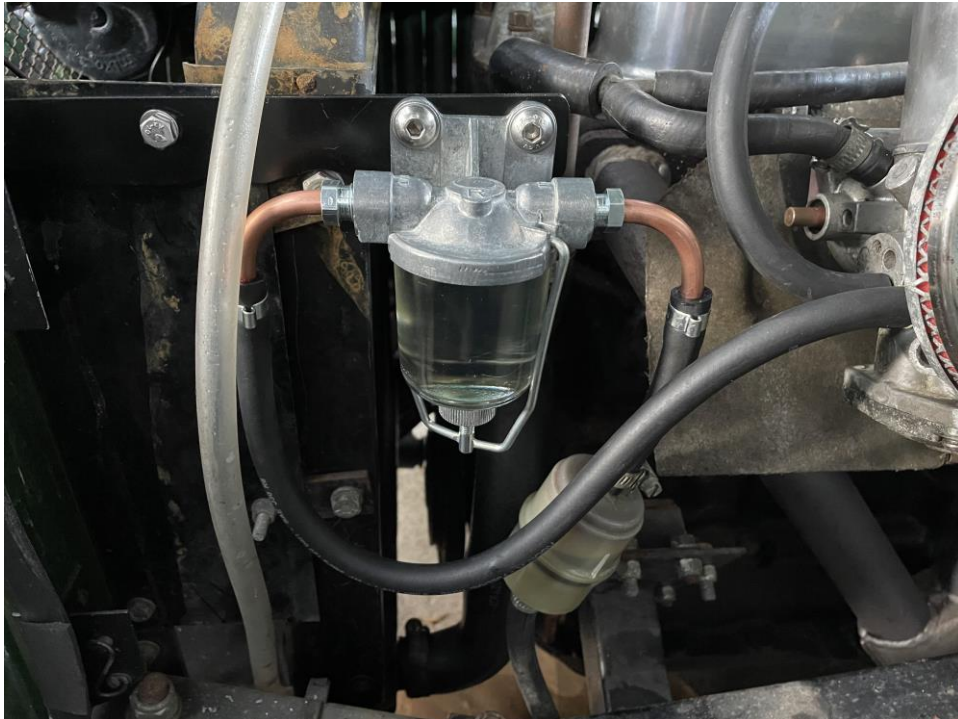


Emma's HIF4 Carburettor Problems and Solutions:

Earlier in 2022 within two miles of refuelling with E10 Emma started backfiring and giving all the symptoms of over-fuelling, luckily we managed to limp home. My immediate suspicion was faulty needle valves, somehow degraded by E10; in any event I purchased a carburettor overhaul kit, stripped and rebuilt the carbs, cleaned out the tank (replacing the E10 with the Esso E5 I normally use) and fitted an AC Delco water trap. I also renewed the fuel filter and all the hoses, including the one between the two carbs. After this work the car appeared to be running well, but within 20 miles the same symptoms returned, again we managed to limp home, banging and backfiring, it's a good job we didn't pass any horses.



↑ The AC Delco Water Filter / Separator.

With various bits removed (air cleaners and overflow pipes) I started the engine and on investigation it transpired that fuel was coming out of the rear carburettor overflow. My immediate thought was that it was again the needle valves. Further investigations and tests revealed that with the ignition on there was no trace of fuel from the carb overflow pipe, but as soon as I started turning the engine over (with the king-lead disconnected so the engine wouldn't start) fuel came out of the rear carb overflow. But why didn't the fuel leak out of the overflow with the ignition turned on and the electric pump running?

Note.

It's worth bearing in mind that running the engine does not increase the fuel flow to the carbs as the electric pump maintains the same output whenever the ignition is turned on.

I've not got enough hair left to start pulling it out in desperation so I decided to turn to the internet for help. This revealed two USA based MGB owners (amongst others) who had suffered similar problems with their HIF4 carburettors, both had had their carbs overhauled by specialists, then returned them under warranty. One chap had had his carbs rebuilt three times (by the same specialist) without discovering any faults and in desperation fitted a Webber carb conversion. Nobody offered a solution.

So what's the problem? Common sense would indicate that if it was the needle valves it would leak as soon as you turned the ignition on. I did in fact phone Burlen Carburettor Technical Department, and they suggested needle valves. My reply was why don't they leak with the ignition on and only start to leak when the engine turns over on the starter. Further discussion revealed they didn't know, but it was suggested that I might have purchased an old overhaul kit that was not E fuel resistant, bearing in mind what I've just said, this seemed unlikely. I nevertheless took the plunge and ordered two new needle valves, two new floats and various seals.

Postscript:

In September 2022 I went to the Beaulieu Auto-Jumble and visited the Burlen SU Carb Stand and had a good chat with one of the experts, his conclusion was a high fuel pressure and possibly a dodgy needle valve. He came up with one other suggestion over and above what I had planned, namely he mentioned that there have been instances of the front carbs affecting the rear carbs which was cured by putting a 'T' piece in the fuel line and supplying both carbs direct. If I eventually need to do this it will mean I will have to block off the feed from the front to the rear carb.

After around three days the goody parcel arrived and the first thing I did was strip Emma's carbs again, blow everything through and then start to rebuild the carbs. Now came the first problem, when I opened the parcel there were no new needle valves in the package. A phone call revealed that they are on back-order and not expected until the end of August, beginning of September (eventually arriving mid October). As you can imagine I was not best pleased and issued a few choice expletives. After being told that the new needle valves would come with new 'O' rings for the float chamber bottom plates I decided to finish building the carbs up and try again.

