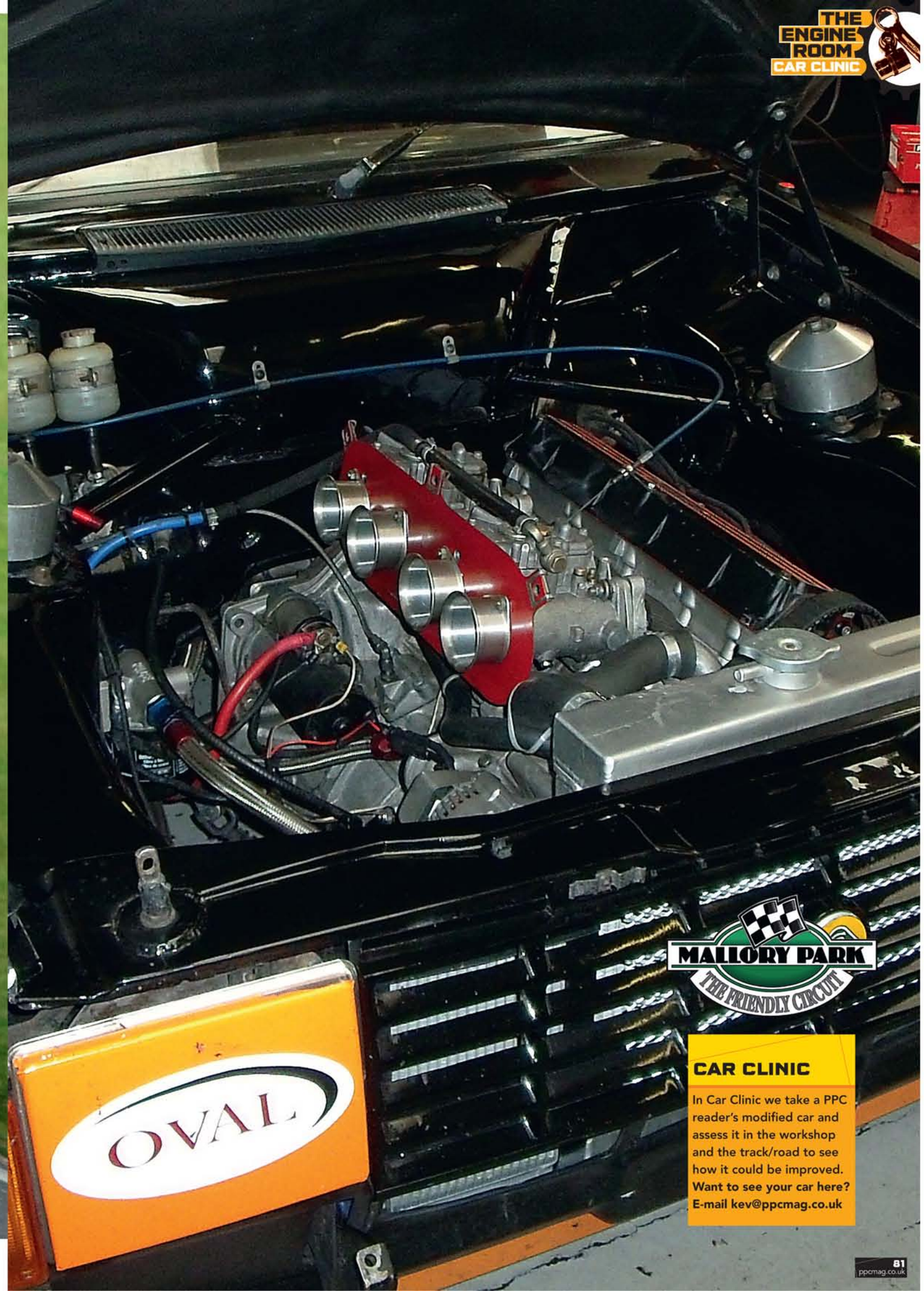
THE ENGINE ROOM

CAR CLINIC

SUNBEAM LOTUS

WITH 327BHP AND AN 8500RPM REV LIMIT THIS IS NO ORDINARY LOTUS. TROY ROBINSON HAS HIS BREATH TAKEN AWAY AS HE PUTS IT THROUGH ITS PACES

