Frequently Asked Questions for the FA20/2015+ WRX

This guide is meant to answer most of the common questions for new owners and to provide general guidance on common practices.

If you have anything you would like added to the FAQ please feel free to message any of the authors.

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Acronyms

AOS - Air/Oil Separator
AP - AccessPort
AVCS - Active Valve Control System
BOV - Blow-Off Valve > Vents to atmosphere
BPV - Bypass Valve > Recirculates
CAI - Cold Air Intake
CARB - California Air Resource Board
CCV - CrankCase Ventilation
DAM - Dynamic Advance Multiplier
DD- Daily Driver
EBCS - Electronic boost control solenoid
EGR - Exhaust Gas Recirculation
ELH - Equal Length Header
FBK - FeedBack Knock
FBO - Full Bolt On
FKL - Fine Knock Learn
FMIC - Front-Mount Intercooler
HPFP - High pressure fuel pump - Cam driven fuel pump located in the engine bay
LPFP - Low pressure fuel pump - Fuel pump located in the fuel tank
MAF - Mass Air Flow Sensor (located behind the engine air filter secured by 2 screws)
MAP - Mass Air Pressure Sensor (located under the engine cover and secured by a single bolt.)
OTS - Off the shelf
PCV - Positive Crankcase Ventilation
UELH - Unequal Length Header
TGV - Tumbler Generator Valve
TSB - Technical Service Bulletin
TMIC - Top-Mount Intercooler
WOT - Wide Open Throttle

Will tuning void my warranty?

- On its own, nothing can void warranty, however warranty work and claims can be **denied** as a result of modification. Especially when tampering with the vehicle's ECU. The Magnuson-Moss Act protects consumers who have purchased and modified electronic and mechanical goods. In essence the warranty has to be honored unless the manufacturer can prove without a shadow of a doubt that the modification created the damage.That being said there are dealerships that are

more and less willing to honor warranties on modified cars. If warranty is important to you, don't modify your car. Source

Can I run this OTS tune?

- For the most part, the OTS tunes are meant to simply work well enough in different climates and elevation. Some OTS tunes (Cobb's offering for instance) can be run indefinitely but your A/F, timing, boost and other parameters are not optimized at all. This tune will be heavily dependent on DAM and what it learns from FKL and FK. Longevity and reliability of OTS maps is heavily dependent on location as some of the hotter states can cause problems with these non optimized tunes. If you have knock issues in a hot environment it is recommended that you swap to the equivalent 91 octane map if possible. It will lose you about 5hp but it will give you some extra knock protection when your engine bay is cooking. All in all even the best OTS will fall short of the safety and power of a Protune/E-tune.

Official map notes from Cobb

Part compatibility for Cobb's OTS maps and stages.

- Stage 0 (simulated stock map)
  - Stock map
  - Compatible with any "cat back/axle back" exhaust
  - Requires stock airbox but is compatible with a drop in air filter (contrary to cobb's map notes but has been tested and found to work just fine, however, we still recommend staying away from oiled drop in filters as they tend to get crap on the MAF sensor)
  - Requires stock j-pipe
- Stage 1
  - Compatible with any "cat back/axle back" exhaust
  - Requires stock airbox but is compatible with a drop in air filter
  - Requires stock j-pipe
- Stage 1+
  - Compatible with any "cat back/axle back" exhaust
  - Requires the COBB BIG SF INTAKE
  - Is not compatible with other intakes as each intake requires different MAF scaling
  - Requires stock j-pipe
- Stage 2
  - Compatible with any "cat back/axle back" exhaust
  - Requires stock airbox but is compatible with a drop in air filter

    - Requires an upgraded highflow j-pipe (Cobb, GS, Invidia, etc.)
    - Requires removal of the second boost restrictor pill (instructions below)
- Stage 2+
    - Compatible with any “cat back/axle back” exhaust
    - Requires the COBB BIG SF INTAKE
    - Is not compatible with other intakes as each intake requires different MAF scaling
        - Take this with a grain of salt as some users have reporting running different intakes with this map and have no problems. I personally see it as playing with fire, but if you are willing to risk your car go for it.
    - Requires an upgraded highflow j-pipe (Cobb, GS, Invidia, etc.)
    - Requires removal of the second boost restrictor pill (instructions below)

For stage 2, you will have to remove the secondary restrictor pill. Instructions on how-to are here: Restrictor Pill Removal instructions

How much power does this mod add?

- This will be an attempt at explaining how much power a mod can add, the numbers are taken from many sources and are a solid average

- Typically a stock wrx will dyno between 210whp and 240whp. There are so many factors involved from type of dyno, fuel, temperature of the day, elevation etc. Typically a stock one will fall in between the 220-230whp range but can read as low as 210whp and as high as 240whp.

- **Stage 1** = A stage one vehicle comes in a lot of forms. Though no parts have been swapped the inclusion of the tune is the variable. One can expect a 10-20 whp gain here with the Cobb OTS tune. A etune or protune can offer a stage 1 tune to that will gain 20-30whp. It is important to note that Cobb claims massive peak gains on their comparison dyno graph. Correctly but the vast majority of the gains are in the upper rev range so the claim can be easily misunderstood by those not experienced with dyno graphs.

- **Intake** = on it’s own on the Cobb stage 1 v3.6 tune (Cobb's big sf intake) it is stated that there is another 10 hp gain. I am skeptical and will call it an extra 3-5whp gain. On a protune/e-tune I’d say it would still be a 3-5whp increase. No other intake is compatible with the Cobb OTS, as per Cobb themselves. However a protuned/e-tuned stage 1 can run any intake though I will still think the gains would still be in the 3-5whp area.

- **Catback or Axleback exhaust =** It's theorized that swapping out the stock mufflers for deletes or straight through mufflers adds some extra horsepower. But that can not be quantified with facts at the moment. This will add sound but for now 0whp.

- **Drop in filter** = Rather it's from K&N or Grimmspeed or somewhere else. We can expect some gains here. It's safe to assume a 1-3whp increase.

- **Electronic Boost Control Solenoid =** This will require a protune/e-tune. Some tuners merely sort the boost tables so there won't be any crazy spikes in boost pressure. Others see it as an opportunity to run a slightly more aggressive boost map. This will add 0whp but it has the potential of adding up to 5-10whp.

- **Front Mount Intercooler =** On its own it won't add any power but a tuner can get upwards of 10whp out of it on the stock boost controller. An aftermarket boost controller will allow for 10-20 whp out of a front mount intercooler.

- **Top Mount Intercooler =** On its own this mod will make no power. But a tuner can extract upwards of 5whp on the stock boost controller and as high as 15whp on an aftermarket boost controller. There are a lot of variables here due to the number of TMIC options available.

- **Flex Fuel =** An E30 blend can net you 40-50whp an e50 blend can net a 60-75whp gain and an e60 blend can net you an extra 70-90whp gain.

- **TGV Delete =** This can vary, some folks gut their stock ones and others just swap them out. Gains here can be 5-10whp.

- **EGR Delete or Disconnect =** This can net you 5-10 whp.

