



INSTALLATION INSTRUCTIONS

AOS-R (Air Oil Separator-Return)

02-14 Turbo Subaru and 2015+ STi

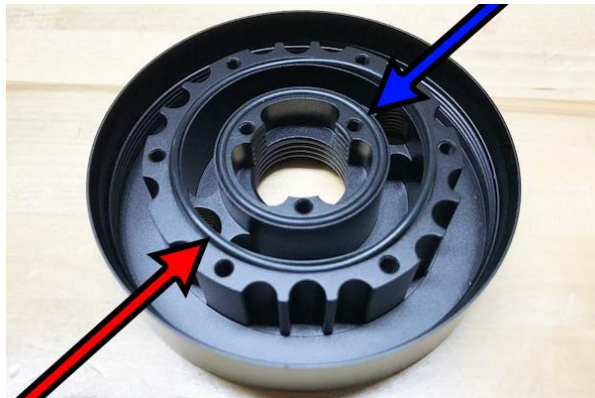
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Support: info@radiumauto.com

These instructions are based on a vehicle with an OEM turbocharger and top-mount intercooler. If a front-mount intercooler is used, or a rotated turbo setup, some steps may not apply and the installation may have to be modified according to the vehicle setup.

1. ENGINE FAILURE MAY OCCUR IF THE AOS-R IS NOT PROPERLY ASSEMBLED

First, place the two provided O-rings into the two O-ring grooves shown.



2. Place the green coolant seal plate on top of the O-rings. This CANNOT go on upside down but it goes on in a VERY specific orientation. The outer fins and all 9 bolt holes should align perfectly, as shown.



3. Apply a high strength thread locker and secure all 9 included button head bolts using a 5/64" Allen hex wrench.



4. Using multi-purpose oil, lubricate the AOS-R lower O-ring.



5. Spin the bottom heating section to the AOS-R.



6. Remove the intercooler by loosening one hose clamp on the throttle body and one on the small coupler coming off the turbocharger outlet. Remove the bolts from the mounts on each side of the intercooler. Unbolt the recirculation valve from the intercooler (leave it connected to the hose). Unbolt the black metal crank breather piping from the bottom of the intercooler. Carefully lift out the intercooler and set aside.

NOTE: If removing the 2015+ STi "sound generator tube" to increase accessibility, see Subaru intake hose P/N: 46013AG020 (if still using the OEM intake).



7. The following step is required only for certain late model Subaru vehicles.

Disconnect the large connector for the ECU wiring harness from the mounting bracket located on the right hand strut tower. Unplug the connectors and relocate the wiring harness downward toward the frame rail. Reconnect the wiring harness plugs. Make sure the connectors are fully engaged and the lever is closed.

Secure the harness away from moving parts by using the included zip ties. Check to make sure the harness is not being pulled, twisted, or stressed in any way.

Remove the harness mounting bracket, it will not be reused.

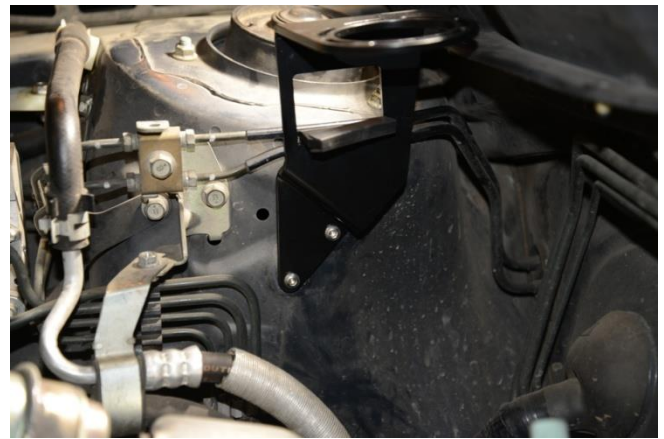


8. Locate the AOS-R mounting bracket in the kit and the small piece of rubber trim.

Mount the rubber trim to the support flange on the bracket and cut to length with scissors.



9. Secure the Radium mounting bracket in place using the two included M6 bolts using a 4mm Allen wrench, as shown.



10. Remove the throttle body from the intake manifold.

Disconnect the water lines and electrical plugs and set the throttle body aside.

Disconnect the recirculation (blow-off) valve hose from the intake pipe and set aside.



11. Locate the PCV valve fitting underneath the turbo compressor. Remove the small hose going to the intake manifold.

Remove the larger hose going to the intake pipe. Use the rubber cap included in the kit to plug the nipple on the intake pipe after the hose is removed.



