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Subaru Forester Diesel Subaru Outback Diesel MY10-On



Introduction - The Standard Cars

First released in Australia back in 2010, Subaru's first diesel engine found its way into two locally delivered models, the Outback and the Forester. With the drivetrain in both models essentially identical in every way (torque/power outputs, engine management system, specifications of the 6 speed manual transmission etc) let's take a look at improving the performance, drivability and fuel economy in both.

In standard trim, the 2.0L direct injected common rail diesel (in the usual Subaru trademark boxer configuration) makes 108kw and 350Nm. Although the engine uses the latest in variable geometry turbo design, it doesn't develop its torque peak till around 2400rpm.

On the road the engine is quite drivable, though not really inspiring or outstanding at any particular point. There is a bit of a torque hole around 1500-2200rpm before the turbo comes up on boost but the close ratio manual transmission (no automatic option available on Australian models at time of writing) allows you to drive within the meat of the torque curve most of the time.



So can they be made to go better? In one word – absolutely..! We were so confident of how well we could develop the Subaru Diesel, we bought our own Forester and entered the Australian Rally Championship (in the SUV class). We are all about improving weaknesses and building on strengths and our reward was winning the SUV Championship in our first year of entry!



Whilst this article focuses on performance related upgrades, there are also plenty of suspension and brake upgrades that we've developed as part of our rally program that can be considered. For more information on that side of things simply give us (or your nearest MRT reseller) a call to discuss your requirements.

Performance Improvement – Our Goal

In looking to achieve increases in performance, there are several areas that need attention – our key aim is always to improve efficiency of the package as a whole in order to achieve well balanced results. Most of our clients buy their cars for enjoyment in a variety of environments (day to day commuting, spirited highway use, occasional track days, etc), but by far the most common is as a daily driver. On that basis, modifications which make a car too loud, consume fuel like someone else is paying for it, drive poorly with no torque at lower rpm, ride harshly, etc aren't our focus.

Gone are the days when you simply bolted on an exhaust and hoped for the best. We aim to take what the factory supplied you and improve on it after thorough testing and development – this is also why we guarantee and provide a warranty for all of the work completed by us or our resellers.

Factory Warranty Guarantee

When sold new, the manufacturer of your car provides a fairly specific warranty that covers a variety of things for a predetermined amount of time or distance travelled. Problems caused by poorly thought out or performed modifications however are generally not one of them! Where a problem with your car is completely unrelated to any modifications made (for example, your air conditioning fails 12 months after you have a power kit fitted) this is generally STILL covered by your factory warranty. However if you increase the performance output of your engine and your transmission fails, it is unlikely they will be too interested in repairing it under warranty.



Fortunately, where a full MRT Power Kit is fitted (by either us or one of our resellers) we will generally take up where your factory warranty ends to the extent that the vehicle is affected by our modifications. Of course there are some exceptions (such as outright race or track use – more information on our website at <http://www.mrtperformance.com.au/about-us/the-best-warranty>), but put simply, if we fit something to your car which impacts on its reliability, we will rectify the problem under the terms of our warranty.

Fuel Economy

In these times of ever increasing fuel costs, one of the main queries we get is how your car will be impacted by any modifications. Truth be known, in order to get better performance from your car two things happen:



- We need to make the engine more efficient throughout the rev range. Whether this comes through fitment of additional parts or changes to engine operating parameters, the aim is the same.
- ECU mapping is optimized to ensure the engine is operating with the most suitable settings for the combination of parts fitted.

As a result, during normal day to day driving your engine is actually working more efficiently and burning less fuel as a result. Of course when you are working the engine harder to extract higher levels of performance, you will burn more fuel (no way around the basic fundamentals of a combustion engine there sorry!) however remember that this is less than 10% of the time you are driving.

On balance, most of our customers who have had an MRT power kit fitted over previous years have provided feedback which confirms this. Depending on driving style (obviously), many notice no increase in overall fuel consumption and many have come back with gains of 0.5-1.5L/100km.

MRT Power Kits – What Options Do I Have?

We have many customers who come to us with a predetermined figure in mind - how much faster they want to go, a certain amount of power, or a preset budget are all common. We have many years behind us of preparing custom combinations to suit specific requirements for customers, be it road, race or rally.

