



ENGINE INSTALLATION DOCUMENTATION

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THANK YOU!

Thank you for your purchase! In a market that is loaded with options, we appreciate that you have selected IAG Performance for your engine build.

This installation guide is meant to be used for general information on components and procedures for installing your new IAG Performance engine. It is not intended to be an all-inclusive guide and if at any time you have questions, please reach out to support@iagperformance.com.

Please note that while our team is happy to try and help, we do not offer installation support not related to our products or services, and always recommend PROFESSIONAL installation. Subaru engines are complex, contain many idiosyncrasies, and are best left to experts with previous experience, and access to installation guides, manuals, and specialty tools.

ONLINE INFORMATION

Special instructions and specifications are available for engines featuring ARP case bolts, 14mm, or 1/2" head studs, which can be obtained by visiting <https://www.iagperformance.com/subaru-support> or emailing support@iagperformance.com.

Digital engine blueprint copies are available by request in DOCX format by emailing support@iagperformance.com.

Please register your engine by completing the online form at <https://www.iagperformance.com/warranty-registration/>



ESSENTIAL INFORMATION

Professional installation is required to establish a warranty on your IAG engine build. Assembly should be performed in a debris-free, climate-controlled, clean room using clean and properly lubricated hardware and new gaskets. Fluids should all be filled and checked to proper levels. Confirm that the timing belt has been installed properly and that cams/cam gears are properly timed. Unless otherwise specified please use torque values specified in the Subaru service manual. Be sure to read ALL instructions below before your initial startup procedure.

Built engines require a variety of supporting components for installation, including gaskets, oiling components, hardware, air/oil separator, and more. Your tuner may supply a base map for break-in. Professional tuning and engine calibration are **REQUIRED** to ensure longevity of your engine. Built engines are designed to be far stronger than their OEM counterparts, but are **NOT BULLET PROOF**. Quality supporting parts, quality installation, and quality tuning are all essential to making your build last. We highly recommend visiting our dealer locator on our website to find Certified Engine Installers in your area.

HOW TO PREVENT ENGINE FAILURE!

WHY ENGINES FAIL	HOW TO PREVENT FAILURE
Bearing Failure	If bearing failure occurred, or if there are any symptoms of metal contamination in the oil, oiling components MUST be replaced. These components include oil pump, oil cooler, oil pan, oil pickup (strainer), oiling lines/fittings (including banjo bolts), AVCS cam gears & more (depending on your model).
External Debris Contamination	After a catastrophic failure such as a dropped valve, broken piston, broken turbo, etc. It is very common to have debris make its way outside of the engine into things like the intake manifold, header, tgvs, turbo, etc. These items all need to be inspected and cleaned thoroughly so as to not introduce the debris back into the new engine.
Cylinder Heads	Cylinder heads must be disassembled, inspected and thoroughly cleaned during the rebuild. ALL oil passage plugs must be removed, passages flushed, and cleaned. Valves should be tested, and valve job performed if needed. The deck must be checked, and resurfaced if needed in order to create a proper seal on new head gaskets.
Accessory Parts Installation	Other components such as the condition of various lines, fittings, gaskets, timing belt, tensioner, timing rollers, guide, etc. should all be inspected during the engine build and replaced if necessary.
Air/Oil Separator Not Installed	You MUST run a high-quality Air/Oil Separator or catch can when running a forged piston engine in your Subaru. Our IAG AOS is the best on the market, and is available in a variety of different formats and colors to suit your needs.
Improper tune, or no tune	It is extremely important to note that IAG engines require professional-level tuning. A base map should be used during engine break-in and in person dyno tuning should be performed once engine break-in is completed.
Overheating	The cooling system of your vehicle should be sized appropriately for the planned usage and power. All cooling components should be inspected for wear and function prior to installation.

1 FUEL REQUIREMENTS

! **IMPORTANT:** IAG Engine break-in must be performed on pump gas, as opposed to ethanol. This is in order to properly seat the piston rings. Ethanol has been known to cause a minute breakdown in the lubricity qualities of the break-in oil. Keep in mind that this is during a critical period in your engine's life!

