



# FITTING AN ATB DIFF UPGRADE

It's one of the best upgrades you can make to a modern fast Ford, so let's see exactly what's involved with fitting a Quaipe ATB differential...

Words & Photos JAMIE

**I**f you read our feature last issue looking at how an Automatic Torque Biasing diff transforms the handling of a fast Ford – especially cars like the new Mk8 Fiesta ST and the four-wheel-drive Mk3 Focus RS – then you'll no doubt want one fitted to your car. If you haven't read the August issue, then grab a copy to see what key members of the Ford Performance team, Jamal Hameedi and Leo Roeks, and Michael Quaipe of Quaipe Engineering have to say about the performance advantages an ATB differential can bring to a fast Ford.

We're pretty sure you'll be convinced. In fact, we're so confident you'll want to fit a Quaipe ATB that we've gone a step further and teamed up with the guys at mountune to show you exactly what's involved with having one fitted. The Mk3 Focus RS may have missed out on having an ATB fitted at the factory, but thankfully you can at least have one retro-fitted. And if you have the work done at mountune HQ or any mountune-approved Ford dealer, it doesn't affect the vehicle's base warranty.

The benefits are well publicised, and after driving an RS Edition model (which

does come with an ATB as standard) we were totally converted. We needed one on our own RS. But it's not just RS owners that can benefit from an ATB upgrade – any fast Focus or Fiesta owner should consider one.

But enough of the reasons to fit one, what's actually involved with installing an ATB? Well, quite a lot as it turns out. It's definitely a job best left to the experts! To show exactly what's involved we shadowed the technicians at mountune as they installed a Quaipe ATB to our very own Focus RS. Here's just what the upgrade involves...

## WHAT IS AN ATB?

There are many different types of limited-slip differential available, and all try to achieve the same goal – to maximise the available amount of traction at each driven wheel.

ATBs (Automatic Torque Biasing) units are the least harsh of all LSD types, because they never lock. A complex arrangement of the sun and planet gears means that when one wheel starts to slip, the torque is biased away from that wheel.

The most famous ATB diff is that made by UK engineering company, Quaife, although some OE manufacturers and other transmission specialists offer similar products.

An ATB diff may look complicated, but the principal behind how it works is actually quite simple. Rather than relying on friction plates to operate, an ATB unit uses gears to bias the torque away from the spinning wheel. To do this, an ATB uses a series of helical pinion gears, which mesh with each other as well as the differential's sun gears. Typically, an open diff will have a sun gear which meshes with a planet gear, which in turn meshes with the other sun gear. This is why when you spin one wheel, with a conventional open diff the other wheel spins in the opposite direction.

However, with an ATB diff the sun gear meshes with a series of helical pinion gears, which mesh with another set of helical pinion gears, which then mesh with the other sun gear. This effectively adds an 'idler' gear, meaning both wheels turn in the same direction.

Under normal driving conditions the pinion gears mesh and both wheels are driven at the same speed. However, when one wheel starts to slip the friction caused by the drag of the pinion gears in their pockets enables the ATB to transfer more torque to the other wheel with traction.

ATBs are one of the most user-friendly LSDs because the amount of torque transmitted to each wheel constantly varies. While ATBs work in all cars, they're favoured by FWD and 4x4 road car owners due to the controllable power delivery and reduction in steering wheel snatch and torque steer.

ATBs behave in a safer and more predictable way than other diff types, making them well suited for road use.

Also, because of the amount of surface area in contact with each other, ATBs are among the strongest LSDs available, making them an ideal fit-and-forget solution for many fast road cars.



# THE FITTING PROCESS

## REMOVE GEARBOX

The Quaife ATB can't be fitted in-situ, so that means the gearbox needs to come out. And, as you can imagine on a modern car with the added complexity of an all-wheel-drive system, that's not a five-minute job.

It takes the experts the best part of half a day to fully remove the gearbox from the car, so there's no way we'd be able to cover each and every step of the upgrade in this feature. But, we can at least show you the main stages involved..

First up, the battery, battery tray, air filter, intake hose, and airbox all need removing from the engine bay – and that's before you can even see the gearbox buried deep beneath. When there finally is enough space to access the MMT6 unit, the gear linkage cables and clutch all need disconnecting, and the gearbox mounting bolts will need loosening (to be fully removed later).

It's not essential, unless you're running a splitter, but it makes life easier (especially for

