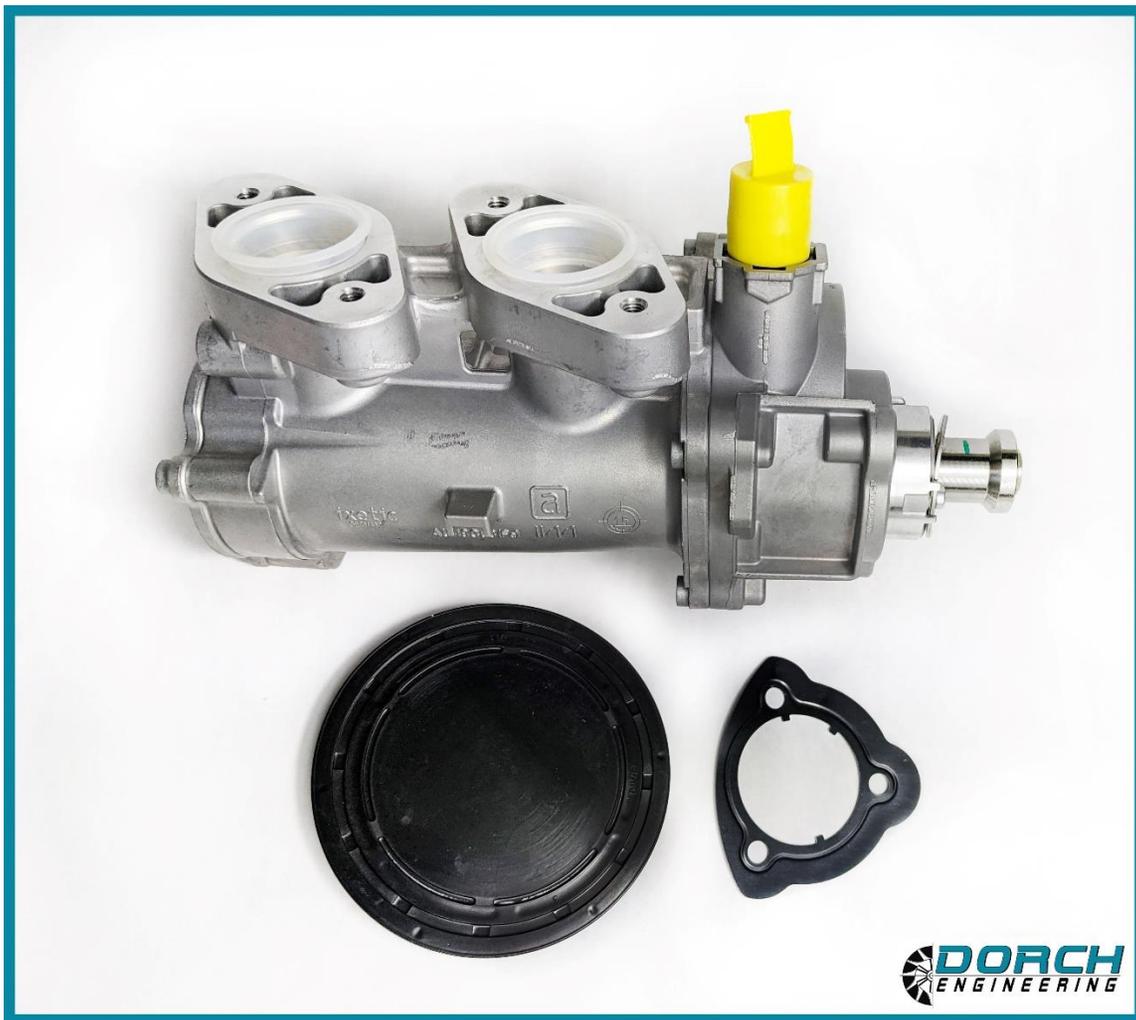


Dorch Engineering S55 HPFP Lift Kit Installation

DE-LK-2001A

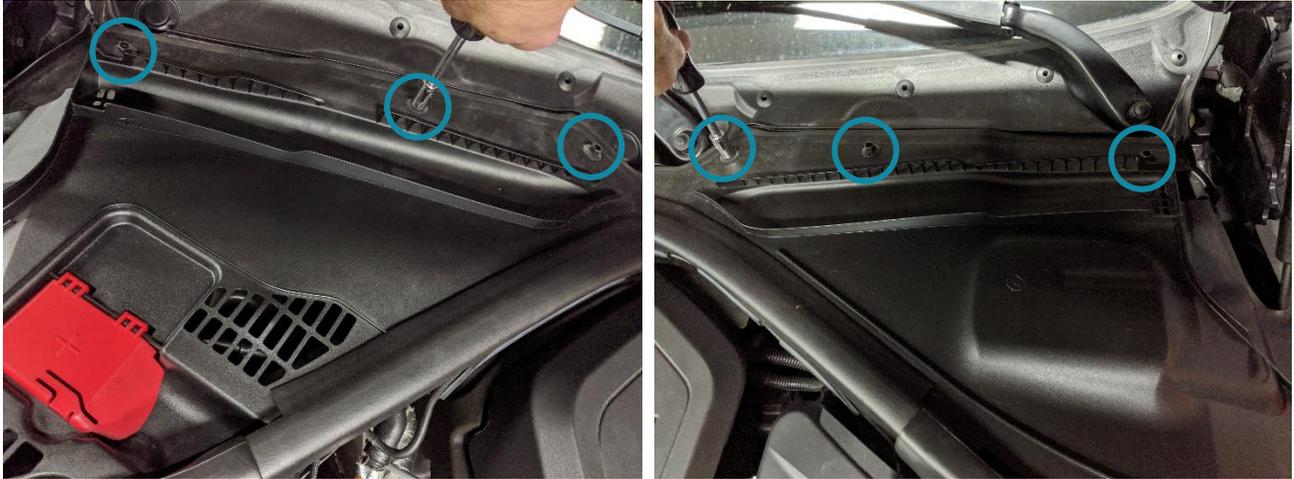


NOTE: Specialty tool kit highly recommended for ease of installation. Simply google “N54 N55 Vacuum Pump Sealing Cover Remover Installer Tool Kit” and there will be multiple options under \$200.

