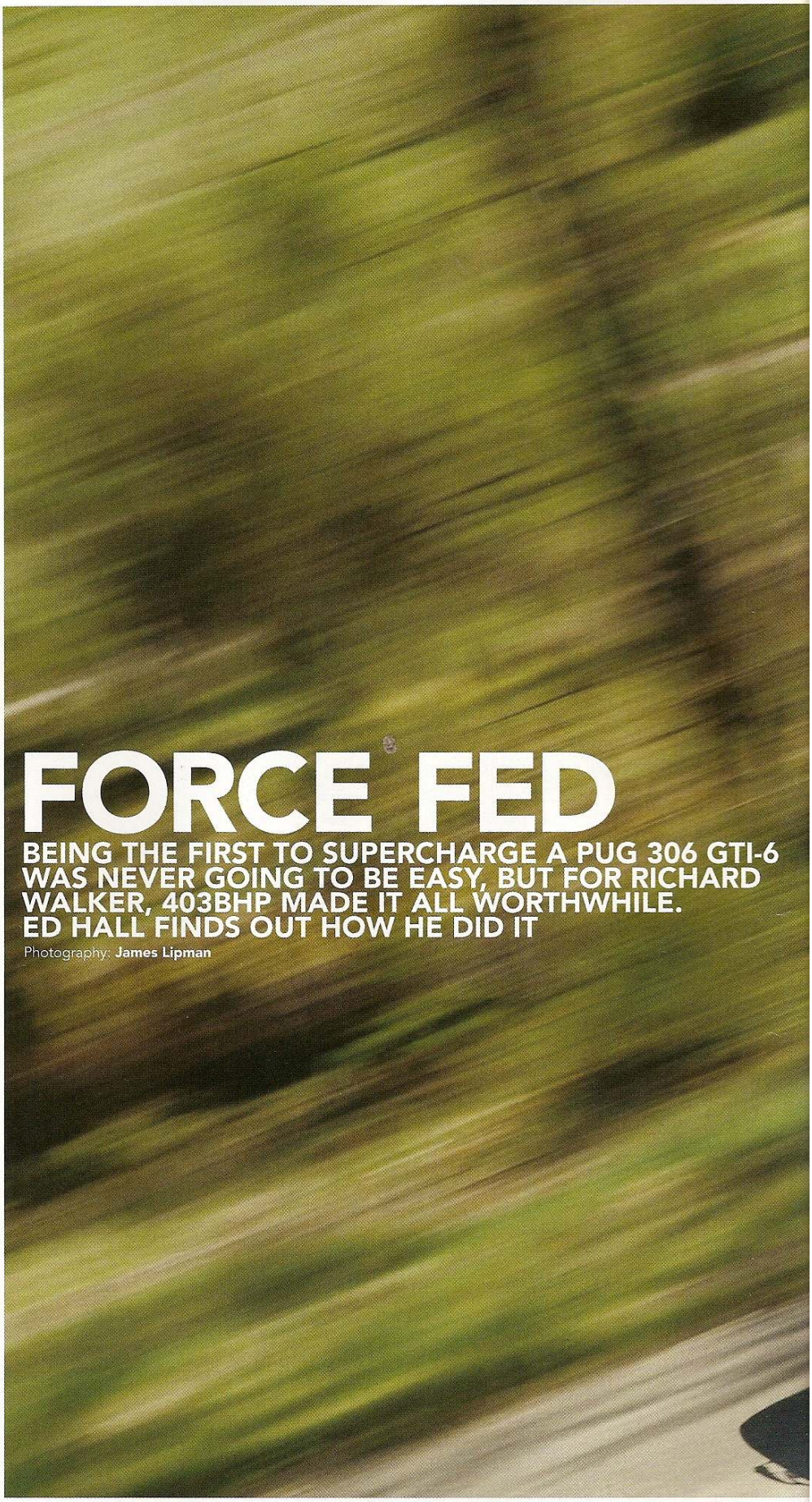
FORCE FED

BEING THE FIRST TO SUPERCHARGE A PUG 306 GTI-6 WAS NEVER GOING TO BE EASY, BUT FOR RICHARD WALKER, 403BHP MADE IT ALL WORTHWHILE. ED HALL FINDS OUT HOW HE DID IT

