

# TEE-ONE TOPICS

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## A LIFE SAVING SWITCH



On Silver Shadows these are not very obvious since they are screwed into the accumulators located under the exhaust manifolds. Their function is simply to turn on the lights on your dashboard when the pressure in the

accumulators drops below an acceptable level. The switches were used right up to the end of production but those used on Silver Spirits differed slightly but most importantly, used different oil seals to cope with the change from RR363 brake fluid.

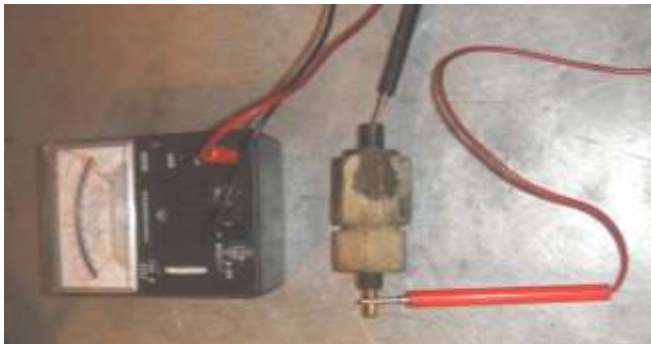
The lights on the dashboard are wired to the switches' brass terminals. If the circuit can find an earth through the switch, current will flow and the lamps on the dash board will light. The primary test will be the little button the dash board which when pushed will illuminate the pressure switch lights. All this establishes is that the light globes behind the pretty glass lenses are working. If the lights come on with the button but are not coming on with low pressure after you have pumped the system down with the brake pedal, you should first check the wiring to the pressure switches. This requires two people unless you are a Martian with stalked eyes. With the ignition switched on pull one of the wires off the switch terminal on one of the accumulators and earth it. If the light comes on, on the dash board the wiring is OK.



At left is one way of holding the switch while undoing it since the two pieces of the body are usually very tight. The socket is held by a short extension piece which is clamped in a vice.

The brass terminal on top connects to the base of the switch and thus to earth when the switch is not under hydraulic pressure be it either RR363 or LHM. The hydraulic pressure forces its way into the screwed end of the switch, pushes against a diaphragm which in turn lifts a contact disc and breaks the circuit to earth. If the above tests are negative you have a faulty pressure switch. Take it out after you exhaust the pressure.

Give it a good clean and you should have something resembling the picture below. The switch can now be dismantled. You will need an ohmmeter to test conductivity.



At left, this is the fundamental test you do before pulling the switch to pieces. The ohm meter is connected to the brass terminal and the switch base. The meter should show a clear circuit of negligible resistance. The test at left if you have been plagued with no warning lights will usually show an open circuit.

If you have the facilities to pressurise the switch with nitrogen the same test will show at what pressure the switch opens and breaks the circuit.



1      2      3      4      5      6      7      8      9      10

Above, here is the guts of the switch nicely cleaned out and lined up for a photograph. From the left:-

1. The switch base which screws into the accumulator and houses the rest of the gubbins.
2. The rubber diaphragm against which the hydraulic fluid pushes.
3. The contact plunger which the diaphragm forces through the hole in the brass holder to the immediate right of it.
4. The diaphragm holder.
5. The spring.
6. The contact disc which is lifted by the plunger.
7. The brass terminal.
8. The stepped fibre ferrule that insulates the terminal from the casing.
9. The fibre sleeve that insulates the spring from the casing.
10. The base of the switch.

At far left is the diaphragm (2) inserted in the holder (4) with the plunger (3) beneath. This is the end that faces the fluid.



At right, the other side of the holder (4) and inserted in the switch base (1). Note that the plunger (3) seen in the middle of the holder is non-conductive.





Here we have the other end of the switch with the brass terminal (7), its stepped insulator (8), the spring (5) and the contact disc (6)

When the two halves of the switch are screwed together the recessed contact disc (5) is pressed down hard on the brass seal holder (4) by the spring (5) the other end of which is jammed up hard against the bottom of the brass terminal (7).

The circuit now is through the brass terminal (7) down the spring (5) through the contact disc (6) and the brass seal holder (4) which is jammed onto the switch base that screws into the accumulator. The earth connection is made and the light glows on the dashboard.

