



# Building

# The Ultimate

**Peter Bell** asks if you can ever really achieve your ultimate 911?  
Here he tells the story of his own quest

**M**y love affair with the iconic 911 started as a small boy and has continued through to adulthood. As soon as I had gathered enough money I purchased my one and only Porsche – a Guards Red, 1974 2.7 911 Coupé. I have now owned this car for 18 years, and in that time have embarked on a journey of restoration and modification to build my 'Ultimate 911'.

It wasn't always this way. I hadn't planned to build my Ultimate 911, rather just to have the opportunity to own and drive the classic icon that I had admired so much in my youth.

However, after a few years of ownership I started to think about restoration, and then modification. For me, the Ultimate 911 project is keeping it, as much as possible, within the classic lines of the impact bumper cars in the period from 1974 to 1989, but in all other ways enhancing its all-round performance. In other words, creating my very own 'wolf in sheep's clothing' (if you can call a 911 a 'sheep').

The purists among you should look away now as this may make you feel queasy. This is not a story of fanatical restoration. Rather the development over many years of my Ultimate 911. So, what have I done?





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## Restoration

Well, as far as restoration goes, I stripped the car to bare metal and repaired and replaced those panels that were in need of a refresh after many years of faithful service to previous owners. This included: new front wings; new sills and a kidney bowl; a refurbished petrol tank at the front and a refurbished oil tank at the rear. The wiring loom was removed and fresh wiring installed, thus providing a new nervous system throughout the car. The car was then sprayed in Porsche A1 Black.



And red became black...

## Modification

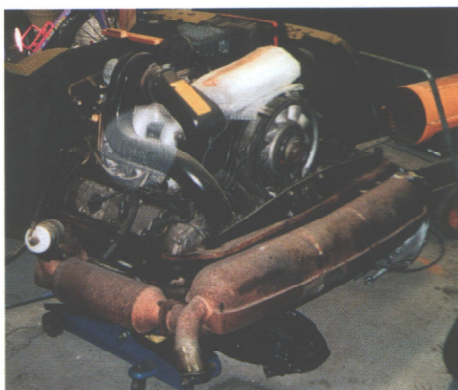
With restoration complete, modification began and hasn't really stopped. Each time enough money has been put by, another stage of the ultimate build is undertaken.

The brakes were upgraded to servo-assisted, using the servo from a 3.2 Carrera and the master cylinder from a 930 Turbo.

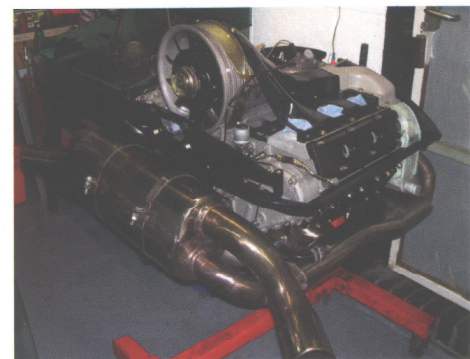
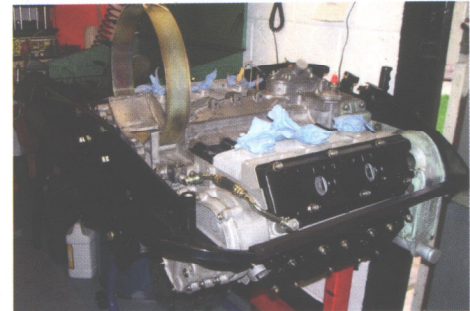
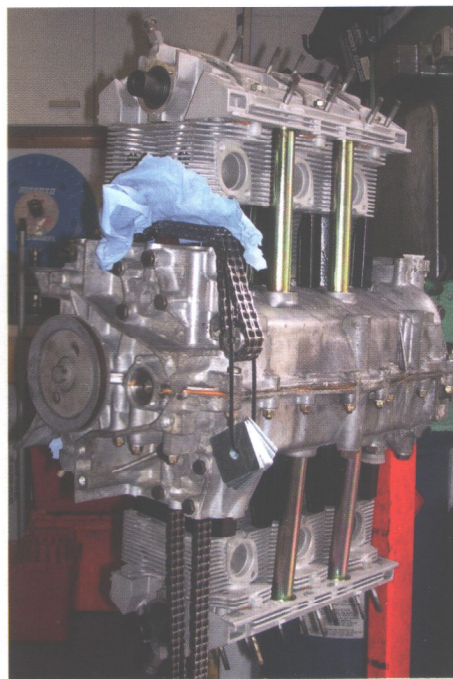
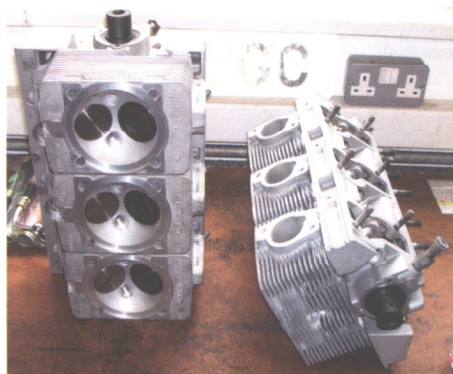
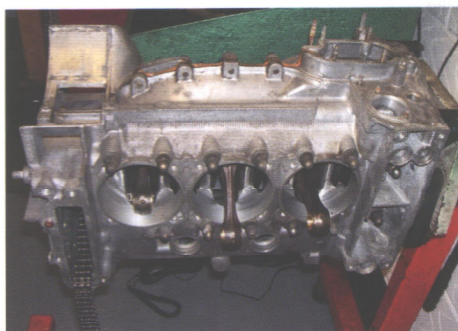
The interior was also updated. All of the carpets were replaced, along with a new roof lining and a leather interior transplanted from a late 3.2 Carrera. Electric windows, door locks and locking mechanism, also from a late 3.2 were installed.

