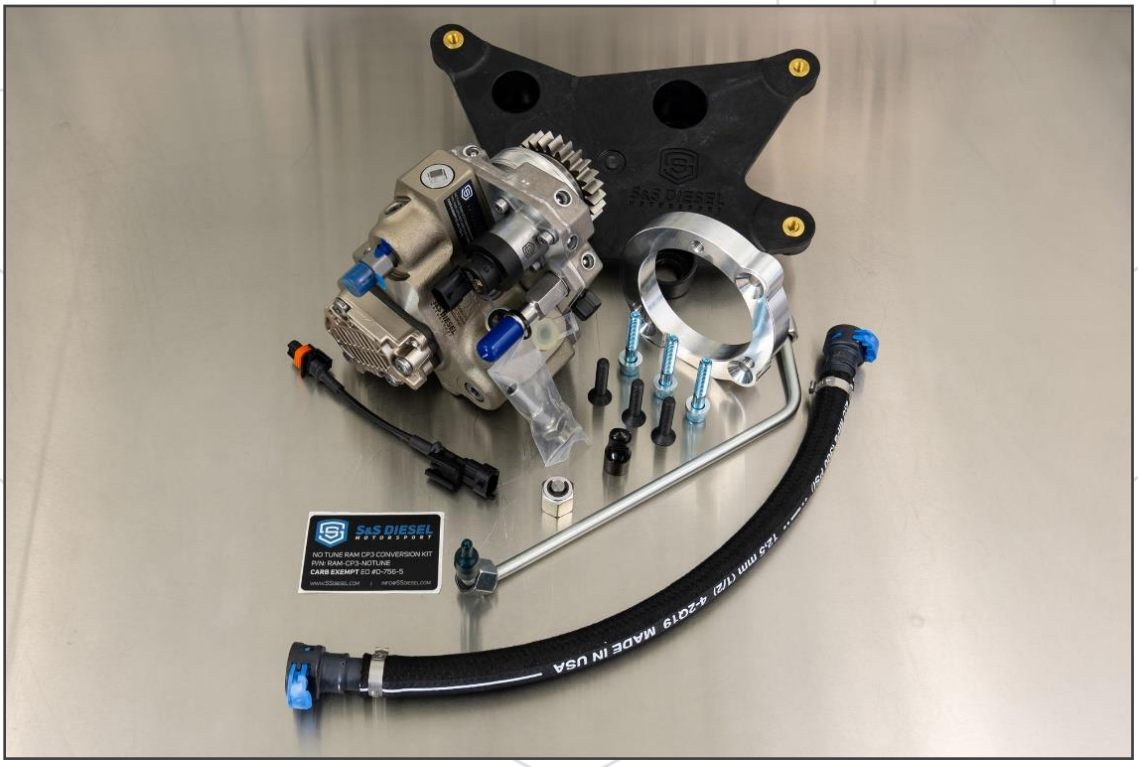
Installation Instructions

RAM CP3 Pump Conversion

RAM-CP3-NOTUNE

CARB EXEMPT - EO #D-756-5

Cummins 6.7L – 2019 - 2020 RAM Truck



Installation Tools

Tools Required:

- Sockets:
  - 8mm, 10mm, 11mm, 13mm, 15mm, 19mm
- Wrenches:
  - 10mm, 11mm
- Assorted Extensions, Wobble Extensions May be helpful
- Using both 1/4” and 3/8” drive tools may be helpful
- Torque Wrench
- 5mm and 6mm Allen socket
- Small flat screwdriver (see Figure 11)

Special tools:

- Fuel injection Line Crows Foot Style Wrench
  - Similar to CTA Tool PN: 2220 (19mm and 17mm)
- Plastic Fastener Removal Tool
  - Similar to Lisle PN: 35260
- Stick Magnet (suggested)

Figure 1

Change Log:

- Revision 3FEB2021
  - Step 25 e
- Revision 13JULY2021
  - Step 24 c
  - Step 26 e
- Revision 31AUG2021
  - Updated to CARB EO #D-756-5
  - Step 25
- Revision 11Jan2023
  - Updated Torque Spec for Pump to Rail High Pressure Line & Rail Cap

DISASSEMBLY NOTE: *As you remove bolts be sure to bag and tag them or set them aside in such a way you remember to put them back in the correct locations.*

1. **Disconnect the battery ground terminals:**
    a. 10mm on each side

2. **Remove the engine cover (Figure 2):**
    a. Remove the 4 bolts (8mm socket) and remove engine oil dipstick from the tube to remove the cover. Then replace the dipstick into the tube.

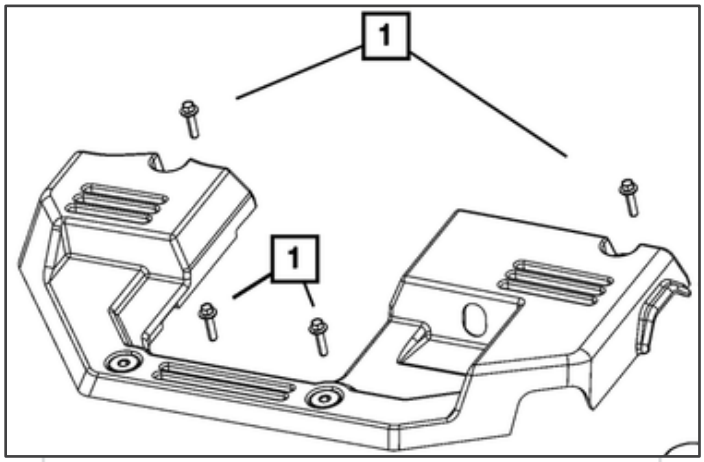


Figure 2

3. **Remove upper radiator hose bracket:**
    a. Remove the upper radiator to cylinder head coolant hose clamp bracket via 1 bolt (10mm socket or wrench) to allow for a little more flexibility in the hose.

