Subaru WRX VA FA20DIT Injector Upgrade Installation Guide

PRODUCT PART SKU#: IAG-AFD-2503

Warning! Please follow all warnings and instructions found in your vehicle owner's manual. The following instructions must be read and fully understood before beginning installation. Failure to follow these instructions may result in vehicle damage, personal injury, or death. If these instructions are not fully understood, do not attempt installation.

Please note that this product does require vehicle calibration. Please ensure provisions are made prior to installation, Nostrum Tuning Guides are available upon request. If you are already in touch with a tuner, please have them reach out to support@nostrumshop.com or access the Tuning Guide via the dealer portal on the Nostrum website. If you do not currently have a tuner, we will gladly connect you with someone within the dealer network.

Required Tools:

- Socket wrench
- Torque wrench (1-25 Nm / 10-221 in-lb range)
- 8 mm socket
- 10mm socket
- 12 mm socket
- U-joint/swivel joint socket for wrench
- Socket extension
- 17 mm wrench
- 17 mm crow's foot or equivalent open ended torque wrench tool
- Flat head screwdriver
- Channel locks and/or hose clamp pliers
- Pliers
- Combustion seal compression tool: Bosch 0 986 616 097 (or equivalent)
- ECU programming interface or other calibration delivery method
- Safety glasses
- Fire extinguisher (Class B minimum)

Consumables:

- Clean lint free absorbent towels
- Dielectric grease
- Engine oil
- Disposable rubber gloves

CLEANLINESS IS PARAMOUNT!

Every injector is production tested for gross leak, fine leak, and leak decay for quality control. These injectors left the factory with no leaks! Contamination is the #1 cause of injector leaks. Injector contamination can come from poor fuel quality, dirt or debris introduced during installation, or dirt and debris from handling before installation. It is imperative that the engine, workspace, tools, and handling is as clean as possible during the installation process. Use fuels and ethanol from trusted sources!

1. If you have been driving the vehicle allow it to fully cool. This is to make the underhood temperatures lower for a safer & more comfortable installation process and to allow the fuel pressure in the system to bleed down for increased safety when disconnecting the high pressure fuel lines.

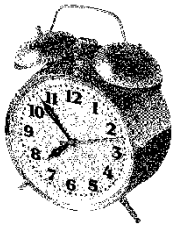

Figure 1

2. Disconnect negative battery terminal using an 8 mm socket.

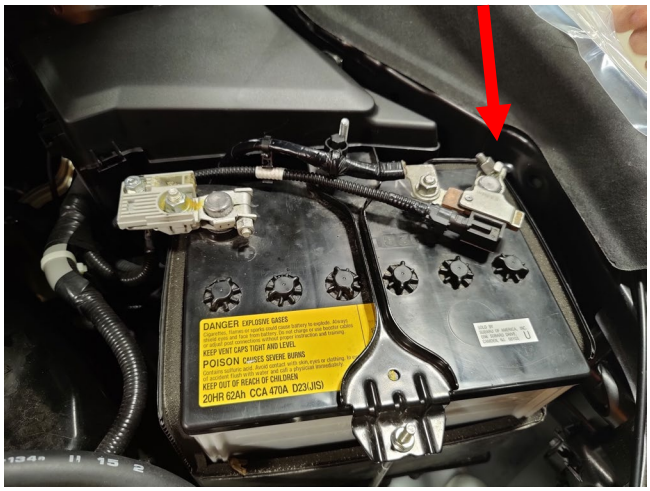

Figure 2

3. Pull the wire connected to the negative battery terminal off the bolt holding it in place.

   Secure / insulate the negative battery connector to insure it will not make a connection with the battery during the injector installation process.

Figure 3

4. Use a screwdriver to unlatch the plastic retainers from the back of the engine cover.

Figure 4

5. Pull engine cover from the front by hand to remove it from the rubber grommets that hold it in place.

Figure 5

6. Remove air box intake by remove plastic retainers holding it to the front of the engine bay using a screwdriver.

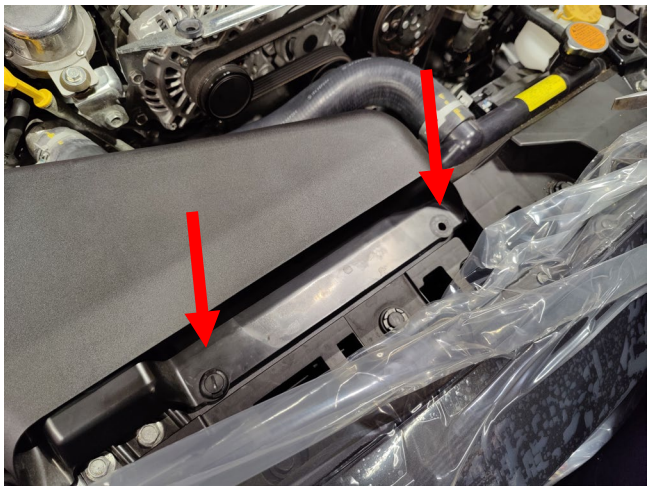

Figure 6

7. Pull the airbox out of the engine bay by hand.

Figure 7

8. Remove the plastic retaining bolts that hold the PCV hose at the front of the intake manifold using a screwdriver.

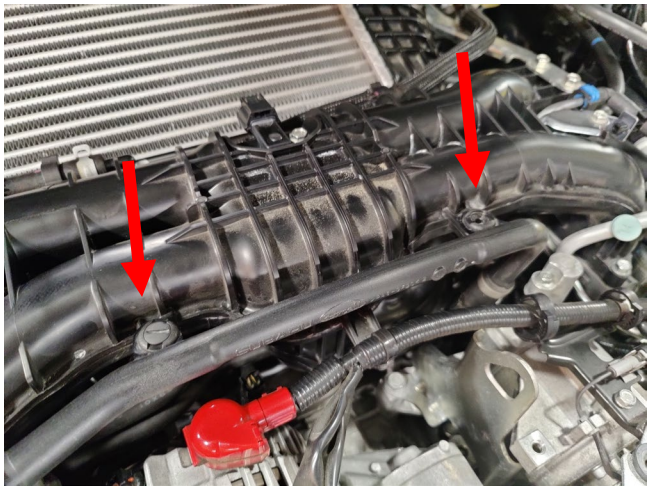

Figure 8

9. Remove the bracket holding the intercooler to the intake manifold using a 12 mm socket.

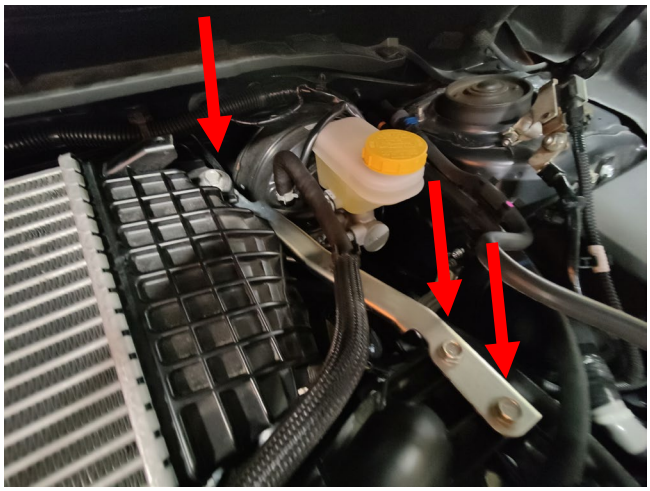

Figure 9

10. Pull the bracket from the hose clamp before removing the bracket from the engine bay.

Figure 10

11. Remove hose clamp from the fitting on the end of the vacuum line by pulling it down the tube using channel locks. Pull the hose off the fitting.

