ALPHA Performance Packages

INFINITI Q50 Q60 VR30

FUEL INJECTORS

Introduction

The goal of AMS Performance is to provide the highest quality, best performing products available. By utilizing research and development, and rigorous testing programs AMS Performance will never compromise the quality or performance of our products. In addition, AMS Performance will only provide the finest customer service offering only parts and advice that are in the best interests of the customer. AMS Performance was built on a foundation of integrity. This is who we are; this is what you can count on.

A vehicle modified by the use of performance parts may not meet the legal requirements for use on public roads. Federal and state laws prohibit the removal, modification, or rendering inoperative of any part or element of design affecting emissions or safety on motor vehicles used for transporting persons or property on public streets or highways. Use or installation of performance parts may adversely affect the drivability and reliability of your vehicle, and may also affect or eliminate your insurance coverage, factory warranty, and/or new OEM part warranty. Performance parts are sold as-is without any warranty of any type. There is no warranty stated or implied due to the stresses placed on your vehicle by performance parts and our inability to monitor their use, tuning, or modification.

These instructions are provided as a guide only as there are many variables that cannot be accounted for concerning your particular vehicle, including but not limited to model year differences, model differences, the presence of non-OEM parts, and modifications that may already be or were previously installed. A basic knowledge of automotive parts and systems is helpful but a better understanding of the parts and systems on your particular vehicle may be required.

If you have any questions or issues at any time during the installation of your AMS Performance product(s) please call us for technical assistance. The AMS Performance tech line can be reached during business hours at 847-709-0530 for AMS Performance products only.

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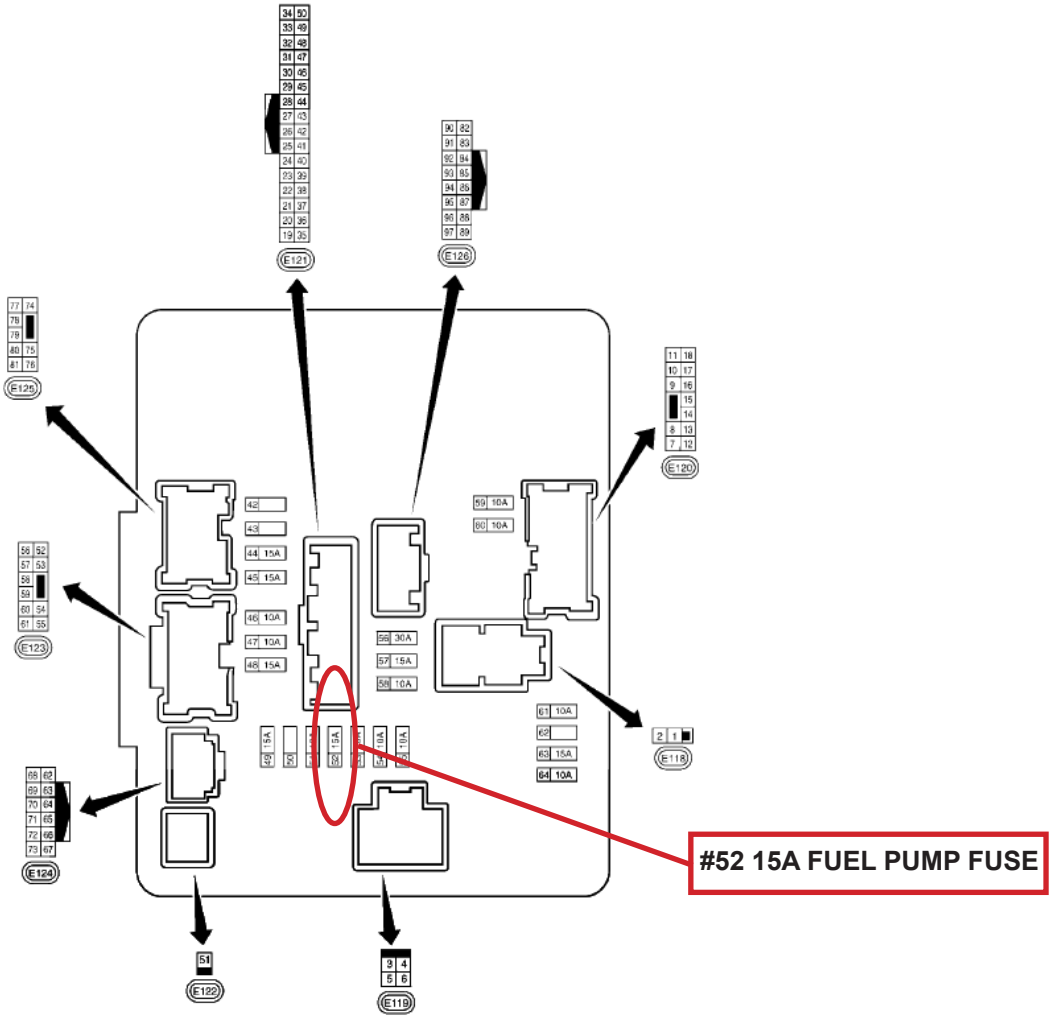
Fuel Pressure Relief

Warning! Make sure the engine has cooled down. Disconnecting fuel lines on a hot engine can lead to fuel rushing out of fuel lines at random, caused by fuel boiling when opened to atmosphere. Fuel temperatures in the low side fuel line can be as high as 150 degrees Fahrenheit at the inlet of the HPFP and the high side can be significantly higher, especially at pressures of 200 bar. At a minimum, fuel in the high side rails and lines will follow engine bay temperature. Make sure to follow the OEM fuel pressure relieving procedure. (Without Consult Tool)

1. Pull the #52 (15A) Fuse listed as Fuel Pump in the IPDM. The IPDM (Intelligent Power Distribution Module) is the fuse box located next to the battery in the engine compartment.

Note: The battery may need to be removed in order to remove the IPDM cover.

2. Start the engine
3. After the engine stalls, crank it for two or three times to release all the fuel pressure
4. Turn the ignition OFF
5. Disconnect the battery
6. Reinstall the fuel pump fuse after the flex fuel installation, see step #20



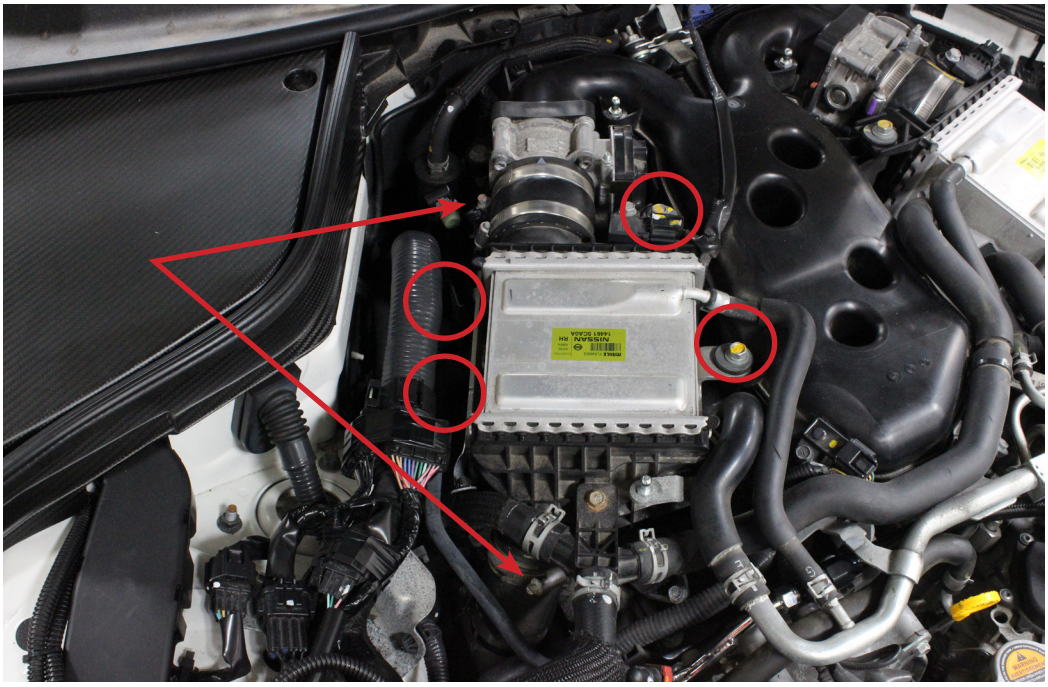
Disassembly

Warning - It is EXTREMELY important to ensure the area around the fuel system components are clean and clear of any debris when removing or disconnecting. Foreign material is the number 1 cause of injector failures in the VR30DDTT engines. Make sure to use clean caps or plugs on the ends of any open fuel lines when parts are being removed. Only use a lint free shop towel if necessary, during assembly and disassembly. Cleanliness is key to a properly operating fuel system!