4. **Remove the EGR crossover tube:**
    a. Remove the clamp in the middle of the EGR crossover with an 8mm socket (Figure 3 – Item 34). You will need to push onto the coolant hose to get to the bolt head. ¼" drive ratchet and extension with an 8mm socket works best.
    b. Remove the push in plastic harness holders from the intake elbow with the plastic fastener removal tool in 2 locations along the wire toward the connector. (Figure 4)
    c. To disconnect the EGR sensor from the engine harness, remove the black connector cover from it. Push the connector together like you are putting it together to release pressure on the locker, while doing so, push the red tab (locker) upwards to release the locker then push down on the rear of the connector to release it. Like a normal connector at that point, you may also need to push it together to get it to release the secondary locker before you pull it apart. (Figure 5)

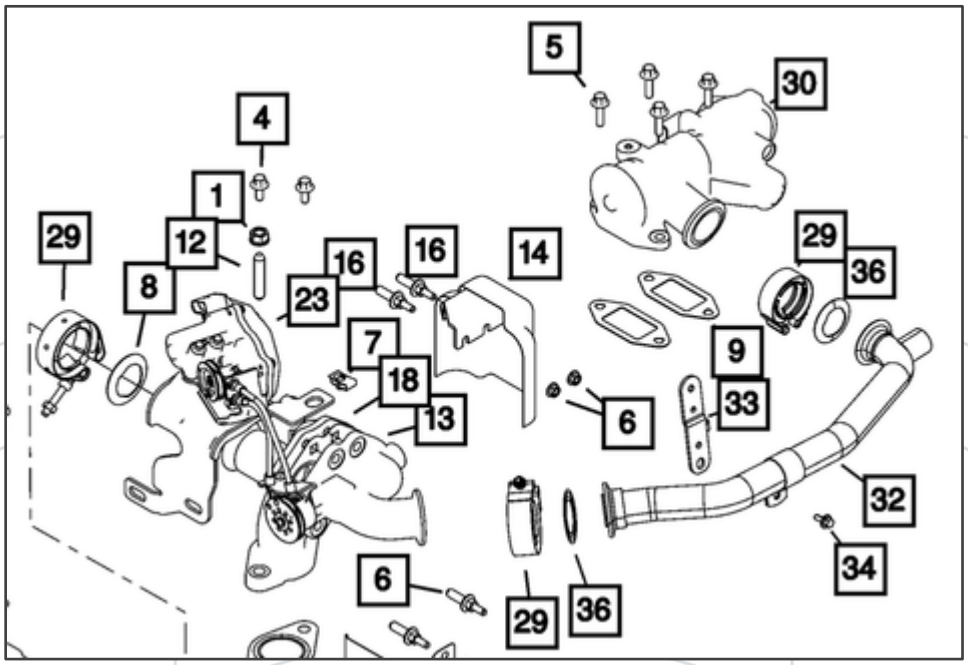


Figure 3

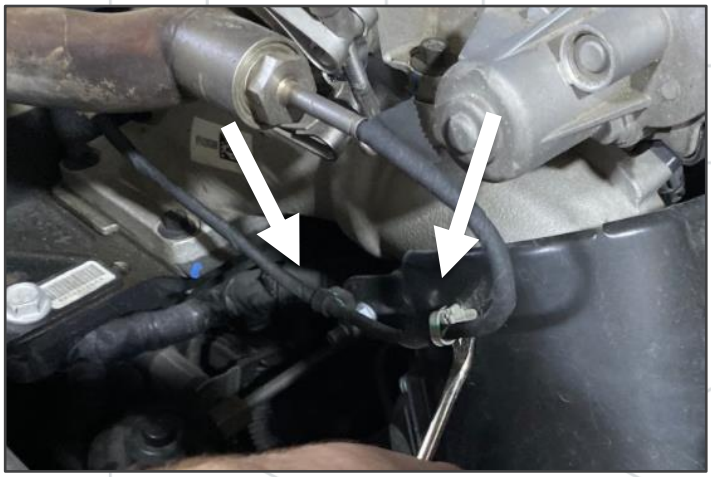


Figure 4

Figure 5

d. Remove both sides of the EGR crossover tube (Figure 3 – Item 32) by removing 2 v-band clamps (Figure 3 – Item 29). An 11mm socket or wrench can be used for the clamp nuts. Be sure to not lose the gaskets, there is a thin metal one on the passenger side and thicker gasket on the driver side. You may also need to use a small pry tool to free the clamp. Once loosened up, you can press the clamp together and the T-Bolt comes out of the slot so you can open the clamp all the way without removing the nut completely.

