

# TEE-ONETOPICS

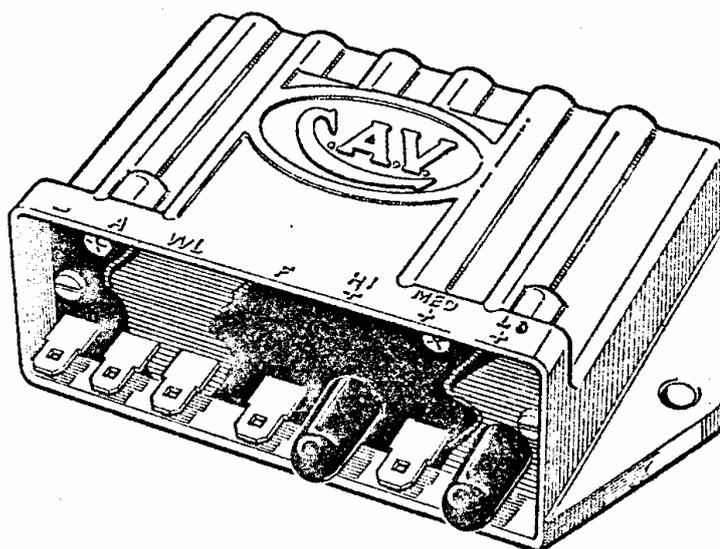
Number 28 September 2003

## TRANSISTORISED BENTLEYS

Warwick Grigg

Recently I had the starter motor of my Wraith II overhauled. What concerned me most was the discovery of severe embrittlement of the plastic insulation of the external wiring connected to the starter motor, particularly where that wiring passed (by arguably poor design) very close to the engine block and suffered excess heat. The deterioration was so severe that there was no responsible option other than replacement of the degraded wiring, to prevent a possible serious short circuit.

Not every electrical circuit of modern Rolls-Royce & Bentley cars is fuse protected: for Shadow II's and derivatives, all battery power to all circuits other than the starter passes from one of the starter terminals along an unfused heavy duty battery positive cable. If this cable were to short against the engine block or other earthed structure, a major electrical fire would probably result, with destruction of the car a likely possibility.



This is the unit that Warwick seeks to repair. Seen on Shadows on the right side of the bulk head, it migrated to the left hand side of the trunk behind the trim. The unit regulates alternator field current which controls the output voltage.

Probably the greatest and most influential physical invention of the last century was the transistor. Invented in 1948 it had a profound effect upon modern life. Without it there would be no modern communications, computers (certainly no PCs), no mobile phones, VCRs, DVD players, digital cameras, life supporting and enhancing electronic medical equipment and much else that characterises and enriches modern life (rather a lot are used by the military too). Transistors are remarkably reliable devices, certainly far more reliable than the radio-type valves which they superseded which explains their widespread use.

The most obvious external difference to Australian viewers between Shadows and Shadow II's was the replacement of chrome bumpers with those covered with black plastic. However a far more significant transition took place 'under the skin'. Shadows were fitted with a transistorised radio/Hi-Fi system but as far as I am aware none of the essential systems of the model were transistorised. Things changed with the Shadow II. A Lucas Opus transistorised ignition system

was fitted, a transistorised voltage regulator was fitted and a then state of the art climate control with transistorised circuits was fitted.

Transistors are highly reliable but not totally reliable, exemplified by my Wraith II. The car's ignition system and voltage regulator suffered intermittent faults, almost certainly due to faulty power transistors. Fortunately, as well as spare original modules, reliable alternative replacements of these modules are available.



As macabre as this may seem, it is interesting to see how the products of the old Factory stand up to a good biff. This picture was taken from a web site that specialises in collecting such pictures all related to exotic cars. This sad Spirit or Spur apparently did an end for ender and even with passive restraints I think the occupants would have been lucky to survive.

Simply replacing modules is the quickest and easiest fix (and quite reasonable in cost), however one day I may get around to repair of the original equipment circuits. If I can identify suitable replacements for 25 year old transistors (not an easy task) this is feasible. Probable cost? About \$4 for two power transistors!

