TEE-ONE TOPICS

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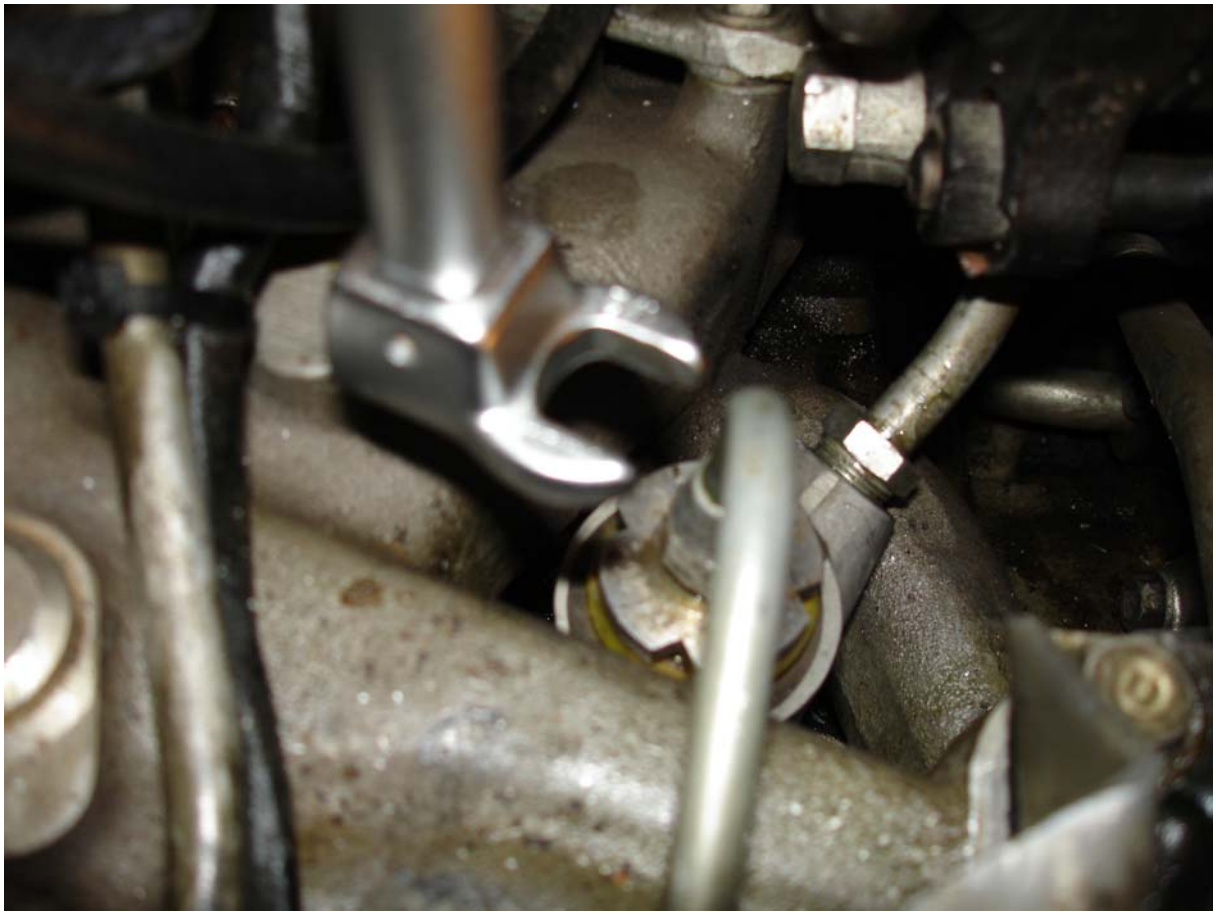
LEAKING HYDRAULIC PUMPS



Seems to be the season for these little things. You are looking at the front pump of a Silver Spirit buried down between the legs of the intake manifold on the engine. The peculiar 'clover-leafed' shape of the top gland nut was a later innovation necessitating ideally a special tool to undo it. Otherwise the pump is much the same as that first used in 1966 on the very first Silver Shadow. Simply a plunger pump with a non return valve it draws brake fluid or mineral hydraulic oil through a gravity fed pipe screwed into the outer casing. Note that Hydraulic oil pumps and brake fluid pumps while apparently the same ARE different and must not be exchanged in installations. The outer casing of the pump contains its fluid by means of two 'O' rings. There is no pressure, as the oil is pumped out the casing simply fills by gravity.

