



# VERUS ENGINEERING

## AOS Kit and Accessories – Subaru VB WRX Install Manual



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### Document Revisions

Rev	Date	Author	Description
01	2022/4/6	T. Lang	Initial release of install manual
01	2023/7/14	D. Charman	1 <sup>st</sup> Revision of AOS with updated instructions

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## AOS Kit and Accessories for Subaru VB WRX – Install Manual

**1. Introduction**

**1.1. Overview:** Detailed instructions on installing the Verus Engineering AOS kit, as well as the accessories associated with the AOS kit, for the VB Subaru WRX.

**1.2. Difficulty:** Moderate

**1.3. Time Required:** 2-4 hours

**1.4. Tools Needed:**

- 1.4.1.** Ratchet
- 1.4.2.** 10mm Socket
- 1.4.3.** 12mm Socket
- 1.4.4.** 19mm Deep Socket
- 1.4.5.** 27mm Deep Socket
- 1.4.6.** Extension
- 1.4.7.** 4mm Allen Wrench
- 1.4.8.** Flathead Screwdriver
- 1.4.9.** Utility Knife
- 1.4.10.** Phillips Head Screwdriver
- 1.4.11.** Side Cuts / Hose cutter
- 1.4.12.** Needle Nose Pliers
- 1.4.13.** Teflon Sealant
- 1.4.14.** Tape Measure

**1.5. AOS Kit Components**

- 1.5.1.** (1) AOS, Assembled with (4) Desiccant filters and stainless mesh

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- 1.5.2. (1) AOS Bracket
- 1.5.3. (120) Inches 1/2" Rubber Hose
- 1.5.4. Hardware Bag
  - 1.5.4.1. (3) M6x1.0 BHCS x 16mm Long, Stainless
  - 1.5.4.2. (3) M6 x 12mm OD Washer, Stainless
  - 1.5.4.3. (2) M6 Serrated Flange Nut, Stainless
  - 1.5.4.4. (6) Zip Tie
  - 1.5.4.5. (1) 21-38mm O.D. Hose Clamp
  - 1.5.4.6. (1) 3/8 NPT to 1/2" Hose Barb
  - 1.5.4.7. (1) 3/8 Female NPT to 1/2" Hose Barb

**1.6. Coolant Add On Kit**

- 1.6.1. (1) Coolant Plate
- 1.6.2. (2) Banjo Bolt
- 1.6.3. (4) Banjo Washer
- 1.6.4. (2) 5/16" Banjo
- 1.6.5. (70) Inches of coolant hose
- 1.6.6. (4) M6x1.0 BHCS x 16mm Long, Stainless
- 1.6.7. (2) M6 x 12mm OD Washer, Stainless
- 1.6.8. (4) Hose Clamp, 9-16mm
- 1.6.9. (4) Zip Tie

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**1.7. Drain Back Kit Components**

- 1.7.1. (1) 1/2" Wye Fitting
- 1.7.2. (1) AOS Bottom Replacement Plug
- 1.7.3. (1) -6AN to 1/2" Hose Adapter
- 1.7.4. (14) Inches 1/2" Rubber Hose
- 1.7.5. (4) 7.5" Zip Tie
- 1.7.6. (1) #014 Buna O-Ring



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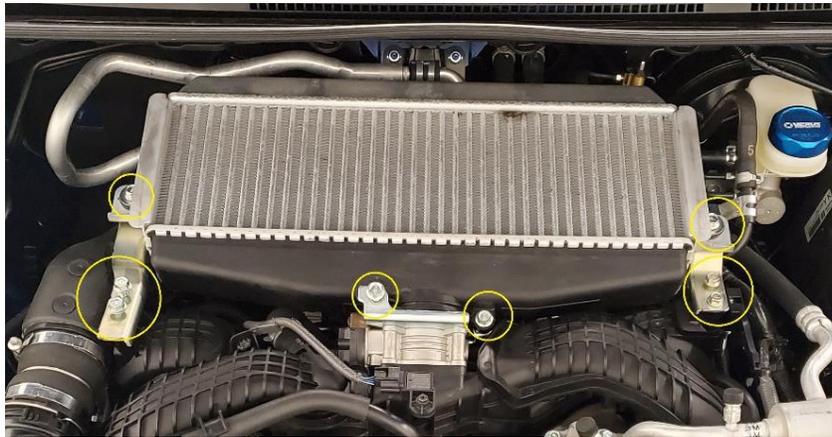
**2. Subaru VB WRX AOS install**

**2.1.** Verus Engineering is not responsible for damage to you or your vehicle by following this manual and/or installing Verus Engineering products.

**\*\*MAKE SURE THE ENGINE IS COLD BEFORE ATTEMPTING THIS INSTALLATION\*\***

**2.2.** Start by popping the hood.

**2.3.** For this install, we have to remove the intercooler. Start by removing the 12mm bolts circled below.



**2.3.1.** Disengage the retaining ring on the charge pipe. Do this by pulling up on the retaining ring. It is seated in the disengaged position in the below images.

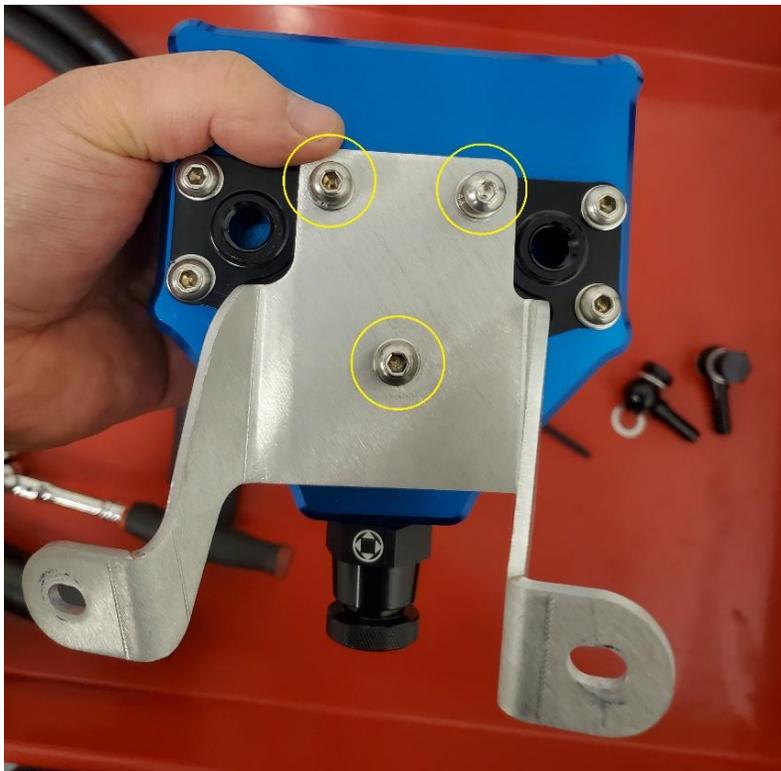


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**2.3.2.** Remove the intercooler, and charge-pipe assembly.