Current luxury cars have electronic control of a seemingly myriad of functions and achieve this through the use of enormous numbers of transistors in the form of integrated circuits. I have heard it quoted that a 7 series BMW contains more transistors than were used in the entire electronic hardware of the Apollo space programme. I would not be surprised if the new Phantom contains of the order of millions of transistors (and the average Lexus several times that). However I'll be happy if I can return my Wraith II to original electronic specification (if I can locate two suitable power transistors).

Postscript. Since drafting the above, I have obtained a replacement voltage regulator for the original CAV 440 module. I understand several replacements for the CAV 440 are available, however it is most important to ensure that a correct 12 volt regulator is used, as 24 volt replacement units can be, and sometimes are, mistakenly supplied. Use of a 24 volt regulator will quickly destroy a 12 volt battery. I have also found a suitable power transistor to repair the original module. Cost of transistor: \$1-75 (an original CAV 440 regulator costs about \$350; time to repair: about ten minutes with screwdriver, pliers and soldering iron. A test drive, noting the ammeter reading, showed that the repaired regulator appeared to be functioning normally. The symptom of a faulty regulator is an intermittent wild full scale flickering of the ammeter, which can be diagnosed by an experienced auto electrician as due to a faulty transistor in the regulator. Should you effect this repair I would follow this up with a check by your favourite auto electrician. By the way the factory workshop manual states that the CAV 440 regulator is not repairable.



# TRANSMISSION TRAUMA

Most of us pale at the thought of transmission trouble – particularly when the unit is an automatic. Today, transmissions are so well designed and built they seldom give trouble. The older units, however, while reliable do not perform so well in the longevity stakes. The first automatic used by Rolls-Royce, the General Motors designed Hydramatic originally conceived in the early thirties was a great old warhorse and in other applications did its job and quietly got lost in the scrap yards. But Rolls-Royces tend to be preserved along with all their bits and today we are trying to keep four speed units on the road that this year are fifty years old!



Oh for a hoist and high-lift transmission jack.. This and the following pictures are of a 1987 installation with a catalytic exhaust system. Note the torque converter sitting on the front. This needs to be lifted off before it falls off.

The Factory had a brief dalliance with transmission design with the four speed Shadow when it was first produced but finally adopted the three speed General Motors GM400 unit. With a few modifications this very reliable workhorse kept their cars moving until the early nineties when they fitted a new GM four speed box which included an overdrive. The GM400 however has long been dispensed with in the automotive world and the earliest examples are approaching forty years of

age. Once again we are stretching the intentions of the designers. Apart from monitoring obvious changes in performance and the residue in the oil pans of the transmission there is little the owner can do to prolong its life. Gentle use of course pays great dividends as does annual oil changes at the very least.

Recently a local 1987 Spirit developed what appeared to be a very noisy engine. Fiddling with the gear change and engaging intermediate while driving produced no change in the engine note, clearly indicating that third gear was not being engaged at all. And on bringing the car home and engaging reverse it was found that the dear old thing was not prepared to proceed backwards either! A quick call to my local transmission man and major surgery was clearly indicated. Armed with a camera I drove the professionals to distraction purely for your benefit to give the reader some idea of what is involved.

Most would not attempt a transmission overhaul but provided you can find a well experienced and careful operator the procedure is quite straight forward and the bill should not reduce you to penury. Despite rumours to the contrary, with the exception of the output shaft and the casing all parts are common to other GM400 transmissions and cost the same as Mr Holden charges down the street. Not only that because many lesser makes have met their Waterloo in wreckers' yards there are a lot of used parts that are perfectly serviceable and can be used in your failing-to-proceed car.

The first problem the amateur has with a transmission overhaul is getting the rotten thing out. They are very heavy, the old Hydramatic very very heavy! Before unbolting the unit one thinks very carefully about how to support it. Is the car on jack stands high enough to get the unit out from under the car. In short a logistic exercise that needs to be thought through very carefully.



