The Lagonda V12 oil filter system - understanding and modification to full flow oil filter

Provided by Jim and Mark Whitehead: (December 2010)

In this essay photos are identified by numerals and diagrams by letters

I acquired my first V12 about 1950. It was one of the four Sanction IVs made which means it was factory fitted with four D4 SU carburettors and numerous other modifications. It was a Rapide chassis with James Young Drophead coachwork - a one only. I used it very extensively in my practise for some years and found it delightful to handle in and out of traffic as well as on open country roads.

After I attended my first AGM in England in 1959 I determined to build up a collection comprising one of each V12 with Lagonda coachwork to restore them after retirement, an event which evaded me on three occasions before success. When finally I got started on the rebuilds, I did all chassis, suspensions and running gear before coming to the engines. When this occurred I had 5 engines lined up in my workshop and dismantled them one by one. 4 of these engines were very heavy with carbon in the combustion chambers and were running on the hottest of plugs. This surprised me as the bores of two were in reasonable condition, valve guides and valve stems similarly so. How was it that they were so badly coked up? Proceeding to the lower end I was astonished by the amount of sludge in the oil pans. There had to be reasons for these irregularities and so I went back to first principles. The carbon and sludge came from burnt oil.

I was familiar with the twin oil filter system and the modification which married the two chambers together, but was intrigued by the difference between it and the illustration of it in the Instruction Book - see page no. 29 illustration no. 14. The assembly had grown in length to enclose a device at the rear end the purpose of which was not immediately visible. I therefore stripped down all five filter assemblies and in each one there was an intriguing valve and in four of them it was seized. I now refer to it as an oil flow regulating valve, its purpose being to control the oil volume to the overhead system. As this appurtenance was not shown in the Instruction Book as referred to above, it likewise was not mentioned that it required servicing and in each of four cases the valve was seized in the fully open position, allowing full oil flow at engine oil pressure to the overhead system at all speeds and in consequence the overhead gear would be flooded with oil resulting in the heavy carbonisation in the combustion chambers oiled up spark plugs and sludge in the oil pan and other problems.

I said that this device intrigued me so I set about trying to answer my own question as to why it was added as a modification and my conclusions were and are that in those days silence was very highly esteemed and that with an overhead camshaft engine the clatter from the valve gear on first starting up before oil reached them was characteristic. That was something from which that make of car the V12 was designed to challenge in the market place did not suffer, not having overhead camshafts. In those days, silence being golden, W.O. had need to give attention to any source of noise. How best to do this? The solution while intriguing was in my opinion brilliant. I carried out some experiments to prove this point, which I now explain as under.

Presume the engine has been standing overnight and all oil in the overhead gear has drained back into the sump and the flow regulating valve is functioning correctly: The engine, as always starts instantly, the oil at full pressure, say 50lbs a square inch and that pressure is conveyed to the overhead gear. From my experiments it took exactly 4 seconds to completely silence the overhead gear. But how did it do it? If the flow regulating valve has been given the service attention required it will fly open immediately the engine starts permitting full oil flow to the overhead system. But what happens if it has not been serviced and remains fully open at all times? Then we have both overhead valve chambers flooded in oil. And flooded in oil with resulting problems such as:

> High oil consumption, carbonisation of valves, pistons and
> oiled-up spark plugs, fouling of oil, blocked oil passages to main and big end bearings, damage to piston heads and rings from overheating, blockage of valves in chassis lubrication system, all resulting in expensive running costs, disastrous damage to its reputation and status and devaluation in the market place.

