

# Carl's Tech Tip #1: Remarks on Maintenance

## Carl's remarks on maintenance

Hello everyone. I would like to relate to you the problems that can be associated with owning one of these cars when purchased second hand.

You may ask why I perform the maintenance on the car myself. I would also like to suggest a few tips that should help a 308 to last longer, even for those people who never wish to pick up a spanner.

When I purchased my car, I wanted a „clean“ example but not a ultra low mileage „trailer queen“ I would be afraid to drive. I also wanted to perform some very basic maintenance, like an oil change, but leave the complicated stuff up to a specialist. My car had been maintained by a „specialist“ and this is part of the reason why I now prefer to perform my own maintenance. I had the car checked out for chassis and mechanical damage and I did a compression test myself. I also made sure all the electrics worked and the transmission had good second gear synchromesh.

I can't remember the exact order of events but it went something like this. I could never get the car to rev beyond 5,500 rpm without misfiring. I checked the ignition and induction system but the only thing I could find is one of the distributors was not advancing properly. About this time the headlights started to not retract. (hence the headlight article). I decided that it was time for some attention. As the cam belts were due for replacement and with renewed confidence after fixing the headlights, I thought I would do it myself one weekend. What happened next was the usual case of the more you look the more you find...I removed the air conditioning compressor in order to change the cam belts. This was about Saturday lunchtime and I now realised that the car would not be going Monday!

I had the seals changed in the compressor and the compressor clutch inspected and filled with oil compatible with the new 134a gas. I then removed the air box and was greeted by four filthy Webers with heavy pink petrol stains. The fuel lines were old, hard and needed replacing. With the top of the engine on view, I then noticed the front right hand side cam seal was weeping oil. I also discovered why the car always smelt of petrol after a run. The car was fitted with a petrol evaporative system designed to „catch“ vapours before they enter the atmosphere. Instead of venting into the charcoal canister, some idiot had cut the line and attached it with a clamp to vent over the rear exhaust manifold!

So now I was finding problems everywhere I looked. I thought I would also check the valve clearances too. When I pulled off the cam covers, I found they had been covered in silicone sealant. I then found out why the car wouldn't rev. The front exhaust camshaft had jumped two teeth on the pulley. The timing had been reset to the „new“ position (the front distributor is driven off that cam). When removing the distributors, I wanted to have a look inside but could not open them as the screws holding them together were so burred. I eventually had to drill them out.

By this stage I was really losing confidence in both the car and myself. I continued on the valve clearances. Well, there were some that had clearance, and some that had no clearance at all. Even cold, one inlet valve was jammed hard up under the cam lobe. As I was going to change the leaky cam seal I thought for the sake of an \$8 seal, I'll change all the cam seals. Easier said than done, as you have to pull the camshafts out! Things were really getting out of hand now. My garage was looking very impressive with a pile of ever increasing Ferrari parts.

When I removed the cams, I also noticed that they pulleys were worn out. They are made of some fibreglass like material and were worn to the point where the cam belts were standing proud of the pulley teeth! I managed to source some aluminium pulleys which also had a much better vernier so the cam timing could be set up absolutely spot on.

I rebuilt the carbs with new seals, gaskets and „o“ rings. I fitted sealed bearings in the butterfly spindles. I also rebuilt the distributors. When disassembling them, I discovered that they had been converted to single point operation. The only problem was that whoever did the job removed the wrong points in the forward distributor and it was set to the retarded setting permanently.

The distributors also had worn bearings and points and the advance mechanism on the front bank had seized. The advance mechanism on the rear bank had been assembled with the springs in the wrong position, giving full advance by 2,000 RPM.

While the cam covers were removed, I decided to torque the cylinder heads. Two of the nuts were under 15 ft. lbs. So low in fact, I could not even get a reading on the wrench.

By now this was a really major project, so I decided to replace all the hoses and all the hose clamps. I couldn't believe how many hoses I found. To give you an idea, the engine compartment took 71 stainless steel clamps in total ! Whilst looking in the engine bay, I discovered some missing items. There was no ducting on the oil cooler and all the heat shields were missing from the exhaust.

When I bled the brakes, the fluid that came from the calipers was jet black. The seals were leaking and the front caliper pistons were not aligned in their bores.

I would estimate that half of the 400 hours all the above took was consumed with reading material, sending faxes and ordering parts. Some jobs like the carbs and distributors could be done inside at home which made working on them much easier.

I guess I did all this for two reasons. The first was the fact that this car was maintained by a so called Ferrari expert (he's retired now so don't worry). At the time I felt pretty angry about the whole thing, especially after seeing a bill for \$2,400 to rebuild the ignition some 9,000 kms. Earlier. The other reason I was inspired to be a home mechanic was because everyone I spoke to said I was mad to attempt jobs like this. There is nothing like someone saying you can't do something to encourage you to do it!