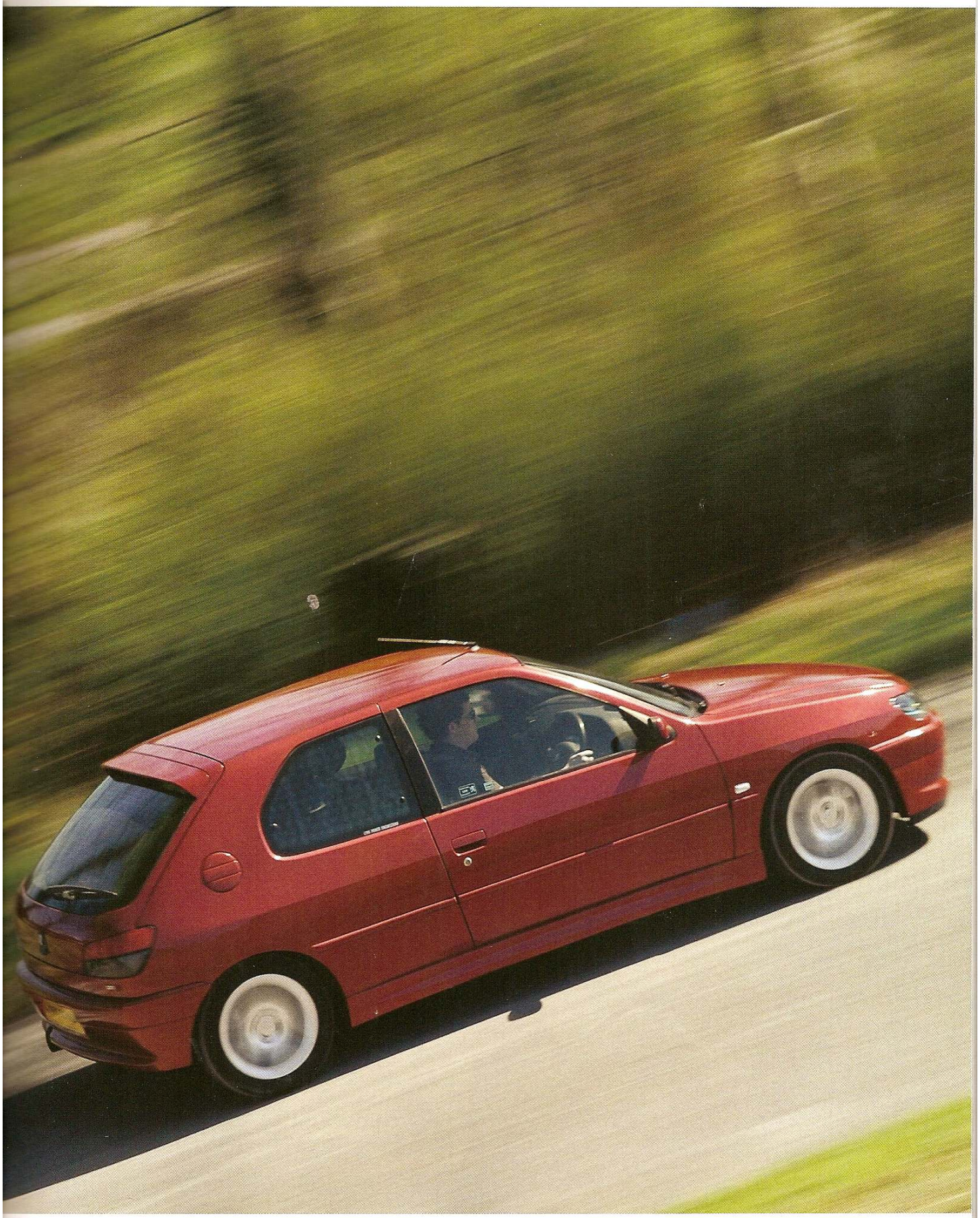
Photography: **James Lipman**



TUNING a car well beyond what others have achieved takes a huge leap of faith. There are no instructions, no forum nerds who've done it before to quiz, and no money-back guarantee if the whole exercise turns into a very time consuming method of destroying your bank balance. But we all worship the god of speed, and our pursuit of it is an addictive religion that takes us to extremes. Let's not be girls about this: who doesn't want to be the fastest?

