TEE-ONE TOPICS

Issue 96 – December, 2012

Figure 1. A view of the castellated head of the ram piston screwed into the top of the rear spring mount after releasing the ram cylinder and pushing it up.

THE LABOURS OF HERCULES

There were 12 of them apparently which I looked up before writing this account. Hercules in my opinion had it easy as the expression is!

Recently there have been some exchanges on the Australian Club Forum http://au.rrforums.net lamenting the struggles experienced in releasing the hydraulic ram pistons used to level the rear end of Shadow cars, from the top of the rear coil spring mount.

A very long-standing friend with a mid-production Shadow finally coerced me into changing the rear shock dampers as the Factory loved to call them, because traversing any but the minutest surface irregularity in the car produced a thunderous crash. Some years ago I undertook to fit new shock absorbers as I call them, to the same car, but was defeated. Now I was to join a long line of amateur do-it-yourselfers who found that the seemingly simple job of unscrewing the hydraulic ram from the rear spring mount was impossible.

When the SY cars were first made it seems that some zealot in the design department assessed that the thread connecting the ram piston and the spring mount should be of fine pitch for reasons that as far as I can understand were known only to God and himself. The excellence of the fitting must have been impressive and much admired when, after some few years, the first rear shock absorbers were replaced. But thirty years later these screwed joints had almost invariably welded themselves together, never to be separated. Fortunately, by the time production had eased into the seventies, having survived receivership and the Californian pogrom on automotive emissions, the threads on the rams had been coarsened.

Figure 2. A better picture of the top of the spring mount, just protruding through the housing. Also shown is one of the ears (arrowed) used to stiffen the assembly. Here the 'L' shaped homemade tool has been bolted into place to catch the next ear.

The new threads made life easier for all concerned; even so 30 years later it usually took gross brute force to unscrew the rams. In Australia thank God we don't have the 'salt' problem. But we do have the ham fisted 'that will never come undone' operator and it is the product of these that would challenge my mythical hero Hercules. So it is back to my friend's car. He approached me again in an irritating sideways approach that hinted, given my great age (he is even older) for me to leave this planet, not having changed his car's shock absorbers may just not bode well when I got to the admissions desk if you follow me! I bit, enrolled at a nearby gymnasium, bought a glossary of new expletives and retired with the car to the privacy of my garage.

In the intervening years since I had attempted this task I had heard that the last resort was simply (?) cut the ram through and drop the spring mount on the floor! One of my closest gurus actually came over and undid a pair of rams (on a later car) by sheer forceful bashing, the implements not me!! He said that if that had failed heat was the next step.

Figure 3. The coup de grace. The shaping of the end of the crow bar is important as is the 're-profiling' of the castellation you are about to belt.

The procedure is quite simple. Exhaust the hydraulic leveling system, disconnect the inlet and return pipes from the top of the ram cylinder and undo the three bolts securing the ram cylinder to the rear suspension tower. The next step is to prise up the cylinder until it jams against the metal base of the parcel shelf above. This gives you less than an inch of space to unscrew the suspension ram piston from the spring mount.

Provision is made for gripping the piston by machined castellations around its neck which can be engaged with a 'C' spanner. Sometimes, with a long tube on the handle of the 'C' spanner the ram will unscrew. More likely you will finish up with a five foot jack handle slipped over the 'C' spanner hilt and two of you swinging on it.

The next occurrence is when making a particularly vicious lunge with your fellow pusher, something turns. The absolute optimist will at that point rush to break open the champagne. Unfortunately what was felt to move was the whole spring mount, jammed against the top of the spring housing well. Those readers who have gotten this far will have remembered that the new challenge is to stop the spring mount simply (?) rotating as you bash the suspension ram piston around in circles. The

friction, mind you between the spring mount and the under surface of the body is very considerable but unfortunately not enough to hold a seized piston head.

Initially, not wanting to damage the castellations on the piston, I heated the spring mount as much as I could to about 200 degrees centigrade with a hot air gun as I have a phobia about flame and petrol tanks. At the point when I thought I would asphyxiate from the fumes of roasted dirt and grease that had accumulated over the past 30 plus years in the spring housing, I hosed a container-full of that new freezing spray that is available, onto the hydraulic piston. No luck, even after doing this about three times.