**2.4.** We will now begin the installation of the AOS to the bracket. Use three 16mm long BHCS, and 12mm washers as shown below. Torque the bolts to 6 ft-lbs. **NOTE: The coolant add-on plate is also installed in the picture below.** If you are installing the Coolant Add-on kit, refer to 3.0 now.



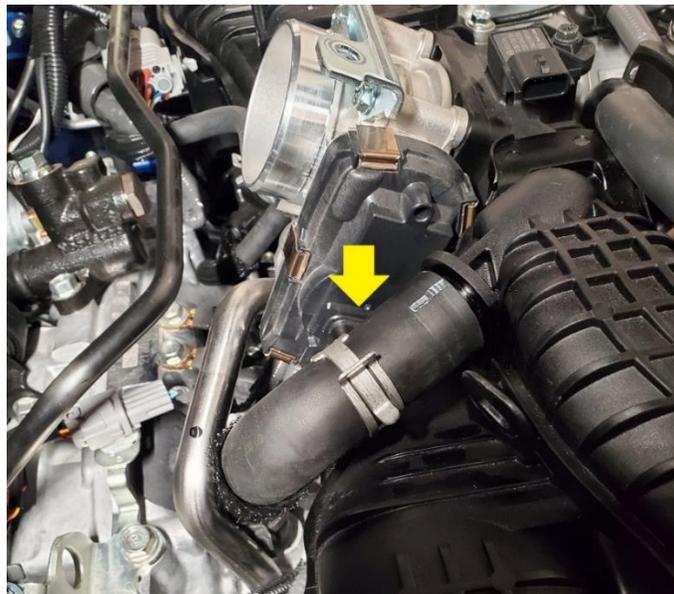
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- 2.5. Locate the two studs on the firewall (located on the passenger side), and install the AOS and bracket to the car using two M6 serrated flange nuts. Torque to 6 ft-lbs.



- 2.6. Remove the OEM PCV valve by first removing the large 7/8" hose, and clamps from the manifold and PCV valve itself.



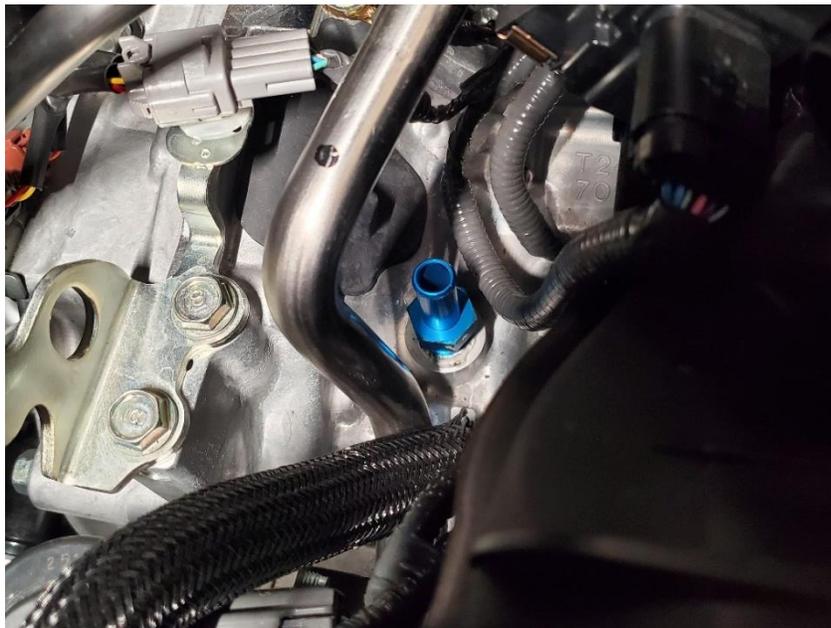
- 2.7. Remove the PCV valve.

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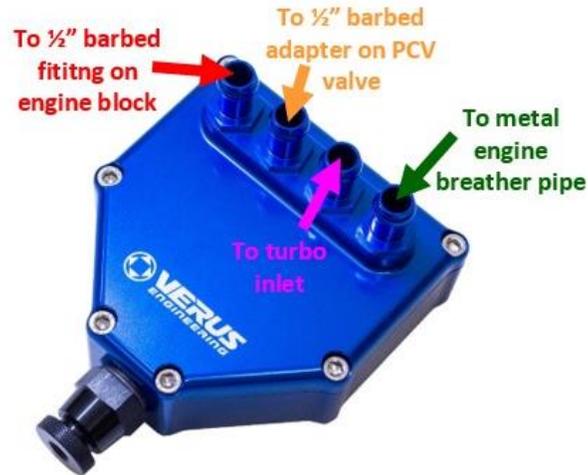
- 2.8.** Replace the PCV valve in the engine block with the provided NPT to 1/2" barb fitting. Clean and degrease the threads on both the fitting and the engine block (make sure no debris falls into the engine), and apply thread sealant to the threads on the provided fitting. Tighten the fitting about a 1/4 turn past snug. These are tapered threads, also known as NPT, and should **NOT** be bottomed out.



