

# BOOST CONTROL

Just how do you extract 420bhp from a 944 Turbo? ProMax Motorsport answers the question you never thought you'd ask.

No matter which of the Porsche models comes top of your wish list, the 944 Turbo (or 951) deserves respect. It handles superbly, has an impressive turn of speed and sells for a fraction of the cost its equivalent 911 would. While the Eighties child can't compete in the image stakes, there is little to fault with its design when, rather than being looked at, it is being used for what it was meant to – going fast.

However, speak to Andrew Sweetenham, the man behind ProMax Motorsport, and you'll get a different view. His name will ring a loud bell for those involved in the UK's Porsche track scene as he's had success as a driver in the

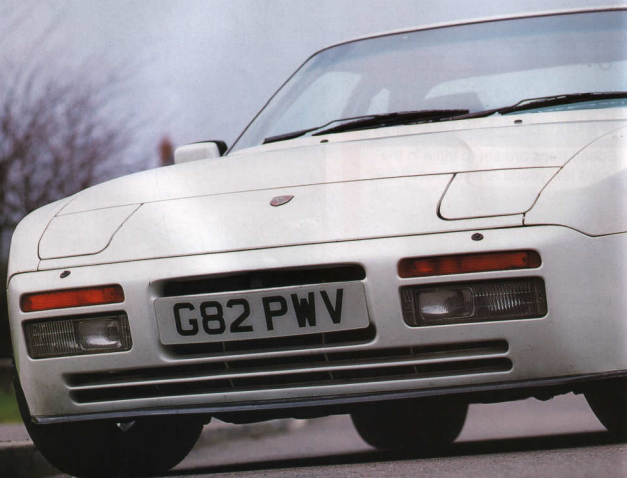
Porsche Cup and is now something of a setup guru for 944 Turbo owners looking for that extra edge on and off the track. With these credentials it's clear his reservations are nothing to do with liking the car per se, in fact, he likes it so much that after a year of driving a 911 Turbo, he got his 944 Turbo back. His gripe is that some of the factory components detract from the 944 Turbo's potential.

If you're expecting us to plough straight into how Andrew gets more horsepower from the 944 Turbo, prepare for a shock: the cornerstone of his company's business is improving its drivability. Being forced induction, it comes as no surprise it translates as reducing turbo lag,

which, although not massively pronounced, is still an issue. While he has other more technical solutions, the first step Andrew recommends is replacing the hosing as all these cars are at least 13 years old and inevitably wear and tear produces leaks in the system.

The consequence of these leaks is that they reduce boost pressure, most noticeably at low revs, stopping the turbo spooling up as quickly and thus creating more lag. For 30 quid, 25 feet of Purosil silicone hosing and five brass 'T' joints seems good value, especially when compared to how much factory alternatives cost.

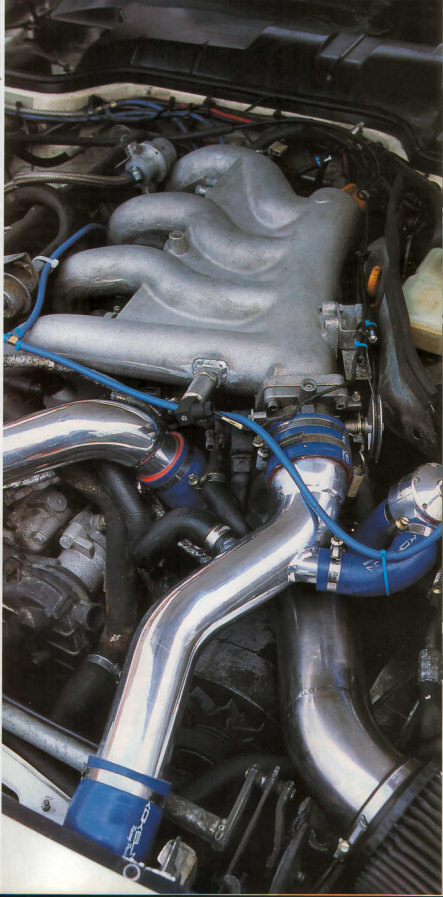
This, though, is a maintenance issue and to really reduce lag you need to address the



Words: Jason Simms Photos: Andrew Brown

standard components. In the 951, Porsche chose to use a single port wastegate (the part which relieves boost pressure when it reaches the desired level – 10psi in the 944 Turbo) and stops the turbo over-revving, but this only has a mechanism to open the diaphragm and not one to keep it closed. The net result is a loss of boost as pressure leaks through the wastegate at all engine speeds, increasing lag at low revs and causing a tailing off in power at high revs. It's an issue for this design of wastegate no matter how old the unit is, although it will of course get worse with age.