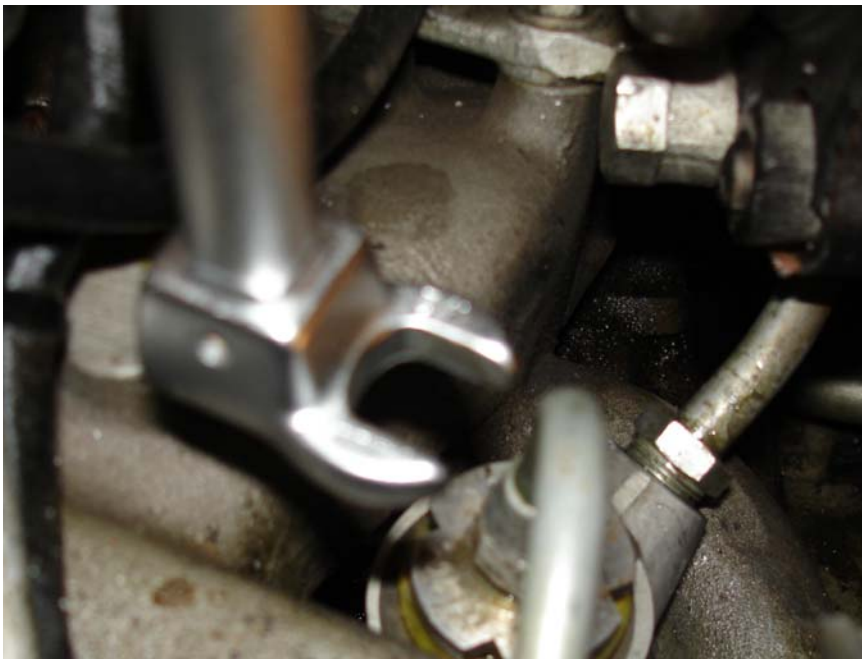
Eventually you will experience a loss of fluid which will drop from the engine in the least expected places. In these cases the lower 'O' ring fails in the heat and vibration and the oil seeps out under the manifold and runs around the valley cover to drip wherever it may. To pick this up you can use

a pressure can of degreaser to clean off the pump and its surrounds and then dry them with a cloth on the end of a screwdriver. After a drive have another look with a bright torch. Oil on the valley cover around the newly cleaned pump is the evidence you are looking for.

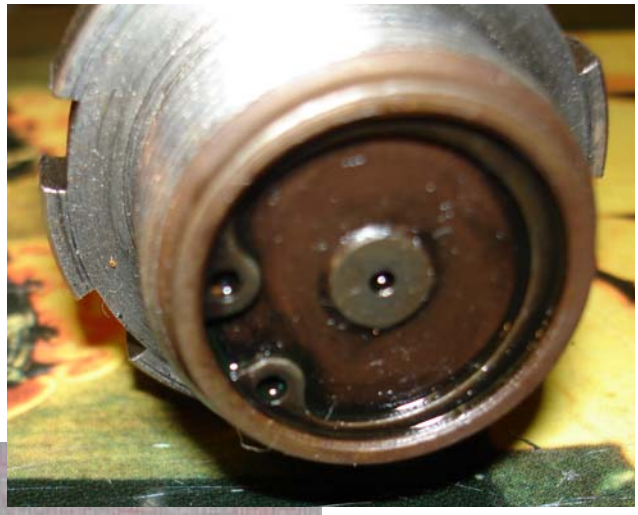
To fix the problem you need to lift the outer casing off, remove the two 'O' rings and reassemble. For the front pump this is a little like throat surgery and for the rear pump depending on the gear decorating your donk it is not much better. You will need reverse acting circlip pliers as there is a circlip holding the casing down. Don't try to do it with a couple of nails, a clothes peg and a skipping rope. You will probably either break something, lose something or beat your previous best at original profanity.

If you are fortunate to have a pump spanner, having removed the outer casing of the pump and the two pipes attached to it, you can easily screw out the whole pump. In the picture to the left one of the upper 'O' rings can be seen through the aperture in the spanner. These spanners by the way can be made by any fitter as long as you give him a sample pump to get the serrations right.

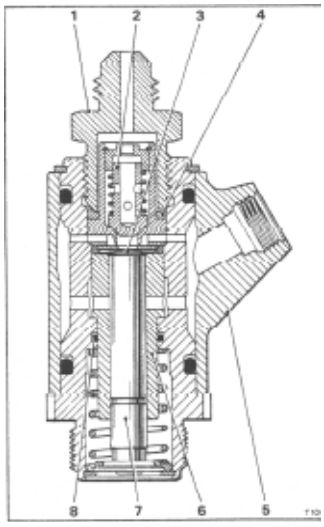
You should also get yourself a crowfoot spanner to undo the outlet nipple rather than burr over the nipple faces. Some long nosed pliers will aid in lifting the casing off the pump.