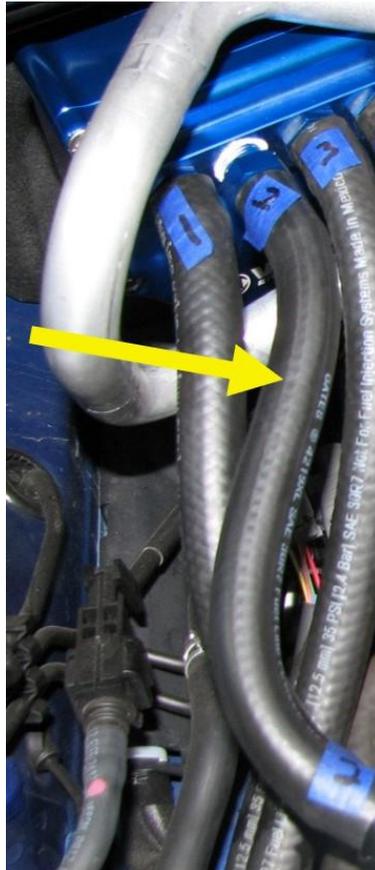
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- 2.9. Before we begin routing the hoses, familiarize yourself with the diagram below. It will help to have an idea where each hose is going prior to routing them.



- 2.10. Install roughly 9 inches of 1/2\" hose from the second fitting on the left.



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- 2.11.** Reinstall and rotate the PCV hose approximately 90 degrees to the left (as viewed from the front of the car) ensuring that the hose will not rub on the intercooler once it is refitted.



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- 2.11.1.** Now thread the PCV valve into the supplied ½” barbed adapter, make sure to use thread sealant and to thread them hand tight before tightening by turning 90 degrees clockwise (tightening) beyond snug. The threads are NPT again and will not be bottomed out. Note the image in 2.10.2 to see the fitting installed.
- 2.11.2.** With the PCV valve connected to the adapter, clamp the PCV valve to the original PCV valve hose using the OEM hose clamp and connect the 9” length of ½” hose to the adapter.



- 2.12.** Now that we have the PCV side finalized, let us begin routing the remainder of the hoses. Keep in mind, all cut lengths are estimated and you should double check before cutting any hose length. Also route hoses however you feel best and by using our guide as just that, a guide.
- 2.13.** Next, install the 21 inches of ½” hose from the first ½” barb fitting (1) on the AOS and install the other end to the NPT to 1/2” barb fitting from 2.8. If you are installing the AOS Drain Back Kit, it is recommended to **refer to 4.0 now**.



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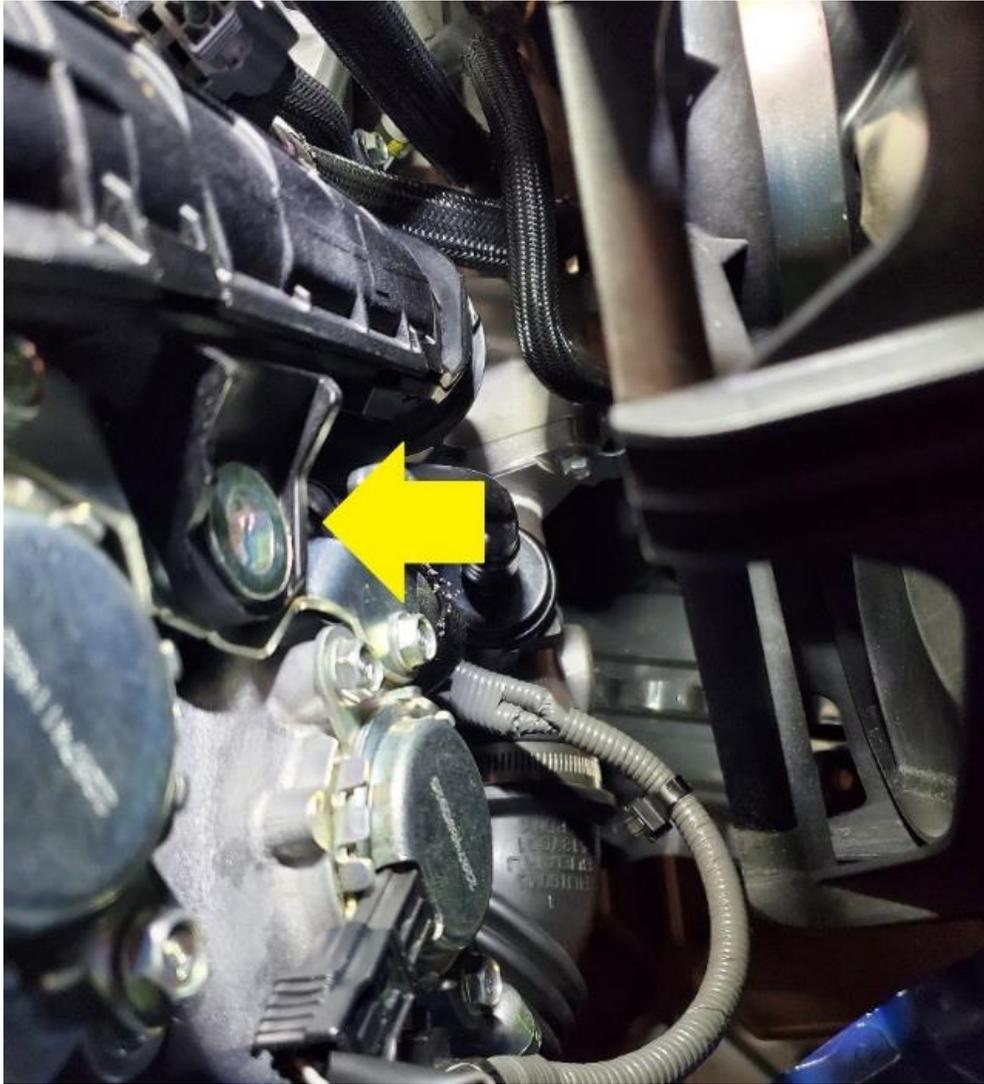
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**2.14.** Next, we need to remove the remaining charge-pipe.

**2.14.1.** Remove the 12mm head bolt located between the passenger side cam actuators as shown below. The radiator is on the right side of the below image as well.