Richard Walker did pretty much as soon as he started driving, but he wasn't likely to be in a 1.4-litre Pug 306. It satisfied his needs in terms of handling and so on, but, in his words, 'it didn't have enough go-go juice when you put the loud pedal down.' Richard remedied that problem by buying a yellow 306 GTi-6. Soon enough this got the usual treatment of Kent PT81 cams, induction kit, exhaust and an a ECU remap by Chipwizards.

'It made 210bhp, which made it fast but nothing really special,' says Richard, 'it was about as far as you can easily go with the naturally →

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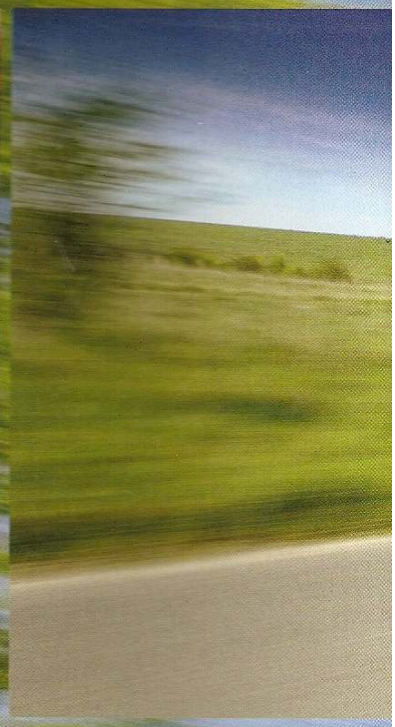
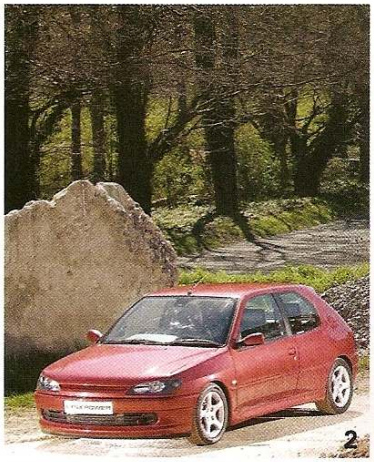
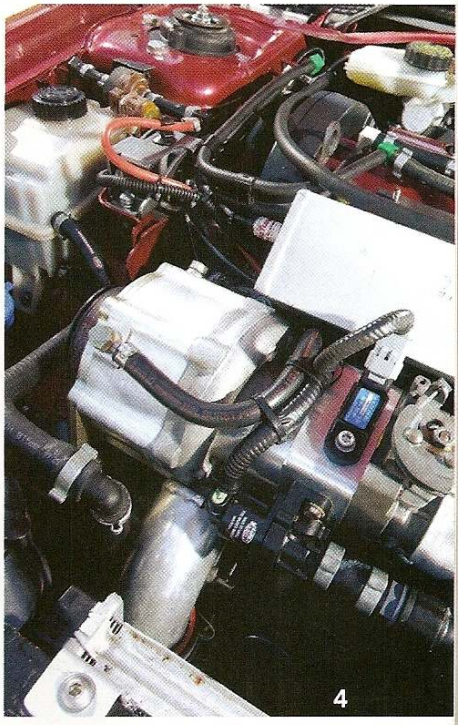



LYNX POWER





1: **No fuss, no lag. Just huge grip and grunt from 400bhp 306 GTi-6.**

2: **Never judge a book. If you see this on a track, move over.**

3: **Richard's 306 is lowered just enough to improve handling.**

4: **Rotrex blower is basically a gear-driven turbo – very compact.**

aspirated engine but I wanted it to be a lot faster. Head porting rarely works because it's so good as standard. Only Longman were doing substantially better, making around 260bhp, but that was from a mega-money engine that revved to 9k rpm. It seemed like a lot of money to spend for another 50bhp.'