However through our years of experience on Subaru, Mazda and Mitsubishi performance models, we know that certain combinations of parts produce certain results. Of course different engine configurations respond differently to various combinations, however we are able to break it down into various stages to suit each model. This allows you the peace of mind of knowing how much you are going to spend and the performance gains you will receive well in advance of any work starting.

Typically most of our supported vehicles come with 2 or 3 performance upgrade kit options:

- **XA Kit**

Entry level kit with a mild power increase but primary focus on improvements to mid range torque and day to day drivability. The XA Kit typically has no or minimal noise increase over a standard vehicle.

- **XB Kit**

Mid range kit designed more for the owner who wants that little bit more from their vehicle, both in terms of performance and sound. Significant improvements in torque and power, with a much broader torque curve compared to the standard vehicle, are the main targets and the kit usually includes an exhaust system upgrade (which provides an added audible improvement at the same time!).



Upgrading between kits is feasible (check FAQ section at end of this document for further information).

All of our kits are designed for engines that will be run on regular pump diesel sold within Australia (not brand dependent eg Shell, Caltex normal and Vortex diesel, BP, winter diesel variants etc are all suitable for use with our performance upgrades).

Please note the performance upgrades have NOT been tested on biodiesel or alternate diesel blends with varying cetane or sulfur ratings etc.

All initial testing, development and verification of results has been (and continues to be) completed on our in house 4WD Dynapack Chassis Dyno.

Dyno time is not normally included as part of our kits due to the level of testing and development already completed on associated mapping work, however if you wish for any specific kit to be custom tuned to your requirements it can be easily done at a slight extra cost.

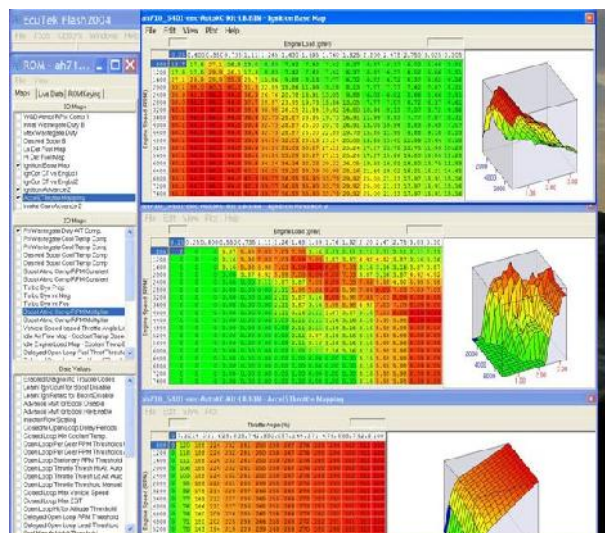


Why EcuTek?

All MRT power kits retain the use of the factory engine management system hardware, recalibrated for optimum engine control through the use of EcuTek software.

Some people prefer to remove the factory management system and fit a complete replacement ECU (or interceptor style unit which overrides some aspects of the factory management systems control), however this is not our preferred method for several reasons.

When tuned correctly the factory engine management system allows you the best of both worlds – factory or better than factory drivability, with the best possible performance from your chosen combination of modifications.



Certificate Of Authenticity

Be sure you get what you pay for! With the success of the MRT Power kits over the years, some companies try to pass off inferior parts and options that replicate what we do. However we guarantee our results because we only use proven parts and the best engine management system technology in EcuTek software.

With each tune or upgrade completed, you will be provided with an individually numbered Certificate Of Authenticity to show what has been completed on your vehicle. To register it, simply complete the detachable feedback details and drop it in the (reply paid) post.



This isn't something just anyone can do however, we (and our resellers) use proven EcuTek engine management software to upgrade your existing OEM engine management system with the required settings. In doing this, you'll get:

- Good fuel economy via accurate closed loop fuel control.
- No wiring or hardware modifications to the electronics of your car (100% reliability).
- The same or better emissions output from your engine (many OEM setups run quite rich air/fuel ratios at higher rpm levels).
- All of the OEM safety parameters such as active knock control and boost limiting adjusted to suit. This means if something isn't going according to plan (eg detection of detonation due to the use of poor quality fuel for example), your ECU can respond accordingly to prevent engine damage in most cases.
- Optimum setup and control of the latest engine management system features such as variable valve control, electronic throttle control (including access to all 3x SI Drive modes on Subaru models where fitted) and more.

