

PROJECTS

WE DON'T JUST WRITE ABOUT PORSCHEs, WE DRIVE AND LIVE WITH THEM, TOO

THE TEAM

JOHNNY TIPLER

964 C2 (PEPPERMINT PIG)

While relishing the prospect of having its dials refaced, The Peppermint Pig has been revelling in its 'new' engine, and it's fantastic to discover how a 964 flat-six would have performed when new. PP is also thrilled to have come 11th in the recent Top Ten 911 poll. (so not in the Top 10 at all then! Ed)



PETER SIMPSON

996 C4/CARRERA 3.4 TARGA

After using the 996 through the great summer months I've come to realise I need to put some money back into my Targa so reluctantly the 996 will have to go up for sale. The car has been amazing and with everything done it will be perfect for its next owner. If anyone is interested send an email to peter@chpltd.com



BRETT FRASER

BOXSTER S

My wheels have returned from The Wheel Restorer and the satin black finish has made a considerable difference to the way the car looks: Sounds corny, but it looks 'tougher' than before. Will publish some decent pictures the next time the Boxster occupies the celebrity slot in the 'Our cars' pages. Hopefully I'll have a new exhaust too!



CHRIS HORTON

924S/944

Yet another month has passed, and still I've done little more than plan how I'm going to get either Porsche going again. I have faced several deserving automotive distractions, though: VW Passat electrics, an MoT for that and the Mercedes Vito van, and even sorting out a colleague's 5-series BMW problems. All in a day's work!



KEITH SEUME

PORSCHE 912 (EL CHUCHO)

I've been cracking on with reassembling the car after months of it being in a hundred pieces. Spent a few days building up the doors and am now starting on the interior. The seats are mounted and I'm almost ready to fit the carpets. Then it'll be the headlining and the glass... There's no peace for the wicked.



944-MIND MANAGEMENT

Augment Automotive have worked their magic on Bennett's 944. What's it got? More power, torque and increased fuel economy, and they're not finished yet

It's been a long time since I've embarked on such a major project, or should I say instigated such a major project, given that I've barely got my hands dirty myself. My 944 is now back from Augment Automotive, where father and son team, Tom and David Barker, have worked all sorts of magic on it.

Before I launch into the whole story, a quick recap is probably in order. Augment Automotive specialise in modifying 944s, although their fuel injection and Augtronic ECU enhancement techniques could apply to many 80s and 90s fuel injected cars, with similar gains.

We dropped in on the duo earlier in the year and tried out their 924S, which was running a number of enhancements that gave it much better throttle response and more power and torque, and potentially improved fuel economy. Needless to say I was keen

to have a bit of that for my own 944. We therefore devised a plan.

The 944, like many cars of its generation, runs a Bosch Motronic ML3.1 injection system. It's a robust and fairly simple set up and pretty bullet proof too. Compared to a modern system it's virtually clockwork in its complexity, but it does a fair job of monitoring and administering the fuelling and ignition of the 944's big bore 2.5-litre engine.

Apart from the ECU, the heart of the system is the air flow meter, which sits between the air filter box and the throttle body and inlet manifold. This measures the airflow into the engine via a spring-loaded air flap attached to a variable resistor (potentiometer). The flap moves in proportion to the airflow and a voltage is applied to the potentiometer. The ECU takes this information and calculates the amount of fuel required.

STEVE BENNETT

944 LUX

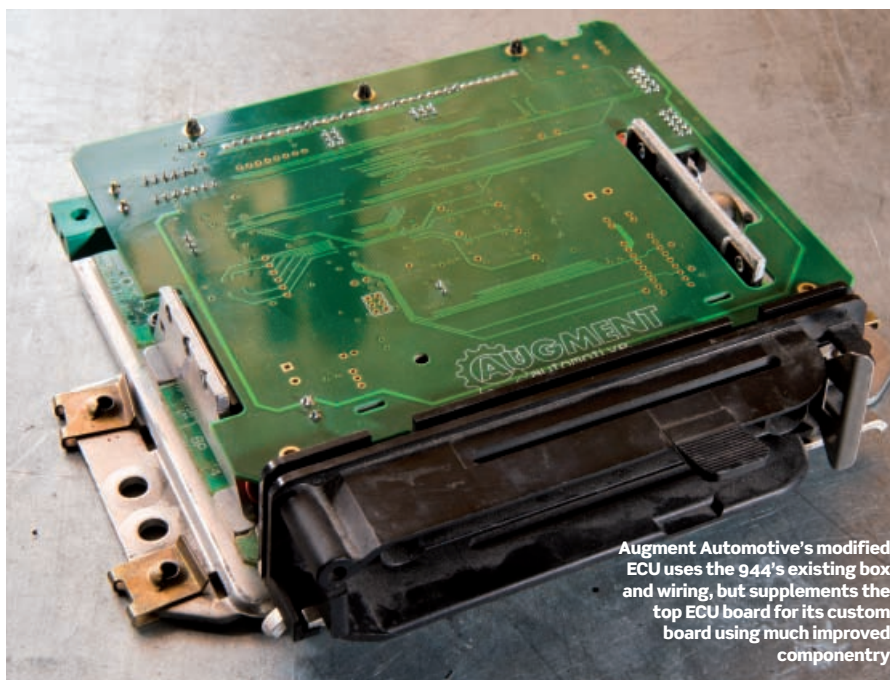
Occupation: Editor, 911 & Porsche World
Home town: Hoxne, Suffolk
Previous Porsches owned: 7
Car: 944 Lux
Year: 1986
Mileage: 89,200
Owned for: nine months
Mods/options: Modified ECU and airflow meter bypass, plus distributorless ignition
Contact: porsche.world@chpltd.com

