A Carburettor De-icing System

By Paul Duncombe

Last September, I had planned a first visit to the Goodwood Revival meeting. Maidenhead on Saturday the 17th dawned bright and clear, but was a little chilly at 7.00am. My blown P type fired up with no problems, and the day stretched ahead of us – breakfast (hopefully large and full English) was booked at the Frensham Pond Hotel just south of Farnham. We were to meet our friends Keith and Susan Leaver, with their PB, at Midhurst for the remainder of the run to Goodwood. There, we would savour the atmosphere of the popular meeting we had heard so much about. We had what we hoped would be an acceptable kit for the day; this included a Panama hat and cravat for myself, and a fox fur stole and veiled hat for Valerie.

A momentary misfire after about seven miles, just before Bracknell, rang alarm bells. Ice was forming in the carburettor. Carburettors, located anywhere than under the bonnet can get very cold, and mine was way out front between the dumb irons, This was not the first time I had experienced this problem, but before, it had been a relatively minor inconvenience. This time it got worse. We slowed briefly and then the motor picked up, then it lost power again.

We eventually left Bracknell behind us, but staggered down to Camberley. We must have been averaging around ten miles per hour, if that! South of Camberley we came to a complete stop, and had to wait, tucked into the nearside verge of the dual carriageway, until the ice melted.

The accelerator pedal had ceased to have any control over the engine. I noted that the sun's rays were slowly becoming stronger and warmer. I realised I was entirely dependent on a globe of swirling gas and flame, 100 million miles away, warming the air, and filling the carburettor intake, so that I could get breakfast as planned, eight miles down the road. After eventually restarting, at Farnham it misfired briefly once again and thereafter, with a much needed rise in ambient air temperature, we had no more problems. I resolved to avoid such a dreadful drive again. In temperatures below about 10 degrees C it was clear the carburettor needed a supply of warm air. I had a small winter project!

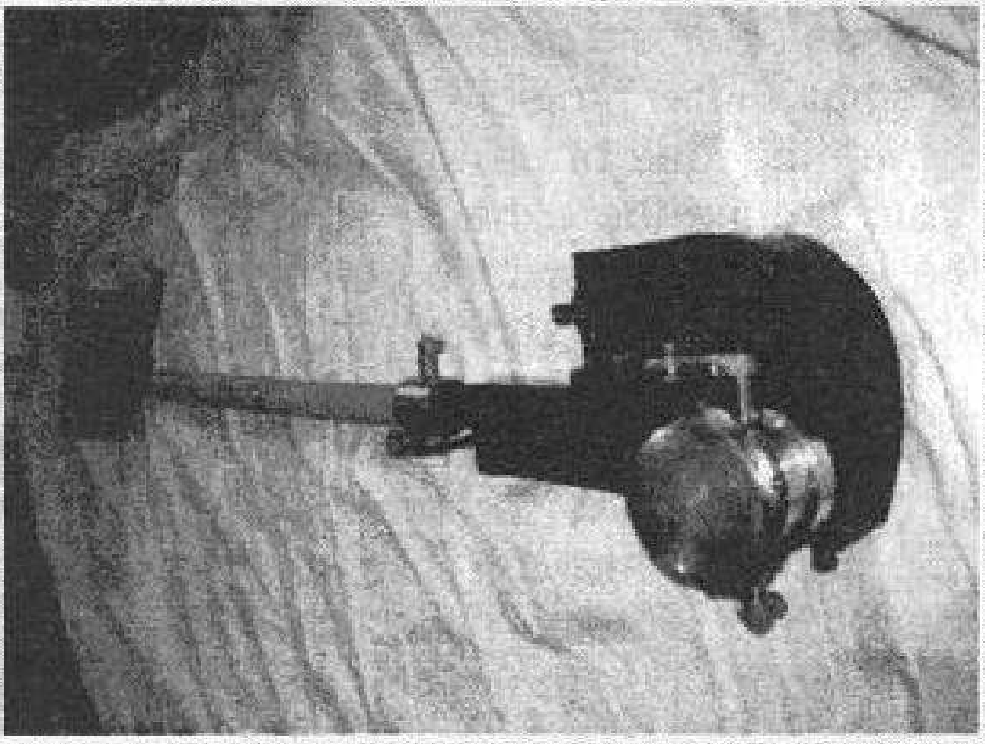
I toyed with the idea of using a small shrouded fan to blow piped air from around the exhaust downpipe to the carburettor intake. The temperature limitation of the electric fan made me wonder whether it would survive the hot air coming off the exhaust.