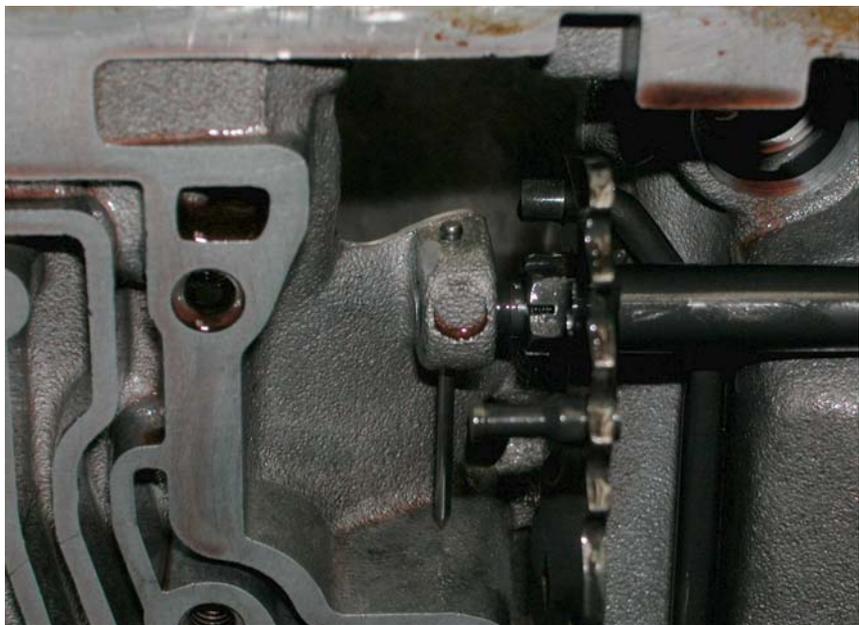
The back of the engine showing the drive plate to which the torque converter is bolted. The latter is always replaced with a service unit since they require very special equipment to open them, clean out any nasties that may have accumulated, replace any worn bits and reweld them together. They then have to be balanced.

Usually it is not necessary to remove the propeller shaft which can be dropped down to clear the transmission output shaft once the centre support has been unbolted. The torque converter is bolted to the drive plate or as we used to call it the flywheel, and the securing bolts can be reached over the back of the sub frame after removing the flywheel lower cover and sliding the protective plate aside. When the transmission is unbolted and various pipes disconnected the unit is moved to the rear on the transmission jack that you have borrowed/stolen/hired/just

happen to have and lowered to the ground. It will take two men to carry it to the bench.

Dismantling requires a few 'special tools' which if you can't borrow them, try and adapt something to replace them. Everything is carefully laid out in relative positions to one another which makes nutting out the problem as to what happened and why, easier.

Probably the two most obvious things to wear out are the clutch plates and the seals in the reverse order. The failure of the front seal is very obvious with oil dripping from the front of the unit. The rear seal is a much less likely candidate for leaking. The clutch plates are splined annuli with friction material glued to them.. What is often not

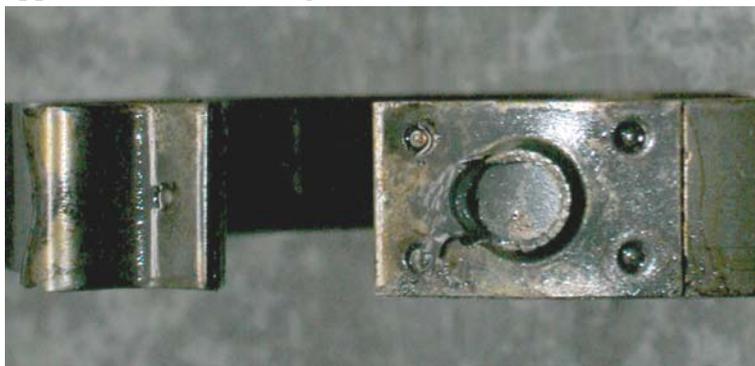


One always wonders whether anybody has been there before and if so how was the job done. I nearly fell into the box to see this nail holding the sector shaft in place. When I came to I was assured that although it looked exactly like a nail – it wasn't, being case hardened and precision formed. There are two more in the box I noted!