Figure 11

12. Pull the vacuum hose out of the clips holding it in place on the intake manifold.

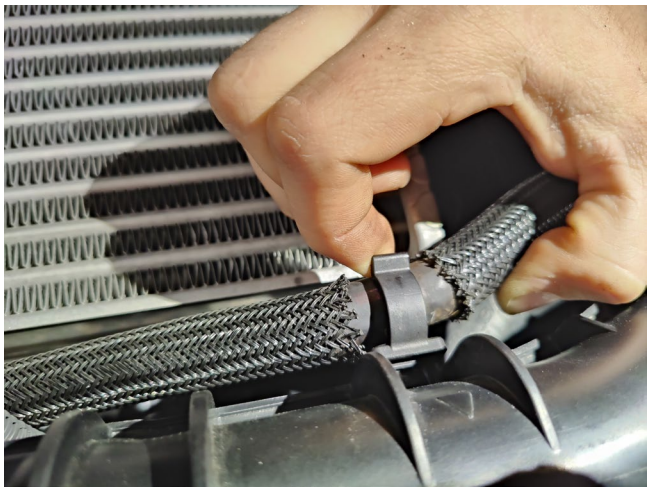

Figure 12

13. Pull the hose clamp on the manifold end of the vacuum hose off its fitting using channel locks. Pull the hose off its fitting.

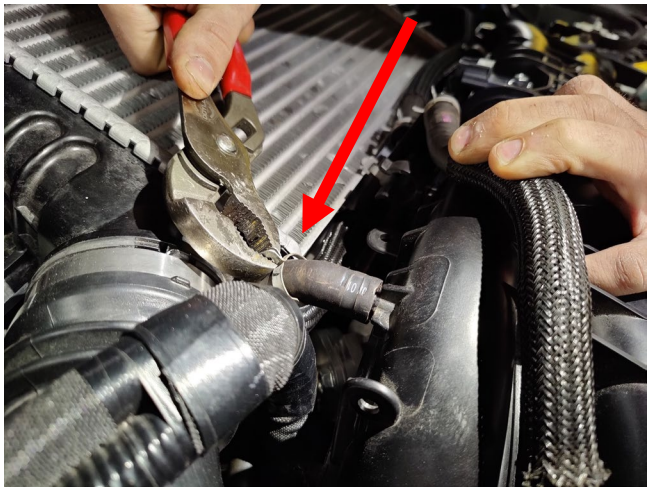

Figure 13

14. Pull the vacuum hose off to the side of the engine on the passenger's side so that it won't get in the way when removing additional components.

Figure 14

15. Use an 8 mm socket to loosen the hose clamp on the charge tube outlet.

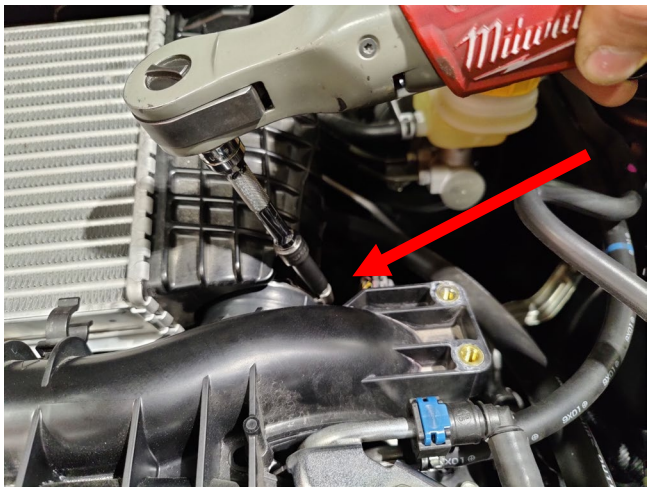

Figure 15

16. Use an 8 mm socket to loosen the hose clamp on the charge tube inlet.

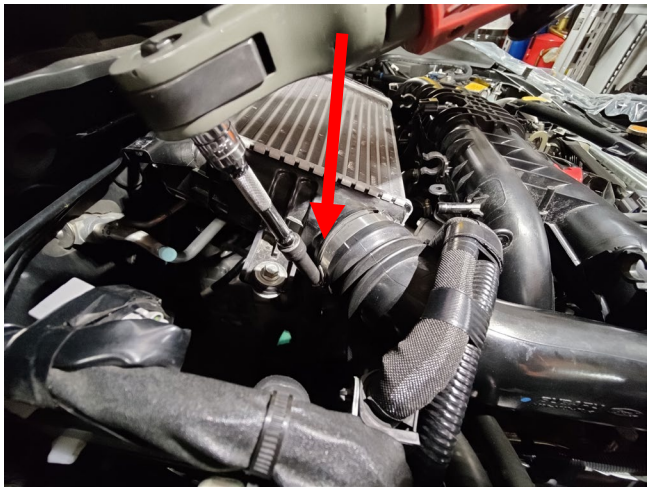

Figure 16

17. Use a 12 mm socket on a U-joint with an extension to reach the bolt holding the intake charge tube at the front of the engine near the bottom of the engine.

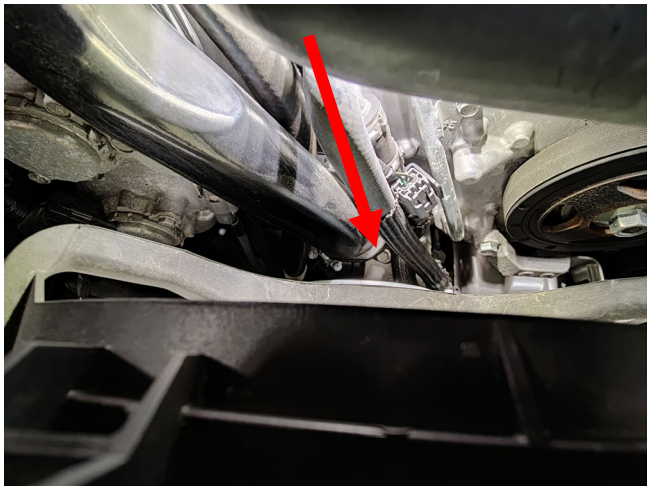

Figure 17

18. Use a 12 mm socket to remove the bolt on the passenger side of the intercooler holding it in place.

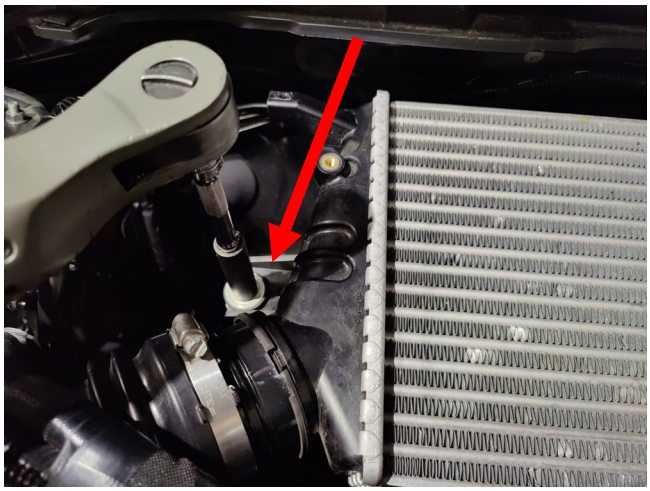

Figure 18

19. Pull the intercooler away from the outlet charge tube and remove it from the engine bay.

Figure 19

20. Squeeze release tab on connector to remove it from the manifold absolute pressure (MAP) sensor at the back of the manifold on top.

