

2013 Jaguar XF AWD 3.0L supercharged engine

March to June 2022 – Coolant system repairs and parts replacements

There was a leak behind the water pump. It was unclear if it was the water pump, the outlet pipe behind the water pump, or the plastic "h" shaped pipe that is behind the water pump. I decided to pull the supercharger and the plan was to:

- Replace the plastic welded seams coolant pipes (upper and lower) with redesigned pipes
- Replace the water pump
- Replace the outlet pipe behind the water pump
- Replace the rear crossover plastic piece
- Replace gaskets
- Replace the supercharger oil

In the end, I ended up also replacing the hose that runs under the supercharger and the rubber hose that connects the rear crossover pipe to the aluminum pipe with the bleeder screw.

Disassembly

- Inflated tires to 42 psi (to avoid flat spots, since it may be sitting a while...)
- Elevated the front of the car onto wooden ramps (4.5" elevation).
- Removed the engine rear undershield.
- Removed the radiator splash shield.
- Drained the radiator.
- Removed left and right air filter housing tops and adjacent plastic air hoses.
 - Disconnected electrical connectors from air filter housing tops.
 - Disconnected rubber hose from left-side air intake connector pipe.
- Removed upper radiator hose.
- Removed upper crossover coolant plastic piece.
 - Disconnected black rubber hose from front of supercharger.
 - Disconnected gray electrical connector just behind crossover coolant part.
- Removed plastic T-shaped air intake piece connected to throttle body.
 - Note: Plastic part has damage where it connects to the throttle body (under the hose clamp). Implemented a repair using non-hardening gasket material and masking tape.
- Removed throttle body.
 - Disconnected electrical connector on right side of throttle body.
 - Disconnected the rubber coolant hose that runs to the engine rear, under the supercharger. Had to pry off the one-time use ear clamp. Will need to use a regular hose clamp during reassembly.
 - Disconnected the rubber hose that connects to the coolant overflow tank at the coolant tank (but left that hose connected to the throttle body).
- Removed the windshield wiper arms.
- Removed the fuse boxes' plastic cover.
- Removed the plastic cowl in front of the windshield.
- Removed the mini black cowl underneath the windshield cowl. Retained by 2 plastic push pins towards the rear.
- Removed metal cowl crossbar support. Notes: rusty bolts were on the inside holes. Maybe swap those to the outside holes on re-assembly. Note: The coolant overflow tank has a plastic tab that slides into a bracket on the crossbar piece.
- Removed the 4 coolant lines connected to the sides of the supercharger. (Connector must be pushed in, then squeeze the sides, then retract the connector.)
- Detached gray sensor with orange fabric strap from left rear of supercharger housing.
- Detached the two black hoses from their holders at the left rear of supercharger housing and removed the bracket.
- Removed last bolt on coolant expansion tank and moved the tank off to the side.

- Removed the left side rubber panel between the engine and the coolant expansion tank.
- Disconnected wiring connector at front top center of the supercharger.
- Removed metal fuel pipe at front of supercharger. 4 bolts. 17 mm open wrench. It was not very much effort to remove the compression joint nuts on each end.
- Removed the left-side pipe connected to the center front of the supercharger (behind where the throttle body attaches). (Note: compress the wide tab on the right side of the connector when removing.)
- Removed the serpentine belt from the supercharger pulley.
- Removed the black hose and the electrical connector from the left rear of supercharger.
- Detached the above referenced black hose from the two clips on the bracket attached to the rear of the supercharger.
- Detached the black metal bracket directly behind the supercharger that appears to hold a section of the wiring harness (the symposer?).
- Removed the top cover of the supercharger. Note: the four interior 10 mm hex head bolts also had to be removed.
- Removed the 6 bolts attaching the lower section of the supercharger.
- Pried the front of the supercharger to get it to break free. Then it was stuck on a pair of alignment pins. Used a Wonderbar on the sides to pry up a bit at a time, alternating the prying on each side. Got it to break free fully.
- Lifted the supercharger up and off by attaching 90 degree brackets on all 4 corners, some climbing rope tied into loops, and a pair of 8 foot 2x3s. (Two person lifting job.)
- The rubber hose from the throttle body to the rear crossover pipe was attached to the bottom of the supercharger. Removed the two plastic clips attaching that hose. Broke the front-most clip when removing it.
- Removed the 2 bolts on the "coolant outlet pipe – lower" (the "h" shaped plastic piece in front of the oil cooler) and removed the pipe. The right side connector into the block was broken off. **Seems like the culprit for the coolant leak.**
- Removed the rear crossover pipe. 3 bolts attach on each end of the pipe. Disconnected the gray electrical connector. Pushed out 3 wiring harness "push pin" retainers. Left the smaller hose that runs under the supercharger connected to the cross over pipe. Disconnected the larger rubber hose on the right side, but left the hose clamp for the rubber hose on the end of the crossover pipe. (Note: Will need to transfer the plastic hose connector (with the two side green squeeze pieces), where the large coolant hose connects to on the right, from the old pipe to new pipe. Will also need to transfer the hose clamp to the new part prior to install.) Note: decided later to just replace that hose that connects to the rear crossover pipe. See note in reassembly section.
- Loosened the inner main serpentine belt off the pulleys.
- Removed the idler pulley near the water pump (which blocks one of the water pump mounting bolts).
- Disconnected the rubber hose from the small plastic connector on the front of the water pump. (Left the plastic connector mounted to the water pump.)
- Removed the bolt for the thermostat housing bracket (to allow more range of movement when detaching the big rubber hose from the water pump).
- Detached the large rubber hose from the water pump.
- Removed the 4 bolts on the water pump.
- Removed the water pump.
- Removed the water pump gaskets. Cleaned the gasket faces on the block using a gasket scraper.
- The water pump left side bolts showed corrosion, so chased both of those threads (M6x1.0) in the block. Right side bolts showed no corrosion.
- Removed the small water outlet pipe directly behind the water pump.
- Used a pipe cleaner to clean out the water pump bolt holes in the block, the block holes for the "crossover pipe – lower", and the block holes for the supercharger base. All of these holes are blind (not through holes) and you can't have coolant or oil sitting in them when tightening bolts.
- Removed the plastic connector from the front of the original water pump and it broke during removal. Found a brass replacement for the broken connector on Ebay.