But what happens if this valve is operational? The oil travels from the filter chamber through a passage of 5/16th" diameter, strikes the blind end of the shaft of the valve which will be in the closed position, flings it open in the aperture in which it slides, to allow full oil pressure to the valve gear but on its way it also enters through a bypass passage of 1/8th" diameter which diverts some oil at full pressure around to the rear of the valve head of 1" diameter which in seconds acts upon the head of the valve to close it and thereby reduce the pressure being fed to the valve gear. There is a short delay for the regulating valve to return to the fully closed position. I say when the valve has closed, but there remains a small gap allowing the ongoing oil supply to the cam galleries to be maintained. Once the engine stops, by the simple and ingenious power of vacuum caused by the oil gravitating from the cam galleries through the filter chambers to the sump drawing the shaft of the valve into the closed position as the oil passes the 5/16th aperture. There is also a 1/16th" aperture in the bottom of the low pressure chamber which also feeds oil to the cam gallery. That is if it is not also carboned up, which will be the case if the flow regulating valve has not been serviced and is frozen in the closed position.
How did I prove this latter point? Stop the engine when hot, quickly remove the triangular end plate of the assembly and with a magnetised bar withdraw the head of the valve partly out and then watch it drawn back in by the vacuum previously mentioned.
See photo 1.

Where would designers be without the benefit of the beautiful laws of physics? In case you will think my claims are fanciful think again after you have examined the diagrammatic explanation and the photos.

The test method I used to prove my theory was:-
Into the triangular end of the oil delivery pipe which fixes to the cylinder head I drilled a hole and tapped it for a 1/8 BSP brass fitting to take and set up an oil pressure gauge which would tell me what pressure was going to the overhead gear, how long it took before the valve came into operation to reduce the pressure and the pressure to which it was reduced. Ref. photo no. 3
You will clearly see the gauge for this experiment and photo no. 4 will also show that after removal of the gauge the hole was blocked with 1/8 BSP plug. A second oil gauge mounted on a long pipe so as both gauges could be sighted at the one time was fitted to the takeoff above the end of the crankshaft which actuates the dashboard oil gauge and a second gauge fitted. The engine was fired up at 500rpm and immediately both gauges read 30lbs pressure but after 4 seconds the gauge measuring the pressure to the cam gallery began to fall rapidly to 5lbs while that registering the crankshaft remained at 30lbs. As the engine revs were increased the crankshaft gauge rose to 50lbs and the flow regulating gauge to 7lbs. I believe my theory and deductions were correct.

Now to make the service maintenance of the valve easy. Photos nos. 5, 6 & 7 show the valve assembly dismantled and the bypass passage through which the oil is conveyed to the head of the flow regulating valve. This passage is outlined in white paint for photgraphic purposes. What I then did was to drill the triangular end plate and tap it for a 1/8 BSP plug and all that needs then to be done is to remove the plug, insert a magnetised bar into the hole and when it makes contact with the head of the valve just test that it slides in and out freely. See photo 7. If not remove the three nuts holding the end plate, remove the valve and cage, clean it all including the cylinder in which it slides and reassemble. If satisfactory oil filtering could be achieved this servicing may become unnecessary.

I trust that this explanation both of the importance of this valve and the absolute necessity to keep it operational is vital to prevent excessive oil consumption, excessive carbon build-up in the combustion chambers, and eliminate the problem of oily plugs and reduction of the sludge accumulation in the oil pan and all the other side effects previously numerated.

But to me the job was only partly completed. So something more must be done - but what? The oil filter elements originally fitted to these engines, while very expensive to manufacture, could not be compared to modern microfilters. I therefore set about figuring out how to introduce a full flow oil filter. At first I considered completely replacing the original assembly and, out of alloy, making a fitting which would pick up the oil from the pumps, pass it through a new filter and return it to the engine: but the fact was I positively and absolutely would not sacrifice the oil flow regulating valve which I think could not be improved upon to fulfil its function. Intriguing and as ingenious as it was it was also simple as all good design is simple.

I therefore turned my attention to what might be done with the original assembly. It became so obvious I could not understand why I had wasted so much time trying to replace it. Now lets consider the following:-

In its original manufacture the 2 filter chambers were independent and for this reason each required a pressure relief valve and a bypass valve. See illustrations 14 & 15 on pages 29 & 30 in the Instruction Book.