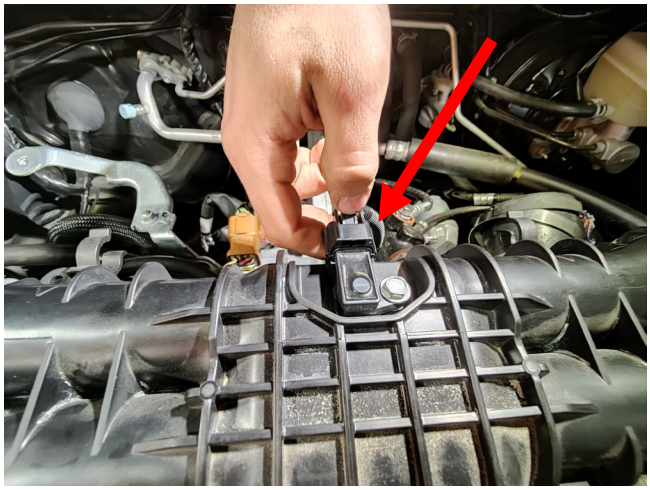

Figure 20

21. Use a screwdriver to pull up the blue tab on the low-pressure fuel line quick connect on the driver's side of the manifold and then slide the fuel line off of the male fuel fitting on the manifold. Be sure to place lint free absorbent towels around and underneath the line to catch any fuel that may exit the line.

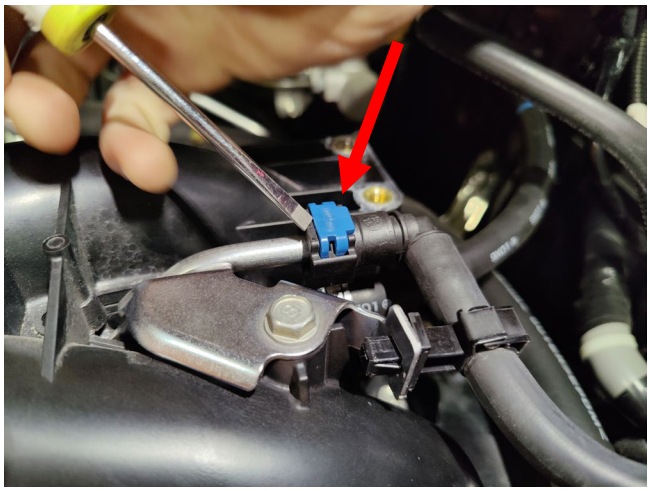

Figure 21

22. Use channel locks or a hose clamp tool to pull the hose clamp off its fitting and then pull the hose to disconnect the lower evaporative emissions line from the driver's side of the manifold.

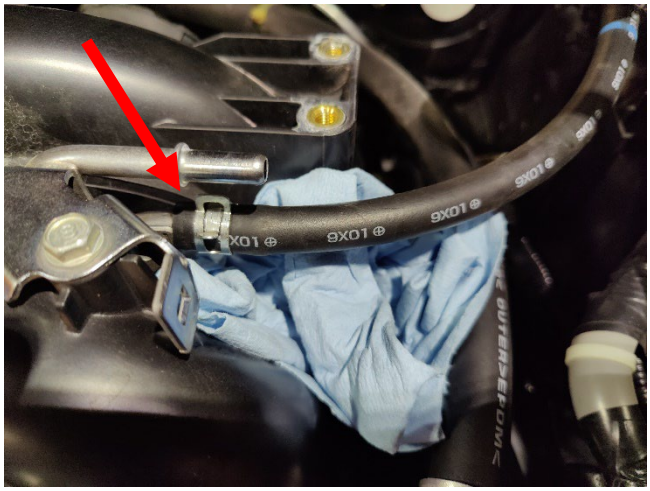

Figure 22

23. Use a 12 mm socket to remove the bolts holding the EGR tube at the back of the manifold towards the cabin of the vehicle. **(Torque Spec: 19 Nm)**

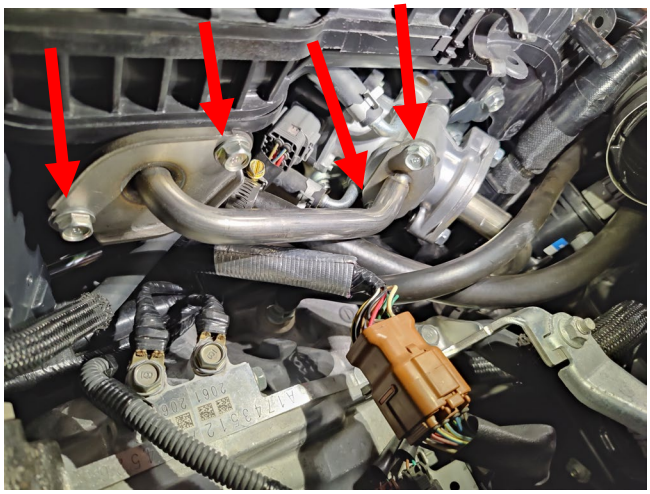

Figure 23

24. The end of the EGR tube on the passenger's side of the vehicle will have a gasket underneath the bracket. This gasket will be re-used during re-assembly so be careful not to damage or lose the gasket.

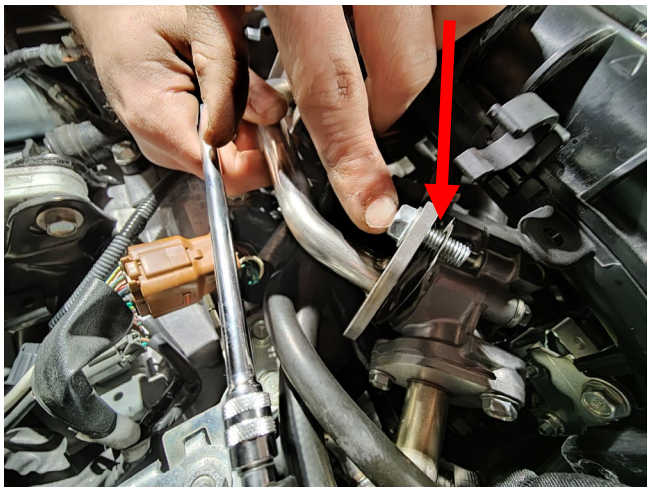

Figure 24

25. Use an 8 mm socket to loosen the hose clamp securing the hose to the throttle body.

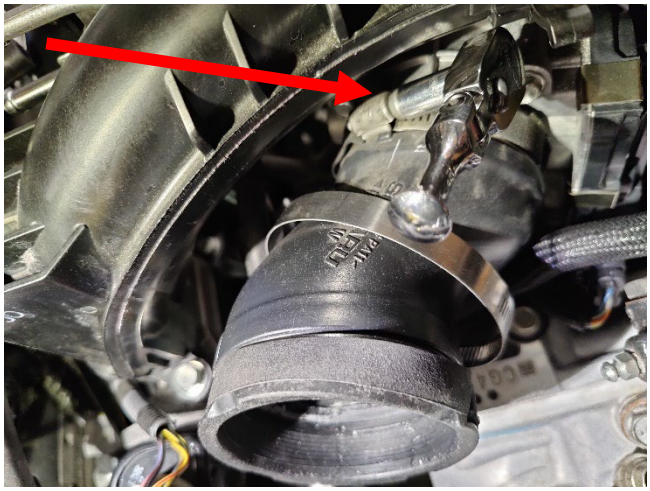

Figure 25

26. Pull the hose off its fittings to disconnect it from the throttle body.

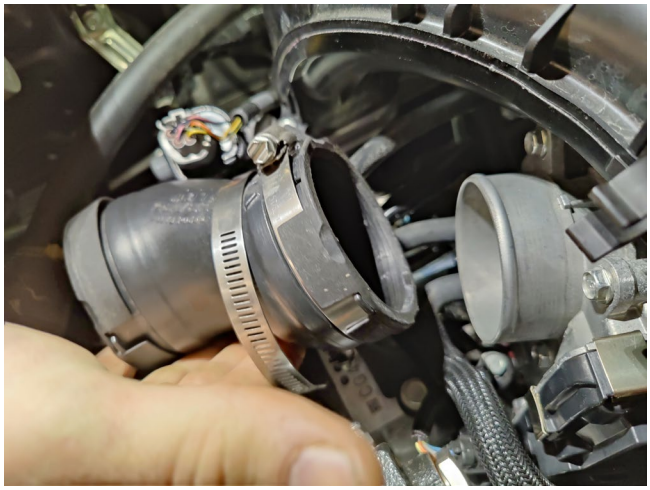

Figure 26

27. Use pliers to disconnect the vacuum hoses at the bottom of the manifold. These hoses are accessible from the front of the manifold as shown.