Figure 4. Here is a home made 'jammer' to stop the spring mount rotating when you are trying to unscrew the piston. The damage to the surrounding bodywork can be seen albeit repairable.

The spring mount rotation was always there to varying degrees so I made up an 'L' shaped strip that was bolted to the top of the spring housing and abutted the 'ears' on the mount to stop it turning. By this time the bashing and 'C' spanner wrenching had clearly burred, nay, mangled the castellations. The fitted strip proved to be able to do the job of holding the mount. In setting up the strip, the spring mount had to be levered back across the opening to the far side of the body hole otherwise the 'ears' on the mount would simply skid past the strip.

By now it was clear that the force required to unscrew the piston was beyond the gripping powers of the 'C' spanner even when it was used on the undamaged castellations. I had tried using a chain wrench but not only was it most difficult to

thread around the castellations, but the grip, given the limited space promised to do even more damage.

To ‘bash’ (can’t think of a better word) the castellations requires some careful thought on the angle of strike and the shape of the attacking end. Various cold chisels were ground for the purpose. The biggest problem was getting one long enough since to get a decent swing with a hammer, (the basher) needed to be outside of the boot (trunk). To improve the ‘bite’ of the cold chisel, the shape of the accessible castellations were repaired with one of those marvelous gadgets marketed as a Dremel.

Figure 5 The damage to the castellations is regrettable but seemingly unavoidable. Filing is indicated in a more comfortable locale!

The coup de grace was executed when we were sure the spring mount was jammed to the rear of the opening and that the ‘L’ shaped wedge was secure and the castellation we were belting was nicely shaped to stop the ‘cold chisel’ slipping. I had given away the hot air gun treatment and resorted to flame. With fire extinguisher primed and very accessible the process was once more followed. I had also purchased a six foot long crow bar with the end suitably ground to engage the castellations. This was my ‘cold chisel’ and its driver was a 4 pound sledge hammer.

With the target area at bacon frying temperature, the crow bar perfectly wedged in the castellation and against the nearby housing strengthening web, I managed to unleash my most savage blows with the sledge hammer and on the fourth blow something moved. The piston had finally released its grip!!!

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STIFF BELLOWS

No, not the story about the arthritic bull but about a small rubber component you see every time you open the bonnet of your Shadow or adolescent Spirit. I refer to the concertina shaped rubber bellows mounted on the top of the engine one end of which connects to the throttle spindles of your carburetors. The idea is that the ‘speed control’ opens and shuts a valve on a vacuum line from the induction system

to the bellows which should be sealed. Sucking the air out of the bellows causes the latter to 'cave in' and in the process pulls the linkage to the carburetters, opening the throttles and all else being well the engine speed will increase. The speed control remembers how fast you wanted to go and keeps opening and shutting the vacuum tap to the bellows and all is right with the world.

The clever fellow who devised the system (I understand he was a lone manufacturer) fitted a large softish spring inside the bellows to dampen any sudden movement and this apart from the springs pulling the throttle levers shut is all the vacuum has to overcome to complete its job. The bellows, which among other users lists the Jaguar, is airtight, light and very flexible. But recently, remakes of the item have it seems not been very carefully supervised for performance or quality.

The rubber molding is too stiff. The end result is that the vacuum is not strong enough to overcome the extra resistance to its pull and the system barely works if at all! If any reader finds a source of softer bellows please let me know.

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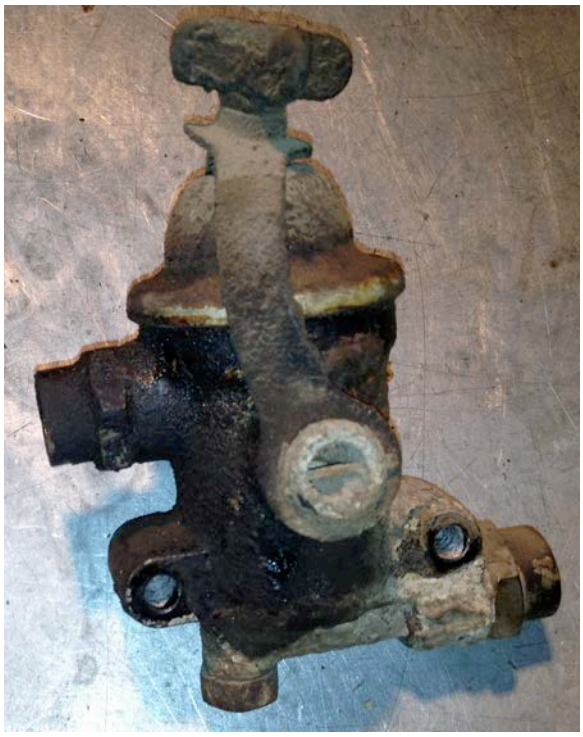
THE FORGOTTEN FILTER