## Engine

This was by far the largest and most technically challenging part and the one that excited me the most. The 2.7 engine was discarded and sold (more money for future works!). Next, a second-hand 3.2 engine was sourced and transplanted into the car. It would become the basis for the car's new heart. The difference between the performance of the 2.7 and 3.2 litre engines was significant and, for a while, I enjoyed many happy miles of motoring.



It started like this...



...and finished like this

But it wasn't too long before I started thinking about ways of improving the performance of the engine. An exhaust system and perhaps a more aggressive pair of cams would be an obvious choice, but instead I went down the engine management route. I had read a lot about MoTec engine management systems and, although quite pricey, this is where I decided to go.

An engine management upgrade was the first choice as I wanted to try and future-proof myself against any further enhancements I might make, providing the flexibility to dial in future engine performance changes. I ended up buying a MoTec M48 pro FIS. This meant, among many other things, that I could run digital sequential fuel injection rather than the continuous system from the 3.2. It also meant that coping with any aggressive cam profile choices at idle would be easier when creating the map to run the engine.

The MoTec unit is sited in the same place as the OEM management system, under the front passenger seat. A custom wiring harness connects the engine management brain to all the usual places and, additionally, includes a throttle position sensor, a lambda sensor and a Bosch ignition coil amplifier. The throttle position sensor allows the engine to be mapped against throttle position rather than the 3.2's air control box. This makes for an incredibly responsive throttle with no delay from right foot to engine pick-up!

Unfortunately, my excitement at the anticipation of the impending MoTec powered performance was to be short lived. A run on a dyno prior to installing the MoTec unit revealed a very sickly engine indeed. The baseline produced peak power of 196bhp at 6,246 rpm, a far cry from its factory original 231bhp. It seemed over the years quite a few horses had left the stable. Further investigation on a leak-down test revealed a very leaky engine, with pressure losses ranging between 20% and 45% across the chambers. Nevertheless, all was not lost; after going ahead with the installation of the MoTec management system the peak power had



increased to 211bhp at 6,096rpm. This was a pretty amazing result. It had not achieved its original power levels but it had managed to claw back 15bhp despite its sickly state.

I drove the car happily for a while but knowing all was not well led me to the inevitable – deciding to go ahead with an engine rebuild. However, if I was to dismantle the engine, I might as well rebuild it as something a little more special.

The engine was stripped down completely and then rebuilt with a few important changes. The engine case halves were skimmed and bore aligned to ensure perfect alignment of the crankshaft. The crankcase halves were shuffle pinned to ensure no movement between them under the higher anticipated loads. Appropriate parts were also gas flowed to ensure every last drop of power could be extracted from the engine. The crankshaft was tested for straightness, then polished and balanced before being reunited with the case in a set of new bearings. The con-rods also had the same treatment. They were capped and honed and then balanced end over end.