When the engine is started the pressure builds in the accumulators and the hydraulic fluid enters the pressure switch through the base (1) and pushes the rubber diaphragm (2).

Eventually it pushes hard enough to move the plunger (3) further through the hole in the seal holder until it lifts the contact disc off the seal holder. This breaks the circuit and the light goes out! The usual problem with a switch not contacting is corrosion between the recessed contact disc and the brass seal holder. The final test is to ensure that when the switch is not pressurised a clear circuit through it is present.



## LEAKING PRESSURE SWITCHES – SZ CARS



For some reason mineral oil cars tend to demolish their rubber components after a few years. The first victims seem to be the front brake calipers followed by the rear. But lately the pressure switches which also have 'rubber' seals in them are starting to leak. The above picture is of the warning light switches located on this '87 Spirit under the wiper mechanism. The leak however runs over the top of the wheel arch and into the rat trap area, major leaks from which are usually nerve racking. These switches are almost identical and replacement bits as for the RR363 items are readily available. Switches for RR363 and mineral oil are NOT interchangeable.





## A COUPLE OF VITAL HOSES

Well yes all hydraulic hoses are vital but these on your Shadow are more vital than any of the others. For those that came in from croquet the larger lump of steel above is the sub frame that bolts under the front of the car and carries your engine, the front suspension and front brakes. The area you are looking at is the right rear corner and the steel pipes connect to the calipers surrounding the brake rotors.

The large circular mount, one of four, one for each corner of the frame, allows the latter to move with the antics of the suspension and the lurching of the motor, thereby insulating the body of the car from vibration and some noise. The four steel pipes, screw into two, three way junction blocks, one for system one and the other for system two. They both need to connect to the two distribution valves in the rattrap under the driver's side floor. Because the frame and junction blocks are moving relative to each other, the designers figured that rigid steel pipes would be candidates for eventual fracture, hence the flexible pipes seen above.

Unlike other 'rubber' pipes around the system, these are under full accumulator pressure all the time. If one blows, one system is off the air, if two blow maybe you will be likewise! Changing them is best done by ET but if he is not around you will find yourself making some interesting spanners to get at the unions.

Spirit owners can rejoice. Although the sub frame is the same the flexible hoses were deleted and replaced with rigid tubes with enough flex to withstand the vibration.





## **NIPPLE ABUSE**

Along with many other fittings that we take for granted, these nipples are required to stand at least 3000psi of hydraulic fluids, they must not leak either fluid out or air in and stand up to ham fisted operators undoing and doing them up a number of times in the life of a car.

To achieve a seal the end of the brake pipe is flared in the shape of a bell as can be seen in the centre example. The nipple in this case is brand new. Tightening the nipple involves forcing the bell shape into a matching seat in the receiving unit be it a wheel cylinder, caliper or whatever. The tightening is firm, sufficient to stop leakage and no more.

The nipple on the left has been tightened excessively and the 'mouth of the nipple is just starting to spread. The nipple on the right has been grossly over tightened, spreading the mouth to the extent that it is often difficult to get the nipple past the thread of the receiving unit.



## **HARD STARTING AFTER A LONG STAND**

Earlier this year in Issue 90/1217, I waffled on about hydraulic valve lifters. Like everything they eventually wear out or get blocked usually resulting in a quite audible 'clack'. But amazingly they do soldier on for incredible mileages before replacement becomes pressing.

What indications are there that lifters are due for attention? Cold starts mean the engine has been sitting for quite a few hours during which the lifters have been under pressure from the valve springs and if worn their contents gradually return to the sump. When the engine starts these lifters have to be refilled and while that is going on the clearances in the valve trains are anybody's guess. So, a cold start and listen to a very noisy set of tappets and you can be pretty sure the lifters are getting ready for lifter heaven!

But if as many of our cars do, the engine has not turned one revolution in weeks and starting it becomes a guessing game as to whether it will be the battery or starter that will give up before the engine runs, then the moment for replacement will have arrived. The reason for the hard starting is that the lifters over a long period have all but emptied giving barely a nudge to the push rods operating the valves. The critical requirement is for the inlet valves to open sufficiently to allow the piston to suck in some fuel and air to compress! If the valve barely opens there is little suck, little fuel and no welcome roar for your pride and joy.