By 1960 when this filter was made most manufacturers were happy to plant a dome of copper mesh over the diaphragm outlet of their fuel filters of perhaps rely on a tube of mesh through which to push their fuel through to the carburetter. It was a mere 15 years since the end of the war and while rationing had ceased for most Western countries, the fuel which did get through the bowsers had to run the gauntlets of rusting tanks and tankers, the sediments of pipes that had sat half empty for some years and overall the general product of a fuel handling system left a lot to be desired by today's standards.

There was and still is the continuing problem of water in fuel which practically can't be avoided, generating rust in the car's own tank. Water being more dense than petrol sinks to the bottom of the tank. The lowest point on our post-war tanks before they were shoved up to the front of the boot, was the protruberance into which the drain plug is screwed. If we had followed instructions and released the drain plug a few turns the water would have dribbled out and the tank would probably outlast the owner.

The filter pictured was used by the Factory on post-war cars up to the Cloud lll, the Shadow being fitted with bought in items. There was nothing wrong with the latter, they were much lighter, probably better filters and far more accessible. The latter feature was the one that prompts this article. As we all know this solid brass filter was bracketed onto the penultimate chassis cross member on all the post-war framed cars.



Can you believe the muck in this filter. It sat below the two beautifully made filter discs separated by the spacer seen with the discs. And above is a view of the very thoughtful drain plug, undoubtedly welded into the filter main housing.

For those that love these cars, the sight of a filter in this condition tends to upset the tear ducts. This particular example was from a car that had seen duty in a salt zone evidenced by the white powdered corrosion. While the body of the pump is cast brass the domed lid is alloy. The threaded strap with the turn screw is steel and what cannot be seen is a button that connects the screw to the lid to avoid borring a hole in it. Here the button was lost, a bit of wood jammed between the screw and the lid and the turn screw forced down. Unfortunately the wood probably slipped but the screwing continued hence the twisted strap!

Removal involves spreading absorbent material on the floor to soak up any spills, being quite aware of the significant list of cars that have been destroyed when careless mechanics have incinerated them and themselves on occasion, lifting the car so that you can move comfortably and using an enclosed trouble light that will not break if you drop it!

First release the union where the fuel pipe screws into the tank. Use good set spanners to hold one union while you release the other. Releasing this union

should prevent fuel siphoning from the tank. Next release the outlet pipe from the filter body, catching the dribbling fuel.

And here is the finished product. I didn't attempt to unscrew the cap screw as it was indeed seized. Instead the split pins that held the saddle strap to the body were removed and the strap sprung off the body. The gasket by the way is neoprene under the cap and remember when fitting new aluminium washers under the unions to first anneal them!

N.B. It is quite in order to take dinner guests under the rear of these cars when they are jacked up to show your restored filter!!

Do not attempt to drain the filter using the small screwed in plug in its base. The metal of the plug unless you have carefully maintained the car will have corroded and screwing the plug will demolish the thread.

Last, remove the two bolts with nuts and washers and remove the whole assembly. It remains to pull the thing to pieces clean it reassemble it and re-install it. Depending on the car you might like to do the right thing and clean the filters in the pumps and the carburetters while you are in such fine form!

ANNEALING ALUMINIUM WASHERS

It is so common to walk under a very nicely prepared RR or B and find a substantial drip hanging on the end of the drain plugs, particularly the engine sump plug since that has to withstand the whole steel pressing writhing about as the engine fires not to mention the considerable range of temperatures in which it has to operate. The reason for the leak can almost invariably be traced to the washer used under the head of the plug.