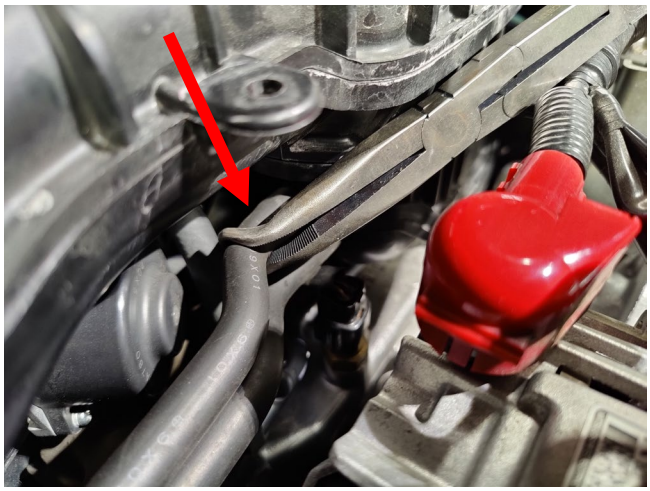

Figure 27

28. Remove the 10 mm bolt to remove the bracket for the low-pressure fuel line on the driver's side of the intake manifold. **(Torque Spec: 6.4 Nm)**

Figure 28

29. Disconnect the throttle body electrical connector behind the manifold next to the throttle body on the passenger side of it.

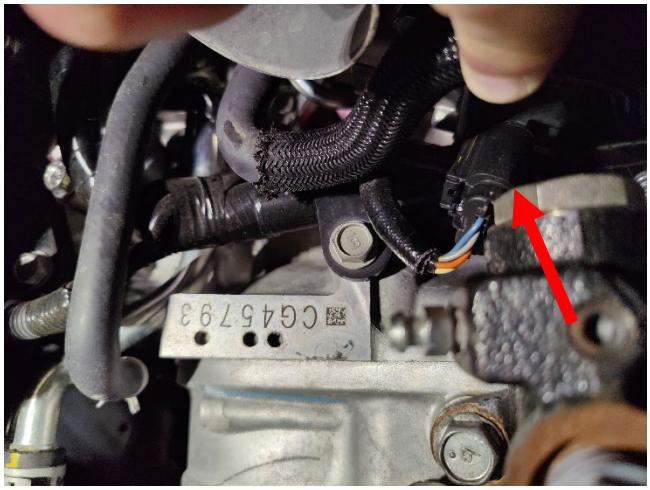

Figure 29

30. Remove the 4 bolts holding the throttle body to the manifold with a 10 mm socket. **(Torque Spec: 8 Nm)**

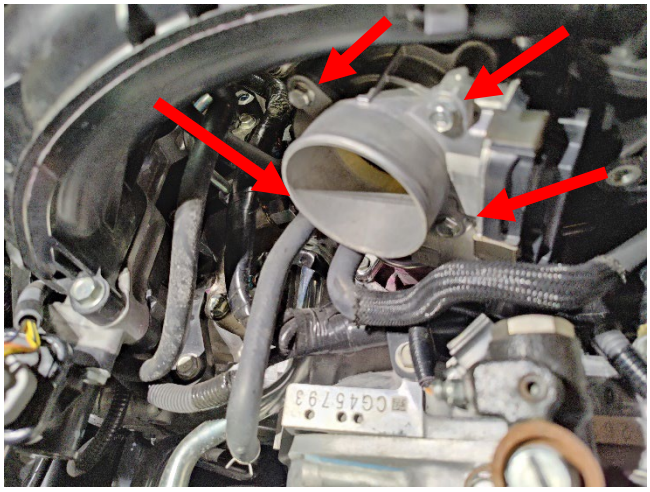

Figure 30

31. Remove the intake manifold by removing all 8 bolts holding it in place with a 12 mm socket. Remove the 2 bolts in the middle on either side of the manifold before removing the 2 outer bolts on either side of the manifold.

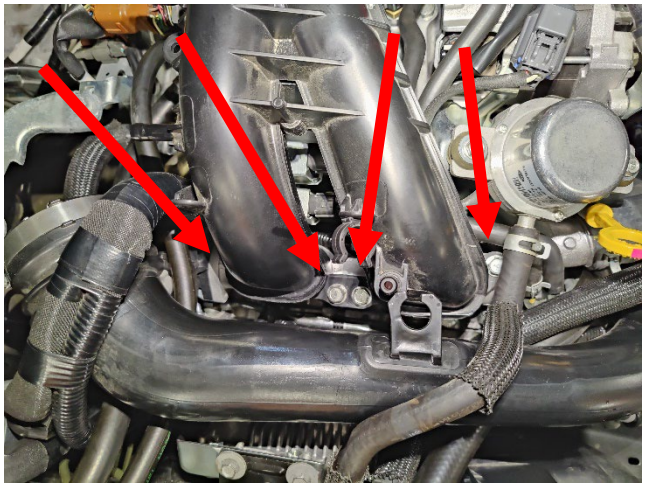

Figure 31

32. Stagger removal of the bolts on either side so as to not put any stress on the remaining bolts. **(Torque Spec: 25 Nm)**

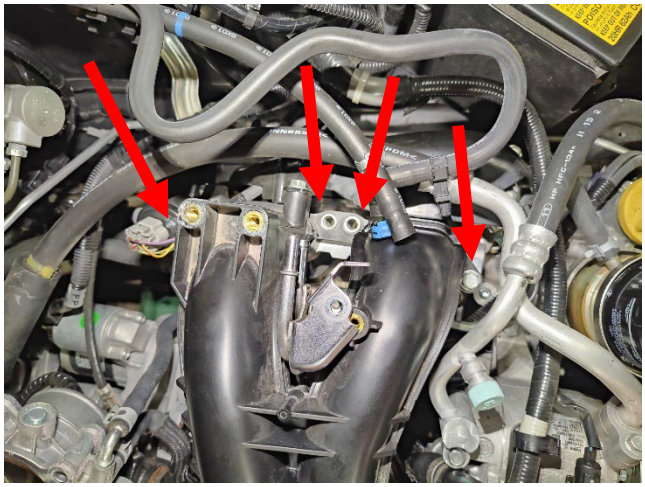

Figure 32

33. Use a 12mm wrench or socket to remove the bolt holding the crash bracket for the high-pressure fuel pump to the intake manifold. **(Torque Spec: 19 Nm)**

