



Air Oil Separator for 2022 WRX

2023-03-09

PSP-ENG-611

Thank you for purchasing this PERRIN product for your car! Installation of this product should only be performed by persons experienced with installation of aftermarket performance parts and proper operation of high performance vehicles. If vehicle needs to be raised off the ground for installation, the installer must use proper jacks, jack-stands and/or a professional vehicle hoist for safety of the installer and to protect property. If the vehicle is lifted improperly, serious injury or death may occur! Please read through all instructions before performing any portion of installation. Always use appropriate personal protection equipment such as gloves, eye and hearing protection for installation of this product. If you have any questions, please contact our tech department prior to starting installation. We can be reached in any of the following methods:

Email Tech@PERRIN.com

Instant Chat off the main page of www.PERRIN.com

Or simply call our tech team at 503-693-1702



WARNING: This product can expose you to chemicals including Lead which is known to the State of California to cause cancer birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

GENERAL MODIFICATION NOTE

Modifications to any vehicle can change the handling and performance. As with any vehicle extreme care must be used to prevent loss of control or roll-over during sharp turns or abrupt maneuvers. Always wear seat belts, and drive safely, recognizing that reduced speeds and specialized driving techniques may be required. Failure to drive a vehicle safely may result in serious injury or death. Do not drive a vehicle unless you are familiar with its unique handling characteristics and are confident of your ability to maintain control under all driving conditions. Some modifications (and combinations of modifications) are not recommended and may not be permitted in your state or country. Consult the owner's manual, service manual, instructions accompanying these products, and local laws before purchasing and installing these modifications. You are responsible for the legality and safety of the vehicle you modify using these components.

SPECIAL NOTES:

- The included foam filter/diffuser is not recommended to be used in climates that drop below freezing temps. Normal water vapor that travels through the engine can collect on this and freeze, causing a restriction in flow through the AOS. The AOS will function perfectly fine with this piece removed. This diffuser is recommended for race cars that can see excessive blow by as this helps diffuse any massive amounts of oil that could reach the AOS.
- The PERRIN Air Oil Separator (AOS) was designed to remove a significant amount of the oil and water vapor that normally gets sent to your intake system to be ingested by your engine. There are many variables as to how much oil will make it past our AOS but expect it to remove a significant amount of the crank case blow by. For cars with built engines with excessive blow-by, or have an aftermarket turbo, you may still experience oil getting past our Air Oil Separator.
- When installing hoses to barb fittings, a small amount of oil on each fitting will allow hoses to slide on easier.

NPT Notes:

- There are NPT (National Pipe Thread) fittings included with your Air Oil Separator. Throughout the instructions, these notes below will be referred to often. It's important to understand these types of fittings and how they work.
- NPT fittings are a tapered thread that seals when tightened, not bottomed out. Thread fittings in by hand and tighten roughly 1/2 to 1 full turn more until fitting is tight.
NOTE: Use a small amount of Teflon tape or proper thread sealant on threads of each NPT fitting before installing into each part.
- Angle of the 90-degree fitting can be adjusted after tightening, as long as it is not backed off more than 1/4 of a turn. When in doubt, tighten the fitting versus loosen it.

Included Parts with PERRIN Air Oil Separator:

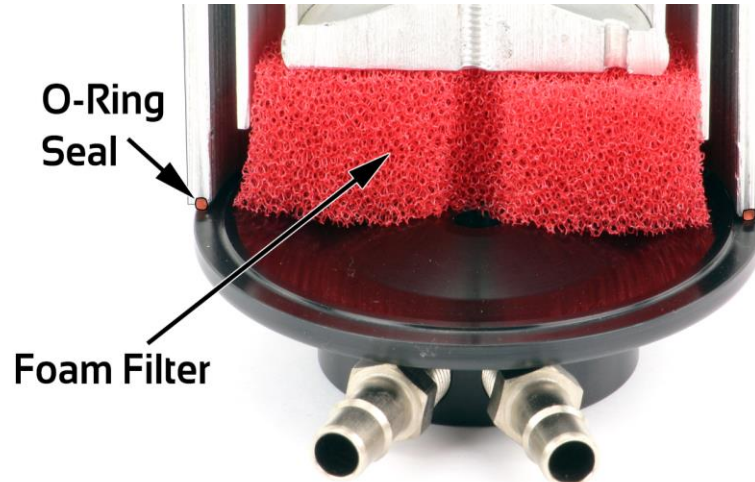
QTY	Part Number	Description
1	ASM-ENG-605RD	Air Oil Separator Universal w/7 Ports Red
1	PSP-ENG-630	Turbo Sump Restrictor for 2018-2022 WRX
8	X-HOS-115	5/16" Heater/Coolant Hose
7	X-HOS-120	1/2" Emissions/Crank Case Vent Hose
2	X-HOS-104	1/4" ID Fuel Hose
1	X-PSP-ENG-611-5BK	Crankcase Vent Fitting for 22 WRX Raw Black
1	X-BLT-1105SSC-SS	8-32 x 1/4 Socket Set Screw Cup Point Stainless Steel
1	X-BLT-0078KHS	5/64 Hex Key
2	X-CON-056BK	Aluminum 3/8NPT -1/2" Hose Barb 90 Degree Black
1	X-CON-058BK	Aluminum 3/8NPT -1/2" Hose Barb Straight Black
1	X-CON-054	Nickel 1/4" Barb to 1/4-28 Thread
1	X-CON-053	1/2" Barb to 3/8NPT Female
2	X-CON-043	Nickel 5/16" Barb 1/8NPT, Straight
1	X-CON-044	Nickel 5/16" Barb 1/8NPT, 90 Degree
1	X-CON-039	Plastic 5/16"- 5/16" Straight
1	X-CON-038	Plastic 1/2" Y Connector
1	X-BLT-00375PPS	3/8NPT Socket Plug Steel
2	X-BLT-M8X10CSB-SS	M8 X 10 Button Head SS Screw
2	X-CLAMP-020	Clamp Size 20 or 23-35mm
8	X-CLAMP-006	Clamp Size 6 or 12-22mm
5	X-CLAMP-002	Clamp Size 2 or 8-16mm
3	X-CLAMP-17.0	Clamp Oetiker 17.0
10	X-BLT-CT080B-18	Zip Tie 8" Long

WHICH WAY IS THE RIGHT WAY?

In ALL situations, when describing left and right sides of the vehicle it is always as though you are sitting in the driver's seat looking forward.
Example of a US Market Vehicle: If standing in front of the car, looking at the engine bay, the Drivers side is described as the LEFT side the vehicle.

1. Assembly of Air Oil Separator (AOS)

- Each AOS is pre-assembled with M6 bolt, nylon seal, O-ring, and foam filter inside for packaging purposes. To ensure your AOS has an oil tight seal, ensure that bolt is hand tightened before finishing installation. Failure to tighten M6 bolt will lead to vacuum leaks and oil leaking out bottom of can.
- See above note regarding the use of the foam filter/diffuser in your AOS, to determine if you should remove it. In most cases it should be removed due to the potential for freezing conditions.



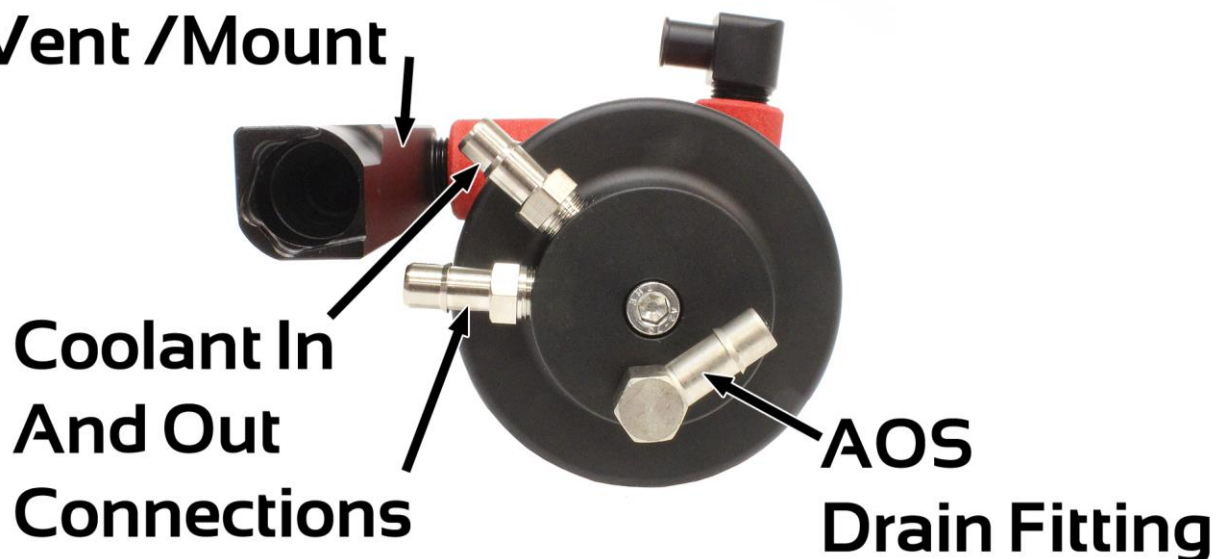
Cutaway Showing Internals of AOS

- Removal of bottom will be necessary to accurately tighten fittings. IF this is done, or bolt is loosened too far, the O-ring may become dislodged from the groove in the AOS body. Before tightening bottom, ensure that the O-ring is sitting equally around groove in bottom of AOS body. **NOTE: Some powder coating will be in the groove, and this is ok as the O-ring will seal once tightened.**
- Orientate bottom to desired position (based on steps below) and hand tighten bolt. Double check that bottom fits evenly all the way around the bottom of the body. **NOTE: A slight mismatch can occur if bottom is pushed to one side or to the other. Make sure bottom is relatively centered over body while tightening, or an oil leak can occur.**
- These above steps may need to be done a couple times throughout the installation.