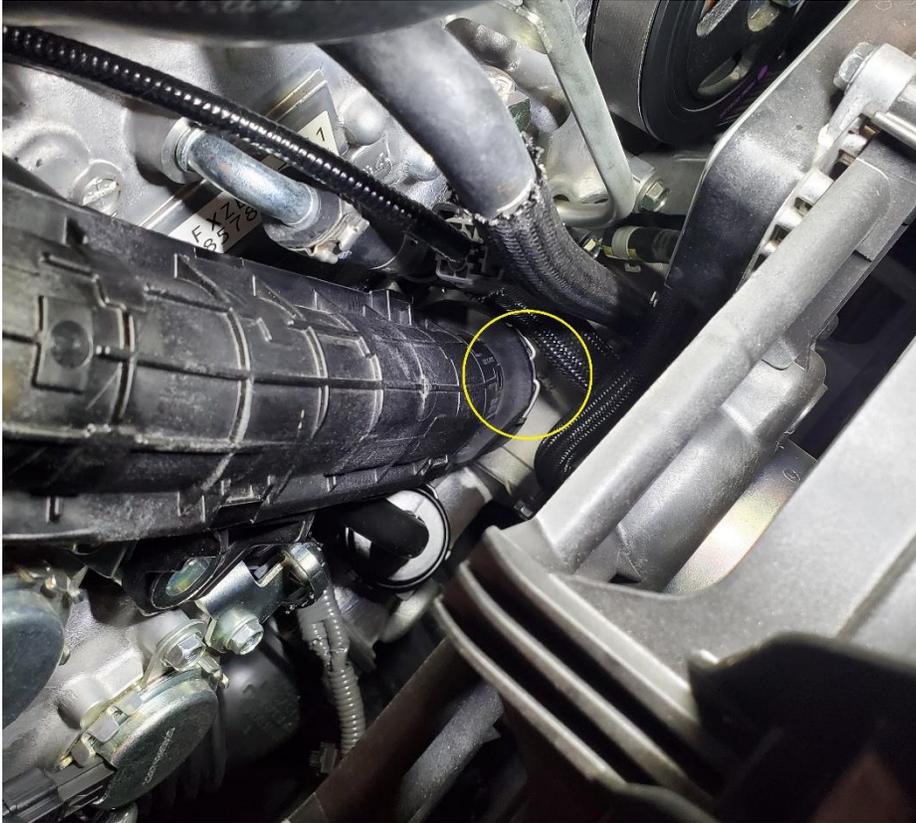
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- 2.14.2. To remove the charge-pipe, we need to pull up, and release a metal clip just like in 2.3.1.



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- 2.15. Remove the charge-pipe.
- 2.16. Now locate the fitting for the engine block breather tube between the A/C compressor, and alternator. Cut the engine breather tube in half.



- 2.17. Where the tube meets the fitting for the engine breather tube slice the tube lightly where it is pressed onto the fitting. We recommend doing multiple light slices to prevent damaging the fitting. Once you slice through the tube, remove it.

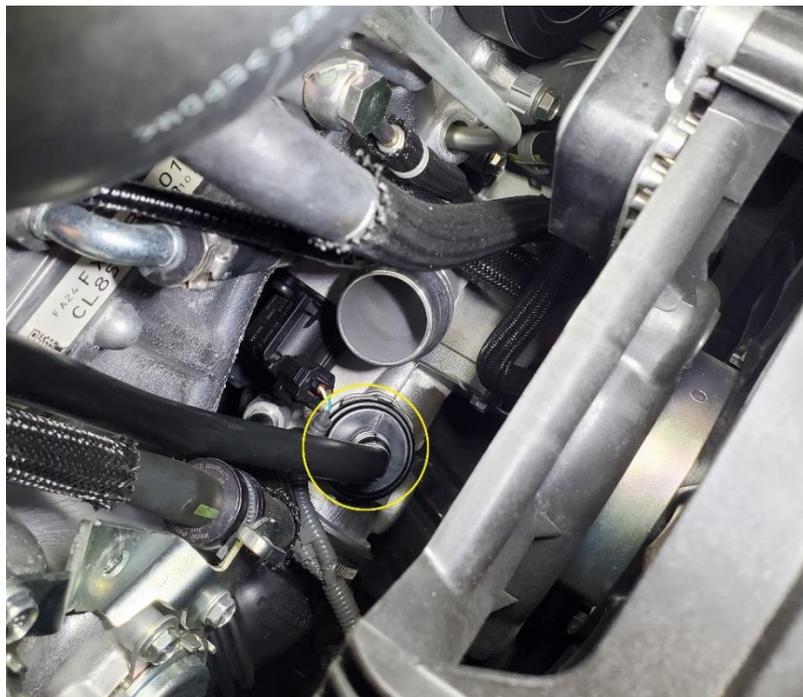


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- 2.17.1.** Following the other half of the tube down to the turbo inlet, you will notice there is another metal clip to release in order to remove the fitting. Take note of where the tube is routed. This is where the AOS hose will also be routed.



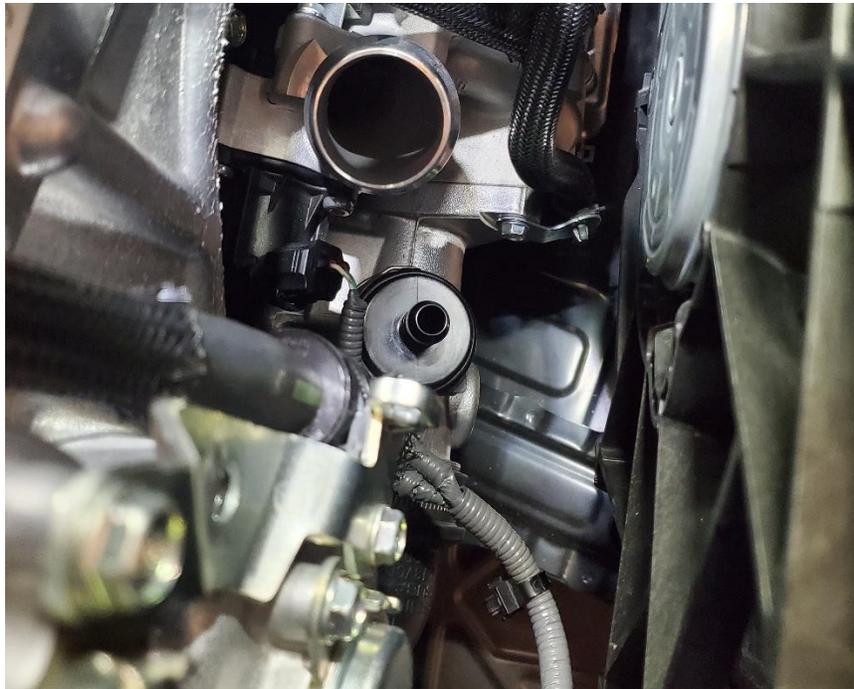
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- 2.17.2.** With the metal clip released, pull the tube out and perform the same steps to remove the tube from the fitting.