If gaskets need to be replaced on reassembly the part numbers are:

- *Passenger side EGR Crossover gasket PN: 68027035AB*
- *Driver Side EGR Crossover Gasket PN: 68005465AA*

5. **Remove the intake elbow:**
    a. Remove the 3 electrical connections to the intake elbow. The one on the bottom has a locker similar to the EGR tube sensor.
    b. Remove the plastic harness retainer on the rear of the intake elbow, the 1 harness retainer toward the valve cover, and the retainers that hold the harness side EGR sensor connector to the intake elbow bracket with the plastic fastener removal tool.
    c. Loosen the clamp that holds the boot to the intake elbow with an 11mm deep well socket. Loosen it enough for the silicone boot to slide off easily when the intake elbow is removed.
    d. Remove the short bolt (Figure 6) that holds the dipstick to the bracket on the intake elbow with a 10mm socket.

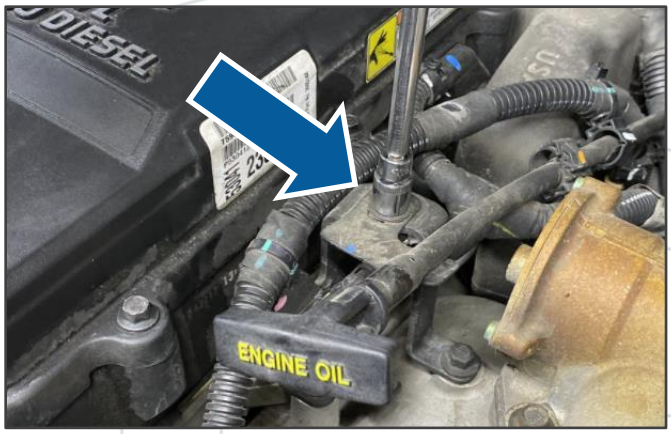


Figure 6

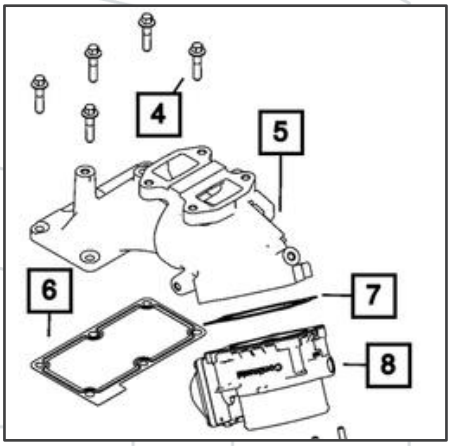


Figure 7

    e. Remove the 6x bolts for the intake elbow to cylinder head joint with a 10mm socket, be sure to note what length of bolt went into each hole for reinstallation. (Figure 7 – Item 4)
    f. Now you can fully remove the intake elbow

- Be sure to cover the intake pipe and engine intake to ensure it stays clean.
- ***A stick magnet is extremely helpful to remove bolts after they are loose, and for reinstallation***
- If the gasket needs to be replaced on reassembly the part number is:
- Intake Plenum Gasket PN: 68444746AA
- You may need to vacuum up the loose carbon build up from the grid heater and debris from the area around it.

6. **Remove high-pressure lines from the CP4 fuel pump:**
    a. There are 2 brackets on the high-pressure lines that need to be removed.
    b. Remove the top rear bracket with a 10mm socket that is also a bolt that goes through the intake plenum plate.
    c. Remove the nut that holds the high-pressure lines to the block with a 13mm socket.
    d. Loosen the high-pressure lines at the CP4 pump heads using the 19mm line wrench referenced in the special tools (Figure 8).

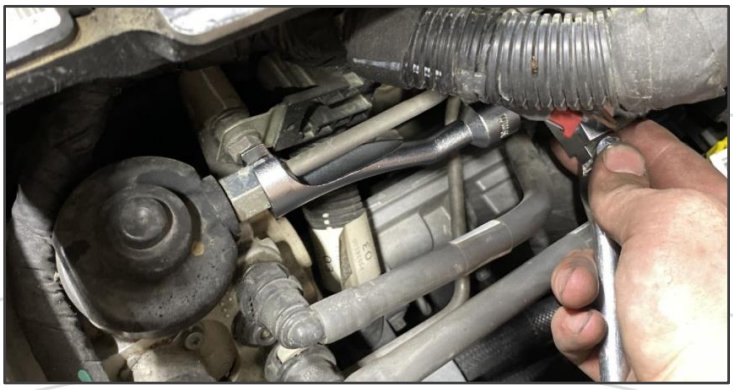


Figure 8

- ***Whenever fuel system ports are open, DO NOT ALLOW dirt or debris to fall into the open ports***

e. To remove the high-pressure line towards the rear of the rail the 19mm line wrench is required. Once the line is removed, install the supplied high-pressure rail cap. A 19mm line socket or crows foot line wrench can be used to **torque the cap to 30 lb-ft (41 Nm)**.

f. Now fully remove both high-pressure nuts and both lines.

g. Place the provided black plastic cap onto the front rail port until the new high-pressure line is ready to be installed to help keep debris out.

7. Remove the CP4 Metering Unit/FCA connector:

a. A small 90-degree pick is helpful to release the electrical connector if squeezing the tab does not allow it to release.

8. Remove the low-pressure fuel supply line (Figure 9) from the CP4 and filter:

a. Locate the 2-button low pressure line quick connects on both sides. The fuel filter side can tend to be easier to reach around the back side, it takes a little bit of effort to get the buttons depressed enough for the line to come off.

