08-13 WRX/STI Air Oil Separator for Top Mounted Intercooler Setups

2013-02-26

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. 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@PERRINperformance.com
Instant Chat off the main page of www.PERRINperformance.com
Or simply call our tech team at 503-693-1702

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.

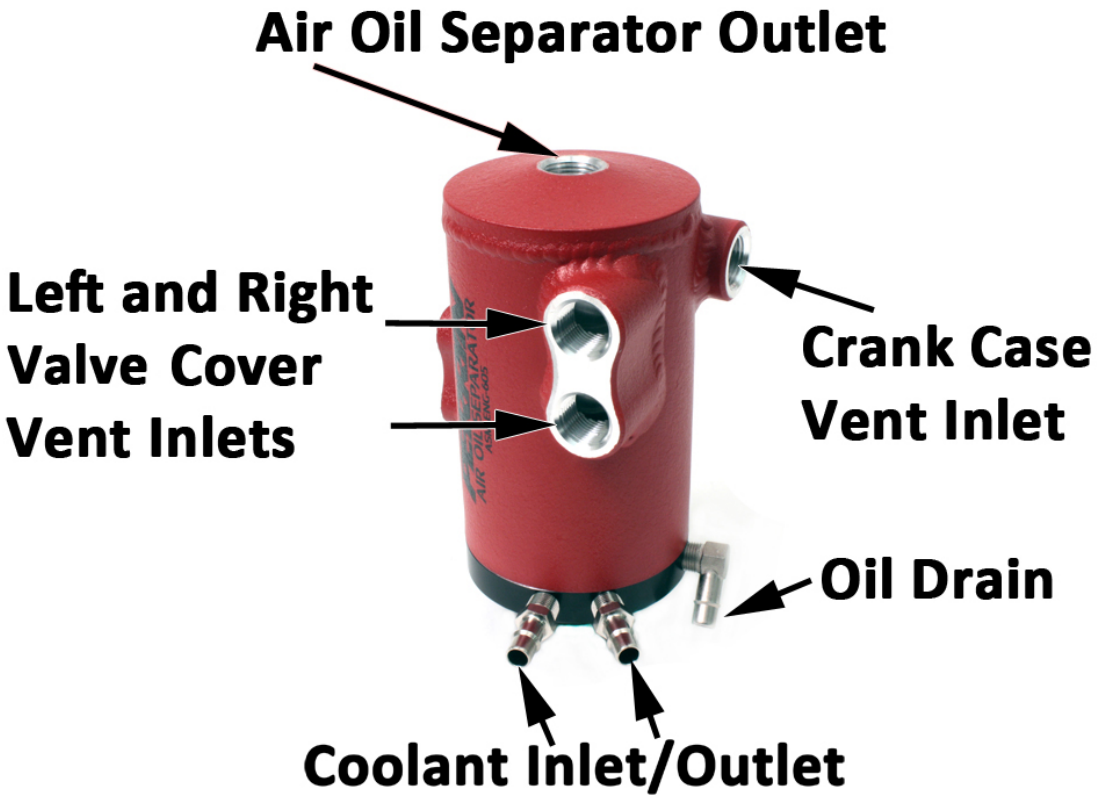
SPECIAL NOTES:

- The use of a factory service manual is highly recommended for installation. These can be purchased online or obtained at dealer.
- We have provided a couple of methods on how to hook this up to your engine. Keep in mind there are many variations of how this can be installed. Consult your tuner or qualified technician before installing this part on your car.
- 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 air oil separator, but expect the PERRIN AOS to remove a significant amount of the crank case blow by. For cars with built engines with excessive blow-by, you may still experience oil getting past our Air Oil Separator.

Included Parts with PERRIN Air Oil Separator for Top Mount Intercoolers:

- **(1) PERRIN Universal Air Oil Separator (AOS)**
- **(1) 08-13 TMIC AOS Bracket**
- **(9') 1/2" Crank Case Vent Hose**
- **(3') 3/8" Fuel Injection Hose**
- **(5') 5/16" Coolant Hose**
- **(4') 5/16" Fuel Injection Hose**
- **(1) PERRIN Crank Case Vent Adapter**
- **(1) 3/8" Check Valve**
- **(9) #3 Hose Clamps**
- **(4) #2 Hose Clamps**
- **(1) #27mm Hose Clamp**
- **(1) 1/2" Vacuum Cap**
- **(2) 3/8 NPT 1/2" Straight Fitting**
- **(2) 3/8 NPT 1/2" 90 Degree Fitting**
- **(2) 3/8 NPT Plug**
- **(1) 1/4 NPT Plug**
- **(1) 1/4 NPT 3/8" Barb Straight Brass Fitting**
- **(1) 1/4 NPT 1/2" Barb Straight Plastic**
- **(1) 1/8 NPT 5/16" 90 degree Barb Plastic**
- **(1) 1/8NPT 5/16" 90 degree Barb Nickel Plated**
- **(2) 1/8 NPT 5/16" Straight Barb**
- **(2) 1/2" Y Connector**

- **(1) 1/2” Tee Connector**
- **(1) 1/2” Connector**
- **(1) 5/16” Straight Connector**
- **(1) M10x80mm Hex Bolt**
- **(1) M10 Nut**
- **(8) 3/8” Washers**
- **(3) M8x16mm Button Head Cap Screw**
- **(3) M8 SS Washers**
- **(2) M6x14mm Button Head Cap Screw**
- **(2) M6 SS Washer**
- **(1) M4 Hex Wrench**
- **(1) M5 Hex Wrench**
- **(1) M6 Hex Wrench**
- **(20) Zip Ties**



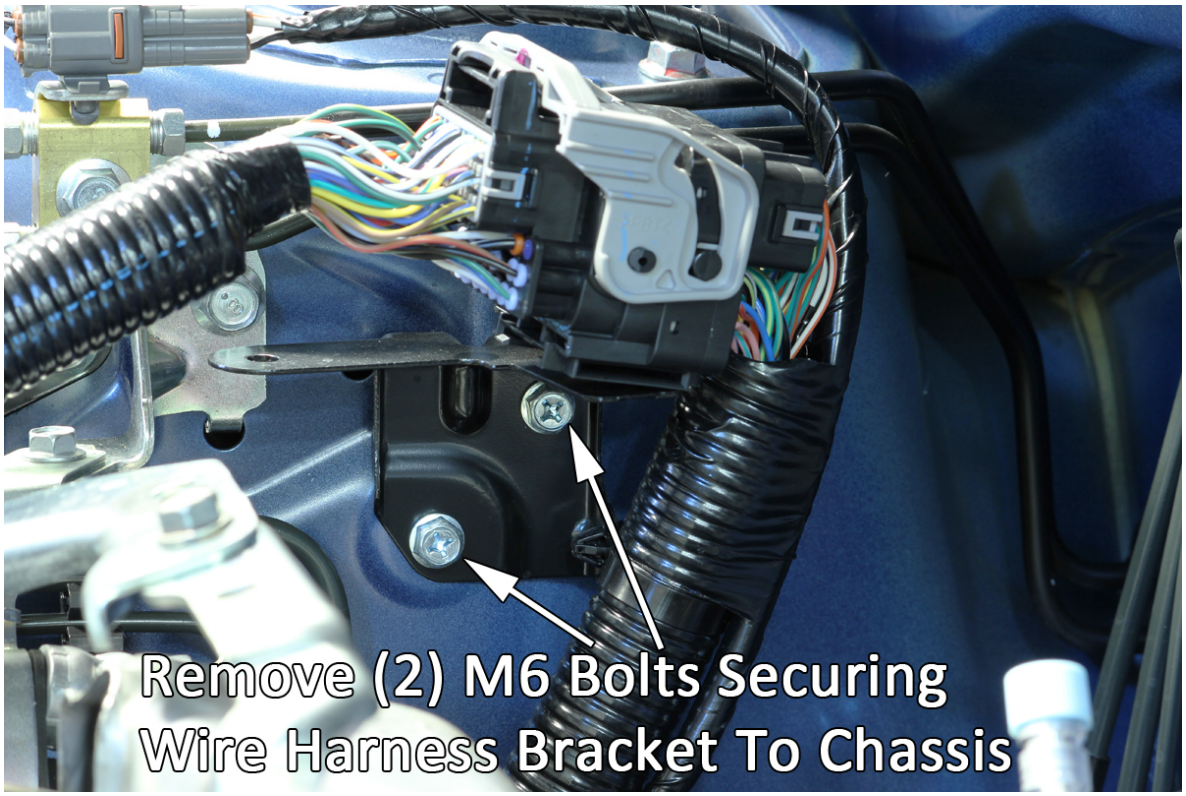
Installation Instructions

1. Using the above diagram as a guide, take note of all fittings and our recommended connections. There are many options and many ways to install this. Please read through all instructions before proceeding with install.
2. Locate and remove top mounted intercooler (including Y-pipe, and throttle body coupler) from engine. This is necessary to gain access to center crank case vent, PCV system and other items. **NOTE: This step will vary depending on FMIC installed.**