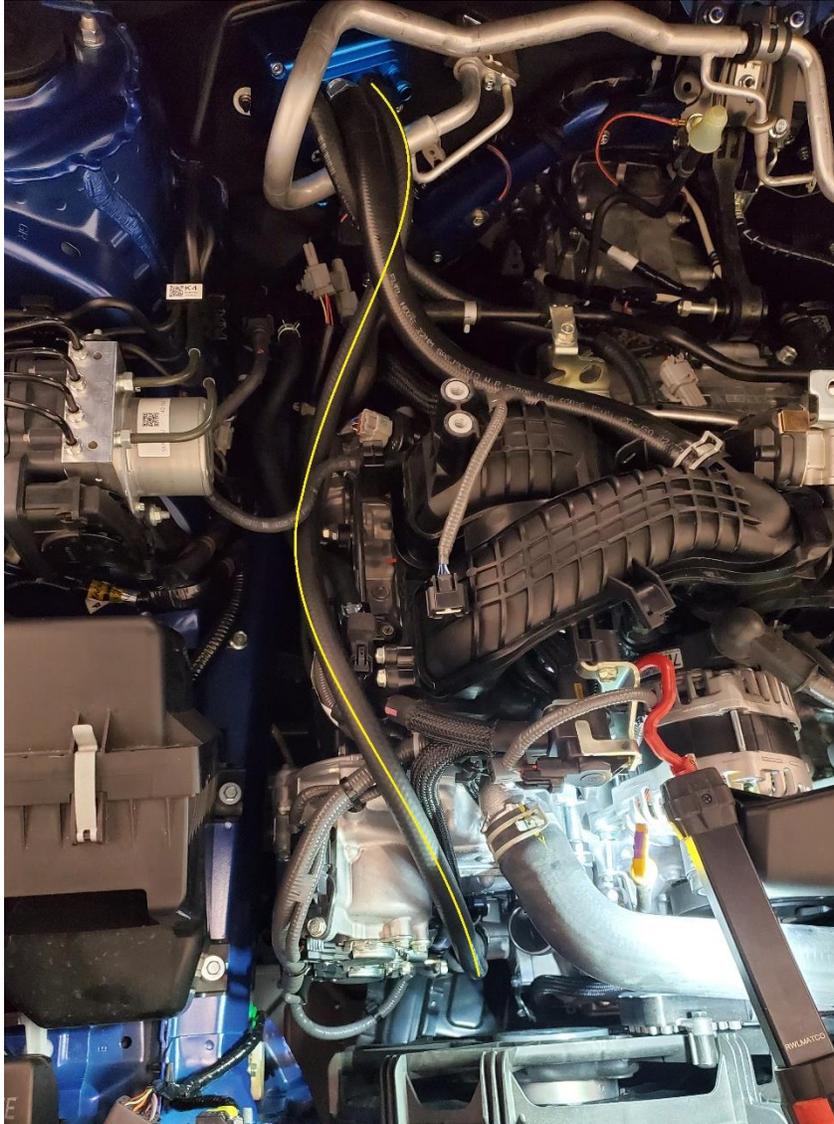


- 2.17.3.** Install the fitting back on to the turbo inlet.



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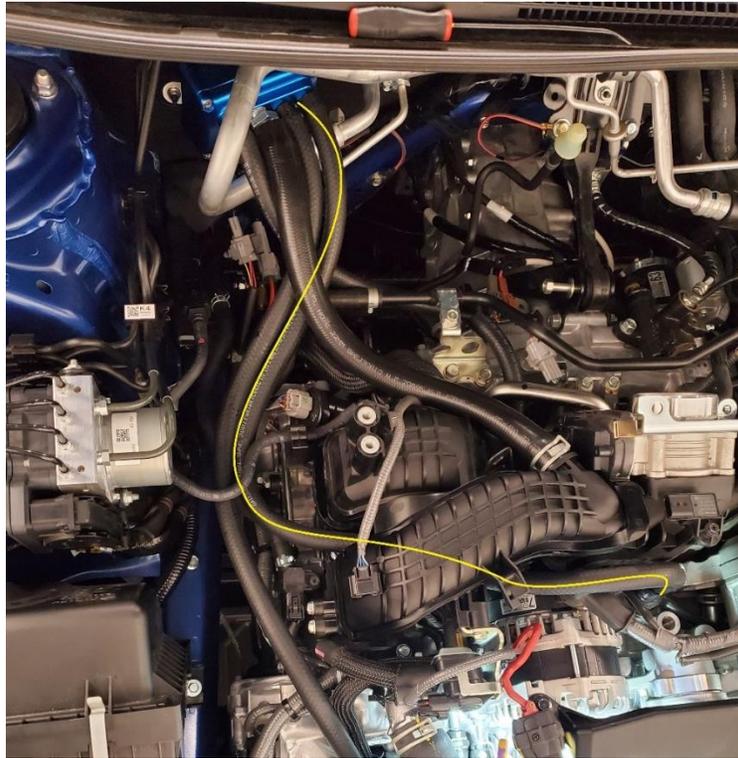
- 2.18.** We are now ready to route the hoses for the engine breather side.
- 2.19.** Cut ~39.5 inches of ½” hose and route it from the AOS fitting next to the PCV valve to the turbo inlet. The hose should be routed against the timing chain cover where the OEM breather tube used to be.



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- 2.20.** Next, cut ~35 inches of ½” hose, and route it from the last AOS fitting available to the engine breather tube. Route this next to the hose going to the turbo inlet, and then cross under the intake manifold.