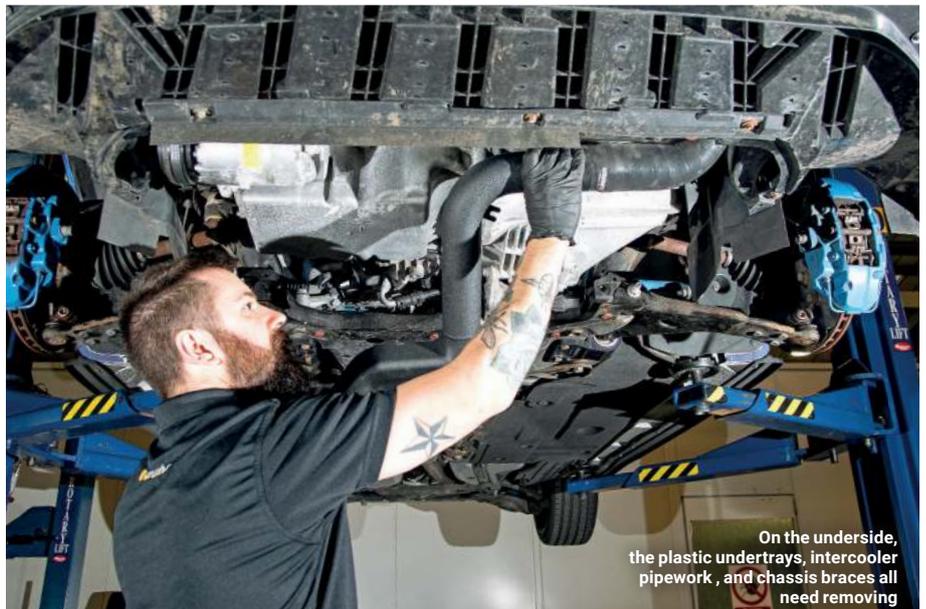
photos!) to remove the headlights and front bumper too.

On the underside there's even more to do. With the plastic undertrays, boost hoses, and chassis braces all removed out of the way and the gearbox drained of oil, there is enough access to get to the driveshafts. Removing these require the hubs to be separated from the ball-joints on the front wishbones before the driveshafts can be fully removed from the car. And then it's time for the really tricky bit – removing the PTU (Power Transfer Unit). It's water-cooler and a series of hard-to-access bolts hold it in place. To make things more difficult, it's also filled with an expensive, specific oil – so it's not something you want to be chucking around all over the place.

With the PTU removed, the engine's weight can be supported with a stand, the bellhousing bolts can finally be removed along with the last remaining fixings and mountings, and the 'box can be teased out of the car...



The airbox and battery tray need removing before you can even see the gearbox!



On the underside, the plastic undertrays, intercooler pipework, and chassis braces all need removing

## COSTS

Quaife ATB: £726  
 ATB fitting kit: £195  
 (supplied & fitted at mountune) £1399

PTU brace: £139  
 Short shifter arm: £159



The balljoints need splitting so the hubs can be separated from the wishbones

## WHAT DIFFERENCE DOES IT MAKE?

**Jamie says:** "Wow! What a difference! Prior to having the ATB fitted I was told the upgrade makes a huge difference to how the Mk3 Focus drives, and they weren't lying. I've driven cars with a Quaife ATB fitted before, but there's nothing quite like a back-to-back comparison in your own car to really highlight the improvements.

For starters, even at everyday speeds it makes the car feel more alive. Simple tasks that never really crossed your mind before, like changing lanes at motorway speeds, now feel so much more energetic. The front end just pulls you wherever you point the steering wheel with a real sense of urgency. In comparison, it actually makes the same situations in the OE car feel a bit numb.

And that's just in a straight line, at sensible speeds. Start increasing the pace and throw it into a corner or two and the ATB-equipped RS behaves totally differently to the OE car. I know my car has got other suspension and handling upgrades already installed, but they have really come alive since fitting the ATB. The front end hugs the apex and allows you to get on the power much sooner than previously. The ATB allows you hold an even tighter line, at faster speeds, and while applying more throttle – if you're accustomed to the original setup it actually comes as quite a shock just how much more aggressive you can be.

But thanks to the RS's AWD system, it never feels like the car is able to get away from you. If you do push a little too hard, the rear drive comes in to play and gives you that 'hero' moment while it allows you to catch the drift. The standard car also does this, but invariably because the ATB has allowed you to carry greater speed before the rear drive needs to kick in, you're doing all the heroics at an even faster pace, making you look like even more of a superstar driver!

One criticism people have labelled at the ATB-equipped RS is that it's less fun to drive, because the increased mechanical grip at the front negates the need for power to be sent to the rear. I understand the theory behind this, but have to say I don't think it's true. In my experience the ATB has actually enhanced the 'fun' factor of the RS. By holding a tighter line through the corners, and front end just gripping no matter how violent you are with the steering angles, I've actually found it easier to provoke the rear end to step out of line since having the ATB fitted. Of course, when you drive sensibly it behaves as you'd expect too.

It takes a bit of getting used to at first, but I can honestly say that fitting the ATB has to be one of the best upgrades you can make to the Mk3 Focus RS. I don't know why it wasn't fitted at the factory (\*cough\* Price!) but I urge any RS owner to consider one, regardless of any other modifications or not. It really is that good."



The driveshafts need to be removed before the gearbox can be taken out



It makes life easier if the front bumper is removed



The PTU is notoriously tricky to remove, and needs to be held level to prevent oil spillage



Finally, with everything else out of the way, the gearbox can be removed from the car



With the gearbox on the bench, it can be split to gain access to the diff itself



## REMOVE OLD DIFF

With the gearbox out of the car and safely on a solid workbench, the fun part of the upgrade can begin. The old oil seals need removing (these can be done either externally, or once the gearbox has been split), the clutch slave cylinder also needs removing, followed by the series of bolts holding the bellhousing to the gearbox. Then, a gentle pry taking care not to damage the mating surfaces will split the two halves of the gearbox, and reveal the differential.