2. Orientation of Fittings on AOS Bottom and Body

- Using diagram below and NPT fitting notes above, install (2) 5/16" Straight NPT fittings into side ports on bottom. **NOTE: Removal of bottom is recommended to tighten fittings properly in a vise.**
- Using diagram below and NPT fitting notes above, install 5/16" 90-degree fitting into bottom. It is important to make sure that the fitting is oriented similarly as shown when fitting is tight. If fitting is tight and doesn't line up properly, unscrew fitting half a turn and re-tighten until it lines up. This may take a couple of times until fitting lines up and is tight enough to seal. **NOTE: The orientation of fitting may need to be adjusted after AOS is mounted to chassis. The diagram provided should get you very close to the correct alignment.**

Front Crank Case Vent /Mount

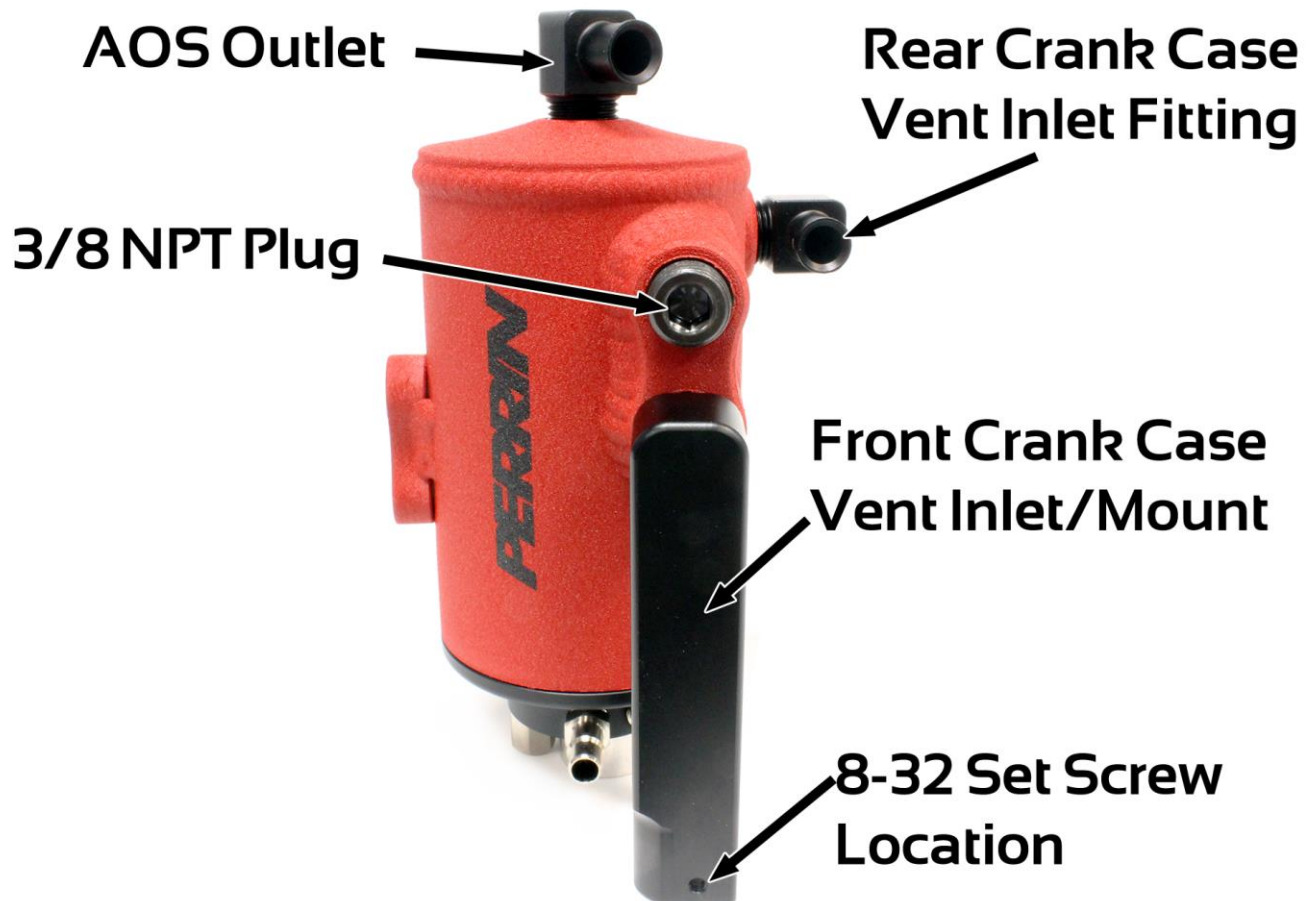


- c. The rotation of the bottom must be as shown for coolant feed hoses (installed in future steps) to route smoothly around crank case fitting. This can always be adjusted later on.
- d. Using diagram below and NPT notes above, install (1) 1/2" 90-degree fitting (marked 056) into port on top of AOS, making sure that when fitting is tight, that it aims as shown in picture.

**Top 1/2" 90 Degree
Fitting Aimed Roughly
In This Direction**



- e. Using diagram above and below and NPT notes above, install (1) 1/2" 90-degree fitting (marked 056) into single side port on AOS, making sure that when fitting is tight, that it is aligned parallel to the ground.
- f. Using diagram below and NPT notes above, install (1) 3/8NPT plug into the top port on the dual port side on AOS.



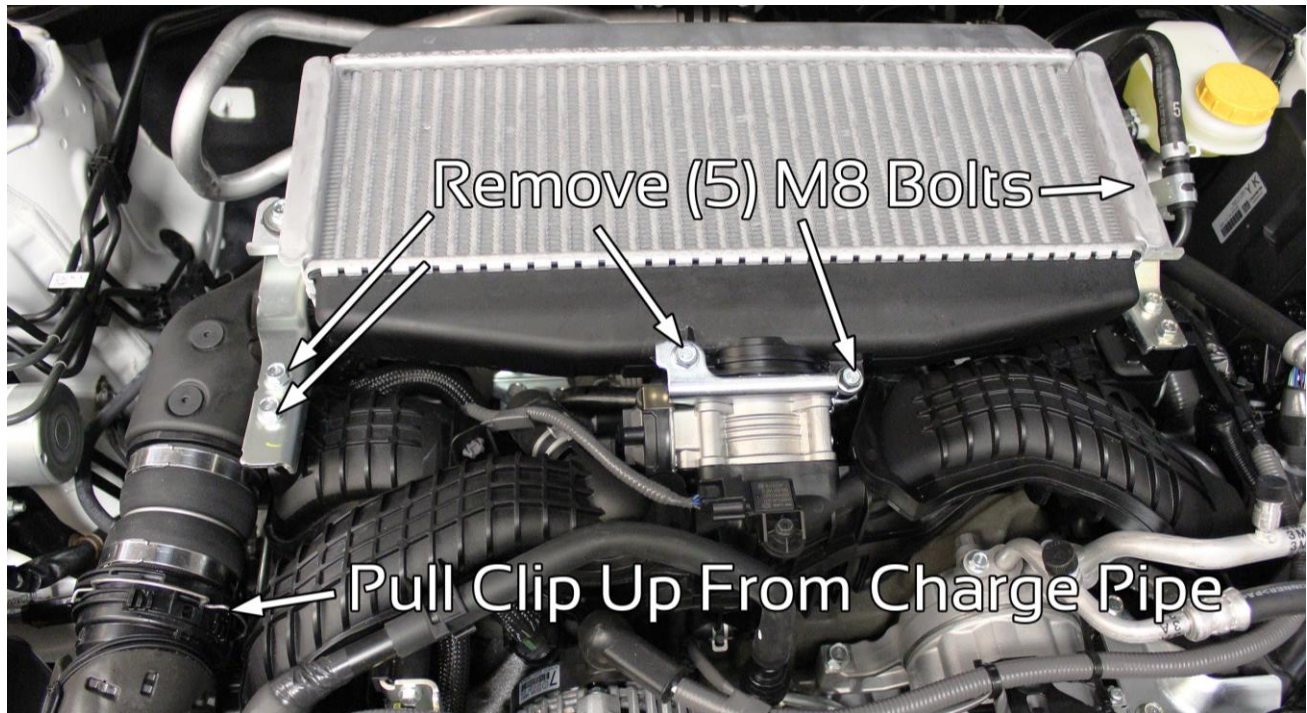
3. AOS Drain Fitting/ Turbo Sump Restrictor Installation

- a. Included with this kit is a PSP-ENG-630 Turbo Sump Restrictor. Take part out of box and replace the small plug with the supplied 1/4" barb fitting. Make sure that the gasket is installed into fitting before it is tightened down.
- b. Continue to follow the instructions that come with the Turbo Sump Restrictor.