I junked the idea of using a fan. I decided that I would need an air box fitted to the carburettor intake into which I could pipe hot air from around the exhaust or cold air from the outside, or a mixture of both. I had little room at the carburettor intake to fit an air box due to the close proximity of the nearside dumb iron and supercharger cowl.

I therefore started by producing a solid wood mock-up (with a fairly complex shape), before making a final version in sheet steel.

The air box would have at its rear, which terminates in front of the front axle, a butterfly valve to control the hot air from a shroud around the exhaust. The cold air intake would also have a butterfly valve, linked to the hot air butterfly, so that a range of hot/cold air mixtures, from fully hot to fully cold, could be selected via a cable control on the steering column.

The butterfly valves were easily made by machining the barrels in aluminium, and purchasing the discs, spindles and levers from Burlen Fuel Systems. The hot air butterfly valve was a nominal 1" and the main air butterfly an $1^5/_8$" to match the carburettor size. A length of 1" diameter aircraft quality heat resistant flexible ducting was used to join the "hot" butterfly to the exhaust shroud. The flexible, but self-supporting, ducting passed through the gap between the front axle and the chassis cross member. The axle rebound rubber would prevent the duct being squashed, but if it did not, the ducting would be damaged, but not the axle or cross member.



The complete "hot air" system, with the cold air intake seen feeding the air box, with the hot air collecting box and connecting pipe, feeding into the back of the box.

Stainless steel rod and clevis joints were used to link the two valves. Sheet steel flanges were made, drilled and welded to pipe stubs on the air box, onto which the butterflies would be bolted.

Great care was taken when welding the air box, to ensure that no welding debris was left inside the box, to be drawn into the engine later on. I decided to coat the inside of the box with petrol tank sealant to prevent any corrosion, and seal in any tiny loose bits of debris, which might have been present.

The cable control was made from a Midget choke control (how appropriate!). This can be pulled, and then twisted to keep it in position. The cable on the standard control is not long enough, so I had to dispense with the cable and fitted another using silver solder. It had to reach from the steering column to the front of the supercharger. The cable return spring was fitted to the rear hot butterfly spindle to ensure that the hot butterfly would remain properly closed when not in use. The cable is connected to the cold air butterfly, which in turn operates the hot one via the control rod.

The cable was taken through the firewall by removing the top bolt of a number, which clamp the plate and rubber seal around the steering column. This saved making an additional hole through the firewall, and it can be reverted to normal by removing the cable and reinserting the bolt. It was a simple matter to make a bracket for the knob/cable assembly to be bolted to the steering column adjusting clamp, and a further bracket to hold the end of the outer cable at the air box.

The connection to the carburettor posed a problem, in that the intake is circular and not flanged. I therefore provided a same-sized intake connection on the air box, and manufactured two half round clips with captive nuts and screws, to clamp the two in alignment. This left me with the problem that the air box and carburettor might still pull apart, if something worked loose. This was solved by using two SU carburettor lever springs attached diametrically opposite to either side of the carburettor/air box joint, on the air box itself, and anchored to the bronze body of the carburettor, where there are two reinforcing flanges adjacent to the spindle ends. The air box was additionally clamped to the front chassis cross tube.

