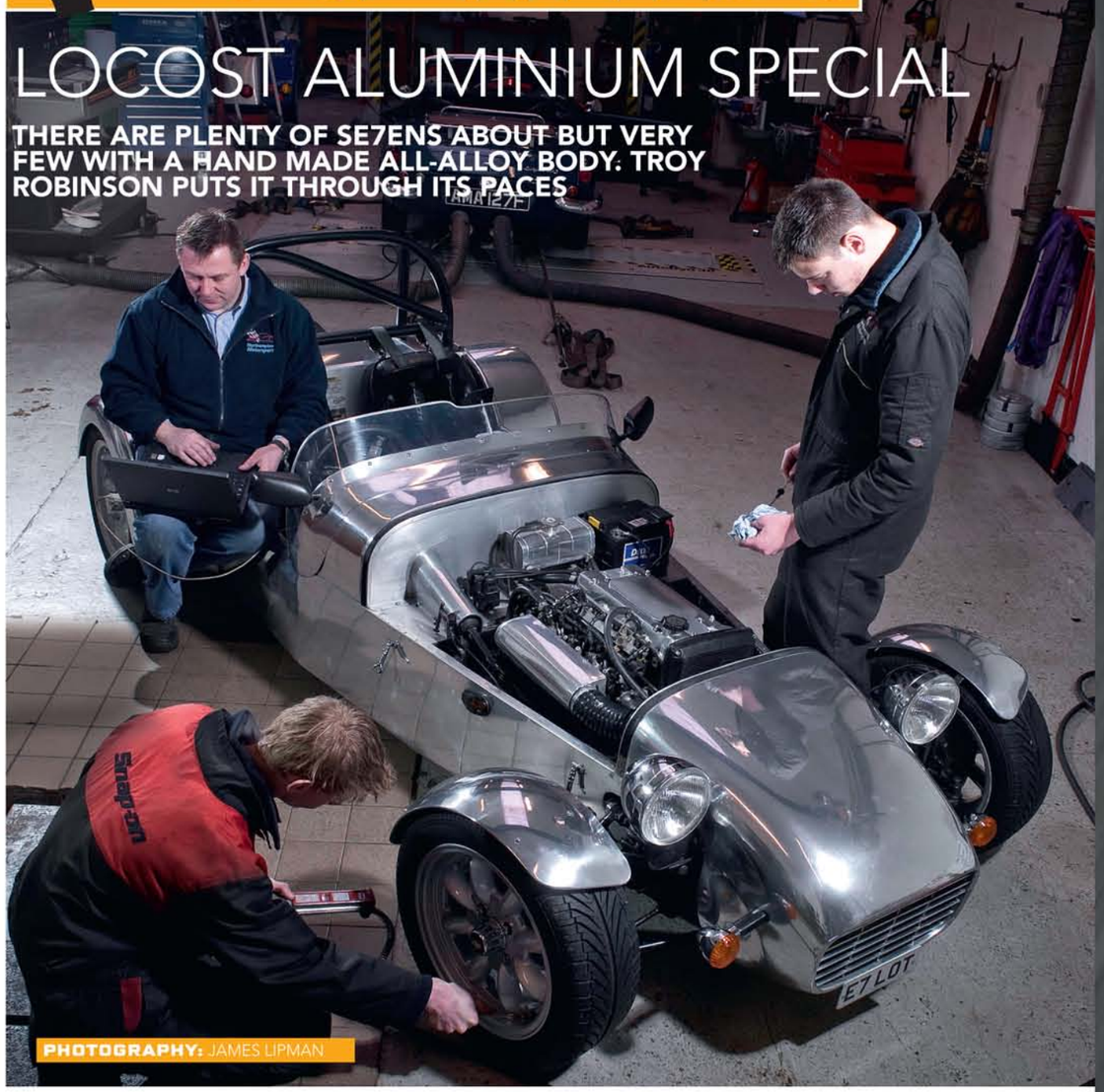
THE ENGINE ROOM CAR CLINIC

LOCOST ALUMINIUM SPECIAL

THERE ARE PLENTY OF SE7ENS ABOUT BUT VERY FEW WITH A HAND MADE ALL-ALLOY BODY. TROY ROBINSON PUTS IT THROUGH ITS PACES



PHOTOGRAPHY: JAMES LIPMAN

MALLORY PARK
THE FRIENDLY CIRCUIT

CAR CLINIC

Car Clinic is where we take a PPC reader's modified car and assess it in the workshop and on the track to see how it could be improved.