- **Stage 2 =** A stage 2 vehicle comes in a ton of forms too. The only prerequisite here is the inclusion of a Jpipe and the removal of the second restrictor pill in the EBCS. One can expect about a 30-40whp gain from the Cobb stage 2 OTS. A e-tune/protune with just the aftermarket jpipe considered will make as much as 40-50whp.

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- **Catless J-pipe =** The inclusion of a catless jpipe (external wastegate prerequisites will have to be met mind you) will add 3-5 whp.

- **Flex Fuel =** An E30 blend can net you 70whp and an e60 blend can net you an extra 90-100whp gain. It is important to note that once you start running ethanol the supporting mods matter a little less.meaning you wont get as much kick out of an upgraded jpipe that you would if you were still running pump gas.

Can I run LED bulbs in my halogen projectors

- Short answer is yes. Long answer is yes, but with some sacrifices. Using LED bulbs in the stock halogen projector will work, but you will most likely lose some usable light. Now people drastically overplay the loss of peripheral light when doing this but it is largely due to the fact that most people just pop them in and see that have very little lateral spread and immediately trash them for their inability to spread usable light. Most led bulbs come with a rotating collar that lets you adjust the positioning of the LED bulbs. For the stock halogen projector the led bulb must be horizontal, meaning the bulbs need to be facing left and right. This largely fixes the peripheral light spread issues.

Why is my car knocking

- It could be bad fuel, massive drivetrain shock, air conditioning or any number of infinite things. Best thing you can do is record a log and send that to your tuner or to someone who can take a look at it. This should be treated as if you were

trouble shooting the car. If you see consistent knock at wide-open throttle paired with a DAM drop, it is cause for immediate investigation. That being said, I've seen some crazy knock values as a result of A/C, drivetrain shock, etc., without a DAM drop. Every car will knock occasionally, nothing is perfect.

My DAM dropped: should I be worried?

- The Dynamic Advance Multiplier is the ECU's global timing adjustment and it will affect all the parameters in your ECU in regards to adjusting timing. Should one be worried if their DAM dropped, sometimes yes and sometimes it could just be bad fuel. It is an issue worthy of immediate troubleshooting. Log and send the info to your tuner or someone who can look it over. DAM holds a histogram, historically looking at knock events and adjusting over and over.

Can I run some E85 to get rid of knock?

- Absolutely. Adding 1-3 gallons of ethanol is a well documented short term solution to bad gas. Here is one of the best FA20 tuners saying just that. Link

What is E85 and why is it so great?

- E85 is the poor man's race fuel. Boasting an octane rating of 108 for true E85. E85 is 85% ethanol and 15% gasoline. This alternative fuel type is derived from corn/sugar cane and has some serious benefits.

- Rarely will you get e85 at the pump. For example pumps in Texas usually dispense E70 in the winter and E85 in the summer. Each state varies but the extreme limits allowed by state are easy to find. The standard in order to brand E85 at the pump is **at least** 51% ethanol content up to 85%. Using a test kit is a decent way to find out what's at the pump, but I prefer using the Cobb ethanol sensor and some math to figure out what's coming out of the pump. This is especially important because some tuners offer E30 tunes without a sensor. Which means you will have to blend ethanol with your tank of pump gas. If you dont know whats coming out of the pump your dilution math will be flawed and you could run less E% than 30 leading to knock and engine failure. My advice is do it once and do it right, get a flex fuel sensor.

- E85 effectively cools down the engine through "charge cooling" and also increases effective octane allowing for more boost and more timing. So what's the downside? E85 is less energy dense than gasoline so it takes more of it to get the same power as gasoline. That sounds very counterintuitive I know. If it's

less energy dense how does it add so much power? Well the answer lies in timing. In short the engine can advance timing because the fuel is so much more stable and the cylinder will also be colder. E85 is also not as lubricating as gasoline and will sometimes cause issues with stock fuel pumps. Which is why the AEM 340, DW, and Nostrum fuel pumps exist.

What are the best “bang for buck” mods and what should I do first?

- Cobb AccessPort
    - Reduces rev hang
    - Adds top end power so the engine doesn't fall on its face
    - Makes throttle linear
    - Is the biggest building block for future modifications
- Cobb Flex fuel
    - In terms of power mods this is the king closely followed by methanol kits
- Shift Stop and a weighted shift knob
    - Really cleans up the shift gates and shifter feel over stock
- Catch cans/AOS
    - It is explained later but this makes a great engine health mod
- TGV/EGR delete
    - Another great engine health mod
    - Reduces tip in knock and carbon build up on the valves.

I'm not hitting my 22 psi when I floor it. Do I have a boost leak?

- Maybe, it could also just be current conditions aren't allowing your ECU to advance more boost. Begin by taking a log and having it sent out for interpretation while you check all your vacuum hoses, clamps etc. If it is extremely hot outside, or you are higher in elevation, your ECU will pull boost pressure in order to keep your engine happy. It is also important to note that not every map has a target boost of 21+. Some of the OTS maps actually run 2lbs less boost than stock.

Front mount intercoolers vs Top mount intercoolers

- The best TMIC won't perform as good as the worst FMIC, so long as you aren't buying some crappy FMIC from China on ebay. FMIC’s have a tendency to

provide cooler much more consistent temps and are not affected by heat soak. They really shine under repeated abuse a s their efficiency drop is much better than the TMIC counterpart. There are some really great TMICs out there, but FMIC's are in a class of their own. Some FMIC's are easier to install than others, and not all TMICs are created equally. Generally the Grimmspeed TMIC is considered to be the best DD intercooler but do your research and ask around.

- It is important to note that for 90% of drivers a GS TMIC will be sufficient for their power and boost goals. It is my opinion that unless you are tracking or doing canyon runs a FMIC is a little overkill.

Will an intake make power, is it a worthwhile modification?

- Let's start with the stock intake. It's really good, there are no bad bends and it does not need upgrading till over 400whp. Hence why aftermarket intakes, especially on the stock turbo, don't make a significant gain in power. If the stock intake is good, aftermarket ones are barely great. Gone are the days when swapping in an intake gains 20whp, manufacturers have finally caught up. Will swapping in an intake with an OTS meant for the intake make more power? Maybe, but it won't be a significant gain until it is pro-tuned or e-tuned. And even then, it's maybe 3-10whp in the curve and not much up top after things taper off. The biggest benefit to the intake is sound. You can hear the turbo breathing, and there isn't anything wrong with wanting to hear that. A properly tuned intake however will make more power throughout the whole power band. Reddit Post

Catch Cans vs. Air Oil Separators. Why do I need them and which one is better?

