



Torque show!

Not content with the standard 313 PS and 553 lb.ft., one customer commissioned Bromleys Tuning to tweak his V10 TDI even further...

Tunit upgrade has transformed the performance of Touareg V10 TDI, not only more powerful but smoother and quieter than before

IT SEEMS almost inconceivable that anyone would find the Touareg V10 TDI inadequate when it comes to pulling power. As we saw in the Technology feature last month, this awesome 5.0-litre diesel engine produces well over 300 PS and more than 550 lb.ft. of torque. Even though the vehicle weighs nearly two and a half tons, and powers through an automatic gearbox, it is still capable of sprinting to 60 mph in 7.5 seconds, and can accelerate from 50 to 70 in 4.5 seconds, real hot-hatch territory. In fact, most of its mid-range times are faster than those of an R32!

But perhaps the clue to any possible dissatisfaction lies in its fully laden weight of 6791 lb. – that's just over three tons! While in its unladen state it has a power to weight ratio of 126 PS per ton, comparable with a Golf GTI 1.8T, this plummets to 103 when laden – about the same as a Lupo Sport. Looked at another way, the

Touareg V10 TDI with a full load on board needs another 69 PS just to maintain its performance. That's more than the maximum power of a 1.9-litre Golf SDI, in addition to the standard output of the Touareg. Otherwise, it's almost like downgrading the V10 TDI to a £30,000 3.2 V6, not really the point when you've paid well over £50,000 for a top-of-the-range model!

'The Touareg V10 TDI with a full load on board needs another 69 PS just to maintain its performance'

This was the dilemma facing one V10 TDI Touareg owner. He'd been very impressed with its massive performance, until the first time it had been fully laden for a family outing. The sensational response was now only adequate, and there had to be something which could be done about it...

The answer came quite by chance, when a friend who owned an Audi A4 TDI mentioned diesel tuning specialist Bromleys Tuning, based in Chorley in Lancashire. Bromleys specialises in a range of diesel tuning devices which go under the brand name Tunit, and it has a wide range of applications for everything from trucks and tractors to small fry like the Skoda Fabia and Lupo TDI.

The Bromleys Tunit module is a small digital processor which is plugged into the wiring between the ECU and the fuel pump. It intercepts the signals and modifies the messages, changing the

Performance tuning: Tunit V10 TDI conversion



'The Touareg V10 TDI requires two Tunit modules, one for each bank of the engine'

feedback from sensors recording air mass and load readings, essentially tricking the ECU into supplying more fuel by readjusting the timing of the injectors, holding them open for longer.

Although pumping more fuel into the engine inevitably increases the power output, the Tunit module is more sophisticated than simple analogue tuning units which overfuel the engine proportionally. By selectively optimising the fuelling at only the required points in the rev range, the engine can be made to produce more power and torque, often more smoothly and economically than standard. The additional economy is achieved when the increased torque is exploited to change into a higher gear earlier. Producing more power, with greater tractability, means that the engine will often pull more cleanly from lower speeds than standard. Ironically, injecting more fuel into the engine, to produce more power, can sometimes result in using less fuel overall!

Although Bromleys hadn't yet tackled an installation on the Touareg V10, it had plenty of experience with other Volkswagen and Audi diesel engines, especially the four-cylinder TDI PD units which use an individual high-pressure injector for each cylinder, the same technology which is used on the V10 TDI.

The installation on the V10 TDI certainly wasn't going to be as straightforward as usual, though. As we saw last month, the V10 TDI is essentially two engines spliced together. Think of it as two 2.5-litre 5-cylinder in-line units, arranged in a vee formation, sharing a common crankshaft, and you won't be far wrong. It also has two completely separate induction and exhaust systems, one per cylinder bank. There are two of everything, including the air filter, hot film air-mass meter, turbo, intercooler, exhaust gas recirculation



system, and the control valves. Each five-cylinder bank is individually controlled by a new type of electronic control unit, designated EDC 16, a 32-bit microprocessor with significantly improved computing power.

Normally, installation of the V-PD Tunit is a straightforward task, simply plugging in the unit in-series, using new adapter plugs to directly replace the original connector to the fuel pump. Using the in-house single-roller TAT dynamometer, it seldom takes more than half an hour to install the Tunit module and adjust it to achieve optimum performance.

There were two problems with the Touareg V10 TDI, though – it has four-wheel drive, needing a suitable dyno facility, and requires two Tunit modules, one for each bank of the engine, the settings carefully co-ordinated so that

they would operate properly in tandem. Fortunately, Bromleys Tuning has an arrangement with the nearby Blackburn Technical College to make use of its Bosch four-wheel-drive rolling-road facility. Under the watchful eye of resident technician Raymond Byrne, Mike Bromley and his technician Eric Cann set about fitting the two Tunit modules and adjusting them to work in harmony.