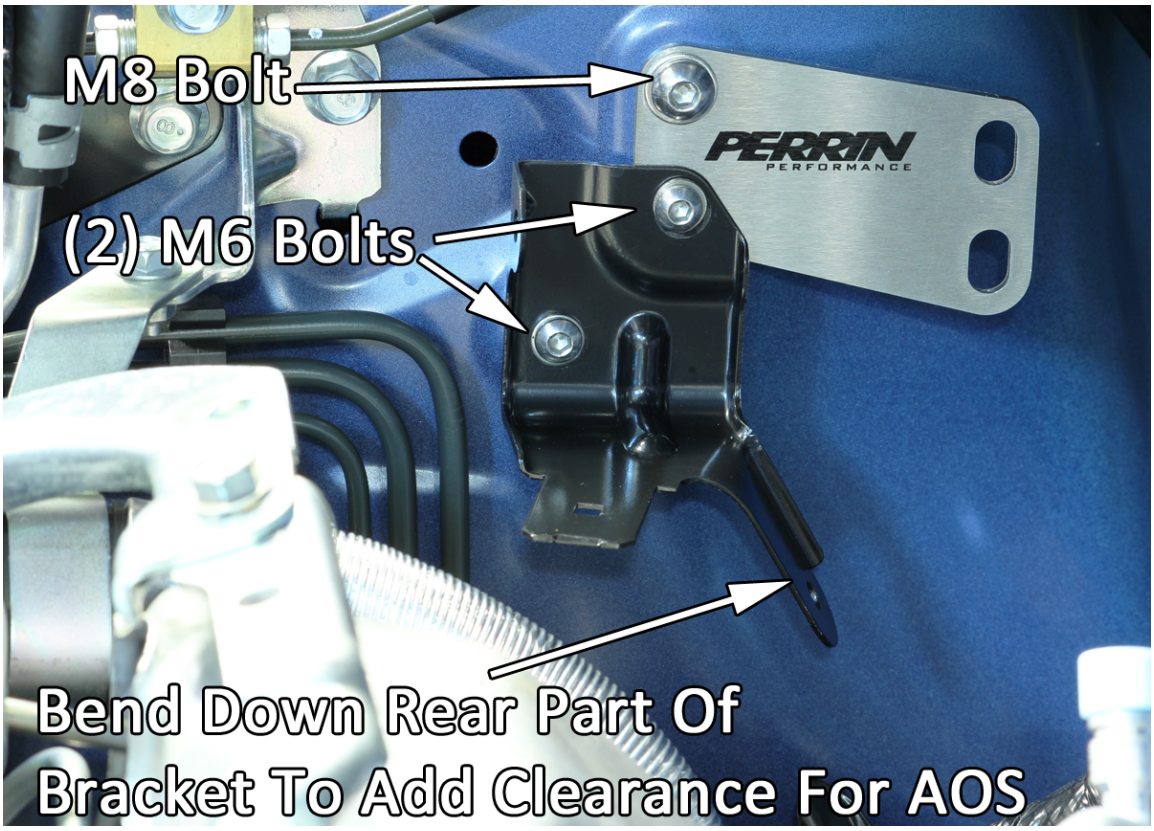
3. Air Oil Separator Mounting

a. The placement of the AOS needs to meet two main criteria. First, the oil drain port needs to be higher than the engine port used for draining oil back into the engine. As long as this is mounted higher, AOS will drain properly. Secondly, AOS also needs to be mounted vertically like in above picture. It will not function properly if mounted on its side or at an angle.

b. The supplied bracket is designed to allow AOS to fit on a car with Top Mounted Intercooler installed. This puts the AOS in the proper location for it to clear turbos, intercoolers and other commonly installed parts. Before proceeding past Step 4, test fit AOS in this location to ensure it clears boost tubes and any other components that might be installed.

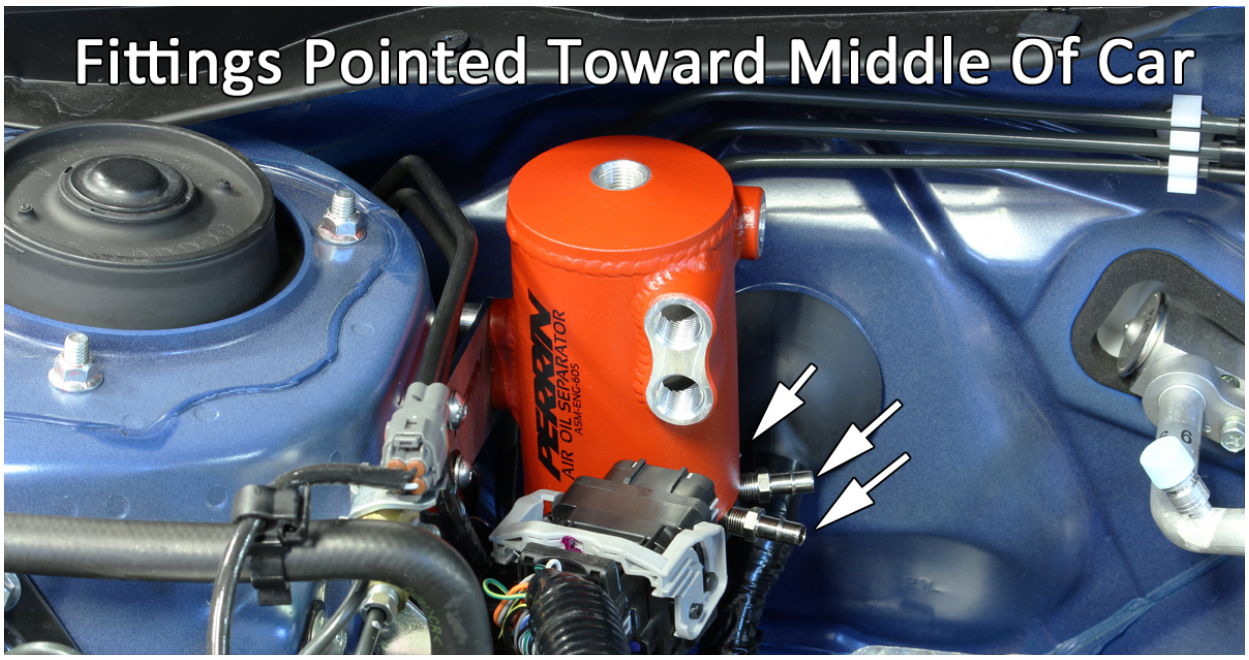


c. Locate main engine wire harness and bracket holding it to chassis. Remove wire harness from bracket by lifting tab under plug and sliding off toward engine. Rear portion of wire harness is secured to bracket with a plastic loop fastener. Pinch small tabs (holding harness and fastener to bracket) and pull harness toward firewall.
d. Locate then remove (2) M6 bolts holding bracket to shock tower. Bend rear tab of OEM bracket down toward chassis as shown below.
e. Using diagrams below, install bracket to AOS using supplied M8 bolts and SS washers. Slide bracket up as far as it can go in the slots and tighten bolts.



f. Using diagrams above, rotate bracket 180 degrees, and place supplied PERRIN AOS bracket (with AOS bolted to it) behind upper screw hole. Install supplied M6 button head screws and SS washers. Leave loose for now.
g. Install supplied M8 button head screw into upper hole on PERRIN AOS bracket. Now fully tighten both M6 bolts and M8 bolt.

h. Install wire harness back onto tab.



i. Take note of AOS clearing all OEM hoses, lines and other things in engine bay. Also take note of the AOS bottom and its rotation. If rotation or adjustments need to be made, remove AOS and bracket from shock tower and adjust.

j. Over the next few steps it may be necessary to remove AOS from bracket to adjust orientation of bottom and fittings to better match your specific setup. It is not necessary to tighten bracket fully until final step.