We have used EcuTek software to reprogram the Subaru and Mitsubishi factory engine management systems on everything from standard cars right through to heavily modified cars with enlarged engine capacity, massive turbo and intercooler combinations and nitrous of all things!

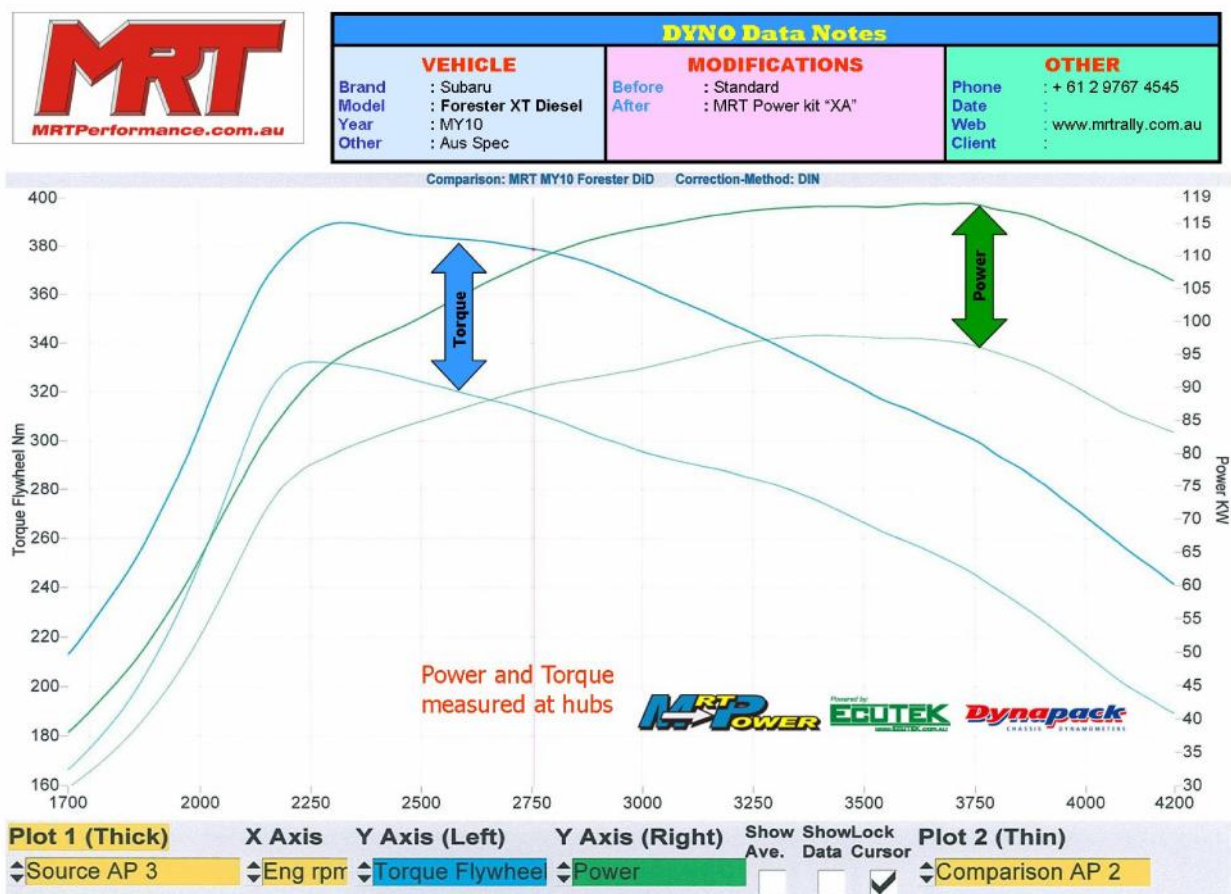
Road or race, the results are on the board – why use anything else?