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It's not very often that you get a car that meets with everyones taste. Some like their cars to be retro, some high tech, a big banger muscle car or lightweight screamer – we all have our favourites. But almost universally, all who clap eyes on Trevor Davis' aluminium bodied Locost take a shine to it (excuse the pun). Even more interesting is the story behind its build and Trevor's skill and dedication in creating this one-off car.

The basis for the car is a Stuart Taylor chassis which Trevor bought as an unfinished project. He was planning to buy a complete car of the Se7en type and restore it, but the part-built car was too good to miss as it came complete with all the running gear, plus a Toyota 4AGE engine, Type-9 Ford gearbox, and was on offer for just over a grand. The car had been competently assembled up to this point which meant that Trevor could quickly sort out any mechanical work left to be done and get on with the major project that was to be the bodywork.

I should tell you at this point that Trevor is no gifted amateur; he has spent the last 20 odd years working for Shapecraft, one of the country's leading specialist body companies. At Shapecraft Trevor spends his days crafting aluminium bodies for all manner of classic Ferraris, Astons, Jags, Maseratis, Lambos etc. Some of the cars that grace the Shapecraft's workshops are worth millions and a one-off body created by the team there can cost £30K, so as you can imagine Trevor knows a bit about bashing metal.

Trevor wanted an authentic Lotus 7 Series 2 look and started by borrowing original panels and taking lots of photos and measurements from other cars before he started cutting metal. He quickly found that the Locost chassis was narrower than the original lotus so set about scaling the major panels before producing wooden bucks over which to form the aluminium. The nosecone is actually 3 sections rolled, bent, and then welded together to produce a beautifully symmetrical part with no visible seams at all. In fact every part of the bodywork started life as an 18 gauge 8 x 4 foot panel of ally and Trevor used five in total. All the bodywork's unique and to Trevor's design; even the windscreen was made by a specialist Perspex company to Trevor's template and then fitted to his screen surround. The fit and finish are exceptional with flush fitting panels and even gaps all round, it really is a stunning car to look at.

So after admiring the bodywork it was time to get the car on the lift and get a look at the bits under the skin. It has a pretty typical Se7en style layout at the front with double wishbone suspension. The uprights are Cortina, coupled with brakes from a Sierra. The steering rack is also courtesy of the Ford parts bin, but the earlier Escort type. The rear suspension is double wishbone independent and uses fabricated uprights with a Sierra diff and driveshafts, the whole thing being supported by AVO Springs and dampers.

AT THE WORKSHOP

Once on the scales the car weighed in at 646KG, which is pretty good for a road car with two seats, a heater and trim. We measured the ride heights and found that the front of the car was ½ an inch higher than the rear at 5 ½ inches. Not a huge problem but this does tend to promote high speed understeer and a general floaty feel as air is squashed under the car. The general rule of thumb with most cars is to aim for around a 2 to 5° rake from the rear of the car to the front as this helps reduce the air dam effect and improves high speed stability.

To correct this we decided to alter the ride height only to find that the dampers and springs are not quite right for the car and were limiting the amount of adjustment available. The dampers at the rear are actually too short for the car and were almost fully extended meaning that we couldn't raise the rear of the car without running out of droop travel (the dampers fully extended) and the dampers at the front were slightly too long meaning we couldn't lower the front of the car by much without running out of bump travel (the dampers fully closed). With a bit of juggling we managed to get a good compromise of the rear at just over five inches and the front at just under four and a half inches.

This is a common problem with kit cars as because they're light and don't compress the suspension much, often there's limited suspension travel by nature of their design. This means that getting the open and closed length of the damper, plus the correct spring rate and length is very important for the optimum set up. For a competition car we would always measure the car before deciding on the damper and spring spec and even then we sometimes have to revisit the measurements to get it absolutely right. The good news is that on a road car like Trevor's, a small compromise in this area will not really be that noticeable and the car will still out handle much more exotic machinery due to its light weight and low centre of gravity.

We also found that the rear dampers were set to full soft whilst the fronts were on 14 clicks, or about 75% towards full hard. We balanced this out to 10 clicks at the rear and 8 on the front as this should give a more equal roll resistance front to rear and slightly more neutral handling with a slight bias towards oversteer (it is a fun car after all).

On to the wheel alignment. Finding the set up was very good at the rear with just a slight difference in rear camber of -2 ½ degrees at the left rear and -1 ½ degrees on the right rear, but again on a road car this will not significantly affect the handling. The rear toe was good with a total figure of 16 minutes toe in and was almost even side to side. Toe in at the rear will make the car nice and stable whilst excessive amounts of toe out will make the car feel very loose at the back and prone to snap oversteer when cornering especially on bumpy surfaces.