At left we see the evidence of a leaking pump. The pushrod coming up from the camshaft department is also visible. And below is a view of the bottom of the pump showing the base of the pump plunger. It is the gap between these two that broadens with age that gives that characteristic clacking noise common to post55 cars. When replacing the two principal 'O' rings you should also replace the small 'O' ring on the neck of the inlet pie seen at left.



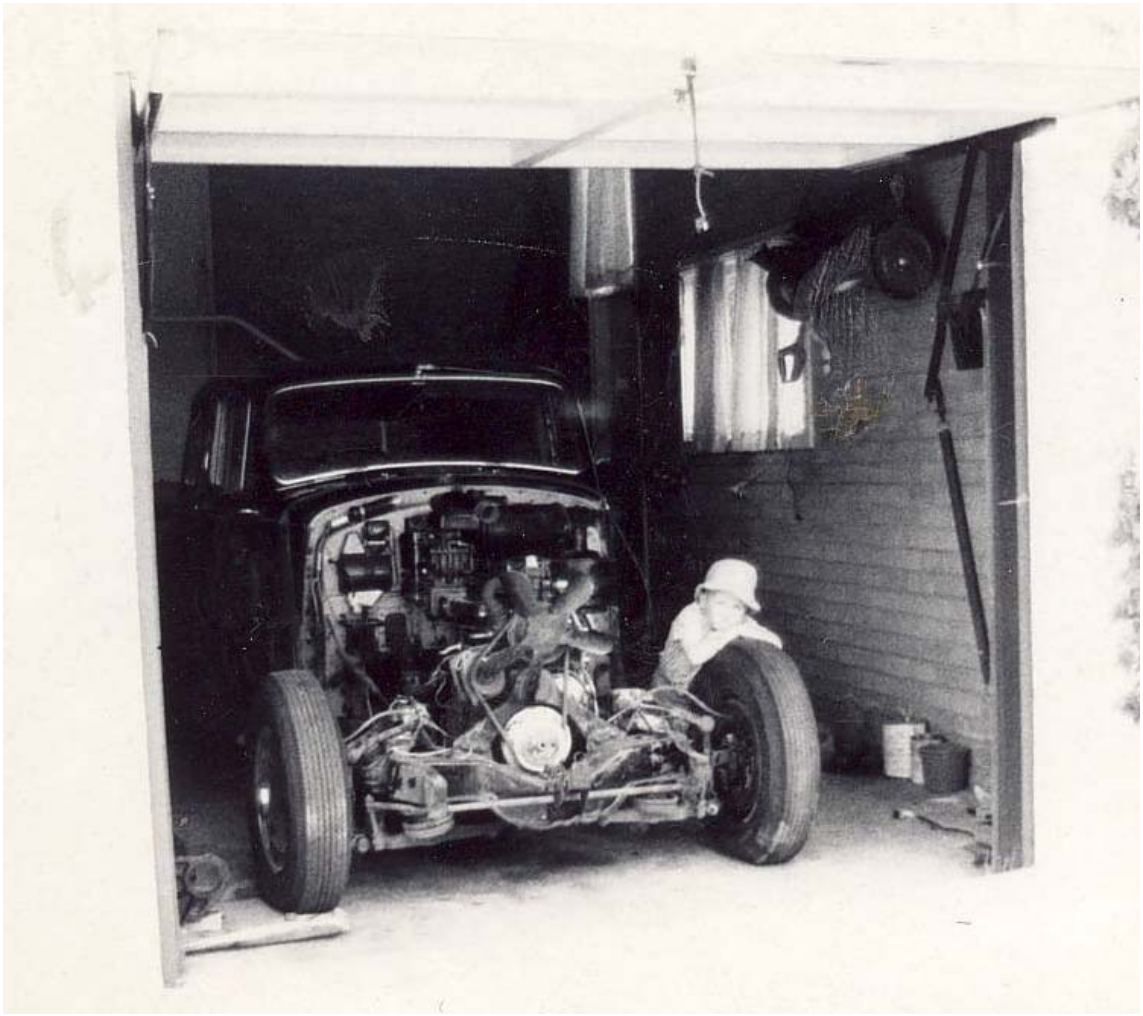
Hopefully you will not see a dirty pump body like the one below when you remove the casing. This is a result of not regularly changing the brake fluid in an RR363 car. What can be seen are the upper and lower 'O' rings which you will be replacing.