2 PRIMING/FIRST START-UP PROCEDURE

- 1 Be sure to PRE-FILL your oil filter before installing. Using 10w40 BREAK IN oil, fill to the appropriate level. It is highly recommended that you monitor oil pressure via a manual oil pressure gauge during engine priming.
- 2 Ensure that you have checked your clutch pedal adjustment! This is vital to ensure that your engine does not suffer premature failure! Failure due to the clutch being out of adjustment is easily identifiable during engine tear down and is not covered under warranty! See this video for more information: <https://www.youtube.com/watch?v=1IH9G8M1k2g>
- 3 Crank the vehicle with the crank sensor disconnected in 10 second intervals, until you register oil pressure on either a temporary mechanical gauge or a known accurate electronic gauge.
- 4 Once oil pressure registers, plug the crank sensor back in. Crank the vehicle until it starts, let it run for 5 seconds and immediately shut it off.
- 5 Check for leaks. If all is good proceed to start and run the engine for 30 seconds monitoring oil pressure. Shut off, and check for leaks again.
- 6 On the final start up, let the car come to an idle. Check under the car for any oil or coolant leaks. If everything looks good and oil pressure is above 30psi at idle proceed to next step.

3

PISTON RING SEATING & CAMSHAFT BREAK-IN

Slowly bring the vehicle up to 2000rpms. Hold the throttle at this point for 5 minutes. After the first 5 minutes you will need to start varying rpm in increments to 4500rpms and back down to 2000rpms. 2500rpms, 3000rpms, 3500rpms, etc. Holding steady throttle while moving between the rpm range every 30 seconds. This should be done for a minimum of 10 minutes.

While running the engine to operating temperature (monitored via coolant temps) carefully watch oil pressure and keep an eye out for leaks. Oil pressure should stabilize and drop once the engine has reached operating temperature. Run the engine until coolant fans cycle at least twice AND you have followed the entire step 7. As well as making sure that the thermostat opens

4

POST INITIAL START-UP/HEAT CYCLE CHECK



After you have started your engine, and have run it through several heat cycles, it's important to recheck all fasteners and fluid levels. It's not uncommon for external fasteners to need retorqued after the engine has been brought to temperature several times.

After this initial heat cycle, it is time for the first oil change. You **MUST** change the oil filter during this time (as well as every oil change interval) as initial start-up produces a good amount of metallic particulates from piston ring seating that will need to be removed from the oil.

5 ENGINE BREAK-IN

! **DO NOT use synthetic oil during the break-in period! It is not recommended, required, or necessary. Permissible Break-In Oils: Motul Break-In Oil (preferred), Penngrade Break-In, Amsoil Break-in, Lucas Break-in, Driven Break-in, HPT Break-in**

1 Drive vehicle (VERY EASY) for the first 50 miles, Keeping RPM's below 5000 and ZERO BOOST (1-2 PSI, MAX). Vary RPM and load conditions while driving, and shift down/decel (engine brake) whenever possible.

2 Second oil change comes now once you have reached 50 miles of driving. Check for leaks and issues with the car in the air. Make sure oil, coolant, and other essential fluids are properly filled and topped-off.

3 When 250 miles of driving have been completed it is time for the next oil change.

4 Continue driving and shifting at a maximum of 4000-5000 RPMs with a break-in ECU map until the car is tuned, being conscious to vary RPM and load conditions, engine braking as often as possible when slowing down. DO NOT use cruise control or stay at a steady RPM and load condition while driving (i.e. highway driving at constant speed/load). Continue with AS CLOSE TO ZERO boost as possible!

! **Check your oil and coolant levels every time you fill your gas (every few hundred miles). During the break-in period, the engine will consume some oil – Be sure to be conscious of the amount of consumption and top off when needed.**

IAG OIL CHANGE INTERVAL

- 1 Run 10w40 Break-In Oil and OEM or Wix XP filter for the entire engine break-in
- 2 Change oil after the first heat cycle on your new engine, and replace the oil filter and crush washer.
- 3 Change oil at 50 miles, and replace oil filter and crush washer. Continue to monitor for exterior oil leaks and check fluid levels at every fuel stop.
- 4 Change oil at 250 miles (as highlighted above), and replace oil filter and crush washer. Continue to monitor for exterior oil leaks and check fluid levels at every fuel stop.
- 5 Finally, change oil at 750, only now are you able to switch over to a synthetic oil, see page 9 for recommendations for your engine and interval change
- 6 Additionally, after any dyno session, tuning, or track outing, it is always necessary to change your oil, as the excessive heat and fuel consumption during these times drastically dilutes the oil

! Make a habit of always checking your fluids every few hundred miles. Built engines may consume oil. Most built engines should use less than 1 quart of oil per 3000 mile oil change after break-in. If your oil consumption deviates, please let us know. It is a good habit to check the oil at every refuel.