4. Removing of OEM Parts (Intercooler, Charge Pipe, Alternator and PCV)

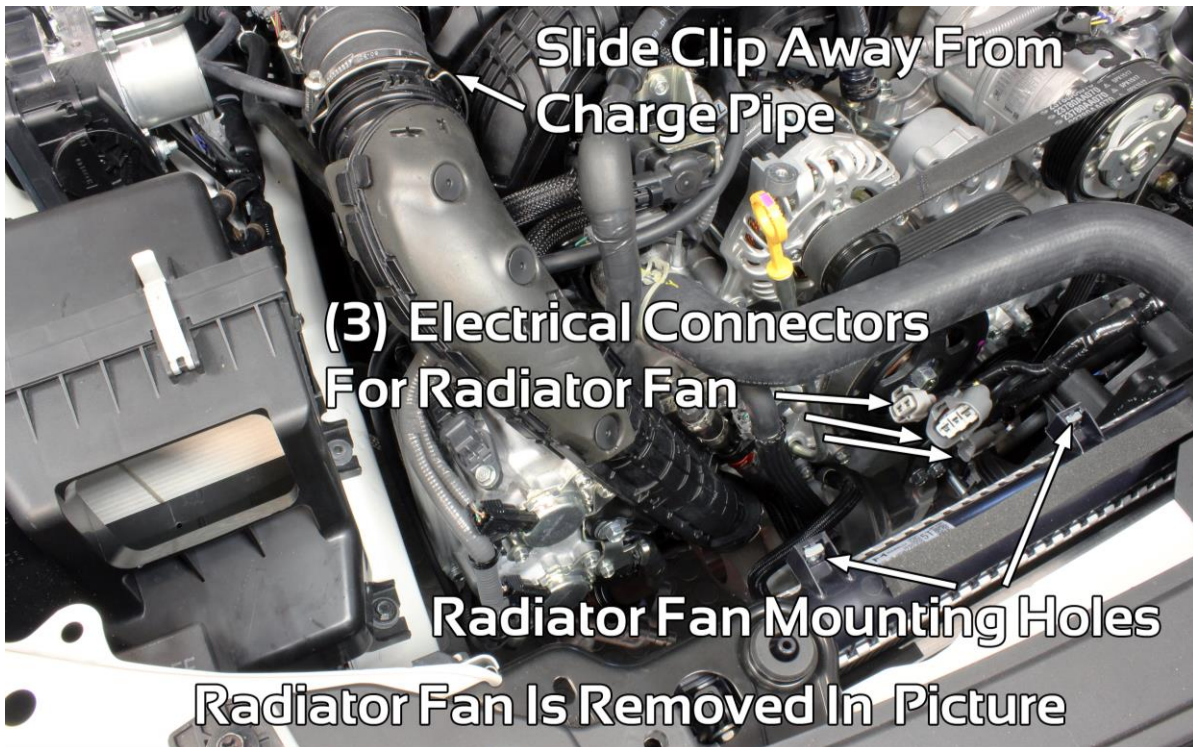
- a. Disconnect negative battery terminal and move away from battery so it can't accidentally touch during the installation. Then make sure engine has cooled off or been sitting for at least 1 hour.
- b. Locate and remove (5) M8 bolts as shown in picture above, then locate large stainless-steel clip, located on charge pipe and lift up until both sides latch onto the catch on the side of the charge pipe. **NOTE: The bottom side is hard to see but also needs to be lifted into the catch to allow charge pipe to be free.**



Pull Clip Up Until It Latches On Both Sides



- c. Remove intercooler from engine bay.
- d. Remove (2) fasteners holding fresh air intake scoop to car and remove scoop from car.
- e. Locate and remove (3) electrical connections from right side radiator fan. **NOTE: Using a small flat head screwdriver or similar tool can aid in pushing the small buttons down to free connections.**
- f. Locate and remove (2) bolts securing right side radiator fan to radiator. Carefully remove fan from engine bay, taking extreme caution to NOT drag the fan across the radiator as it is pulled out.



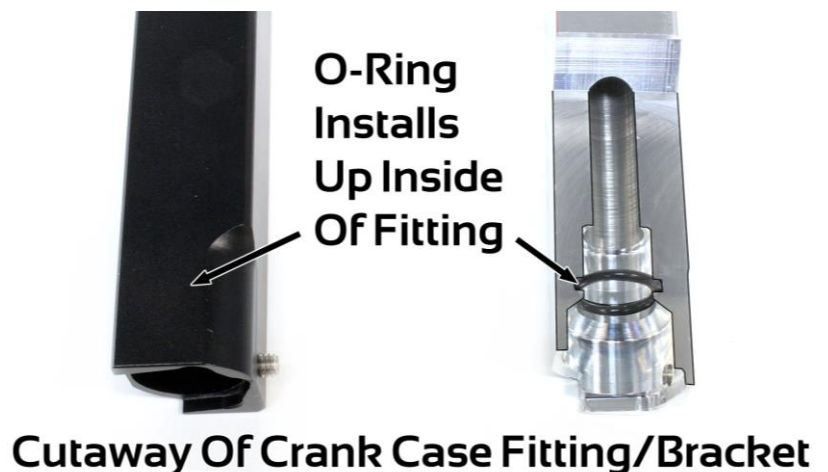
- g. Locate and remove (1) M8 bolt securing OEM charge pipe to front of engine.



- h. Locate lower stainless steel quick release clip securing charge pipe to turbo. Using a flat head screwdriver pry clip away from charge pipe while slightly pulling up and wiggling charge pipe. This should free charge pipe from turbo and allow you to remove it from the engine bay. **NOTE: This step can be tricky due to the available tools you have and the tight clearances. It may require prying the clip in a couple of different locations while pulling up.**
- i. Locate and remove M6 bolt securing belt cover to engine, then remove belt cover (this will be re-installed later).
- j. Locate OEM front crank case vent pipe directly behind automatic belt tensioner.
- k. There are two methods to remove this fitting, both methods will expose a small stainless-steel clip that needs to be removed to remove the remaining plastic from crank case pipe.
 - i. Using a flat head screwdriver or chisel, and hammer lower section to break lower half of fitting off as shown below.
 - ii. If you have large enough pliers (channel-lock types), grab around lower section and squeeze plastic in a few locations until a cracking noise is heard. The fitting should lift off just as shown in picture below.

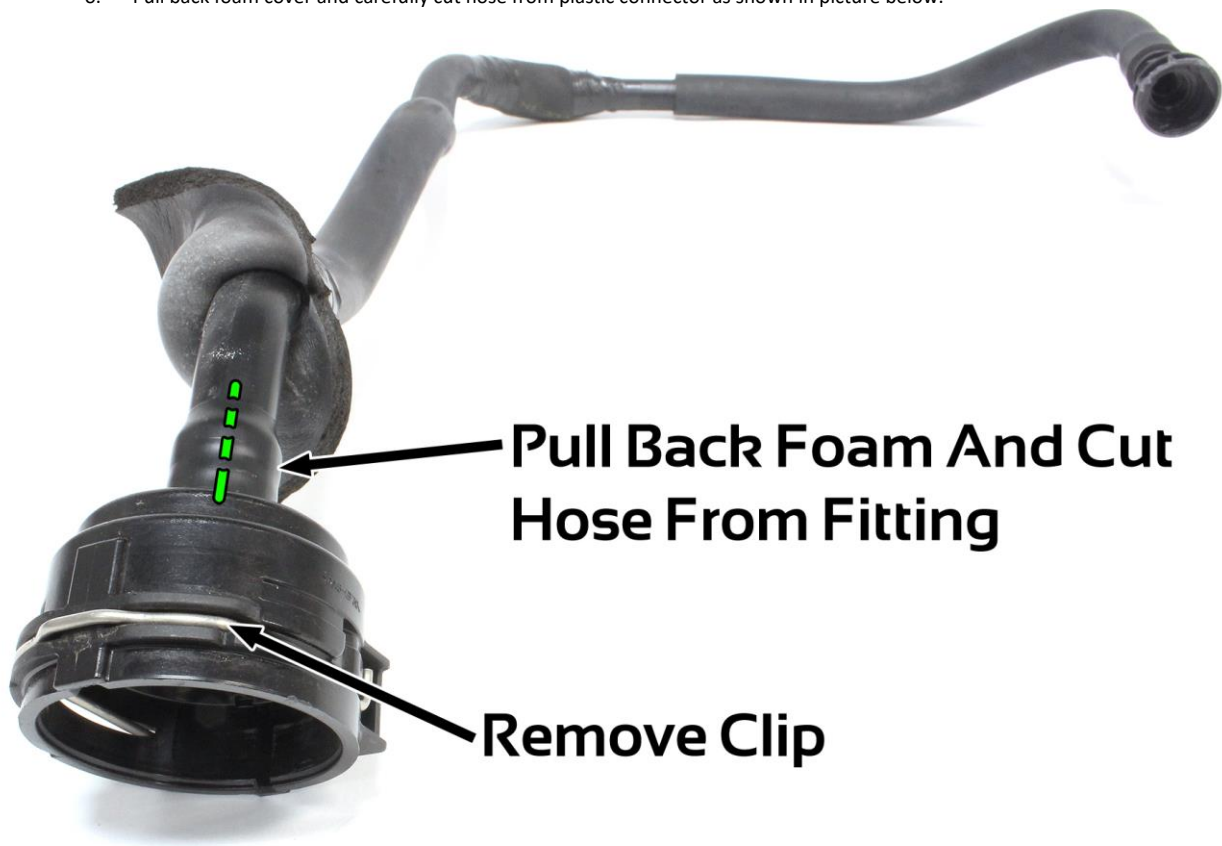


- l. Locate and remove O-ring found either on crank case pipe or up inside of plastic fitting that was just removed.
- m. Place O-ring inside of PERRIN crank case fitting/bracket (long black fitting screwed into PERRIN AOS), making sure to place this into the groove as shown below.