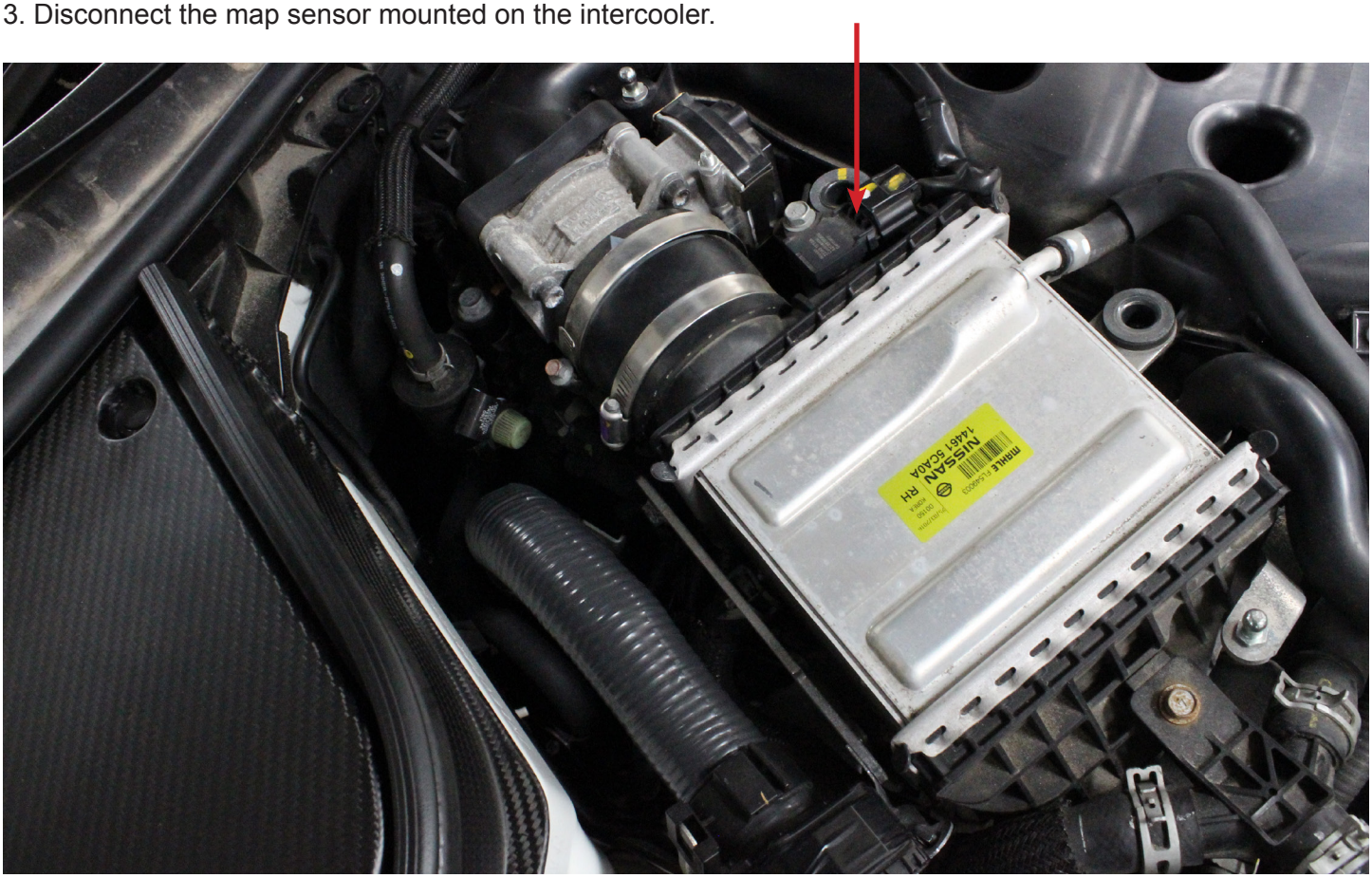
Tech Note: The first few steps will show a method that does NOT require draining the intercooler system by flipping the intercoolers over and leaving the hoses connected.

1. Place fender covers around the car especially at the front to protect the core support cover and then remove the engine cover.

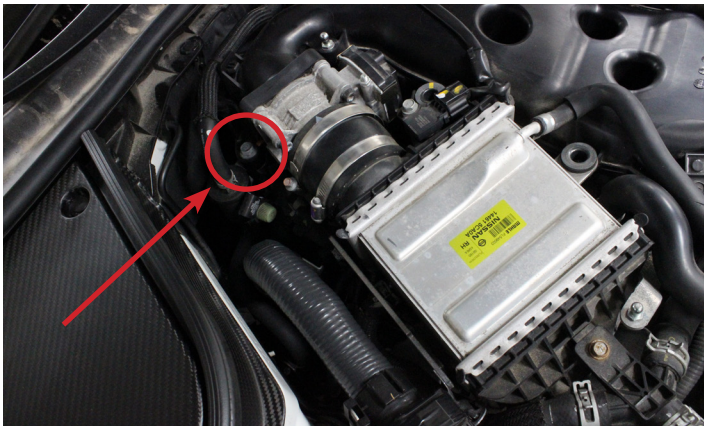
2. Loosen the two hose clamps (arrows), then remove the four intercooler bolts (circled). Two of the bolts are below the engine harness. See photo below.



3. Disconnect the map sensor mounted on the intercooler.

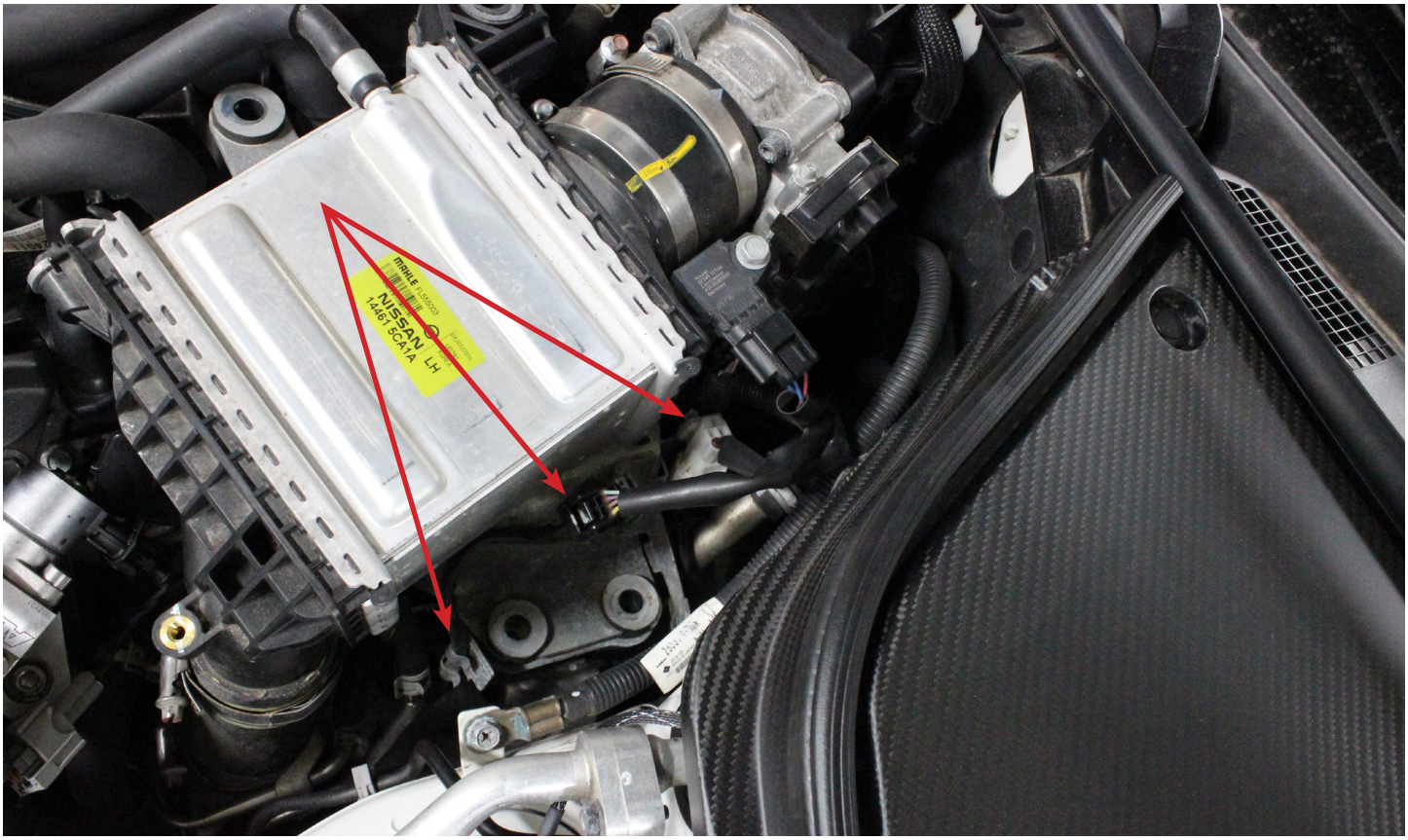


4. Disconnect the hose and remove the bolt holding the bracket.

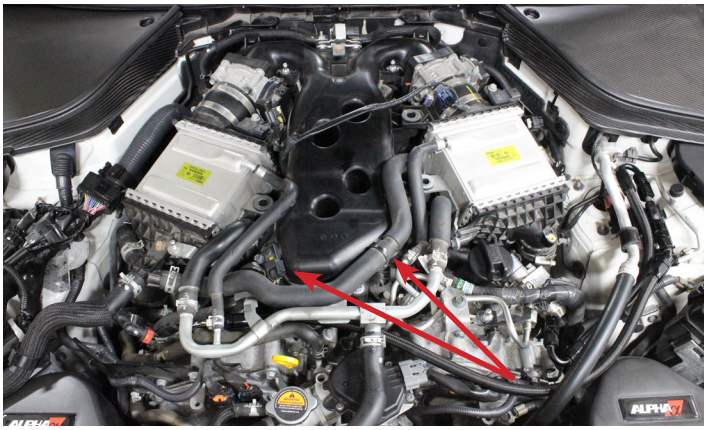


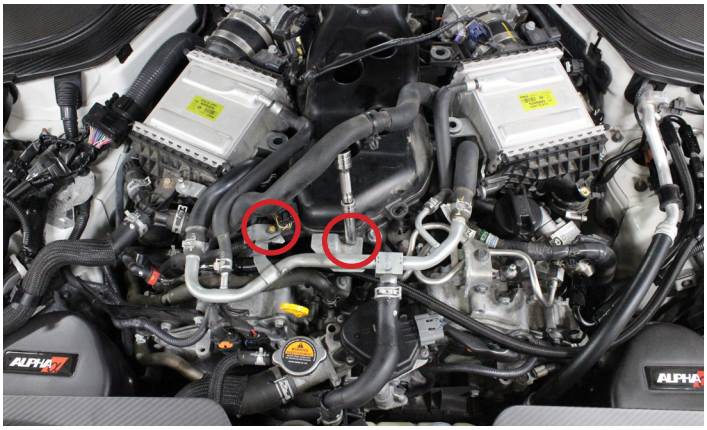
5. Repeat steps 2-3 on the driver side.