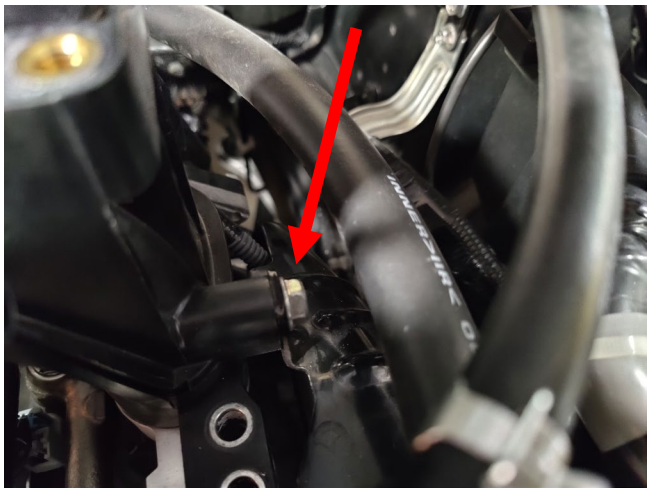

Figure 33

34. Remove the bolt holding the bracket in place on the passenger side of the intake manifold. **(Torque Spec: 6.4 Nm)**

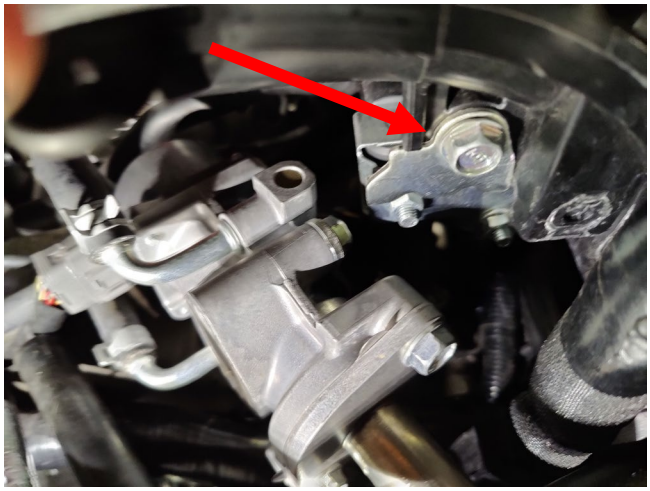

Figure 34

35. Pull the intake manifold out of the engine bay.

Safety glasses and rubber gloves are recommended for the following steps that involve disconnecting the high pressure fuel lines.

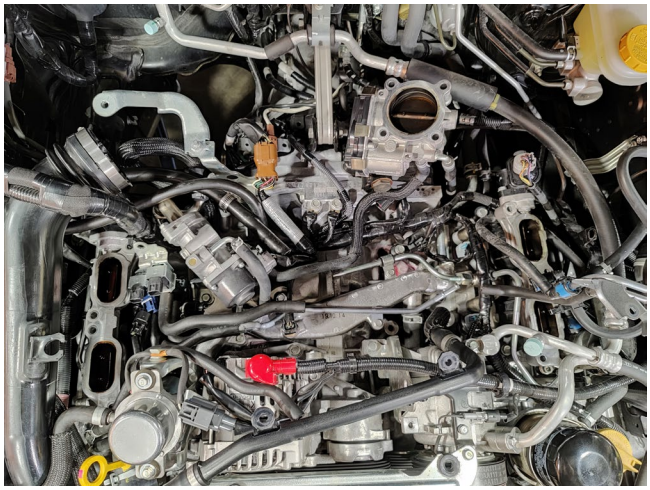

Figure 35

36. Use absorbent towels catch the spilled fuel and keep it from spraying on you or in the engine compartment. Remove the compression nut holding the high-pressure line that connects to the two fuel rails on either side of the engine using a 17 mm wrench. **(Torque Spec: 25 Nm)**

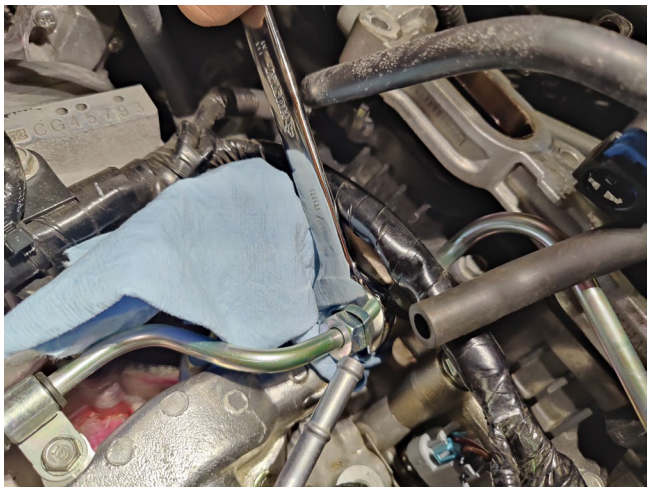

Figure 36

37. Remove the compression nut holding the fuel line that leads to the fuel pump from the fuel rail using a 17 mm wrench. Use absorbent towels to catch any remaining excess fuel that may drain out. **(Torque Spec: 25 Nm)**

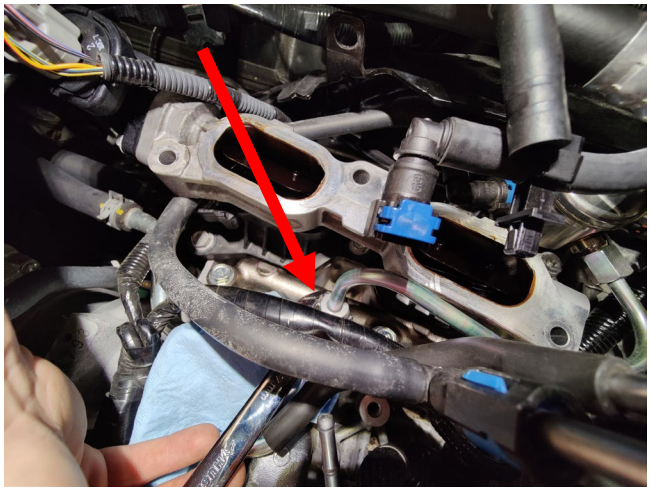

Figure 37

38. Remove the compression nut of the fuel pump side of the line using a 17 mm wrench. Use absorbent towels to catch any remaining excess fuel that may drain out. **(Torque Spec: 25 Nm)**

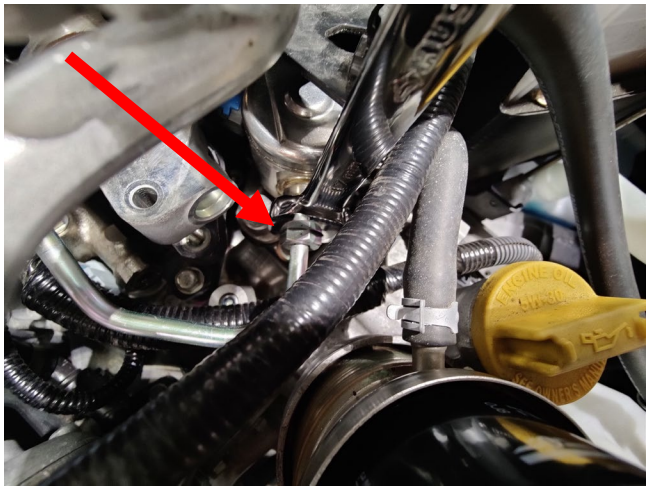

Figure 38

39. Remove both P clamps that hold the fuel line that connects the individual fuel rails using a 10 mm socket.

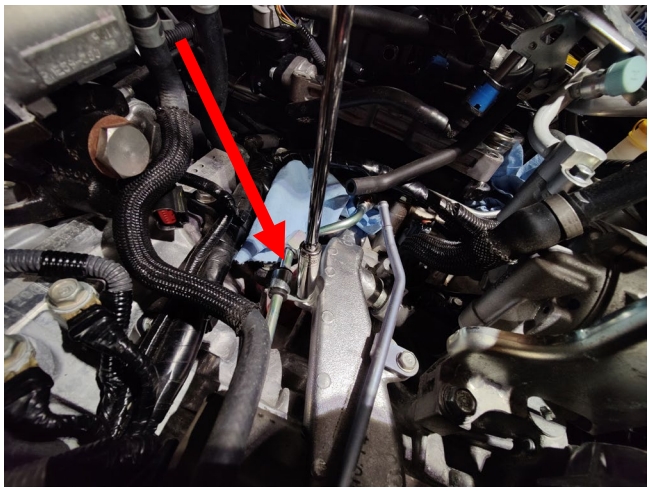

Figure 39

40. When removing one of the P clamps, you may need to pull back the foam cushioning that protects the fuel line to access the bolt on the p-clamps.