The really convincing diagnosis is to place your hand over the carburetor intake, having removed the elephant's trunk, while you crank the engine. If there is little or no suction you have your diagnosis. If you just have to have the old girl going before you pull her to pieces try holding the choke lever down firmly which should contain any vestiges of suction in the system and will often allow the engine to start. Once it is going the lifters fill up and normalcy is restored.

The repair which is not rocket science involves removing the whole induction system, the tappet covers, rocker shafts and arms, the centre valley cover and pulling the old lifters out. Unless you are in the lottery winner class, use after market lifters, they are quite satisfactory.



## A LITTLE HOME CARE

Last month I locked the gates pulled the phone off the hook and swore that I would overhaul the suspension on my Spur which I have had for some seven years. All that time I have cringed as I went over a bump that left one or both of the front wheels in mid air. Before gravity dragged the whole car back to terra firma, the 1400 lb front spring slammed



the lower and upper wishbones down to their limit and there was then a distinct hollow sound approximating to 'BOCK'. The noise was not unlike that of worn telescopic shock absorbers but I eliminated that diagnosis by their replacement soon after I got the car.

Many owners do not realise that the shock absorber or shock damper in Roycean, actually acts as a rebound stop for the front suspension. This explains why the bushes on the top plate and indeed the top plate itself take such a hammering and wear appropriately.

So the only solution to the bocking was to pull the whole suspension out and examine each bit. It also allowed me to look at items pre-packed with Crewe grease during production and which can wear seriously. One of these is pictured on the previous page. This is the lower ball joint on which the whole car sits and allows the front wheels to swivel.



And this is the joint in pieces. The Shadow and Spirit used 'plastic' very slippery cones and cups seen here for the ball of the joint to turn in. With liberal greasing there is little friction and little wear.

Both the cup and the upper seat (it's fitted in the top cover) have four axial grooves cut in them to help distribute the grease. They also give some idea of the extent of wear.

Below is the cleaned up and greased lower ball joint installed. The bright shiny cap which holds the whole lot together has shims between it and the main housing. These are removed selectively to tighten the grip on the ball. The tension should be such that you can



just knock the ball pin sideways with the ball of your hand without screaming in agony.

My 'cups and balls were in great condition albeit a little loose. Dropping a shim out brought them back to spec! One casualty however was the rubber boot which was nicely sliced radially and would have let road muck in if not replaced.

One of the worst jobs on these suspensions is getting the wheel yokes that connect the top suspension arms to the bottom suspension arms, to release their grip on the taper of the ball joints. The manual suggests using a suitable puller which they are happy to supply.



These are difficult to position and awkward to tighten. The solution is fairly simple. Undo



the retaining nuts about 3/16" obviously with the car on stands and the wheel unsupported. The pictures show the bottom yoke bearing above and the upper yoke bearing below. All that remains is to use a large brass drift and a brickies hammer to belt the yoke. If you find a serious attack of bursitis coming on, stop hammering and apply a little heat then a couple of bangs.

Having removed the springs which we have addressed previously, the yoke nuts can be removed and the assembly

lifted off. When the spring is about to be removed be sure to support the lower suspension arms unless as in this case you have disconnected the brake lines. With the suspension at full droop without the limitation of the shock absorber, the assembly will hang on the brake line which is not good for them or yourself in the long run.



The first wheel I tackled (the right one) I simply (?) disconnected the steering arm and the brake lines. Having undone the ball joints I lifted the whole assembly and carried it to the bench, then retired to my cot to get over the strain. The assembly of rotor, two calipers and yoke is very heavy. Sense prevailed for the left side and I dismantled all the detachables before lifting!



silentbloc camber bush. The bright metal on the arm is where the arm has been able to move back and rub on the mount.

Finally I dragged out the upper suspension arm and found the source of the bocking – the



The camber bush had to be pressed out and the new one pressed in. This time I had George my machinist mentor to make me an arbor and support sleeve to handle the very considerable force needed to do the job.