6. Using a trim tool or pliers, remove the connectors from the brackets and push them clear of the intercooler bracket near the strut tower.



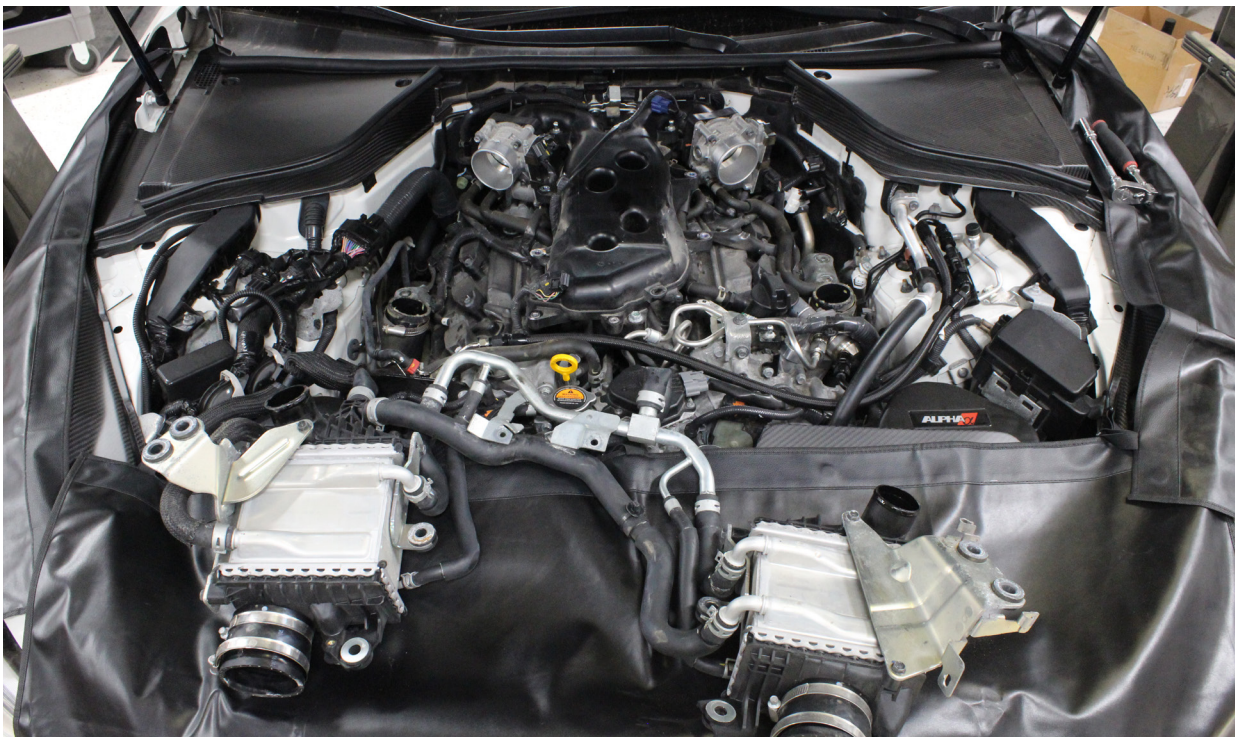
7. Disconnect the connector and release the clip to lift up the hose. Remove the two bolts underneath.



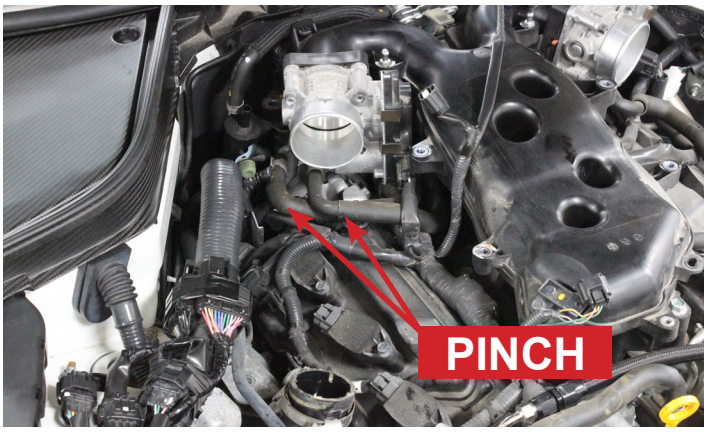


8. Lift at the front of one of the intercoolers to pull the intercooler out of the coupler, then pull it off the throttle body. Repeat on opposite side.

9. Now that intercoolers are both free, grab them and flip them on their tops onto the core support. See photo below.

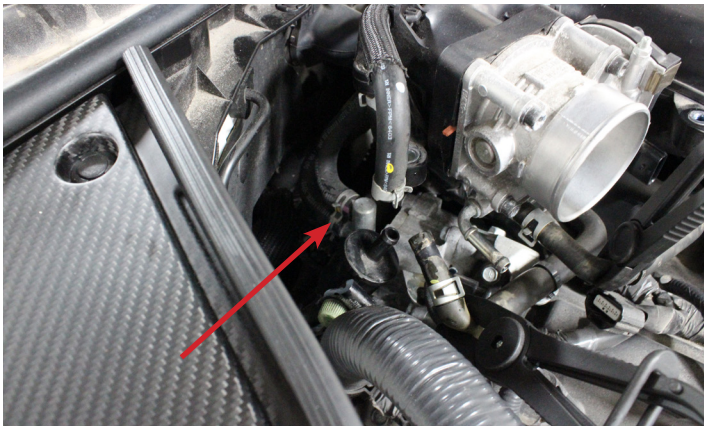


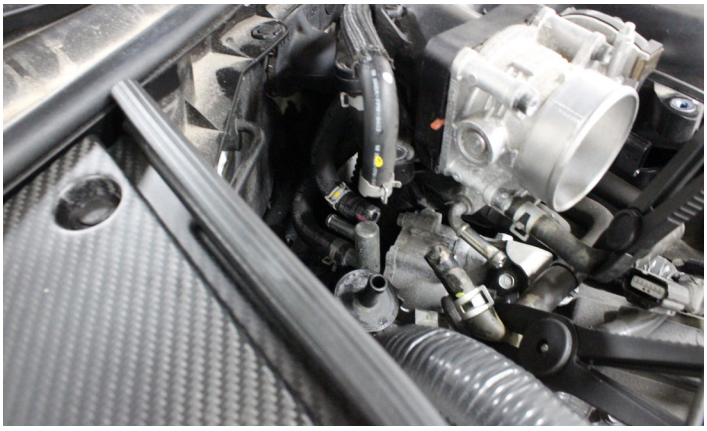
10.If you have hose pinchers, use them in this step to have minimal coolant loss and avoid having to re-bleed the cooling system. Pinch off both throttle body hoses and slide the outer most hose clamp back and remove outside hose as shown below.



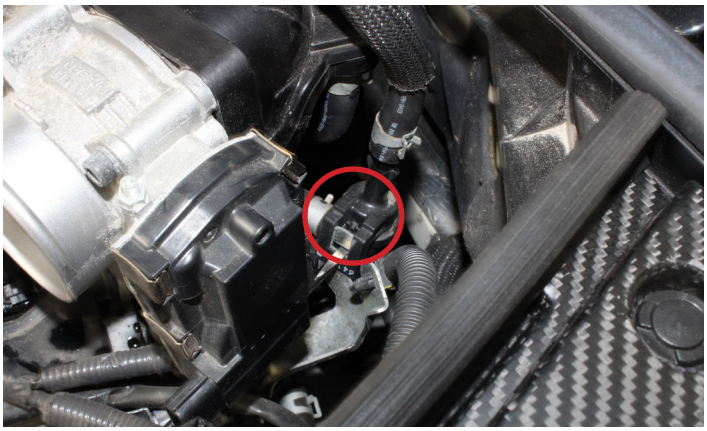
11. Repeat last step on driver side.

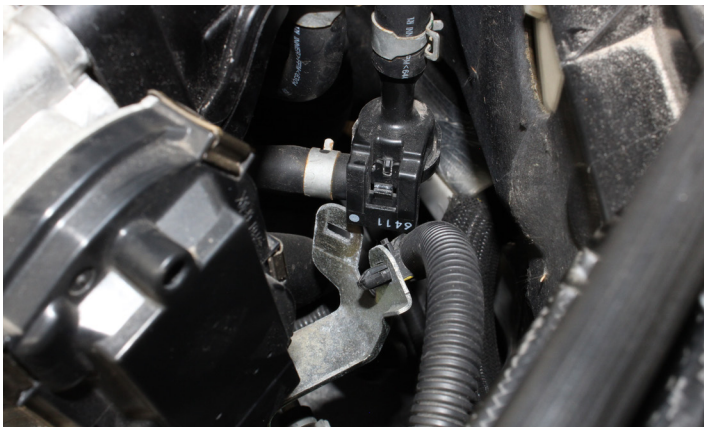
12. Remove the hose behind the intake manifold on the passenger side.