And here is the pump in section. The dark dots are the errant 'O' rings. There really is little to go wrong with these pumps other than they get clogged up through neglect.

WORKSHOP MANUALS

Be aware that through a concerted effort on the part of a number of enthusiasts, workshop manuals are being progressively scanned and the results placed on the Federal website. These are available to anybody – member or not in the hope that it may actually help save yet another car from destruction!



MEMORIES

This is where it all started SDB94 a 1951 Silver Dawn half stripped and then abandoned. Thirty years ago. The precocious lad draped over the front wheel is my son Simon who suffered neglect, starvation and abuse during the following years as the bucket of bolts was resurrected. Three owners followed and she disappeared.

But a lovely and thoughtful email sent by a friend of the new owner restored my faith in human nature!

The story is yet to be told!

VOYAGE AROUND A PHANTOM VI BOOT

There were reports of the smell of petrol in the rear compartment. Not an unusual complaint in any car but considering 36 years to brew up a leak I thought it must be a perished hose. The large one seen in the above picture is one of two. The actual filler tube is screwed to the body shell and the tank, is slung from the chassis. The latter area it will be appreciated is subject to a certain amount of movement given the weight of a fuel tank and the fact that it hangs out beyond the supporting rear axle. Certainly the body which is flexibly mounted moves relative to the chassis so a flexible joint between the filler tube and the tank is required. But the distance is significant so the Factory placed a bent tube which can be seen in the picture in the line and connected it with two large diameter rubber hoses. The latter by the way are perfectly standard hoses available from your local friendly hose man.

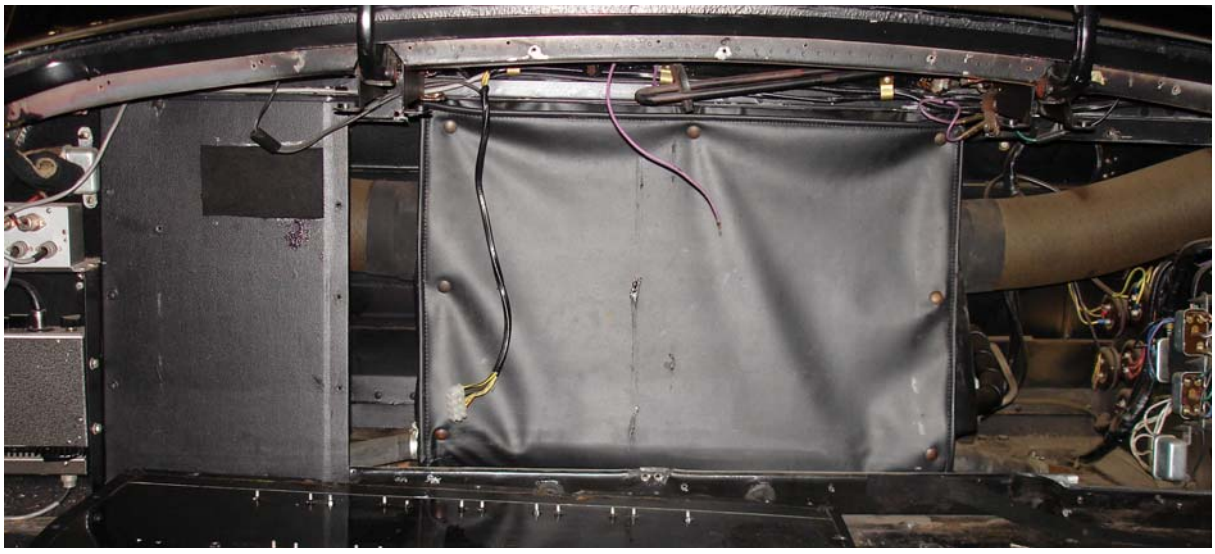
The other possible source of smell was the blow back tube. This is seen snaking up the outside of the main filler pipe and vents immediately below the filler cap inside the filler tube. At left is the hose on the top of the tank. This was a modification on early Clouds and later Phantoms to stop blow back when filling with high volume refuelling hoses. The modification was simple but time consuming. An 'L' shaped pipe was fastened into the top of the tank and the hose above was connected to it. Air trapped in the tank during a fast fill is then able to flow out right at the filling point

which is open to the atmosphere.

The blow back pipe is simple standard fuel hosing not even clamped at the tank end since there is absolutely no pressure. The hose lies across the top of the tank untethered and I wondered whether this might weep with wear and age!