The last job I have to do is to synchronise the carburettors which should be fun

I hope this encourages all of you to check out a prospective purchase very carefully. You really can't be too careful. Make a wrong decision and buying someone else's bad maintenance could financially bury you.

Here are some hints that don't involve lifting a spanner:

A big problem seems to be that most of these cars don't seem to get driven enough. I try to take my car for a drive at least once a week. This includes giving the air conditioning a run. When a car sits, seals dry out and harden. When a seal hardens, it shrinks slightly, causing the all too familiar oil leak. With the four cam Ferrari engines, and especially the belt driven cam models, there are 8 seals just for the cams. (7 for single distributor models, 6 for single distributor dry sump 308's). This part of the 308 engine is a very common area for oil leaks.

After an engine and transmission have cooled, moisture condenses in the crankcase and transmission. As these lubricants are slightly hygroscopic (water absorbing), it doesn't take long for the oil to become contaminated. The boiling point of the fluid is also reduced and at the same time „foaming“ is increased. Foaming is when the lubricant becomes aerated and this results in a loss of oil pressure, especially at high RPM's.

Another problem with oil and this only applies to carburettored cars is the problem of „fuel wash.“ This is when a particularly rich fuel mixture is ingested into the combustion chamber. This causes the thin layer of oil on the cylinder walls to be washed off into the sump. The cylinders are now unprotected and the oil is contaminated with petrol! It is very easy to check if your oil is contaminated. Just remove the dipstick and smell it. If it smells of petrol, change the oil. Unfortunately, „fuel wash“ is very difficult to eliminate on these engines. When you floor the throttle, the accelerator pumps deliver a very rich mixture. This is especially true if the engine is not revving very hard, say 2,000 RPM.

The accelerator pumps are designed to stop the mixture leaning out when the butterflies are opened very quickly. This eliminates detonation, misfiring and increases torque. I love flooring the throttle regularly but it is better to „feed“ it in slowly if accelerating from a low RPM. This saves the fuel in the accelerator pumps for when it is really needed, ie. The 4,000 to 7,500 RPM range where it will be burned more completely.

One really stupid practice is the „blipping“ of the throttle before shutting the engine down. How this came to be accepted in polite society is beyond me. Firstly it fills the combustion chambers with an excessively rich mixture (those accelerator pumps again). As the carburettor has just squirted fuel into the venturi's, the float level decreases quickly, activating the needle valve to top up the bowl. Now the engine is switched off and the excess fuel just runs into the combustion chamber.

The last thing to consider in making your engine last longer is the need to let the engine warm up before working it hard. This applies to the oil coming up to temperature, not just the water. Let's consider what happens when an engine is started from cold. Firstly there is a lot of friction. This is because the oil is not circulating too well due to its increased viscosity when cold. Secondly, the pistons expand faster than the combustion chambers as they are warming up. Again, this increases friction due to the very tight fit in the bores. This puts all moving parts under increased load so go easy on your cold engine, and transmission.

That's about as much as you can do to make your engine and transmission last longer without actually touching any tools!

If you want to get your hands dirty, here is a maintenance schedule suggested by the factory: Please note that it does not include common sense items. Such as: checking for leaks, loose bolts, wheel bearings, pedal, hand brake, clutch, throttle linkage and belt adjustment, ignition leads and flushing the cooling system every 2 years.

Obviously, there are simple tasks like checking oil level, tyre pressures and brake pads that can't be ignored.

Every 5,000 km. Or 6 months, change the engine oil. (note they only suggest changing the filter every 10,000 km?)

Every 10,000 km. Or 6 months, change the brake fluid, lubricate the distributor cam and oil the horn compressor (more important in Italy I suspect)! Also included, change the plugs, check the points gap, air cleaner condition. Change if necessary.

Every 15,000 km. Change the oil in the transmission and transfer gears, check valve clearances and cam belt tension.

Every 20,000 km. Grease the clutch thrust bearing. Does anybody do this?

Every 30,000 km. Check carburettors and clean fuel filter (I think this should read „replace fuel filter.“)

Every 40,000-60,000 km. Replace the cam belts. I don't want to start an argument about these but the cam belts have a time limit as well. Some people suggest changing them every two years even if the car has covered very little mileage. I think this is excessive. Tony Palladino, the technical adviser to „Forza“ magazine suggests replacing the belts every 50,000 km. Or every 7-8 years. If anyone has had a belt break, I would be interested in hearing from you.

Regarding the valve clearances, it seems with modern oils you can stretch the valve adjustment to at least 25,000 km. Again, there is some argument as to whether a „fresh“ shim surface should be used. I think this is a good idea as the price of a shim is very little in relation to the overall cost of the valve adjustment job.

Happy motoring!