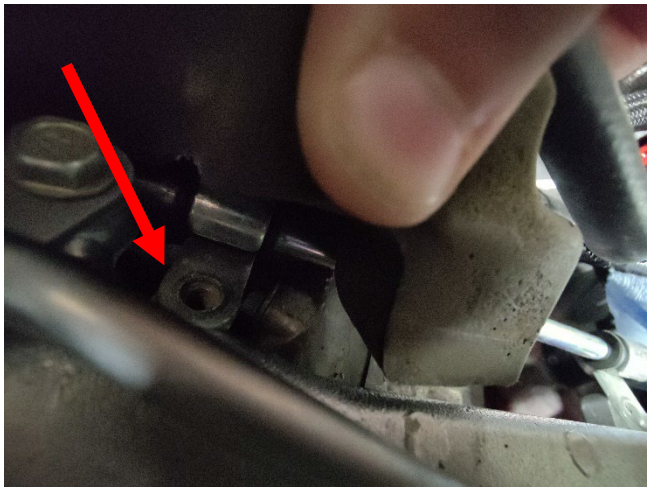

Figure 40

41. Pull the hose out of the way so that you can access the compression nut on the passenger side fuel rail. Remove the nut with a 17 mm wrench so that the line is no longer connected to the rail fitting. Use absorbent towels to catch any remaining excess fuel that may drain out. **(Torque Spec: 25 Nm)**

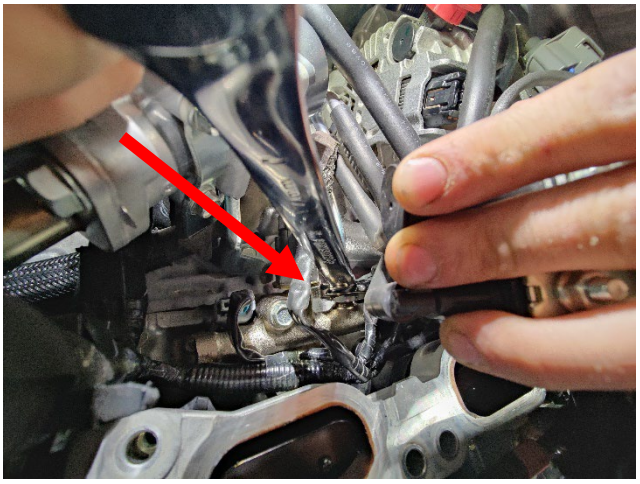

Figure 41

42. Remove the injector connectors on either side that are preventing the rail from being removed (upper two arrows on the right). They have blue tabs.

    Then remove the fuel rail pressure sensor connector on the passenger side fuel rail (location indicated by the lower red arrow in the image on the right).

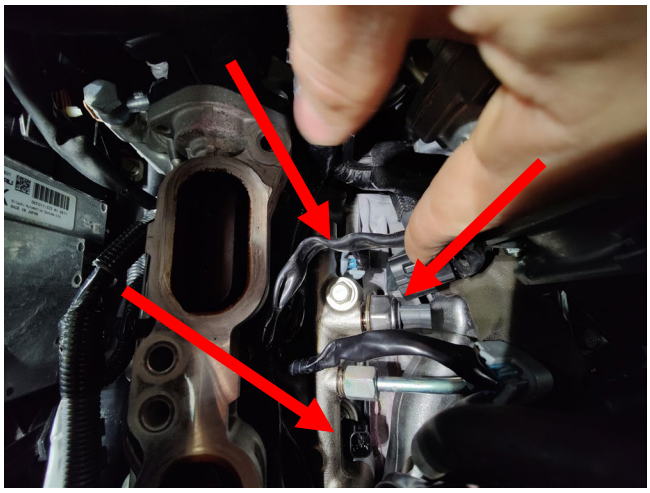

Figure 42

43. Use a 12 mm socket to remove the 2 bolts holding the fuel rail in place. **(Torque Spec: 19 Nm)**

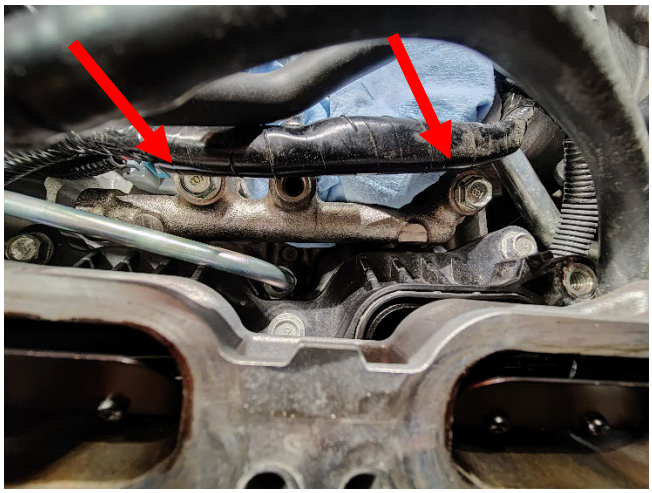

Figure 43

44. Remove the fuel rail on either side of the engine in this way.

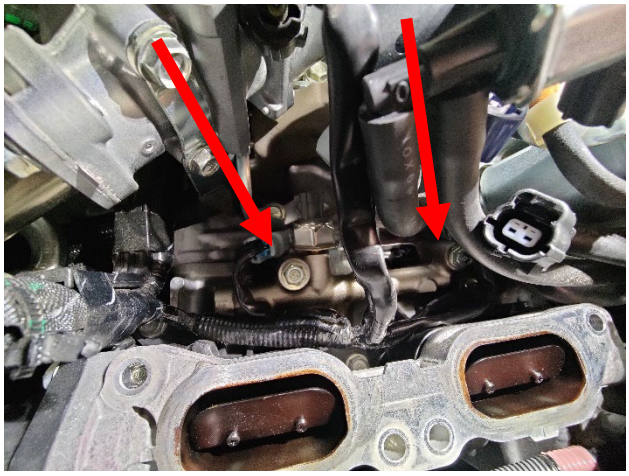

Figure 44

45. Put both fuel rails on a lint free absorbent mat in a clean workspace. Make sure to mark which rail goes where and which injector went where on the mat.

Be very careful with all of the high pressure and low pressure fittings and connections to avoid any contamination from dirt or other debris. GDI systems are very sensitive to debris. Keep caps on the pump and fuel lines until you are ready to make the connections.

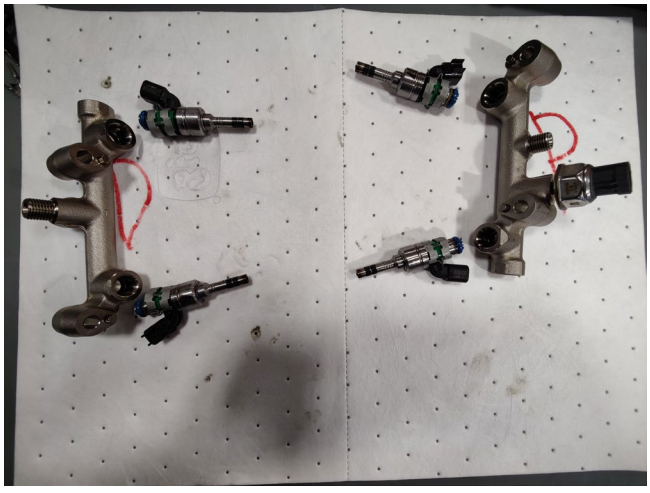

Figure 45

46. Remove the rubber boot from the back of the stock injectors. Save these parts as you will be re-using them.

    Note early model year vehicles may not have this rubber boot unless service has been done to them after they were manufactured. This rubber boot was added to production in 2017 and was made part of the service procedures for all older vehicles at that time as well. If you don't have the rubber boots they can be purchased from Subaru (PN 16395AA050).