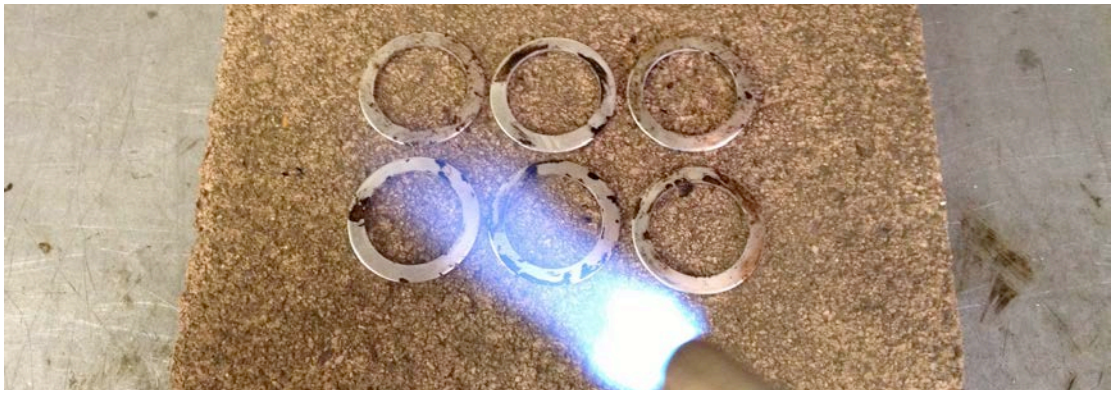
Many people have not heard of crush washers. They are simply aluminium washers that can be crushed under the head of a plug or union to form a good seal. The 'crushabilty' quality is correctly known as ductility, in turn meaning the quality to be deformed! Generally all metals are ductile but most need heat to change their

molecular structure. Rolls-Royce tend to use annealed aluminium washers to seal joints rather than copper or fibre.

You don't need to draw on the skills of the legendary Hollywood series NCIS to work out why anyone would be reduced to ruining a perfectly good drain plug with a cold chisel. The middle washer was probably the original and when the diff level was checked the washer was not replaced. I guess the plug leaked so the genius grabbed another old washer and fitted it as a backup. It probably still leaked so out comes the torque extension and the plug screwed up to about a high 'C'! The next inspection prompted the cold chisel. By now both washers are hardened again. The remaining pristine washer shown can be bought from any auto parts place is not annealed but this is something you can do yourself!

If you have tried, simply finding sources of aluminium washers is an achievement. Ask for annealed washers and you will witness a blank look. The colloquial term is 'crush washers' because that is what they do! If you find an old sump plug washer you will note how it is 'extra' flattened, distorted and often almost impossible to remove because it has squeezed itself around the thread of the plug or bolt. It is this distortion that provides the seal.

Be not daunted, you can anneal your own washers. Aluminium washers sized to suit our sump plugs are readily available. To anneal them you will need a brick, the washers a cake of soap and a gas flame. You can do several at a time. Simply get a



The last step having rubbed soap on the washers and placed them on a brick is to heat them gentl y and evenly and lo…. The soap turns black indicating that the aluminium has reached the correct temperature and if left to cool is now annealed and ready to use under your plug!

cake 🛠of soap and smear it on one side of the washer. Then heat with a gentle flame and evenly over all the surface and after a few minutes the soap smears will

quickly turn black. This means that the aluminium has been annealed. Further heating will as likely produce a blob of molten aluminium. Do not quench the washers but simply allow them to cool while you drink your tea and eat the fresh scones your wife/partner etc has prepared for you for morning/afternoon tea!

I hope this helps. If you miss out by half a point at the next concours, demand an inspection of the winner's sump plug; if there is a drip there you may well win eh!!! Further you may have great pleasure in checking the knowledge of the judge on the matter of annealing aluminium!

POSTSCRIPT. By now you will have Googled most of the guff I have set out above but do note that after having used your annealed washer and some time later pulled it out for the scheduled reason, you may not be aware that having squashed the item with your drain plug, the washer has lost its annealed properties! Some enthusiasts have discovered that reheating the squashed washer you can actually re-anneal it. Very true but I suggest this should only be done when there is a true paucity of washers! For our sump plugs that is very unlikely. The small problem in repeating the procedure is that each time, the washer gets squashed a bit more – not happy with that Mabel!!