Later cars had a larger transmission sump and the oil filler tube enters the unit through the casing above the sump line unlike the earlier cars with side entry. Another casualty is the drain plug – gone is the nice old 1” BSP brass plug which fortunately is still used on the engine and the rear axle. This is a good view of the torque converter. The black ‘top hat’ round unit is the modulator which monitors the engine through a vacuum line and the thing hanging slightly to the rear is the oxygen sensor required on cars with catalytic exhaust converters. If too much oxygen gets into the catalyst such as when the car runs out of petrol, it overheats and destroys itself. Also note the fibreglass heat shield to the left rear – a bit of a change from the carefully fitted aluminium shields we have all struggled to fit under our cars!

appreciated is that the glue which is used is water soluble, so if you are in the habit of a quick



This is the intermediate overrun band which for some reason broke itself away from its anchorages. A lot of owners do not realise that even though the transmission may be running in intermediate through normal progression through the gears, there is no engine braking unless the gear change is actually made to ‘1’ on the column.

start and stop and a build up of condensation occurs in the box – guess what comes unstuck and appears as pieces of friction material in the sump of the transmission. Fine dust from the plates is to be expected – much the same as the muck that gets around the front wheels from the brake pads.

And so the box is inspected for unusual wear and any collateral damage. New bits are procured and the whole thing goes back together. Replacement is the reverse of

removal and provided there is no horrific damage and you use aftermarket parts, the bill as of this month should be about \$3,500. Labour should run to about 24 hours.



## DAVID GORE AND ETHANOL

*As the debate 'rages' I grabbed a rather succinct observation about ethanol from our Technical Officer.*

The use of fuel containing ethanol in older cars will engender ongoing debate as different makes of cars will display the widest possible variations in effects. The fuel delivery systems in some cars will encounter problems with softening/attack of the non-metallic components whereas other makes will not have this problem.

All cars will suffer an automatic increase in fuel consumption due to the lower energy content of ethanol compared with petrol. Cars with metal fuel tanks containing corrosion deposits may end up with clogged fuel filters as the ethanol takes these deposits into suspension in the fuel and ultimately clogs the filter element. This problem can also arise in the service station storage tanks and an otherwise "clean" car can have a load of dirty fuel pumped into it - ideally the pump should have a filter on the delivery hose to remove the sediment before it gets to the tank [remember the Amoco "final filter"?].

I personally have an objection to fuel containing ethanol as the pump price is not reduced commensurate with the increase in fuel consumption to give no effective increase in running costs.



## TENAX FASTENERS

This is a very common sight in the trunk of a post-Cloud car. The Tenax fastener has been wrenched out of the carpet trim and the inspection flap is left to flop around. I have yet to find a spares reference for these little items but fortunately remembered my friends in South Australia

### CLASSIC FASTENERS

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Welland SA 5007

Australia

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E-mail: [cf@tne.net.au](mailto:cf@tne.net.au)

The demand for these clips is low and they are relatively expensive so they are not kept in stock. This didn't prevent them from finding some for me.