German Specialty Tools and Freedom Racing usually both stock them [HERE](#) and [HERE](#)

1. Start by disconnecting the battery's ground terminal and removing the cowl covers:

The cowl covers are held on with three 10mm ¼-turn fasteners on each side. Rotate ¼ turn to the left, to release



There is also a plastic clip on the outside edge of each cowl cover. Remove this by pulling out the center first, and then the base:



2. Next, remove the cowl weather stripping. First pull the wire out of it's groove and then pull towards the front of the car to remove the weather stripping:

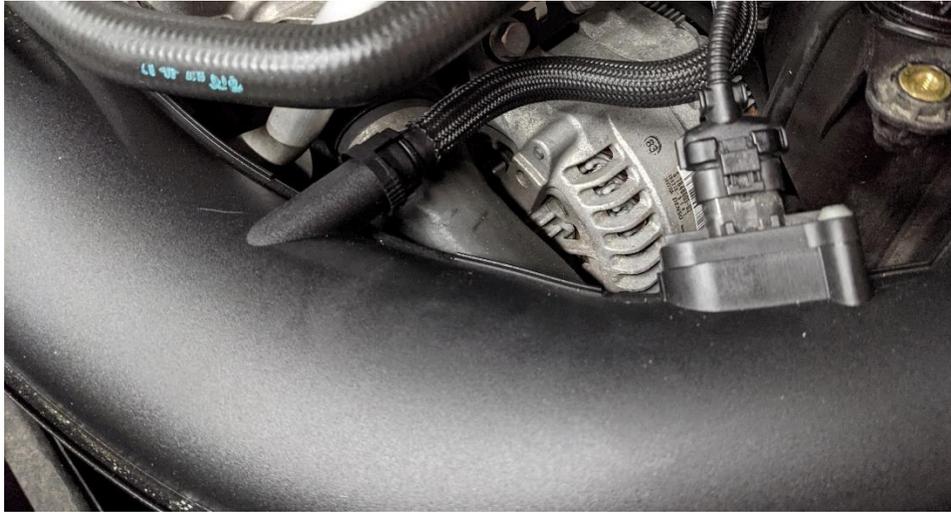


3. Remove the strut bar by loosening the 8x 13mm bolts and the single 10mm bolt by the coolant reservoir:



4. Remove the left side airbox assembly.

To do this, first remove the vacuum hose and MAF electrical connector:



Loosen the hose clamp using a 6mm nut driver and pull the coolant hose out of the clips as pictured. To remove the front clip, first turn the rubber grommet $\frac{1}{4}$ turn and then squeeze the clips inward and push down.

The entire airbox assembly is now free and can be removed entirely.



5. Remove the undertray panels. The center metal panel is 16mm bolts, the oil cooler shroud is 2x T30 bolts, and the rest of the panels are 8mm bolts.

Note: You will need to turn or remove the wheels to be able to access the 8mm bolts holding the corner panels to the fender liners. The fender liners DO NOT need to be removed.

6. The electric fan assembly now needs to be removed. First remove the 2x T25 bolts at the bottom corners of the fan assembly:



7. Next remove the oil cooler and let it hang freely out of the way. To do this, unclip the hose from the subframe and then remove the 3x 13mm bolts:



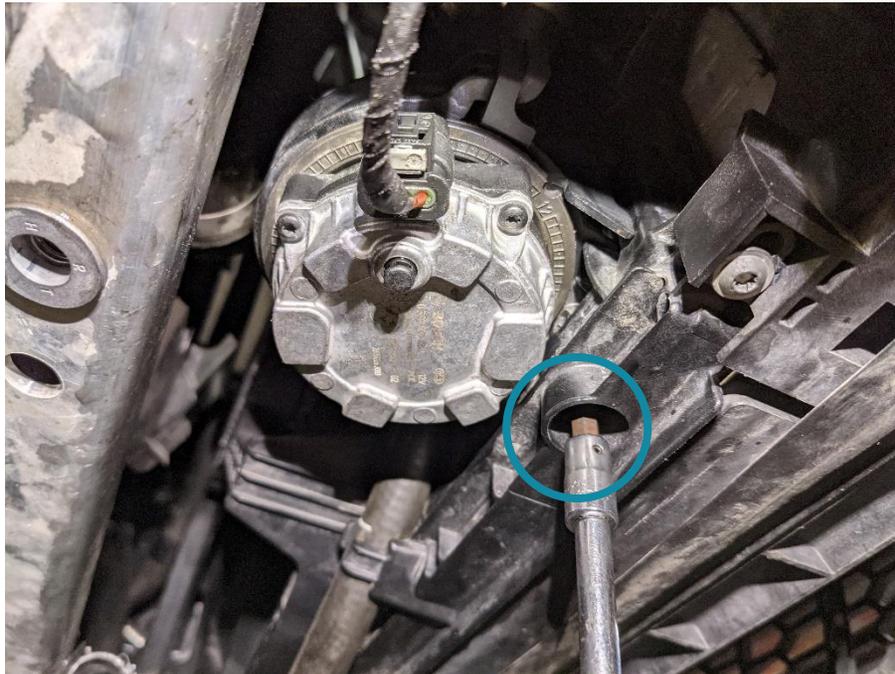
8. Next remove the 2x T25 bolts holding the fan shroud extension and unclip the hose from the fan:



9. Next, drain the low temp (intercooler) water circuit, by disconnecting the lower hose from the intercooler pump:



10. Once drained, the intercooler pump can be removed entirely. To do this, remove the single T25 bolt to undo the pump bracket and then lift up. The pump and bracket will come out as one piece. The electrical connection and upper hose connection will also need to be removed:



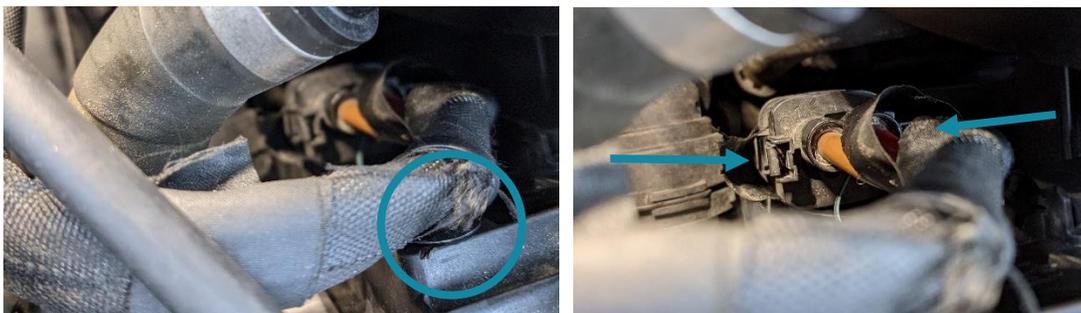
11. Now double check that all hoses have been unclipped from the fan assembly and routed out of the way:



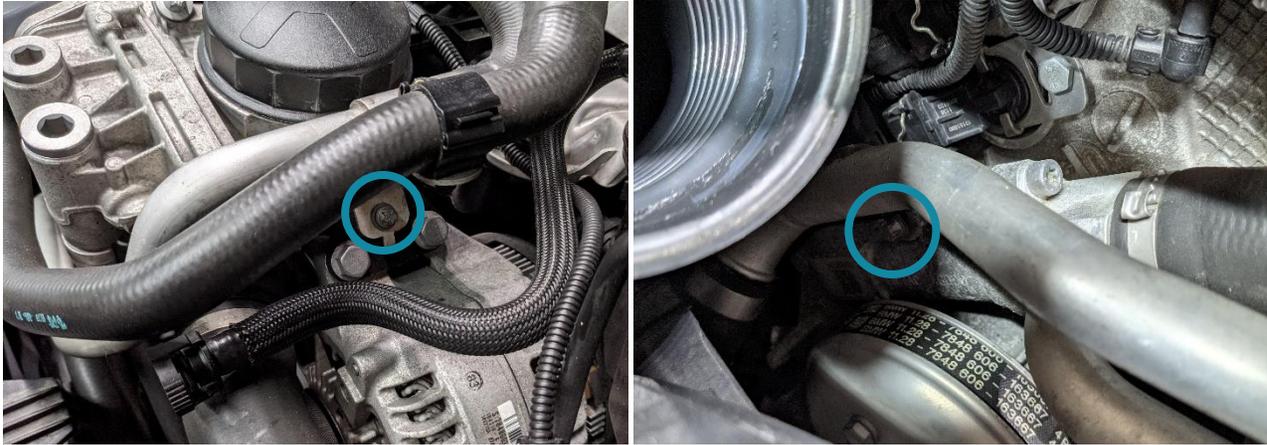
12. Now, moving up top, remove the hose clip from the fan assembly on the left side:



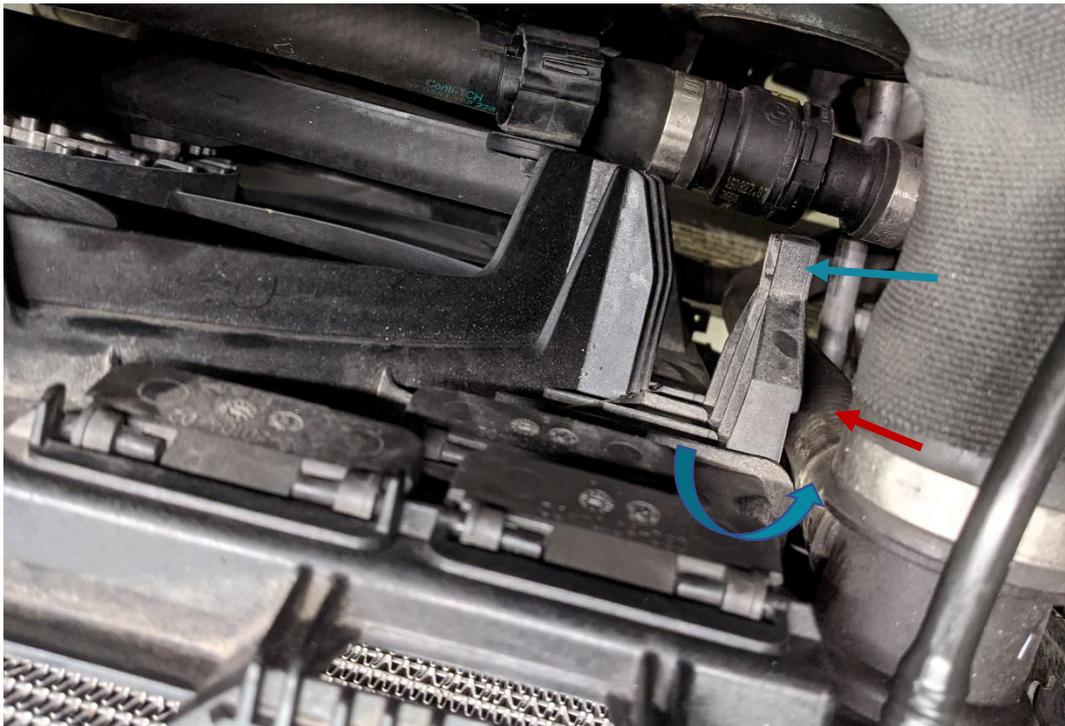
13. On the right side, remove the clip for the fan's electrical harness and then unplug the connector by squeezing the tabs on both sides:



14. Next, remove the two E10 bolts holding the intercooler coolant hose to the engine. This will allow for a bit more room when maneuvering the fan out of the car:



15. At this point the fan is free and the removal process can begin. To start, the fan needs to be lifted slightly out of its lower and side brackets and moved slightly to the left. This is to gain clearance for the pivoting mount:



The left side fan mount actually pivots 90 degrees once it's moved into a location to do so. It is somewhat difficult to move, but it "snaps" into a 90 degree position (pictured). You will need it in this clocked position and it needs to be inside the hose (red arrow) as pictured. This will allow for the removal of the fan through the bottom of the car.

16. The fan can now be removed through the bottom. Go very slowly and move aside hoses, etc. as necessary. Be very careful not to force anything and do not let the fan drag along the radiator and bend the fins. It's a tight fit, but it comes right out of the bottom with proper and careful maneuvering.
17. Next, remove the 10mm bolt and bracket holding the two oil cooler lines together:

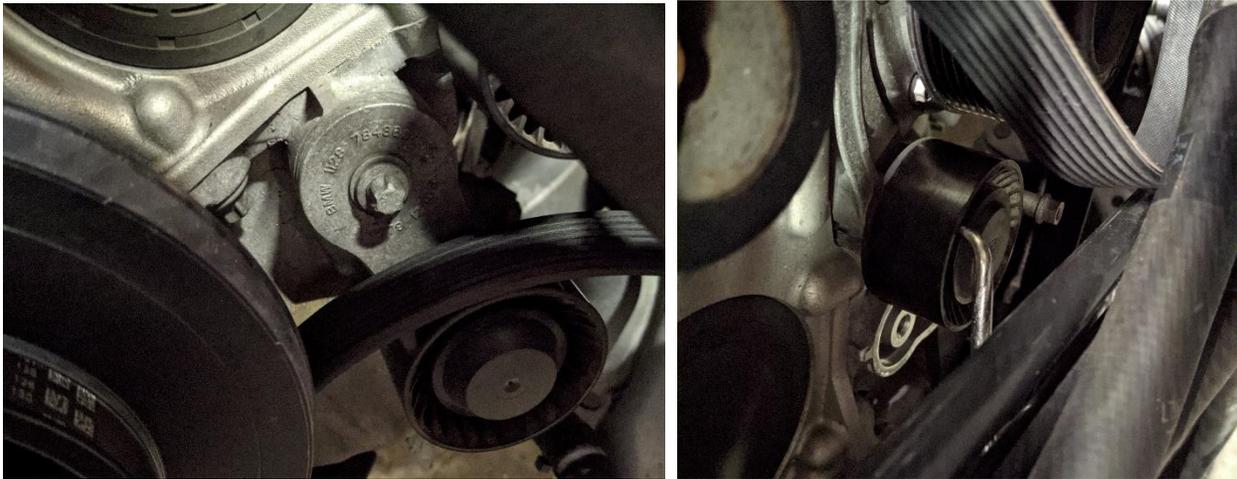


18. Using a T60 socket, rotate the serpentine belt tensioner clockwise and remove the belt from the AC and Alternator pulleys. Take note of the belt routing before removal.