PHOTOGRAPHY: CAPTURED IN DIGITAL



CAR CLINIC

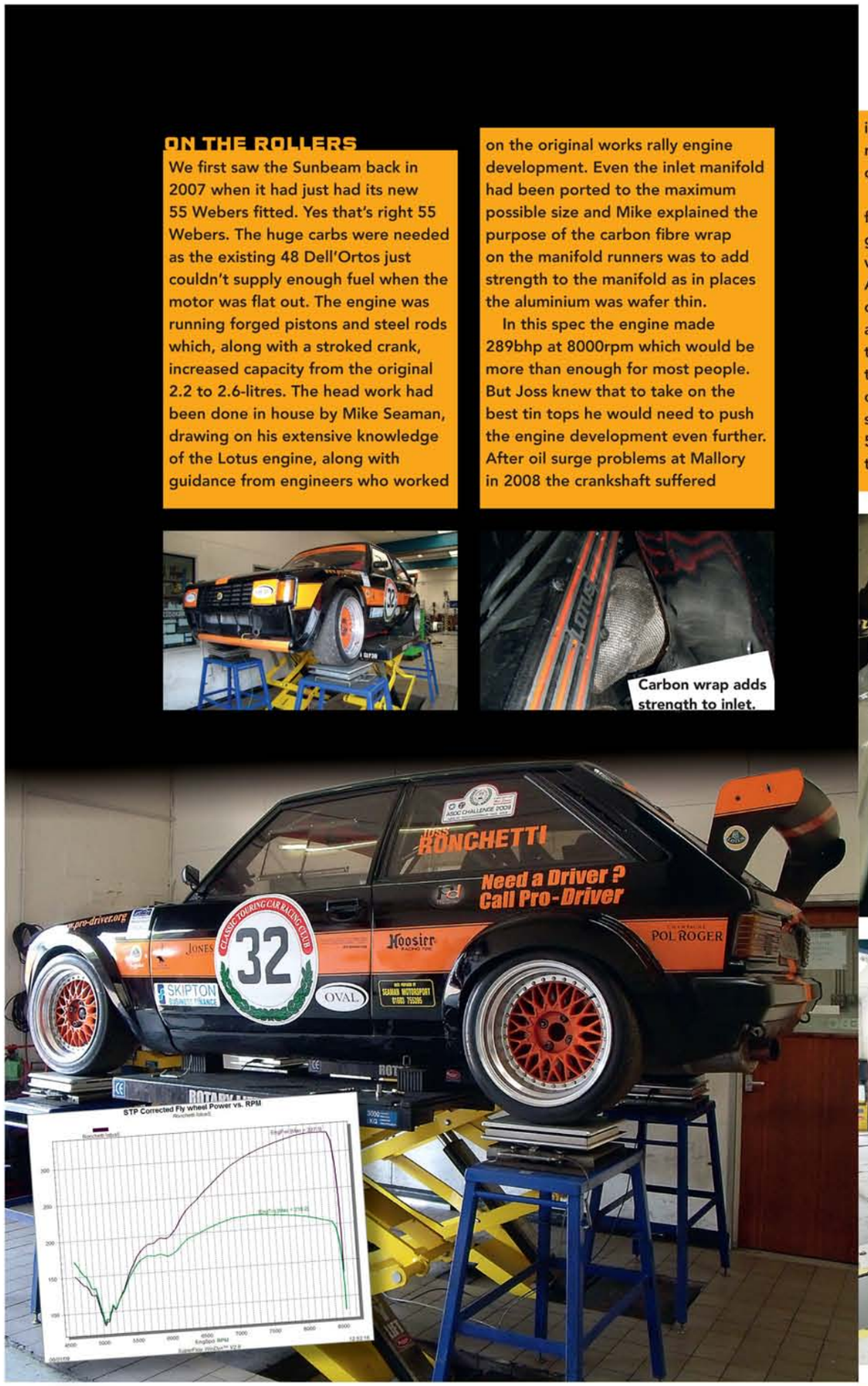
In Car Clinic we take a PPC reader's modified car and assess it in the workshop and the track/road to see how it could be improved. **Want to see your car here? E-mail kev@ppcmag.co.uk**

As a relatively small volume car manufacturer struggling to make ends meet, Lotus have always been happy to sell their expertise and performance cachet to bigger players. Among them over the years have been the likes of Ford, Vauxhall, Proton and of course Talbot.

The Chrysler Sunbeam had been around for a few years and there were the usual day to day volume versions plus an already successful Ti sporty version. Chrysler competitions manager Des O'Dell was looking for a power plant with the potential to take on and beat the dominant RS Escorts and Chevette HSRs on the world rally scene and so the Sunbeam Lotus was born. Known as the Talbot Sunbeam Lotus after Chrysler sold its UK division to the French car maker Peugeot, the car went on to do exactly what Des O'Dell had envisaged and took the World Rally Championship in 1981.

So what's with the history lesson I hear you say? Well this car's pedigree and competition ability is well known but it's a 30 year old design so what could you possibly do to make it competitive against its more modern counterparts?