The last connection can be seen in the picture above which is the breather – essential to allow air into the tank as it is emptied. The breather courses across the wide chassis rail immediately under the rear window, down the left hand chassis rail and sits with a smart shepherd's crook curve above the very end of the dumb iron! Maintenance here is to ensure that the end does not become blocked with mud. If it does the vacuum generated in the tank will stop the release of fuel!

On the left hand side of the boot behind a panel is the equipment for the internal communication between the front and rear compartment. This whole assembly could probably now be replaced by something the size of a cigarette packet.



And here is the rear boot air conditioning unit. The delivery pipes seen directed to either side of the boot connect with plenums delivering cooled air to ceiling ducts and controlled ducts at either side of the rear parcel shelf.

And at left is the maze of wiring and relays to control the rear seat weather. The whole lot could now probably Be handle by a small printed circuit!

UNTYING THE TIE ROD ENDS

These little but frighteningly vital joints relay your desires expressed at the rim of the steering wheel to the actual front wheels and hopefully the car will proceed in the direction you would so wish it! They consist of a hardened steel ball pressed tightly into a brass cup and the whole thing is squashed up into a forging about the size of a cigarette packet. To connect the joint to the steering arm the hardened ball is mounted on the end of a tapered pin. The latter which is threaded pokes through a matching tapered hole in the steering arm and the whole thing done up very firmly!

With time, corrosion, and continuous shock movement the pin becomes so firmly planted in the tapered hole it requires special methods to extricate it. But extricate it you must to do certain jobs on the suspension. The method surprisingly recommended in the Factory manuals involves placing a heavy object on one side of the taper and a heavy iron bar on the other and belting the end of the latter with a bloody big hammer. This can take up to three people which is difficult if you are working at home. Worse, a lot of operators simply bash the steering arm in this case, where the taper pin goes through. This does quite a bit of damage and must surely rank among the cruder procedures used in the profession.

You can buy a 'U' shaped wedge that can be driven between the steering arm and the joint. But as this has to ride over or under the grease retaining rubber boot protecting the joint, the latter is usually badly damaged in the process. The remaining method involves pushing the tapered pin out of the arm. The factory advocates specific 'pushers' which they make and supply but of course not to John Owner and service organisations are a little reluctant to hand them over! One solution I have used for many years is the scissor pusher seen in the picture. They are readily available and

universal in application. They are incredibly strong, the only thing likely to fail are your nerves. I have done one of these up so tightly I frightened myself. Turning to get a larger spanner, there was just one Hell of a bang and the whole thing came apart as I almost did!

At left: The guts of a Shadow II tie rod end. The tie rod with its housing is still on the car. Starting from the bottom is the base which screws into the housing. The spring sits in the base with the 'top hat' bit poked into the spring, next comes a tiny ball bearing which sits in a recess in the top hat. Then there is the ball pin itself in which can be seen a machined recess to match the ball bearing. All of this is screwed very tightly into the main housing when the actual frictional load can be checked by rotating the pin with a tension wrench. The tension can be raised or lowered by placing steel shims under the rim of the screwed base. It's all in the manual. Before poking the ball pin back into the steering arm the rubber protective boot has to be installed. The large loosely coiled spring sits on the top of the ball joint housing, the dished washer next sits on top of the spring then the boot and finally the circlip clamps the boot to the housing. No wonder they gave this design away!

The only limitation with the tool is getting it on squarely and the amount of 'gape' the tool can handle. If the distance the thing has to open is too wide there is not only a possibility of it slipping off backwards but also damaging the end of the pin. As far as thread damage is concerned try and loosen the nut on the pin until the face of the nut is level with the top of the pin. Then if there is room pop a small piece of brass in between the pusher arm and the nut. I apologise for the messy picture but I think you can see what I am preaching.

WARNING:- Whenever you are using a puller or pusher carefully consider where the piece being detached will go when it separates. I learnt this the hard and terrifying way. A friend brought his vintage Armstrong Siddeley over to do some work on the rear axle. It was necessary to remove the axle flange having got the brake drum off. It was held on by a huge nut which we managed to undo but there was the end of the axle nicely tapered and two keyways beautifully fitted between the flange and the axle shaft!

Quite simple says stupid me I have the puller that would shift the Sphinx so I rig up my three leg puller complete with a one inch thick base and an inch diameter turn screw. We tightened and tightened that puller finally using the trolley jack handle on the biggest break bar we had. We knocked off for a cuppa inside and half way through the first scone there was a bang that rivalled Krakatau and a dull thump. The whole thing had finally given away and the enormous energy stored there had propelled the flange and the puller straight out from the car. On the way it went clean through a half inch timber wall brace and a fibro wall and finally hit the brick wall of the house 20 feet away which was the thump we heard.