With the belt and tension now released from the tensioner, remove the entire tensioner via the single E12 bolt.



19. Remove the two lower idler pulleys to make room for the sealing cap removal tool:



The first pulley (above left) can be removed via the single E12 bolt. The second pulley (above right) first needs the plastic cover popped off, and then the T50 bolt removed. You may need to rotate the oil cooler lines slightly to get access to the T50 bolt.

20. There is now sufficient clearance to use the sealing cap removal tool. For the removal of the sealing cap you will be using the rounded stud in the off-center threaded hole, along with the with the matching disc (off-center rounded indentation):



To fasten the tool to the engine, you will need the two thumb screw fasteners pictured above, right.

21. When inserting the tool, YOU MUST thread the center rounded stud far enough into the tool to be able to clear the crank pulley.

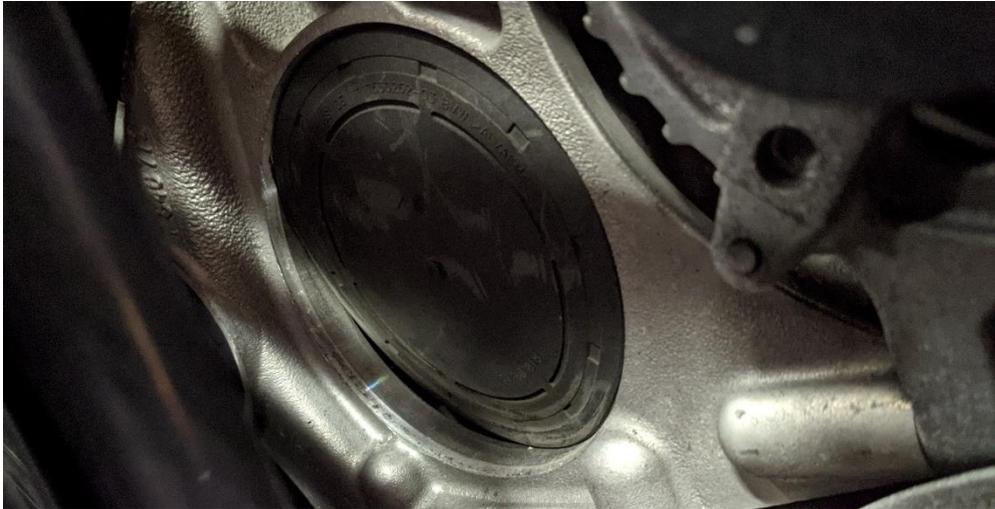
Start by threading in the top fastener (M10x78L) and then swing the tool down to line it up for the bottom threaded hole. If the center stud hits the crank pulley before you can swing the tool far enough for the bottom fastener, then you must thread the center stud in further. Once everything is lined up, and the threads are started for both the top and bottom thumb screw fasteners, slide the disc in behind the tool. The indentation should be lined up with the rounded center stud.

Now thread both thumb screws all the way in by hand. THE FASTENERS MUST BE BOTTOMED OUT TO PREVENT BLOCK DAMAGE. It should now look like this:



22. Now using a 17mm socket, slowly drive the rounded threaded stud into the plate. As you thread the stud in further, the plate should start angling out. It will need to go in quite far, to reach a sufficient angle to remove the seal.

WARNING: DO NOT thread the stud in all the way blindly. Your timing chain is behind the cover, and incorrect usage of this tool could potentially result in timing gear/chain damage. We recommend going slowly your first time and removing the tool to check progress. This is what it should start to look like:



The goal is to push the bottom of the seal in far enough so that the top edge pops out. This sometimes doesn't pop out easily and may require careful usage of hand tools such as hooks and SMALL rounded pry bars. Be extremely careful not to gouge the sealing surface or to push any tools too far into the timing assembly.



The above sealing cap was finished off with hand tools. By leveraging the bottom in further with the hook, the top edge of the seal became exposed. Once exposed, a long flathead screwdriver and hammer were use to tap downwards on the exposed edge of the seal. This allowed enough rotation to then get the hook in the top (pictured above). Once the top is out, the seal pulls right out.

23. With the sealing cap removed, you can now use the additional pieces of the specialty tool kit to lock the timing gear in place. The same M10x78L bolt will thread into the upper tensioner hole with spacers installed:

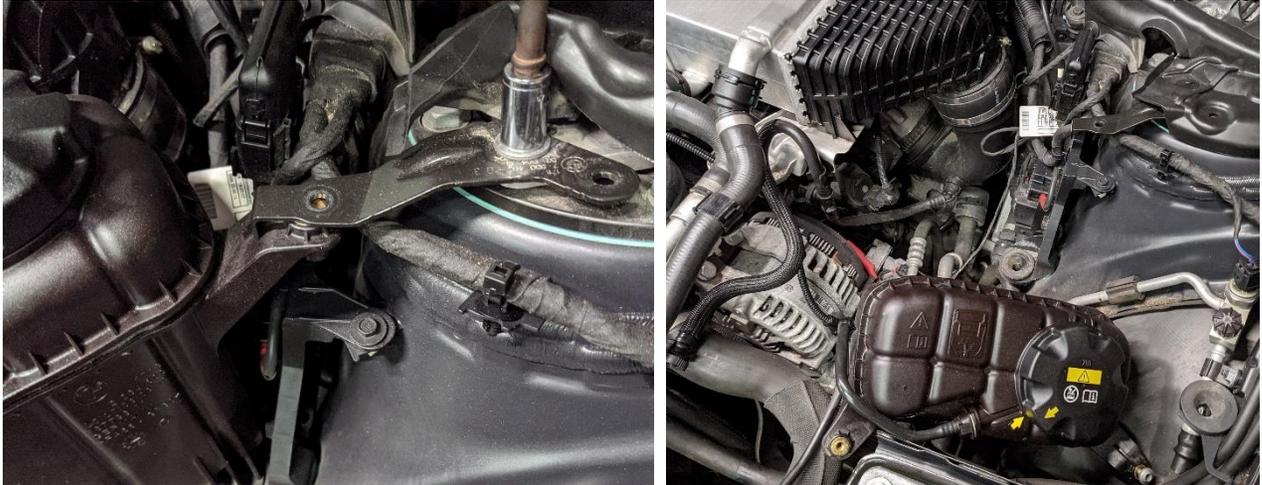


The timing gear can be locked in various positions, but the position pictured below is the most secure. You may need to rotate the engine to get in the proper location to lock the timing gear. To do this, rotate the engine clockwise using a 22mm socket on the crank pulley.