- One of the issues with our DIT FA20 is that we get significant carbon buildup on the intake valves. Direct Injection Turbo engines do not wash fuel/detergents over intake valves and therefore we get carbon buildup. This carbon buildup comes from two different issues. The exhaust gas recirculation system and crankcase ventilation. For this section we will talk about the crankcase blow by and the function of the Positive Crankcase Valve (PCV). The FA20 is a turbo vehicle. Once the turbo has spooled up the intake tract is pressurized. This extra air is met by extra fuel and is ignited in the cylinder. However, sometimes this forced air and fuel makes it past the o rings on the cylinder and into the crankcase. So now we have pressure in an area that is not supposed to be pressurized. To relieve this unwanted pressure we have a PCV valve. This valve

opens up to release this pressure. Now sometimes when this pressure vents, it releases some oil with it. If this was released to the atmosphere it wouldn't be a problem but the air coming out of the PCV has already been measured and the engine is expecting it back. So the PCV valve dumps back into the intake tract so the car gets the air back. So now we have oil in our intake tract effectively reducing octane once it reaches the cylinders. To combat this issue we have Air Oil Separators (AOS) and catch cans. They function by intercepting this blow by and running it through a combination of baffles and micron filters. Thusly allowing nothing but air back into the intake tract. Where they differ, an AOS is low maintenance. The AOS will allow the oil to pool and drip back into the motor. A catch can on the other hand will just continue to collect until you undo it and pour it out.

- If you're deciding on an AOS, get one that plumbs in radiator fluid. This will fight off condensation for a longer period but it's still a good idea to check the return line once a winter. If you're going to go with a catch can, get one that has at least one micron filter and one baffle. Or one with two baffles. Or one with a baffle and a chamber that will hold steel wool, make sure you swap out that steel wool once a year!

Exhaust modifications

- It has been said that the stock mufflers behave almost like a dual pass unit in a way. As a result, going for a straight through muffler or muffler deletes results in a 3-5whp gain in the power curve. Take that with a grain of salt though as it is hard to quantify this at the moment of this writing. Mufflers affect the volume of your exhaust sound. They also help with some low speed drone, up to a point.

- The stock resonator does a decent job of reeling in the drone. Both at low speed and highway speed. Removing it will make for some rasp, depending on your choice of muffler. It could also drastically increase exhaust drone. A larger straight through resonator can help here and could outperform the stock unit. Ultimately when choosing a new resonator you're going to want to hit youtube to find sound clips.

- Catalytic converters, stock system has two units. Swapping in a catted j-pipe will 100% make you fail emissions in states that follow the CARB standard. The Grimmspeed unit has a 300 CEL cat but it is unknown (currently at the time of this writing) if that will pass emissions in CARB states. MAPerformance offers a 300 dollar option to their j-pipe. They essentially swap in a GESI 300 cell

catalytic converter. So far this j-pipe will indeed pass emissions in CARB states, though it will definitely not pass visual inspection. Cobb is currently in the process (at the time of this writing) of getting a CARB compliant j-pipe approved. Going cat less and deleting both of the catalytic converters is an option too but going down this route will induce boost creep. To avoid boost creep, one should swap in an EBCS and an external wastegate. See more about boost creep below

- Cat back exhaust systems, it's pretty much swapping everything after the j-pipe. There are some gains swapping to a less restrictive cat back. Not as much as back in the day due to the stock one being "not too bad". It is also a great way of tuning and achieving a particular exhaust note too. The best thing to do is listen to the exhaust in person, but if you can't, listen to as many videos on YouTube, etc., before choosing.

E-tune Vs. Pro Tune

- Both options yield the same results but they both do it in different ways. A pro tune will have your vehicle on an AWD dyno. Your tuner will be making changes to the tune he/she is building run after run. An e-tune is essentially the same except your tuner is making changes remotely while you run the car on the street. E-tuning is a perfect option for folks who want the same effect while not paying for a pro tune or don't live near a tuner. Both have their risks but e-tuning's risks are unique. E-tuning could gain you a speeding ticket, or worse. So keep that in mind and make sure you have a safe unpopulated road you can romp on. Pro tuning has its own unique risks too, such as but not limited to your car jumping off the dyno.

- Regardless of which route you go for, do your homework and make sure your tuner's tuning strategy meshes well with what you want. It never hurts to mention you would like some room for error on a safer map. You of course can always ask for a more aggressive "kill" map but I recommend against it.

Accessport values. What is normal and what is not.

- AF Learning: This monitor shows a percentage correction for fueling. Positive numbers indicate that fuel is being added. Negative numbers indicate that fuel is being removed. The closer to zero the better, but generally, the acceptable range would be +/- 16%. That being said, most tuners like to set the car to run a little rich and let the car correct down to proper air fuel ratio. In general I wouldn't start

looking for a leak unless this value was camping above +/-16 for an extended period of time.

- Feedback Knock: This value represents a current realtime minor timing correction made by the ECU in response to a perceived noise. Feedback Knock Correction is the default correction used by the ECU. The ECU will “respond” with this monitor by immediately removing timing and then slowly decaying the value back to zero assuming no further noise is detected. “Normal” is considered values -2.81 and below. Consistent and repeatable values above -2.81 should be looked into. Knock under WOT should also always be a concern.

- Fine Knock Learn: This value represents minor learned corrections currently being applied by the ECU as a product of historical noise. These values are reset if the DAM value is changed; once DAM has stabilized, any learned corrections will be intermittently evaluated for sanity when certain thresholds/conditions are met. Fine Knock Learning is learned (and thus applied) for specific ranges defined by load and RPM; once a correction value has been learned into a particular range, it will be applied whenever the engine is operated within that range. “Normal” is considered up to -2.81.

- AF Correction: Short-term (immediate) fueling correction in closed loop based on input from the front oxygen sensor. This is a percentage correction of the injector pulse width. Positive values indicate fuel is being added as a result of the correction. Negative values indicate fuel is being removed.

- AFR: Air/fuel ratio based on the front oxygen sensor.“Normal” values 10.14-22.20 with 14.70 being cruising/idle, as low as 10.14 during pulls, and 22.20 off throttle.

- Intake temp: Intake temperature based on the intake air temperature sensor in MAF housing (i.e. Pre-Turbo) “Normal” values can be between ambient and ~30° above ambient

- Intake Manifold Temp: Intake temperature based on the intake temperature sensor in intake manifold. This is post turbo, after the intercooler. “Normal” values can be anywhere from ambient temps to ~160°

- DAM: This value represents a global adjustment to ignition timing. In general, this value is determined by historical detonation/knock as well as the default mapping value. “Normal” values with 1 being ideal. Anything less is cause for investigation if prolonged, especially between fill-ups to eliminate the ‘bad gas’ notion.

- Coolant Temp: Current temperature of your radiator fluid. Anything greater than 225° paired with extreme oil temps (>250°) and you should probably stop and let the car cool down.

- Oil Temp: Current temperature of the oil lubricating everything. Anything greater than 250° and your car is overheating.

    - Proper Cold start procedure: First, if the vehicle is stationary for an extended period of time it should be started at least once every three days and run till it reaches operating temps. After three days the only thing protecting your moving parts is an extremely thin layer of engine oil. Hence why we start the car every three days, to renew that layer of protection. After start up stay away from boost until oil temps reach a comfortable 190°. It is important to note that the FA20 DIT needs to be warm before getting into boost as the turbo uses this oil to lubricate as well and it spins magnitudes faster than the engine. A good warmup procedure is to start the car. Let it idle for a minute or two or until the RPMs drop from the cold idle threshold. Then start driving, but stay out of boost and under 3k until the oil temp is around 190. Your engine will thank you and your turbo will thank you. A good video describing why we don't idle to operating temps.