An early modification to the assembly married the 2 chambers together and added the oil flow regulating valve, which meant only 1 bypass valve and 1 pressure relief valve was then necessary. Therefore there were 2 apertures in the assembly which could be used to fit an external cartridge type filter but the filter would require to have its own bypass valve in the event of failure. I researched the motor industry catalogues of filters but none suited this purpose. I then researched filters used in the agricultural industry, where filtration is so vital in our dry western country where ploughing and sowing of crops extends over hundreds and thousands of acres always dry and dusty. I ultimately decided upon a filter which had everything including a sliding bar indicator so as one could see at any stage the state of the filter and thereby avoid replacing it before its life expired. The one I chose of course turned out to be the most expensive and a little larger than ideal for the location where I had decided to fit it. However it still had 1/8" clearance on each side and the cartridge can be removed by more than one of the tools available for this purpose.

The make of this filter is UCC and model MXA8511 223, 25units ABS. They are made by UCC International Ltd. address post office box 3 Thetford, Norfolk, IP24 3RT. The literature stated "for return or suction applications for use with mineral and petroleum based fluids". This raised uncertainty in my mind so I phoned the chief technologist at the works in Thetford who confirmed the model quoted above was suitable for engine lubricating oils and the purpose for which I intended to use it. UCC produces one which is smaller, easier to fit but of much reduced capacity.

The next hurdle to be overcome comprised internal modifications to the original filter assembly refer to diagram A which shows the underside of the original filter assembly. Refer to diagram A before alteration - a worm's eye view. Now proceed in the following sequence:-

1. Refer to diagram B. The blackened areas 1 and 2 are infill with marine quality alloy welded into the body of the filter, but first remove the flow regulating valve assembly as in photo no 2 in case of distortion under heat. Plug the holes 3, 4, 5 and 6 with tapered alloy plugs press fit. Then surface skim the underside of the assembly, make up and tap the thread into the brass plates for the front end of the original filter assembly. Note the step in the new plates are to be as the original, and also a new step for the bolt head to allow the nut for the brass elbow nut to turn, see photo no. 8. Then make the bracket from which the new UCC filter is suspended. See photo no. 9 and diagram D.

2. Refer to diagram C. Machine a channel from point X to point Y and on to point Z. At point Y slightly widen the channel through to point Z. At point X the oil from the upper pump enters the channel, marries up at point Y with the oil from the other pump and exits at point Z to the brass fitting which has replaced the former relief valve now unecessary, and is conveyed through 5/8" hard copper tubing shaped to allow adjustment for the fan belt and to pass around the cylinder head so as the head may be removed without interfering with the filter plumbing. Then to the inlet port of the new full flow filter from where it exits through the outlet and into the second tube and then it enters the filter chamber in the original assembly. These filter chambers have no elements and the oil is conveyed to the crankshaft through orrifice 7 and bypass to orrifice 8 where it comes under the control of the remaining pressure relief valve then on through the oil regulating valve to the overhead gear. At this point all oil has been filtered. All plumbing joints are silver soldered.

3. Now to the location of the new filter.

Refer to photos nos 9 & 10 which show the bracket from which the new filter is suspended. On the offside of the timing case chamber is a plate held by 4 studs. The purpose of this plate was to me a mystery, as every engine I have dismantled has revealed hard sludge rendering it inoperative for whatever mysterious purpose it was intended, until I cleaned away all the carbon sludge and discovered the aperture in the chamber casting covered by the plate revealed the vibration damper, which I regard as a secondary flywheel. As it revolves in oil at the bottom of the timing case chamber it would cause the oil to foam and WO would well have been aware that foaming oil is really air and air has no value as lubrication. Therefore as it rotates it flings the oil up to the upper wall of the chamber where it then drains down, is trapped by the casting of the wall of the chamber and the cover plate as it flows over the undulating shape of the exposed wall and plate and exits out at the bottom aperture covered by the plate, drains into that very large copper tube which slants down and enters the filter on the underside of the lower crankcase. The plate which covers this aperture I did not reduce in thickness, tempting though it was, to get more clearance for the new filter. And the plate remains in situ, the studs lengthened to take the newly made bracket, which bolts onto those studs. Photo no. 9 shows the plate and the bracket and sketch D shows the dimensions of the bracket. It is made from 5/32"steel. Having fixed the head of the new filter onto the bracket on the workbench the bracket can now be fixed onto the side of the timing chamber and then the final stage is reached by screwing on the new filter element after connecting up the two 5/8th" external oil pipes.