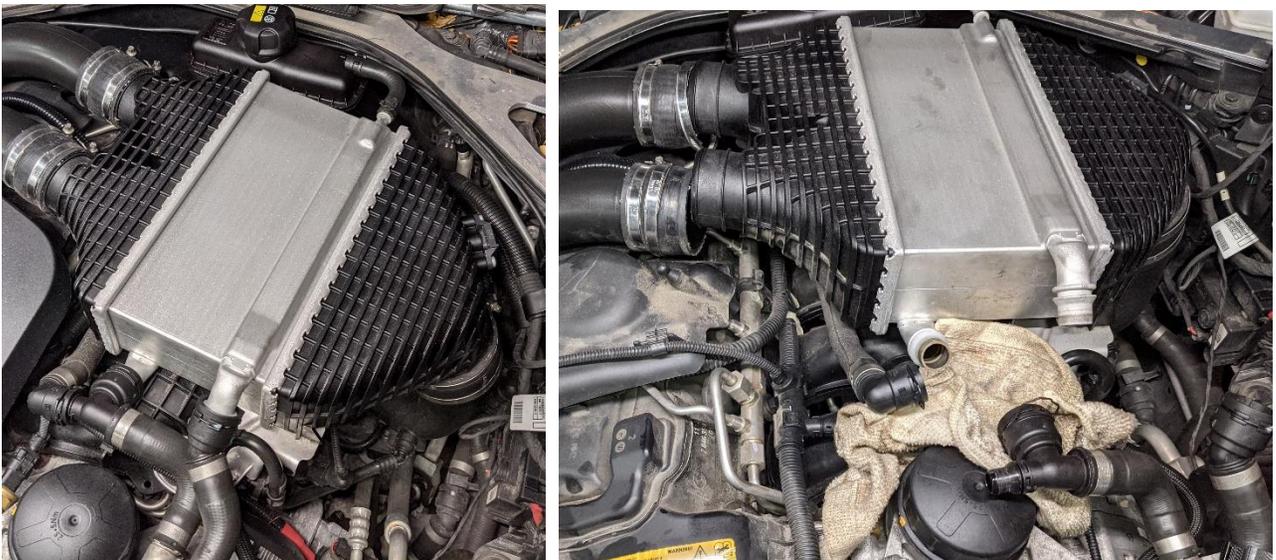


Once the tool is properly locked into the timing gear, use a T55 socket to crack loose the center bolt. Once it is cracked loose, do not remove the bolt. Instead, put it on finger tight and remove the locking tool.

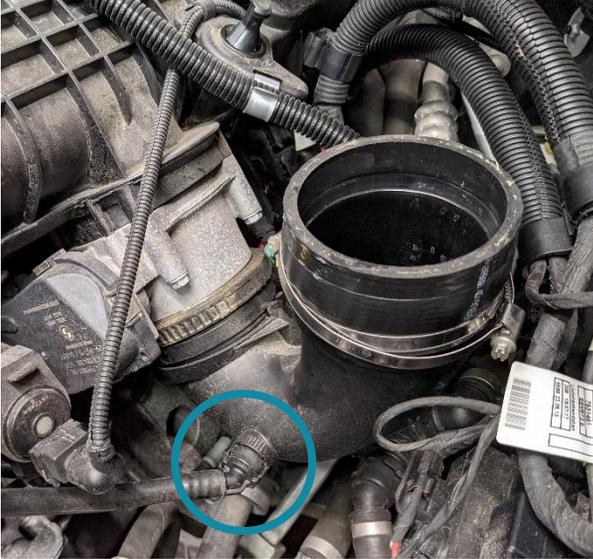
24. Next, move the coolant reservoir out of the way by removing the T25 bolt and loosening the 10mm bracket bolt:



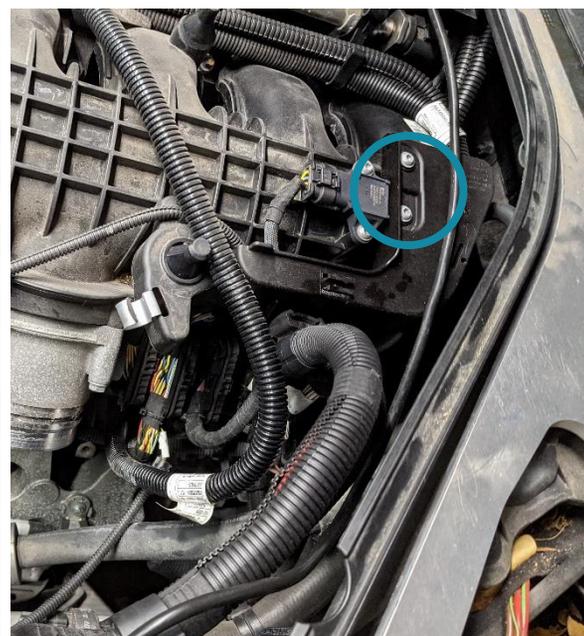
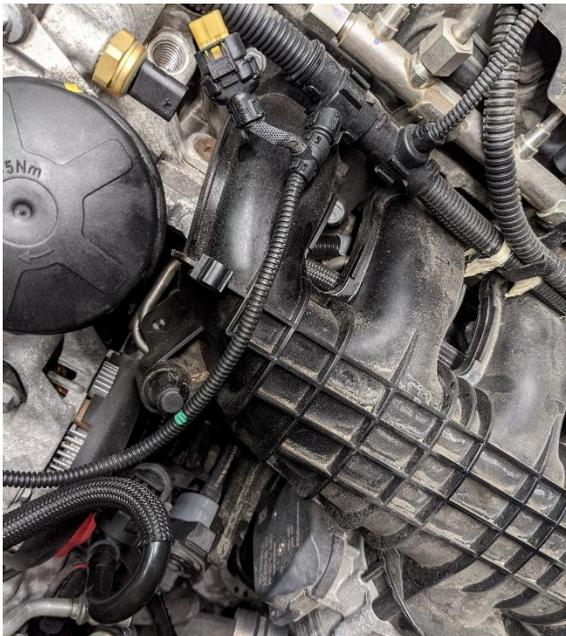
25. It's now time to remove the intercooler. The intercooler outlet clamp and both charge pipe clamps can be loosened using a 6mm nut driver. Next, unplug the map sensor and remove the coolant hoses as pictured below. You may want to place rags under the coolant hoses upon disconnecting for any residual fluid.



26. Next, remove the throttle body charge pipe. Unclip the vacuum hose and harness from the charge pipe and then pull out the white retaining clip. The charge pipe can now be removed.



27. Prepare to remove the intake manifold by removing all electrical connections, clips, etc. that will be in the way. This includes the oil pressure sensor plug, rail pressure sensor plug, MAP sensor plug, and rear manifold bracket (2x T25 bolts pictured below, right).