As part of building my Ultimate 911, I wanted to ensure as far as possible that Porsche components were used. Capacity was increased from 3.2 to 3.5 litres using Mahle pistons and barrels. I would have built a bigger capacity engine, but the biggest pistons and cylinders built by Mahle at an affordable price would only allow me to go to 3.5 litres.

The heads were individually matched to the barrels for a perfect, gas-tight fit and each had an additional spark plug added to both balance the pressure across the piston face as well as allow high compression and less ignition advance. The twin-spark ignition is powered by a twin distributor from a 964 linked to two coils. The coils are fired by the MoTec system via a Bosch twin amplifier.

That wasn't the end of it though. Next came the camshafts. This took a lot of thinking about. The cams really do create the personality for your car so it is important to get the choice right. For me, I wanted a car that would deliver power early in the rev range and then consistently deliver more power smoothly as the revs built up. The choice then was the profile from a 911 GT2. A turbo profile for a naturally aspirated car might not appear to be an obvious choice. However, the angle between the lobe centres is 111 degrees. This is only a degree tighter than standard but more than the 99 degrees of the early 'S' cams. This had desirable features for me. First, the wider angle meant minimising overlap and avoiding unnecessary reverberation; second, the mechanical timing of the valve lift meant I had more room for higher lift without piston to valve collisions; and third, the power band of the car would be extended over a wide area of the rpm range. This third area was hugely important for me as the car would be mainly a road car with occasional track use and I didn't want to have to rev the car to the upper limits of its range to extract the power.

Next was improving the air intake system. The Porsche inlet manifold is a good design, but if I was going to get the most out of the 3.5 litre engine with high lift cams, it was going to need to be able to consume vast amounts of air quickly, efficiently and more importantly, evenly. The answer was a set of individual throttle bodies providing an unimpeded straight line for the air to find its way into the combustion chambers. These I purchased from Jenvey. The quality is great and the customer support was perfect.

Since completing the engine I have enjoyed 5,000 miles of very happy motoring. I have to admit I have been very pleased with the result. She now

produces almost 330bhp and delivers power right across the rev range all the way up to a new limit of 7,350rpm. With increased revs comes the chance of valve bounce, so the engine has titanium racing valves and retainers to cope.

The noise is fabulous too. She retains the distinctive, air-cooled signature tune, but there are now some new ingredients in the mix. The induction noise from the throttle bodies reminds you how thirsty she is, followed by the growl of the high lift cams. To top off her new-found vocal expressiveness, an equal length stainless steel exhaust from Hayward and Scott ensures other street users know you are coming well in advance of your arrival. So, with the help of a little Viagra this old 911 punches well above her weight and is up there with the very best of them.

## The Highs & Lows

Taking on a project like this is bound to both elate and disappoint, and this has certainly been true of my project. The lows included finding out I had bought a sickly 3.2 engine, despite having been told it was a good one with low mileage. This brings me on to a more general point. It is so easy to take the wrong advice, or find or hire the wrong people who talk a good talk but are unable to deliver on their promises. Ill advice and poor workmanship cost you heartache, time and precious money. Research is the key. Spend as long as it takes to seek out the best advice from the best people, only then will you achieve the right results. There is no such thing as a bargain. If it sounds too good to be true, then it probably is.

On a more positive note, there were a great many highs to my engine build adventure. I met some fantastic people from the Porsche fraternity, with a vast amount of knowledge and experience, and some interesting stories to tell. Rolling up my sleeves and jumping in at the deep end was challenging, but so rewarding when it all started to come together. The biggest high, though, has to be the thrill of the drive. From the moment I took it off the rolling road with its shiny horses lurking in the engine, and the 5,000 miles I've driven since, I've had a smile on my face for every mile.

## What's Next?

Have I achieved my Ultimate 911? Well, partially. The quality of the general restoration, and the power and responsiveness of the engine, certainly makes me feel I have achieved my goal in those areas, but there is more to be done.

With all this new-found power comes a need for upgraded braking, traction, transmission and suspension. On these areas I have already started and work is well under way, including bigger Fuchs alloys, Brembo GTPL brakes, a G50 transmission and RSR coil-over suspension and spring plates.

Just like Porsche, who has evolved the 911 over its many years of production, the concept for me of building 'The Ultimate' is likely to be a long and evolutionary process. For me that's a good thing.

Look out for a further report in a future issue of *PP*. In the meantime you can see more detail of progress at [www.myporsche911.co.uk](http://www.myporsche911.co.uk) 