

SOME 2CV HARD LUCK STORIES ALONG THE ROAD

By Graeme Dennes

Away From Home Problem 1:



While away from home, our orange 2CV would run for perhaps 2-3 km, then almost die from what seemed like fuel starvation, but, with much encouragement it would (blurrp, blurrp, blurrp, just) come good again and off we'd go (blurrp, blurrping blurrping), with the process being repeated. Fuel was not overflowing from the carburettor, which would otherwise indicate a failed float valve. It seemed probable that it was being caused by either dirty fuel (possible), a restriction in the fuel line from rubbish from the tank (less likely), a dirty fuel filter (possible, but the filter had just been changed), a sticking carburettor float valve (cycling with a repeated sticking action) is very unlikely), dirt in or around the carburettor jets (possible), or a fuel pump failure (possible). It could also have been due to rubbish trapped in the fuel filter, whereby the very act of fuel being drawn through the fuel filter by the pump pulls on the rubbish sufficiently to cause the filter to block itself off, when the engine would stop or almost stop, at which point the rubbish would fall away again, allowing fuel to pass, and repeating the cycle. However, as the fuel filter had just been replaced, I discounted that option for the moment. I therefore put my money on the fuel pump, so my first step was to disconnect the rubber fuel hose from the carburettor inlet pipe, then start and run the engine for just a few seconds to check how much fuel was being discharged from the fuel hose. Ah ha, it was found to be almost zero. As no spare fuel pump or diaphragm was carried as a spare, RACV Total Care was called to take us home!

I later confirmed that the fuel pump diaphragm had failed. The diaphragm material had become sufficiently "floppy" due to its age that no pump action occurred.

And what have we learnt? As the fuel pump diaphragm is not generally inspected, my new rule is to change it every five years, reminding myself by an entry in the maintenance log book. If unsure when the diaphragm was last replaced in your car, do it now as a matter of urgency. Always carry a new spare diaphragm or pump with you.

Away From Home Problem 2:



During Raid 2016, our orange 2CV started to blurrp, blurrp, then slow down and almost stop, so up went the bonnet. Clearly, the carburettor float valve wasn't shutting off the fuel as fuel was overflowing from the carburettor onto the engine below it. Not good! The problem could also be caused by an incorrect float height, a damaged float or binding float, or a damaged/worn float valve. The carburettor top cover was removed, both floats appeared intact, visually fine and doing their job, and both float heights were found to be correct at 18mm (with the gasket in place). The float valve was deemed to be the problem and it was replaced with a new one provided by a fellow Raider. (Thank you Alan!) The car started fine and all was good.

And what have we learnt? As the internal state of a float valve is essentially impossible to determine by inspection, my new rule is to change the float valve every five years, reminded by an entry in the maintenance log book. If unsure when the float valve was last replaced in your car, do it now as a matter of urgency. Always carry a new spare float valve with you.

Away From Home Problem 3:

A long way from home, another 2CV started showing repeated symptoms over several days of very difficult starting (hot or cold), very rough idle, large out of balance forces in the engine during startup until it reached idling speed, and a strange “hollow-sounding” engine/manifold exhaust sound at idle. At road speed, acceleration and driving seemed to be fine according to the owner, so not a fuel or electrical problem. However, the engine/exhaust sound was not normal at road speed. The air filter was fine. It could have been a low-RPM mode of failure of the fitted 123 ignition unit, but the chances of that are fairly slim, so I decided not to swap the unit over until all other possibilities had been exhausted (no pun intended!). The idle speed was set to 800 RPM with the tachometer, then the ignition timing was checked, initially with a 6mm rod inserted in the crankcase and flywheel orifices to confirm the timing reference marks, and then with a timing light, and all was correct. The carburettor idle mixture screw had essentially no effect throughout most of its range, so it was returned to three and a half turns out. I removed the carburettor top cover and checked the floats and the float heights. Both float heights were correct at 18mm with the gasket in place. The gasket was in good condition. While the top cover was off, the carburettor jets were removed one at a time and checked for blockages, just to be sure, and all were clear. The fuel bowls were free of contamination. The top cover was refitted with each cover screw being returned to its same (original) position, just to be sure. To ensure the base of the carburettor was properly sealing against the paper gasket and the thick spacer between the carburettor and the inlet manifold, the four carburettor securing nuts were loosened and then retightened. Still no change to the symptoms.