RECOMMENDED OIL SPECIFICATIONS

- **EJ (91 or 93Oct)** - Motul 5w40 8100 X-cess Gen1 or Gen2 Synthetic, change oil every 2500-3000 miles
- **EJ (E85 or Race Gas)** - Motul 10w40 6100 Synergie+ or Motul 300V, change oil every 1200-1500 miles
- **FA20DIT (91 or 93Oct)** - Motul 5w30 8100 X-clean EFE, change oil every 2500-3000 miles
Motul 5w-40 8100 X-clean Gen2 may be used in climates where the average ambient temperature is above 80° fahrenheit. It is important to note that the oil used must carry the GM dexos2 rating.
- **FA20DIT (E85 or Race Gas)** - Motul 5w30 8100x - CLEAN+ or Motul 5w40 8100 X Clean Gen2, change oil every 1200-1500 miles
- **FA20 BRZ / FR-S / GT86 (91 or 93Oct)** - Motul 0w20 8100 Eco-lite, change oil every 2500-3000 miles
- **FA20 BRZ / FR-S / GT86 (E85 or Race Gas)** - Motul 5w30 8100x - CLEAN+ or Motul 5w40 8100 X Clean Gen2, change oil every 1200-1500 miles

Comparable oils for E85 and Race Gas can be found from Amsoil, Penngrade, Driven, HPT, Valvoline VR1, and Lucas.

DYNO TUNING

IAG built engines can be professionally tuned once they have reached approximately 750-1000 miles of break-in driving and have been extensively quality controlled. This is also the specified mileage to reach before switching your vehicle over to ethanol.

Once break-in tune has been performed, monitor ECU readings by logging the vehicle and continuing your relationship with your tuner to ensure that the car is running properly and safely.

After Dyno session / Tuning it is time to change your oil once more, from there on stick to your recommended oil change interval

IAG PERFORMANCE

SALES & TECHNICAL ASSISTANCE

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RACE CAR SPECIFIC INSTRUCTIONS

Please be aware that these instructions are **ONLY** advised on cars that **DO NOT** have registration and legal tags allowing them to be driven on public roads. Follow all steps from pages 5 and 6 for priming, initial start-up, camshaft break-in, and ring seating. Only proceed with the below once those steps have been completed.

- 1 Load the car on the dyno simulating normal driving conditions on a flat road, accelerate, at light throttle, to 6,000 rpm with an immediate transition to full engine braking and allow the engine rpm to return to 2,000. Repeat this procedure/process 10 times or more. During this time it is very essential to pay attention to engine vacuum and how it changes. As the new piston rings seat in, the engine will continue to make more vacuum. Only proceed to the next step when you have come to a point where vacuum has not continued to increase.
- 2 Change oil to a good Non-Synthetic race oil with high amounts of ZDDP (zinc and phosphorus). EX: Valvoline VR1, Penngrade, Lucas, Driven.
- 3 Proceed to tune the vehicle, now is the time to make any fuel changes as needed.
- 4 After tuning, change oil/filter once more.
- 5 From this point forward, EJs running E85/Race Gas use Motul 10w40 6100 Synergie+ or Motul 300V. FAs running E85/Race Gas use Motul 5w40 8100 X Clean Gen2. Comparable oils for E85 and Race Gas can be found from Amsoil, Penngrade, Driven, HPT, Valvoline VR1, and Lucas.
- 6 Additionally, after any dyno session, tuning, or track outing, it is always necessary to change your oil, as the excessive heat and fuel consumption during these times drastically dilutes the oil

SHOW US YOUR BUILD!

We always enjoy seeing our engines, builds, and products out in the wild. Please tag us **@IAGPERFORMANCE** in your posts and stories!



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