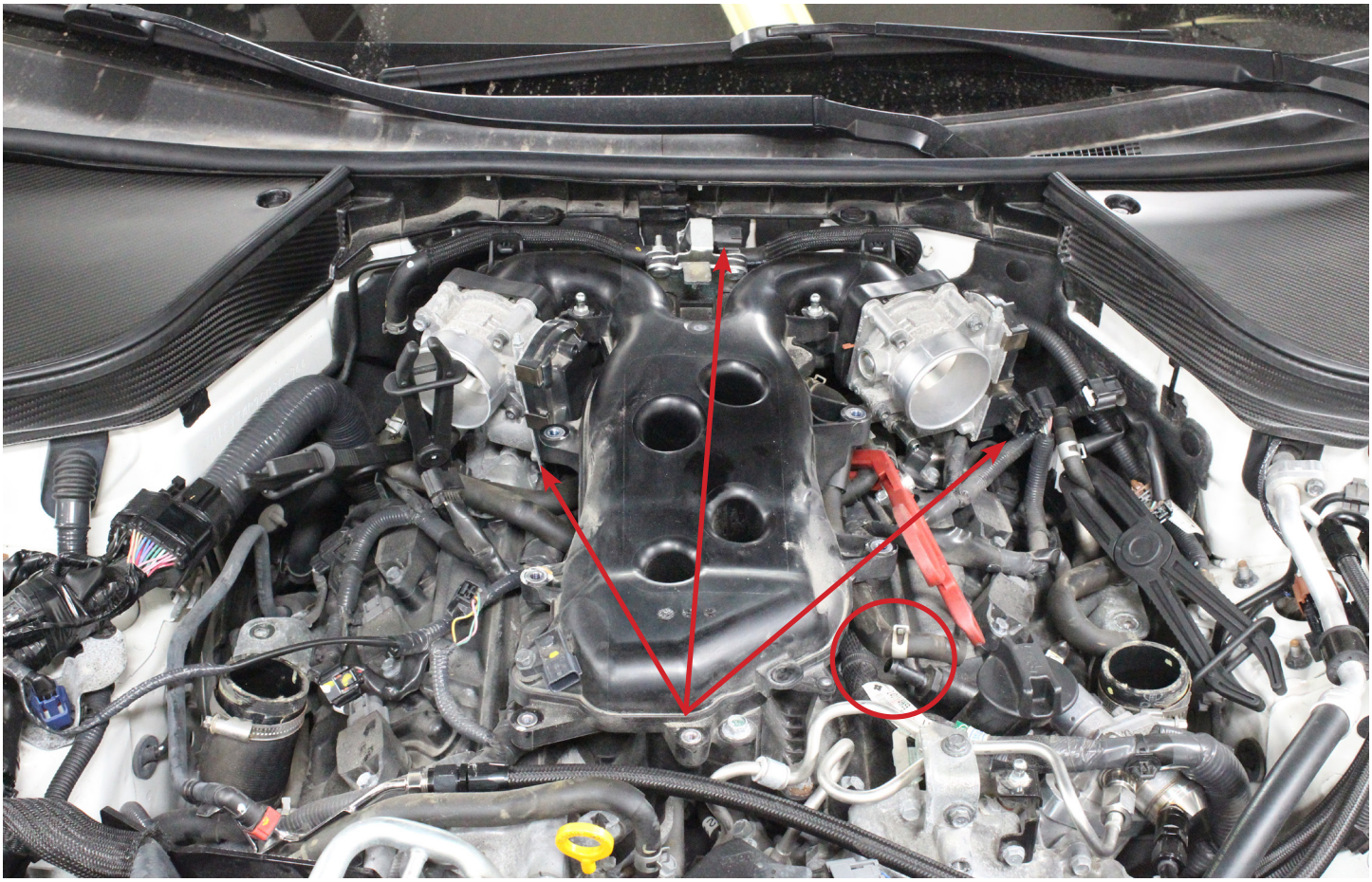


13. Using a long flat blade screwdriver, release the clip and pull the hose off the bracket.

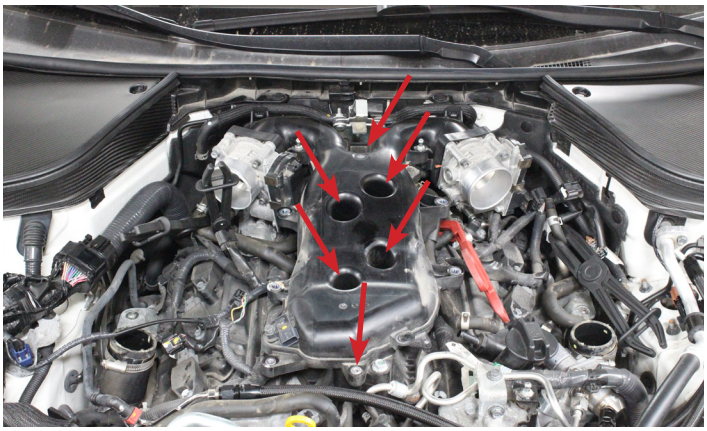


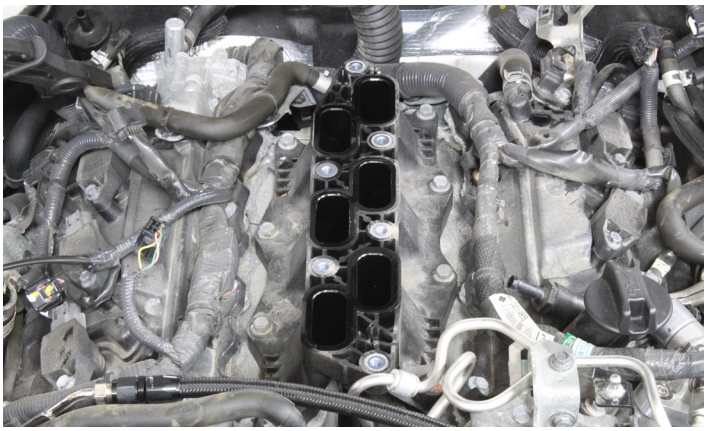


14. Disconnect the two throttle body connectors, the EVAP connector and the hose from the valve cover as shown below.

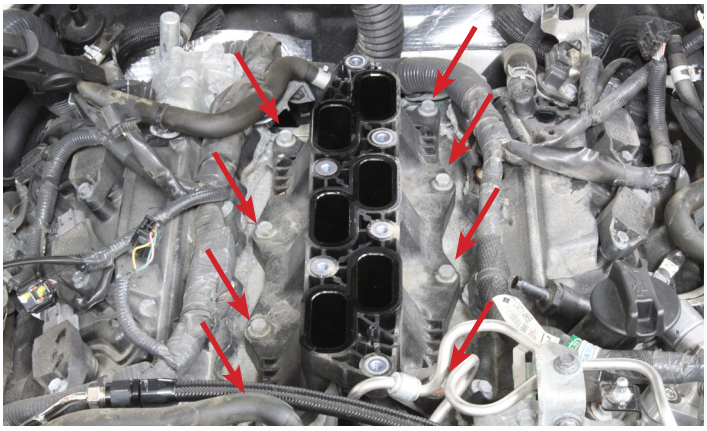


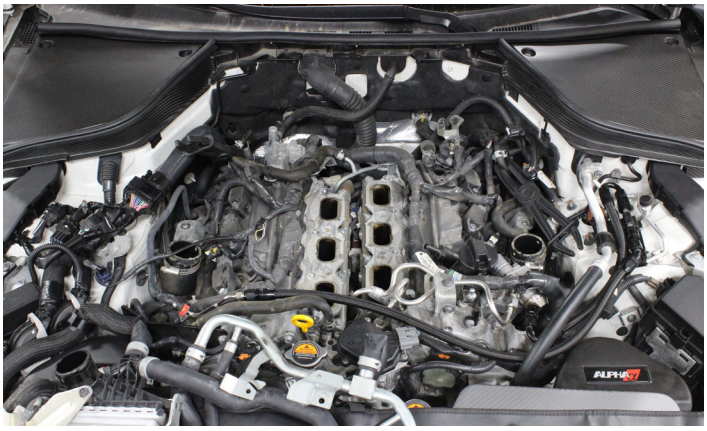
15. Remove the six upper intake manifold bolts. Then remove the intake manifold.





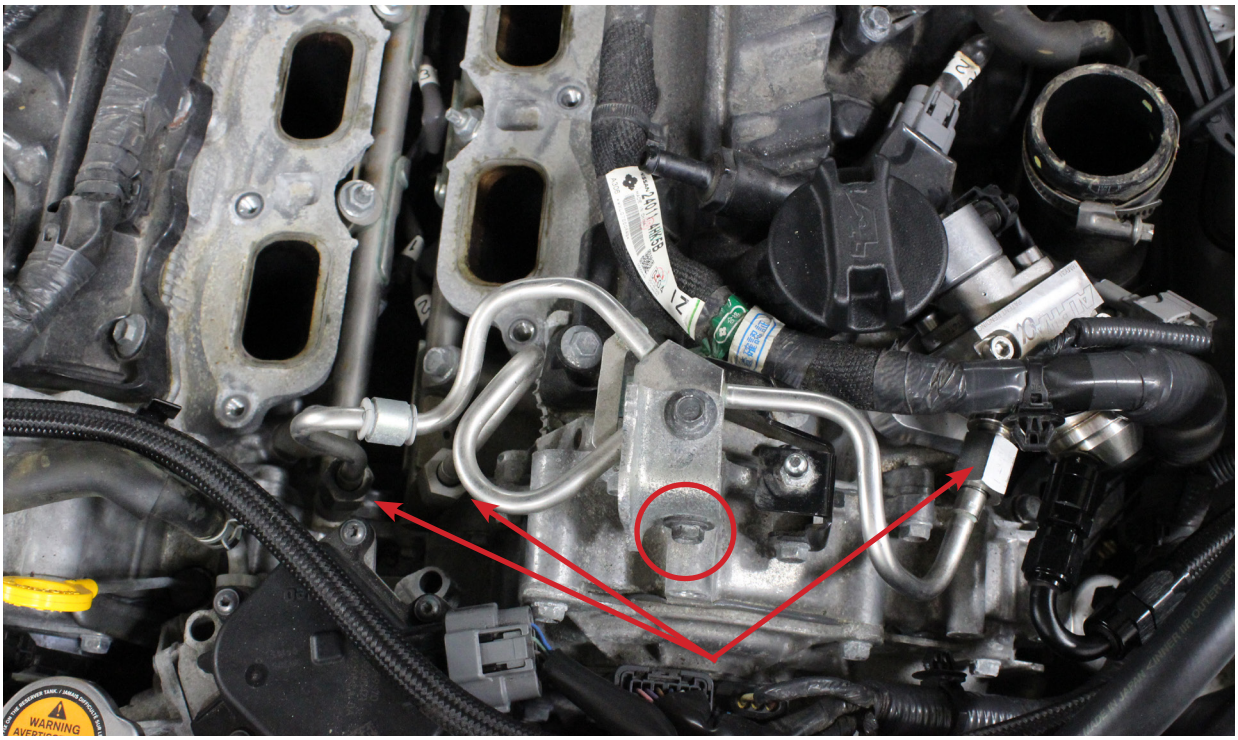
16. Remove eight lower intake bolts to remove the lower intake.