    - “After you start the car it takes the front 02 sensor 60-90 seconds to warm up, even if the car is warm. So it’s best not to just start your car and start beating on it because the AF learning and corrections may not be active. You can monitor this by monitoring AF Sensor 1 Ratio on the AP. When you first start the car the AFR will stick at 14.7 until the 02 sensor has warmed up. Once the AFR has moved from 14.7 and the AF Correction1 are AF Learning1 are active, then you know it’s ok to log. You need to be really careful about beating on the car before the sensor is active, running lean will cause knock and could potentially blow the motor. You can see an example of a non-warm 02 sensor below...the AFR sticks to 14.7 until 5800rpm.

    - After you flash a new map the AVCS also has to go through a warmup/activation procedure for 10-15 seconds. The coolant temp also has to be 160*+ for the calibration to happen. YOU LIKELY WILL NEVER SEE THIS CALIBRATION UNLESS YOUR AP IS POWERED AND ON THE GAUGE SCREEN BEFORE YOU START THE CAR. You can monitor this by monitoring AVCS intake Left or Right. It will go -5, -4, -3 -2, -1, 0, 1, 2, 3, 4, 5, then back to zero. It basically goes through a calibration to make sure it knows where the cams are at after you flash a map. This process has to take place at idle….if you start driving before

the AVCS is active, it won't become active during the drive. If the AVCS is active you should see the Intake AVCS go to -15* by tapping the gas at idle. If it doesn't go to -15, try restarting the car. If the AVCS doesn't activate within 1 minute, it won't. Restart the car. The -15 is the Intake AVCS. If you're watching the exhaust avcs the values will be different. As long as they are moving and not stuck between 0-5, you're fine.

- Cliff notes:
    - Tap gas: you see 0-5 = NO GOOD. RESTART CAR
    - Tap gas: you see anything besides 0-5 = GOOD. Go log.

- WARNING: DOING A PULL WITHOUT THE AVCS ACTIVE CAN CAUSE INCREASED BOOST PRESSURE AT HIGH RPM RESULTING IN THE CAR RUNNING OUT OF FUEL WHICH MAY LEAD TO EXTREME KNOCK AND ENGINE DAMAGE AKA BOOM BOOM"
  -Ron Watson @ Phatbotti Tuning

- Flex Fuel -- Running E85 on direct injection/high compression motors will make tremendous power. It is recommended you swap in a flex fuel kit from COBB and an intank LPFP such as the AEM 340 or the DW unit. Make sure you are e-tuned/pro-tuned for the flex fuel kit. E85 is essentially race gas. Your tuner will be able to add a more aggressive boost curve and add more aggressive timing. A fully bolted on WRX can make well over 100whp from stock on an E50-E60 mix. A stock WRX can gain more power on flex fuel alone than another WRX on FBO stage 2 on pump gas.

General Maintenance Wash Guide

- Subaru paint is notoriously soft and easy to chip. Aside from this, general maintenance washes will keep your paint looking great, but nothing will come close to ceramic coating, paint protection film (PPF), or paint correction. These are the best options for protecting your paint in the long term.

- If you're like most people and can't afford/don't want to shell out $1500 for a paint correction and ceramic coat on a new car then general washes, quality off-the-shelf coatings, and waxing will keep the paint looking good for a long time.

- Washing your car at a wash bay:
    - Things you'll need:
        - Coins

        - Maybe 15 minutes
    - General tips:
        - DO NOT USE THE BRUSH. It causes swirls and scratches
        - Touchless bay washes work much much better if your car has a fresh wax or a ceramic coat
        - It is not recommended that you dry your car off with a towel as this process does not get all of the dirt and you can still easily swirl your paint afterwards
        - The more time you spend on the spot free rinse, the better your car will look
        - If you notice any water spots when you get home, use some quick detailer and a microfiber to get them off.
    - Procedure:
        - After starting the machine start with a thorough pre soak aka low pressure soap
        - Follow up with a thorough high pressure soap. Get all the nooks and crannies, It helps to work from the top of the car to the bottom
        - Rinse thoroughly
        - Spot free car rinse
- Washing your car at home:
    - Things you need:
        - 2 buckets
        - Pressure washer (optional but nice to have)
        - Microfiber wash mitts
        - Microfiber drying towels
        - Some high lubricating soap (Meguiars gold class is a user friendly soap that works well for beginners)
        - Optional: Wax or sealant for when the car is clean
        - Optional: A foam cannon
        - As much time as you're willing to spend
    - Procedure:
        - 1. Fill both buckets with water. One will act as your rinse bucket and the other will be your wash bucket that you will add soap to (grit guard optional, but highly recommended)
        - 2. If you have a foam cannon, get some sudsy soap and fill the cannon with soap and water. You don't need a ton, especially if the soap is formulated for foam cannon in particular. Make sure your foam cannon is open enough for a satisfactory, even, conical spray before adding the soap
        - 3. Pre-wash with the pressure washer from the top down. Pass over twice if you want. This is to loosen all the initial particles stuck to the paint that are loose enough to get knocked off. I find that if you take time with the pre-wash, the rest of the wash goes easier.

        - 4. If you have a foam cannon, foam the entire car from the top down. It's important to cover every inch of the car. Wheels, tires, exhaust tips, everything. Let the foam do its thing and pick up particles for a minute or two. This is the perfect time to take a cool pic too
        - 5. Using the soaked wash mitt from your wash bucket, lightly apply pressure and wash in straight lines from the top down. I like to drag the length of the car from the center roof in either direction. Washing in straight motions will keep paint from swirling and reduce scratches from particles the mitt picks up.
        - 6. After the first pass, put the wash mitt in the rinse bucket and rub it against the grit guard (if you have one) This releases trapped particles in the mitt that could scratch the paint if you continued washing with the mitt without rinsing. Wring the wash mitt out and rinse once more for good measure.
        - 7. Soak the wash mitt in the wash bucket and repeat, working from the top down using straight motions until you are finished washing.
        - 8. Rinse the car to get all the soap and the rest of the particles off. Some people like to use the sheeting method, which is where you take the hose and rinse from the top down so the water beads off in sheets rather than beading. Personally, I use the pressure washer itself.
        - 9. Dry the car immediately after rinsing it after the wash with microfiber drying towels. Lay a large drying towel flat on the roof and drag towards the hood or trunk in straight lines, much like how you washed. This will achieve the same goal: keeping particles from scratching your paint.
        - 10. Sealing your wash can happen in a number of ways from wax to spray on ceramic. This is gonna be up to you whether or not you'd even perform this step, but it's important if you want the work you just put in when washing the car to be shown off. Follow the instructions of the sealant you bought. If you're waxing, applicator pads really do help but microfiber will do the trick.
    - General tips:
        - Generally speaking, you'll get out what you put in, especially during the washing phase. If you wash your car, *wash* your car. Put some elbow grease into it and be vigilant about your rinse process. I guarantee you'll see results.
        - When washing the car, it's better if the vehicle is parked in a shaded area. This cuts down on the likelihood of water spots forming during the time before drying or even in the middle of washing
        - Higher quality microfiber will be nicer to your paint by trapping less particles in the microfiber itself. Don't be surprised to see high prices for towels; they can be worth it. I definitely would not use shop rags, paper towels, or even terry towels on paint, especially Subaru's.