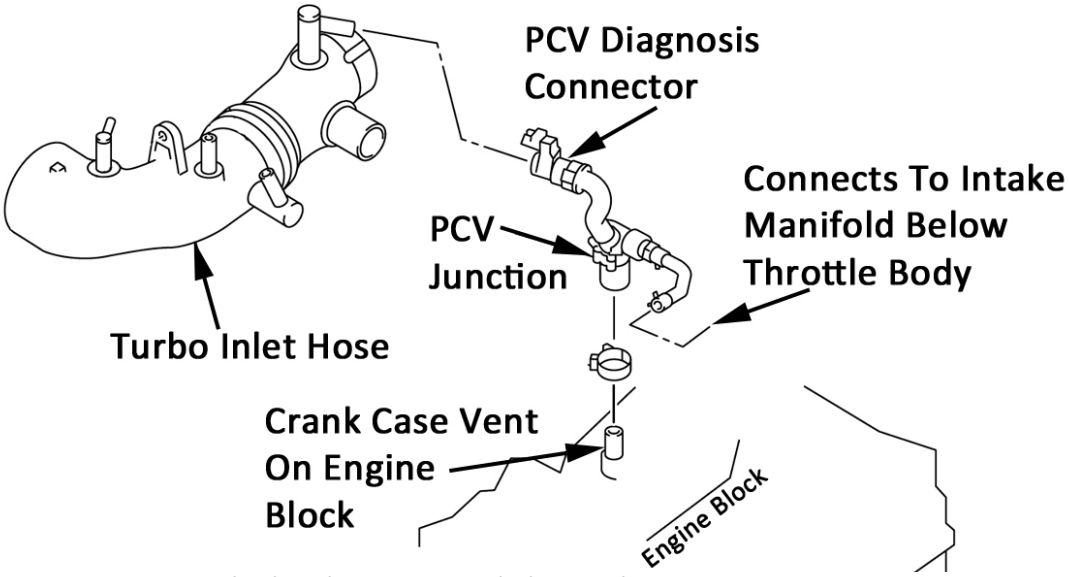
4. AOS Oil Drain Connection

a. The AOS oil drain is not an optional hook-up as the AOS is not designed to contain oil within itself. This fitting is used to drain the oil that is captured within the AOS body back to the engine through a crank case vent.

b. Install supplied nickel-plated 5/16” 90 degree fitting into Oil Drain Outlet in bottom of AOS. . This fitting is NPT, which is 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 pointed slightly downward toward ground. **NOTE: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**

c. Install supplied 1/2" 90 degree fitting into crank case vent inlet on side of AOS body. This fitting is NPT, which is 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 pointed toward front of car. This can be adjusted later if needed. **NOTE: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**

d. Locate and remove throttle body from intake manifold for better access to crank case vent and PCV connection. Using diagram below, locate OEM PCV/crank case vent junction and remove from engine, turbo inlet hose, and intake manifold. Take note of intake manifold connection, as you will need to connect a fitting to this in a later step. **NOTE: When removing PCV Junction on 2004-13 STI and 2005-13 WRX models there is a PCV diagnosis connector with an electrical connection. Simply remove crank case vent hose from connector, leaving electrical connection alone.**

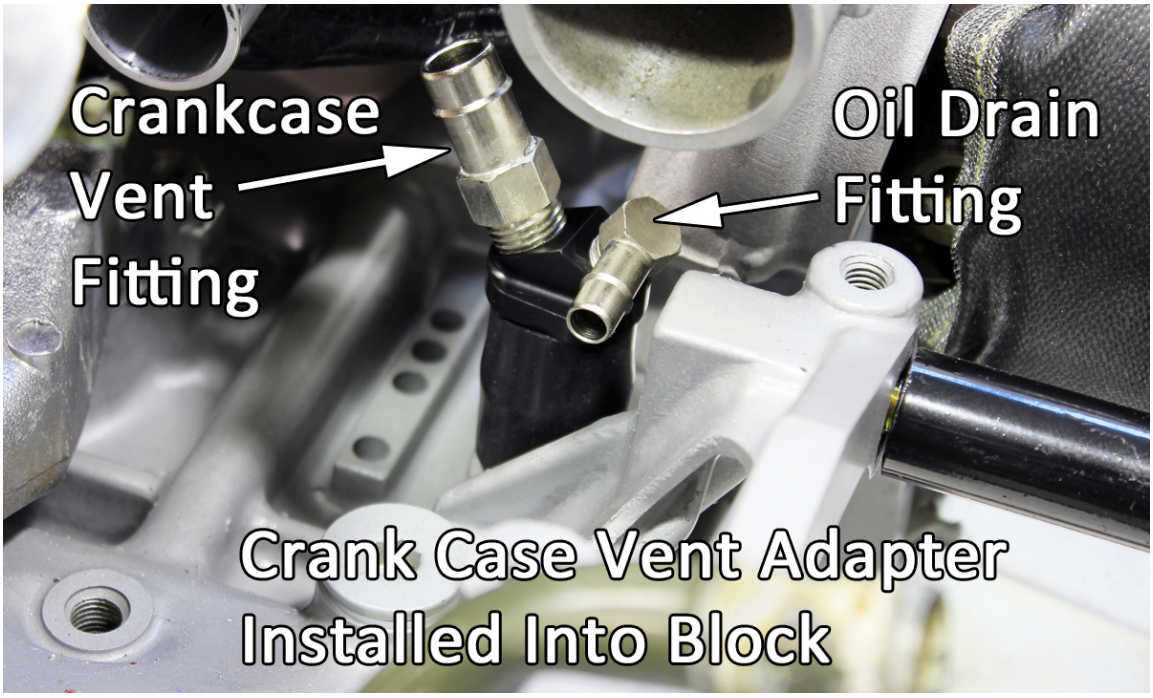


This above diagram represents both WRX and STI PCV junction setups.

e. Using supplied 1/2” vacuum cap, plug open connection on turbo inlet hose (or PCV diagnosis connection on newer cars). **NOTE: It is important to ensure there are no vacuum leaks in turbo inlet hose after this step is complete. This will cause a lean condition and lead to engine damage.**

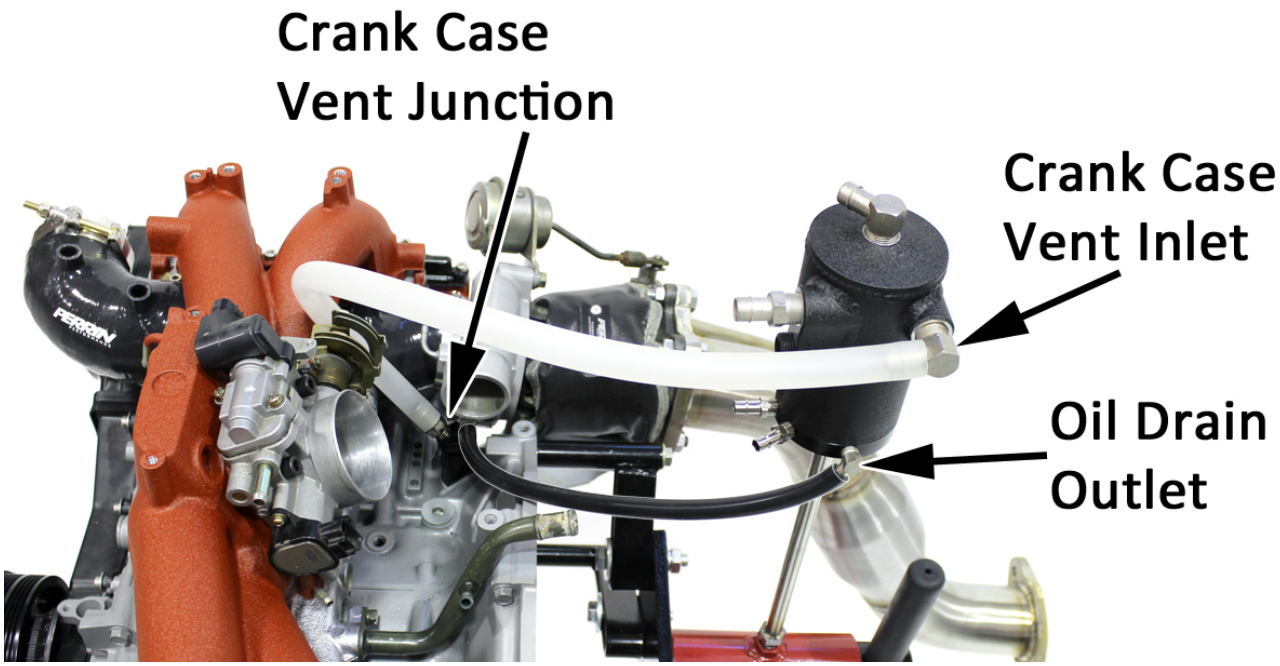
f. If short rubber hose (5/8”ID x 1” long) was pulled off in above step, remove from PCV junction and reinstall to engine block. Remove upper clamp from hose and loosely install supplied 27mm clamp.

g. Using diagram below, install supplied 5/16” 90 degree fitting into PERRIN crank case vent adapter. . This fitting is NPT, which is 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 aligned as shown. **NOTE: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**



a. Using diagram above, install supplied 1/2" straight fitting into PERRIN crank case vent adapter. . This fitting is NPT, which is 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: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**

b. Install PERRIN adapter into short hose (5/8”ID x 1” Long) on engine crank case vent then tighten hose clamp to secure.