Joss Ronchetti started racing bikes the same year the Sunbeam Lotus won its World Championship. After moving on from bikes he raced a Pug 205, Rover Vitesse, Astra GSi and finally hooked up with the Sunbeam in 2002. The car was an ex rally car and had reputedly got some trick bits including a well tuned engine, which promptly blew up at its first outing at Cadwell park. Undeterred Joss decided he needed some proper expertise on the job and started to look for suitable candidates. After quite a few positive recommendations he got in touch with Phil and Mike Seaman.



Based in Norfolk the two brothers run a successful motorsport preparation company and between them have extensive experience in top flight motorsport. Both have worked for the Lotus F1 team and Mike has worked for British and Australian touring car teams plus various sports car and Global Lights race teams.

Now in its 7th year of development and encouraged by Joss' vision of a classic touring car to compete with the best modern machinery around, Phil and Mike have used all their experience to extract every ounce of performance from the car. So, shall we have a peek under its immaculate black and orange skin?

ON THE ROLLERS

We first saw the Sunbeam back in 2007 when it had just had its new 55 Webers fitted. Yes that's right 55 Webers. The huge carbs were needed as the existing 48 Dell'Ortos just couldn't supply enough fuel when the motor was flat out. The engine was running forged pistons and steel rods which, along with a stroked crank, increased capacity from the original 2.2 to 2.6-litres. The head work had been done in house by Mike Seaman, drawing on his extensive knowledge of the Lotus engine, along with guidance from engineers who worked on the original works rally engine development. Even the inlet manifold had been ported to the maximum possible size and Mike explained the purpose of the carbon fibre wrap on the manifold runners was to add strength to the manifold as in places the aluminium was wafer thin.

In this spec the engine made 289bhp at 8000rpm which would be more than enough for most people. But Joss knew that to take on the best tin tops he would need to push the engine development even further. After oil surge problems at Mallory in 2008 the crankshaft suffered irreparable damage so it was the right time to look at extending the capacity even further.

A billet steel crank was ordered from Farndon and was designed to give an 87mm stroke. Combined with 99mm JE forged pistons and Arrow steel rods this gave a capacity of 2.7-litres. The larger bore posed a problem with the head gasket as there was not one large enough off the shelf to fit the wider bore. Mike overcame this problem by using the same make of gasket as used on the 500bhp turbo Esprit racers but with the original fire ring removed and replaced with a larger one. The head was further developed to improve flow using 38mm inlet and 32 mm exhaust valves. The cams are Kent items and give a 13mm lift with 320 degrees duration.

As already mentioned the car still runs on carbs as this allows Joss a great deal of flexibility in the types of races he enters, although when the car's original ignition system began to give trouble it was replaced with an Omex 600 engine management system to allow wasted spark ignition to be used. This sophisticated ECU purely runs the ignition in 2D mode, but has the capacity to manage fuelling if Joss decides to go the throttle body route.

Once strapped on the rollers we ran the engine up under light load to get oil and water temperatures to reasonable levels. It never fails to amaze me the number of drivers who fire up the car and blast off into the distance at full chat before the engine has had any chance to warm up. It's really important on a tuned engine to get the oil and water temperature up to a normal level before revving the engine hard. Cold oil will show good pressure but won't be flowing freely enough to ensure all parts of the engine are fully protected. We always look for a minimum of 60˚C on the oil temp before giving it any beans.

Once warmed up and under some load the engine quickly showed its potential, pulling strongly throughout the rev range. A power run showed a whopping 327bhp at 8100 rpm and 219 ft/lbs of torque at 7100. For a large capacity 4 pot this engine loves to rev and in fact held its peak 327bhp from 8100 right to the limiter at 8500rpm.

The carbs do present some problems, as the fuelling when the engine is off cam is very difficult to control. At 5000rpm and full throttle the engine runs very rich almost falling into a rich misfire. This is due to cam overlap and exhaust gasses contaminating the incoming fuel air mixture, as the revs rise and the engine begins to work efficiently the mixture leans out to a much more acceptable level and power rises dramatically. Trying to jet this out resulted in the engine running dangerously lean at high revs so it's something the driver has to live with.

This is where the precise control of fuel injection would provide big driveability gains, and this will probably happen with the next major engine upgrade. Joss has said that he rarely notices this as in the lower gears the engine pulls through the hole instantly and once off the line the engine is hardly ever below 6k.

Carbon wrap adds strength to inlet.

55mm Webers needed for flow.


Cage picks up suspension mounts.


Gauges on dash are minimal.

CHASSIS SET UP:

The engine on this car is far from the whole story; yes it's an amazing amount of grunt from a normally aspirated four-pot design that's more than 30 years old, but a lot of work has gone into making sure the chassis can make the best use of the power.