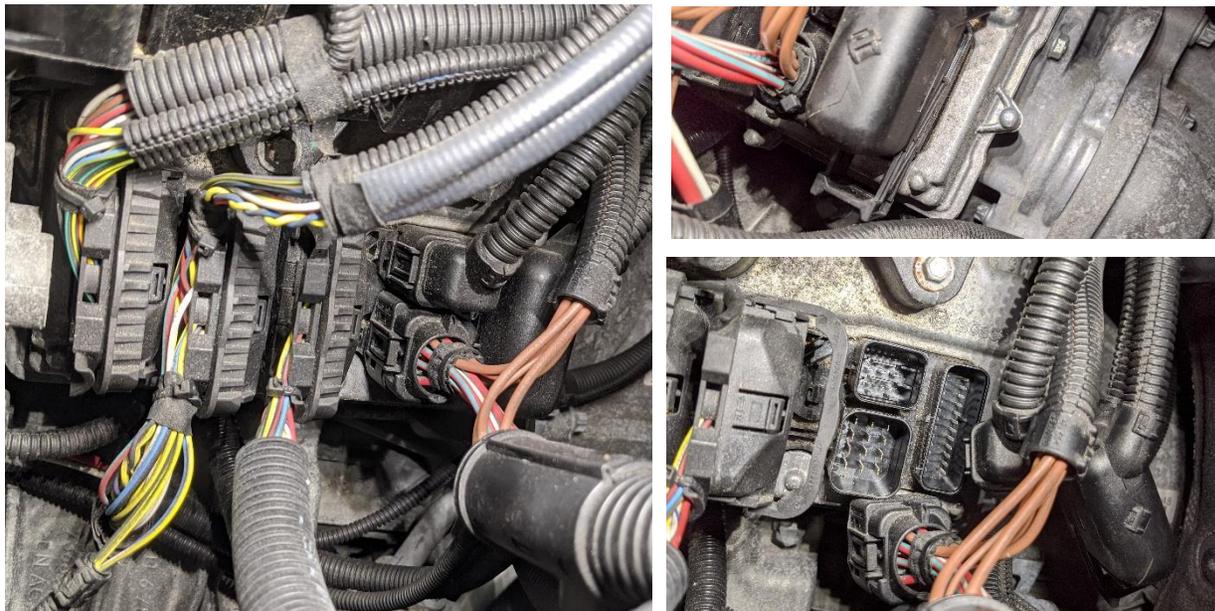


28. Loosen the 4x 10mm bolts holding on the throttle body. Disconnect the vacuum hose and electrical connection from the throttle body and remove it entirely.

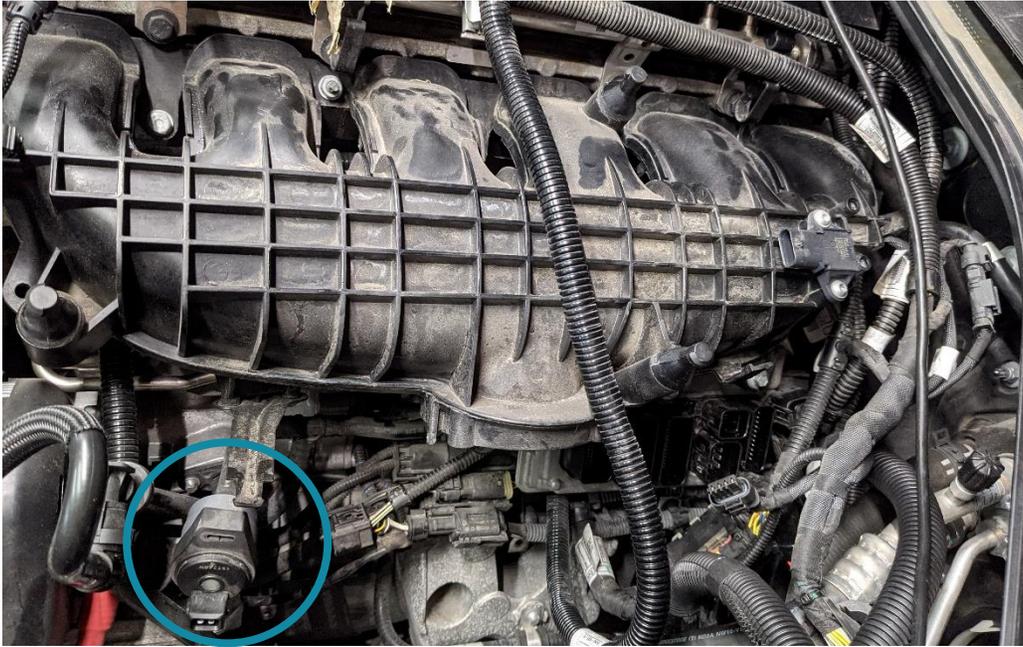


29. Next, the ECU connectors need to be removed.

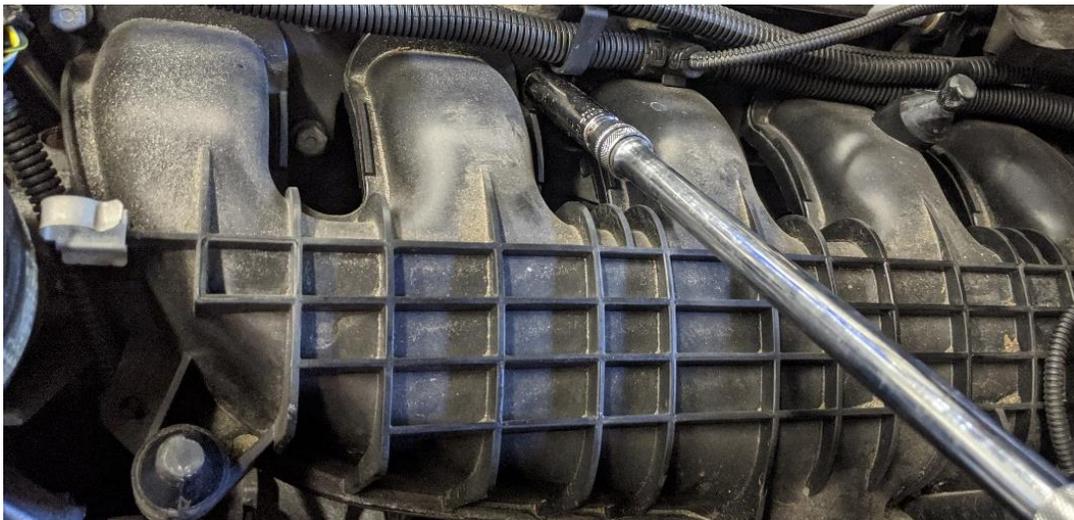
The rear most connector has a slide release which requires pulling down (top right photo below). With the rear connector removed, the two square connectors come right out by squeezing the tab on each side simultaneously. The next three connectors release by pushing down on the small release tab in the center and then rotating the gray collar towards the rear of the vehicle:



30. Be sure that the rubber solenoid clip is removed from the intake manifold's metal bracket, and release all the wiring looms that are tucked into the rear of the intake manifold.



31. Now remove the intake manifold by loosening the 2x 11mm bolts and 5x 11mm nuts. It requires some maneuvering, but it will come right out.