One answer to this problem is to stop the boost reaching the wastegate until it is at the



## HOW MUCH?

**Level One:** £249.95 (£279.95 with AccuBoost)

**Level Two:** £699.95

**Estimated Cost for Level Three:** £1200 approx

**Estimated Cost for Level Four:** £2000 approx

correct pressure; in other words, by introducing a boost pressure relief valve. It works by incorporating a piston inside the housing that has a perfect seal which can only be opened once pressure builds to a preset level (10psi out of the box, although this can be adjusted). Called the Boost Enhancer, it effectively takes the wastegate out of the loop until it is required, stopping the loss in pressure.

While this does the job, the clear alternative is to replace the wastegate for one that's more efficient so you don't have to use a boost pressure relief valve. That means using one which has a mechanism for keeping the diaphragm closed as well as one for opening it, so a dual port wastegate is used, just like those employed on the 924 Turbo and 911 Turbo. To make these, Promax actually uses the original unit and modifies it so that a second signal pressure is applied to the spring side of the actuator (which can be adjusted to raise or lower boost) and thus keeps it closed. For those looking to add extra power for improved drivability, this will ultimately be the direction they'll need to take.

However, there are other options for upping the ante of either the 220bhp or 250bhp 944 Turbo before you get to that point. For a start, the mapping of the 944 Turbo is at best iffy, causing an over-rich burn at idle, and if you're tuning for more power, too lean a supply of fuel at the top. There is, of course, a vast array of chips available off the shelf from many tuners but Andrew was never happy with the results, and while a custom mapping is always the ideal answer, it is a costly exercise.

So, as part of Promax's Level One power kit, a Guru chip is supplied which has several maps pre-programmed into it (suitable for those running 100 octane race fuel with highly-modified engines to those with standard street setups). Combined with three shims to tension the standard wastegate's spring more firmly (reducing the effect of its leaky nature) and a choice of boost controller (one which requires tools to adjust (ReliaBoost) or not (AccuBoost)) is claimed to give a conservative estimation of 30bhp-plus and 50lb ft-plus gain. The Level Two kit includes the dual port wastegate, AccuBoost and also a replacement Bailey bypass valve (or dump valve), the latter again being less prone to leaking boost than the Porsche original part. The package is claimed to raise output by 50- to 70bhp and 60- to 90lb ft torque.

If your 944 Turbo is in good nick, then it should see you well over the 300bhp mark, but there is more in the pipeline. A Level Three 330- to 340bhp kit will add a map sensor setup and 55lb injectors (the Guru chip has maps to accommodate this) and this will ultimately be

joined by a 380bhp Level Four upgrade with a bigger turbo and freewheel intercooler.

When you consider that prices for these kits start at just £250 for the Level One with ReliaBoost, rising to £700 for the Level Two and on to an estimated £2000 for the Level Four, they seem to represent remarkable value for money, but the real test of their worth comes out on the road. However, before we relay our findings, it must be pointed out that modifications to Andrew's demo car are more extensive than any of the configurations detailed above. He has combined the Level Four kit with the fitment of a three-litre S2 crank, thereby raising the engine's swept volume to 2.8-litres, giving it peak outputs of 422bhp and over 400lb ft torque.

That said, what we were most interested in was the effect the kits had on the 944 Turbo's drivability as much as the car's outright performance, and the results were impressive. It's hard to imagine a setup where all traces of lag are removed without the use of high and low pressure turbines; instead a progressive increase in power through the rev range rather than the kick in the back, all-or-nothing delivery that classic single turbo setups give.

We weren't disappointed. As soon as you pull away there is good response which steadily quickens as you head towards 3000rpm. Closing in on 4000rpm, the acceleration builds up to its next level as the turbo really gets to work and begins to unleash the car's full potential. It's at this point that the performance becomes prodigious. Obviously, there is a massive difference in response and acceleration between the top and bottom end but the off-boost/on-boost divide is not marked by a gigantic step.

Even though Andrew's car will inevitably have more low-end torque than a 2.5-litre 951, from what we saw, the claims made for his boost-enhancing products seemed wholly justified. Turbo lag was significantly diminished despite Andrew running 1.2bar boost, so when translated onto a standard car's 0.7bar the results should be equally good if not better. What makes them even more appealing is that they don't automatically hook you into increasing peak power, although they lay a solid foundation for those wanting to. If you do want more oomph, then the other Promax kits represent good value for money and are pretty easy to fit. Improved boost control seems to be a good way to improve the 951 ☐

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944TURBO