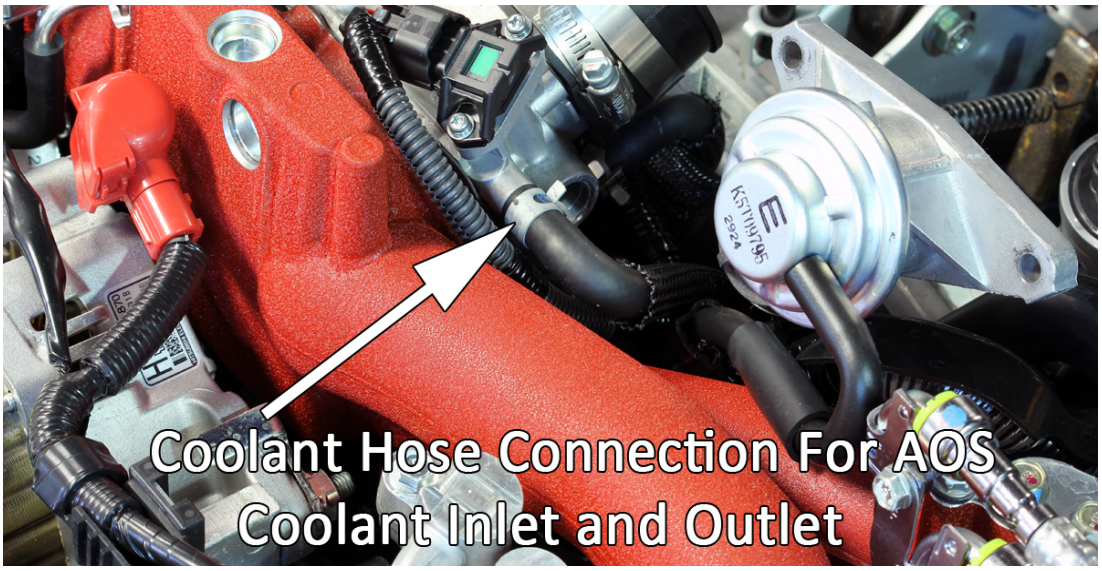
c. Using diagram above and supplied 5/16” fuel hose connect oil drain fitting on bottom of AOS to smaller fitting on PERRIN crank case vent junction. Secure both ends using supplied #2 Hose clamps. **NOTE: It is very important to route this hose such that it NEVER travels up hill from bottom of AOS to crank case vent fitting.**

d. Using diagram above and supplied 1/2" Emissions Hose, connect 1/2" fitting on PERRIN crank case vent adapter to 1/2" fitting on side of AOS. The direction of this fitting is not critical and can be adjusted to fit your particular installation. Use supplied #3 clamps to secure both ends. **NOTE: Routing of this vent hose is not that important, just makes sure it is not pinched off while traveling to AOS body.**

e. For cars that see an extreme amount of high G's or an excessive amount of blow by, we recommend a slightly different installation for the crank case vent. See special notes below on this.

5. AOS Coolant Feed Connections

a. The coolant connection is an optional hookup, but we HIGHLY recommend to connect these up as they help reduce water vapor and sludge that can build up in AOS. The easiest connection to get coolant from is the throttle body, as all Subaru models have the same coolant connections on the throttle body that can be used. Other connection points can be used as long as there is some coolant flow through the hoses. **NOTE: Installing coolant connection will cause some coolant loss and coolant spill. Make sure to top off coolant after installation is complete.**



b. Install supplied 5/16" straight 1/8NPT fittings into bottom coolant ports on AOS. . This fitting is NPT, which is 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: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**
c. Locate coolant hose on throttle body that will be used to supply coolant to AOS.
d. Disconnect coolant hose from throttle body and installed supplied 5/16" plastic adapter into hose. Secure with OEM pinch clamp.
e. Install supplied 5/16" coolant hose to 5/16" adapter and route hose to either coolant feed fitting on AOS bottom. Cut hose to length and install hose over barb fitting. Use supplied #2 hose clamp to secure.
f. Install remaining 5/16" coolant hose to 5/16" barb on AOS bottom and secure with supplied #2 clamp. Route hose back to fitting left open on throttle body and secure with supplied #2 hose clamp.

Above is a 08-13 STI engine showing the coolant hose routing.

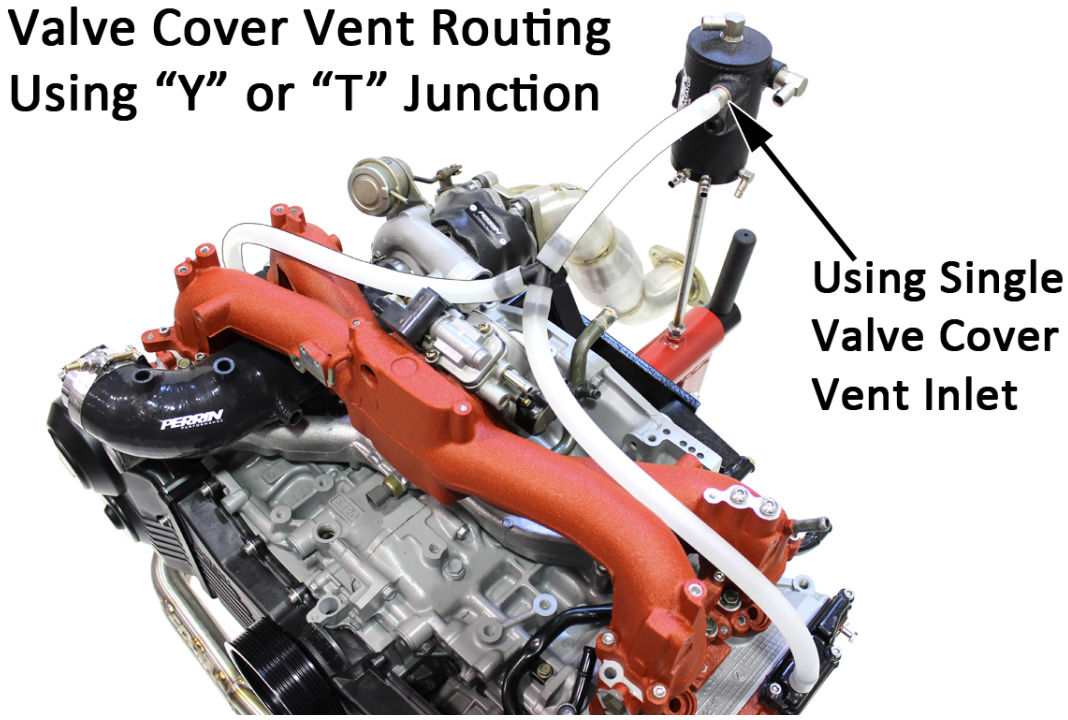
Above is a 08-13 WRX engine showing the coolant hose routing.

g. Using above diagrams, you can see the coolant hose connections for all WRX's, and STI's. Theses diagrams have been simplified to show the hose routing. Hoses can be routed differently depending on where the AOS is mounted or if intercooler plumbing requires this.

6. AOS Valve Cover Vent Inlet Connections

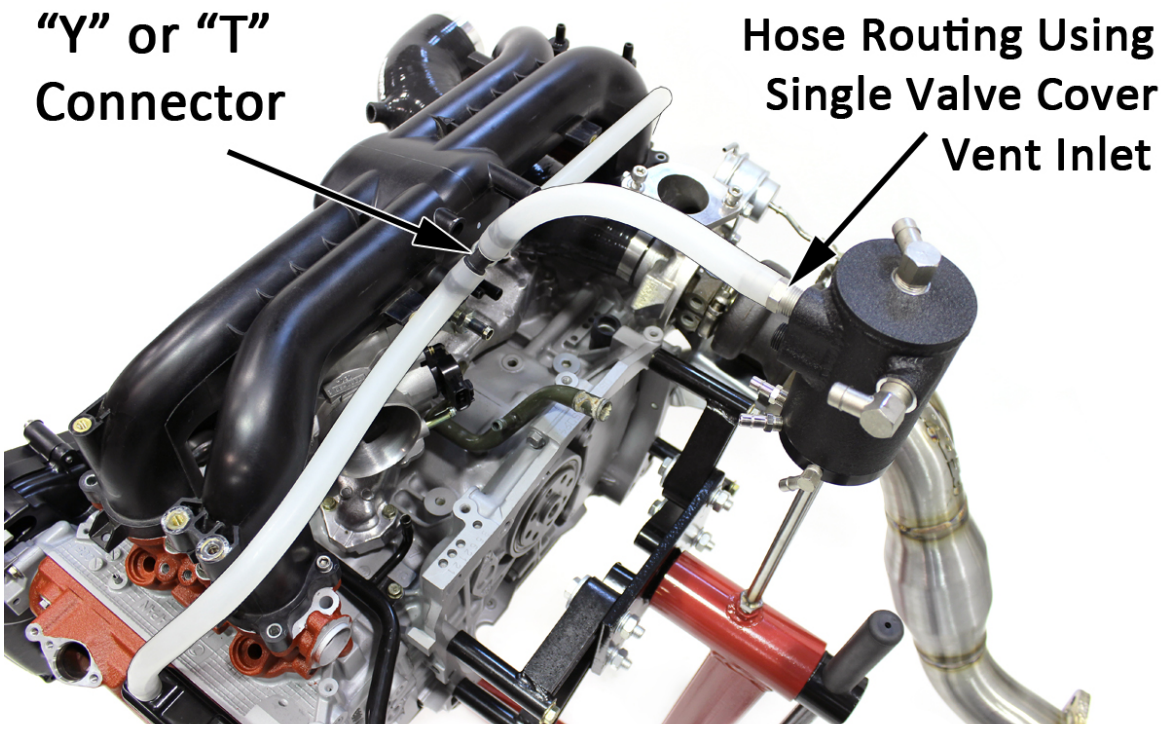
a. Your Subaru engine has a valve cover vent on both left and right heads that need to be routed to the AOS. The method for doing this can vary depending on the desired setup. **Special Note: Most all models will appear to have two vents on each valve cover, only one set of these are considered vents. Locate vents that connect left valve cover, to center crank case vent, then to right valve cover. These sets of hoses/vents are considered the balance hoses and are to be left alone. DO NOT remove or tee into these hoses!**

b. Once proper set of vents are located, decide if you want to join both heads together with a "Tee"/"Y" connector, then connect to one of AOS valve cover inlets, OR connect each valve cover vent separately to separate AOS valve cover inlets. For most situations, we recommend connect each valve cover vent separately to the AOS. This will provide the best venting while under high lateral G forces. If connecting each vent separately, skip to step "f".