My mistake was removing the retaining nut, had it been left a little unscrewed there would have been a bang and the whole thing would have stayed in the garage. Had I been standing in front of the thing with no nut I probably would have lost an ankle!

At left:- Here is the tie rod housing into which all the gubbins screws. What you don't remove is the upper bronze cup into which the ball pin is forced. This can be seen through the central hole. If this has to be replaced it requires a press to remove it.

So having got the tie rod off consider opening up the assembly, cleaning out the muck and re-setting it probably replacing the rubber boot while you are about it. Sadly if you have an SZ car this will be denied you as expediency apparently dictated not only sealed tie rod ends but they in turn are integral with the tie rod itself! Getting them off however is just the same as the old ones.

FROM A UK HEAD

The following comes from a correspondent on the busy Federal site that was airing the problems of head warpage on the vee eight cars. The author styled BobUK is apparently a highly experienced mechanic who has a Shadow of his own. He has a most abbreviated style which I have edited where essential otherwise what you see is what we have all got!

Heda gaskets are sometimes coated in a sealant that looks like varnish. When the engine is running the heat of the engine and the clamping force on the head causes the sealant to activate and seal the head joint.

When a cylinder head warps it warps both sides. It does not get thicker and thinner. This means that when the rocker shaft is bolted down to a head that has been skimmed the rocker shaft bends a bit.
Because the rocker shaft does not turn, providing the warp was small then no problems will result.
Heads that have a camshaft in them or bolted to them (ohc) are a different matter and can cause the cam to break due to the bending forces of out-of-line cam bearings.

The Shadow has hydraulic cam followers. If the head is skimmed make sure that the followers are still operating in the design range. If the followers are out of range then shims must be fitted under the rocker pedestals to lift the rocker shaft up. Pat is absolutely correct. You must find out why the head gaskets blew in the first place. I always check the radiator carefully.

One test I do is to physically remove the radiator and doing a guestimate, hand weigh the radiator. If it feels heavy then it is a sure bet that it is clogged. Another test is to fill the rad with water and drain it into a bucket to see how much water capacity the rad has. Another is to pour boiling water in the rad and feel the rad with your hand to check for cold spots which means blockages.

I have had radiators that look good externally but when checked they have cold spots and feel overweight. If in any doubt get the rad recored.

The core is of the older gill type. The cores come in various sizes and depths and the reconditioners can cut another size core to fit the bottom and top tanks.

In the range of radiator sizes the Shadow rad is not that big and there will be a core that can be used. There is nothing special about the rad.

I have noticed that some have a misconception about what the thermostat does and how reliable they are. The stat is important because it also guides the coolant around the system. Without it the coolant is liable to go the shortest route through the bypass when it should not (engine hot).

Stats are very reliable and once a new one is fitted it will last for many years. To test a stat place in saucepan of water bring to a boil and observe the stat it should have opened before the water boiled if you have a thermometer it should start opening about 80 degrees and be fully opened at about 86 degrees.

I have found that stats either work or they don't if the stat opens in hot water then most likely it is opening at the correct temperature. Most modern stats fail safe and remain open (bypass closed)

To test a stat in situ (engine running and warm)feel the top and bottom hose if the top hose is cold then the stat is shut. The bottom hose should be colder than the top because the radiator should be drawing heat out of the water.

Infar-red thermometers are very useful; point and take a reading

Water pumps are simple machines and providing the bearings are not slack and quiet and they are not leaking and they are going round and the belt is not slipping then the pump must pump. That said I did once see a pump where the impellor fell off and it appeared ok but it didn't pump. had me going that one.

Also car water pumps are surprising powerful, not so much for pressure but the volume of water they can shift. I always suspect radiators when problems like this come up so do check the rad carefully. Also remember that the stat must be fitted.

🛠

NEVER PLAY LEAPFROG WITH A UNICORN

An old saying but my way of warning drivers to be aware of what is dangling under their car as well as watching out for the glossy paintwork! The picture is of the former sump on my Silver Spur. Forgetting that we were not in the 4WD I gently nosed down a track that had been built up with sand. That in turn had been well rained on but it was smooth the slope was negligible and the track was interesting. I stopped to point out something and when I went to move off there was a scraping noise much like a branch caught underneath. Given that there wasn't a likely looking branch in sight this simply demonstrates my optimism! The following morning there was a nice little oil slick running away from the car. Hope springs eternal as they say and I concluded the rear engine oil seal must have given up.