The whole of this conversion can be done without removal of the radiator, but not with ease and it will be the one case in the whole job where indulgence in foul and irreverent language may be excused

By the time you have completed this conversion you may be a little poorer in the pocket, but you will have an engine with a filtration system par excellence.

Henceforward you will be able to utilise the full life of the oil you are using, run on moderately cool plugs, not leave a smoke screen, better fuel comsumption, easy starting, cooler engine running temperature and a very much longer life of moving parts. The chassis lubricating system may also work if the drip valves have their filters clean.

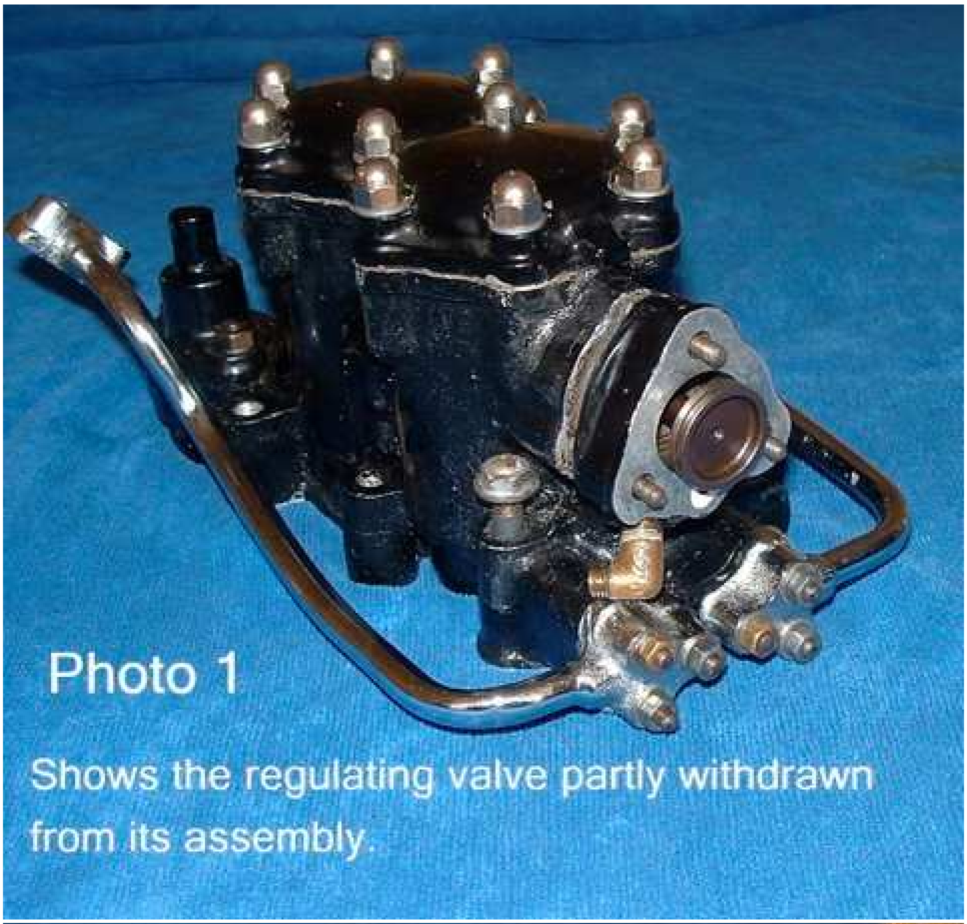

Photo 1

Shows the regulating valve partly withdrawn from its assembly.