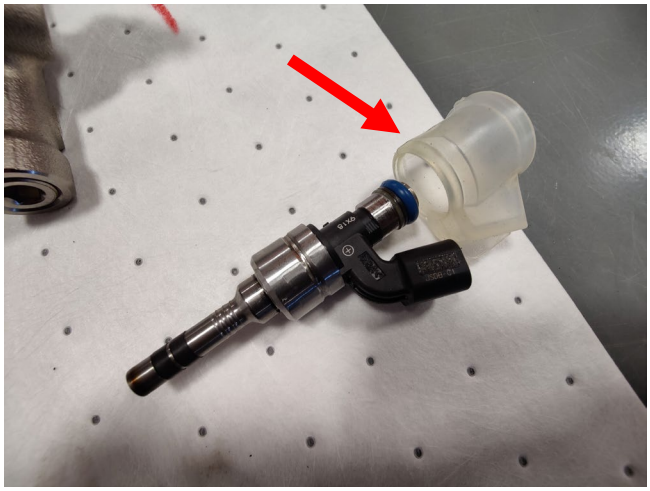

Figure 46

47. Remove the gray metal retaining clip (Subaru PN 16605AA110) that lies towards the back of the injectors next to the solenoid connector. Pull the retaining clip up and off the stock injector. Save these parts as you will be re-using them.

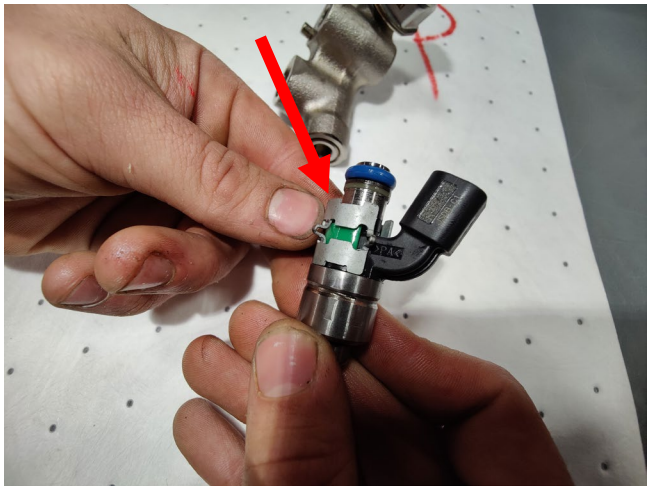

Figure 47

48. Once the grey retaining clip is removed pull the green spacer off from the side of the injector by pulling away from the solenoid connector. Save these parts as you will be re-using them.

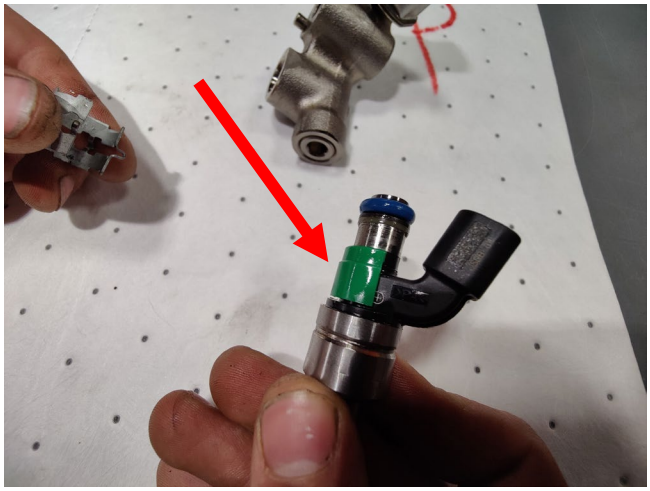

Figure 48

49. Once all the parts have been removed from all the stock injectors you can begin installation of the new injectors into the fuel rails.

    Pull the Nostrum injectors out of their packaging and remove the red caps on either end of the injectors.

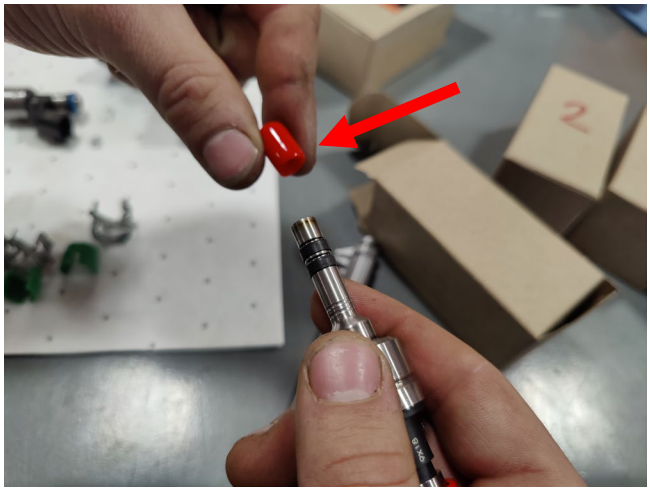

Figure 49

50. Place engine oil on the stem of each injector to lubricate them.

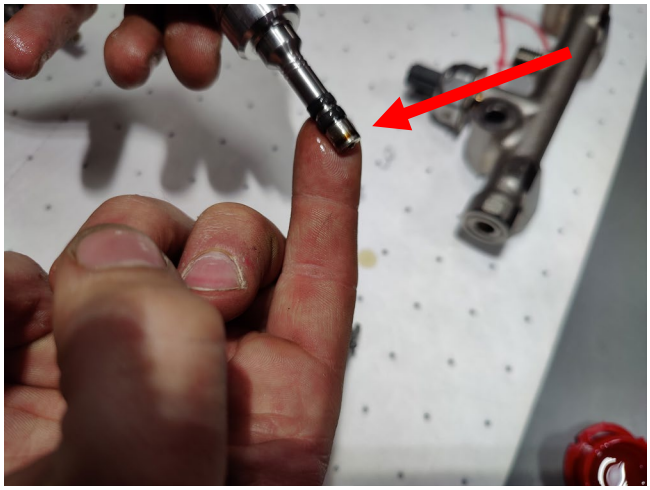

Figure 50

51. Place the compression tool over the stem of the injectors and push the injector into the tool while twisting side to side as you push. Once the tool is on remove it in the same way by pulling and twisting until it comes off. Repeat this for all the injectors. This is a critical step in the installation of GDI injectors. Do not skip this step if you do not have the correct tools. Note that the injectors should be installed shortly after sizing the seals – don't perform this step in advance.

Figure 51

52. Push the green spacer back onto the injectors with the lip of the retainer facing up (same orientation as when removed from the stock injectors).

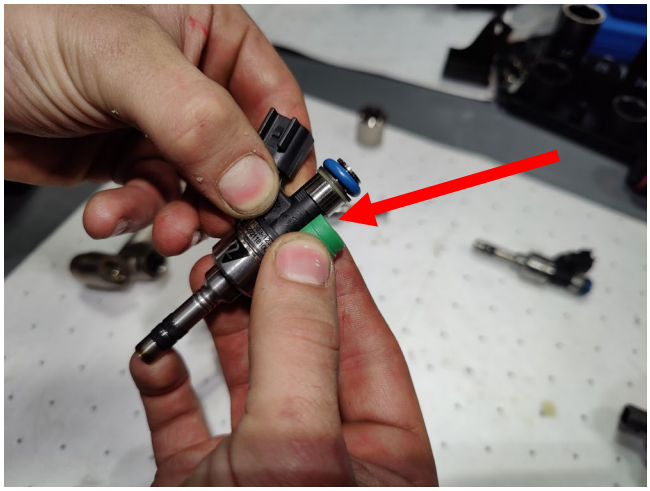

Figure 52

53. Place the grey retaining clip over the green one from the top of the injectors. The opening in the retainer should line up with the green one. Push until it slides in place.