- 2.21.** At this point, all of the connections for the base AOS kit are made. If no accessories are being installed, the installation is complete. Simply reinstall the charge-pipes and intercooler in reverse order.
- 2.22.** Congratulations on installing the VB WRX AOS with optional drain back, and coolant add-on kit!
- 2.23.** For any questions or comments, please send us and e-mail at [sales@verus-engineering.com](mailto:sales@verus-engineering.com).

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**\*\*Optional Coolant Add-on Kit install\*\*****3. Coolant Add-On Kit Install**

- 3.1.** Locate the Coolant Plate. Notice the o-ring that is pre-installed. If it has come off during shipping, simply reinstall as shown below.



- 3.2.** Install the coolant plate between the AOS, and the mounting bracket. Use seven 16mm long M6 BHCS, and torque to 6 ft-lbs. Make sure the o-ring does not become unseated and get pinched.

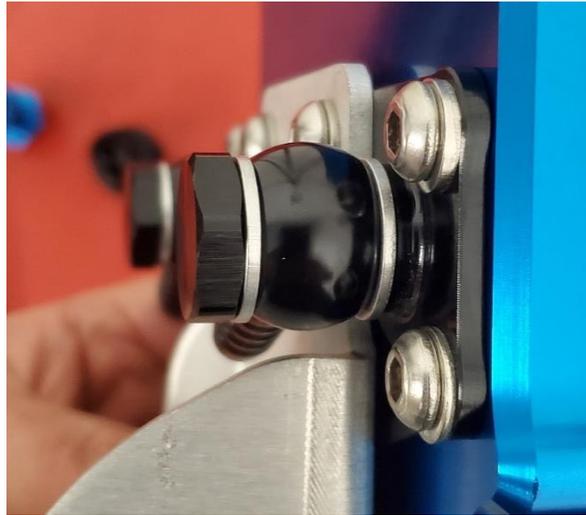


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- 3.3.** Install the banjo bolt, and fittings. The barbed banjo fitting should be between the two crush washers. Clock the banjo fittings as shown (towards the driver side), and tighten the banjo bolts.

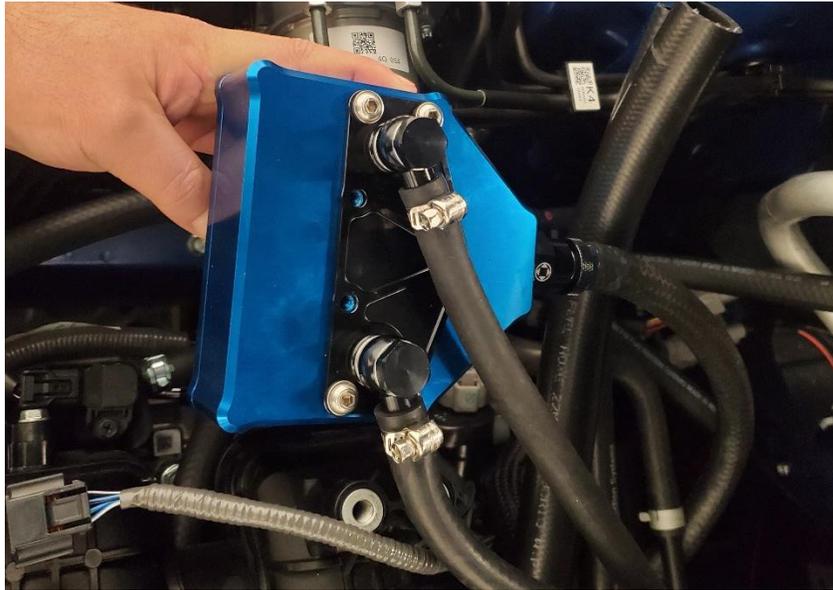
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**3.4.** Cut two lengths of 5/16" coolant hose. Cut one to 32 inches long, and the other to 30.5 inches.

**3.5.** Using the supplied hose clamps, attach the shorter hose to the banjo fitting closest to the driver side, and the other to the passenger side.

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- 3.6.** Bolt the AOS to the fire wall with the two M6 serrated flange nuts just as you would have in **2.5.** Torque the nuts to 6 ft-lbs.

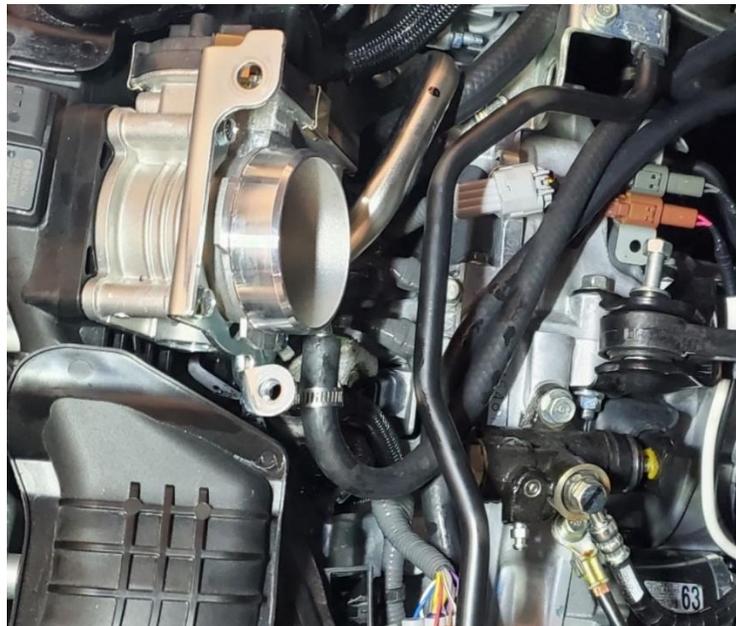


- 3.7.** Next locate the throttle body coolant hose that we will need to remove. It is directly under the throttle body opening.