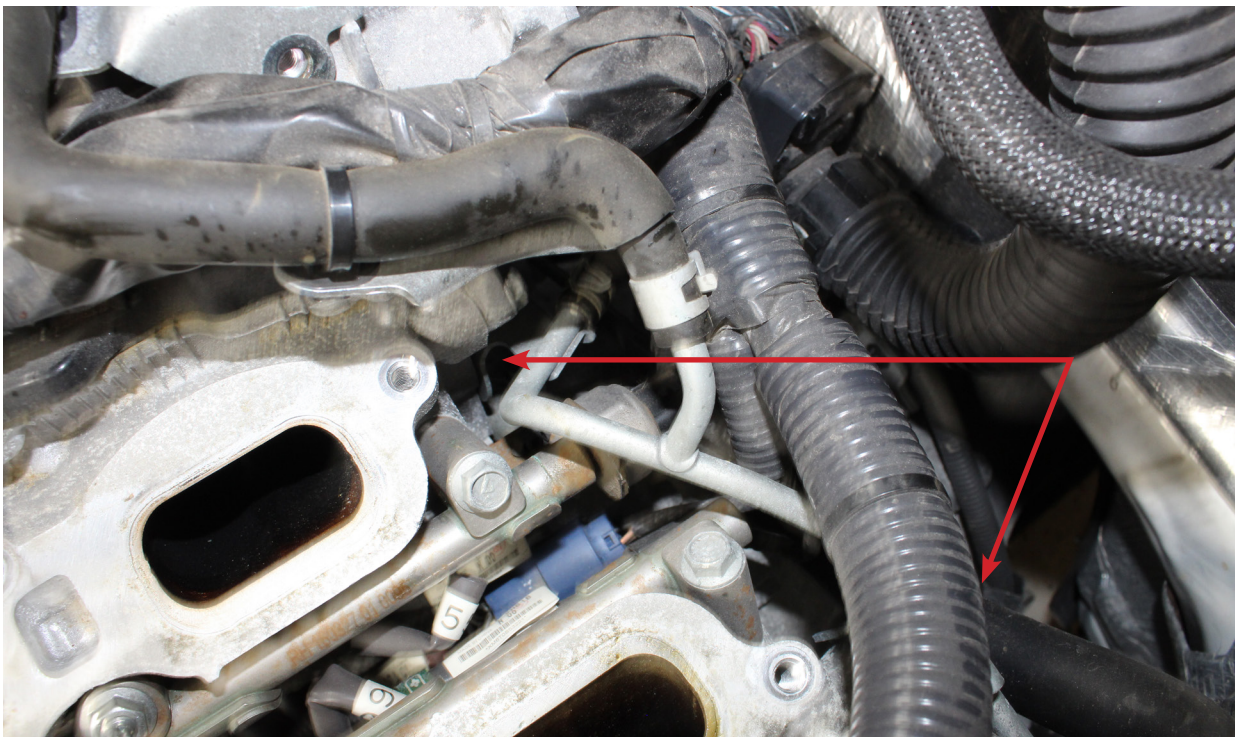


NOTE: If you have not already, clean up any debris in or around the valley of the engine. Any contaminants in the fuel system can lead to injector failure. Also, it is a good idea to use paper towels to plug the intake ports to keep debris from falling in while the manifold is off.

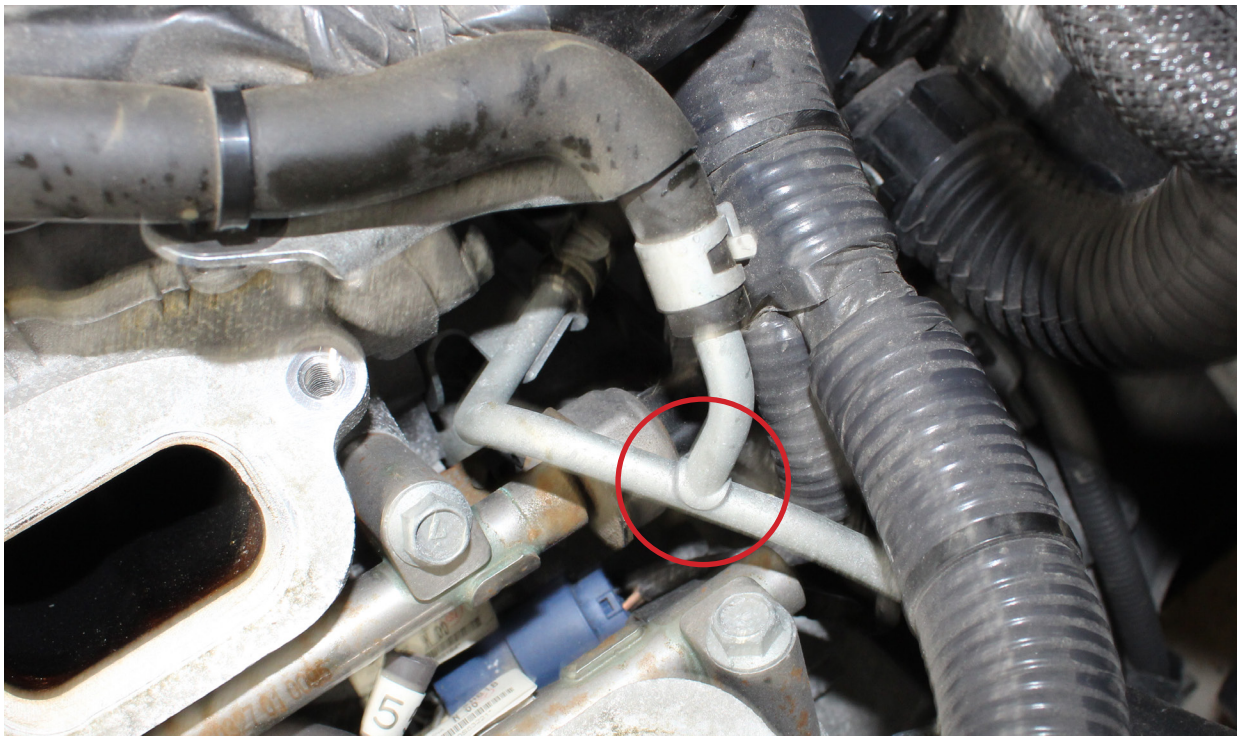
17. Remove the bracket bolt and then the three high pressure fuel line connections. Remove the fuel line and cover the open connections with a cap or similar.



18. Remove the two bracket bolts holding the hard pipe on the back of the head to create more room to slide the fuel rails out.

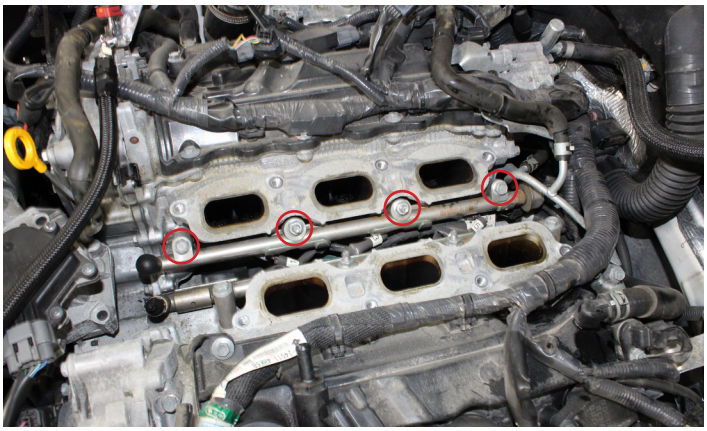


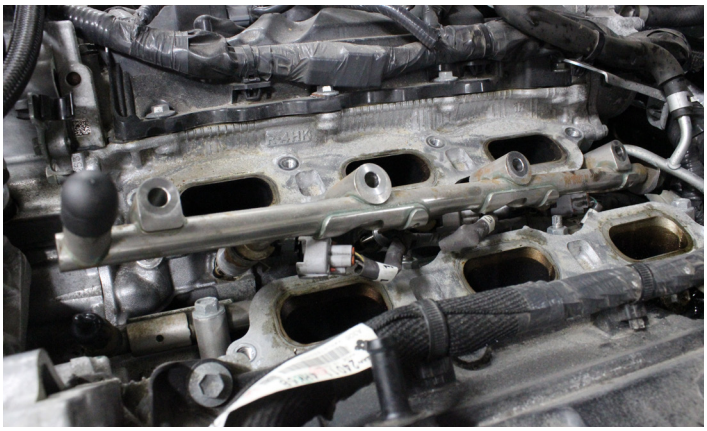
19. Disconnect the fuel pressure sensor connector and the black fuel injector harness connector just below the fuel pressure sensor.



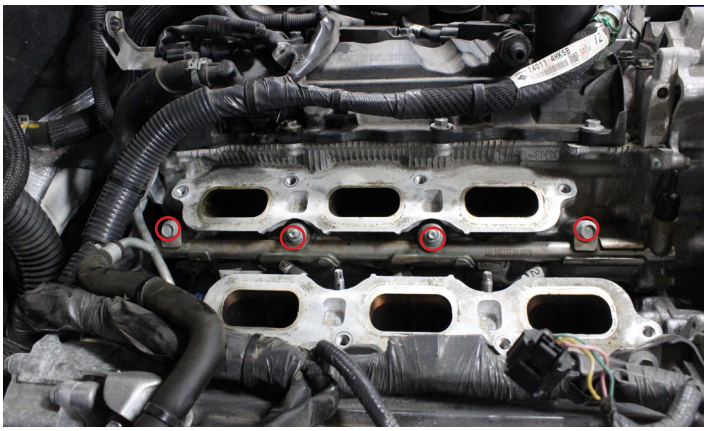
20. Due to the design of the fuel rails, the passenger rail needs to be remove first. Remove the two nuts and two bolts holding the passenger side fuel rail to the cylinder head. Work the rail free and remove it as shown below.