- Made 4 supercharger mounting guide pins (from M8 x 1.25 x 60mm bolts). Cut off the bolt heads; ground the cut end smooth; chased the threads.
- Repaired the large air intake "T" piece. Used Permatex non-hardening gasket material.
- Cleaned both mass airflow sensors.
- Replaced the supercharger oil. About 3.5 to 4 ounces came out. Re-filled with ~5.2 ounces.
- Cleaned gasket mating surfaces top and bottom on the supercharger.
- Cleaned gasket mating surfaces above the intake valves.
- Cleaned the intake valves. Used Giraffe USB inspection camera to view the intake valves on my laptop. Rotated the main crank clockwise (24 mm socket + torque wrench) to verify valves were closed before cleaning. Used a stainless steel wire brush, 6 mm head, 1/8" shaft diameter, extended length shaft, on the end of a flexible extension cable, driven by my drill. Also scrapped carbon off using a screwdriver. Blew out debris using compressor air nozzle.

Reassembly:

- Rear crossover pipe: Transferred plastic hose connector (with the two side green squeeze pieces), where the large coolant hose connects to on the right, from the old pipe to new pipe. Moved the spring hose clamp over to the new pipe, so it is ready to be put in place once the rubber hose is connected. Installed all 6 bolts. Torqued to 84 inch-lbs / 7 ft-lbs. Reattached hose and hose clamp. Reattached gray electrical connector and 3 push pin connectors. Attached new rubber hose that goes under the supercharger. Added an old bicycle tube over the rubber hose to handle any rubbing that might occur since the hose won't be suspended by the bottom of the supercharger.
- Installed new water pump using new bolts and new gaskets. Installed small brass connector into water pump. Attached the two rubber hoses to the pump. Reattached bolt at the thermostat bracket. Torqued to 10 Nm / 88 inch-lbs.
- Installed idler pulley. Torqued to 47 Nm / 34.6 ft-lbs.
- Installed inner serpentine belt.
- Installed the "crossover pipe – lower". Torqued bolts to 12 Nm / 106 inch-lbs.
- Applied anti-seize to the two guide pins on the supercharger.
- Installed 4 guide pins and gaskets for the supercharger base.
- Decided to replace the rubber hose that connects the rear crossover pipe to the 18mm OD metal pipe with the plastic bleed screw. Jaguar part # C2Z29963. The concern was that having to remove that plastic connector when replacing the rear crossover pipe might result in a leak later. And the hose would be much harder to replace once everything is back together, given its rear location.
- Bought aluminum reproductions of the "crossover pipe – lower" and upper.
- Removed the new plastic "crossover pipe – lower" that had just been installed and replaced it with the aluminum version. Torqued bolts to 12 Nm / 106 inch-lbs.
- Dropped supercharger based into place using guide pins and ropes & 2x3s. Got it mostly seated in place by rocking back and forth and pressing down. Torqued bolts to 25 Nm / 18.5 ft-lbs.
- Installed two guide pins into the supercharger base. Set the new gasket into place. Placed the supercharger top (i.e. charge air cooler) into place. Inserted and loosely tightened all bolts. Followed the bolt tightening sequence that is in the manual. Torqued bolts to 25 Nm / 18.5 ft-lbs.
- Attached the black metal bracket to the rear of the supercharger.
- Attached the black hose and the electrical connector to the left rear of supercharger.
- Attached the above referenced black hose to the two clips on the bracket attached to the rear of the supercharger.
- Attached the serpentine belt to the supercharger pulley.
- Attached the left-side pipe to the center front of the supercharger air intake.
- Attached the hard fuel pipe. Torqued the fuel pipe unions to 21 Nm / 15.5 ft-lbs using 17 mm crowfoot wrench. Torqued M6 bolts to 12 Nm / 106 inch-lbs.
- Attached the wiring connector at front top center of the supercharger.
- Inserted the left side rubber panel between the engine and the coolant expansion tank.
- Attached the bracket to the left rear corner of the supercharger, and attached the two black hoses into their holders.
- Attached the gray sensor with orange fabric strap from left rear of supercharger housing.