# SLOW WINDOWS

Richard Treacy

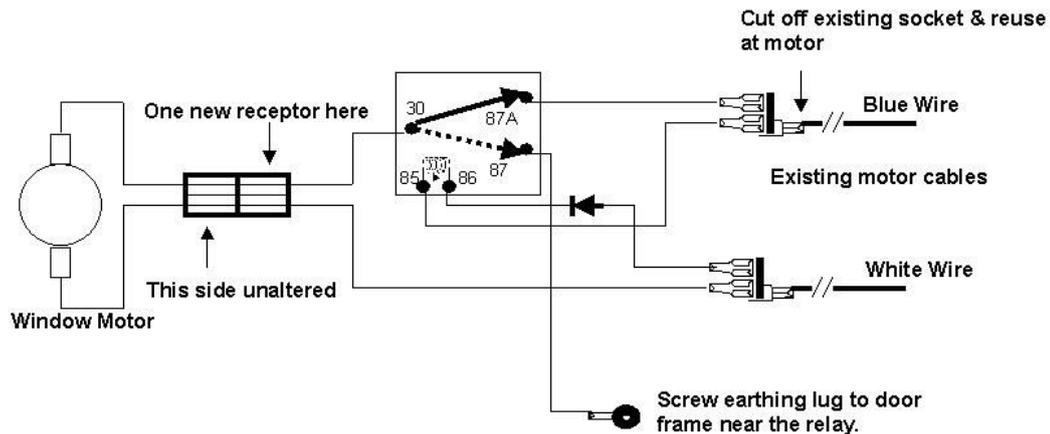
*There have been two local Spirits that have had abysmal window performance particularly the left rear unit. This has been a festering problem for many years and our Canberra member now resident in Switzerland, Richard Treacy, recovered a procedure which I now find was de rigueur at the old York Motors! It works and the final result is well worth the effort. The following exchange was pinched off the web site. We also have Richard to thank for the drawings.*

Courtesy of Richard Vaughan, I have implemented a thoroughly worthwhile modification on my Turbo R, SCBZSOTO9HCH20037, which has dramatically improved the performance of the window lifts from being mediocre and unacceptable to outstanding. This is so successful that I am posting this publicly.

Wow. Thundering windows alright !! This modification is a MUST. I have never been so pleased with such an easy modification. It took about 15 minutes to prepare each of five modules, and 20 minutes to fit each to the car.

## Window Control Wiring Diagram for Silver Shadow and SZ Series Cars.

Front Passenger Door



The reason for all this is that, in order to save weight, Rolls-Royce used very thin wire on the window circuits, in my opinion only thick enough to power the clock. From memory, they toyed with the idea of using a ring main on these cars, but backed off and simply used thinner wires than on the Silver Shadows. The windows on our '72 T-Series are just superb, but the Turbo R's were just embarrassingly slow.

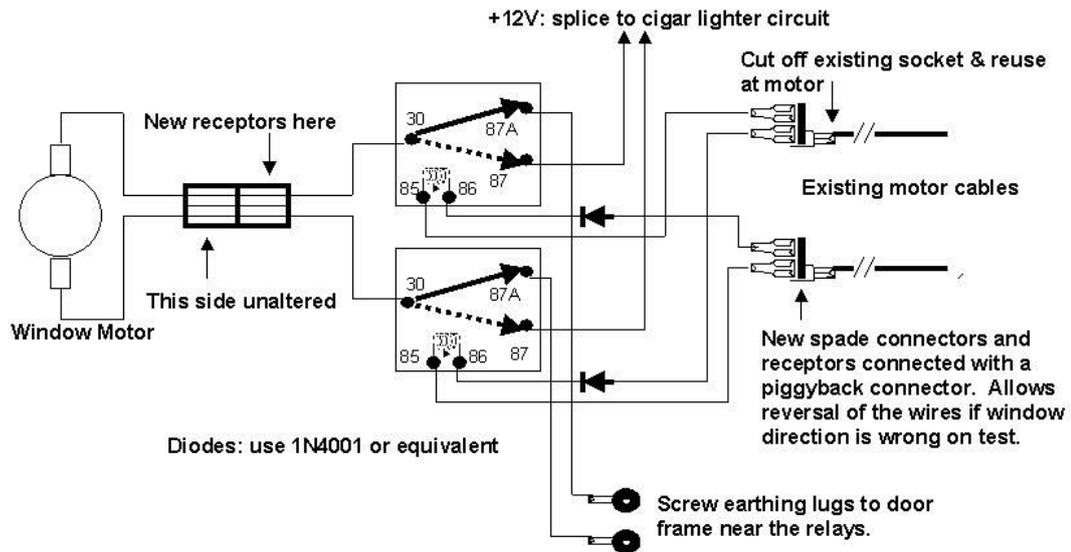
Originally, both window motor supplies are normally live. When the window switch is activated, one supply wire is grounded to produce the voltage to lift or lower the window. Given that the circuits are metres long and supplied by mere micro switches, the voltage drop in the circuit is excessive, especially as the cars age., when the micro switch grounds its wire, the voltage particularly at the motor lead can be as high as five volts instead of zero. Time for a local relay to remedy this. My driver's door was OK, but the other three left something to be desired of this fine beastie of a car.