Any worries about how to satiate the lust for power were rapidly put on hold while Richard grappled with, and lost hold of, the power he did have; pirouetting his Pug across several lanes of carriageway before crashing through a beach wall and into the sea. 'Well the bonnet and bootlid were still mint, but that's about all,' remembers Richard.

Nonetheless with the insurance money he bought the salvage back for the tuned engine, bought this red GTi-6 and swapped the engines. That at least left him with a quick running car and a perfect standard engine to prop up the garage wall.

Back to the question of going faster; Richard narrowed the options down to squeezing a Pug V6 under the bonnet, buying a nitrous oxide kit, fitting a turbocharger or a supercharger. The V6 idea was dismissed quickly as Richard track-days his car as much as possible and the V6's weight would upset the handling.

That would be a problem with the turbo conversion too – while weight wouldn't be the issue, turbo lag is the last thing you want on the track where power needs to be an instant response to throttle input rather than a second class post delivery. 'The sudden boost delivery would probably have me understeering into the nearest tree anyway.'

Nitrous seemed a bit like a part time cheat, leaving supercharging. Although more parasitic than a turbo, a blower would give instant throttle response and a progressive, linear power delivery. 'I looked at American Vortec blowers first but they were too big and bulky to fit into the packed engine bay. Then I came across Rotrex Superchargers; they're amazingly compact, hardly any bigger than an alternator.'

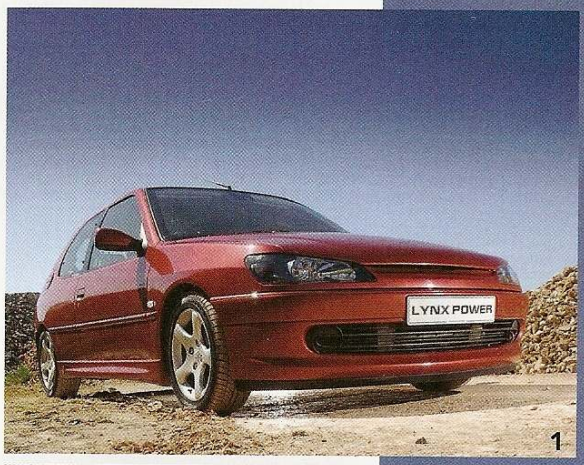
Even though Richard's plans only involved one bar of boost he couldn't help choosing the second largest blower in Rotrex's range, the C30-94, and the smallest pulley he thought he could get away with. Working with the spare engine in his garage, which usefully had the standard cams he needed, Richard began figuring out where everything was going to fit. And having stripped all the ancillaries off the block quickly realised something had to go. On the basis that the power steering pump and alternator were pretty crucial, it was the air conditioning unit that got its marching orders.

> "BY RIGHTS YOU SHOULD ONLY EXPECT THIS KIND OF ACCELERATION IN A SUPERCAR"

Losing the air con also meant its radiator could go, freeing up space for an intercooler. However, the blower wouldn't work where the air con unit went, down near the sump, so after a think Richard decided to relocate the PAS pump there instead and site the supercharger where that was, at the top of the engine. Using measurements from the 306, Richard began making up dummy brackets from card before putting his designs into a CAD programme and having them laser cut.

The stock GTi-6 manifold uses extremely long inlet manifold runners to boost torque - torque was hardly going to be a problem but the dimensions of the manifold were. In order to squeeze the blower in Richard enlisted the help of his best mate and owner of tuning outfit, Lynx Power Engineering, Nick Davis, who cut the runners down to four inches, then designed and TiG welded together a new plenum chamber.