At the front the only adjustment required was to the front toe which was toeing out by nearly a degree. Trevor had already mentioned that the car was a bit fidgety in a straight line and this toe out is almost certainly the cause. But it's very easy to adjust so we quickly reset this to 10 minutes toe in.

Corner weighting the Locost.


Correcting too much toe out.

Wheel alignment generally good.

Laser alignment of all four wheels.

Alignment gear is crucial for getting best handling.

ON THE SCALES

144kg	171kg
FRONT	
153kg	177kg

ON THE ROLLERS

With the suspenders checked out it was time to get the car on the dyno and see what kind of power it makes. Well, to be honest we already knew. As Trevor lives just down the road from Northampton Motorsport we've had the car on the rollers a few times as its spec has developed. Originally Trevor built the car with a pair of Dellorto 45 DHLA carbs supplying the fuelling and a distributor to handle the ignition. Those of you that know your Toyotas will be saying 'hang on, the Toyota distributor is just a spark distributor and doesn't have any facility to control the ignition advance as this is done by the ECU.' And you'd be right.

Trevor didn't have the ECU or loom so decided to cut the top off the Toyota distributor and graft on the top half of a Ford Sierra dizzy instead. Typically for this car you could hardly tell and the dizzy worked well apart from the advance curve which wasn't quite right for the engine. With the timing set to give best power the engine wouldn't idle well and with it set for a nice idle and good emissions it dropped around 15bhp off peak power. It was, however, more than good enough for Trevor to get the car through SVA and run it for around six months before upgrading to a Webcon Alpha mapped ignition system which we supplied. The engine stayed in this spec for around two years before being upgraded to the current spec.

About six months ago Trevor bought a complete engine with a pair of high lift cams, GSXR 600 throttle bodies and Megasquirt management with Ford EDIS wasted spark ignition. We had the pleasure of mapping the engine once installed and apart from a couple of hardware problems with the Megasquirt ECU the mapping process went well and the engine produced 151bhp@6900rpm and 116ft/lbs of torque@5100rpm. The power curve is typical for this type of engine with little happening below 4500rpm and then coming on strong from about 5K rpm onwards peaking close to the rev limit. Bear in mind though that in standard format these engines were limited to just under 8K rpm and in good health would happily spin to this all day long.

On the day of the Clinic the car developed quite a large oil leak just as we were about to do a power run on the dyno. Initial concern turned to relief as we realised this was just a split copper pipe from the block to a remote T-piece which housed the oil pressure gauge sender and the oil warning light switch. The T-piece was tie wrapped to the underside of the alternator mounting bracket and the engine vibration had simply fatigued the pipe until it fractured.

Undeterred Trevor just asked to borrow a few bits of kit and we pushed the car into a corner and he got to work. Forty five minutes later and the rigid pipe was replaced with a bit of braided brake hose, the engine was back up and running and the flexible pipe should be more resilient to the engine vibration. The engine made the same power on the rollers and as we knew the mapping was spot on we decided to get out on the open road and see how the car performed.


Troy strapping the car to the rollers.


Toyota 4AGE makes 151bhp.


Megasquirt mapping software.


Adjusting the rolling road.


Oil pressure gauge feed pipe leaked.

ROADTEST

The first impression was how supple the car felt over the bumps. Even with the rear dampers turned up from their original low setting the car still felt very compliant. Without measuring the spring rates on the bench I would guess that they are quite soft at around 200 lbs. This may sound a lot for a lightweight car but remember they are inclined at almost 45 degrees so the actual effective spring rate is reduced. A good upgrade would be a set of anti-roll bars front and rear which would reduce some body roll without losing the compliance. After sorting out the front toe the car felt directionally stable giving you confidence that you could place the front end just where you wanted it, Trevor commented that he could tell the car was more stable even from the passenger seat. The roads were damp so it was difficult to safely explore the car's handling on public roads, but the car felt nicely balanced with good levels of grip and plenty of sideways action if you wanted it.

You could definitely feel the engine come on cam around 4500rpm and then pulling strongly all the way to the limiter. In a saloon the engine would definitely be described as cammy as it would struggle to overcome the inertia of a heavier car until operating efficiently. But in the lightweight Locost the engine gives spritely performance even off cam so the car doesn't feel fussy to drive.

But let's be honest, this is one of those cars you deliberately want to drive slowly from time to time – it's such a cool looking car it just brings out the poseur deep within you.