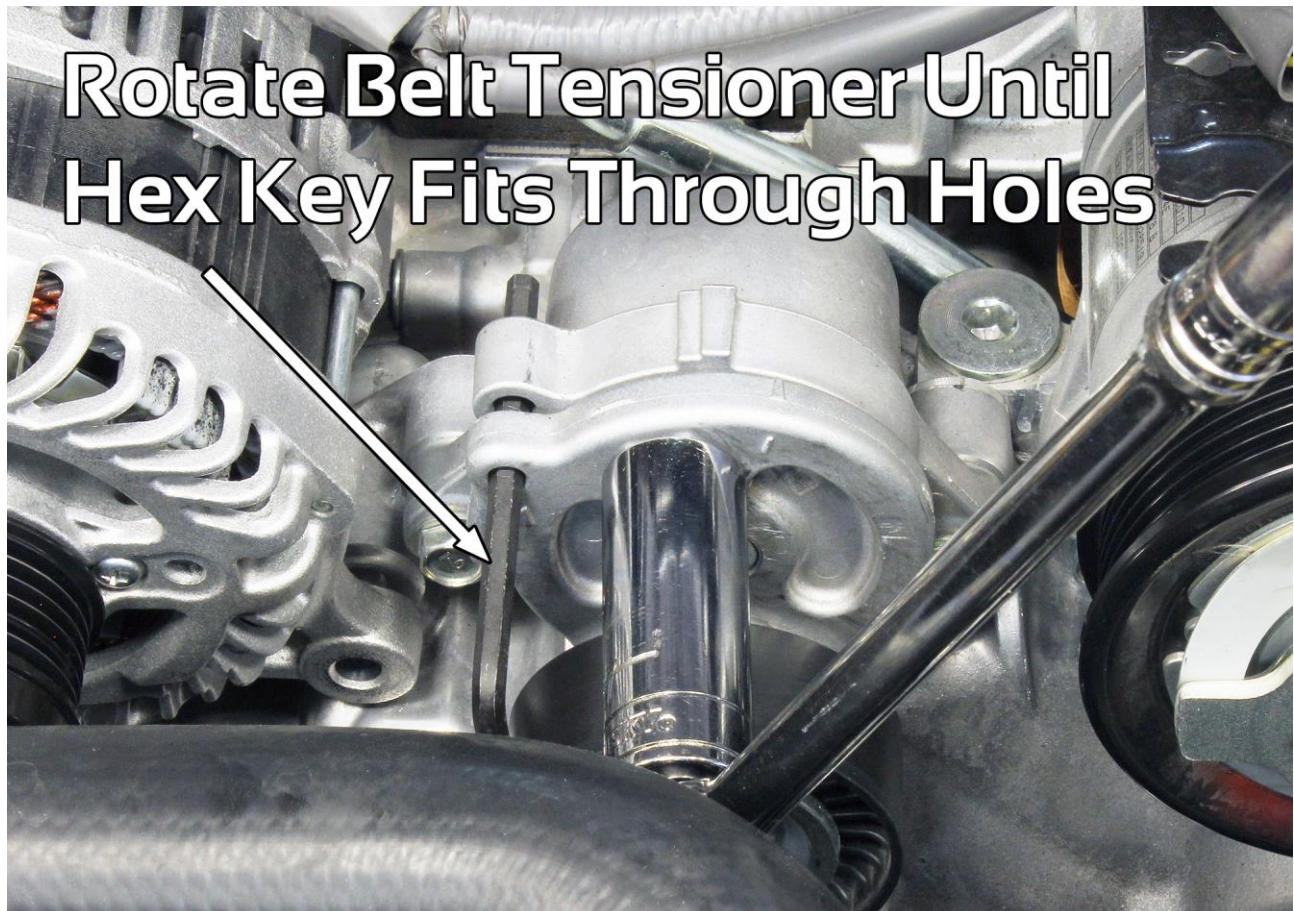


- n. Follow front crank case hose down to intake system and remove clip from plastic connector. Pull hose (shown in picture below) with fitting up and remove from intake system and engine bay.

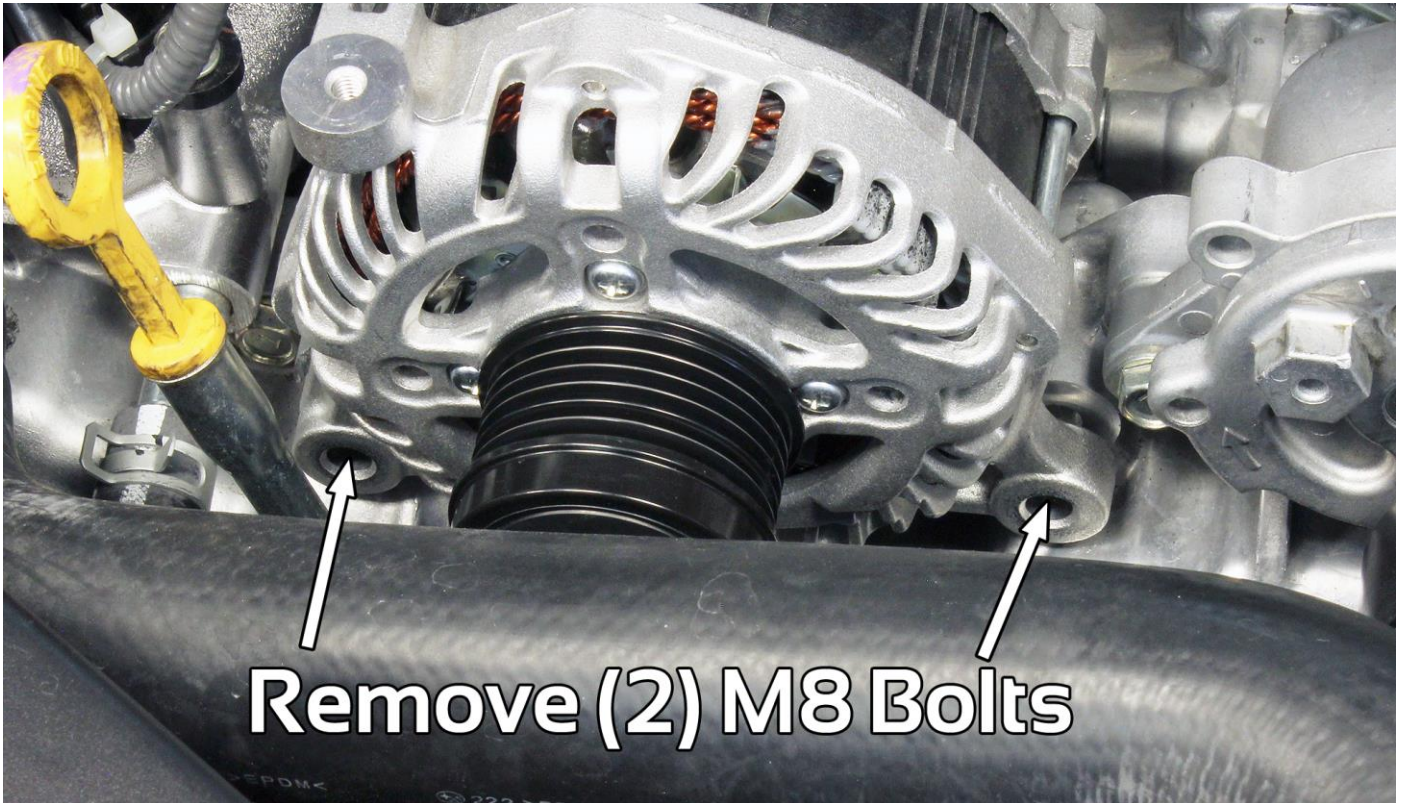
- o. Pull back foam cover and carefully cut hose from plastic connector as shown in picture below.



- p. Cut roughly 24" of the supplied 1/2" emissions hose and connect it to the fitting above. This connection does NOT require a hose clamp.
q. Reinstall stainless steel clip that was removed and then reinstall plastic fitting back onto intake, making sure you hear the click when it is fully seated onto the intake pipe.
r. Using supplied M6 hex wrench and 19mm socket, pull automatic belt tensioner until holes line up where M6 wrench can be installed.



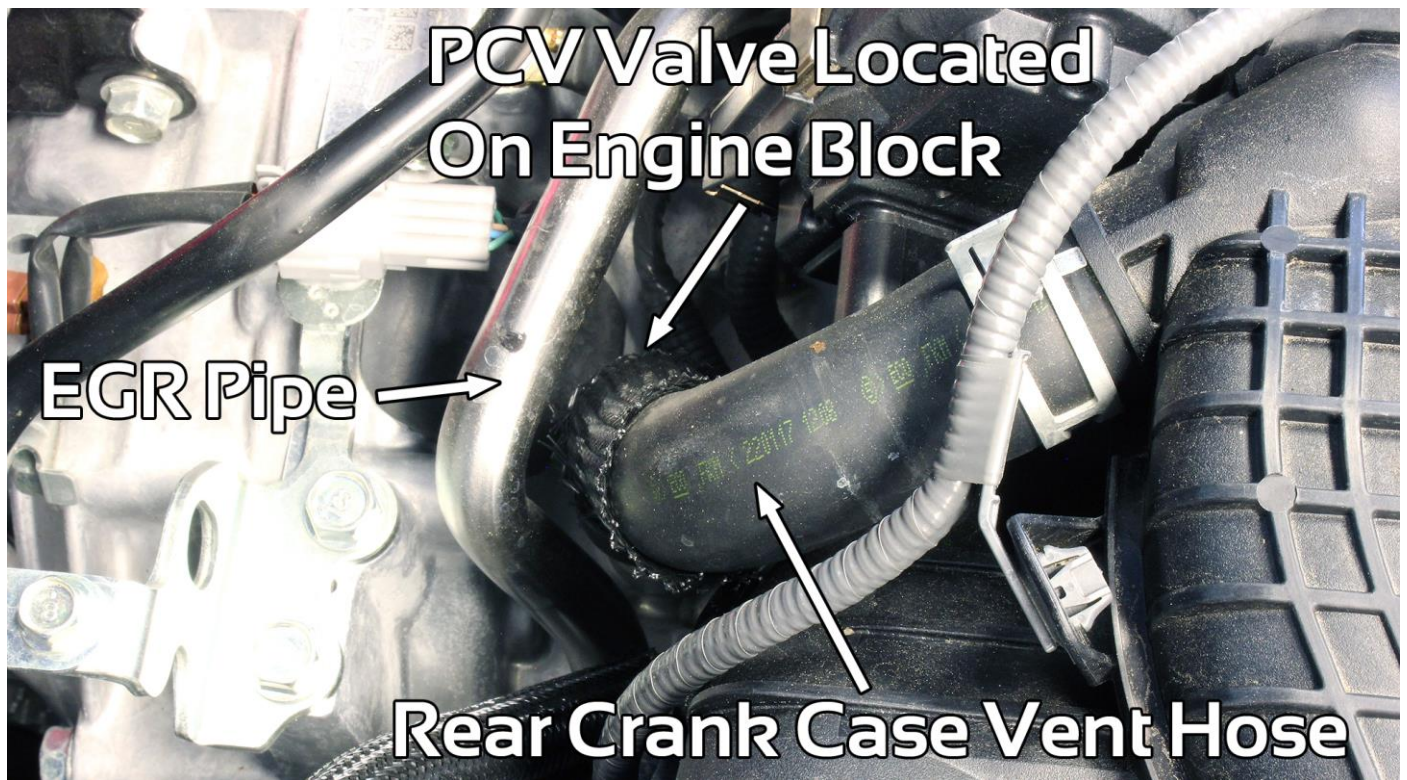
- s. Remove serpentine belt from alternator and set off to side toward the battery (it does not need to be completely removed).
- t. Locate and remove (2) M8 bolts securing alternator to engine.