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A WARNING FROM THE WINGS

The Australian Club web site Forum attracts contributors and enquirers from literally around the world. Fortunately it has almost all been in English. Advice given is clearly understood to be governed by all the caveats most interested legal experts can think of, so if you accept proffered advice of running your car on molasses – be it on your own head (the advice that is, not the molasses).

But a gem popped in from one of our revered advisers – a professional in his own right, which bears repeating.

> *"It is important to not let the fuel tank drop below 1/4 on Spirit based cars because they are prone to sucking air when cornering uphill or accelerating. This causes the pump to cavitate and will quickly ruin even a brand new pump . The pump uses fuel to cool and lubricate itself."*

I have to claim that this advice has appeared before on these pages and in another place but I still get in cars and note fuel warning lights on. This doesn't really matter with a carbureted car but the pumps for fuel injected cars are the ones that are referred to above. And the advice applies to all fuel injected cars. Yet I have never seen the warning in handbooks. Perhaps the sale and fitting of new pumps is extra profitable.

Earlier carbureted Spirits dispensed with the good old thumping diaphragmed pumps under the driver in favour of a vaned rotary pump near the rear wheel. Unlike the fuel injected pump the motor is sealed in its own little dry world. The pump proper however, which is basically an impeller in a chamber with the vanes actually running on the chamber's surface does use the fuel as a lubricant. Running it dry however would also seem to be a hazardous adventure.

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The brake fluid reservoir along with so many bits of the Shadow had numerous iterations to overcome small problems and to minimize engineering effort. It is not necessary to remove the unit to clean it. The first obvious thing to do is exhaust the brake spheres by doing an energetic rendition of the 101 pumps until the warning lights come on. If you don't do this, as the spheres 'naturally' leak pressure the lost fluid returns to the reservoir. You will siphon out the contents and dry them cleaning out any muck and half an hour later there is a half inch of fluid to greet you.

A BARRELL OF FUN

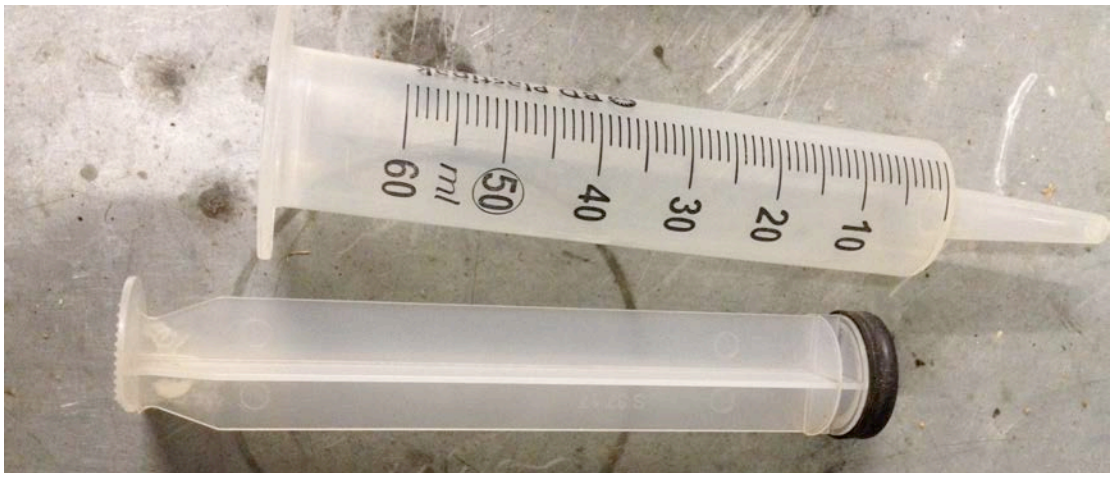
There are two sludge buckets on your Silver Shadow, the sump and the hydraulic reservoir. The sump somehow seems to attract owners sufficiently for them to periodically change the oil and filter. But the reservoir seen above often only receives attention when the lights start ablinkin!