Photo 2

Flow regulating valve and assembly dismantled. White paint for photographic purposes only shows the bypass passage for oil pressure to be applied to the head of the valve.

Photo 3
Oil gauge let into the supply line to the cylinder head.
Note brass plug replacing the brass fitting for the oil gauge.

Photo 4
Flow regulating valve dismantled.
Note 1/8th O ring used for a seal.


Photo 5
Rear view flow regulating valve dismantled


Photo 6
Flow regulating valve assembled. Note drilled and tapped hole in the end plate, the magnetised bar for testing and the brass plug for sealing the hole

Photo 7
Magnetic bar for testing

Photo 8

Brass fittings for the flow and return to and from the new filter. Note the step in the surface of the brass plate on the right and the cut-away for the bolt head

Photo 9
Bracket for suspending the new oil filter and the plate which goes between the bracket and the timing chamber.

Photo 10
The timing chamber with plate removed. Note the vibration damper and the apertures top and bottom which traps the oil and diverts it to the lower filter in the sump

Photo 11
Underside of filter body after alterations.
The black line indicates the passage of the oil from both pumps to the outlet leading to the inlet port of the new filter.

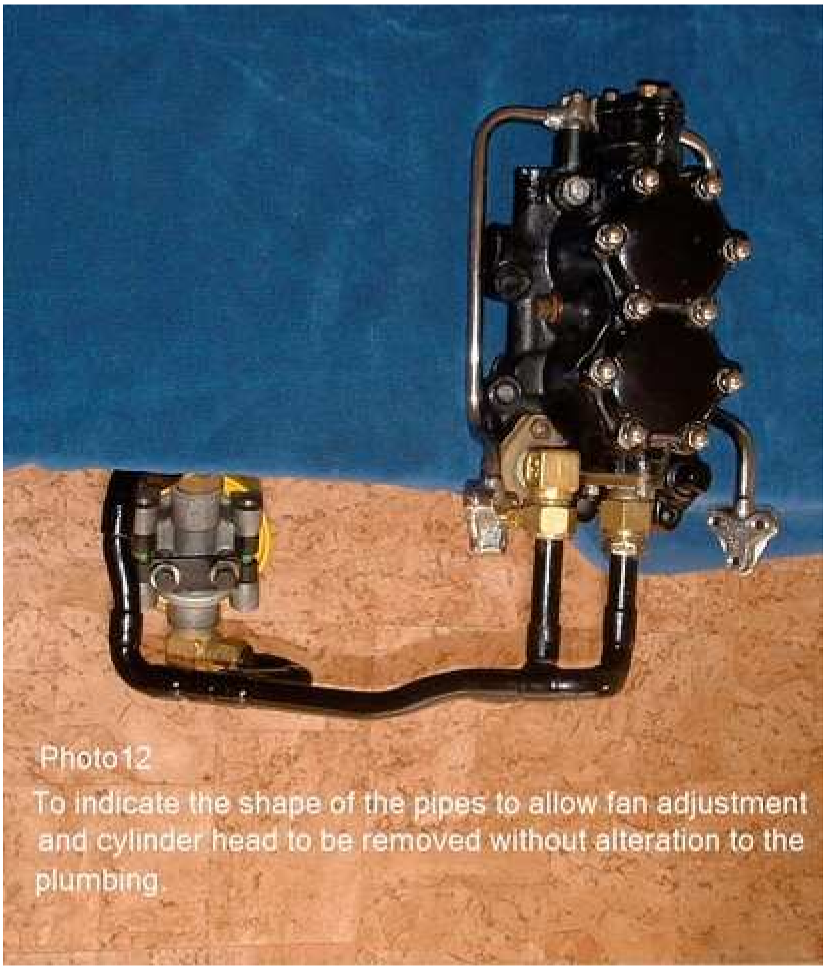

Photo12
To indicate the shape of the pipes to allow fan adjustment and cylinder head to be removed without alteration to the plumbing.