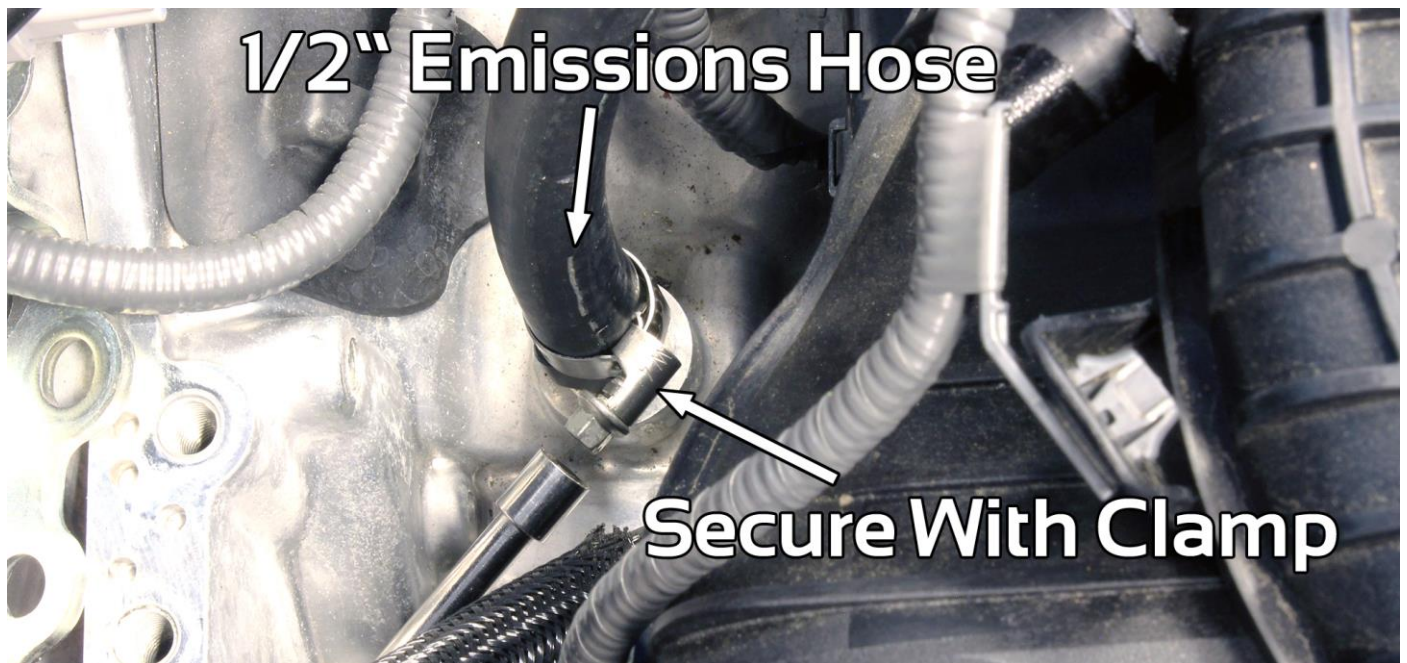
- u. Wiggle alternator front to back a few times to loosen it from engine and then slide up and out of the way. Set alternator next to AC compressor for now (electrical connections do not need to be removed but can be).

5. PCV Valve Relocate And Crank Case Fitting Installation

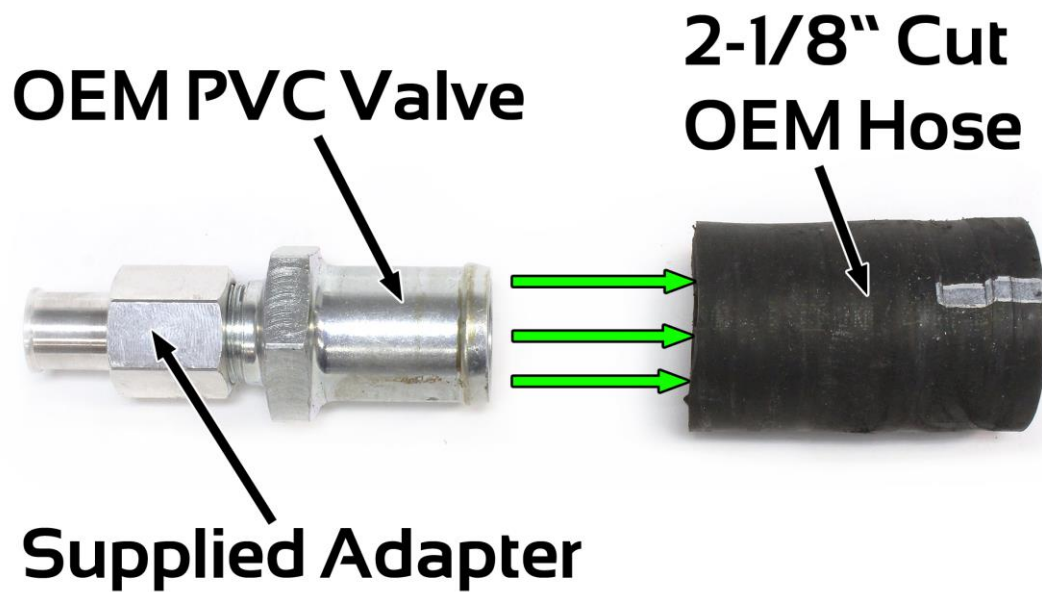
- a. Locate rear crank case vent hose coming off back of intake manifold and follow this down to PCV valve.
- b. Pinch both clamps and remove hose from both intake manifold and PCV valve.



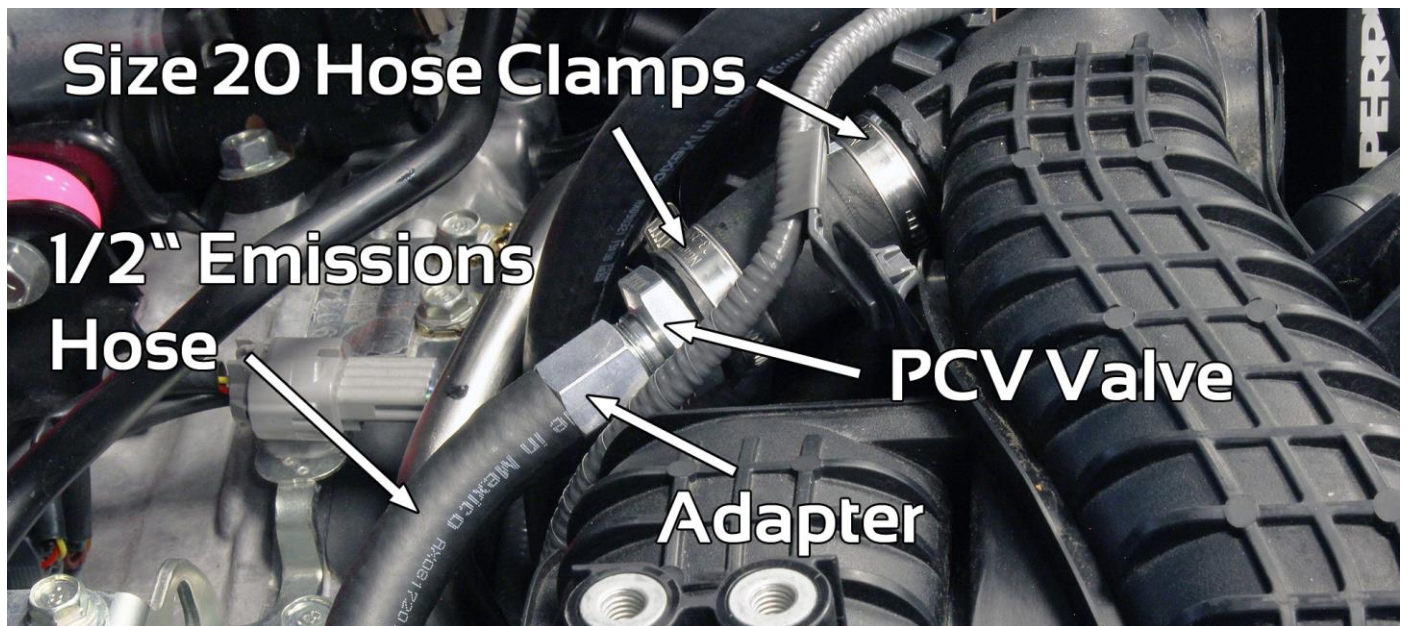
- c. Using a 27mm deep socket, remove OEM PCV valve from engine block. **NOTE: This is a difficult connection to reach, and you may not have the proper tool to remove this. Alternatively, you can loosen/remove the EGR pipe (two nuts on manifold and two nuts on EGR valve) to allow for additional space to remove this. This will allow for an adjustable wrench to be used to install this.**
- d. Using NPT notes above and a 19mm crows foot type wrench, install supplied 3/8NPT with 1/2" barb fitting into block. **NOTE: This fitting can be difficult to access and or you may not have this tool. Alternatively, you can remove the bracket that is used to pick the engine up and gain access to allow a standard 19mm wrench to tighten it.**
- e. Cut roughly 20" of the supplied 1/2" emissions hose to fitting and secure with the supplied size 6 clamp. Route hose over intake manifold as this will be trimmed in a later step.



- f. Using NPT notes above, install OEM PCV valve into supplied adapter fitting as shown below.
- g. Cut roughly 2-1/8" of the large OEM rear crank case vent hose and connect it to the PCV side of the assembly as shown below. Install (2) size 20 hose clamps over hose but leave loose for now.