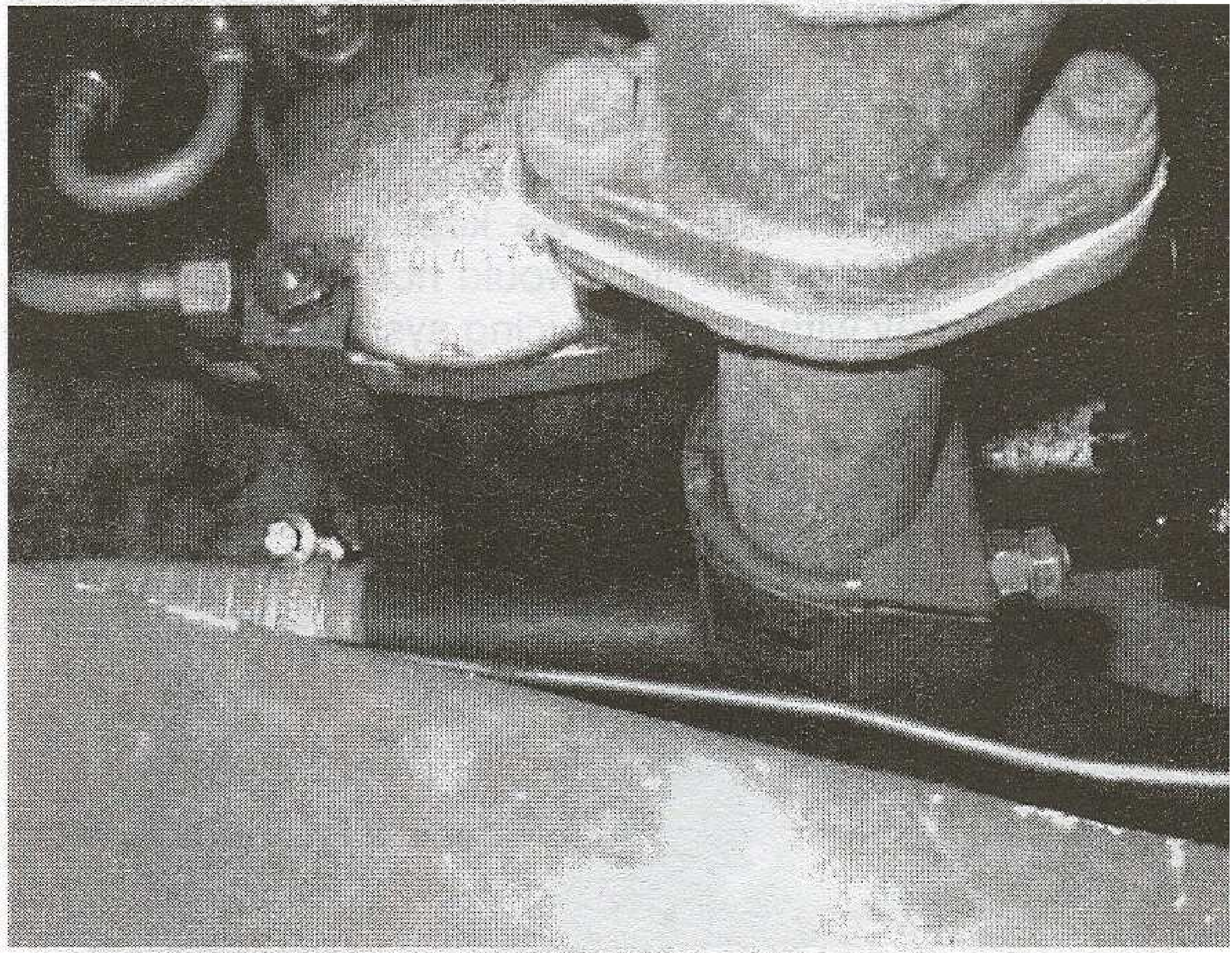
The shroud for the exhaust downpipe was made using a curved piece of sheet steel (6 inches x 5 inches), into which was welded an exhaust pipe clamp U bolt at the top end. The shroud was drilled with a number of five sixteenth inch holes, to allow cooling air to pass through onto the exhaust pipe itself, when no air was drawn off to the carburettor.

The exhaust heat collector box, with connector pipe to the air box

A 4" length of 1" pipe was welded into the shroud for the hot air off-take, and a bracket was added to provide additional support between the off-take pipe and one of the oil filter body studs. This would also prevent the shroud from sliding down the downpipe, if the clamp nuts slackened for any reason.

The shroud was finished using a spray can of heat resistant matt black paint. Being situated well down the exhaust downpipe, the shroud is not very noticeable when looking at the nearside engine bay.

With everything fitted up, it now remained to fire up the motor and test the system. I knew that if the system was working as planned, turning on the hot air at around 2000rpm should provide a rev drop of around 150 to 200 rpm. And so it proved. The MG day at Brooklands a few days later, provided a morning ambient air temperature of around 5 degrees C – for my carburettor, icing weather! I had made a new needle for the carburettor, since the one I had made, when installing the supercharger a while ago, was a little too rich.



The degree of icing one can encounter is related, among other things, to the adiabatic expansion of air, and the amount of fuel being vaporised, in the carburettor. The first can give up to 2.5 degrees temperature drop, and the second up to 15 degrees. Putting in a weaker needle could therefore reduce the tendency for ice formation. I wondered whether it would eliminate it, and negate all my work! I needn't have worried. Having set off from Maidenhead, all went well until we were close to Thorpe Park near Chertsey, a distance of around 10 miles, when the engine began to misfire. At the time we were on a level road, so I kept my foot steady on the throttle, and applied the carb heat. After a few seconds, the misfire stopped, and the car accelerated. This was a sure sign that the ice had been dispersed. I had to use the system again, and kept it locked slightly open, before we finally arrived at Brooklands.

Later in the day, the journey home was very cold, with rain (with resultant high humidity), but we kept motoring with the help of more hot air. We definitely would not have had trouble free journeys that day without the de-icing system.

Was it worth the effort to build the system? Since it will avoid being stationary at the roadside in cold, and possibly wet weather. I think so!!