

How to Fit an Anti-Cavitation 'Apollo' Oil Tank

Fluctuating oil pressure in his 1.8K Supersport persuaded **John Vine** that the time had come to invest in an anti-cavitation tank. Here is his story...

15 May 2001

It starts at my first Brands Hatch trackday. Exiting fast (at least, by my standards) from Surtees, I'm alarmed to see the oil-pressure needle waving about like a semaphore flag. It even hits the red at one point. Next lap, the same thing happens, so when I come in, I ask the Caterham organiser, Paul Kite, for advice. As the oil level is OK, he diagnoses oil surge and froth, and suggests an "Apollo" tank. Here's what happened next....

23 May

Call the factory, who explain what an Apollo is (so called, apparently, because it looks like a NASA rocket) and how it works. Basically, it picks up the frothy oil from the oil filter flange, and shoots it tangentially into the top of a cylindrical tank, expelling the air. The air returns via a hose to the cam cover, while the oil returns to the oil filter flange. At £200, the kit seems expensive, but cheaper than shot bearings. Sounds promising, but I think it over.

4 June

Check my "small toys and accessories" budget. There's some cash left, so I order (£208 incl P&P).

6 June

The kit arrives. Included amongst an army of polystyrene chips is a shiny all tank, mounting brackets, sandwich plate, pipes, adapters, seals, filter, oil temperature sender (unexpected, but handy), wire, two-way switch, and copious ty-wraps. The fitting instructions seem clear enough, but the photos are so dark as to be practically useless (copies of copies of copies, I guess).

11 June

Wanting to be prepared, I make my inaugural post to BlatChat/TechTalk on the L7C website to ask about anti-cav wrinkles. Get an excellent response, including pointers to installation notes and digital pics.

13 June

Lay all the bits out, and discover that the tank magnetic drain plug has no washer.

Call the factory. Not needed, they say, just use PTFE tape (why couldn't they put that in the instructions, I ask myself).

16 June

10:00 Compare the kit to the excellent digital pics, and try to work out where the bits go and how they can possibly be made to fit into such a small space. Remove the header tank to improve access.



12:00 Still puzzling it out. Not only does the pipework look like it will be horrendously convoluted, but it'll be frighteningly close to the whirring alternator belt as well. Opt for a spot of lunch to help clear the mind.

14:00 Remove the cam cover (taking care not to damage the gasket), and ponder for some time where exactly to drill the hole for the air-return hose. Caterham suggest 25mm forward from the second left-hand (near-side) cam-cover bolt. Experiment with the position of the interior union retaining nut to ensure it will fit flush on the cover wall. Finally settle on a position, and mark it up. Drape a sheet all around to catch swarf, then make a 2mm pilot hole, enlarging it in steps to the required 3/8", but very gently as the metal is surprisingly soft. Clean out what little swarf has crept in. Insert the oil union plus copper washers, and tighten up. Remember to insert the yellow foam pad, then refit the cover, and torque up the bolts to 6lbft. Discover there's no tightening sequence in the instructions, but find what I need in an old Haynes Metro manual: 10 9 5 6 12 14 3 1 2 15 13 7 4 8 11.

16:00 Jack up the front of the 7 and put her on stands. Drain the oil, and remove the oil

filter. Offer up the sandwich plate (this is retained by a sleeved adapter). The two oil pipes attach via 90-degree elbows and unions (the longer pipe goes next to the engine block), and then pass through the loop of the alt belt (yes, really!), curling round tightly to reach the tank. Working out the best route and angles takes a good hour or so. Tightening the unions looks impossible in the space available, so remove the sandwich, and attach the adapters (with O-rings) and pipes at the bench. Find that the sleeved adapter makes a good vice-held mount. Trial-fit twice more to get the angle of the unions right. Feed the pipes through the alt belt, lightly grease the sealing ring on the sandwich plate, offer it up to the oil filter flange (very awkward to align it square enough to get the sleeved nut to bite). Succeed eventually, escaping with only mildly damaged knuckles. Hand-tighten the nut, then add the specified extra 3/4 turn. Fill the new oil filter with oil, then hand-tighten it on the sleeved adapter. Torque up sump drain-plug to 15lbft.

18:30 Fit the adapters plus Dowty seals to the tank (again, at the bench), then call it a



Sandwich plate fitted, showing 90° unions (viewed from beneath the car)

day. Progress reasonable but laborious—enjoying it really, though, despite the skinned knuckles!