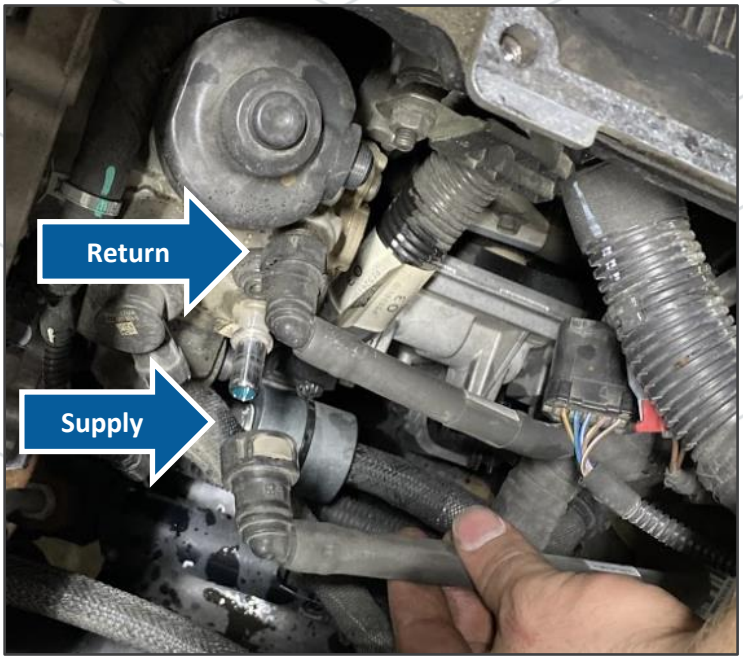


Figure 9

9. **Install S&S supplied supply hose:**
    a. Remove protective cap from one side of the supplied low-pressure hose and install the open end onto the bottom of the filter assembly. The provided quick connects must be pushed all the way on and held there before the locker is able to be pushed in. *Leave the cap in the other side of the hose and tuck it up out of the way. Having the hose on and the plug in one side ensures the fuel system is still sealed to minimize risk of contamination.*

10. **Remove Fuel Pump Return Line (Figure 9):**
    a. Single button Quick Connect on both sides. Also, there is a clip that holds it in place in the middle. It can be extremely easy to remove if you squeeze it together and push the top piece to the side or up as you squeeze it together it will release.

11. **Remove nut for the main ECU wiring harness retainer bracket with a 13mm socket (Figure 10):**

Figure 10

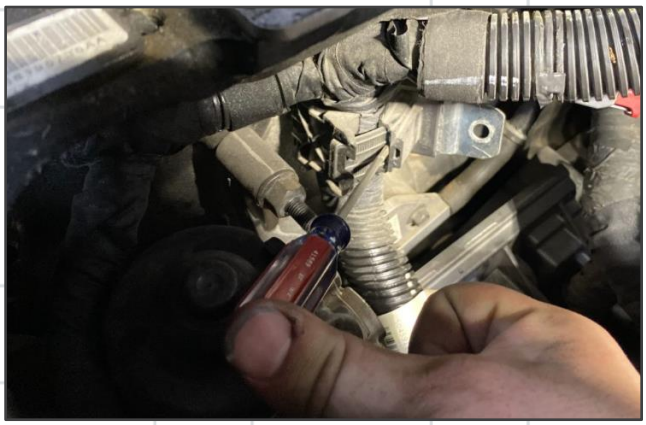


Figure 11

12. **Remove the harness retainer from the harness (Figure 11):**
    a. A smaller flathead screwdriver pushed into the locker and twist while pulling it apart will help release the locks. It takes a bit of working it around, you will not need this part, so do not worry about damaging it, just do not damage the harness underneath it.

13. **Remove the CP4 tail support (Figure 12):**
    a. This is the same location as where the harness retainer was fastened to. A 15mm socket will remove the bolt from the block and an 8 mm socket will remove the bolt to the pump. Now the tail support is free to remove.

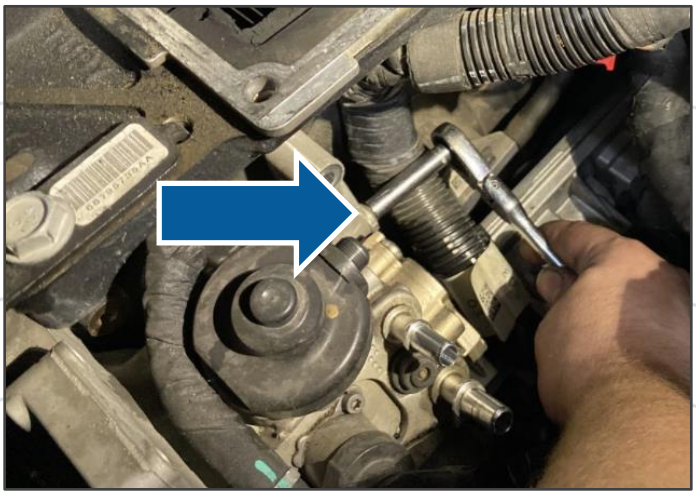


Figure 12

14. **Bend power steering line (Figures 13 & 14):**
    a. Push power steering line towards the driver's side, this is to clear the new location of the ecu. Start with a little bit and you can bend it more once you get to reinstalling the ECU if you need more room.