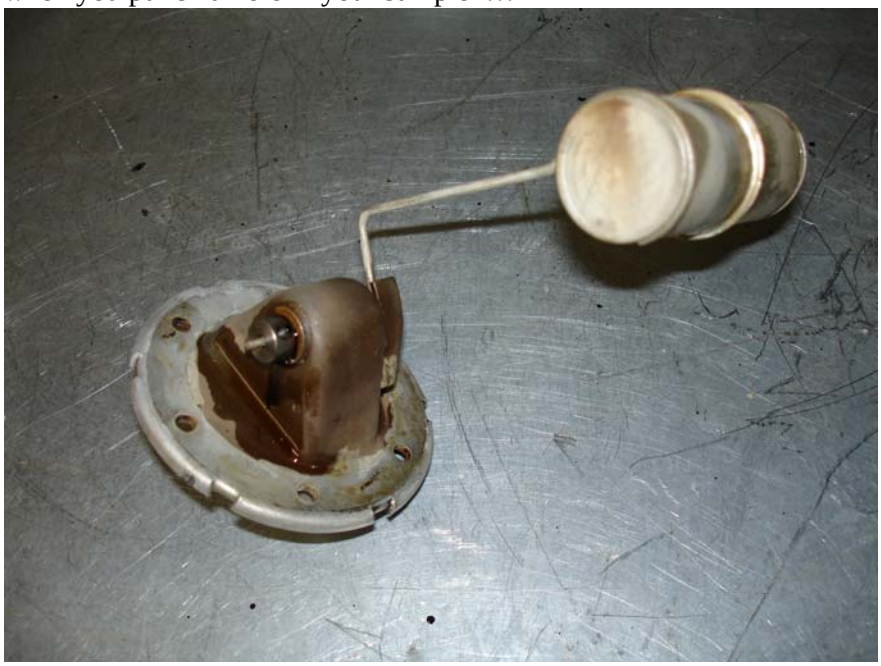
Eventually back in my own garage, I jacked the car up and was greeted with the above sight. The 'branch' I had run over was a rock under the sand. The wheels had sunk into the damp sand just enough for the sump to engage the rock and my driving off did the rest. One of my mentors said that sump casualties were almost common and what was more interesting was that drivers seldom realised that damage had been done.

One entirely preventable happening believe it or not is for the car to be lifted by placing the head of the jack under the lower part of the sump. The sump dents to the point where the sludge in the bottom is forced into the oil pump pick up strainer, forcing the muck into the filter but also reducing the access for the oil to be sucked into the pump intake! Somewhat serious.

Repairing the sump is apparently seldom practical and hopefully a replacement can be found from a wreck.

First step is to get the front of the car nice and high on stands under the front jacking pads under the front doors. Don't have the car too high or you will tire reaching for the various bits. The sign on the windscreen says sump drained in case someone wants to demonstrate how well the thing starts.

This should be a familiar sight, assuming you change your own oil filter. The three gadgets screwed into the filter pedestal need watching for leaks. The 'tin can' at the bottom is the variable rheostat that sends messages to the oil pressure gauge on the dashboard. The other two are standard switches, one turns the oil light on the other cuts out the fuel pump(s) if the oil pressure fails such as when you punch a hole in your sump eh!!!