Subaru Forester & Outback Diesel – XA Kit

Like most new diesel cars on offer from many manufacturers, the Outback/Forester engine is tuned primarily for emissions and reduced soot output as a priority. Everything else (torque delivery, drivability, fuel consumption, etc) is a distant second. This isn't necessarily a bad thing in the current environment of manufacturers reducing vehicle emissions, but also means there are some additional things to consider when looking at tuning and increasing performance.

The boxer diesel engine is fitted with a fairly complex Diesel Particulate Filter (DPF), designed to reduce (and in most cases completely remove) soot output from the engine. There are a variety of control systems in place to prevent the DPF from becoming clogged, including various regeneration programs and a vast array of sensor inputs for which certain values must be maintained within range to keep the engine management system happy. All of these must be factored in when considering performance improvements, and fortunately the use of specially designed EcuTek software allows us to accurately remap the OEM engine management system. This helps to both yield fantastic results AND keep all of the emissions control systems happy.

As an entry level starting point, the engine management system is completely remapped with revisions made to boost control, fuelling, injection timing, emissions control related functions and more. The results are astonishing to put it mildly!



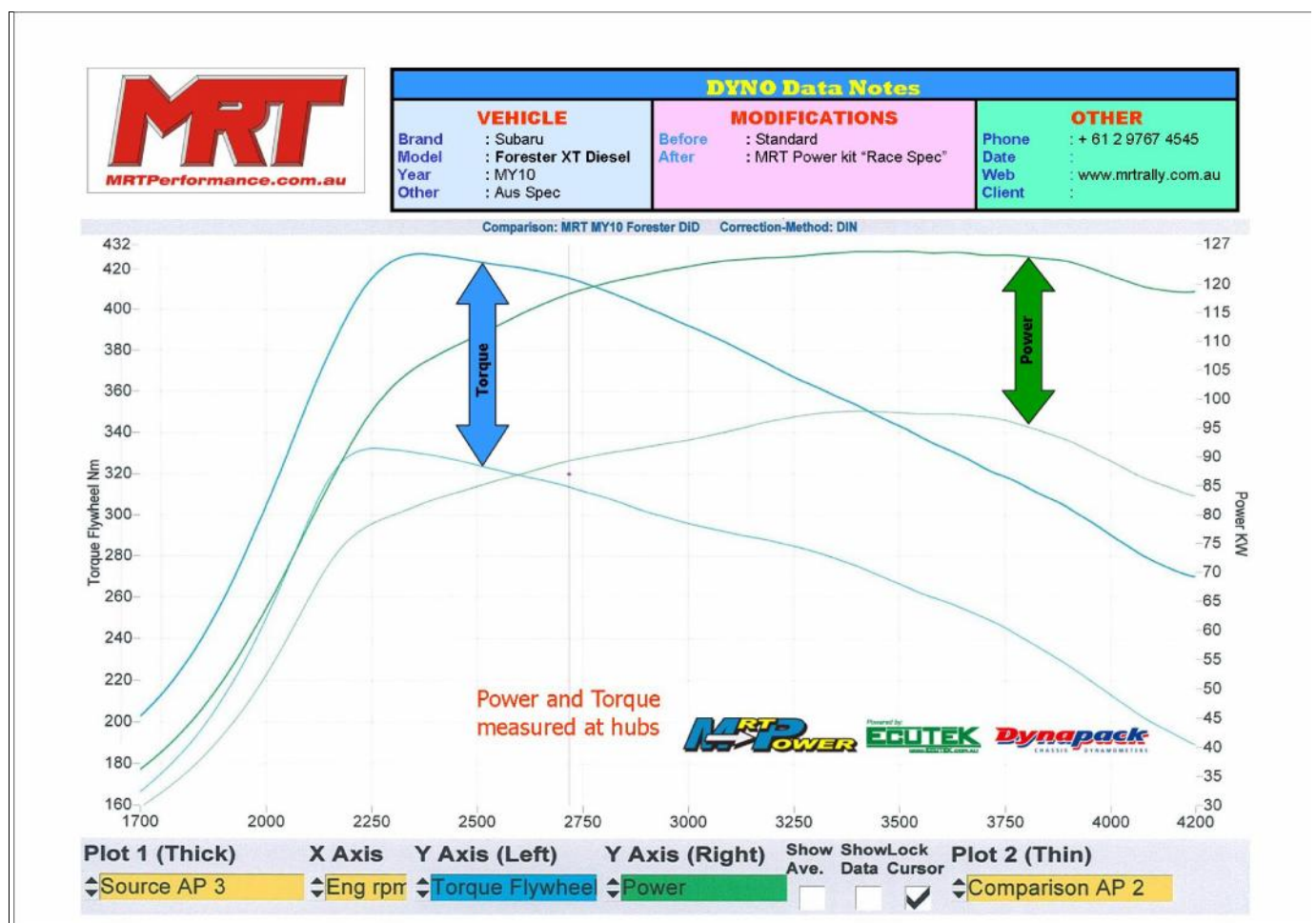
With over a 20kw increase in power and more than 18% gain in torque through much of the rev range, performance on road is transformed with noticeably more urge. Additionally more torque is available earlier in the rev range, and all DPF and emissions related functionality is retained and kept reliable.