Although he reckons he could have got away with the standard throttle body, Richard bought a new Dellorto 70mm body figuring that he might as well have a hole as big as that which comes out of the 'charger. To house the MAP sensor and idle control valve Lynx Power machined an alloy housing to fit on the intake side of the body, and an air filter and breather block t'other side. Now that the engine looked pretty and like it was going to work from the outside, it was time to look →



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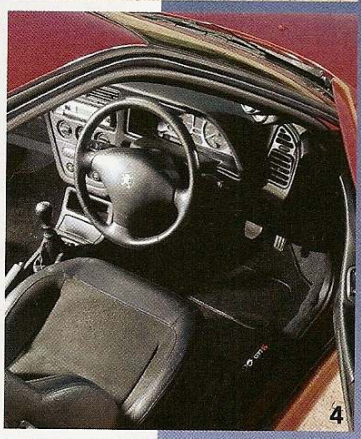

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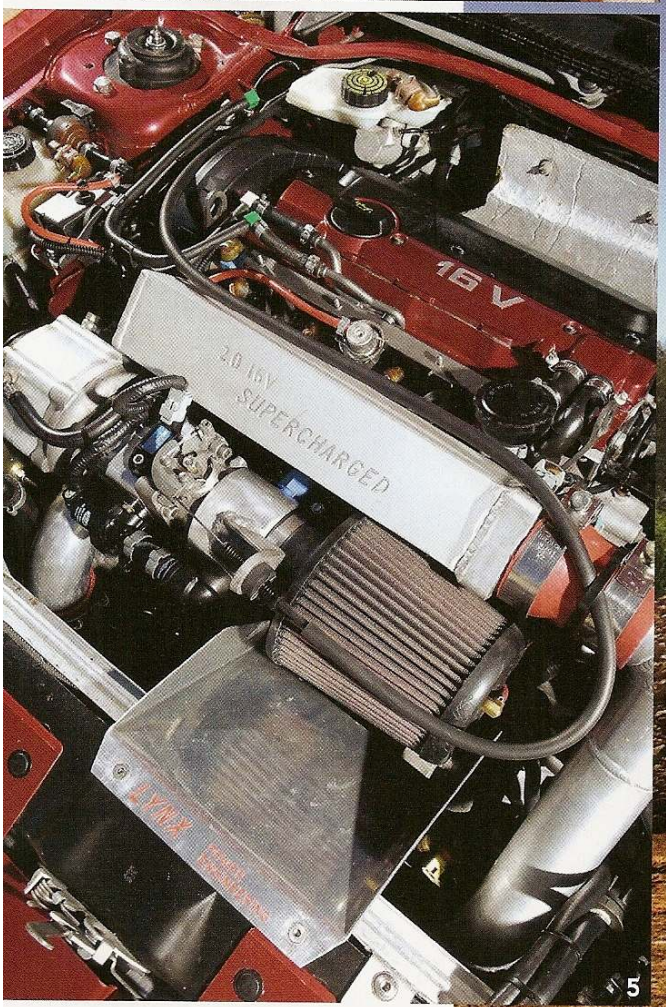

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at the insides to ensure it wouldn't blow itself to pieces. Compression was the main issue; as standard the GTi-6 squeezes the air and fuel at a ratio of 10.8:1. 'I wanted serious power from the outset so I knew low compression was essential but I didn't fancy using a decompression plate between two head gaskets as I don't see the point in half doing things. Anyway reliability was a priority – I use it every day.'

So Richard commissioned a set of custom made forged pistons from Wossner, 0.5mm oversize to give 2022cc and compression ratio of around 8.5:1. That sounds like it would be mighty expensive but wasn't at £400. And apart from low friction piston rings and ARP rod bolts the rest of the engine remained standard.

Unfortunately things didn't go smoothly on the engine's dyno run. As the engine spun up to produce 363bhp, so did a bearing, throwing Richard and Nick's plans right back to square one. 'Obviously we were anxious to find out what caused the failure. At first we thought that a rod had bent due to the extremely high cylinder pressure and increased rev limit, causing the bearing to pick up and spin, but they were straight. The cause was the oil film on the bearing breaking down and dodgy quality bearings, even though the oil was supposedly quality and the bearings from Peugeot.'

Next time round they weren't going to take any chances. The bottom end was rebuilt with Saenz forged steel rods with bushed little ends and fully floating gudgeon pins. To replace those dodgy bearings, Richard got in touch with Peugeot experts Richard Longman & Co and picked up some Touring Car spec big ends and some Peugeot XUD diesel mains. Just to make sure, the sump is filled with Royal Purple Racing oil – expensive but it claims to have a film strength 400% greater than other brands.