Note: In rare cased if an injector gets stuck in the head and is not easily removed, there is a special tool from Infiniti to remove the injector. SST: KV105H0170

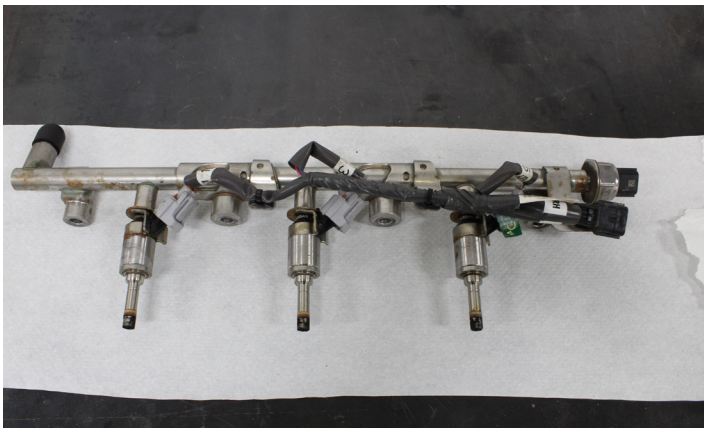


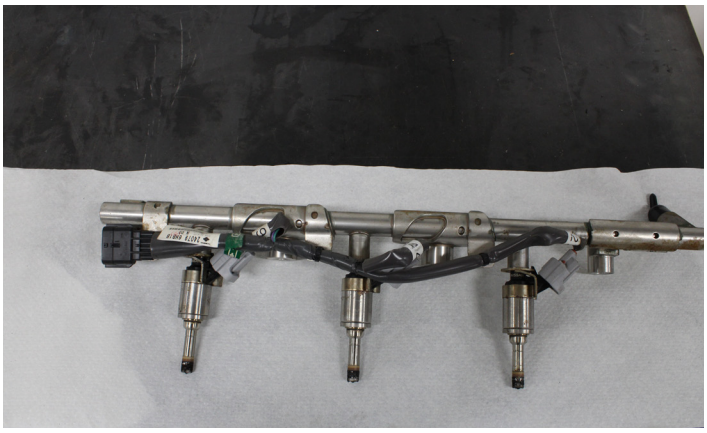


21. Disconnect the driver side fuel rail connector and remove the bolts holding the fuel rail. Remove the fuel rail.



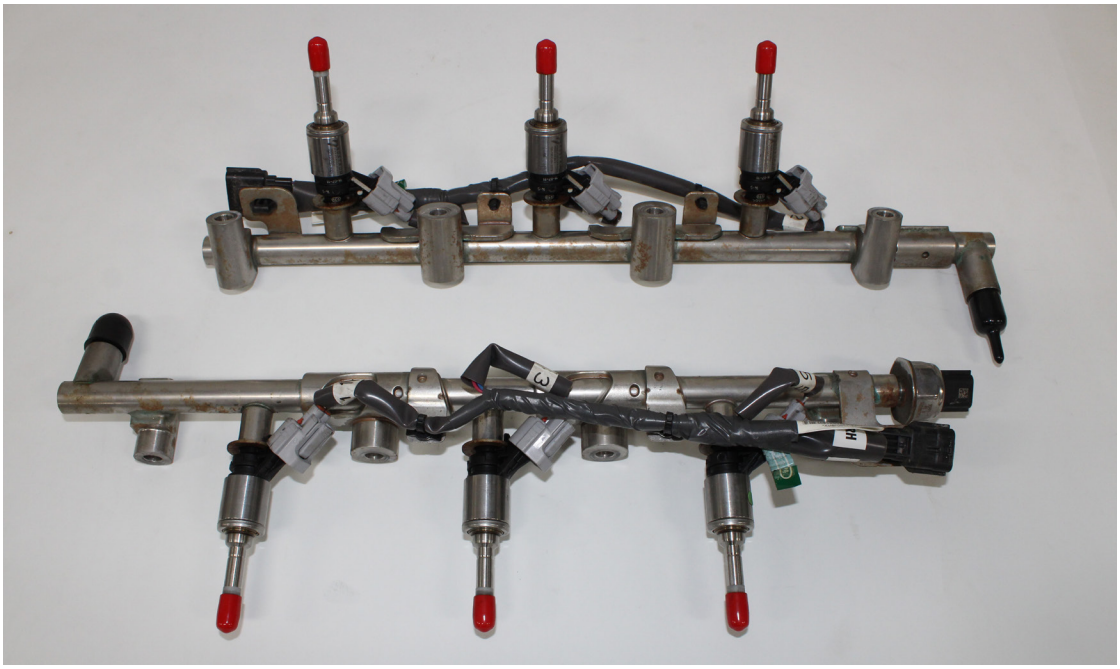
22. Place the fuel rails on a clean work surface.





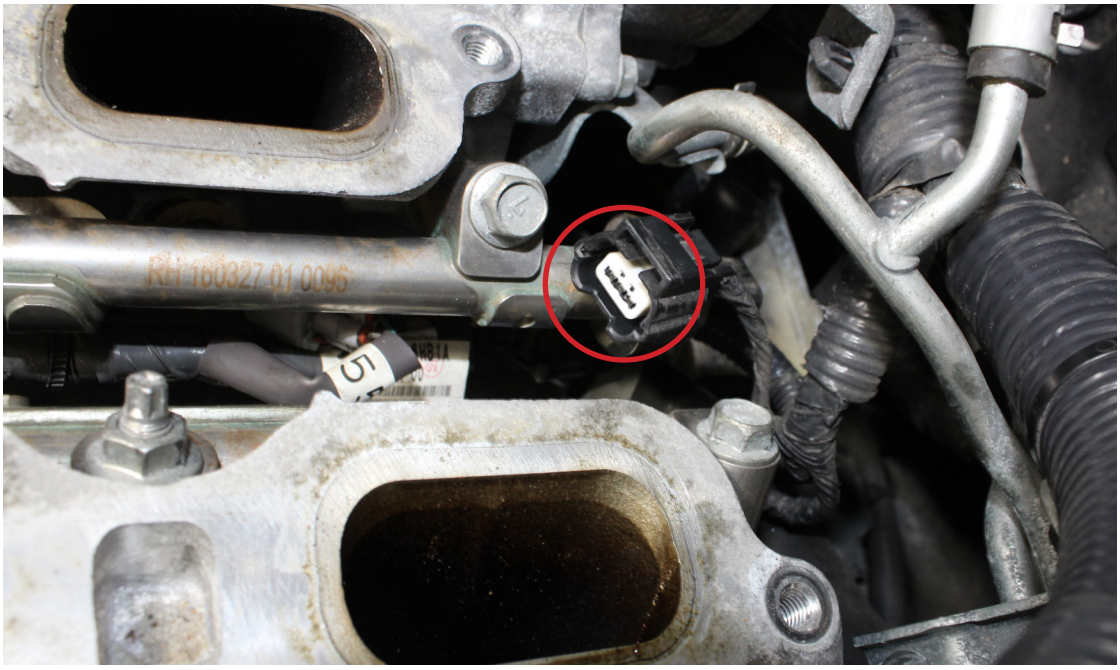
23. Replace each injector by disconnecting the connector and removing from the rail. Apply a small amount of O-ring safe grease to the new o-rings. Ensure that none of the grease ends up in the inlet of the injectors.

Note: Make sure there are no o-rings left inside the rail before installing the new injector



24. Reinstall both fuel rails.

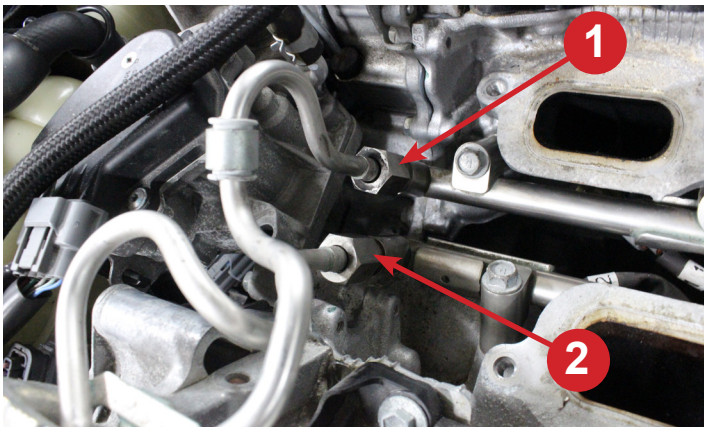
Tech Note: It is very common on the VR30 engines to throw a DTC for fuel pressure sensor. This is caused by a loose pin fit on the fuel pressure sensor connector and generally not a sensor failure. If you have a pin fit tool, now is good time to check the pins and correct if necessary. The sensors can fail as well so now is a good time to replace it is necessary.

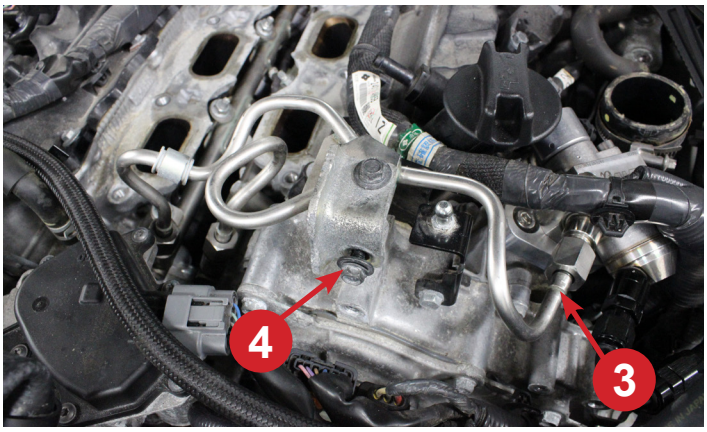


25. Apply a small amount of engine oil to the fuel rail inlet threads and reinstall the high pressure fuel line removed in step 17 by starting the nuts by hand on the rail and then the fuel pump. Install the bracket bolt before tightening the lines.