- Attached one bolt (loosely) onto the coolant expansion tank.
- Attached the 4 coolant lines connected to the sides of the supercharger.
- Installed the throttle body. New gasket. Torqued bolts to 10 Nm / 88 inch-lbs.
 - Attached electrical connector on right side of throttle body. However, the little plastic retaining knob on the connector is broken off. Used a wire tie and plastic zip ties to fashion a retainer setup.
 - Attached the rubber coolant hose that runs to the engine rear, under the supercharger using a regular hose clamp.
 - Attached the rubber hose to the coolant overflow tank.
- Installed the plastic T-shaped air intake piece connected to throttle body. Torqued the single bolt to 10 Nm / 88 inch-lbs.
- Installed the upper radiator hose.
- Installed the upper crossover coolant metal piece. Torqued bolts to 10 Nm / 88 inch-lbs. Attached small overflow hose to upper crossover piece.
- Attached black rubber hose (PCV?) at front of supercharger.
- Attached gray electrical connector just behind crossover coolant part.
- Filled the coolant system.
- Pressure tested the system (using 15 psi of pressure). The hose connection above the thermostat housing was leaking. Installed a regular hose band clamp onto the hose and the leak is gone.
- Pressure tested again overnight (15 psi). Topped off coolant.
- Installed the metal cowl crossbar support.
- Installed the mini black cowl that goes underneath the windshield cowl. Installed 2 plastic push pins towards the rear.
- Installed the plastic cowl in front of the windshield.
- Installed the windshield wiper arms.
- Installed the fuse boxes' plastic cover.
- Installed the left and right air filter housing tops and adjacent plastic air hoses.
 - Attached electrical connectors to air filter housing tops.
 - Attached rubber hose to left-side air intake connector pipe.
- Installed engine rear undershield. Torqued bolts to 7 Nm / 62 inch-lbs.
- Installed radiator splash shield.
- Set tires to proper inflation.
- Ran the car. Topped up coolant as air worked itself out of the system.

TSBs

Coolant parts: <https://static.nhtsa.gov/odi/tsbs/2018/MC-10142170-9999.pdf>

Related Parts Info

Radiator Drain Plug

Good info at: <https://www.jaguarforums.com/forum/xf-xfr-x250-44/replacement-bleed-radiator-drain-screws-237867/>

Chewed up the drain plug head trying to remove it. Ordered part C2C1467, but it is a long drain that won't fit.

Correct drain plug numbers for my XF: JLM20622, Ford f5rz8115a, Dorman 61138. Plug is M10-1.5.

Coolant system air bleeder screw (passenger side)

Plastic screw, size is M10-1.0

Dorman 902-404

Same screw as BMW 11537793373 (or 17111712788?)

Anodized aluminum option: <https://www.ecstuning.com/b-ecs-parts/heavy-duty-aluminum-coolant-bleeder-screw/003530ecs01a/>

Supercharger + Oil

Appears to have an Eaton TVS / R1320 supercharger.

Oil capacity is 5.2 oz (according to <https://superchargersonline.com/2021/08/31/eaton-supercharger-oil-chart/>)

Oils:

- Eaton / SCOL Synthetic Supercharger (<https://superchargersonline.com/product/eaton-supercharger-oil-bulk-fill-8-oz/>)
- AC Delco 10-4041
- GM Parts 12345982
- Ford XL4
- Audi G070000A1