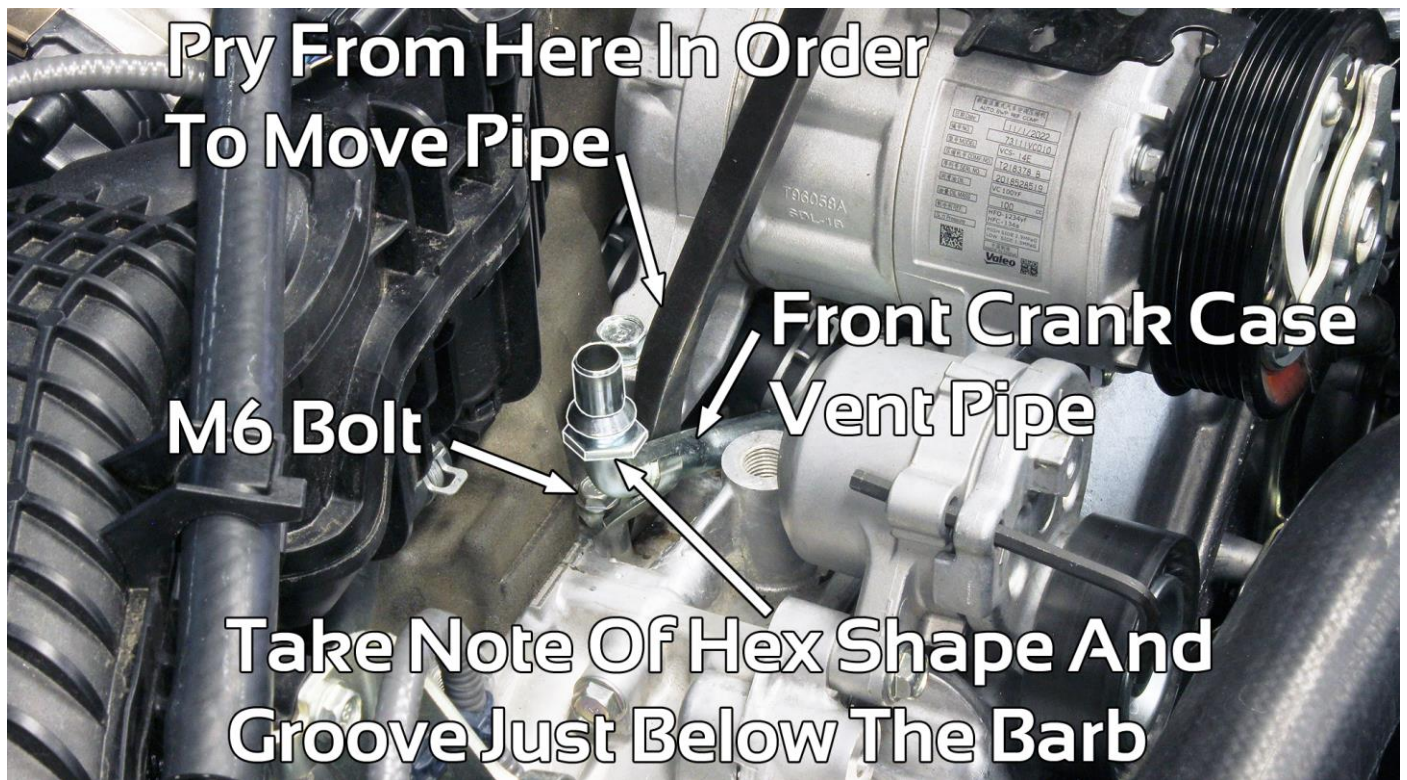


- h. Install PCV/Adapter/Hose to intake manifold as shown below and secure with supplied size 20 hose clamps.
- i. Cut roughly 19" of supplied 1/2" emissions hose and connect it to the 1/2" adapter. Secure with supplied size 6 hose clamp (not shown on hose in picture below).
- j. Route hose toward front of intake manifold for now, as this will be connected in a future step.

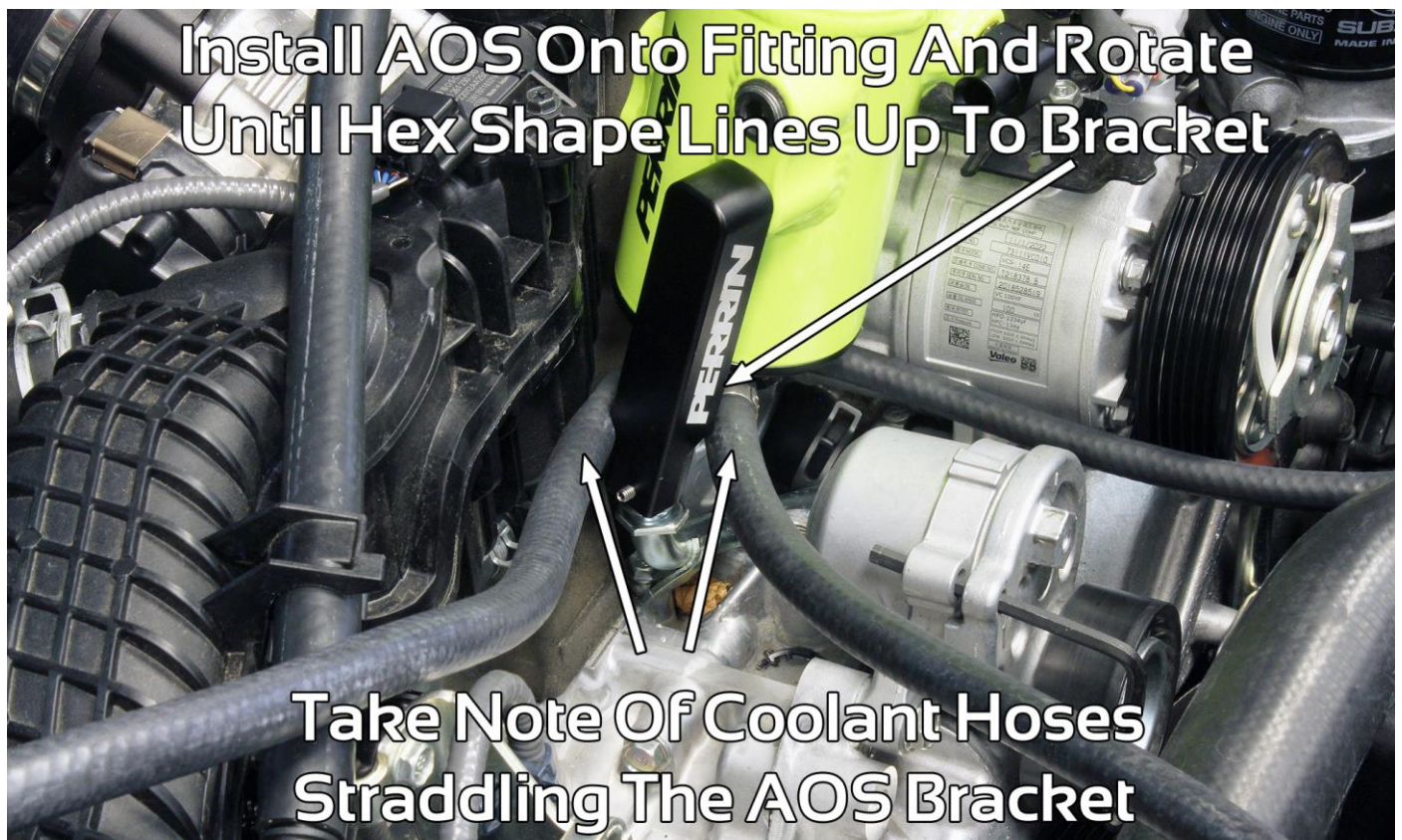


6. AOS Mounting With Coolant and Drain Connections

- a. Install (roughly 2 turns) the supplied 8-32 set screw into PERRIN Crank Case Fitting/Mount on AOS body.
- b. Locate front crank case vent pipe and apply a small amount of oil or grease around this to aid with the next few steps.
- c. Install supplied size 2 hose clamps to each end of the supplied 5/16" coolant hose, then connect each end of the hose to the coolant feed fittings on the bottom of the AOS. Leave hose as a loop for now. **NOTE: Included with each kit are two different types of clamps, a worm drive type and a lower profile crimp type. The crimp type clamp requires the use of a nipper/single ear crimping tool to secure. If you are not familiar with this type of clamp, install the supplied worm drive clamp.**
- d. Connect supplied 1/4" hose to AOS drain fitting (90-degree fitting on AOS bottom). This connection is made to NOT require a hose clamp.