THIS MONTH IN BRIEF:

More power, more torque and better fuel economy. It's like having your cake and eating it

The drawback of the AFM is that it's rather slow and it can wear over time. It also restricts the flow of air into the engine. It's what contributes to the slow throttle response that can typify early fuel injected engines. Indeed it's rather like having a small, restrictive inline throttle body before the main throttle body. If the key to an engine breathing efficiently is a smooth, fast passage of air to the cylinders, introducing a slow moving flap for the air to negotiate is not the way to go.

So unsurprisingly Augment Automotive



Augment Automotive's modified ECU uses the 944's existing box and wiring, but supplements the top ECU board for its custom board using much improved componentry

replace this crude piece of kit with a straight through pipe, thus removing the restriction. The pipe runs straight from Augment Automotive's modified air box. Indeed it is integral with the bottom half of the airbox, where previously air had to negotiate a square exit into the air flow meter. Now it's a free flowing, large diameter exit straight into the replacement pipe, and straight into the throttle body. The function that was carried out by the air flow meter is now superseded by a manifold pressure sensor and intake air temperature sensor.

Obviously the ECU needs to make sense of all this, but the standard 944 ECU is going to be rather flummoxed. Electronics whiz, Tom, has developed a new board for the 944's ECU, using modern components and processors that are far in advance of the standard items. Sensibly Tom retains the standard 944 ECU's connector and housing, this means the wiring loom remains the same only requiring the addition of a small ancillary loom plugged into the existing air flow meter connector for the new sensors [T1].

In an effort to further improve the efficiency of the engine Augment Automotive has also included the ability to run what is commonly known as wasted spark ignition.

On the rolling road. We wanted to make sure that the mods that we making were quantifiable. In standard form Bennett's 944 was putting out 144bhp. Post mods it's got nearly 160bhp and between 10-15lb ft torque in the mid range, which is the sort of extra power that you can really feel



This allows the use of modern ignition systems which provide a consistently stronger spark at the plug. Various types of ignition system are available and can be supported. The system fitted to my car is a coil pack mounted in place of the distributor. Although there are more powerful individual coil pack systems available this still gives a worthwhile improvement and is readily available, cost effective and easy to install.

In Augment Automotive's demo 924S, all this added up to a healthy 13bhp increase in

peak power and a very healthy increase in torque across the rev range, which frankly is what's more noticeable in real world driving conditions.

So I rather liked the sound of all this. Not only that, by improving the efficiency of the engine, there would also be benefits in economy, which appealed even more. In fact I decided that I really wanted to go all out for a 944 with improved throttle response, power, torque and economy. So not a lot then? To further this goal the system has the capability to run both fuelling and ignition

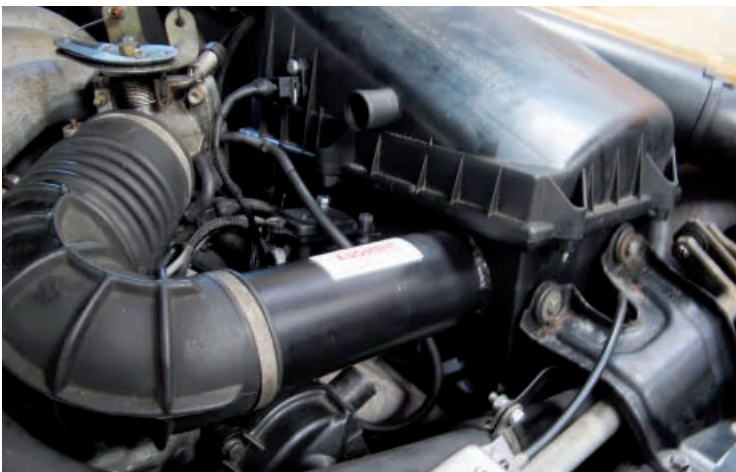
systems in closed loop, adjusting both to give optimal fuel economy when cruising. Knock and air fuel ratio sensors are used to give the required feedback to the ECU.