Basic DIY-type adjustment is simple, using a moveable connection (or jumper) which shifts from left to right, but the V-PD Tunit can also be fine-tuned using a laptop, re-programming it either as you drive along, or on the rolling road. As well as being able to increase the maximum power by optimising the settings, the shape of the power curve can be moved further down or up the range and the power delivery can be varied to be either

Top left: V10 TDI engine needs two V-PD Tunits, one for each bank of cylinders

Top: The V10 TDI is essentially two separate five-cylinder units built into one engine

Above: Bosch four-wheel-drive rolling-road facility at Blackburn College seldom sees cars as powerful as this!



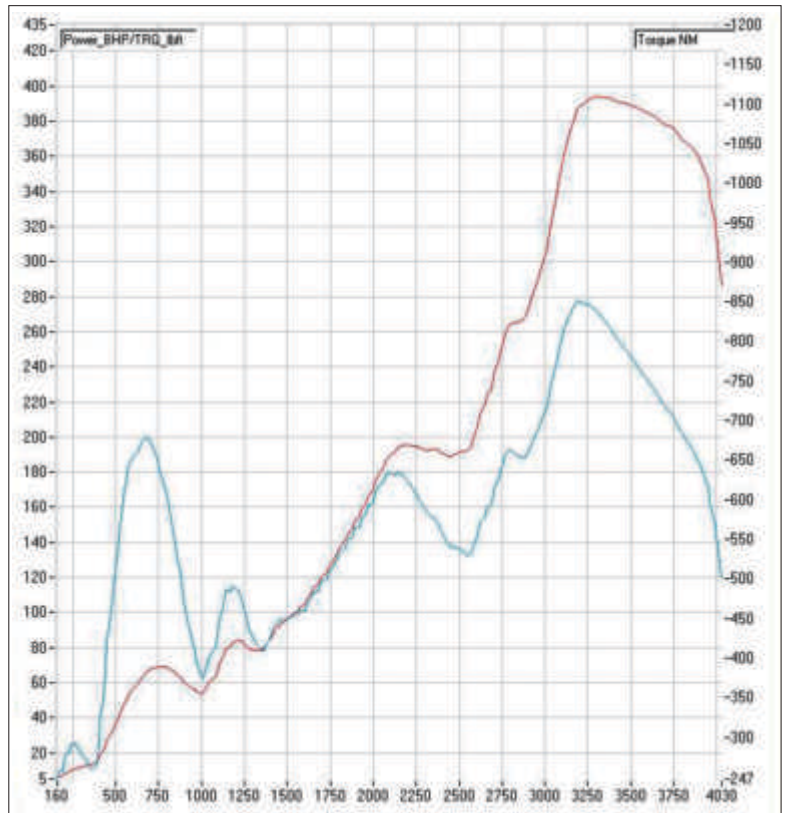
'Peak torque is now nearly 850 Nm and maximum power was increased to 393 PS!'

Above: Peak power increased to nearly 400 PS!


smooth and progressive or punchy and aggressive, according to requirements. Space is extremely tight under the bonnet of a V10 Touareg, though, and although the Tunit modules are quite compact, each only about the size of a pocket calculator, it took quite some time to locate them neatly and set some basic adjustments to allow the engine to run. While the initial four-hour installation could undoubtedly be halved with the benefit of hindsight, Bromleys wouldn't recommend that the V10 TDI installation be tackled on a DIY basis like most of its other conversions.

Time for some full power tests, and the next problem to overcome was the tendency of the automatic gearbox to change up prematurely in response to the higher power and torque outputs now being generated. This can only really be overcome by reprogramming the gearbox control unit itself, as yet untried territory. Selecting Tiptronic was no real solution – even in this mode, the gearbox control unit overrides the manual selection, and so the increased power output can only really be observed in top gear. The graph speaks for itself, though: peak torque, now produced at about 3250 rpm, is nearly 850 Nm (627 lb.ft) and maximum power was increased to 393 PS at 3300 rpm, both very substantial improvements over the standard output.

Needless to say, the owner is very pleased with the results: 'considerably increased mid-range performance, better response from start-up, quieter and less dieselly, increased smoothness and power throughout the rev range, 0-60 must now be more like 6 seconds', but the most telling observation must come from his 11-year-old son. On the first outing, after only a few hundred yards in town traffic, he is quoted as saying 'So how does it feel Dad?'... 'Don't know yet, son!'



'Well I can feel that it's smoother and quieter already!'

Bromleys Tuning supplies a wide range of Tunit modules, for virtually all diesel-engined Volkswagen Group models, as well as a range of related tuning products such as air filters, induction kits, high-flow injectors and intercoolers. Units can be supplied for straightforward DIY fitting, or installation can be carried out at the Bromleys Tuning rolling-road facility in Chorley, or by one of its many local agents. 

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