On the scales the car weighed in at 852 kilos and with the driver on board was just over 930. This has been achieved by extensive use of plastics and carbon fibre panelling plus a good understanding of where the car needs to be strong and where it doesn't. A good example of this is the fully triangulated cage, which has been installed by Phil and Mike Seaman, it picks up on all the damper mounting points and significantly adds to the shell's rigidity.

The suspension itself has been subtly modified to give improved performance but ensuring it stays within the regs of the championships that Joss competes in. The dampers are Leda two way adjustable with remote reservoirs all round. The brakes are big too, with 305mm vented discs and AP four-pots up front and 285mm discs with Wilwood Supalite four-pots at the rear.

A big step forward in the car's development was the introduction of a Hewland six-speed H pattern dog box. As well as the additional strength the flexibility of ratios and drop gears meant that the gearing was no longer a compromise regardless of which circuit the car was racing at. Although the box gave a good performance gain with Joss being able to flat shift through the gears, the additional drive line shock loadings led to several axle and diff failures throughout 2008. The solution was elegant and simple, the guys engineered a shock absorber into the drive line in the shape of a 6in rubber doughnut coupling joining the prop shaft to the diff. Taken from a BMW M5 the doughnut can easily cope with the lower power and weight of the Sunbeam while smoothing out shock loadings. The axle was strengthened by cutting the axle tubes and inserting needle roller bearings which support the halfshafts in the middle. This stops the whipping action as the torque's transmitted down the shaft which is the main cause of halfshaft failure. While modifying the axle Mike and Phil also increased the negative camber as far as the shaft alignment in the diff would allow.

The set up was near perfect for a live axle car with between ¾ and ½ degree negative camber at the rear and three degrees at the front.

Dampers are two-way adjustable.

Front suspension uses short struts.

ON THE SCALES

263kg	216.5kg
FRONT →	
246.5kg	211kg

The car runs Dunlop 235 section slicks on 17in rims and to round off the chassis package it grew a large rear spoiler and front splitter halfway through 2008. While giving an immediate performance gain the extra grip and lateral G was suspected as the cause of the oil surge that finally put paid to the old engine around Gerard's bend at Mallory. The considerable investment in the new 2.7 engine also warranted an upgrade to a dry sump system.

ON THE TRACK

I was pleased to see the sun shining as the immaculate black and orange car arrived in the paddock at Mallory on the back of Joss' transporter. After starting the car and warming it up Joss took the car out for a few laps to get everything fully up to temperature before it was my turn to try the car for size. Sitting in the driver's seat the first thing that strikes you is the lack of bling in the cockpit. Just a big tacho flanked by pressure and temperature gauges to let you know what's going on under the bonnet.


Rear axle is strengthened.


Hewland six-speed gearbox fitted.


BMW M5 doughnut in prop.

The pedals are well spaced with the throttle and brake pedal ideally positioned for heel and toe downshifts. Joss is pretty much the same height as me so the seating position and distance to the wheel and pedals felt spot on. Driving onto the circuit and up to speed the car instantly felt stable and predictable both under hard acceleration and braking. This really gives the driver confidence and leaves him to concentrate on the racing rather than having to fight the car to keep it on the black stuff. This sounds simple and basic but I've driven lots of cars that have a Jekyll and Hyde character when it comes to braking and accelerating. Cars like this are a challenge to drive on their own never mind when racing against 25 other guys.

The Hewland box shifted with fantastic precision and speed but I did find the shift a bit vague in the 3rd to 4th plane which resulted in me exiting the hairpin in 4th instead of second a couple of times. Because of my uncertainty with the gear selection I found myself coming down from 6th through each gear to 2nd whilst braking for the hairpin. The effectiveness of the brakes and the grip from the slicks meant that some pretty late braking was on offer resulting in hectic downshifting. Joss said now he's used to the gearbox he can block shift to save time and I'm sure that with more time to get used to the it this would have shaved the lap times a bit more.

Grip from the Dunlop slicks was really strong and the car felt very nicely balanced – at no point did it feel like the front end was going anywhere else than where it was pointed. Rear end traction was also good and even when pushing hard out of the hairpin in 2nd any tendency for the rear to break away was easy to control with a flick of opposite lock.

Basically this is a very sorted car that can flatter an inexperienced driver and make a really good one shine, as Joss' numerous race and championship wins go to prove. It looks fantastic as well and always draws a crowd in the paddock. No wonder then that this car was in the top ten best race cars of 2007, as voted for by by Autosport magazine readers. To use Joss' own words:

'I believe with the right development and race engineers that we could build a Sunbeam Lotus that could take on any Touring Car, from any era. We have set out to build the Works Touring Sunbeam Lotus that could have been.'

Together with Mike and Phil Seaman I believe he has done just that and it was a privilege to get to play with it. Thanks guys.