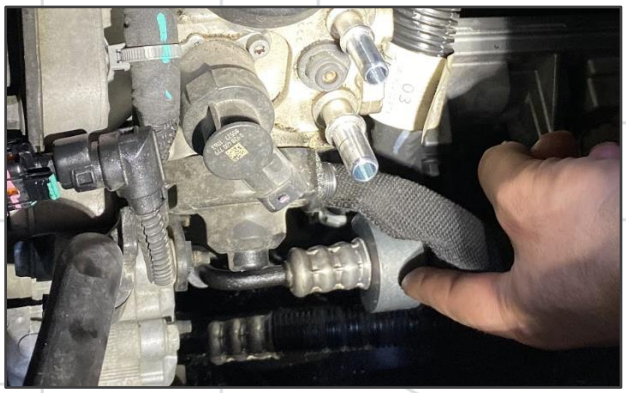


Figure 13 (Before)

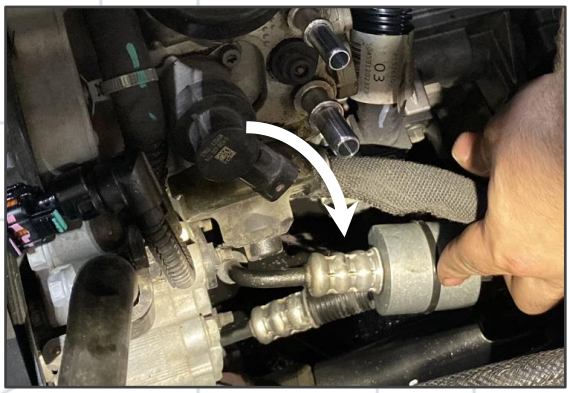


Figure 14 (After)

15. **Remove front ECU connector to allow better access to CP4 nuts**
    a. Remove the 2 bolts (8mm Socket) on front ECU Connector
    b. To disconnect it from the ECU there is a small tab that you must push down while you pull on the lever. (Figure 15)
    c. Pull the connector up out of the way to help with access.

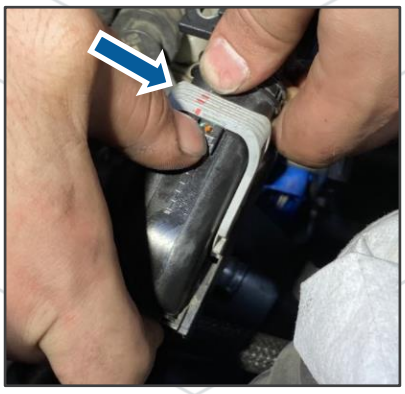


Figure 15

16. **Remove the CP4 Pump**
    a. There are 3 nuts (13mm Socket) to remove, then the pump should slide out, although there may be some resistance. The orings on the pilot will be reused on CP3 installation.
    - ****The engine crankcase is now open, ensure that no dirt or debris enters the crankcase.****

17. **Remove the studs that held the CP4 in place**
    a. These will not be reused, but you can remove them by double nutting them and screwing them out, or a vice grip or pliers as they will not be reused.

18. **Remove ECU**
    a. Remove 2 bolts (10mm socket) on the rear ECU connector
    b. To disconnect it from the ecu there is a small locker that you must push down while you pull on the lever. (Figure 15)
    c. Once the connectors are off pull them up out of your way for easier access to the 4 bolts (10mm socket) around the perimeter of the ecu.
    d. Once these are removed, the ecu can be removed from the truck

19. **Remove the ECU mount**
    a. There are 4 bolts, 3 (10mm socket) and 1 (15mm Socket). Once these are out you can remove the factory ECU mount from the truck.

20. **Prepare S&S ECU Mount**
    a. Remove the isolators from the factory ECU mount. Push the metal piece out of the center, or pry them out from the top. Now you can remove the softer part (Figure 16 & 17).
    b. Reinstall them in the same orientation on the custom S&S ECU mount (Figure 18). A lubricant will help to slide the metal pieces all the way in.