- When drying the car, if you want to take the time to get in between badge lettering, door handles, rain guards (if you have them) you can pick up quite a bit of particles
- Tire shine can really make your car pop no matter what color it is. I'd recommend a spray-on tire shine and applicator pads to buff it in. Some products can keep your tires shiny for close to a week even if you daily it.
- You can wax anything. You can also ceramic spray anything with most products. This means headlights, tail lights, exhaust pipes, plastic trim pieces, windows, wheels and door jambs. If you're gonna take the time to wax the car, I'd highly recommend taking the time to wax it thoroughly and seal the *entire* car.
- If you are going to clean the outside, it's probably wise to do the inside too, even if it's just a quick couple items that need to be thrown away, taken inside the house, etc. If you have a shop-vac at home, five minutes right before or after your wash will make you even happier you washed it in the first place.
- Everybody will wash their car on different schedules. If you let the car stay dirty for a while (~a month?) you could expect some of your paints shine to go away and stay gone, or find pesky scratches. They're easy to notice, I promise, especially due to the nature of how soft the paint is. I recommend **<u>at least</u>** bi-weekly spray-offs if nothing else. You don't need to take an hour and a half every week to clean the outside of your car, but it is wise to maintain the paint as best as you can in case you decide to sell it some day, but hopefully you'll do it because you love your car and love when it looks clean.

Reliability Concerns/Mods to mitigate issues

1. AOS/Catch cans — this limits the amount of gunk in the air being recirculated back through the intake from the PCV (see #11) If you live in a colder environment, beware the lines may gunk up on an AOS in certain hoses due to a combination of condensation and temperature drop. In colder environments make sure you procure an AOS that pumps in radiator fluid, this system will evaporate condensation.

2. EGR/TGV deletes — Deleting both these components in the engine bay will improve AFRs, intake temps, and mitigate the gunk being recirculated through the system. It will also help with cruise knock. Both the TGV and EGR work together. When EGR is being pumped in the TGV will flutter to make sure the exhaust gasses perfectly mix with the incoming air. Don't delete the TGV if you're keeping the EGR. You can however delete

the EGR and keep the TGV if you want. But don't because its dumb. Do it once and do it right.

3. Walnut Blasting — The process of cleaning the engine valves that have gunked up with carbon due to the direct-injection motor. I'll be getting mine done at 60k, but without TGV/EGR deletes you could have them done sooner if you so choose. Insert horror stories of VW DI engines and crusty valves that cause engine failure

4. Timely oil change schedule — Most modern synthetic motor oil is rated for 5,000 miles, despite this, most tuners/owners recommend a strict 3,000 mile oil change interval with a stock OEM filter. This early change is largely done for two reasons. The first reason is turbo engines use the same engine oil to lubricate itself. The turbo spins much much faster than the engine and tends to put out a lot more heat which leads to quicker degradation of the oil. The second reason is that turbo engines tend to have a little bit of "blow by" meaning fuel and air sometimes make it past the o-ring and into the crankcase. It happens but if enough fuel gets into the oil then it will start to thin out prematurely. Each FA20 is different as each has different clearances in the engine. If this concerns you change the oil out every 3,000 miles. If you're interested in running oil longer I would recommend sending an oil sample to blackstone oil laboratories. Make sure to go with an API SN PLUS (or GF-6A) oil, as it helps with low speed pre ignition on direct injection motors. Favorite oils for the FA20 are currently Amsoil signature series 5w-30 (costs an arm and a leg but damn is it good stuff), Motul xclean 5w-30, and Valvoline max life 5w-30. Currently I am testing different oils to see which one is best for the FA20.
    a. Thus far valvoline full synthetic Max life if the frontrunner. Will update if any oils unseat it. (2/6/2022)

5. General maintenance — Check all your fluids if you are in your engine bay after each tank of gas. Make sure your tire pressure is okay too. A little precaution can go a very long way.

6. Top tier fuel — If running top tier fuel for the life of the vehicle. More than likely you will never have to clean off your injectors. Though the nozzles can be affected by carbon build up at the very least, internally the injectors are sound. The best and most recommended fuel stations are shell and chevron in that order.

7. Seafoam — this can fight some of the gunk build up. But performing this a day or two before an oil change consistently will help tremendously if you don't have an AOS or catch can. Here's the vacuum line you're going to want to use. Link. You can also run it through the tank like normal if you wish, but it won't have an effect on intake valve carbon build up.

8. Funky sounds -- At cold start up the car is very loud. This is normal, your basically at -5* of timing or worse and the automatic belt tensioner makes a ton of noise. When oil

temps get to about 90° the rpm will drop to idle and the louder exhaust noise would have been long gone. AVCS check routine doesn't happen until about 150°-160° coolant temperature. The boxer is not a "v boxer", the crank lobes don't each hold two pistons. As a result the FA and EJ aren't truly balanced. Though they aren't unbalanced enough to require neutral balance shafts though. As a result, you will feel some shaking every now and then during idle. Especially on your butt, it honestly will feel like something is wrong. It feels identical to momentary misfiring. This in fact is normal and expected, keep in mind one bank in the engine is a bit off centered. This oscillation can be avoided by cranking up your idle to 900rpm. You can do this in the AccessPort settings under 'Tune'. Thump sounds coming from the driver or passenger side of the engine is bad, turn the car off and get it towed to a mechanic.

What is a technical service bulletin (TSB) and which ones are for our car

- A TSB is essentially a problem with a car that Subaru has decided "we messed that up" and offered an extended warranty for those individual pieces. These issues are deemed severe enough for a TSB but nor severe enough for a full recall. It is easy to search the Subaru website for recalls, such as the EPF nut recall, but it is much harder to dig up TSBs as they are not publicly available documents.
- Current known TSBs are as follows
    - PITCH STOPPER BRACKET DESIGN CHANGE 1/24/17
        - 2015-2017MY WRX
    - CREAKING SOUND WHEN OPERATING CLUTCH PEDAL 1/20/17
        - 2014-2016MY Forester MT
        - 2012-2016MY Impreza MT
        - 2013-2016MY Crosstrek MT
        - 2015-2016MY WRX MT and STI Models
        - 2013-16MY BRZ MT
    - CLUTCH RELEASE BEARING DESIGN CHANGE 1/3/17
        - 2015-2017MY WRX 2.0L DIT Models
    - CLUTCH SYSTEM PART CHANGES 10/22/18
        - 2015-18MY WRX
    - 4th GEAR VIBRATION ISSUE

LINKS TO THE ACTUAL PDFS CAN BE FOUND HERE

Self maintenance videos

There's an advantage to getting work done at the dealership. For one thing everything will be very well documented. But for some, learning the intricacies of your car is fun and rewarding. Here are some how-to videos to get you started.