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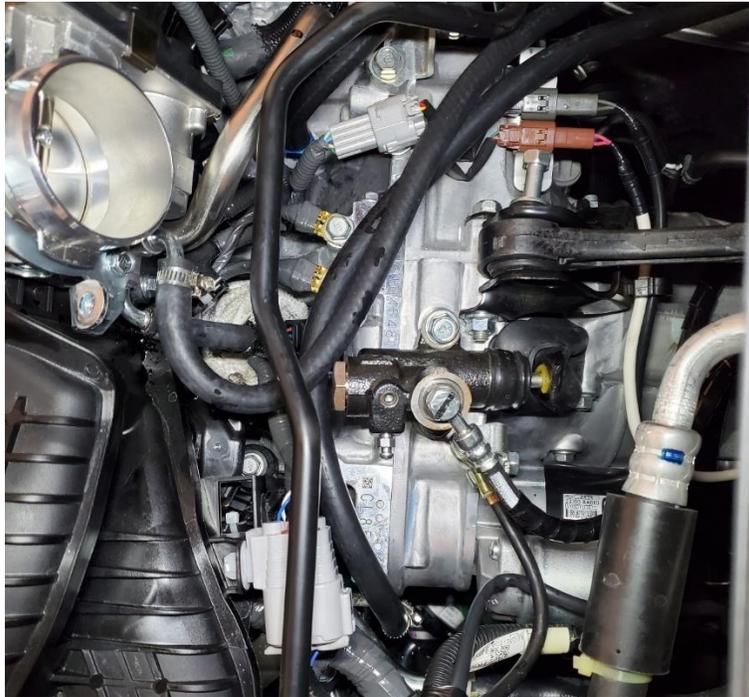
- 3.8. As shown above, pinch the coolant line off using some needle nose Vise Grips or hose pinchers.
- 3.9. Remove the coolant hose from the throttle body, and replace it with the coolant hose coming from the driver side banjo fitting. Tighten the clamp on the AOS coolant hose. **NOTE:** A small amount of coolant will drip out of the throttle body when the hose is removed.



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- 3.10.** Follow the OEM coolant hose to its' next attachment point behind the driver side cylinder head. Remove the clamp, and the OEM coolant hose all together. Replace that connection with the other AOS coolant hose. Tighten the clamp for the AOS coolant hose.

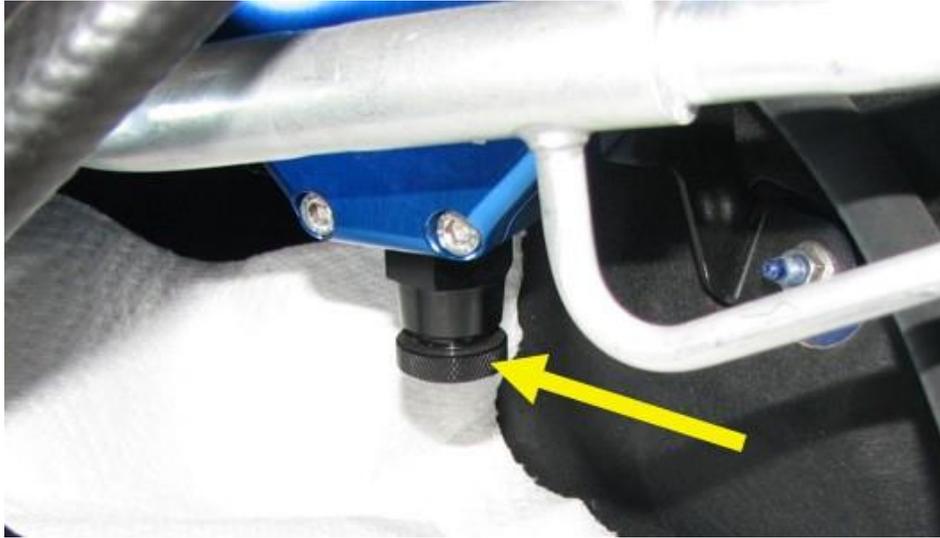


- 3.11.** Secure the hoses away from any sharp edges or abrasive surfaces with the supplied zip ties.
- 3.12.** Continue back with the install manual at 2.6.

**\*\*Optional Drain Back Kit Install\*\*****4. AOS Drain Back Kit install**

- 4.1.** Start by unscrewing the plug at the bottom of the AOS. You can place some paper towel here in case some oil drips out.

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- 4.2. Swap the o-ring over from the knurled plug fitting to the new threaded adapter with the through hole shown below.



- 4.3. Fit the supplied o-ring to the black 6AN to 1/2", ensuring that it is located after the thread.

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- 4.4. Then, install the black 6AN to 1/2" barb into this and torque to 8 ft-lbs. A photo of this is shown below. **When installing the black 6AN to 1/2" nipple, do so with the knurled fitting already installed on the AOS.**



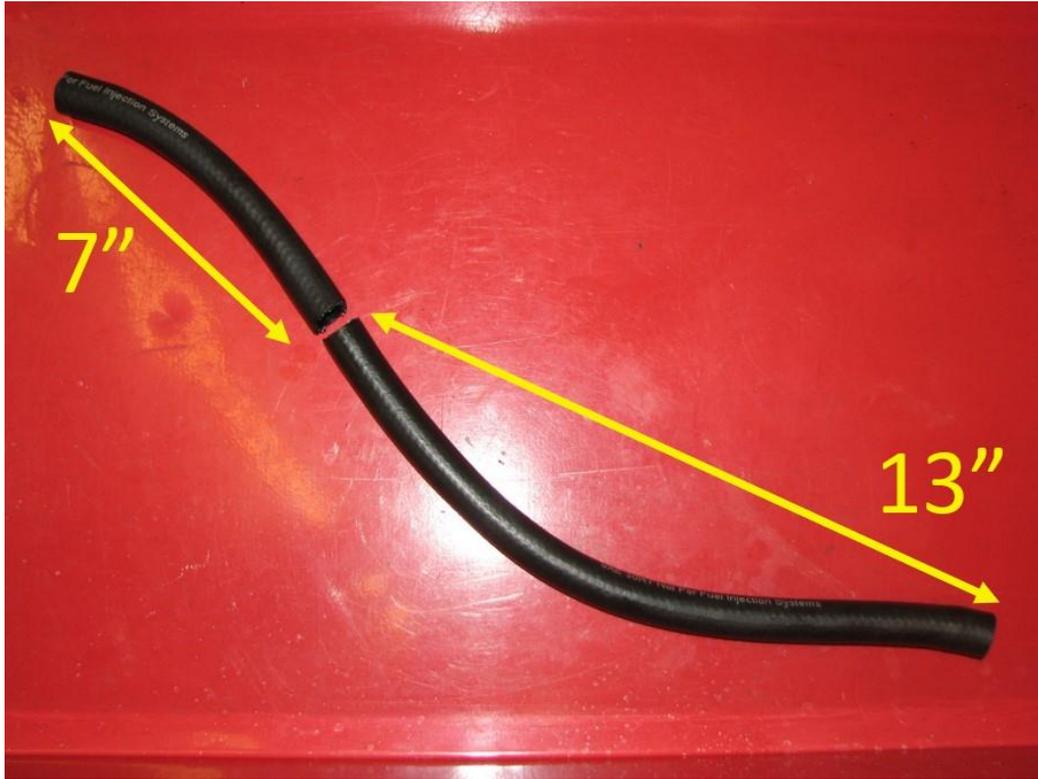
- 4.5. Locate the hose going from the AOS to the 1/2" adapter fitting installed in the engine block.