17 June

Fit the magnetic drain-plug to the tank, sealing it with PTFE tape. Trial-fit the tank. It rests on a plate riveted to the chassis cross members, just inboard from the near-side lower wishbone. The top is held by a

jubilee clip to a bracket riveted to an upper cross member. Spend some time getting the position right before drilling 5/32" holes for the rivets. There are supposed to be four on the bottom plate, but I can fit only three as one is tucked under the diagonal chassis strut and I just can't get the drill in there! Perhaps three will be enough. (Thinking about this afterwards, maybe I should've moved the plate around)



Tank installed, showing routing of oil hoses

The top bracket (with curved end to match the chassis tube) attaches about 190mm left of the intersection of cross members under the header tank (I drill two 5/32" holes in the bracket first). L7C website wisdom suggests that this is a good time to slip a spare alt belt over the pipes (and hook it up out of the way) so as to avoid an oil drain-down should the belt fail.

However, it seems to me that you can simply detach the top hose, air hose and jubilee clip, then slide a new belt over—no need to drain at all. As I can't get a spare belt in time anyway, I'll just have to wait and see. Next, attach the oil pipes to the tank and tighten up (the longer pipe goes to the top of the tank), then install the tank on its mountings. After passing through the alt belt, the bottom pipe does a sharp right bend, then a very tight U-turn down to reach the tank. Care needed here to avoid the possibly of kinks. Fortunately, the top pipe follows a much gentler path. Ty-wrap the pipes to the chassis, each other, and anywhere else that will keep them away from that whirring alt belt! Next, fit the air hose from the top of the tank to the cam cover union. The non-adjustable elbows are not ideally set, so the hose has more twists than a strand of DNA.

A bonus of the anti-cav kit is that I can now measure oil temperature (the downside is that there's yet another reading to worry about!). Fit the sender to the tank. Is the thread wrong (it goes in only three turns), or is it just the tapered third binding? Call the factory to be sure (I feel very uneasy about forcing a brass thread into a soft all hole). Yes, it's supposed to be tapered, they say (thinking me a prize dummy, no doubt), and three turns is fine, but avoid PTFE, though, to ensure good electrical contact. (Another item for the instructions, perhaps?) The sender wire and the existing water temperature wire connect to a two-way dip-type switch, and from there a common wire connects to the gauge. So, I can now simply flick between readings on the same gauge. Very neat! Decide to put the switch between the water temp and oil pressure gauges, opposite the immobiliser light.

Align the switch so that flicking towards the oil gauge gives oil temp. Run the wiring alongside the existing loom, and solder up joints. Excise the water temp wire from



Braided air hose connecting tank to cam cover

the existing three-wire holder behind the temp gauge so as to reroute it. Just as well I pick the switch spot I do, as there's precious little slack in the loom!

18:30 Call it a day. Testing can wait till tomorrow. Incidentally, Caterham quote 4-5 hours to fit the kit. It's taken me about eight to get this far.

18 June

09:30 Test day! Fill up with Syner-G, five litres to start with, then add another litre (estimates seem to vary between six and seven litres altogether—mine needs seven in the end). Fire her up—it seems to take an age for the oil pressure to build (had already tried spinning the engine with the plugs out, but couldn't raise a peep of pressure that way). There's all manner of

gurgling and splashing, presumably as the tank and pipes fill up. Run her for two minutes, switch off, wait 30s, then dip the oil (Caterham's method). No oil at all on the dipstick! Ouch! Add another half litre, repeat the procedure, then add another half (seven altogether). Level now OK. Take her out gingerly for a short run. Oil pressure about 4 bar (normal), oil temp rising very fast, but water temperature zero! Stop to investigate. Discover I'd put the sender leads on the wrong way round! Also discover on my return that oil is seeping very slowly from the sandwich plate. Pain. Call it a morning (I have work to do, as well as playing with my toys).

20 June

10:00 No alternative but to drain the oil, carefully preserving it for re-use. The sleeved adapter seems only loosely nipped up. Nothing in the instructions about torque, so I call the factory for a setting. There isn't an official one, they say, so try another 1/8 turn, maybe taking it up to 30lbft, but check the unions too. Starting at 10lbft, I go up in steps of 5, but chicken out at 20 for fear of pulling the thread. Replace drain plug and oil filter, fill with oil, and go for another run. Oh no! There's STILL a leak, but much less than before. Very close inspection suggests that there's a tiny seep from the inboard sandwich union (the one that's an absolute job to tighten in situ). I don't have a special (crossfoot?) spanner, so the only option is to strip the whole sandwich/pipe/tank assembly out and start again! Ugh. Call it a morning.

23 June

20:00 Jack her up, put her onto stands, and drain the oil. Remove filter, strip out sandwich plate, pipes and tank. Retighten the sandwich unions really firmly at the bench, and reassemble. Call it a day.

23 June

12:30 Engage in 25-mile flat. Oil-tight! Hurrah! Or practically so, anyway, with only the merest hint of oil molecules from under the sandwich plate, and certainly none of the oil smears on the chassis that occurred with the earlier leaks. Wunderbar! Immediately check the oil level. At the top of the hatching. Excellent! Now to wait for a REAL test at the next trackday.