1. Oil change
2. Air filter change
3. Cabin Air Conditioning Filter Change
4. Front and center differential and transmission oil drain and fill
5. Rear differential drain and fill
6. MAF cleaning
7. MAP cleaning is the same process as cleaning the MAF sensor but it is located on the top of the intake underneath the engine cover. skip to 10 minutes for MAP sensor location
8. Spark plugs

Recommended Reading

- Phatbotti Part Recommendations (MUST READ)
- Cobb AP monitoring and DIT DAM Strategy changes by Cobb
- Phatbotti Mod Path
- List of Cobb-Certified Protuners

UEL Headers for the FA20

- Reddit user u/DevilsFan99 posted an outstanding write up on the subject here: Reddit Post

The Catless Debate

- What is "going catless" and how/why would somebody want to do it?
    - If you didn't know already, going catless is simply removing the catalytic converters on the exhaust. As a result of the increased airflow due to the absence of the cats, the engine produces a noticeably deeper, more crisp

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exhaust note along with ~50% volume increase from the turbo whistling when it spools and begins to build boost.

- What is boost creep?
    - Boost creep is the action of the stock wastegate reaching its mechanical limitation to allow exhaust to bypass the turbocharger, so much so that “overboosting” can occur, providing a discrepancy in air-fuel ratios, which can lead to knock events due to the fuel trim leaning out extremely. My tuner has told me that he RARELY sees boost creep in catless applications that *he* tunes, and even then the creep is only happening in the 6300-6500RPM range, which is extremely high, near redline.
- Is there any way to stop boost creep?
    - External Wastegates (EWG) are a solution, however you will need to upgrade the headers as well in order to achieve this, along with a retune. EWGs allow you to vent boost pressure to the atmosphere in an extremely controlled fashion that’s unattainable by keeping the stock BPV and internal wastegate.
    - Methanol injection. Not only is this a cheaper option than getting new headers and EWG, it’ll also clean your valves. From Phatbotti Tuning: “Since the issue with being catless is running out of fuel, adding meth will increase the fueling capacity of the vehicle and prevent you from running out of fuel if a boost creep situation does occur. Meth injection also has the added benefits of increasing the octane of your fuel, decreasing the post intercooler air temperature entering the engine, both of which will reduce knock and it will also clean the intake valves”
- Will boost creep blow my engine?
    - Chances are, no. Can it? Certainly. However, with a reliable tune and responsible throttle control, chances are you should be okay. Always talk to your tuner if you have concerns and questions. They are your most valuable resource.
- Is going catless worth it?
    - This is entirely subjective. I would attest that going in either direction can be a good decision that yields satisfactory sound and performance. Emissions testing can throw a stick in the spokes, so know if your state requires testing or is CARB compliant before spending money to go catless.
- What are the benefits of going catless?
    - Louder, deeper, more crisp exhaust sounds

    - Increased volume of turbo whistle at 0psi and above.
    - Shooting flames (if you're into that kind of thing, you can be tuned for it)
    - A very slight power gain, maybe. There has been no conclusive evidence that a catless exhaust makes more power than a catted one, especially on the FA20.

- Why won't my tuner tune my car if I want to go catless?

    - Here's a link from Phatbotti concerning boost creep: Link

    - Every tuner is different. Some will be comfortable tuning catless applications, others will not. Choosing your tuner is the most important piece of the puzzle if you are deciding whether or not to go catless

    - Try to keep in mind that these are their careers. If they blow a motor and boost creep is the issue, it can tarnish a reputation and/or cause a tuner to lose potential customers. Please be considerate of different possible tuners and their respective boundaries as far as tuning goes.

- The trade-off between the benefits and downsides of going catless lies within boost creep. Carefully assess the risk, read up, and consult your tuner before making a final purchase decision. See #12 for more info on catalytic converters

- As of summer 2021, it is illegal to tamper with emissions components of a factory-made road legal vehicle in some states within the United States, such as California. **PLEASE CHECK YOUR STATE/PROVINCE LAWS BEFORE PROCEEDING WITH ANY TYPE OF MODIFICATION THAT WILL AFFECT YOUR COMPLIANCE WITH EMISSIONS, OTHERWISE YOUR CAR MAY NOT BE ELIGIBLE FOR REGISTRATION.**

Reputable companies for performance modifications

- While this is totally subjective to each individual, these are brands that I believe put their money towards making the best product for consumers through funding research and development along with testing of their own products. All of these companies stand behind their products 100% and I would believe your hard-earned money would be well spent on these companies. That being said, certain companies simply make better quality products than others, and some tuners prefer certain companies over others for

certain parts. Be in contact with your tuner, but know it's ultimately your money and your decision. **Some brands will outperform others for a certain part. Do research and ask around if you have questions.**

  - Cobb
  - GrimmSpeed
  - IAG
  - Perrin
  - ETS
  - TurboXS
  - Torque Solutions
  - Invidia
  - Nameless
  - Koyorad
  - Tomei
  - Borla

- On the contrary, these are brands I would stay away from
  - Anything on eBay
  - Anything that falls into the "too good to be true" price category

I want to get a built motor, where should I start?

- Call IAG or a local Subaru shop with a reputation for built motors.
- Find a Cobb certified protuner to work with throughout the process.
- Get ready to spend a ton of money. Being fast ain't cheap

Getting ready for the track

1. Tires. Get good ones. Don't just go out and get the stickiest you can find either. The tires need balance, look at the stock Dunlops. That's a good example of an unbalanced tire. The compound is so soft it can lose grip quickly if you don't exercise proper tire management at the track. The stock Dunlops are one of those "great tires till it isn't great anymore" type tires, if that makes sense.When looking for your first tires for track use start with some aggressive summer tires like some michelin PS4s. Stay away from track tires (aka r comps) until you have some real experience on the track as they behave very differently.

2. Tire pressure management - It's fitting that the second thing we choose to mention is the psi management of the tires you just bought. Tire pressure carries wildly while on the track and depending on what type of track you are at it can make a huge difference to how your car performs. When managing tire pressure on your first track session you have 2 temps. A cold and a hot temp. Cold temp is before you go out and a hot temp is after you finish your session. The goal is to have enough tire pressure to prevent you rolling onto your side walls but low enough to prevent you from shrinking your contact patch. I would recommend starting at 30 psi for all 4 tires on your first run and checking psi when you get off the track. Generally you're going to be looking for 36 or so when you are coming off the track hot. Now each car is different and each driver is different so it's important to know if your tires are rolling over in these sharp turns. Using chalk is a great way to figure it out. Take some sidewalk chalk and draw some lines from the middle of your sidewall to about 2 inches into the tread of your tire. After one session on the track you should be able to tell where your tire is making contact. If the chalk is rubbed off on the sidewall, add more air. If the chalk is still on the tire tread, take some air out.