Above is a 08-13 STI engine showing the valve cover vent hose routing. This shows complete replacement of OEM hoses.

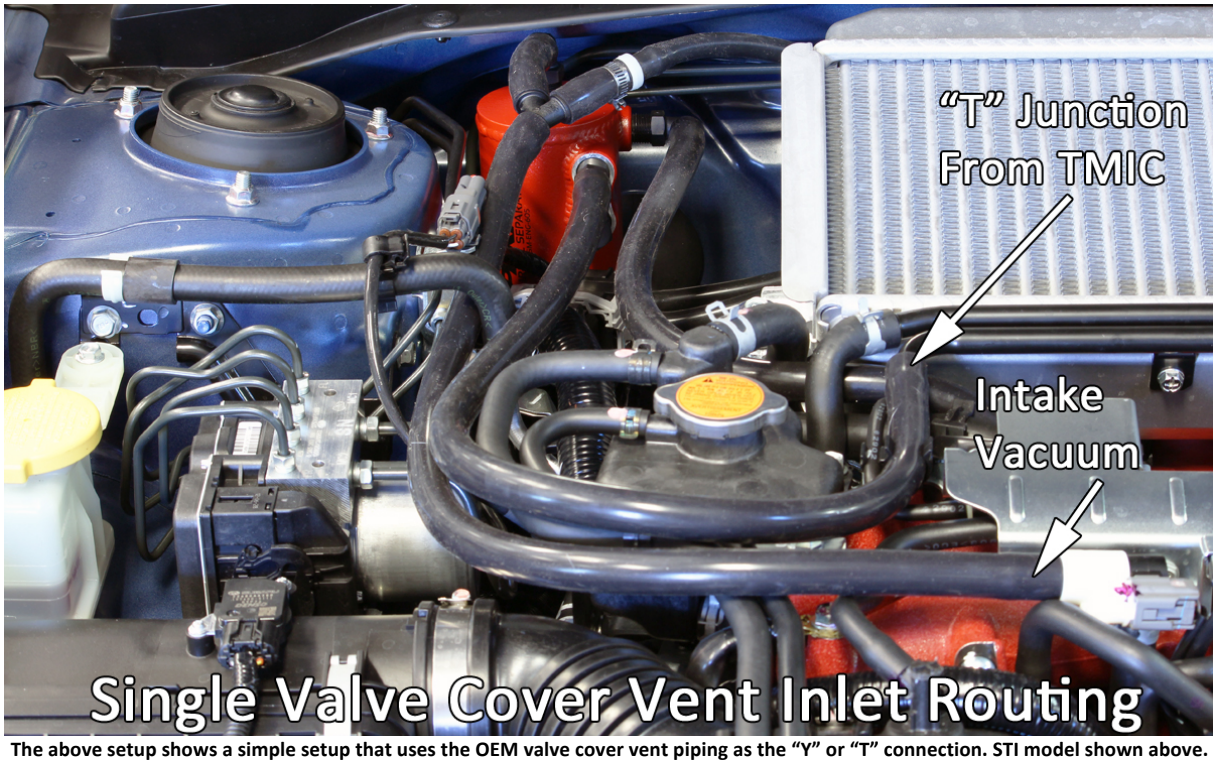
c. If you are connecting each valve cover vent to a “Tee”/ “Y” junction and only going to use one of the valve cover vent inlets, install (1) supplied 1/2” barbed 3/8NPT straight fittings into one valve cover vent inlet. Install supplied 3/8NPT plug into remaining valve cover vent inlet. . This fitting is NPT, which is 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: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**



Above is a 08-13 WRX engine showing the valve cover vent hose routing. This shows complete replacement of OEM hoses.

d. Remove all OEM valve cover vent hoses and install supplied 1/2" emissions hose onto valve cover vents. Joint left and right side valve cover vent hoses with supplied “Y” or “T” connector, then secure with supplied clamps. In the above diagram you can see how a “T” instead of a “Y” connector can be used. **NOTE: In all situations, we recommend removing all OEM rubber valve cover vent hoses as they typically crack or get brittle over time.**

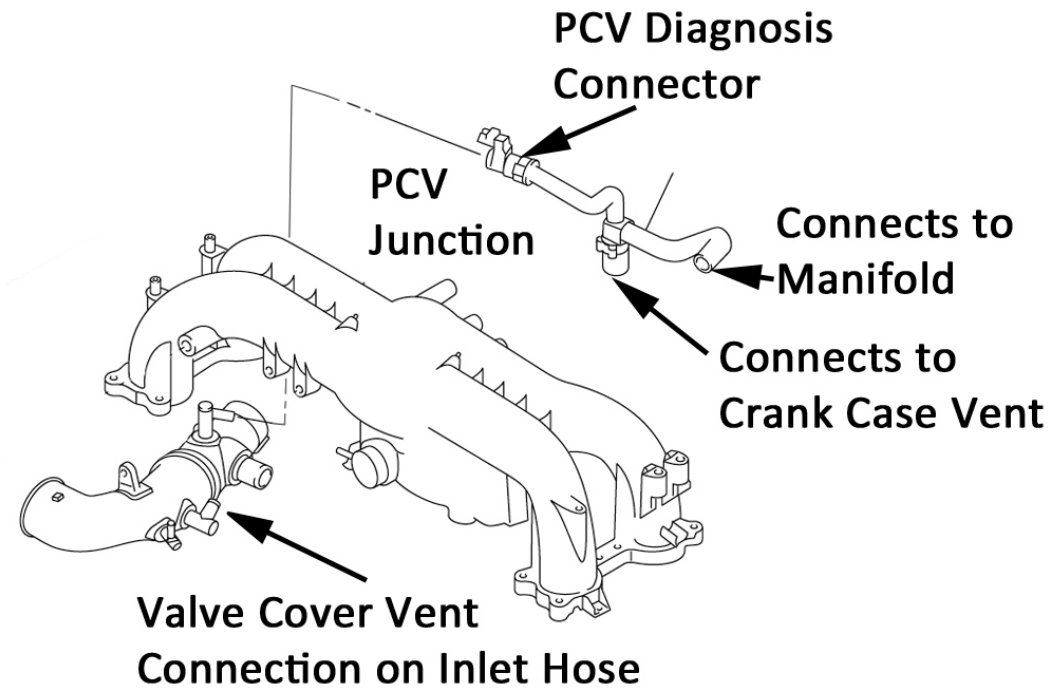
e. Connect third leg of “Y” or “T” to AOS valve cover vent inlet. You can see in the above and below diagrams typical routing found on the most common setups. **NOTE: Make sure that the routing of hoses do not interfere with moving parts or travel over extremely hot parts like a turbo or downpipe.**