Photo 13
Indicates angles at which the filter is inclined to allow for removal of the cartridge

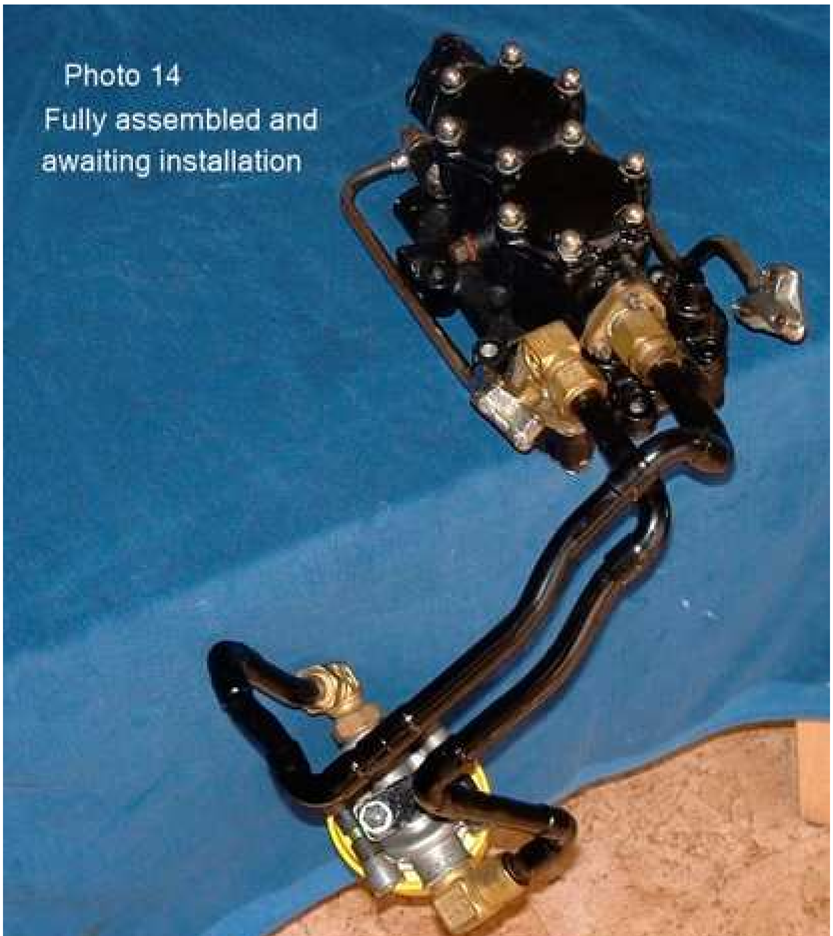

Photo 14
Fully assembled and awaiting installation


Photo 15
Fully installed and
ready to go