First turn of the key and she started up and sounded fine with no trace of a leak, after letting the engine warm up I stopped her and let her cool down. I then repeated the start pattern two more times with no problems. On the fourth attempt at starting fuel again came out the rear carb overflow. After 48 hours thinking about the problem I began to think I knew the solution. After spending a bit more money, and around an hours work, I started her, warmed her up and stopped her ten times (I counted them) with no problems. Of course by this time I had lost faith in her reliability and the follow up road test was three miles or so on local streets never driving more that a quarter of a mile away from home. With three miles satisfactorily completed I ventured further afield and drove round and round a two mile section of the local parkway, using two roundabouts as turning points.

Having now covered over 50 plus miles I'm quietly confident that I've cracked the problem, but what was it? To recap! Turn the ignition on no leaks, rotate the engine on the starter (without starting it) and fuel leaks out of the rear carb overflow. "What's the problem?"

Even though they are new common sense says that the problem is related to the needle valves. After thinking about it I decided that the only thing that had changed by turning the engine over was to introduce a slight vibration, what if this vibration was enough to unsettle the needle valve to the extent where it allowed fuel to flow, even though the float was normally effectively seating the needle valve when the engine was stationary with the fuel pump working? "The answer to that question is definitely **Yes!**" In parallel with this my mind turned to the fuel pump, what if the E10 fuel had somehow affected the fuel pump pressure? Not knowing the internal workings of the fuel pump this was an unproven wild guess. Another consideration was the specific gravity of the fuel, what if the float was sitting lower in the 'E' fuels and had barely enough buoyancy to shut the valve, unlikely but the thought did occur. After a couple of days I couldn't think of any other logical explanation than a suspect needle valve being affected by vibration and possibly aggravated by a high fuel pump pressure and, as noted during the rebuild, the excessive angle of the float tag that operates the needle valve (though I did come up with several illogical explanations).

To test my theory in respect of high fuel pump pressure I blocked the fuel hose that goes to the front carburettor then got a six foot high step ladder, stood a can off Esso E5 on the top step, and jury rigged a gravity fuel feed to the front carb (where it passed to the rear carb). On turning the engine over no fuel came out of the rear carb overflow. After re-connecting the king-lead I started the engine and everything appeared to work as normal, again with no fuel coming out of the rear carb overflow. Several stop and start tests produced the same result. This test seemed to confirm my theory that the fuel pressure was too high for the replacement needle valve, so I spent another £25.99 and purchased a fuel pressure regulator that had a calibration dial reading between 1 and 5 psi in half psi increments. Selecting the lowest setting I plumbed it in the fuel line between the water separator and the front carburettor.



↑ The fuel pressure regulator.

Voila! Problem solved, and has remained solved ever since. Now I'm not naïve enough to think that I've rectified the fault, rather I've masked the symptoms. There must be something fundamentally wrong with that rear carburettor/needle valve (maybe it's just a faulty one that snuck past quality control) otherwise why doesn't the front carb produce the same symptoms. There is a fair amount of information on the internet about these HIF4 carbs leaking from the overflow, but no one has offered a solution other than dirty fuel, faulty needle valves and punctured floats; in other words the normal suspects, none of which appeared to apply to Emma.

To finish off I used some 6mm nylon pipe to form a breather system for the carb overflows, terminating them on the opposite side of the car to the exhaust system. I fitted a fuel filter (as shown in the photo) it's purpose is to act as an air filter and prevent crud getting into the carbs via the overflow tubes and to act as a connector for another short length of nylon pipe (I only had short lengths in my box of bits) which exits just below the chassis on the right hand side, well away from the exhaust system.



↑ The new overflow breather system.

When the new needle valves finally arrived some two months later I decided to fit them but leave the fuel pressure regulator in place (belt and braces etc.)

One thing I did notice during re-building the carbs originally, and again with the new floats, is that with the floats set at the correct level the tags that press against the needle valves seem to be at a funny angle. Burlen Carbs assured me that there are no washers fitted above the needle valve bodies, but agreed to supply some with the new needle valves. My plan was to fit a washer which will lower the operating part of the needle valve slightly and help improve the angle; unfortunately the washers supplied by Burlen were the wrong size (they had supplied them free gratis so I didn't complain). During the final assembly I reduced the float level by 1mm, which in theory should help alleviate the situation by shutting the needle valves earlier.

Note.

*** One problem with these HIF4 carburettors is that you have to remove them from the car to make any float height adjustments; this invariably means that you also need to fit a new bottom plate 'O' ring as once they are in the presence of fuel they often swell making re-fitment either awkward or impossible.*

Postscript:

Thinking back to when I first stripped the carbs the rear carb had two visible faults. First the fuel metering needle was set about 1.5mm too low, possibly compensated for by incorrect mixture screw adjustment; second the fuel float level was incorrectly set, sufficient to make the fuel level around 3mm too high. Yet Emma had been running perfectly well on the carburation side since the day I bought her. In my opinion curing both these faults on the first rebuild should have helped eliminate any tendency for the float chamber to overflow!

Finally:

I doubt very much whether my £25.99 fuel regulator is all that accurate, but on the lowest setting (an indicated 1psi) there is ample fuel pressure to give continuous top rpm if needed. When I ordered the fuel pressure regulator I also ordered a new Facet Posi-Flow Fuel Pump, these are a solid state design, produce between 1.5 to 4psi and have a 0.3m lift. These appear to be the lowest fuel pressure pumps that Facet manufactures. (They are considered to be ok for motorcycle engined cars, the carburettors of which are normally gravity fed from a height of only a few inches, so practically zilch fuel pressure). Fitting the Facet pump was my fall back position pending my attempt to get Emma back on the road while waiting for delivery of the new needle valves. In the event this pump was not needed and will now replace Muffin (the TA's) very old SU pump.