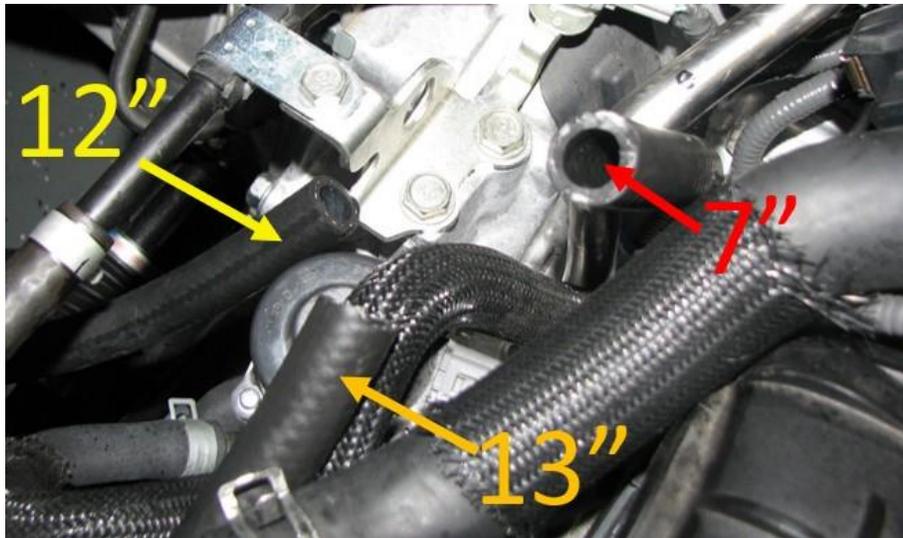
- 4.6. Remove the hose from the AOS and cut it into two pieces. One should be approximately 13 inches, and the other should be approximately 7 inches.

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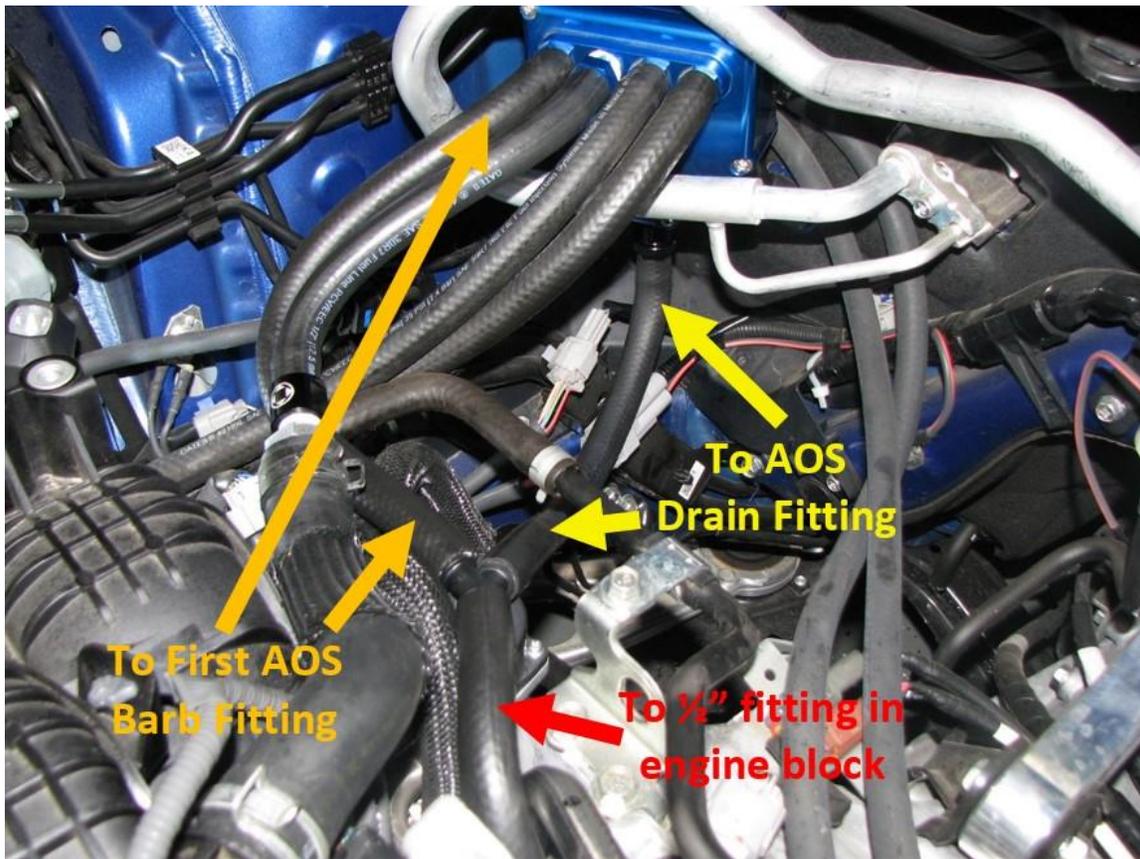
- 4.7. Install all three hoses to the car, the 7 inch section goes to the  $\frac{1}{2}$ " adapter installed in the engine block. The 13 inch section goes to the first barbed connector on the AOS and the supplied 12 inch section goes to the drain plug on the bottom of the AOS.



- 4.8. Using the supplied "Y" fitting, combine all three hoses as shown below

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4.9. Continue on with the installation at 2.15.