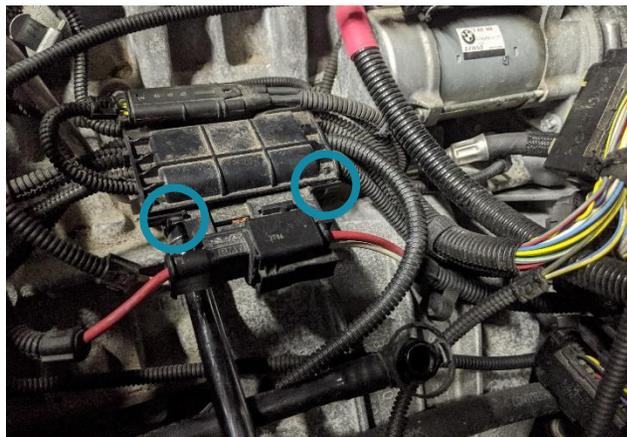
Disclaimer: The fuel system is now accessible for removal, but take **CAUTION** as it is under **EXTREME PRESSURE**! Safety glasses, a disconnected battery, and plenty of rags are highly recommended.

32. **READ THIS STEP THOROUGHLY** - For discharging a pressurized fuel system, we recommend placing Pigmat or an equally absorbent rag under both the inlet and outlet ports of the high pressure pump. Using a 17mm wrench, slowly crack the nut loose first on the outlets and then on the inlets. Leave both of these cracked enough to drain, but not enough to spray fuel.

Now let these drain for a couple minutes before removing any nuts completely (even if you think it's already drained).



33. Now loosen the low pressure hardline hold-down clamps. Remove the two 13mm bolts below the cable junction assembly:



The low pressure line (17mm nut side) can now be disconnected from the pumps and leaned over out of the way for vacuum pump removal. The high pressure lines can be removed entirely.

34. Next, remove the fuel pump electrical connectors. First, pull the gray tab out until it stops (pull up). Then squeeze the gray tab in towards the connector body while simultaneously pulling the entire connector away from the pump.



35. Now remove the 4x T30 bolts on the vacuum pump block bracket:



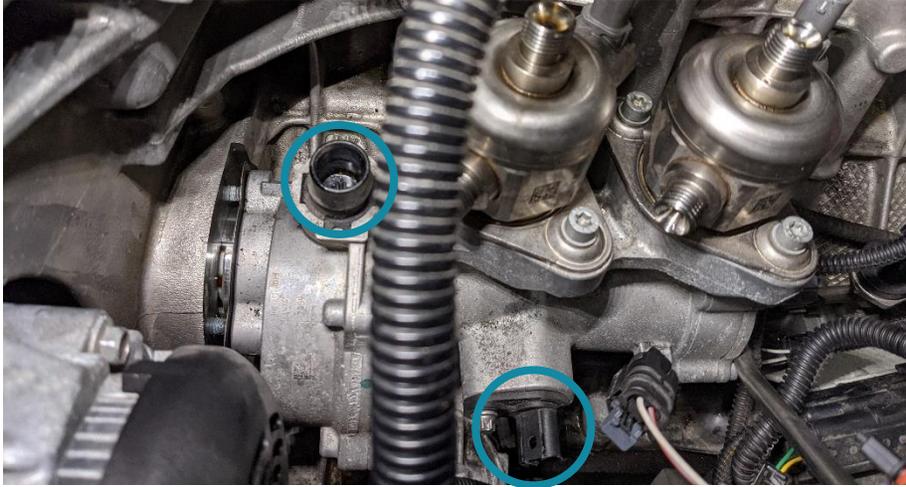
36. Once again, using a 22mm socket on the crank pulley, rotate the engine clockwise until the 3x T30 bolts behind the timing gear line up with the three circular holes. Once these are lined up, use a T30 socket to loosen these bolts all the way. Once loose, remove the center T55 bolt as well:



37. Now using a flat head screwdriver, very carefully depress the timing chain tensioner (pictured on the left below). Hold the screwdriver in place and then slide the timing gear off the tip of the Vacuum pump shaft. Once the gear is off the shaft, release the screwdriver and allow the gear to rest as pictured (right):

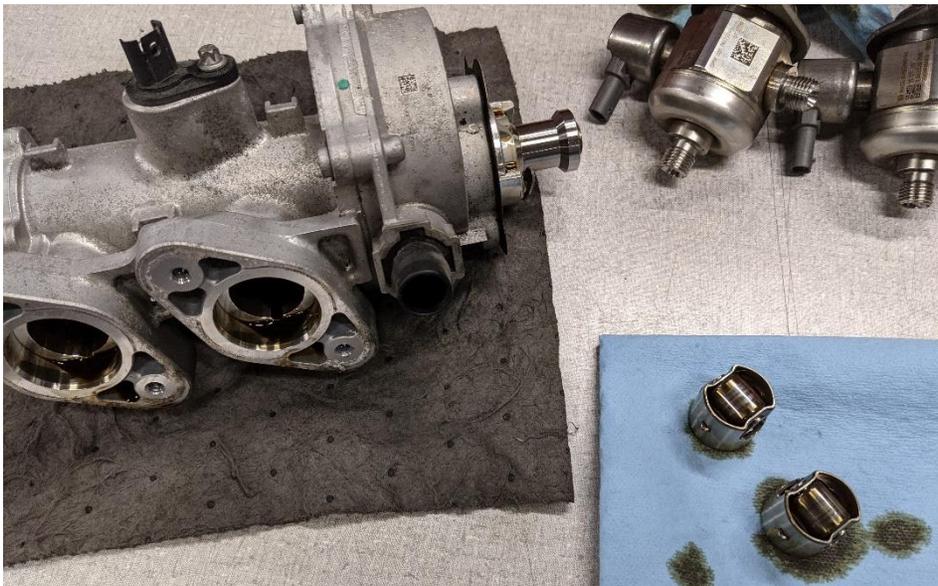


38. The vacuum pump assembly is nearly ready for removal. Make sure to disconnect the vacuum hose (squeeze the clip in on both sides while pulling up) and the HPFP cam sensor. The entire assembly can now slide out backwards for complete removal.



CAUTION: The vacuum pump assembly will be FULL of oil.

39. With the Vacuum pump now on a bench, remove the cam sensor (E8 bolt). Now remove the OEM high pressure pumps using a T30 socket. Use **CAUTION** when removing the pumps. The area must be VERY clean to avoid contaminating the pumps. You also must unthread each mounting bolt a little at a time to ensure the pump comes out STRAIGHT.



Once the pumps are removed, be sure to remove the cam followers (they just slide out vertically).

40. Now transfer the cam followers, cam sensor, and HPFPs on to the Dorch Engineering supplied vacuum pump assembly. Make sure the followers are oiled when they are dropped into the new assembly.

Use **CAUTION** when installing the pumps. The bolts **MUST BE TIGHTENED EVENLY**. Uneven loading of the spring can damage the pump. Also, be **EXTREMELY CLEAN** as all HPFPs are very sensitive to contaminants.

HPFP to Vacuum Pump Tightening Torque: 12nm

41. Once the vacuum pump assembly is ready for reinstallation, be sure to install the supplied gasket on the front of the assembly. Be sure to also clean up the gasket area on the engine block.