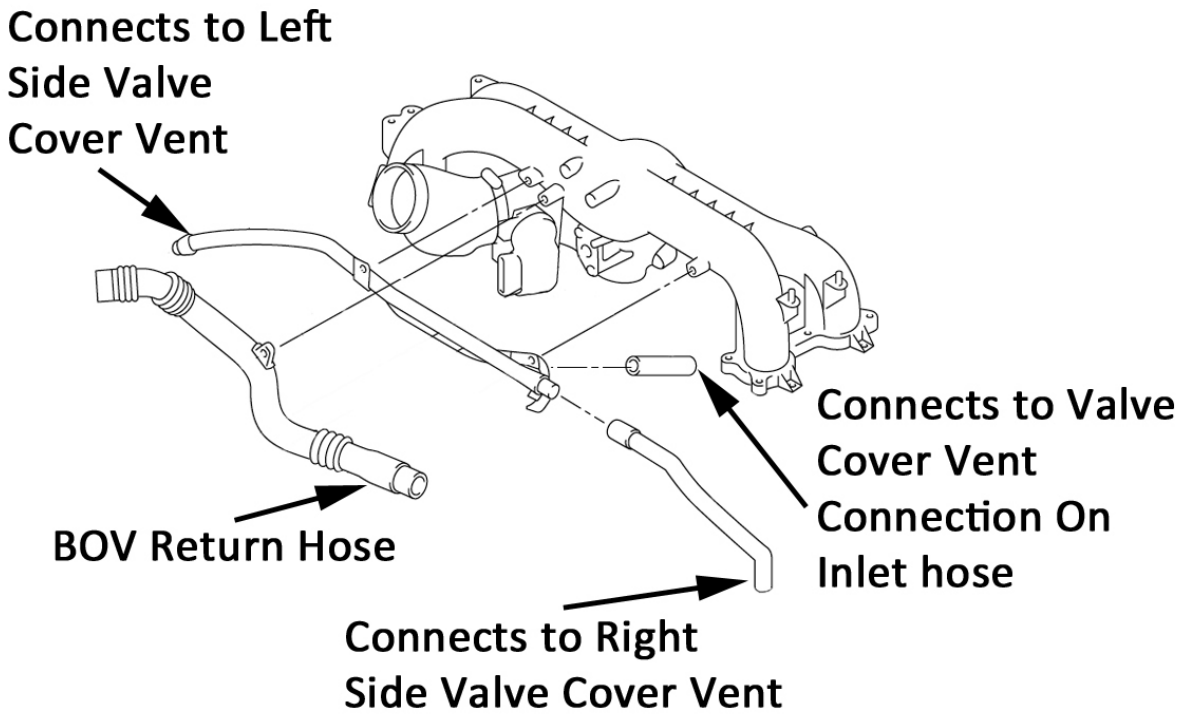
The above setup shows a simple setup that uses the OEM valve cover vent piping as the “Y” or “T” connection. STI model shown above.

Using the OEM valve cover vent piping on a 2008-13 WRX engine will look different. This pipe where each valve cover vent comes together is buried under the manifold. Use the below diagrams to give you an idea where this connects to on WRX engines.

WRX Intake Manifold from Front Side



WRX Intake Manifold from Back Side



f. If you are connecting each valve cover vent separately to AOS, install supplied 1/2” barbed 3/8NPT straight fittings into each valve cover vent inlet. These seal by being tight, not by bottoming out. Thread fittings in by hand and tighten roughly 1/2 to 1 full turn more until

fitting is tight. **NOTE: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**

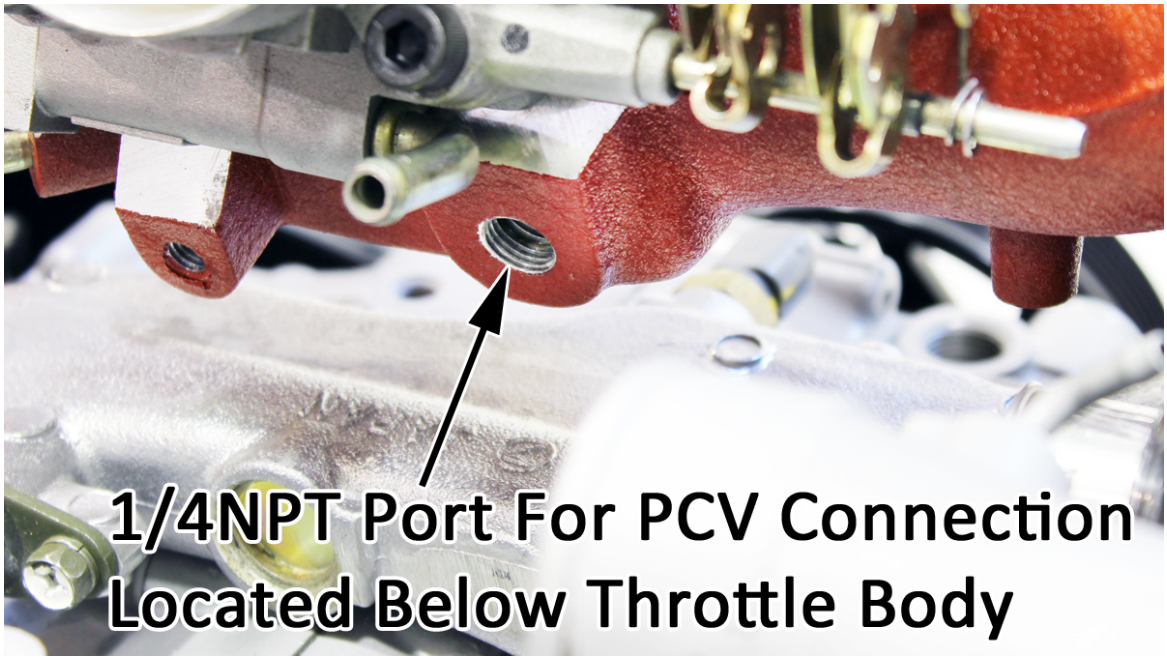
g. Using supplied 1/2" emissions hose, connect each valve cover vent to each valve cover vent inlet on AOS body. Secure with supplied #3 hose clamps. **NOTE: Make sure that the routing of hoses do not interfere with moving parts or travel over extremely hot parts like turbo or downpipe.**

7. Air Oil Separator Outlet and PCV Connection

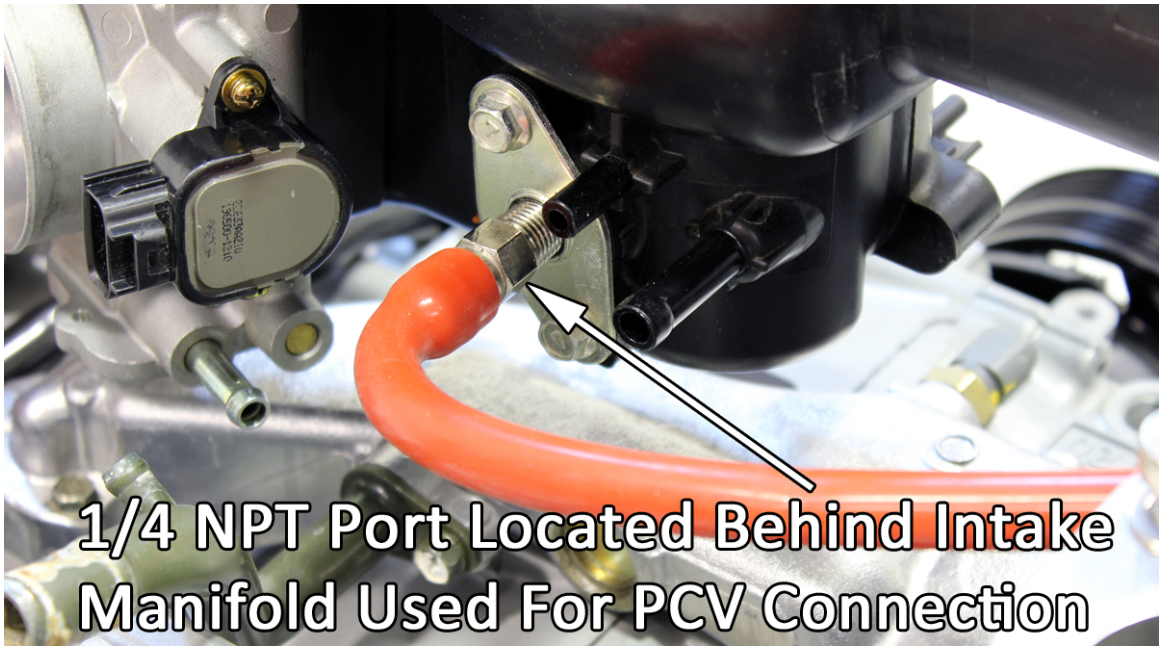
a. The AOS outlet is the top threaded hole on body. This connection needs to be connected to the turbo intake system. This connection must be in front of the turbocharger, and behind the air filter. **NOTE: We do not recommend leaving this fitting open as some oil can still come out under certain conditions, which can create a mess or combust if exposed to extreme heat.**

b. Along this hose (connecting AOS to intake system) you will need to install the PCV connection. This is a 1-way valve that provides positive crank case ventilation during idle and light load situations. This valve is important to install as described or boost pressure will be lost and there will be no positive crankcase ventilation occurring. **NOTE: The PCV connection can be skipped for certain applications, see special note regarding this at bottom of instructions.**

c. Install supplied 1/2" barbed 3/8NPT 90 degree connector into top of AOS. This fitting is NPT, which is 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 and or its lined up in the direction you desire. **NOTE: Using a small amount of Teflon tape on threads is a good idea to ensure a proper seal.**



Above picture shows PCV connection on backside of STI intake manifolds.



Above picture shows PCV connection on backside of WRX intake manifolds.