Adapting the engine management to maintain the correct fuelling for all that extra air is a feat that Richard and Nick are particularly proud of because they've managed to retain the 306's original ECU. 'We put the MAP sensor on the intake side of the blower, meaning the ECU cannot see the boost – it relies on the new base map with an Innovative Motorsports' LC-1 wideband lambda controller to tidy up the fuelling depending on the conditions.

The injectors were changed for Bosch 441CCs, though they're a bit small now and run open at full revs. 'Actually when we ran the engine in

1: People expect 306 GTi-6s to be pretty quick but not this quick.

2: Six-speed gearbox has so far handled the power with no problem.

3: Boost currently set to a 20psi. It's enough for 400bhp though.

4: Stock. If it doesn't make you go quicker, you don't need it.

5: 2-litre engine has 8.5:1 CR. Steel rods and forged pistons

we just used the naturally aspirated map because it meant we wouldn't be tempted to over-rev it during the first 1500 miles – it spluttered to a halt if you tried to go over 3k rpm.'

By this stage it was apparent that Richard's Pug was going to be really rather fast, so he and Nick turned their attention to the rest of the car. Prior to the blower conversion Richard had already dropped the car on its haunches with a KW Variant Two coilover kit, then went on to augment these changes by fitting Lynx Power solid, roller bearing front wishbone bushes, P-bushes and Peugeot Sport Group A solid rear beam mounts.

While they were under the arches the boys boosted the 306's already powerful brakes by fitting braided lines, Ferrodo DS2500 pads and six-groove discs. Nothing radical there but these guys are more about what actually works rather than boasting about twelve piston platinum calipers gripping two foot diameter discs. And out on the track there's little to improve upon, though Richard admits that if he feels like wasting some money he might splash out on some 406 V6 Coupé Brembo four-pots.

All the hard work and cash proved its worth on the long trip back to the south coast after Wayne Schofield had installed the new base map. 'It was hilarious,' laugh Richard and Nick to each other, 'the power was unbelievable, and it's such a smooth delivery. We came up against an E36 BMW M3; in the end he had to move over. It feels like there's just as much pull in first as there is in top at 140mph.' Not surprising though when you aim for just over 300bhp and come away from the rolling road with 400bhp.

There was a little bit too much boost to start with; that planned one bar, or 15psi, of boost had transformed into 24psi during the conversion. Thinking that that might be a little much, the supercharger's pulley was swapped for a slightly larger one to give 20psi, but because it was running at a more efficient speed there was no real power loss. On the final rolling road run the power figure was 391bhp with power increasing all the way to the limiter. And since then the rev limiter has been raised from 7600rpm to 7800rpm, peak power is now, to quote Richard, 'on the good side of 400bhp at the flywheel.'

Now, I don't know about you, but when someone tells me about a front-wheel drive hatch with 400bhp, I imagine something that accelerates like a Rodeo steer, bucking from one side of the road to the other in an attempt to throw you into one of them; incinerating the tyres while it's at it. Back in the 90s high-power RS Turbo owners boasted about how the first three of their five gears had been reduced to parking duties, and how the car was totally undrivable in the wet.

Richard's 306 is from a completely different planet, such is the awesome level of grip and tractability. Off the line the Quaife ATB channels every horsepower without any fuss to the grippiest wheel, ensuring there's not even a squeak from the tyres. Pulling cleanly through the lower echelons of the rev range it feels quick and torquey as if it had an engine twice the size under the bonnet, but just when you think it's all over, you realise it's only just waking up.

"ON THE FINAL ROLLING ROAD RUN POWER WAS 391BHP. IT'S NOW MORE THAN 400 AT 7800 RPM"

From here the pull's relentless, the sort of shove you should only, by rights, expect from a supercar. Every gear change throws the engine right back into the power band with seemingly no reduction in thrust as the speedo needle passes into three figures. Supercharging – it should be the new religion. ◆

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