3. Brakes. Even with the performance package brakes. Your pedal will go soft quick. Depending on your track it can be as soon as 2-3 laps. This is most likely due to the weight of the car, throwing the weight around plus having the torque-based vectoring intervene will make for a soft pedal. As soon as she feels soft take a cool down lap and let her rest a bit. Procuring better brake fluid and brake pads will help here. Yes, even with every electronic aid off, the torque vectoring still intervenes a bit. For your first outing ebc yellow stuff or hawk HP+ pads are good. After you build some confidence they will start to fail and you'll need to look into race pads or a BBK. It is also important to note that you HAVE to have either fresh dot 3 brake fluid (stock) or some dot 4 brake fluid. Otherwise you may put that foot on the brake and you might end up in a wall.

4. Center viscous differential. After 3-4 laps your AWD system will feel like an older slip and grip system from the late 90's. This is due to the viscous fluid needing to cool down. This is also very unsafe. Remedy this by pacing yourself and letting things cool down in between various activities. The STI won't suffer from this at all.

5. Fuel. If you're not flex fuel tuned and if your tuner gives you the green light. Consider adding 1.5-3 gallons of E85 or at least 3 gallons of 100 octane. This will help fend off the ecu when it will want to remove timing and boost. If you are flex fuel tuned, then run flex fuel!

6. Heat management. Going up to a 5W-40 for race day isn't a bad idea at all. One should consider a front mount oil cooler. Front mount intercooler or better top mount intercooler, though the fmic will be the best choice here.

7. Driving schools at the track. Consider them a resource. If you are just starting out these classes can help you develop good habits.

8. Safety. Check tire pressure, fluids, seat belts, your helmet etc.

How to properly log your car using the AccessPort

Before we can even touch this subject we have to make sure the proper parameters are being set to be logged. We should also cover some bad habits too. Finally we will be able to cover what a proper log looks like.

First, some logs are devoid of important data. Go into your accessport, you should be connected to your running vehicle. Go to gauges>go up and select settings>select configure datalogging>select the parameters you want to actually log>then hit the back button when you're done.

Typically you will want to log the following but don't be surprised if your tuner asks for different data too. This isn't an end all list but are the most basic and relevant parameters:

1. Accelerator Position
2. AF Correction 1
3. AF Learning 1
4. AF Sensor 1 Ratio
5. AVCS Exhaust Left/Right
6. AVCS In. Left/Right
7. Barometric Pressure
8. Boost
9. Calculated Load
10. Closed Loop Sw.(on/off)
11. Commanded Fuel Final
12. Coolant Temp
13. Dynamic Advance Multiplier
14. Ethanol Content Final (Flex Fuel only)
15. Feedback Knock
16. Fine Knock Learn
17. Fuel Pressure
18. Fuel Pump Duty
19. Gear Position
20. Ignition Timing
21. Injector Duty Cycle

22. Intake Temp
23. Intake Temp Manifold
24. Limit Boost Table Base (may be Boost Limits Base (Table) Rel. Sea Level)
25. MAF Volt
26. Oil Temp
27. RPM
28. Requested Torque
29. Roughness Cyl 1,2,3,4
30. Target Boost (may be Target Boost Final Rel. in some ECUs)
31. TGV MAP Ratio
32. Throttle Position
33. Wastegate Duty
34. TGV Sens L Voltage (Flex Fuel)

A vehicle running Flex Fuel would require extra parameters too, the situation and mod list can be as diverse as the information your tuner will want logged. Make sure this is part of the interaction and ask if there's anything specifically that should be logged. Quite frankly your tuner should bring this up first but there isn't anything wrong with being a bit proactive in this regard.

Some bad habits:

- You shouldn't take a log that's longer than a minute or two unless the person receiving your log requested a longer one. Also, a longer log is necessary for certain issues, such as troubleshooting. Other than these two reasons a log should never be too long. It makes the graph very dense. It becomes difficult to comb through things while it becomes easy to miss key fluctuations and readings.

- Don't modify the log before sending it. It could seriously throw everything off.

- Unless otherwise specified, before you start a log make sure the engine is at proper temp. This means oil temp above 190°, coolant temp around 200°, and intake temp as close to ambient temp as possible. Doing a WOT pull while your intake temp is sitting at 140° is a recipe for knock. Cruise around to cool it off if need be.

- Before logging, make sure your AccessPort is updated on the latest firmware too.

- Keep the AccessPort's memory tidy. There's no need for you to store tons of tunes you will never flash (like valet mode) and a bunch of logs. Move the logs to your computer.

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Proper logs looks like:

- A proper log will come from a person who (for example) complained about a loss of power immediately after a shift. The log reviewer/tuner who agreed to review the logs would then ask the person to try and log about two or three miles worth of driving in the city and send the log. At this point we know this log will be a long one considering that is what the log reviewer/tuner is requesting. The person should have properly warmed up the car and started logging when temps are ready.

- In another scenario, a person is getting some FK. The log reviewer/tuner asks for a third gear wide open throttle pull. The vehicle owner should warm up the car property, get to his/her road of choice for the pull and start logging then. As soon as the third gear pull is over and the vehicle's owner can safely stop the log on the AccessPort, he/she should.

Boomba bypass valve issue

Lately we have seen some troubling logs from folks with Boomba bpvs, and it was enough to personally feel obligated to warn folks about this particular issue.

We are seeing some feedback and fine knock issues with cars that have the Boomba. It's mostly tip in knock, especially after an up shift. When troubleshooting everything is considered. From boost leaks, intake placement, bpv inlet trimmed (as per Boomba's instructions) and all the other usual suspects.

The crazy thing is. These issues aren't present on every Boomba equipped WRX. So we have no idea if it's just bad qc on Boombas part, or maybe some prerequisites are present that needs to be addressed on certain vehicles.

Speaking to Boomba, no tune is required even though the stock bpv bleeds a bit during tip in and theirs doesn't. And I think this is important, because more than likely, the ecu is freaking out because there is a hair too much cfm being pumped in since it can't bleed the way the stock one does. It's enough to make me want to declare that one should retune for a Boomba bpv. Just in case at least, for the sake of due diligence.

Ultimately compared to stock. The Boomba is well built. Looks solid as shit. And can perform well even with larger turbo chargers.

Speaking with Cobb on the matter, the Cobb bypass valve allows for adjustment. I was told this is important because not every car will be able to live with a bpv that won't leak a bit. The Cobb unit allows for a delayed or instantaneous release of pressure.

A Cobb customer service agent told me their unit doesn't require a tune. But you should spend time getting it adjusted properly, or set an adjustment and get tuned for the different bypass valve behavior.

So. In short. Log your car. If you're having an issue, call Boomba. Maybe your bpv is defective. Maybe it isn't and you need to get it tuned. Just get ready to address any possible issues. Log it.

CVT modding FAQ

Disclaimer: Some of the authors/contibutors opinions vary for this portion. In general the CVT does not handle modding as well as the manual. That being said we have seen CVTs run corn for 350Hp with no issues and i've seen slippage on a stage 2 CVT. Mod at your own risk.