There was another item which hadn't been checked. After the engine had fully cooled down, the rocker covers were removed. The head bolts seemed tight but were not further tightened (no torque wrench at hand). The valve clearances were checked, and this is what was found: the two inlet valves were exactly correct at 0.2mm, but both exhaust valves had not only presented with *zero* clearance, but were in fact being held open by some small amount, meaning they were never able to fully close. Definitely not good.



Normally, in the four-stroke engine cycle, the exhaust valves are opened near the bottom of the expansion/power stroke after most of the power (and heat) from the burning/expanding gas has been extracted from the fuel mixture and converted into work by the pistons acting on the crankshaft. However, with the valves (always) open at the point of ignition and on the expansion stroke, the valve faces and seats are being subjected to the blisteringly high temperatures (even for steel!) of the burning mixture from the top to the bottom of the expansion stroke.

After setting the exhaust valve clearances to 0.2mm, the rocker covers were refitted. The idle mixture screw was set to three and one half turns outwards (counter-clockwise) from being (gently!) seated. The engine started immediately, and the strange engine sound had gone. After checking there were no oil leaks from the rocker cover gaskets, the idle speed was adjusted to 825 RPM in conjunction with adjustment of the idle mixture screw. The oil was topped up. All was good.

The analysis. I expect the large out of balance forces (the engine was pounding the engine mounts after it fired and until it reached idling speed) was because only one cylinder was firing during startup and idle because the other cylinder couldn't raise the necessary compression pressure required to ignite the fuel mixture because its exhaust valve was being held open too far. However, it still managed to start on one cylinder which already had a held-open exhaust valve! How the car even started leaves me astounded. Above idling speed and up to driving speed, the (slightly) held-open exhaust valves would have had less effect on engine power, as by then, both cylinders would be firing and providing their part of the total engine power with plenty of air-fuel mixture being drawn in at the higher engine RPMs, so the small amount of mixture escaping during the compression and expansion strokes via the open exhaust valves may not be readily noticed. If only one cylinder was operating at idle, it would help to explain why adjustment of the idle mixture screw had such little effect.

With the exhaust valves held open in this manner, the basic engine timing diagram (crankshaft angle vs valve open/close positions) was quite displaced from the correct settings. This, coupled with only one cylinder operating at idle, could well have caused the weird engine/manifold/exhaust note. It also means that instead of all the fuel-rich air mixture previously drawn in on the inlet stroke remaining in the cylinder to be compressed on the compression stroke, some of it was escaping (being pushed out) via the held-open exhaust valve and pushed into the exhaust manifold and cross box where it was later ignited in an explosive manner by the next burst of hot burnt gasses discharged on the following exhaust stroke. This too would have changed the engine sound.

It seems very odd that the inlet valve clearances were on specification but the exhaust valve clearances had not only closed up to zero so the rocker arm adjustment screws were always in contact with the valve stems, but the adjustment screws had been positioned even further inwards (clockwise) to where the valves were no longer able to close. That's the only way to cause the valves to remain open, apart from them being set incorrectly at some point in the past. Further, the lock nuts were definitely very tight! Could it have been due to the locknuts not being adequately tightened, allowing/causing the rocker adjustment screws to rotate in a clockwise direction under the influence of the net mechanical forces at work, driving the valves further out of the heads. Perhaps it was only because the locknuts had tightened up that prevented the valves being pushed even further into the combustion space, and into the domain of the piston!! I'm at a loss to explain how this situation could arise if the exhaust valves had been set correctly last time they were adjusted. Luckily, the exhaust valves hadn't contacted the piston crowns, otherwise it would have been all over red rover.

I don't know whether any heat damage occurred to the exhaust valves and the valve seats due to the exhaust valves being held open. Only an inspection of the heads after their removal from the engine will tell, unless other performance issues arise.

And what have we learnt? At each annual service, check the valve clearances. It only takes a few minutes. However, before doing that, *slightly* crack and then re-torque the head bolts to Citroen's specifications. It only adds a couple of minutes to the task, and by using multi-use rocker cover gaskets, the job becomes much easier. Do both these tasks with a cold engine. If unsure when the head bolts were torqued and valve clearances were set, do them now as a matter of urgency. It won't take you long.

In conclusion, we can never prevent all failures in our old cars or even failures from newly fitted parts, but by preventative maintenance actions such as those above, we go a long way towards minimising the risk of such failures happening out on the open road. Besides, experience tells us that it's way easier to attend to these things at home than on the side of the road!