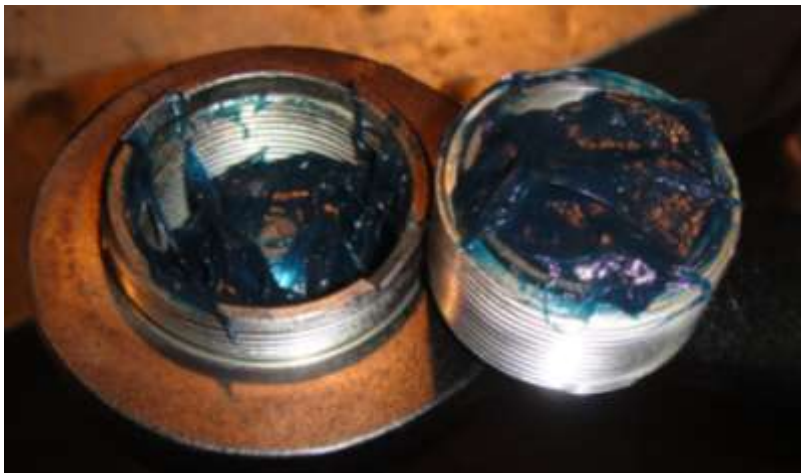
And here we have Madam Lash, as I like to call my chain wrench, entwined about the retaining collar securing the top ball joint bearing. Having removed the retaining ring above I realised that it was not really necessary unless you need to replace the bearing housing itself. Anyway it made cleaning the whole thing easier to clean and allowed fitting of a thick bastard in the slot of the adjusting cap.



Retaining ring off, the rubber boot can be left in place if it's in good condition. Note the slots machined in the top of the bearing casing. The slots in the housing are provided to allow the adjusting cap lip to be peened at these points to lock it in place.



Here is the whole gubbins laid out. The adjusting cap is on the right, the friction cones are much slimmer than the lower ball joint items and the small Belleville washer sits on the top cone to help keep its shape. The slot in the adjusting cone is clearer here. My earlier reference to the product of an illicit liaison by name, applied to a bastard file. The end of a large thick example of one of these and a stout adjusting spanner are ideal for tightening down that cap.



Here the bits have been refitted with lots of wheel bearing grease and the cap is ready to be screwed down and adjusted.

The bits for these bearings are not available from the Factory – one buys the whole assembly. All the bits however are available after market.



This was a nasty surprise. When I bought the car the supplier remarked that they had to fiddle with one of the front wheel bearings but it was 'all OK'!!!!!!!!!!!!!! Like the trusting idiot that I am I had not bothered to check the result of their 'fiddling'. When I pulled the front hub off this was what greeted me. Had a bit of that cage got jammed in the rollers, I may well have departed



prematurely for that great garage in the sky! The outer race on the front wheels is relatively small compared with its predecessors in the Clouds so it is worthwhile keeping a watchful eye on their condition.

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### **POSTSCRIPT**

These strange looking links you will recognize as

connecting the anti-roll bar or 'stabiliser' in Roycean, to the lower suspension arms. The Spirits have the joints set off by 90°, the Shadows are parallel. They are available after market and are fitted, as can be seen, on tapered pins and require a tie rod end splitter to part them from their mount. That they are past their prime can be seen here where the rubber starts 'oozing' out or separating from the pin and/or housing.

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### **POWER STEERING HIGH PRESSURE HOSES**



All Shadow I's (sic) still functioning will have had their high pressure hose from the back of the power steering pump to the top of the steering box replaced at some time. Some

owners find that the second hose which they had made at their local hose shop, didn't last as long as the first one. The reason for this is pictured above.

If you follow the route this hose takes and note the relative angles between the inlet and outlet fixed pipes, you will appreciate that the latter is quite critical. The above pipe's maker made a fair guess at the angle and assumed that any error could be overcome by just twisting the hose a bit. Hoses like these do not like twisting.



So here is the solution, the lower hose has been made up but the end into the box has been modified as an attachment. The latter is made up loose and the hose installed. The end nipples are nipped up, the hose support bracket fitted and last of all after assuring yourself that the hose is perfectly relaxed, the modified connection to the hose at the box end is tightened!

