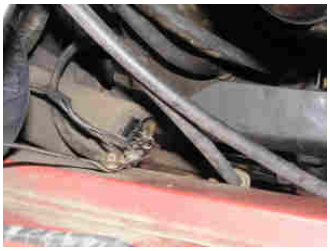
MGF COOL AIR INTAKE

Why have a cool air intake?

Engine power output depends on the amount of air that passes through per unit time. The fuel injection system senses the mass flow and schedules fuel in proportion. For a given volume, cold air has more mass than hot air, so drawing in cool air will allow more fuel/air mixture to be burnt than with warm air, and therefore more power can be generated at a given engine speed. A smaller throttle opening can therefore be used to maintain a given road speed, and because engine efficiency is related to the difference between intake and combustion temperature, there will also be a slight improvement in fuel consumption.

The density of air is proportional to its absolute temperature, so an estimate can be made of the possible increase in mass flow due to a reduction in intake temperature. A simple experiment of putting an air temperature sensor in the existing intake showed figures of between 10°C and as much as 25°C above ambient under different driving conditions. Taking the worst case, 25° is 318°K at an ambient temperature of 20°(293°K), the ratio is 318/293=1.085 or 8.5% greater density. An MGF 1.8i with 118bhp won't deliver that at the wheels, but whatever does arrive there could now be that 8.5% greater. That makes it a worthwhile aim if it can be reasonably easily achieved.

The device I used was a little battery-operated air temperature sensor with a remote thermistor which I can't guarantee would have been measuring true air temperature. It could well have been affected by radiant heat, but nevertheless showed some pretty high values.



Simple outside air temperature sensor clipped into air intake

What to do about it?

There has been a fair bit of discussion about this over the years, and Rob Bell's website has some interesting stuff. Go to http://www.mgf.ultimatemg.com/ and follow the links to technical stuff and intakes to find a lot of good reading matter.

I've been trying to decide the most cost-effective way of getting a good improvement for a while, and finally arrived at the following system. All I've done is bypass the existing intake duct system ahead of the filter box, and run a duct to the nearside vent. Nothing fancy, but it means that the air entering the duct is at least at ambient. The wider the throttle the faster the air's going through, so it has less time to warm up, so it was potentially going to be reasonably effective.

The method

Whilst rummaging around on the internet, I came across a ready-made air duct assembly from Europa Spares - https://www.europaspares.com/AIR_FILTERS_and_INTAKES/ - which at £37.54 delivered looked as if it would be very useful. After a good look under the 'bonnet', I reckoned I would be able to connect to the air filter housing elbow and run the duct through to the side inlet.

Step one

Unclip the back of the hood and remove the shelf liner and engine cover (you probably know how!)

Step two

Take the top off the air filter box, and remove the filter. (I've not gone for anything other than the standard filter as yet - there could be further small improvements from other types, but mine is still quite new and unsullied!)

Remove the filter box - there's one bolt at the forward end to undo, and a plastic locking pin to pull out at the rear, and it can then be manoeuvred out.

Step three

Prise the elbow out of the resonator box that sits below the filter box, and remove it along with the short connecting duct.

Lower elbow and connector removed

At this point, I replaced the filter box to get some more temperature measurements. I relocated the sensor to the bottom of the filter box, mounting it on a piece of foam to isolate from the box itself.

With the air intake now directly into the box, the temperatures went sky-high, easily reaching 50°C on an averagely mild day. I then attached a short length of plastic rainwater pipe to the elbow, so that the engine would draw air from nearer the side vent. This dropped the temperatures quite noticeably, but still only to about what I'd measured before. My fingers were crossed that taking the duct through to the side vent would take the final step.

outside air temperature sensor mounted inside air filter box

Step four

By now you should have purchased the duct assembly - I went for the black one, and hoped that the 63mm diameter would fit the elbow OK. The kit includes an attaching clip, an intake gauze which can be omitted, and a couple of heavy-duty tie-wraps which go in your bits box for a future job. A quick check against the redundant elbow showed it to be a perfect fit. The duct comes in a 1 metre length and has to be cut to the right length. I found that shortening it by 33cm allowed it to fit neatly.

EuropaSpares duct as delivered

Step five

Remove the two screws holding the body side vent outer frame, then the three screws holding the inner frame. The flexible duct will go through the inner shaped duct with a bit of persuasion. Feed it round the corner and up towards the air filter box. The picture below shows the duct before it gets trimmed.

Flexi duct fitted through inner liner

Push and pull the duct until it is as far into the side vent as it will go. It will sit quite neatly in the inner shaped duct flange.

Once cut to length, it should look like this -

Step six

Refit the air filter box - getting the plastic peg into the rubber bush underneath at the front is a bit trial and error - and secure it with the bolt and the plastic pin. Fit the worm drive clip from the kit onto the duct so you can reach the tightening screw, and persuade the duct onto the filter box elbow. Tighten the clamp (this takes quite a few turns), then refit the filter and replace the top housing. Reconnect the duct to the inlet system, and tighten its clamp.

Duct clips neatly into place

Step seven

You can now refit the outer parts of the side vent. You will find that the inner flange neatly retains the bell mouth flange of the duct, and once the outer housing goes in place, it all looks nice and tidy.

Duct flange fits between inner and outer liners

Ready for business

Step eight

Replace all the gubbins of the engine cover and the felt-backed liner (the fun part of the job), reclip the hood and retire to the driving seat.

The result

I've found no audible difference in the engine, so the resonator box doesn't appear to do anything much. I have found though, that for the first time, when I start the engine, the indicated intake air temperature goes down! It also stays down while it's running, seeming to operate within a few degrees of ambient air temperature. At idle it will rise slightly as the air filter box warms up, but once there's a decent flow of air to the engine it settles back down again. If I switch off it goes up fairly steadily, but again it will drop when I restart.

The reduction is so great I can't see any need to add an air scoop. I had been thinking about it, but can now happily stop wondering how to produce something that looked professional. There is no such thing as ram effect at the speeds the car can achieve anyway!

I reckon the height of the intake is now a bit lower, and would be more vulnerable to floodwater levels than the standard engine bay position, but it's still above the wheel centre. I don't think I would feel too happy trying to go that deep anyway. On the road it's difficult to say there's any obvious difference, but the pick-up in 3rd gear feels pretty brisk when overtaking.

All in all, it's been an easy job to do, and it should have made a definite improvement. The duct from Europa Spares is exactly right for the purpose, and the intake lurking behind the grille is nicely visible.