

Converting an old engine, or at least one of an old design, to run fuel-injection can be quite complex. But the SU carbs on MG Midgets are robust but unsophisticated things and don't give much in terms of performance. So PPC reader Bob Tooke started looking for something that would give more power.

He followed the traditional route to a pair of Weber carbs but they weren't altogether satisfactory. 'I got a good jump in bhp but the low end torque was useless,' says Bob. Unimpressed he started to think about alternatives. 'I toyed with the idea of engine swaps and the K-series seemed like the best but it was too costly for me.'

So having decided to stick with the Midget's venerable old Triumph 1500 and having had enough of messing about with carbs and their needles, fuel-injection was the obvious alternative. Keen to save money and learn something new, Bob opted for a DiY system from Megasquirt. The ECU comes in kit form and you build up the circuit board bit by bit.

Bob has a lot of experience with electronics so putting it all together only took him a couple of evenings. But he reckons there's no need for the novice to be daunted. 'It's a quality kit so providing you have a steady hand, a good soldering iron and a bit of aptitude, anyone could

Bob Tooke wanted the power of Webers but the flexibility of a standard engine. So he built his own EFi system, says Graham Flemington

Megasquirt MG Midget

Words & photography Graham Flemington

Below: MG Midget is Bob's everyday transport.

Bottom: Triumph 1500cc pushrod engine.

build one.' Once the ECU was built Bob started scouring scrapyards for all the hardware that he'd need.

'I got loads of advice from the forum on the Megasquirt website for the parts that I'd need. It saved

me a lot of time searching,' says Bob.

The Fuel pump and filter were taken as a complete assembly from a Volvo 740 – they're just right for the job and will happily run at 3 bar. Bob bolted them to a square plate and then mounted that onto the rear bulkhead of the Midget so it's out the way of any debris or possible damage as the car sits quite low.

So the pump's vibration isn't transmitted through the floor of the car, Bob installed the mounting plate on four rubber exhaust mounts and now everything runs nice and smoothly. Back at the business end of the car Bob had some designing to do – not all of the parts come from a breakers' yard.

He needed to buy or make a suitable inlet. Bob knows his Midgets and he knew that the rubber bumpered version was sold on the American market with a single Stromberg as opposed to the twin SUs that we had on this side of the pond. Once he'd got a manifold through the owners club he had it machined to accept the pockets for →



the late model Fiesta XR2 injectors that he intended to use. With the manifold back from the machine shop Bob needed a throttle body to bolt on in place of the carb.

From the combined area of the four ports on the manifold Bob calculated that he needed a 55mm throttle body. 'It took a bit of patience to find the right one – it was just a case of trial and error and I ended up wandering around the breakers yard with a tape measure until I found one the right size.'

The single inlet on the manifold was rather small at 38mm but was machined out to suit the throttle body, which was liberated from a V6 Mondeo. Bob slotted the injector pockets into the freshly machined manifold, using some old injectors for testing so he could get as sharp an angle as possible without fouling any of the connections.

Once it was all marked up the manifold was handed over to a professional to be welded up. 'My attempts ended in blood, sweat and tears but no weld,' says Bob. The bottom ends of the injector pockets were then machined back so that they didn't foul the inlet ports. 'I wanted to have the injectors injecting directly into the ports which I haven't quite managed, but with the injectors almost at 45° to the gasket face, it's about as good as it's going to get.'

The fuel rail design is Bobs' own and it's brilliantly simple. 'The tops of the injectors are 13mm,' Bob explains. 'And the internal diameter of 15mm copper water pipe is about 13mm – in fact it's a perfect fit.' So



Above: MG's Volvo 740 fuel pump and filter.



Right: Mondeo V6 throttle body on US spec single valve manifold.

with a length of tube and four T-pieces on the bench, Bob set about cutting it all up and brazing it together to form of a perfect fuel rail. Time for a test.

With the rail connected to the injectors Bob pressured it up to 3bar with compressed air. 'It blew straight off and hit the ceiling,' he smiles. 'For the next test I secured it down to the manifold with wire, the

brackets came later.' Bob then used the fuel pump to pressure it up to 3bar again, using water from a bucket. Then he left it to re-circulate over night and it behaved perfectly.

The copper tube and fittings were a fraction of the cost of a custom made fuel rail and after a quick lick of silver paint it looks the part too. Bolt on the pressure regulator and brackets from a Volvo and it's job done. There's also another advantage to the homemade rail. It does away with the need for a swirl pot.