Note: Installing the nuts by hand is very important. They should spin all the way down without much resistance and is helpful to avoid gulling the threads.

Fuel Nut Torque Spec: 15 Nm or 11ft lbs





26. Reinstall all parts in reverse order. If you pinched off the coolant hoses to the throttle body, it is not necessary to bleed the cooling system.

Lower Intake Manifold Torque Spec: 25 Nm or 18 ft lbs in cross pattern

Upper Intake Manifold Torque Spec: 25 Nm or 18 ft lbs in cross pattern

27. Fully reassembled and tuned/reflashed.

This tuning guide was made using EcuTek software. Other software may not use the same naming conventions for their tables.

ALPHA / Nostrum Injector Calibration Steps

Note: If any of these require MAPs are not available in your ROM, they may need to be requested from ECUtek. Please ensure these MAPs are present before beginning the tuning process.

1. Injector Sizing

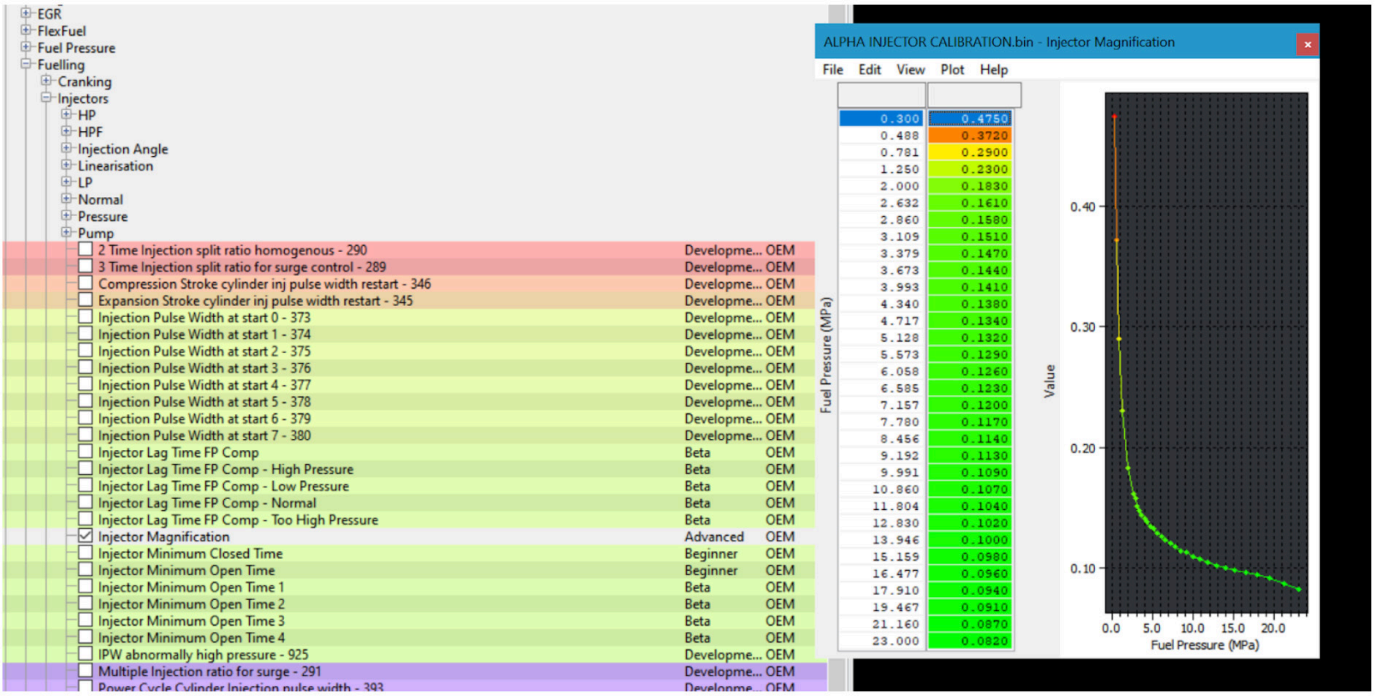
- Calibration of the ALPHA/Nostrum KDI injectors requires modification of the calibration data in the injector data table “Injector Magnification.”

- This calibration table works very similarly to a standard injector scale table for a port injected vehicle. Coarse global fueling adjustments can be made here in respect to injector flow rate changes.

- This Calibration Table is in the Folder as shown in the screen capture below. SC#1

- Please note, the ALPHA/Nostrum KDI injectors flow approximately ~40% more fuel than the stock injectors and a coarse “Injector Magnification” adjustment could be made to accommodate this, however we recommend the starting point for this calibration table be directly transposed from the data that is provided with your injector purchase.

1. **Injector calibration from one matched set of 6 injectors may differ slightly than another matched set of 6. Please keep this in mind when calibrating.**



2. Injector Drive Current

- Calibration of the ALPHA/Nostrum KDI injectors require modification of the calibration data in the injector data tables responsible for injector drive current.

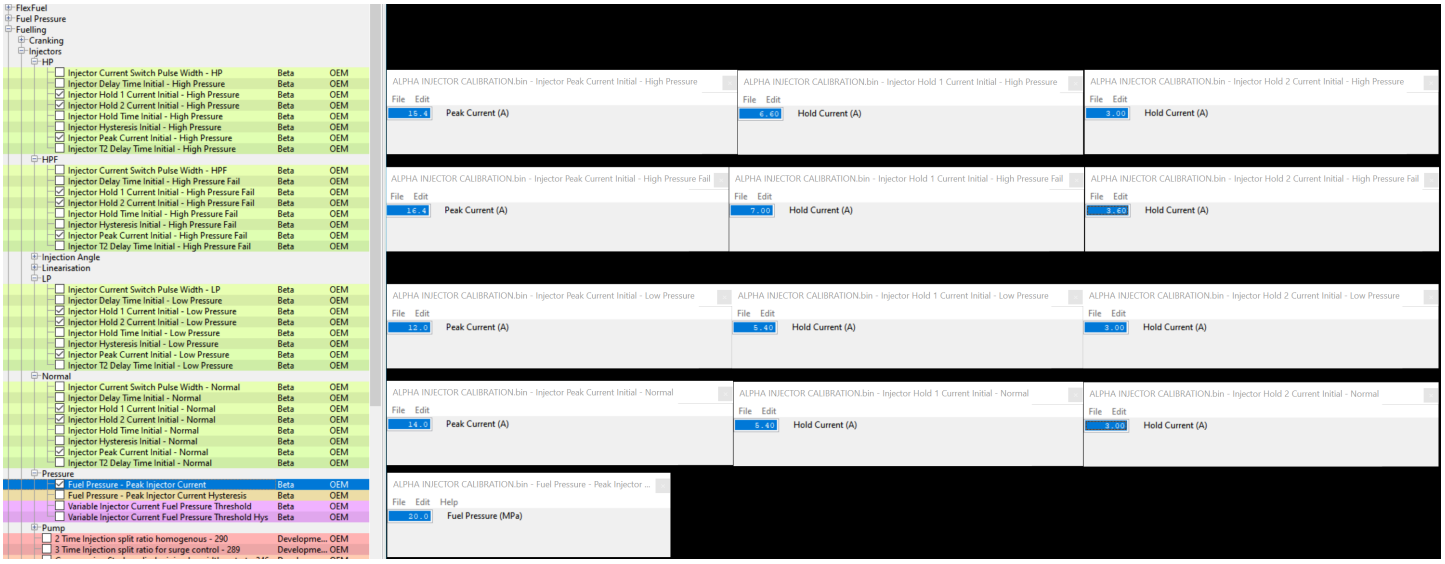
- The ALPHA/Nostrum KDI Injectors for the VR30DDTT engine require a higher drive current than stock to open fully. The recommended drive currents are listed below:

	High Pressure Fail	*High Pressure*	*Normal*	*Low Pressure*
Peak Current	16.4	15.4	14	12
Hold 1	7	6.6	5.4	5.4
Hold 2	3.6	3.6	3	3

- The ALPHA/Nostrum KDI Injectors for the VR30DDTT engine also require the highest drive current to be utilized at a lower injection pressure.

1. **The recommended value for this pressure threshold is 20MPa.**

- These Calibration Tables are in the following folders as shown in the screen capture below.



3. Fuel Pressure Target

- Calibration of the ALPHA/Nostrum KDI injectors require modification of the calibration data responsible for fuel rail pressure targets.

- Adjustment of the fuel pressure target tables is required as the nominal operating pressure of the ALPHA/ Nostrum KDI is lower than that of the factory injectors. This is due to design characteristics that affect all GDI Injectors.