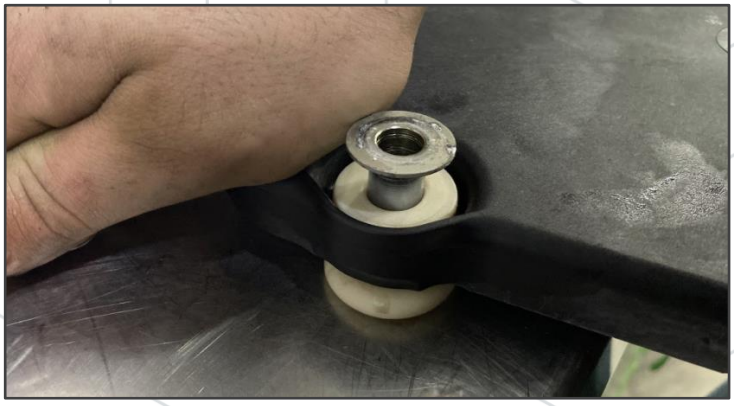


Figure 16

Figure 17

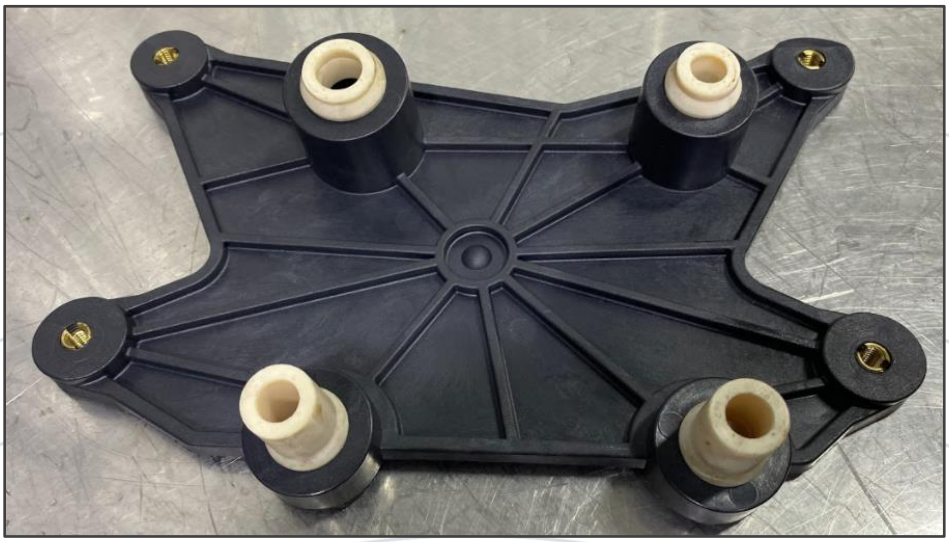


Figure 18

21. Install the S&S ECU Mount

a. Put the 4 bolts, 3x (10mm socket) and 1x (15mm socket), back into the same holes they came out of. Lengths are different. **Torque to 18 lb-ft (24 Nm)**.

22. Reinstall the ECU

a. Put the ECU onto the mount in the same way it came off the original with the same 4 bolts (10mm socket). **Torque to 15 lb-ft (20 Nm)**.

b. Install the rear ECU connector by putting it on the ECU and push down while moving the lever until it seats completely, then reinstall the 2x harness connector bolts (10mm socket).

c. ***Do not install the front ECU connector until the CP3 pump is installed***

23. Remove the black connector cover on the camshaft position sensor:

a. This is done for additional clearance between the sensor and the CP3 flange

b. The connector and sensor should look like Figure 19 once the plastic cover is removed.

24. Install the CP3 pump adapter flange provided with the kit

a. There are 3 countersunk bolts that require a 5mm allen socket (Figure 20).

b. **Apply a small amount of lubricant to the countersink taper** on the aluminum flange to reduce friction between the bolt head and the flange while torqueing.

c. **Apply liquid thread locker to bolt threads** and tighten all three bolts evenly so the bolt heads center the flange, and seat all the way down. **Final torque to 25 lb-ft (34 Nm)** after lightly tightening each evenly.

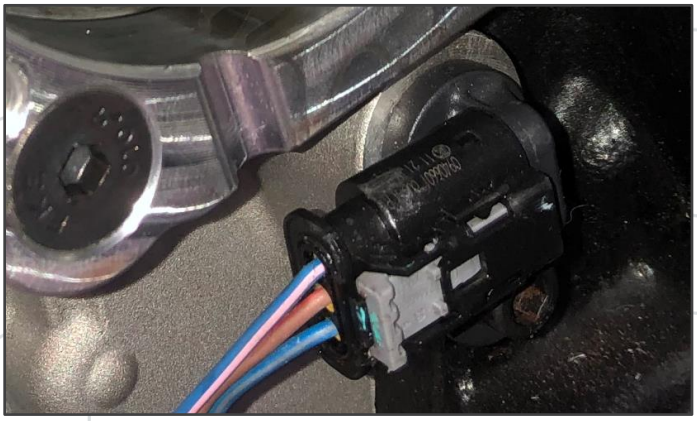


Figure 19

Figure 20

25. Install return fitting on to the CP3 high pressure pump

a. Carefully install the provided edge molded sealing washer onto the provided return fitting as pictured in figure 21 on the left.

b. Thread the quick connect return fitting into the return port of the CP3 pump (figure 22) and **torque to 25 lb-ft (34 Nm).**

Figure 21

Figure 22

26. Install the CP3 high pressure pump

a. You must remove the black o-ring and blue o-ring from the CP4 pilot and install them in the same orientation on the S&S CP3 pump pilot flange.

b. Lubricate the o-rings with engine oil or similar o-ring lubricant prior to installing in the gear cover to ensure that the o-rings are not cut or damaged during pump install.