Chatting with Tom and David, there were other things that we were keen to try too, like ASNU's new performance fuel injectors and even Millers' new Nanotech oils, which claimed to reduce friction in the engine, oh and Evans waterless coolant. Anywhere where efficiency gains could be found basically. So I dropped my 944 off at Augment's Gloucestershire base and

got the train home.

We were determined to do this properly so a rolling road was introduced to the project so that we could get accurate back-to-back figures. My standard 944, with just under 90,000-miles on the clock, was strapped down and produced – wait for it – 144bhp. Well I was rather disappointed, but then I've never seen a 944 that's produced a factory

Bottom left: Augment Automotive's big bore air filter box with integral outlet pipe replacing the restrictive air flow meter. Below: Distributorless, coil pack ignition replaces the clockwork distributor for stronger spark



RUNNING REPORTS



163bhp. Indeed my first 944 Lux managed 150bhp on the rollers, and my last square dash 944 only ever managed 135bhp, and the last 944 rolling road shootout I attended saw the 2.5-litre cars fluctuate between 121bhp and 148bhp. Tom and David concurred, saying that they've never seen a 944 make factory power either, unless it's a Turbo. Anyway, no matter. We had a base figure and that's what counts.

And we didn't have to wait very long for the results. The Augtronic box is a direct replacement for the standard ECU. The air box and integral pipe is a direct bolt on replacement for the airflow meter and

This box of tricks is the mass air flow meter, which we've binned. Inside is a crude, slow-moving flap, which measures the air coming into the engine via a potentiometer and adjusts the fuelling accordingly. Replacement does a far more accurate, less restrictive job



as such is a quick fit. The wasted spark ignition kit is likewise a quick bolt on fit.

And we got pretty much what we were expecting. Peak power is up by 13bhp increasing to 20bhp by 6500rpm, torque is up by at least 10lb ft or more across the rev range and up to 15lb ft in places. Result! Unfortunately some elements of the test weren't quite so conclusive. The ASNU injectors are unfinished business, since they couldn't be made to fit in the intake manifold. A solution is being worked on and Tom and David are very keen to try these new injectors, with their revolutionary new spray pattern, in their own development 944, before fitting them to my car. So at the moment we are still running with the standard injectors, which are hardly state of the art.

Sadly the K&N air filter failed to arrive from a Porsche specialist that will remain nameless, despite assurances that it was in the post. This was reckoned to be worth 2-3bhp in improved airflow, but we'll see next time we get on the rollers.

The Millers oil didn't give any notable performance benefits during testing and caused the engine to smoke quite badly when using a 10w50 grade oil. The Evans waterless coolant will have to wait too as we ran

out of time to flush the system. However see pg8 of this issue for a full Evans 'How to.'

So understandably I was quite excited about picking my 944 up, and rather looking forward to the lengthy drive home from Gloucester to East Anglia. Not only had Augment Automotive messed with my 944's mind, they had also replaced a myriad of seals on the front of the engine, which were leaking oil and changed the cam belt, various rollers and a rear wheel bearing, which had been grumbling for some time.

So, how does it feel? In a word: Strong. Throttle response is much sharper and it feels like a bigger, stronger engine across the rev range. It's also incredibly smooth too, quite the smoothest 944 engine I've experienced, which is something that Tom and David both commented on. I can either use the increased performance through the gears, or just wallow in the extra torque and waft around in fifth. Each option is satisfying.

I haven't tested for economy yet, but David has been running the same set up in Augment's development 944 – a square dash car – and is regularly seeing 37mpg. A later oval dash car should be better that thanks to the improved aerodynamics of the flush fitting

windscreen. We hope also that the ASNU injectors will come good and improve economy too.

Anything else? Yes, Tom and David have also been playing with cam timing, and have seen some significant improvements in mid-range torque from the standard cam, albeit at the expense of peak power. Driving their demo car, it feels more like a 3-litre than a 2.5-litre engine, with a really gutsy feel. Encouraged by this they are looking into their own custom camshaft in conjunction with Piper Cams.

They've also got themselves a 944S to play with too. This, of course, is the 2.5-litre, 16-valve, 190bhp 944, that looked good on paper, but on the road proved to be a bit limp, never really feeling as if it had the claimed power and totally lacking in torque. I've always been convinced that the injection system is what is holding this engine back, so I can't wait to see what Augment Automotive's mods do to release its potential. It could be the must have mod for any 944S owner.

In the meantime ASNU are sending some more injector tips Gloucestershire way, so hopefully next month we'll be able to complete the project. For now, though, I'm enjoying the car as it is.

Above: Standard air filter in for now. Will be replaced with a K&N when we put the new injectors in for easier breathing

CONTACT

Augment Automotive
www.augmentautomotive.co.uk
 Got a 944? Looking for more of everything and improved fuel economy? Get in touch

Standard injector (top) is holding things back at the moment. ASNU performance injector (bottom) is what we're itching to try, but we need a longer injector body and possibly some mods to the inlet manifold