Thankfully, after all the hard working getting to this point, the diff unit simply lifts away from the gearbox casing. But we're not quite finished yet, as the crown wheel needs removing from the old unit ready to re-fit to the new Quaife ATB...

Before the new ATB can be fitted, the crown wheel needs removing from the old unit





The crown wheel then needs fitting to the new ATB unit



Some assembly grease is used to ensure the new bearing surfaces are well lubricated



The new ATB then slides neatly in position in the gearbox

HAVING THE MK3 FOCUS RS QUAIFE ATB FITTED AT MOUNTUNE HQ OR ANY MOUNTUNE-APPROVED FORD DEALER DOES NOT AFFECT THE BASE WARRANTY



Gasket sealant is applied before the bellhousing is refitted



## FIT NEW DIFF

This is the business end of the upgrade, but you can't get all giddy and bolt the Quaife ATB straight into the gearbox – there's a few bits that need doing first.

The crown wheel that was removed from the original diff needs to be installed to the ATB (ensuring the bolts are thread-locked and torqued-up correctly) and the new differential taper bearings need pressing onto both sides of the new ATB unit, while the corresponding bearing cages in the gearbox casing need the old items removing and the new cages securely pressing in place. Then the diff backlash is checked, as per Ford's ETIS procedure.

The new bolts for the crown wheel and the differential bearings are included in the fitting kit mountune offers – along with the PTU oil seal, new propshaft bolts, and driveshaft oil seals that you will also need to complete the job.

With the diff bearings securely in place and lubed up with a bit of assembly compound, the new ATB unit can be offered up to its new home. Ensure everything's sitting correctly in the bearing and the crown wheel is meshing as it should with the rest of the gearbox, and then it's time to start the reassembly process.

A nice even bead of gasket sealer is applied to the gearbox before the bellhousing can be refitted – a gentle tap ensures it sits snugly over the dowels before the series of bolts can re-fitted and torqued accordingly.

The gearbox is nearly ready to be re-fitted to the car now, but before it is the driveshaft oil seal and new PTU oil seal (the one that is notorious for leaking, even on standard cars) need to be fitted, and the clutch slave cylinder re-installed. At the same time, the second driveshaft oil seal should be fitted to the PTU unit, and then everything's ready to go back together...



With the ATB installed, the gearbox can be refitted to the car



## REFIT GEARBOX

The refitting process is largely the same as removing the gearbox, just in reverse. The gearbox unit itself is initially lifted into place and held there with a few of the easiest to access bellhousing bolts. The upper gearbox mount can then be re-attached before the stand supporting the engine can be safely removed.

Refitting the PTU comes next, (we also took the opportunity to replace the standard PTU brace with one of mountune's upgraded parts at this point) which needs carefully positioning back onto the gearbox before everything can be done up – when the propshaft is reconnected, the new bolts included as part of the fitting kit replace the old items.

It's then a case of slowly but surely re-fitting everything that was previously removed to get the gearbox out; the driveshafts, the intercooler pipework, the airbox, the battery tray, the headlights, the bumper and so on.

The final jobs are to bleed the clutch, fill the gearbox with fresh oil, and check the coolant fluid levels (some may be lost when the water-cooled PTU is removed). A quick test drive to ensure everything's doing what it should, and that's the job completed.

Now you can enjoy all the benefits the Quaife ATB offers, and because it's such a robust unit you'll never have to worry about any maintenance either. It really is a bit of a no-brainer.

## WORTHWHILE EXTRAS

As you can see from the photos, fitting the ATB is a labour-intensive job that requires the gearbox to be removed. So, while the gearbox is out it makes perfect sense to take the opportunity to fit a few extra upgrades now that everything is easy to access. It would be foolish to pay unnecessary labour charges to fit these parts at a later date when installation at this point would barely increase the labour time of the original job!

That's why we opted to replace the original PTU mount with one of mountune's alloy upgrades. As torque and power are increased, the OE PTU casing has been known to fail due to torsional load and strain caused from hard launches and aggressive driving, so for £139 it makes sense to fit an upgrade while the driveshafts are removed and everything is easy to get to.

At the same time, while the gearbox was on the bench we took the opportunity to fit one of mountune's short-throw shifter arms too. Reducing throw by 25%, the shifter offers a shorter, crisper and more precise gear change, making the RS even nicer to drive at all speeds. This billet arm can be replaced in-situ, but still requires the airbox to be removed, and even then, access can be a little tight. Whereas, while it was on the bench we had all the room in the world, making installation really simple. It also meant we had plenty of room to photograph the installation too – so we did, and anyone thinking of fitting one in-situ will have a nice clear step-by-step fitting guide to follow in a future issue of the mag...

**FITTING GUIDE ON SHORT SHIFTER COMING SOON...**



it makes sense to fit mountune's short shifter arm at the same time...



...and also the upgraded PTU brace



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