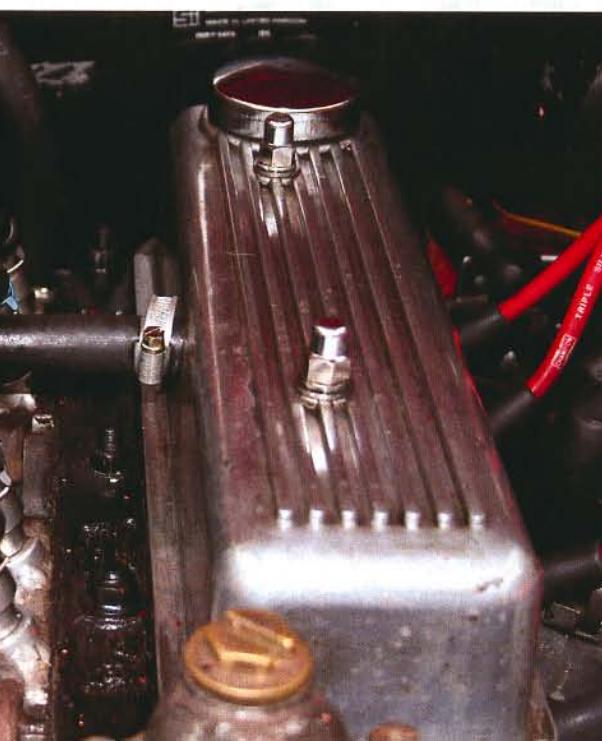
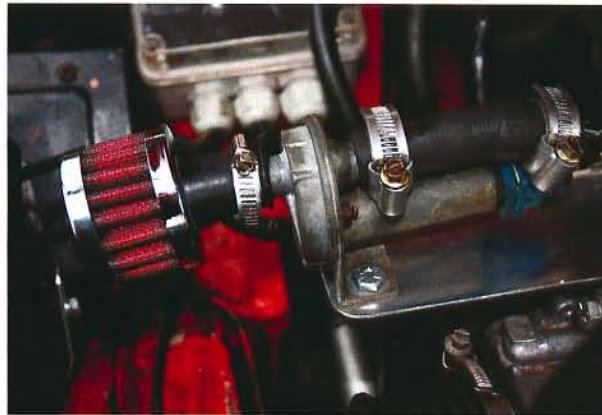
Bob admits that it is more by luck than design but it works, so who cares? According to Bob, because of the diameter of the fuel rail there is considerably more fuel in it than the injectors need. If any air's picked up from the tank it will go through the pressure regulator and into the fuel rail. Obviously, air's lighter than petrol so the air bubbles travel along the top of the fuel rail above the injectors and return to the tank.

Once the fuel was sorted Bob turned his attention to the electronic side of things. The Midget has an Aldon distributor with a mechanical advance to which Bob has connected an optical pick up so

Below: VW Golf GTi idle control valve works well.

Bottom: MG engine has Fiesta XR2 injectors.

Below right: Relay box keeps things tidy.





the ECU can keep the injectors timed. The whole lot runs through a loom from a Volvo 240 turbo.

It was when the inlet manifold was assembled and ready to fit that Bob came across his first real problem. It was designed to fit with the original British Leyland exhaust manifold and as Bob says, 'they were crap.' So some time ago Bob replaced it with Janspeed exhaust manifold, which extends further from the head than the standard part.

The old 1500 Midget has a non-crossflow head and the inlet manifold that Bob had spent so many hours developing wouldn't fit because its water jacket was fouling the exhaust. Bob machined it back a

Bob's Midget now has more torque than when it had twin Webers and more power than the original SU carb set-up.

bit and bypassed it with an extra bit of pipe. 'If I was in traffic for more than a few minutes the inlet manifold and injectors were getting too hot and the fuel was vaporising in the ports.' Bob lives in Croydon so avoiding traffic isn't really an option. Off came the manifold again.

Bob welded up the bit of the water jacket that he'd cut back and then reconnected the two sections with a piece of copper tube. Now each end of the manifold is kept cool around the ports and the car runs properly in traffic.

One of the advantages of the Megasquirt system is that it can be set up at home on a laptop using the software provided. 'To try and get it

spot on I took the car out for a run and I logged the whole trip on the laptop. Then I ran the log through a programme called MS tweak. That works out where it wasn't running quite right and tells you how much you need to adjust the mixture to get it spot on,' explains a very satisfied Bob.

Since the Midget's been on the road Bob's made a couple of improvements. 'The inlet air temperature was far too high so I got a plastic elbow from a Peugeot 406 to fit the throttle body. I fitted the air temperature sensor in it and ran some ducting down to the radiator grille so it would pick up air at ambient temperature.

'To improve the Midget's cold running I've now fitted a fast idle valve from a VW Golf GTi – it replaces the solenoid valve that I was using,' says Bob.

The Megasquirt electronic fuel-injection has transformed the car and it now produces 110lb/ft of torque as opposed to the 79lbs that the original SU carbs were giving. 'It's now absolutely fantastic to drive,' Bob enthuses.

'It's got so much torque that it will pull cleanly from 1000rpm. In fact it's got so much torque that I've snapped three halfshafts so far' ♦

Below: Megasquirt ECU lives inside the cabin, away from heat and wet.

Below left: Broken halfshafts are common thanks to engine's torque.