I do have some pictures of opened units but haven't included them in deference to your alimentary system and I also remember that this would have to be the ninth plea I have made to keep reservoirs clean. They are an interesting gadget to get dirty since they are fitted with a commodious filter for general filling and more line filters hopefully to stop muck getting into the more important gubbins.

The brake fluid specified for the reservoir is made by Castrol for Rolls-Royce or now Bentley Motors and labeled RR363. The composition is more guarded than the distillery specification for my favourite single malt. When the car first arrived in showrooms it used a standard high grade fluid but, the owner speculators believe that concerns were had for the hydraulic pumps sitting on top of the engine and jumping up and down every time the engine rotated. The concern was for lubrication since the only source here is the brake fluid.

So an additive was found, inserted and we were all carefully warned that RR363 was the only fluid to use to save your pumps. The secret fluid allegedly is a form of

castor oil of which there are several. Our fellow sufferers, the drivers of the legendry Citröen have been experimenting for years and reports abound as to their success. Being a less adventurous mob we tend to do as we are told and RR363 it is Sir!!!



Having got inside the vessel and repressed the gag relex, if you don't have one of those large garage syringes on hand whip up to your local chemist and by these which are simply described as 'syringes' and are a couple of bucks each. Usually you can only use them once since the rubber plunger takes a quick taste of the product you are extracting and after a while swells up and dies.

Anyway whatever you put in that tank the prime requirement is to observe some basic hygiene! Unfortunately due to the fact that any brake fluid is hygroscopic meaning that it absorbs water from the atmosphere it seems that you behind the eight ball to start with! Providing you don't leave your bottles of top up fluid lying around open to the air and always replace the filler caps on the reservoirs promptly, that is as much as you can do for the water absorption problem.

STOP FOR BREATH

Unfortunately the generic term 'brake fluid' has always referred to the stuff you pour in the reservoir for the brakes!!! In the late 70's the Factory trialled the use of Mineral Oil in a new braking system for the then model Corniche. In 1980 the use of mineral oil or LHM became standard from production of the Silver spirit and derivatives. This later oil is manufactured from mineral oil whereas 'brake fluid' or RR363 as we call it, is produced synthetically. THE TWO FLUIDS ARE TOTALLY INCOMPATIBLE AND IMMISCIBLE. Owners of early Spirits will notice that the reservoirs for the brakes have wired on, simple snap on lids. The wire was there for a purpose, mainly to stop well-meaning mechanics clipping the wire and pouring in some polyglycol brake fluid. This stuff attacks the specific 'rubber' used for mineral oil systems and the next scene is a completely inoperative set of brakes. Later cars have an ingenious method of getting the fluid into the reservoir which hopefully avoids this catastrophe!

The woven metal stainless steel mesh must surely protect the system, but still the muck gets in. The rubber strip seen here was an afterthought probably prompted by drivers' experiences in San Fransisco. As most would know quite often in that town when you manage to find a parking spot, the hill is so steep you find you are looking up under the skirts etc of celestial beings! With the car at that sort of angle fluid at either end of the reservoir is going to flow over the top of the divider and overfill the other compartment. The hunk of rubber slows this down. If you don't have one in your car make one and fit it. The gaskets were either 'rubber' or cork, both seem to work OK.