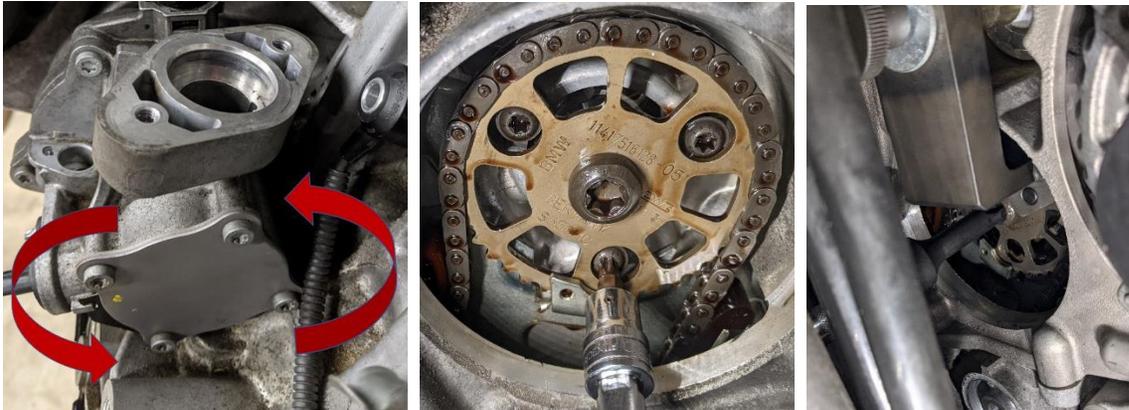
42. The Dorch Engineering vacuum pump assembly can now be installed in the block. Once it is seated in place, the timing gear needs to be placed back on the front of the shaft (reverse process of Step 37). This will require carefully using a screwdriver (again) to hold back the timing chain tensioner while the lining up the gear onto the front of the shaft.



43. Once the gear is back in place, hand-thread the T55 bolt to keep the gear in place. Be sure to clock the vacuum pump assembly outward within its bolt holes. This clocking reference is pictured below and it's important for maximum HPFP to block clearance.

Now tighten the 3x T30 bolts to secure the vacuum pump assembly. This may require realignment via turning the engine over (clockwise) via a 22mm socket on the crank bolt.

Vacuum Pump to Block Tightening Torque (T30 Bolts): 10nm

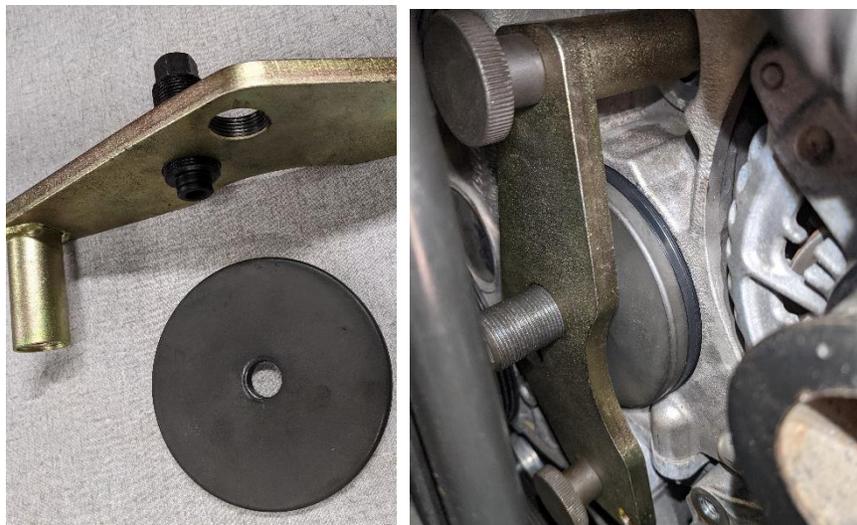


44. Now, reinstall the timing gear lock tool and tighten the center T55 bolt to the final torque.

Timing Gear to Vacuum Pump Tightening Torque (T55 Bolt): 66nm

45. Now install the supplied sealing cap using the sealing cap installation tool. This time you will be using the other shape threaded stud in the centered hole (pictured below left) and also the other disc (with the centered hole).

Install the tool with the thumb screws in the same fashion as step 21. Except this time, fit the threaded stud into the corresponding hole in the center of the disc. As you tighten the threaded stud (17mm socket), the stud will be locked into the disc and it will push the sealing cap in perfectly straight. Tighten it slowly until the sealing cap is installed flush and then remove the tool. **MAKE SURE THE THUMB SCREWS ARE BOTTOMED OUT BEFORE PRESSING IN THE NEW SEAL!**



46. Everything will now install very straight-forward in reverse order. Please take note of the following **TORQUE SPECIFICATIONS** for reassembly:

- Belt Tensioner to Block (Long E12 Bolt) **Tightening Torque: 38nm**
- Idler Pulley to Block (T50 Bolt) **Tightening Torque: 56nm**
- Lower Idler Pulley Bracket to Oil Sump (Short E12 Bolt) **Tightening Torque: 38nm**
- Intake Manifold to Cylinder Head **Tightening Torque: 15nm**
- Throttle Body to Intake Manifold **Tightening Torque: 7nm**
- Carbon Strut Brace (13mm bolts) **Tightening Torque: 28nm**

Once everything is complete and bolted back in place, re-connect the battery ground terminal. Now turn the car's ignition on to be sure the low pressure pump has fully primed, and check for leaks at every fuel connection.

47. If there are no leaks, then you can proceed with refilling the intercooler coolant reservoir. Fill it all the way to the top and then begin the BMW self-bleed procedure:

Note: It's recommended to use a battery charger for this procedure.

- Turn the ignition on (but NOT the engine)
- Put the car in Sport Mode
- Switch on low-beam headlights
- Set the heat to the maximum temperature and the lowest fan setting
- Floor the accelerator pedal for a FULL 15 seconds

BE PATIENT, the bleeding procedure will now begin and it will last about 10-12 minutes total, but you may not hear anything for the first couple of minutes. Once the procedure is complete, check the coolant level. If it's low, top it off and complete the cycle again. You will most likely need to repeat this cycle 2-3 times before the system is properly bled and full of coolant.

48. You are now free to start up the car and once again, double check all fuel junctions for leaks with a flashlight while the car is running. Also, double check for coolant leaks at any of the junctions that were disconnected during this installation. If all is well, it's time to enjoy your new found fueling capacity!

NOTE: We highly recommend custom tuning to be sure that your new high-capacity fuel system is dialed in and hitting the commanded rail pressures efficiently and properly. If you are using BM3 or MHD, simply check the flashing options and configurations for the "Dorch S55 Lift Kit" and you'll be on your way. For any other software, simply contact our tuning department at: tuning@dorchengineering.com

For any other installation related questions please contact our support team at: info@dorchengineering.com