12. Remove the hose barb fitting from the intake manifold.

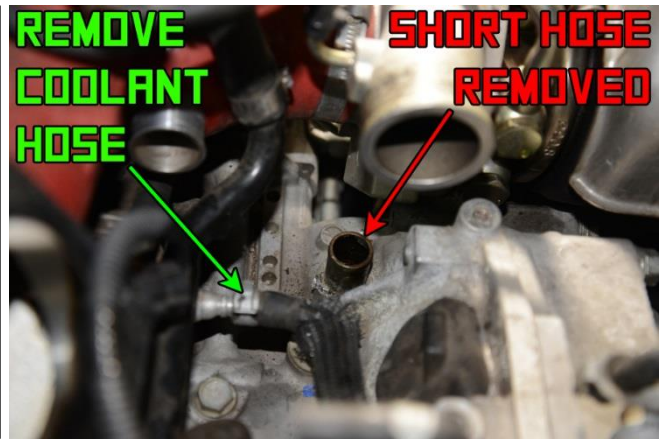
Plug the hole using the threaded plug included in the kit.

Use a small amount of Teflon paste or tape on the threads.



13. Remove the PCV fitting and the small section of rubber hose from the port on the engine block, as shown in RED.

Also disconnect and remove the coolant hose shown in GREEN. The OEM hose clamps will be reused.



14. Install the included $\frac{3}{4}$ " ID PCV hose onto the engine block nipple and secure in place using the included spring hose clamp, as shown.

Route the $\frac{3}{4}$ " ID hose under the turbo outlet and toward the firewall. NOTE: If the top mount intercooler is still being used, modification to the OEM steel bracket mount may be required to avoid hose kinking.



15. Prepare the AOS-R for installation. First, lubricate the O-ring on the 8AN male fitting with light oil. Next, fully tighten the fitting into the side port.

Lubricate the O-rings on the 2 small hose barb adapters with light oil. Next, fully tighten these fittings into the bottom of the AOS.

Before installing the AOS-R large -12AN lower banjo bolt fitting, make sure the 8AN fitting will point towards the front of the vehicle. Next, install the large 12AN banjo bolt fitting into the bottom port of the AOS so that the lower banjo will point at about a 45 degree angle towards the center of the firewall. Make sure to use a crush washer on each side of the banjo and finger tighten.



16. Temporarily mount the AOS-R to the bracket. Route the $\frac{3}{4}$ " hose from step 9 to the bottom banjo bolt fitting. Arc the hose so that it keeps a safe distance from the hot turbocharger and downpipe. Cut it to an appropriate length for best fit (roughly ~26"). When the proper length has been achieved, lubricate the -12AN hose end barbs and fully insert it into the $\frac{3}{4}$ " hose.

Adjust the rotation of the lower banjo bolt, if needed. NOTE: If there is not a clear path for the large $\frac{3}{4}$ " (12AN) return hose or there is a miscellaneous obstruction, **the complete AOS-R unit can also be adjusted in the mounting bracket's slotted holes for proper clocking.** When oriented correctly, tighten the lower banjo bolt to 25 ft-lb using a 28mm (1-1/8") socket.

Do not secure the AOS-R to the mounting bracket at this time.



17. Locate the included 5/16" heater hose in the kit.

Cut one section to ~28" and install it to one of the hose barb nipples on the bottom of the AOS.

Attach the remaining piece of 5/16" heater hose to the other hose barb nipple.

Secure both heater hoses to the AOS-R using the included spring hose clamps.

NOTE: The AOS-R coolant ports are interchangeable.



18. Once properly clocked, the AOS-R can be bolted to the bracket. Using a 3mm Allen wrench, tighten the seven included M5 bolts to the AOS-R.

Connect the 3/4" hose (with hose end) to the lower banjo fitting and tighten.

Route the coolant hoses from the AOS-R along the strut tower. Pass them underneath the power steering lines and towards the engine, just in front of the wastegate actuator. Next, run them over the top of the turbo intake pipe to the area of the throttle body.

Secure the hoses in place using the included zip ties. Make sure the hoses are not kinked, twisted, or routed near any sharp edges that may chafe the hose.



19. Attach the 28" heater hose to the coolant manifold nipple from step 13.

Cut to length, if necessary.

Reuse the OEM spring hose clamp.



20. Reinstall the throttle body.

Connect the other 5/16" heater hose from the AOS-R to the nipple underneath the throttle body opening. Reuse OEM spring hose clamp, as shown. Reconnect the factory coolant hose to the nipple on the side of the throttle body.