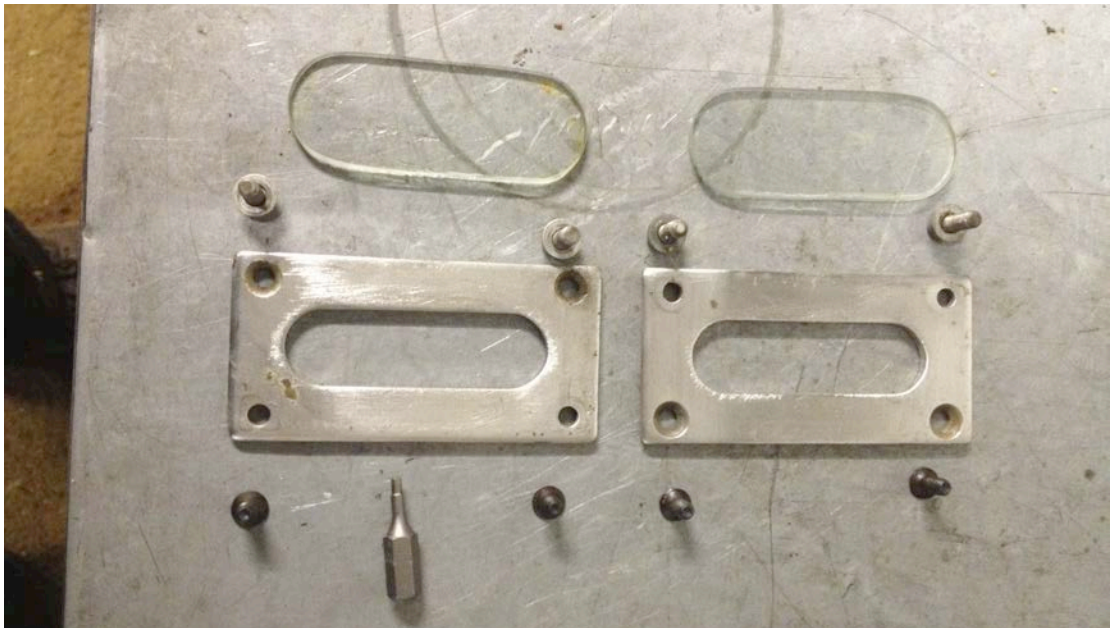
One thing owners of prestige cars do not like is a series of flashing lights on the dash board. Given the best part of 2 litres of brake fluid sloshes around in the two compartments the level floats pointed out here by a screwdriver are going to be a major distraction on a rough road – hence the baffles – next bits to come out!

Where were we? Ah yes dirty brake fluid. Apart from water in the brake fluid which is not visually apparent and needs to be tested with special equipment, dirt or better still foreign material gets into the fluid and eventually lodges in the reservoir. The material I suspect comes from the breakdown of the myriad of rubber brake hoses and the various rubber components in the system. Fluid ingress in the Shadow is particularly bad given that in the reservoir you

OK, baffles and floats are out and muck removed. I think the previous cleaner used a cold chisel – perhaps he had to! The three intakes can be seen here the front compartment on the left needs only one but the backl compartment has a separate outlet for the master cylinder (up until about '76)The remaining holes are for the return lines from the brakes, suspension and pumps. The two prongs are the reed switches to light the warning light in the event of the fluid dropping too low. To remove a filter for cleaning requires a 1" spanner either tube or set. You can make one up for the job.

have a broad surface of fluid exposed to the air. So at the very least you should open and clean out the reservoir every 2 years. This does not require removal of the unit nor the bleeding of the brakes.

And here are the floats that slide up and down on the reed switches to alert you to low fluid. The dark section seen here at the top of the holes are the annular magnets. Being magnets they pick up muck on their way and need to be cleaned before reassembly,



Here are the bits to clean for the windows to actually see how much fluid is actually in the reservoir. The glass windows are still readily available if you break one and at the bottom left is the one tool you should have – an Allen key that can be chucked in your socket set. The actual hexagonal key at the end is 5/64" wide. You may get away with a common Allen Key but they are usually softer in composition and not only slip in the hexagonal socket but can damage the socket itself. The row of countersunk 3BA socket head screws fit in the countersunk holes seen at the top of the retaining frames for the glass. These screws seem to be a special so don't damage or lose them. The other retaining screws are 3BA cheese head with washers and are still readily available.

Don't even contemplate NOT replacing the 'O' rings they are available from any engineering shop supplier. Note also the application of antiseize grease so that the next poor bastard who has to take the thing apart won't have the trouble you may have had!

Hopefully you will be able to get the top countersunk screw undone without drama. If, as often happens the bottom one is resistant, try swiveling the whole frame to unscrew the screw. The advantage here is that the screw is probably not only glued in its thread but also on the sloping sides of the countersink head!!

While you have the reservoir open check that the reed switch warning of low fluid works. Different cars have different lights. Turn the ignition on with one of the floats sitting on the switch at the bottom and slide the float up noting when the light extinguishes – all with the ignition on of course. If no light check that the spade connector with its wire has not been snapped off underneath!