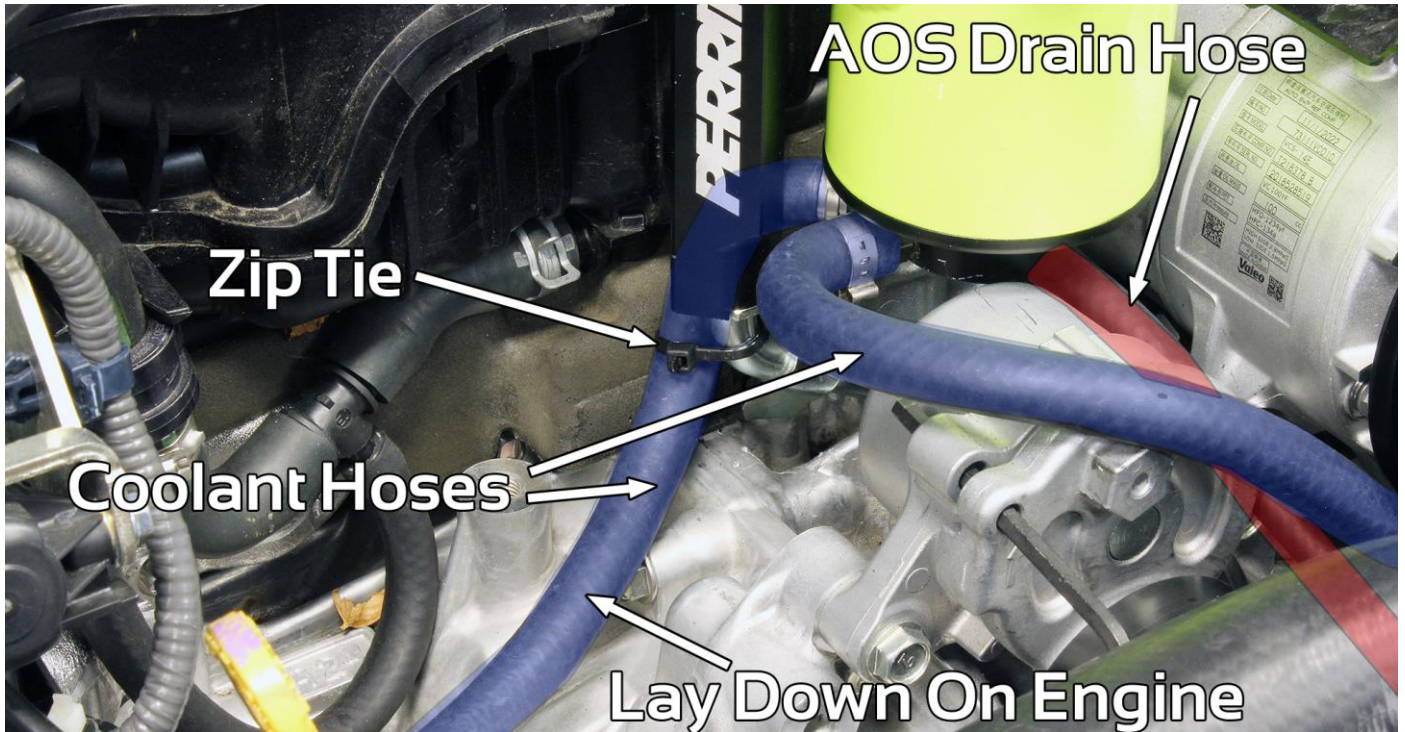


- e. Set AOS onto crank case vent pipe and rotate until the hex shape lines with PERRIN Crank Case Fitting/Bracket.
- f. Check that AOS clears the AC compressor, intake manifold and automatic belt tensioner. If any adjustments need to be made, remove AOS, loosen M6 bolt on block and move pipe the direction it needs to, then retighten it. If additional clearances need to be had, use a pry bar, and slowly bend pipe the direction it needs to be moved. **NOTE: During the next few steps, the AOS will need to be installed and removed a few times to make sure everything is aligned and has clearance around components.**

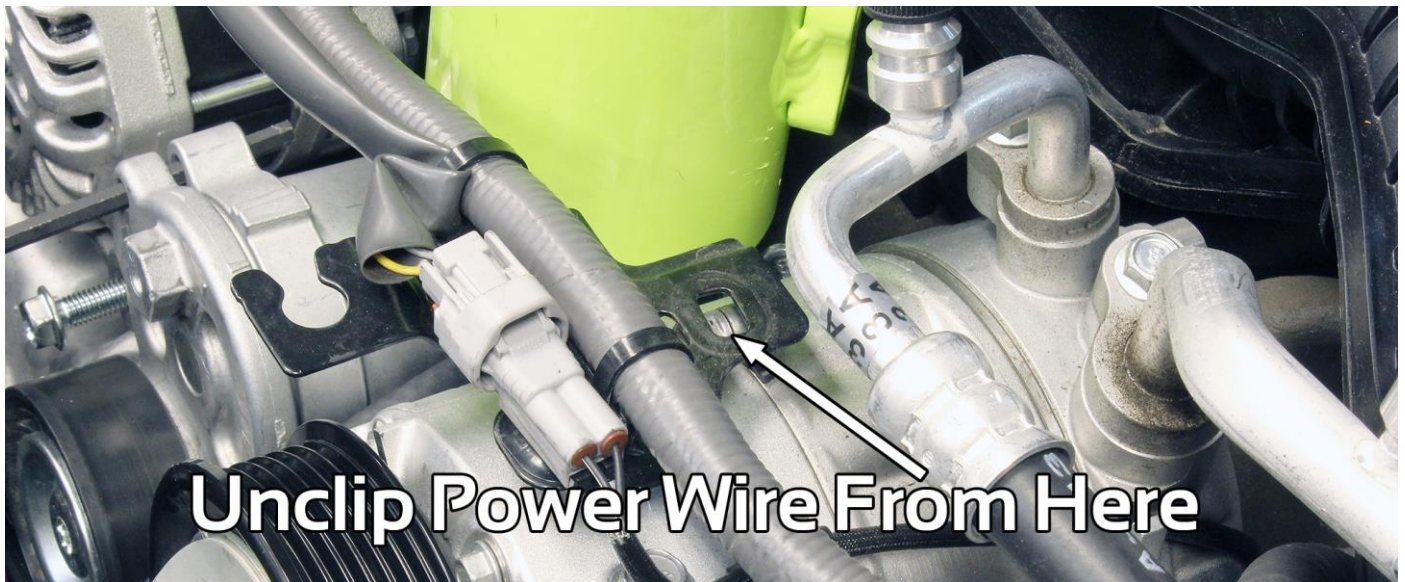


- g. With AOS installed back onto crank case pipe, make sure that both coolant hoses gently straddle the PERRIN Crank Case Fitting/Bracket, and make sure that the AOS bottom is rotated so both hoses are gently resting on this.
- h. Take note of AOS drain hose and where it is aimed. This should be aimed so that it points between the AC compressor and Automatic Belt

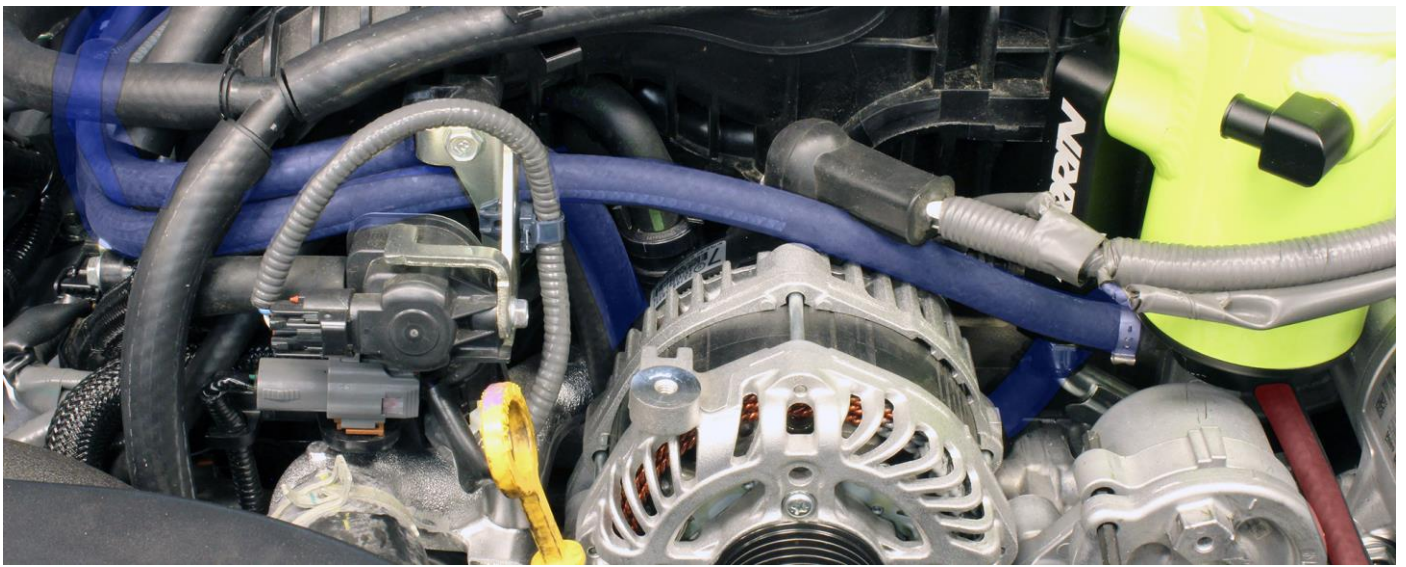
- Tensioner. Make any last adjustments to the rotation of this fitting and/or AOS bottom, before going to the next step.
- i. When AOS is sitting in its desired location and there is good clearance with hoses and other engine components, triple check that it is lined up with the hex shape in the OEM crank case pipe and that it is fully seated.
 - j. Snug down 8-32 screw into bottom of PERRIN AOS crank case fitting/bracket. As this starts to get tight, give the AOS a small twist back and forth a few times and further tighten screw until it stops. **NOTE: During this tightening step, the set screw will be wedging itself between the groove on the OEM crank case pipe. It will feel like it is snug most of the way until it stops.**
 - k. Using below pictures, route coolant hoses. Take note that one hose will lay down on the engine block and then up to EVAP solenoid. The remaining hose will route on top of alternator.



- l. Once hoses are routed as shown above, zip tie coolant hose to OEM crank case pipe (shown in picture above).
- m. Reinstall alternator back to engine block in the opposite that it was removed and tighten M8 bolts to 12ft-lbs. **NOTE: During this step, make sure that coolant hose that passes underneath alternator, is not being pinched.**
- n. Unclip power wire from bracket as shown below.



- o. Reinstall serpentine belt to all pulleys then release the automatic belt tensioner. Double check that the belt is lined up with all grooves in all the pulleys.
- p. Route both coolant hoses around intake manifold as shown (still leaving in a loop for now).
- q. Route oil drain hose toward the radiator and then to fitting on turbo sump restrictor. Zip tie hose so it maintains clearance from belts and other moving parts, then trim to length and connect it to the turbo sump restrictor. Secure with supplied size 2 hose clamp.