Plug in the electrical connectors for the throttle body.

Reinstall the intercooler.



21. To attach the AOS-R side “vent” port to the turbo inlet pipe, measure and cut the ½” PCV hose (it will be roughly ~23”). Next, attach this ½” PCV hose to the nipple on the turbo inlet pipe and secure with the factory clamp.

Optional: To run the AOS-R in a VTA (vent to atmosphere) configuration, purchase Radium 20-0050 10AN ORB to Air Filter and install into the side “vent” port, as shown. NOTE: Only a Speed Density system using a MAP sensor should be used with a VTA configuration. Running a Mass Air Flow system can be used, but because this pre-metered air will not be burned in the engine, the mass air input for the ECU will be incorrect.



22. Remove each hose from each valve cover vent port (right side and left side).

Retain the factory spring hose clamp from the connection to the valve cover as they will be reused.



23. Assemble the banjo fitting for the top port of the AOS-R. Make sure a crush washer is used on each side of the banjo. Do not tighten the banjo bolt at this time. Lubricate the -10AN straight hose end barbs and install into a section of the included 5/8” PCV hose. Cut the hose to length (roughly ~7”).

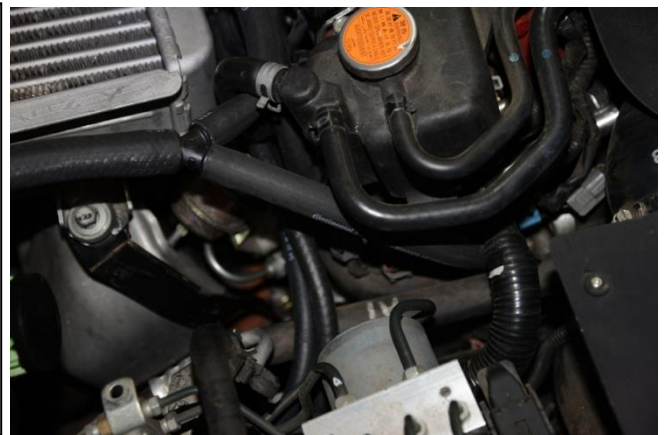
Screw the hose end (with hose) onto the banjo fitting and tighten. Point the hose toward the corner of the intercooler. Tighten the banjo bolt to 25 ft-lb.

Next, remove the metal valve cover vent pipe from the intercooler. This will not be reused.



24. Fully insert the plastic Y-fitting into the 5/8” PCV hose, as shown. Use a section of the included ½” PCV hose to go from one branch of the Y-fitting down to the right side valve cover vent port. Cut the hose to length (roughly ~13”) and secure to the vent port using the factory spring hose clamp.

NOTE: Clamps are NOT needed on the Y-fitting.



25. Use the remaining ½" PCV hose to make a connection between the left side valve cover vent port and the other branch of the Y-fitting. Cut the hose to length (roughly 36").

The ½" PCV hose is routed over the intake manifold in the picture for clarity. The hose may also be routed under the intake manifold for a cleaner appearance.

Secure the ½" PCV hose to the left side vent port using the factory spring hose clamp.



26. Remove the OEM valve cover vent hose from the air intake pipe.

Plug the nipple with the included rubber cap.



27. Some late model Subaru vehicles will have an electrical connector tube (shown) on the OEM hose that routes to the turbo inlet pipe.

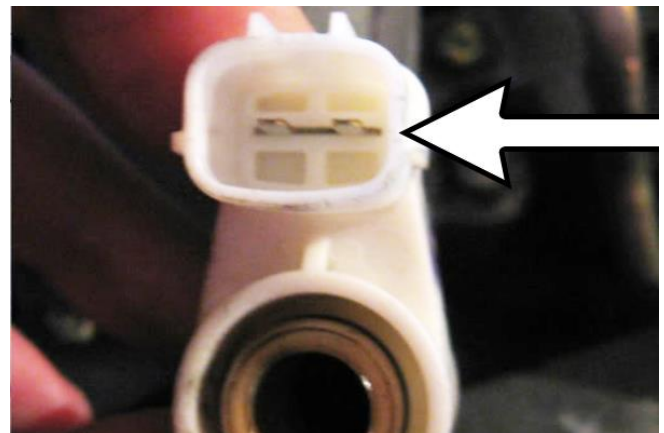
This PCV leak detection plug is used to communicate to the computer for diagnostic purposes. In particular, for cases when the PCV system is mistakenly disconnected.