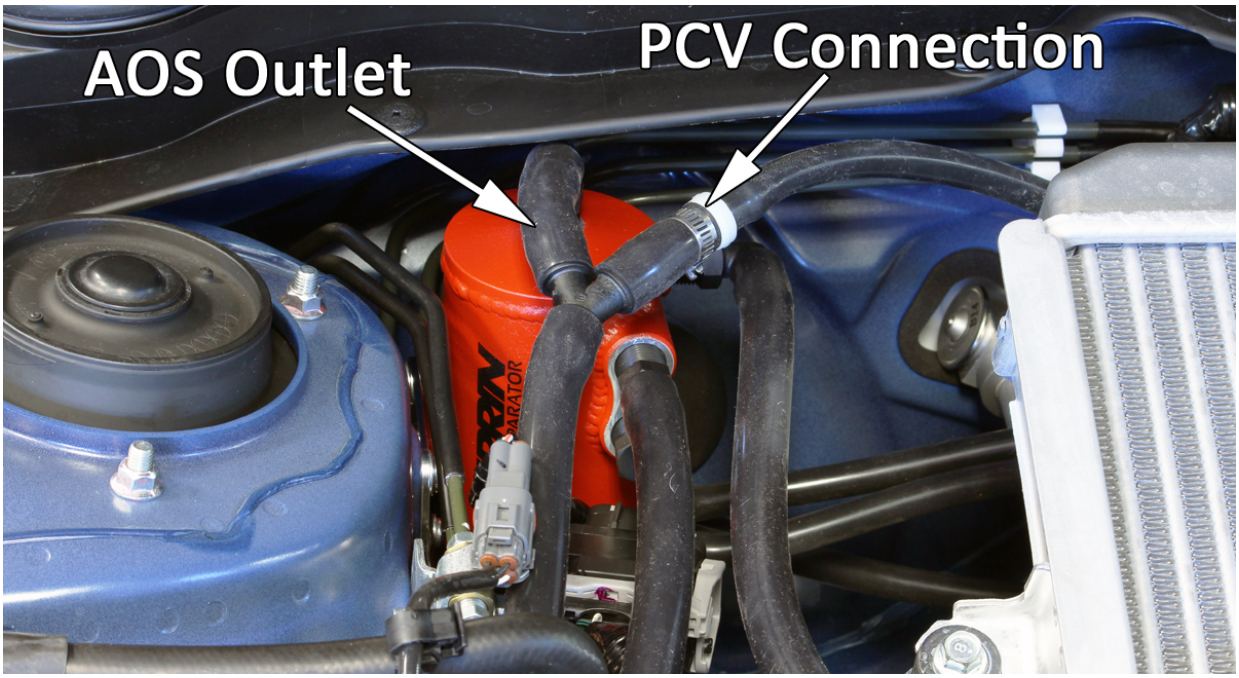
d. Locate previous PCV connection on intake manifold. Using the diagrams above and below you can see where this is located on your

specific vehicle. **NOTE: 02-04 WRX's will need to remove OEM fitting (it has a built in PCV valve) installed and replace with supplied 3/8" 1/4NPT brass barb fitting. This fitting is NPT, which is a tapered, thread that seals when tightened, not bottomed out. Thread in by hand and tighten 1/2 to 1 full turn further to seal.**

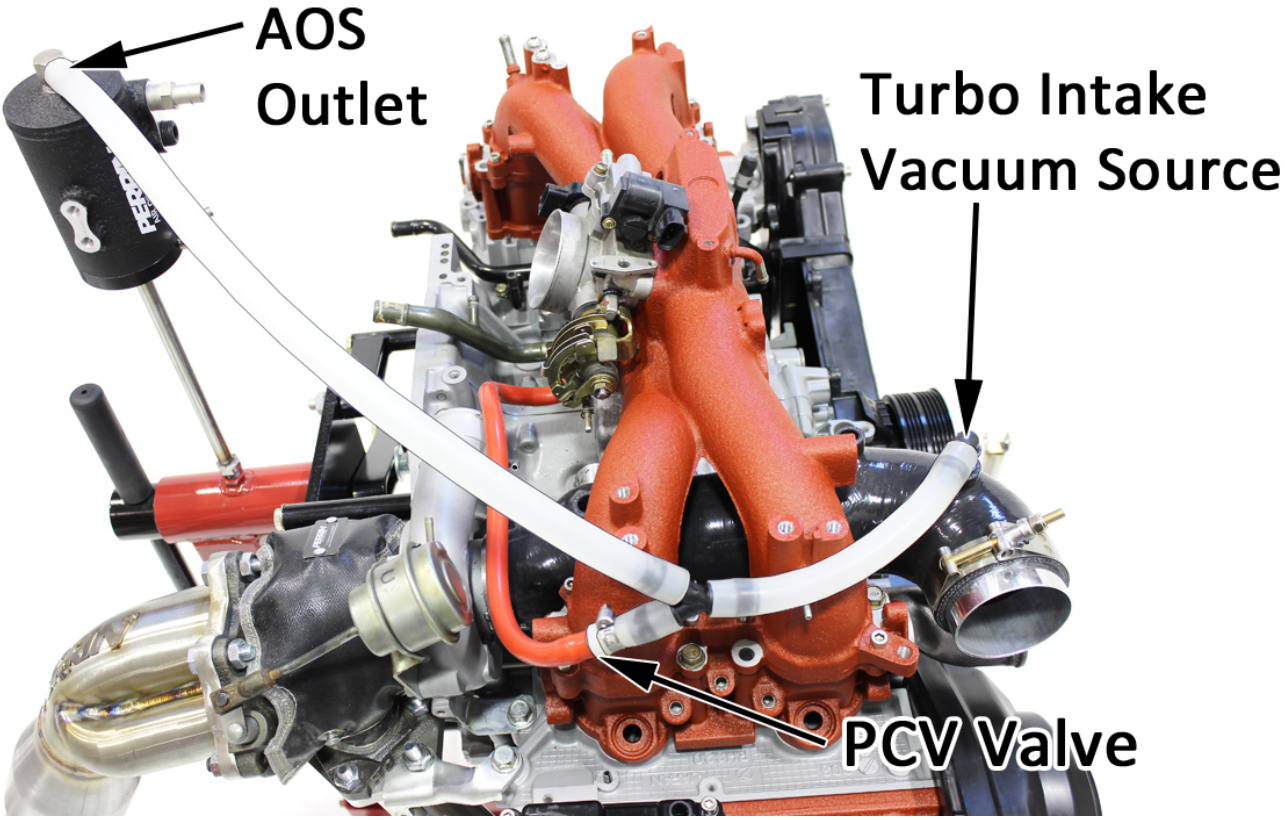
e. Connect supplied 3/8" hose to fitting and secure with supplied clamp. Route hose away from manifold temporarily.

f. Using supplied 1/2" emissions hose, connect AOS outlet to intake system making sure to use supplied clamps to secure each connection.

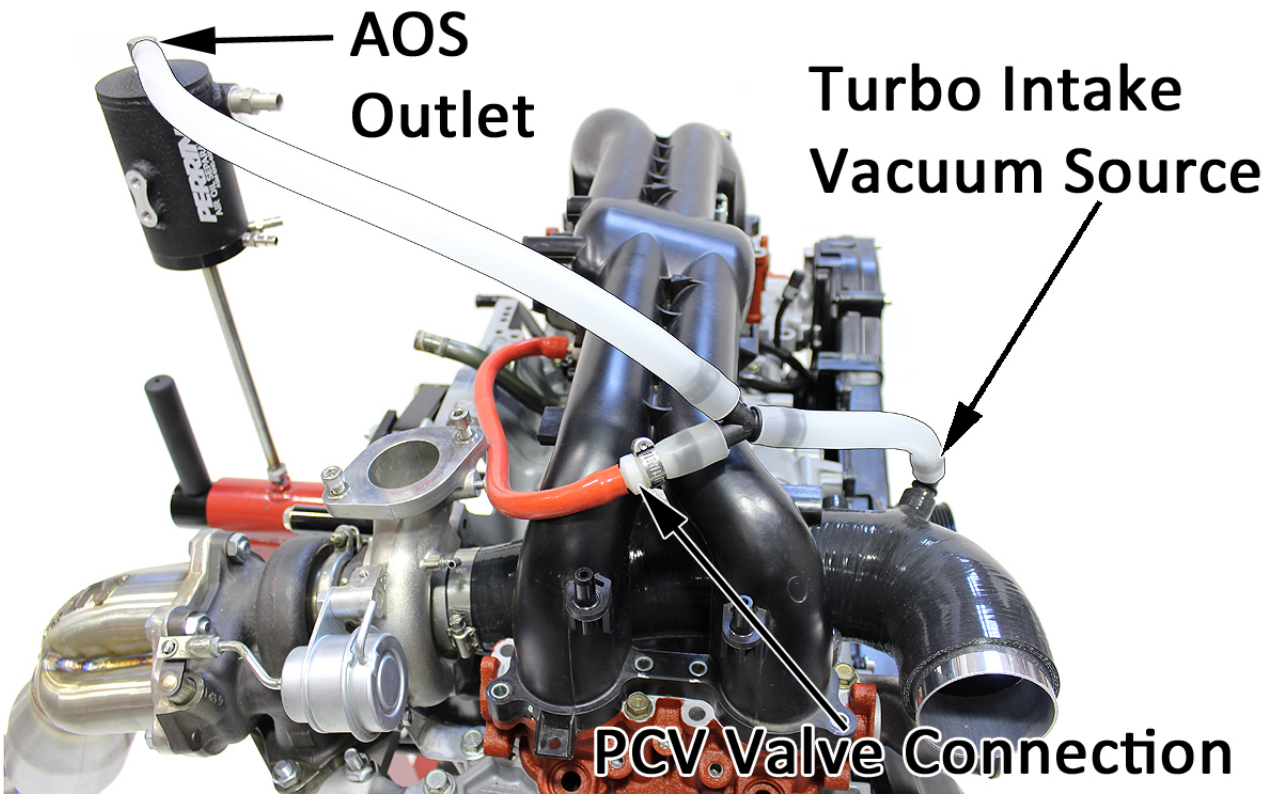
g. Decide where to install PCV valve (one way valve) and "Y" connector along 1/2" emissions hose coming from AOS outlet. **NOTE: It's best to keep this junction as close to AOS outlet as possible.**



h. Once a location is found, cut 1/2" emissions hose and install supplied "Y" connector making sure to aim 3rd leg back toward AOS and away from Turbo Intake Vacuum source. Use above and below diagrams to give you a better idea how this can be setup.