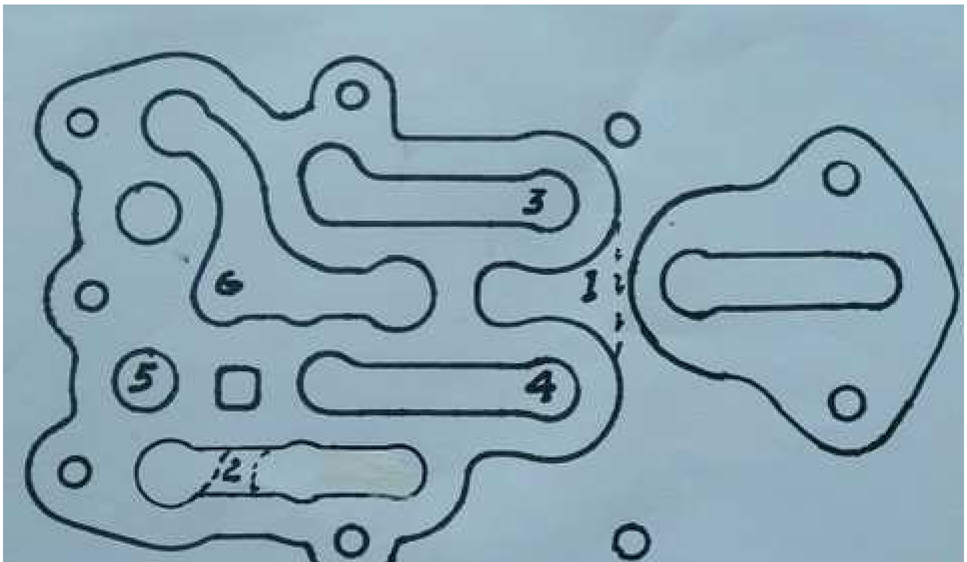

Diagram A
Original assembly unaltered - worms eye view

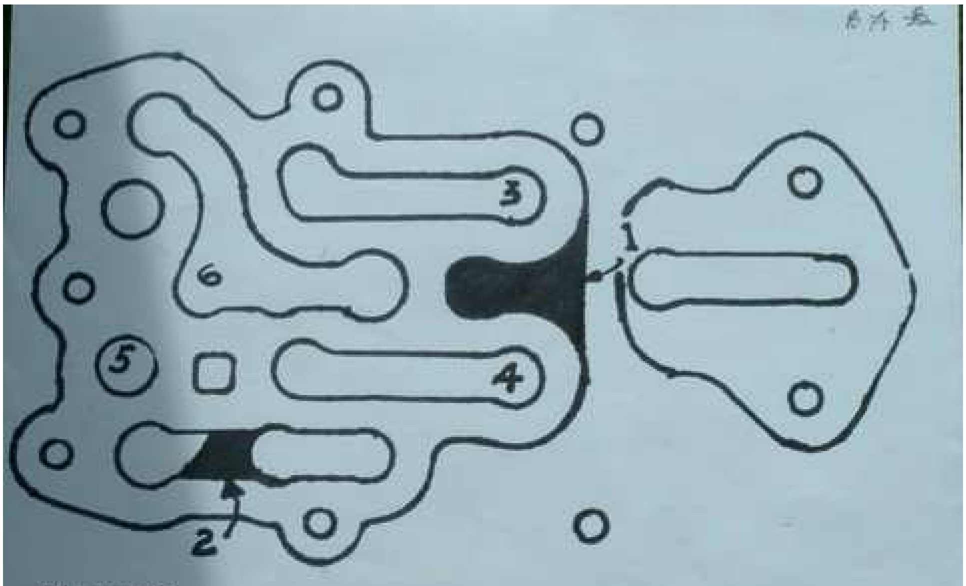

Diagram B
Blackened areas identify the alloy infill weld.
3,4,5 & 6 indicate the location of the alloy plugs.