28. Using needle nose pliers, carefully pull to dislodge the small metal jumper shunt (shown) inside the PCV leak detection diagnosis connector. It is not a resistor.

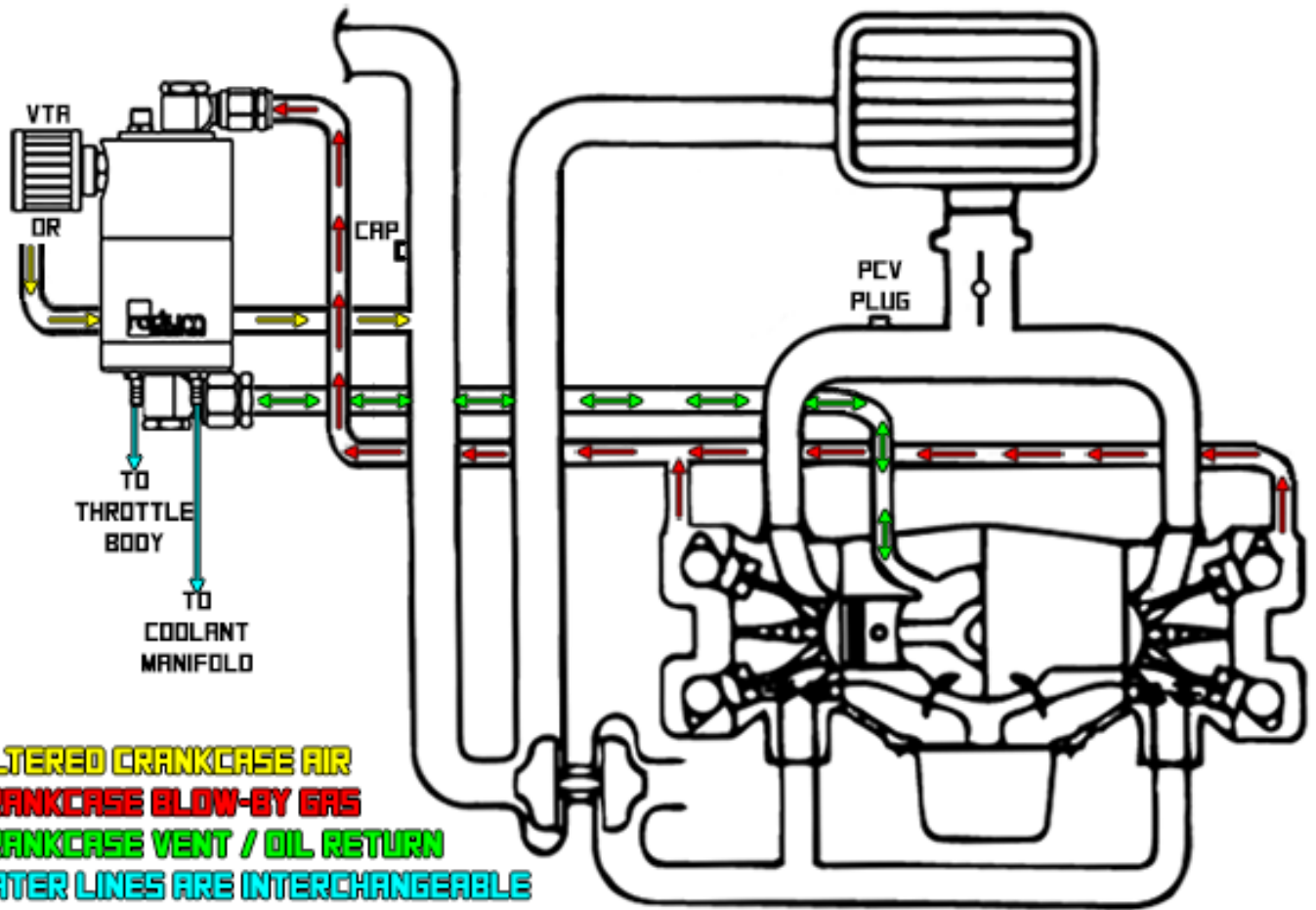
Next, attach this piece to the wiring harness female terminals. Insulate this wiring junction with electrical tape to prevent accidental shorting.

The mating connector should be tucked out of the way.



29. Installation is now complete.

Start the vehicle and check for leaks in the coolant system. Top off cooling system, if necessary.



FILTERED CRANKCASE AIR
CRANKCASE BLOW-BY GAS
CRANKCASE VENT / OIL RETURN
WATER LINES ARE INTERCHANGEABLE