Subaru Forester & Outback Diesel – XB Kit

Performance gains in the XA Kit are essentially limited by the amount of fuel we can inject into the engine (more fuel = more soot = clogged DPF = trip back to Dealer for expensive repairs). With the maximum potential from the standard mechanical configuration achieved, upgrades to intake and exhaust design to improve air flow and engine efficiency are required.

Specifically, this includes changes to the DPF and catalytic converter fitted to the car which will impact emissions and soot output, voiding your OEM warranty and breaking a range of emissions related laws on road vehicles. For this reason, at present this option is only available for use on off road vehicles (such as our Forester Rally car).

Along with removal of the DPF assembly and modifications to exhaust design, some additional proprietary modifications to some engine sensors and the engine management system are required. This then allows further engine management system remapping and the injection of additional fuel amounts without causing reliability issues or exhaust gas temperatures outside of safe ranges etc.



With these additional changes, torque output rises to more than 30% over standard, with power gains of over 30kw over standard output feasible. At this stage however, the factory turbo is nearing its maximum flow potential (both in terms of housing size and shaft RPM limits etc). We have tested some alternate configurations as part of our rally program, so on the off chance you are chasing more power for your off road or competition vehicle please feel free to get in touch.

Frequently Asked Questions

Do the modifications void my new car warranty?

Also refer details on the *Factory Warranty Guarantee* listed earlier. One of the most common queries we get in relation to performance upgrades on new models is the potential effects on factory warranty. To that extent, Subaru retains the right to refuse claims on warranty where the item being claimed on has been modified or changed from factory specification.

However, to date we are yet to have any vehicle fitted with one of the MRT Power Kit upgrades fail as a direct result of the improvements made, with hundreds of kits supplied and fitted to date Australia wide. We also offer a warranty against manufacturer defect on all parts we supply. We also spend countless hours on research and development of parts, tuning, and the associated effects of these changes on the rest of the vehicle.

I have already made some modifications, can I get the same results as seen above?

Many customers perform modifications in stages, partly due to budget constraints, partly because it starts in stages then the bug bites and performance becomes an obsession. All modifications listed can be performed around what you already have. Depending on the quality and type of items fitted, we will get performance gains as close as feasible to the above. Of course to make sure you get the gains the vehicle is capable of, just make sure you use MRT parts from the beginning! ☺

Can I still service my car with a dealer?

We would like you to choose us for your regular servicing, but should you choose not to there are no hardware or software changes that will stop a Subaru dealer using their factory diagnostics equipment. Additionally if they reset your ECU it will still retain its “enhanced” settings.

How long does the work take?

The XA Kit can be completed within 1 day, XB slightly longer. When booking your car with us (or your local authorised outlet) the total time your vehicle is required will be reconfirmed as well.

7 Reasons why you can rely on MRT.

1. **Extensive R&D program** - each MRT Power Kit is the result of hundreds of hours of road and dyno testing. Different performance components are tested and retested to find an optimal solution to the question of “How can I cost effectively upgrade my car to be quick, reliable, economical AND fun to drive, without voiding my factory warranty?”