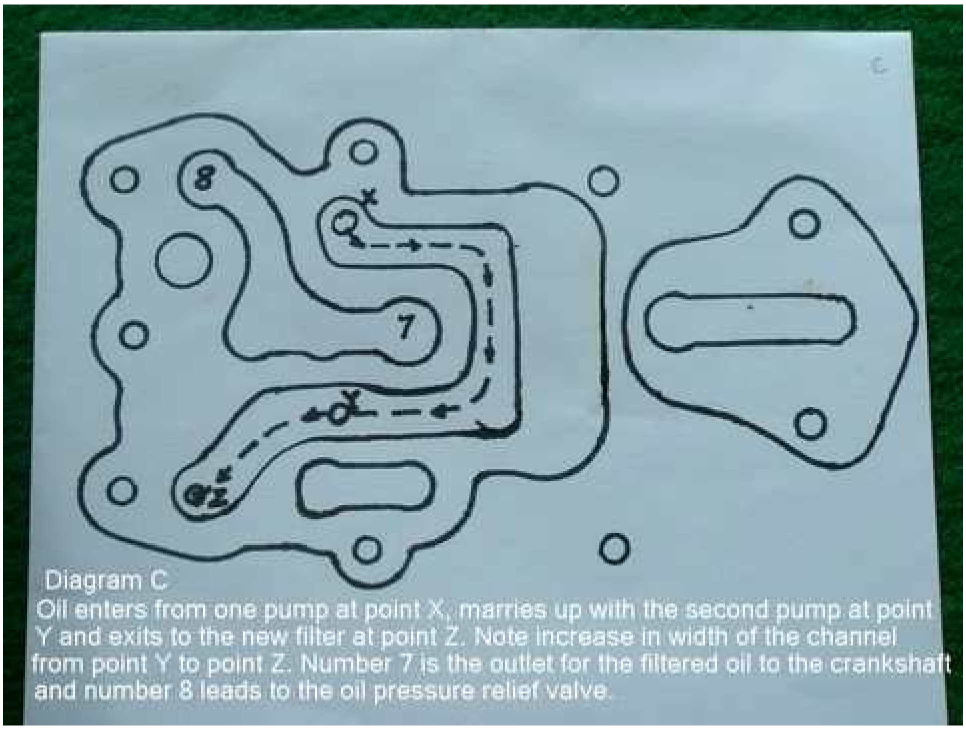

Diagram C
Oil enters from one pump at point X, marries up with the second pump at point Y and exits to the new filter at point Z. Note increase in width of the channel from point Y to point Z. Number 7 is the outlet for the filtered oil to the crankshaft and number 8 leads to the oil pressure relief valve.

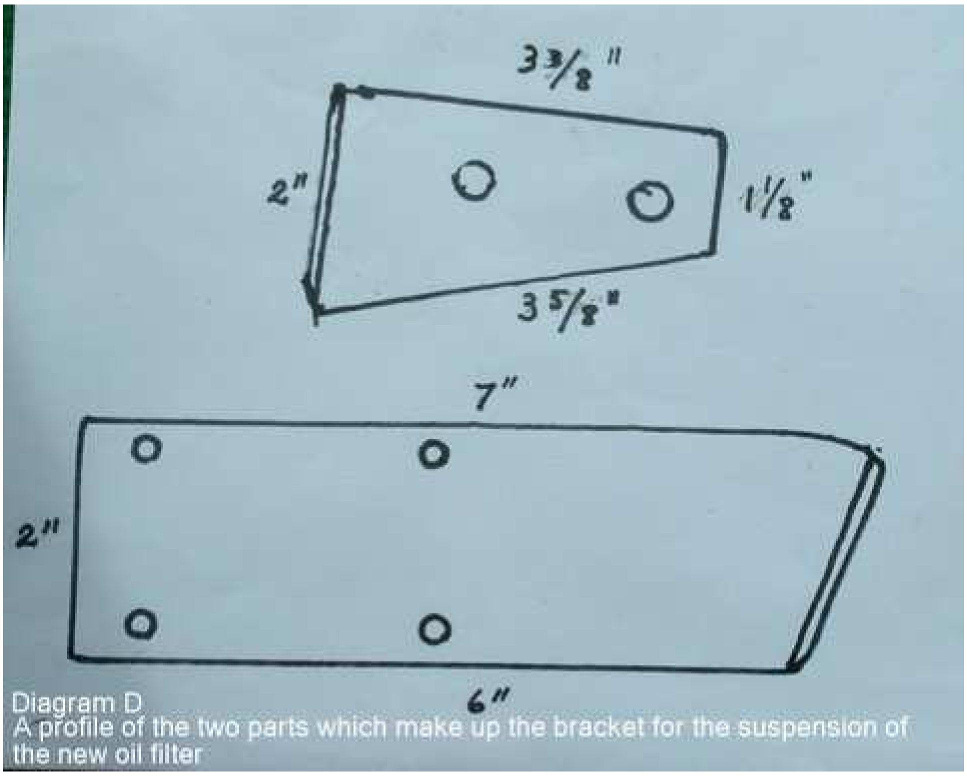

Diagram D
A profile of the two parts which make up the bracket for the suspension of the new oil filter