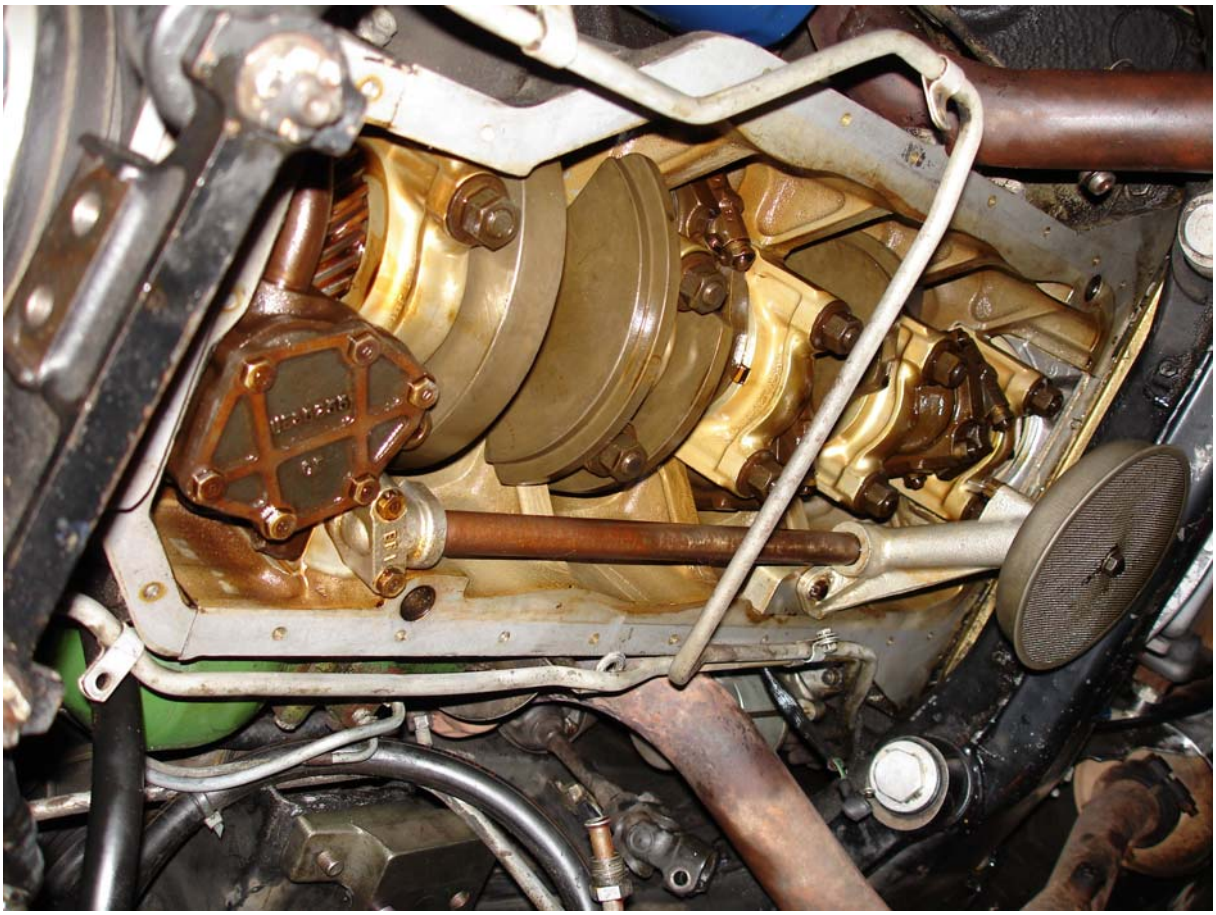
This is the float that bobs around in the sump to tell you what is the oil level. There is a new thin plastic sheet gasket supplied for the joint between the float assembly and the side of the sump which at last appears to have stopped the perpetual leak that has existed on all preceding cars. When you remove the retaining screws note that each one has a star washer and a very thick washer under the head. The thick washer goes against the level unit. Tighten the screws evenly and watch for distortion particularly if you are using a soft material gasket. This is because the older flanges are diecast and bend easily.

One of the more difficult tasks in this exercise is undoing the rear sump bolts. The designers carefully lined up the engine so that the rear row was just placed so that the row you see here was not quite accessible to anybody but ET! Worse still the bolts immediately above the rear cross member seen filling up the bottom the picture would even confound ET! The solution is to suspend the front of the engine from above and remove the front engine mounting including the handsome cross member bolted either side to the sub-frame. You can do the suspending with a gadget available from most auto supply houses. It consists of a steel cross member that sits over the front

of the engine with its legs sitting in the rain channels either side of the engine bay. A central very large threaded hook depends from it on which you hook a chain. The latter is passed around the front engine pulley and back to the hook. A large nut on the shank of the hook is tightened and lo, the engine lifts and lets

you remove the front engine mount.

Next step is to unbolt the rear engine mounts so that the now suspended motor can be slid about an inch forwards and backwards to get at the rear bolts. Using a small hand jack, the rear of the



engine can be lifted an inch or so clear of its mounts to get at the 'side' bolts over the cross member.

And isn't this a great pic! First of all I rejoiced that the engine was so clean. The oil pump seen at the left of the picture which is the front of the engine, sucks its oil with aid of the large pipe running along the side of the crankcase and through the pedestal complete with the wire mesh strainer. The latter of course sits in the 'deep' bit of sump to the rear of the power steering rack. Students of the engine will note that the late engines adopted a practice of 'cross bolting'. This involves placing a beam of metal across the sump at the lowest possible point, below the 'non-end' main bearings that is numbers 2, 3 and 4. This greatly reduces block 'flexing' and makes for a much more stable engine. Main bearings at either end of course are supported by the end castings.