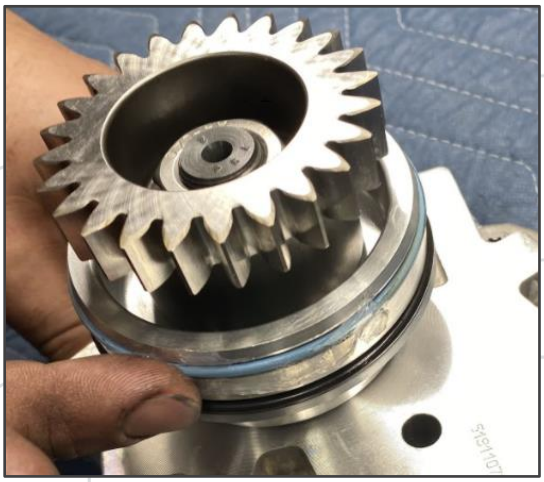


Figure 23

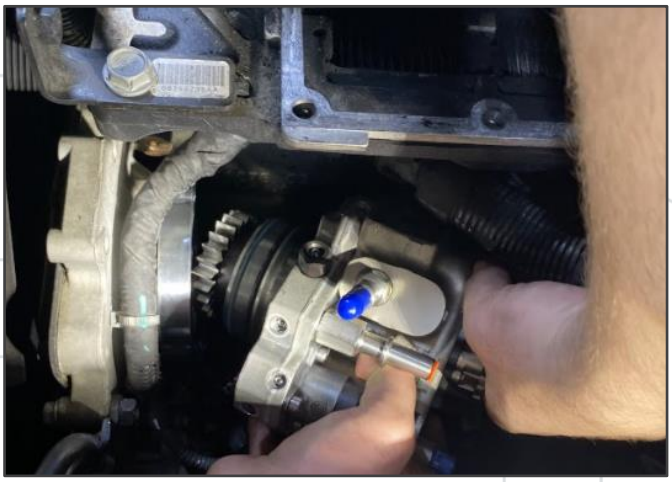


Figure 24

c. You will need to slide the pump all the way in and then rotate the top of it toward the engine block once fully seated, there is a boss on the block that is very close to the pump but it should not touch once the bolts are tightened on the CP3. (Figure 25).

- It is unlikely, but possible that variation in the block casting could allow that boss on the block to interfere with the pump. If this happens, grind the boss on the block until there is sufficient clearance, without introducing debris to the gear housing, intake, or fuel system.

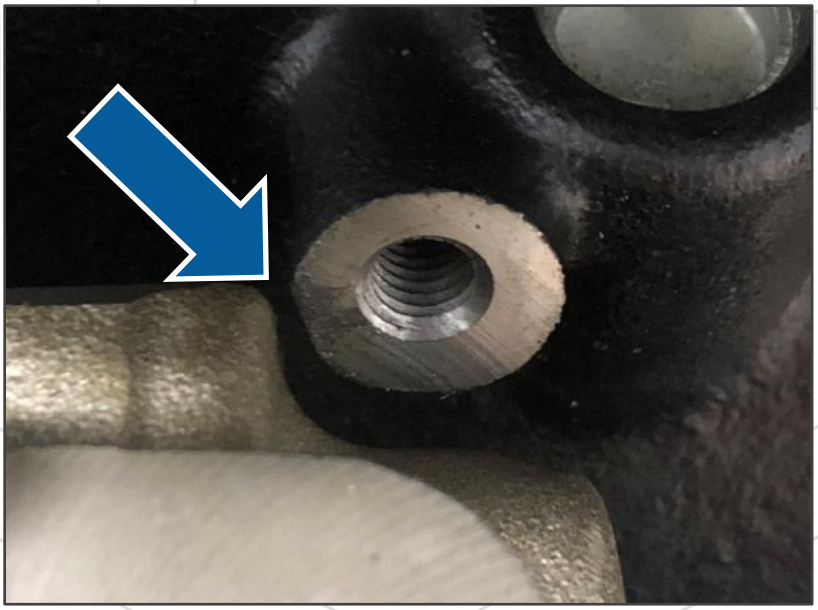


Figure 25

d. The best way to get it oriented correctly is to put a bolt in one of the CP3 flange holes then while rotating it and you can feel the bolt start to pilot into the hole when the pump is properly aligned.

e. **Put 2 of the supplied washers on each bolt** (Critical step to ensure bolts do not bottom out) Then apply liquid thread locker on the threads of the 3 provided allen head bolts (6 mm allen socket). Torque to 33 lb-ft (45 Nm) after snugging all of them evenly.

f. There is minimal clearance between the cam sensor and the CP3 flange. Reference Figure 26, this tight clearance is normal with this conversion.

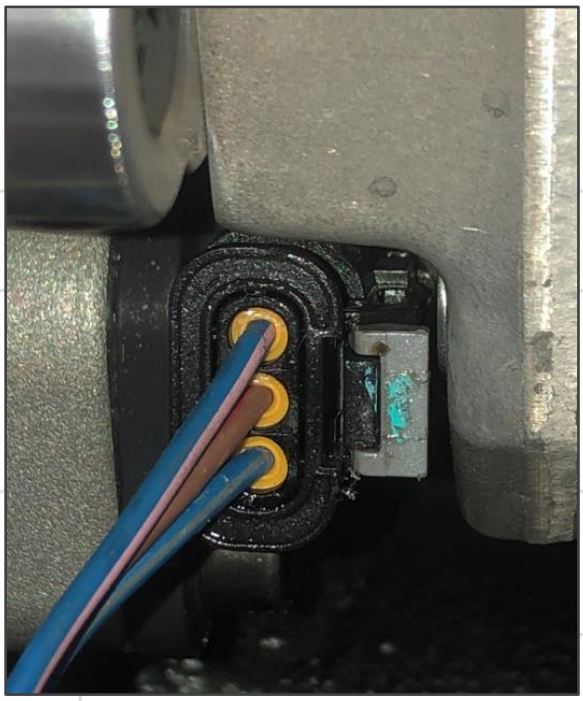


Figure 26

27. Install the front ECU connector

a. Install the front ecu connector, there are 2 bolts (8mm socket), in the same way as installing the rear connector. Again, the power steering line may be in the way if you need to bend it a little more.