7. Coolant Feed Connection To Engine

- a. Locate small coolant pipe that feeds left side of throttle body and prepare to remove hose and catch coolant that may spill out.
- b. Remove hose from throttle body, then install supplied 5/16" straight connector into hose and use OEM pinch clamp to secure.



- c. Route coolant hoses from AOS toward the throttle body making any final adjustments to the routing around the engine.

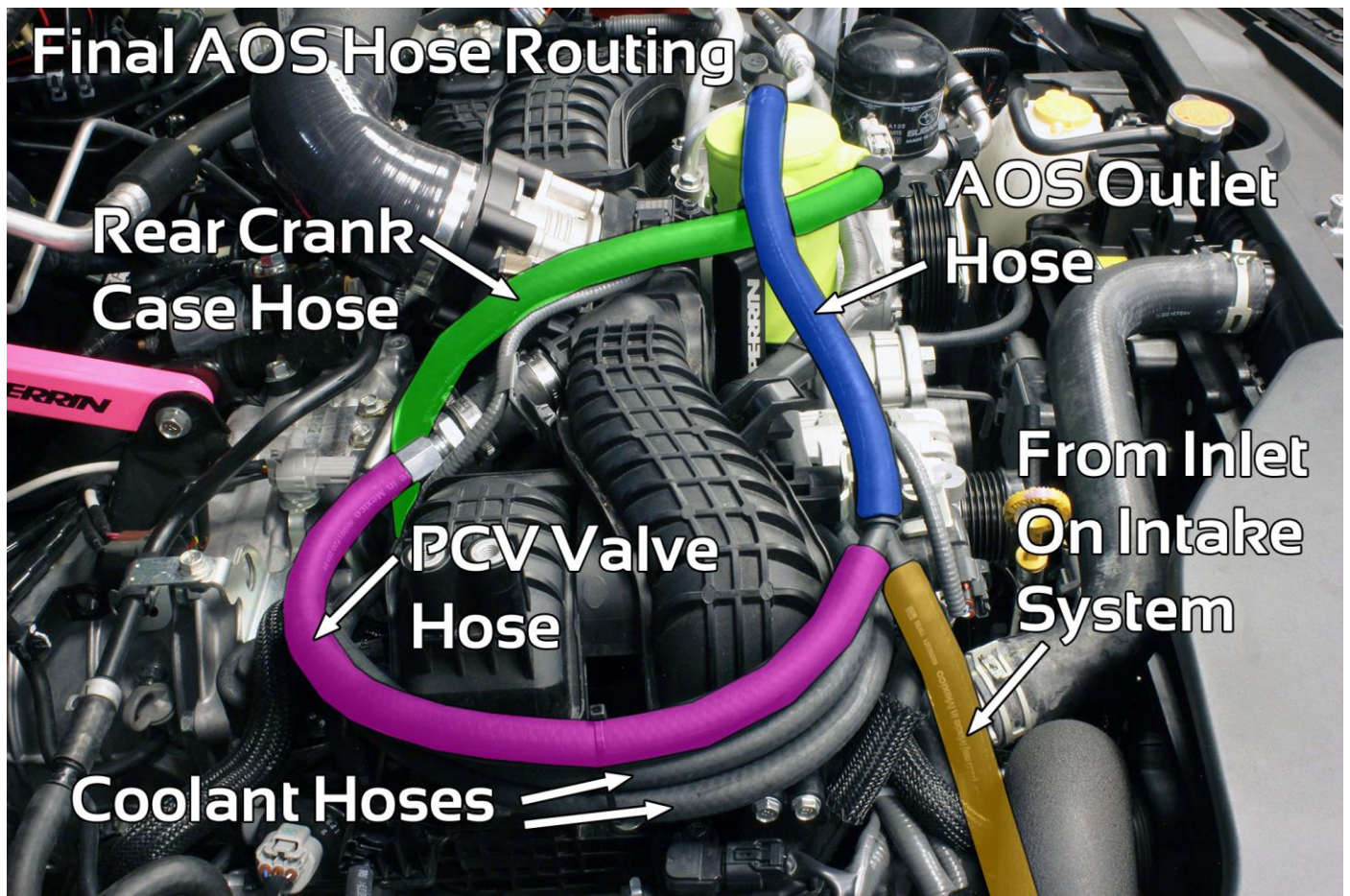
- d. Cut supplied coolant hose (doesn't matter which side of hose) to length so it matches up to 5/16" connector installed into OEM coolant hose. Install supplied size 2 hose clamp over 5/16" coolant hose then connect hose to 5/16" connector. Tighten hose clamp to secure. **NOTE: Straightening out the OEM hose and routing it down toward the engine is best. Picture is showing hose routed differently for illustration purposes.**
- e. Route remaining hose toward the open fitting on the throttle body. Install a supplied size 2 hose clamp, then make a nice smooth loop to attach hose to coolant fitting on throttle body. Secure with supplied size 2 hose clamp (not shown in picture below).



- f. Using supplied zip ties, secure hoses to the engine making sure they are not attached to moving objects.

8. AOS Inlet, Outlet and PCV Connection

- a. Using picture below, attach rear crank case vent hose (hose coming from engine block behind intake manifold) to the side inlet fitting on the AOS body. This hose will need to be trimmed to length and secured with supplied size 6 hose clamp (not shown in picture below).
- b. Cut a 12" piece of supplied 1/2" emissions hose and attach it to the top fitting of the AOS (AOS Outlet). Secure with supplied size 6 hose clamp (not shown in picture below. Then install supplied 1/2" Y connector into other end of hose (this connection does NOT need a hose clamp).
- c. Using picture below as a guide, route hose from PCV valve along intake manifold and cut it to fit to one of the legs of the Y fitting. This connection does not require a clamp to secure.
- d. Route hose from intake and cut it to fit to remaining leg of Y fitting. This connection does not need a clamp to secure.

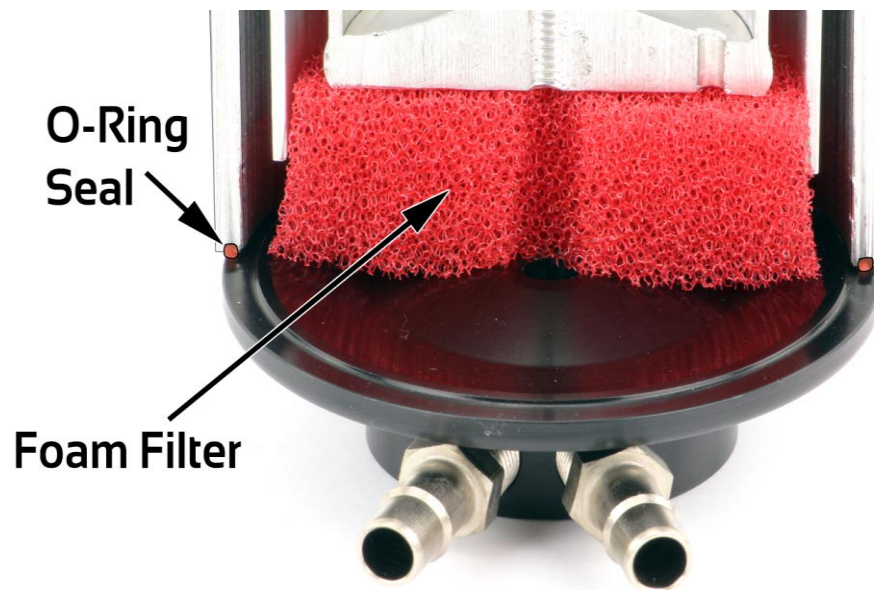


9. Final Checks and Testing

- a. Use supplied zip-ties secure all hoses away from extremely hot parts and moving parts of the engine.
- b. Reinstall belt cover, charge pipe, and intercooler making sure that the large O-ring connections are fully seated, and stainless-steel clips are locked in place.
- c. Reconnect battery ground.
- d. Start car and listen for any vacuum leaks and look for any check engine lights. If no check engine light appears, let car warm up completely and check for any leaking coolant from hoses and fittings. If no leaks are found, take car for test drive.
- e. After roughly 30 min of driving stop and recheck that there are no leaks found. Fix any leaks before continuing to drive car.
- f. After 2-3 weeks of driving check all fittings for leaks (mainly for oil leaks) and fix any leaks before continuing to drive car.

Maintaining your Air Oil Separator

- There is very little maintenance required with the PERRIN AOS. From time to time, you may want to remove it and clean out some of the oil residue from the inside. Before taking apart, double check you have the spare O-ring in case you find the O-ring is damaged.
- Removing the AOS will involve removing the alternator. This is a 5 min job to remove, so don't feel like you need to plan for hours of time to do a thorough AOS cleaning.
- Leaving coolant hoses and oil drain hoses attached to bottom, remove bolt in bottom of AOS using an M5 wrench and remove AOS body from car. Take note of nylon washer under head of bolt or located in AOS bottom. If this is damaged or missing, please call tech support and order another one.
- If foam filter/diffuser was installed, remove, and use a biodegradable degreaser, liberally spray, and let it sit for a few minutes. Wash out with warm water until it rinses clean water and is free of oil. Do NOT use brake cleaner on this part as it will destroy the foam.
- Using a biodegradable degreaser, liberally spray inside can and let it sit for a few minutes. Wash out with warm water until inside of AOS is clean and free of oil.



Cutaway Showing Internals of AOS

- Remove and inspect O-ring thoroughly and even remove from bottom to ensure it is not cut or cracked. **Note: Do NOT use brake cleaner to clean O-ring as damage may occur.**
- Install O-ring into groove on into AOS body, making sure it is fully seated in groove and not sticking out.
- Reinstall foam filter/diffuser into AOS body. **NOTE: Remember this is not recommended in climates that drop below freezing.**
- Reinstalled AOS body to bottom, making sure to secure with bolt and nylon washer under head of bolt. Hand tighten bolt, making sure that bottom is lined up with body and O-ring is not sticking past it.

Questions, Comments and Suggestions Contact: Tech@PERRIN.com

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