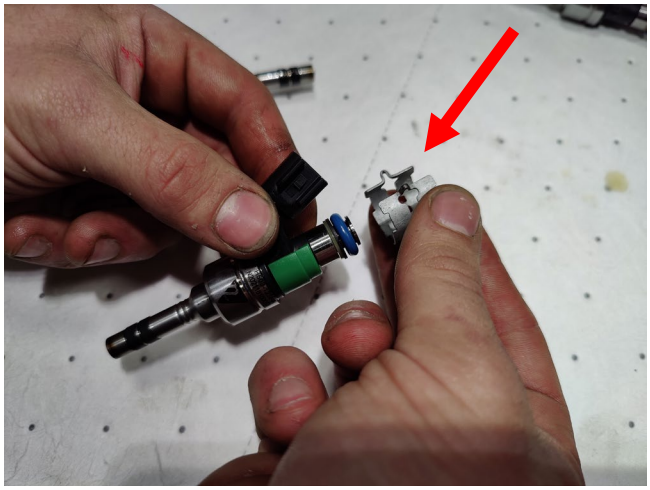

Figure 53

54. Use dielectric grease or engine oil to lubricate the O-ring on the fuel rail side of the injectors. Repeat this for all the injectors.

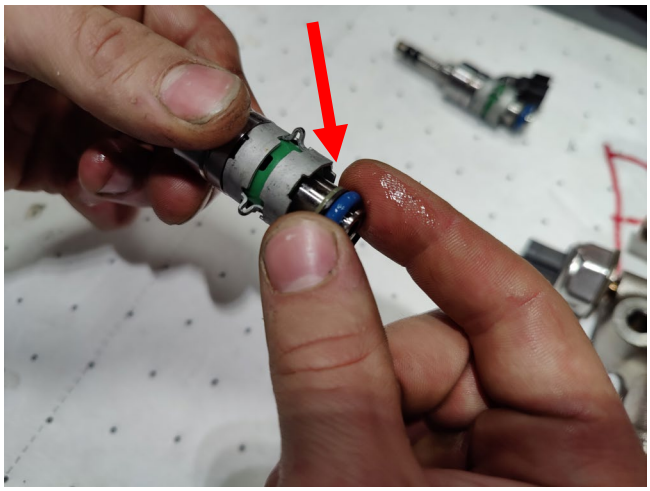

Figure 54

55. Install the rubber boots over the injector assembly

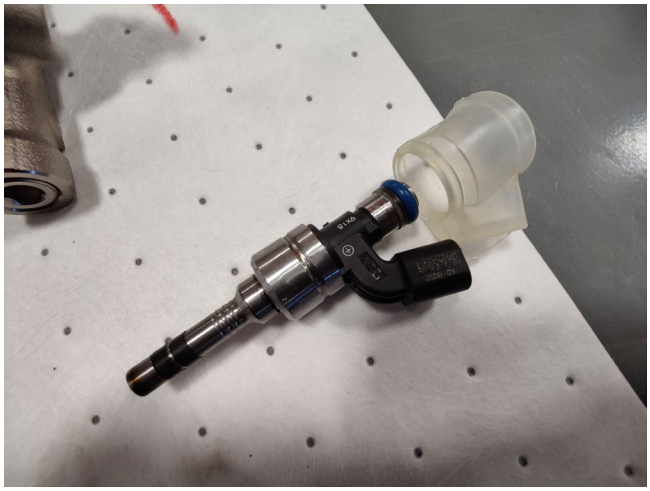

Figure 55

56. Seat the injector into the fuel rail. Ensure that the connector lines up with the chamfer on the side of the fuel rails seating position for the injectors.

    We recommend recording the serial numbers of the injectors by engine cylinder location so you have this information for future use if needed.

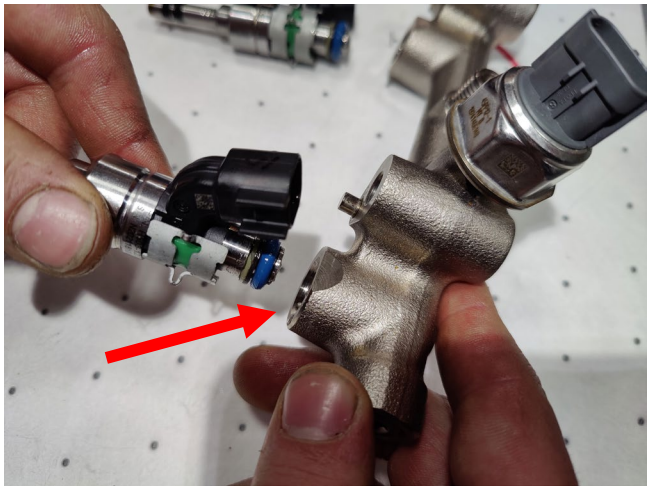

Figure 56

57. Make sure the rubber boot is positioned correctly. For more details on proper alignment of the rubber boots see Subaru Service Bulletin 09-65-16R.

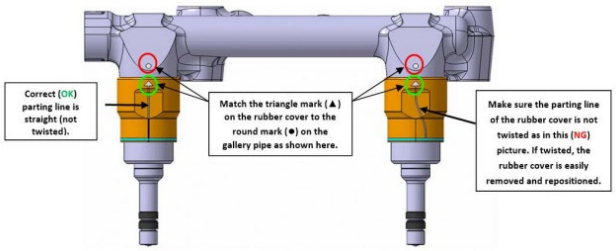

Figure 57

58. Seat the fuel rails with the injectors back into the vehicle where the injectors were originally placed. Once the injectors and fuel rails have been installed, reinstallation of all remaining components can begin. Follow the steps of disassembly listed above in reverse to re-install components starting with Step 43. Follow all torque specifications that are included in each step where applicable. If the torque specification is not included in a step where it seems applicable consult the OEM service information for the correct torque specifications.

Figure 58

Hardware installation is complete.

Calibration

Do not start your vehicle, this product requires calibration. Please refer to the Nostrum supplied tuning guide to make the necessary changes prior to starting the vehicle. Once calibration is complete, please proceed to the next step.

First Start-Up

1. Be sure to remove all installation tools and loose items from the engine compartment. Follow good, safe practices when working on your vehicle. Be sure to reassemble all parts and components according to your OE maintenance manual.

2. Key cycle the vehicle into the "Accessory On" position (do not go to Ignition position). The low-pressure fuel pump with activate and the low-pressure side of the pump will pressurize. Check the high-pressure fuel pump and the low-pressure side for leaks. If OK, proceed to step 3.

3. Key cycle to ignition and let the car attempt several start cycles. Remember that the fuel lines, pump, and part of the fuel rail are filled with air, therefore this step is necessary to evacuate that air and get the system charged. If it starts, OK. If it does not, key off the vehicle. Check the high- pressure lines to the fuel rail, to the pump and the pump itself for leaks. If OK, proceed to step 4.

4. Key cycle one more time all the way to ignition. Engine should start-up and idle. If not, proceed with steps 2-4 again.

5. Let the car idle for a few minutes. Check for leaks on low and high-pressure portions again.

6. Installation is complete!

NOTE: a fault code may appear at the first key cycle due to the long ignition time or the low pressure in the fuel rail, both due to the air in the fuel system.
This code should self-clear after the OEM defined quantity of key cycles.

NOTE: Please check for fuel leaks after driving the car and letting it cool for an extended period of time, fittings may loosen after the first heat cycle due to thermal expansion and contraction. Retighten fittings if needed.

For additional technical & software support please contact:
Email: support@iagperformance.com
Phone: 410-840-3555 (during normal business hours)

Revision	Notes	Date
Rev 1	Production release	11/29/21
Rev 2	Title image update	5/17/22
Rev 3	Added calibration details	2/20/23
Rev 4	Updated to include H720-1813 part number injectors	2/29/24
Rev 4.1	Added combustion seal compression tool part number and other minor updates	3/1/24
Rev 4.2	Added cleanliness warning. Expanded with IAG formatting	10/10/24