28. Install the fuel supply line

a. Finish installation of the low-pressure fuel supply line from the fuel filter to the CP3 flange fitting. Just like on the filter, push it all the way on and while holding it on push the blue locker inwards. It will not let you push the locking tab in until the quick connect is pushed all the way on. (Figure 27)

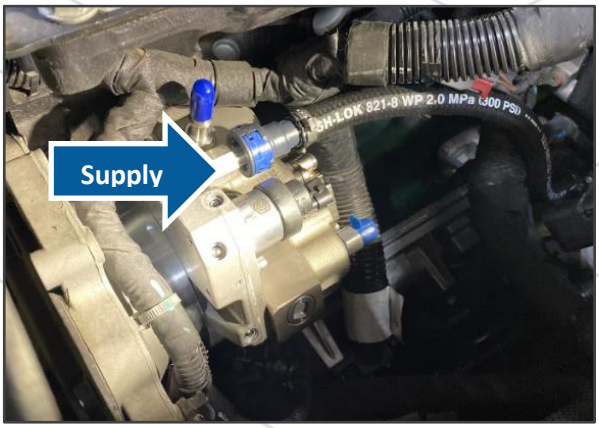


Figure 27

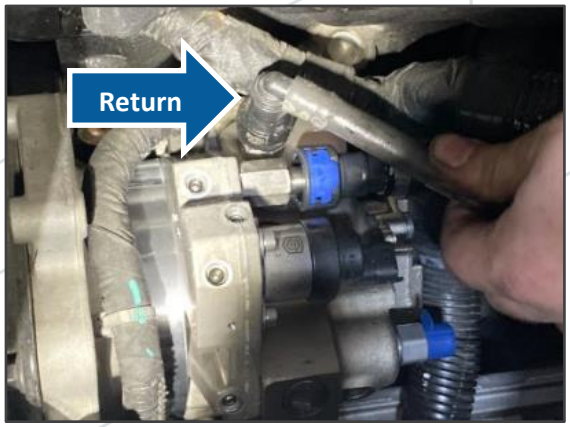


Figure 28

29. **Install fuel return line**
    a. Install the factory fuel return line and plastic retainer clip. You can hold the hose and rotate the end fitting in the hose to orient it better for fitment onto the CP3. (Figure 28)

30. **Install S&S supplied metering unit extension and route under the high-pressure outlet fitting**

Figure 29

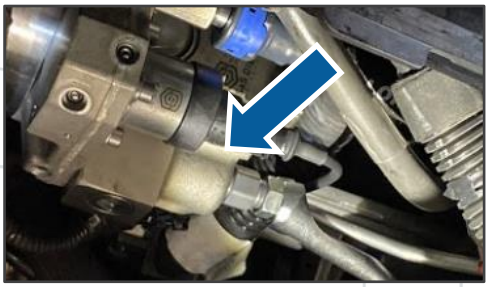


Figure 30

31. **Install the supplied high-pressure line from pump to rail**
    a. Remove protective caps on the CP3 and rail high pressure fittings.
    b. Install the supplied high-pressure line between the CP3 pump and the rail.
    c. Thread both end nuts finger tight first before tightening either end to ensure the end cones seat into the high-pressure fittings correctly.
    d. **The torque spec for both line ends is 30 lb-ft (41 Nm)**. Torque the 17mm nut on the CP3 Pump Outlet first. Then torque the 19mm line to rail nut.
    e. *Keep in mind if using a crow's foot type tool, that the offset of the tool from torque wrench drive centerline will affect the actual torque applied for a given torque wrench tool setpoint. There are calculators available online if you search for "crow's foot torque calculator".*

32. **Replace the bolt that was removed to take the rear high-pressure line bracket off with a 10mm socket. This is one of the bolts that holds the intake plenum plate on.**

33. **Install the intake elbow**
    a. Be sure to use the same 6 bolts (10mm socket) in the same location, a magnet can be helpful to get them placed properly. Ensure that the intake intake elbow gasket is installed. If it was damaged on removal a new gasket is PN: 68444746AA.
    b. Replace the short bolt to the dipstick bracket with a 10mm socket. (Figure 6)
    c. Reinstall the plastic retainer plugs back into the holes that they came out of.
    d. Connect the 3 electrical connectors on the intake elbow, all are different so they cannot be installed incorrectly.

34. **Install EGR crossover tube**
    a. Do not forget to make sure you put the gaskets back in the correct orientation.
    b. Reconnect the sensor and push the plastic harness retainers back into place.
    c. Reference Step 4 and Figures 3-5.

35. **Install the bolt to hold the coolant hose bracket**

36. **Reconnect the ground side of each a battery**

37. **Check for tools throughout the engine bay, be sure you have removed all tools and previously removed parts.**

38. **Prime the fuel system**
    a. With your foot off the brake, put the vehicle into the run position to cycle the electric supply pump. Cycle power on and off without starting the engine at least 5 times for 30 seconds each time in the 'key-on' position to allow the supply pump to prime the system.

39. **Start the vehicle and check for leaks**
    a. An extended crank time the first start is common for the system to purge air.
    b. Check for any active diagnostic trouble codes to ensure all sensors are plugged in correctly.

40. **Replace engine cover with the original 4 bolts (8mm socket) and removing and reinstalling the dipstick into the tube after it is installed.**
    a. Reference Step 2 and Figure 2

****Due to disconnecting the battery, it is possible the trucks entertainment and climate control system will take up to 24 hours to reset after disconnecting the battery. You may not have backup cameras or full access to SiriusXM, some climate control settings, and other apps. This is normal, but it will come back. This is a Ram issue and not related to the CP3 installation.****