Should I get a CVT WRX?

- If you are looking for an automatic WRX, it's an option. It drives very differently from a traditional automatic, so it's strongly recommended to test drive before buying.

How is a CVT different from a typical automatic?

- Engineering Explained did a video on this at https://www.youtube.com/watch?v=cb6rIZfCuHI . Of note with the Subaru CVT, it's using a belt that's actually a chainmail belt instead of a bunch of plates stacked together and held in place with a couple of bands, so you may hear it referred to as a chain instead of a belt.

Can I engine brake?

- Yes, it's possible, but it will generate more heat on the CVT so keep that in mind.

The CVT WRX has drive modes?

- Like the STI, the CVT WRX has three drive modes: Intelligent (gas efficient), Sport (all around), and Sport# (track/high performance). Because of how a CVT works, Intelligent and Sport modes have 6 simulated "gears", while Sport# has 8. Shifting is near instantantaneos, and you generally keep your boost. In manual mode you do the shifting with the paddle shifters while in automatic mode the TCU (Transmission Control Unit aka TCM or Transmission Control Module) does the shifting for you. That said, I'm not entirely convinced that auto uses the "gears" instead of moving the chain as necessary.

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Is it safe to mod a CVT WRX?

- A: Yes - as long as you keep the torque limited to about 300-320 or so. Getting a CVT cooler is a mandatory supporting mod. One of the oldest known modded USDM VA CVT WRX is https://forums.nasioc.com/forums/showthread.php?t=2628737 , Bellipotens was the trailblazer for this platform that showed the rest of us what is possible.

Why is a CVT cooler so mandatory?

- A: From an email thread with Amsoil, the CVT fluid will start to rapidly degrade above 220F, with sustained periods basically causing the fluid to need to be replaced. The degraded fluid is also known to cause other bad stuff (aside from the fluid not doing what it's supposed to) like causing seals to degrade faster.

But the dealership said the USDM 15+ CVT WRX already come with a CVT cooler?

- Subaru of America decided to label the engine coolant/CVT fluid heat exchange as a "CVT Cooler" for whatever reason - and the heat exchanged will be called that for the scope of this email. This should not be confused with JDM Subaru CVT cooler which is an actual CVT cooler (as seen on https://www.japanparts.com/parts/detail/50100 and https://www.subispeed.com/part/most-popular-15-wrx/45512va000-kit-subaru-cooler-atf-cvt-15-wrx-1-box-1-bundle#.XxG1qWqSlGN). Infuriatingly, Subaru of America never brought the real CVT cooler over despite it appearing on several of the more performant JDM CVT WRX models.

Can I run stage 1 without a CVT cooler?

- It's strongly recommended to have a CVT cooler as there's no good way to rapidly cool down the CVT fluid on the USDM CVT WRX. Subaru of Japan sells several of their more performant CVT WRX models with a CVT cooler stock for a reason...

Can I run stage 2 without a CVT cooler?

- A CVT cooler is a mandatory mod for running stage 2 safely because your transmission will generate enough heat that running stage 2 without a CVT cooler is an easy way to break it.

Imported JDM Subaru, Mishimoto, or DIY CVT cooler?

- Mishimoto CVT cooler is the recommended way to go because you don't have to fabricate the mounts, even though the core is believed to be a Setrab core (like one listed at http://www.setrabusa.com/products/oilcoolers/engine/index.html). If you do go with a Mishimoto kit, do not install the rubber lines as carrying CVT fluid is a bad application for the rubber lines and they will crack and leak in about a year. Instead, use either braided metal lines like the ones listed on http://www.setrabusa.com/products/hose/index.html or something similar when installing the Mishimoto kit. Many lean towards the Mishimoto kit over the imported JDM Subaru

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CVT kit because has a larger cooling core and is cheaper - mostly due to the cost of importing stuff in small quantities from Japan. Also, if you've got the fabrication skills to make your own mounts, you might want to consider it just for bragging rights.

Should I change my CVT fluid?

- The SoA documentation states that CVT fluid is a lifetime fluid - but I suspect that that's actually planned obsolescence (so the CVT is guaranteed to die at about 100k miles and you need to replace the WRX with a new one). However, past experience on other automatic platforms has shown that replacing the fluid about every 30k miles is a good idea and generally keeps the transmission working - even when done to cars (like the 80's and 90's Ford Taurus) that are known to have severe transmission problems, and I have followed that on my 18 CVT WRX.

What mods should I do for a CVT WRX?

- Aside from the CVT cooler (and the usual supporting mods like AOS) you're probably going to be generating all the torque you safely can with a flex fuel + Stage 2 build.

What should I be aware of with modding a CVT WRX?

- Not all tuners want to work with a CVT WRX because they tend to be a rare vehicle to mod - so they likely don't have the experience working with the platform. Unfortunately the TCU is still a black box, so you are going to need to get good with manual mode if you choose to mod. Watch the torque as torque is the killer and shouldn't really exced more than about 300-320 on a mustang dyno.

Should I launch a CVT WRX?

- If it's stock, it's OK once in a blue moon. If it's modded, HELL NO. That's the fastest way to go talk with the Subaru service department and explain why they should replace your borked CVT as the instaneous torque from the launch on a modded FA20 can break the CVT - specifically causing the chain to break and/or other damage to the CVT. If you want to launch your WRX, go get a manual one instead.

Is the CVT good for the quarter-mile/drag racing?

- No, it's not. If you truly care about the quarter-mile or a fast take off from a stop (like drag racing or racing from a stop light), go get a manual.

So what about autocross or a high speed track?

- Yes, and yes. Autocross is a lot of fun (especially in S#) and the CVT WRX shines best on a high speed track.

My clutch is making a “squeaking” type sound after a cold night and/or some wet weather. Should I be worried?

- If your clutch is squeaky after a wet and/or cold night, you probably shouldn’t worry about it. Cold temperatures compress the bonding between materials, from rubber to stainless steel, and hotter temperatures expands those bonds.
- If your car continues to have a squeaking problem after it has fully warmed, slowly press your clutch into where the ‘bite point’ is. If you can start to hear the squeak then, and it continues throughout the depression of the clutch until it is fully engaged; it may be an early sign of a throw-out bearing (TOB) going bad.
- There is a technical service bulletin (TSB) for this issue from Subaru. See the technical service bulletin information tab in this FAQ for more information on this particular TSB.
- Finally, a squeaky clutch ultimately CAN be normal, however it can also be an early sign of an issue with the clutch assembly itself. If you ever doubt yourself, see a trusted mechanic unless you are comfortable doing the work yourself.

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2002-2019 WRX / STI SERVICE Manuals...Complete With Torque Specs, Part Numbers, Wiring and Diagrams.

Link to service manuals

What does a COBB AP do? (needs to be written) - Sean (god I still need to write these 2/6/2022)
Octane Explained (e0 vs e10)(91 and 93)(e85 and its range)(needs to be written) - Sean

Last updated 5/4/2022