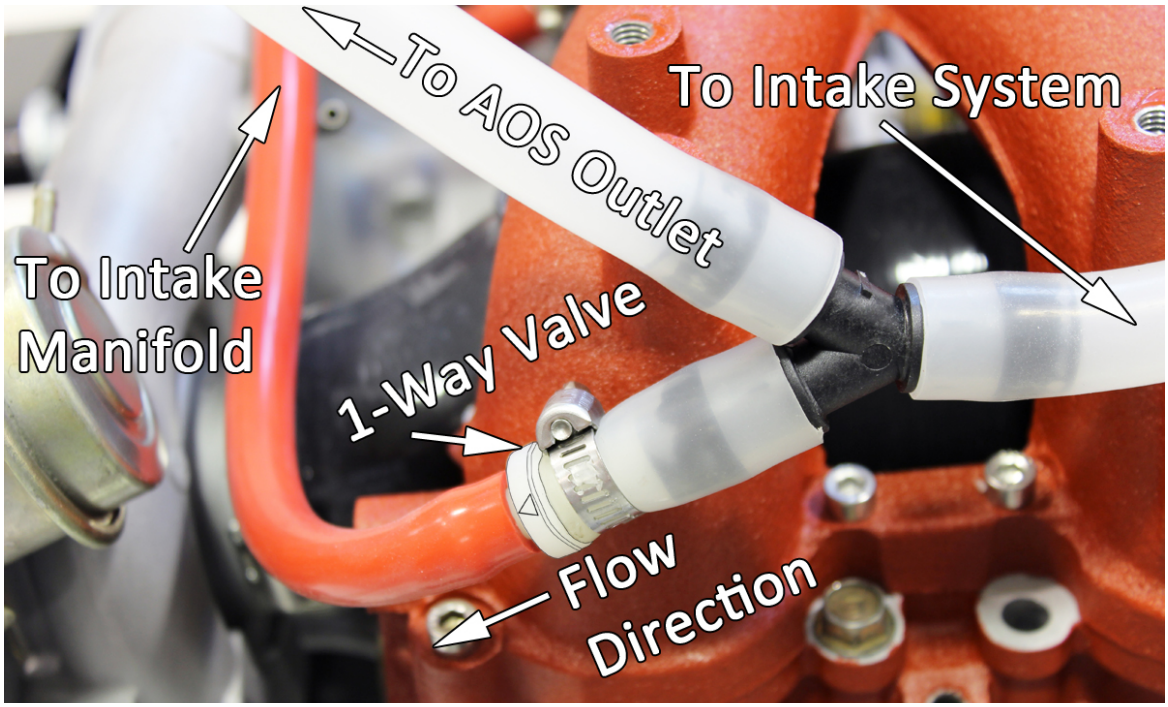


Above picture shows 02-07 WRX and 04-13 STI PCV setup.



Above picture shows 08-13 WRX PCV Setup

i. Cut roughly 1-3/4" of 1/2" emissions hose and install over 3rd leg of "Y" connector as shown below. Install one-way valve into half in hose making sure that small arrow is pointed away from "Y" connector. Install supplied clamp and tighten down on hose (hose will "suck" down to smaller barb fitting on one-way valve).



j. Route previously installed 3/8" hose from intake manifold to one-way valve. Cut hose to length and secure both ends of 3/8" hose with supplied clamps. Using above diagram, ensure that one-way valve is installed in the correct direction and on the correct leg of "Y" connector.

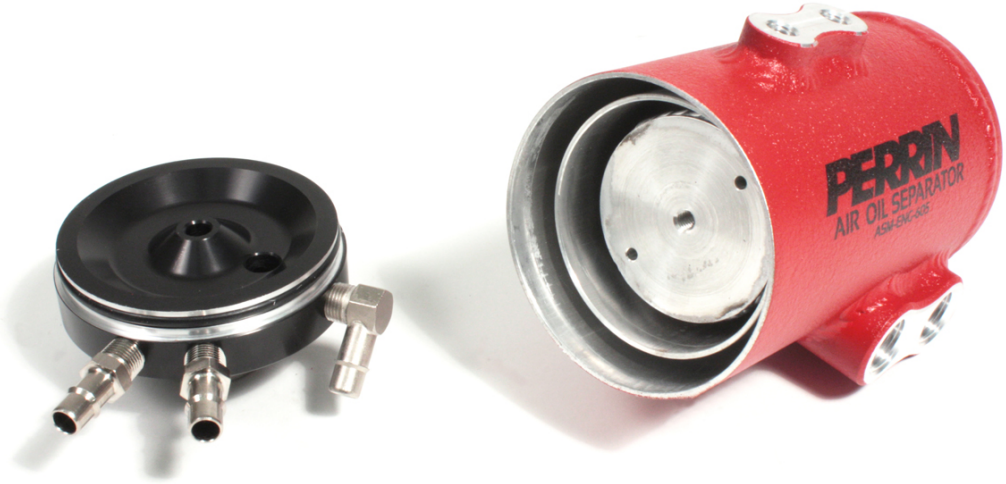
8. After AOS is completely installed, double check that all hoses and vacuum lines are connected and secured using a clamp. Any leak in the system can cause the engine to run poorly and will lead to unsafe engine conditions.
9. Check that all bolts and hardware securing AOS are tightened down.
10. Reconnect throttle body to intake manifold. **NOTE: Gasket can be reused if it was not damaged during installation.**
11. Using supplied zip ties, secure wire harness (removed in earlier step) toward shock tower or frame rail. **NOTE: Keep away from turbo charger to**

ensure no damage from heat occurs.

12. Using supplied zip ties, secure hoses to engine and other hoses. This will reduce the chance of abrasion wearing down hoses over time.
13. Reinstall intercooler pipes removed earlier and start car. Ensure its running as it was before. Turn off engine and add any coolant that was lost during installation. Restart engine and take car for test drive. If car is misfiring or check engine lights occur, recheck all aspects of install.
14. After roughly 10 minutes of driving, recheck all fittings for signs of leaking. If leaks are found stop and fix ASAP.

Maintaining your PERRIN AOS

- 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 from the inside. If you choose to do this, simply remove bolt in bottom of AOS using an M5 wrench and lightly twist bottom while pulling. This should free bottom from can.
- 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.
- Inspect installed O-ring and determine if it needs replacing. These can be purchased through PERRIN performance, or through one of our dealers.
- Put a small amount of grease on o-ring and reinstall bottom into AOS body.



Crank Case Vent Hook Up for Race Cars/Cars With Loosely Built Engines

- We have found that to help control oil entering the AOS you can alternatively remove the crank case vent hose from the system.
- If this is something you think you can benefit from, simply plug off Crank Case Vent Inlet on side of AOS, using supplied 3/8NPT plug. Then plug larger hole on PERRIN crank case vent junction using supplied 1/4NPT plug.
- This turns the PERRIN crank case vent junction into a drain only.
- You must ensure that left open vacuum ports on turbo intake system are plugged up if this method is chosen.

PCV Delete for Race Cars/Cars With an Extreme Amount of Blow-by

- While we do not recommend this for street driven cars, some racecars may want to disconnect the PCV side of the system. This can cause long-term issues on street driven cars, and is not recommended. For those who understand these risks and understand the reason for removing the PCV connection, please follow the below alternate instructions.
- Locate port on intake manifold that PCV was hooked up to. Remove fitting and install supplied 1/4NPT plug into manifold. **NOTE: This is a tapered type of fitting and seals when tight, not when bottomed out. Take care in not over tightening fitting as this can damage intake manifold.**
- Using supplied 1/2" emissions hose, connect AOS outlet to intake system somewhere before turbo and after air filter.
- Secure hoses with supplied hose clamps.
- If you find you have excessive of blow by and or smoking from car after this done, we recommend reinstalling PCV system as described above.

Questions, Comments and Suggestions Contact: Tech@PERRINperformance.com
Visit Our Website for Instant Chat Options at www.PERRINperformance.com
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