2. **Our Unique Triple Guarantee:**

i) **Guaranteed Performance Outcome** – We guarantee our kits will deliver at least our quoted figures for Power and Torque. You benefit from the hundreds of dyno tests we have performed to optimize our power kits and your car is individually tuned by our expert tuners to give you the best possible result.

ii) **Factory Warranty Guarantee** – Where our modified parts have been fitted to your car by us (or a reseller), should your new car warranty be voided as a result we will cover repair/replacement of any OEM parts negatively impacted by the modified parts under the same terms as the factory new car warranty.

iii) **Parts Guarantee** – All of the parts we supply are of high quality and covered by a full 6 month/10,000km warranty or for the life of your factory warranty, whichever is greater.

3. **Proven Track Record** – Why risk your money playing mix and match with components not designed to work together with no guarantee of a performance outcome or risk of engine failure? We have invested many hundreds of hours in developing each kit offered to find the best performance enhancement solution at realistic price points for you. Thousands of happy customers use their cars with our parts every day.

4. **How fast do you want to go** – Each kit has been designed specifically to suit your particular model car with different levels of performance based upon your budget and individual needs. Custom solutions are also available where required.

5. **Single Supplier** – if you encounter any issues, you have a single point of contact to get them resolved to your satisfaction. The possibility of vendors passing the buck and not accepting responsibility is eliminated.

6. **Improved Fuel Economy** – thousands of km of road testing has proven that your fuel economy will be as good as or better than prior to fitting the kit when the car is driven in the same manner under similar conditions.

7. **Drivability Focus** – our kits are not about massive outright power levels (although we can do this separately!), they are designed for practical enjoyment.

* For full details refer your MRT reseller and additional information within this document. MRT is independent of Subaru/Toyota.

If I have one type of kit, can I upgrade at a later stage if I want more?

Easily! All of our parts are designed to be compatible with other items. For example if you have one type of kit, upgrading to the next level simply consists of adding any additional parts that may be required (eg upgrading from a rear muffler only to a full exhaust system, updating ECU tuning to suit, etc).

The cost to upgrade depends on what parts you already have fitted. As a guide it's generally around the difference in price between your kit and the next + any additional labour associated with the changeover.

Where can I get the work done?

Any authorised MRT reseller can easily complete the above work for you, or assist in designing a series of modifications around your requirements. For further information and contact details please check out our website at <http://www.mrtperformance.com.au/resources/mrt-partners-and-authorised-outlets>.

Of course if you have any other queries that we have missed, or need further information either give us a call directly on (02) 9767 4545 or get in touch with your local reseller.

Subaru Forester & Outback Diesel MY10-On Kit Pricing And Inclusions .



XA Kit

Guaranteed minimum 20kW gain* (up to 20% more torque)

Includes:

- 1 x Factory Warranty Guarantee ***
- 1 x EcuTeK MRT ECU software upgrade
- 1 x EcuTeK Certificate of Authenticity
- 1 x Label kit, (1x petrol cap cover, 1x engine bay and 1x radiator support panel)
- 1 x EcuTeK embossed label
- 1 x Recalibration of factory ECU using mapping extensively developed on dyno and road **
- 1 x Full on road diagnostics and testing
- All labour to fit/tune/test vehicle

For pricing and more details refer to your local MRT Supplier



XB Kit

By negotiation depending on your requirements. Please contact us.

* Whilst realistic/achievable on all MY10-On Subaru diesel models, power gains are subject to 10% variation due to fuel quality and temperature variations in some areas of Australia. If you've concerns about any aspect of the work to be completed, please just ask us (or your local Authorised MRT Distributor)!

** Kits are NOT dyno tuned at time of fitment in most cases. We spend hundreds of hours on dyno and road at the development stage to eliminate unnecessary expense for you. This knowledge is incorporated in mapping designed for each kit, then refined in your car with road testing and diagnostics. Before and after power runs, or custom dyno tuning for every last kw are both feasible however additional costs will apply.

*** Refer Warranty details within document.