1. **GDI injectors have a max pressure at which the force of the fuel can prevent the injector from opening, and we need to be sure that this pressure is not reached.**
2. **Pressures above approximately 24 MPa may prevent the injector opening thus it is important to have adequate fuel pressure control to limit pressure oscillations.**

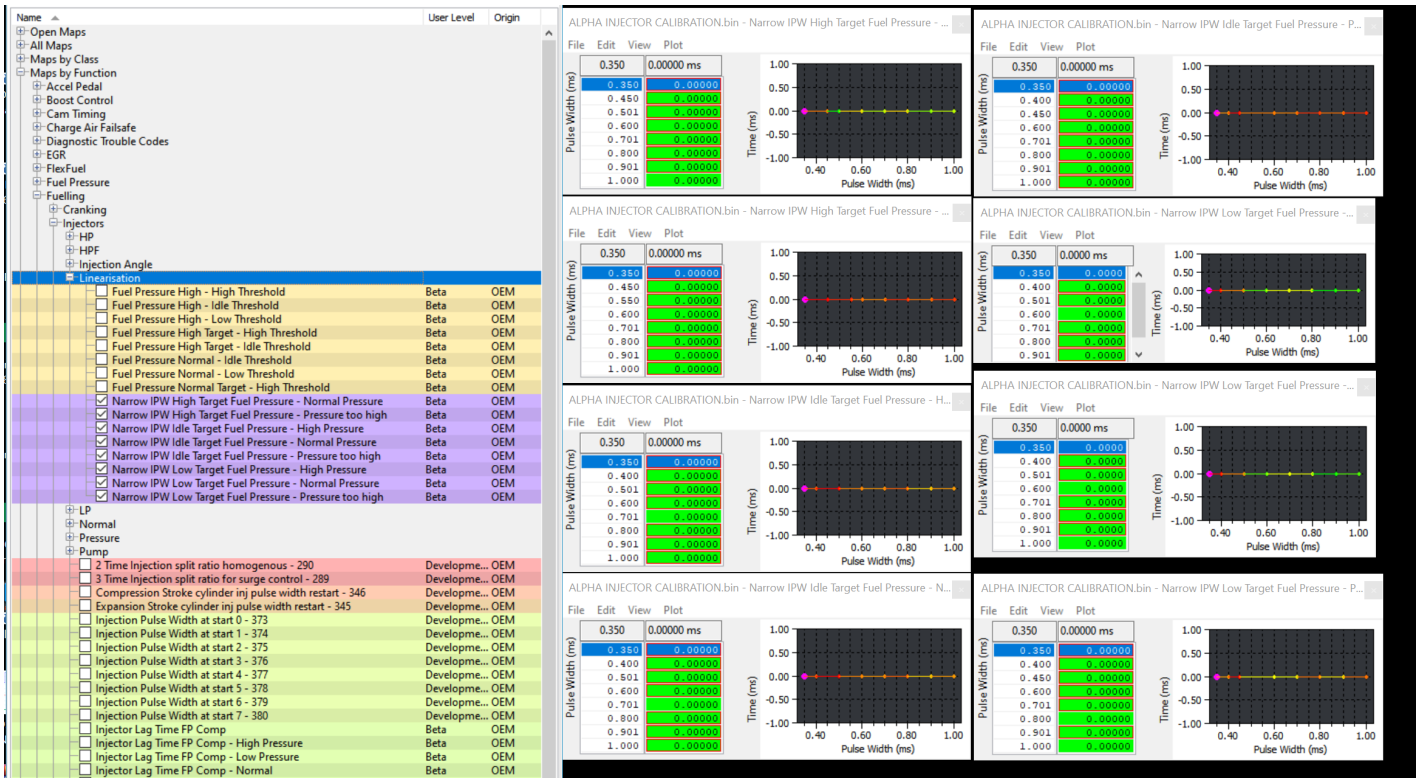
- AMS and Nostrum recommend targeting a maximum fuel pressure of 18 MPa on all three fuel pressure tables as shown in the screen capture below SC#3.

- AMS and Nostrum also recommends that the fuel pressure target near idle and low rpm, low load cruising be lowered to 3MPa and that the fuel pressure target does not rise or fall during idle operation.

1. **This will ensure a more consistent injection quantity at low load and low injector pulse-width to prevent any AFR oscillations.**

4. Narrow Injector Pulse Width

- Calibration of the ALPHA/Nostrum KDI injectors require modification of the Injector calibration data responsible for narrow fuel injection pulse width compensation.
- The “Narrow IDW” tables correct for the non-linear injector flow characteristics at low injector pulse widths.
- These tables are specific to the OEM injectors and for this reason they should be zeroed out when changing injectors.
- These Calibration Tables are in the folder as shown in the screen capture below. SC#4



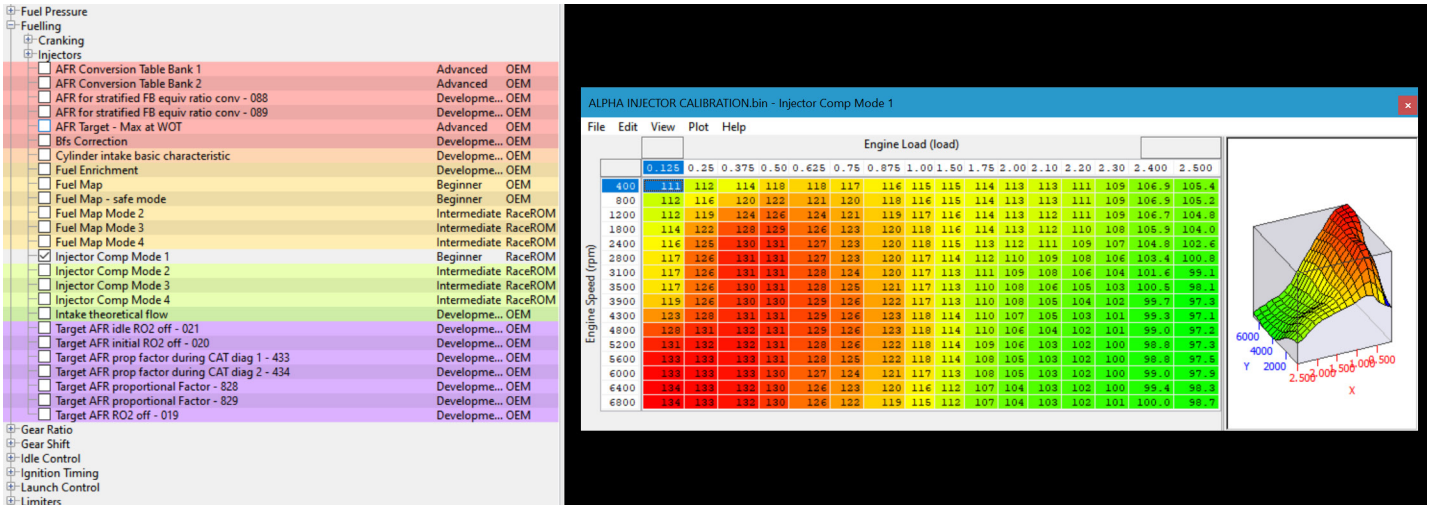
5. Base Fueling Compensations

- Calibration of the ALPHA/Nostrum KDI injectors require careful consideration of the calibration tables responsible for fine tuning fueling.

- These tables are labeled “Injector Comp Mode 1,2,3,4) and as shown in screen capture SC#5.

- It is worth noting that if you have previously applied fueling compensations utilizing these calibration tables due to the modifications on the car or oxygenated fuel, this may be a good place to start for fine tuning your new set of injectors.

1. **If you are unsure of your current “Injector Comp” calibration, please “zero” the table out where all cells are equal to 100 as this will apply no fueling corrections and work well as a starting point.**

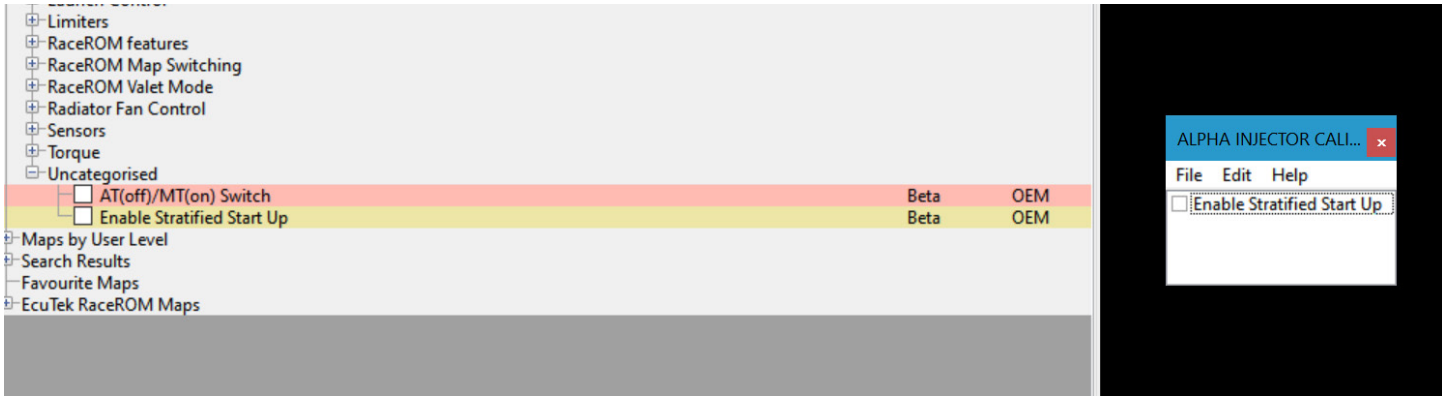


6. Stratified Startup

- Calibration of the ALPHA/Nostrum KDI injectors require the toggle “Enabled Stratified Startup) to be disabled. (not checked)

- Leaving this table “checked”, will cause poor cold and warm startup conditions.

This is due to the very narrow pulse width of the factory startup, split injection, and injection angle of the startup. Under these conditions, the Alpha injectors would be commanded to inject such a small amount of fuel per injection stage that there can be a discrepancy between the amount of fuel being commanded for injection, and the amount of fuel actually injected.



7. Fine Tuning

- After you have completed all the previous steps it's time to start the engine and start tuning.

- Dialing in your new injectors to maintain a target AFR with minimal fuel trim corrections will be an iterative process of driving at various engine speeds and engine loads and reviewing your datalogs.

- The first task you should work on is fine-tuning the injector magnification table.

1. **You will want to calibrate this table so that the average of the fuel trims at each fuel pressure is within +/- 10%.**
2. **This injector magnification curve should remain quite smooth**

- If your collected data suggests otherwise you can make up for it in the next step using the injector compensation table.

- Secondary fuel adjustments after adjusting the "Injector Magnification" table will be taken care of in the previously mentioned "Injector Comp" tables.

1. **Adjustments to this table should have smooth transitions for good drivability.**
2. **Please reference SC#5 for the location of this table, and for the smoothness of the data.**

Any questions or concerns that are not outlined in this tuning guide shall be forwarded to your AMS sales representative. Thank you and enjoy!

Warning - It is EXTREMELY important to ensure the area around the fuel system components are clean and clear of any debris when removing or disconnecting. Foreign material is the number 1 cause of injector failures in the VR30DDTT engines. Make sure to use clean caps or plugs on the ends of any open fuel lines when parts are being removed. Only use a lint free shop towel if necessary, during assembly and disassembly. Cleanliness is key to a properly operating fuel system!