To fix the three wanton doors, you will need to make up 5 modules, each made from:

Bosch 0 332 204 122-850 changeover relay (R-R UD22452) socket to suit. (pairs may be tandemed for the rear door by sliding their slots together) 6 spade receptors to suit the above two pairs of spade plug and socket (standard automotive type) 25 cm black, 30 cm red: 2.5 sq.mm automotive power cable 60 cm automotive low power cable, white, 0.7 sq. mm cable ties 1 diode, type 1N4001 or equivalent. earthing lug (bolt it too the door frame together with the relay socket)

### Window Control Wiring Diagram for Silver Shadow and SZ Series Cars.

Rear Doors



One issue addressed here using the original R-R equipment Bosch type of relay: you must insert a diode before each relay coil as there is potential to reverse bias the coil slightly on the de-energised relay when the power supply (cigar lighter) is on load, enough to blow the diode suppressor inside if an external diode is not fitted. Incidentally, this extra diode even simplifies installation as all five modules are identical. By the way, I implemented this with a configuration such that the motor is normally at zero volts, not live as original. I have an aversion to leaving electrical devices permanently live. To do this job, I opened up a rear door to see the arrangement, designed the simple layout, made two in the workshop and then installed them.

Previously, I measured typically 4 volts across the rear door motor supply leads when activated; now it's at least 11 volts and the windows are fast as lightning.

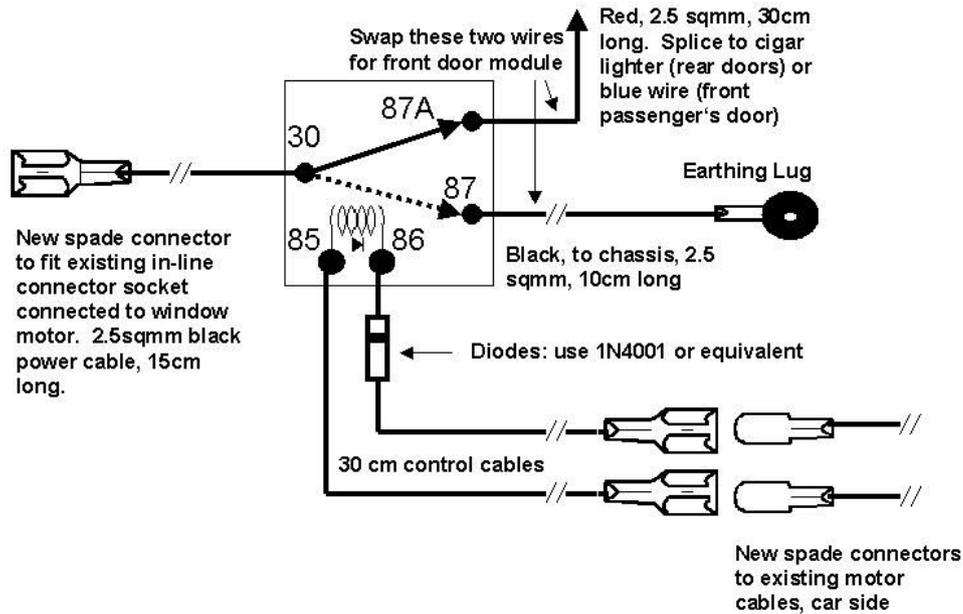
The slowest window is now the driver's !!! The solution on the passenger side works amazingly well, and the windows are now as fast as any new car. The rear doors each have a high current supply for the cigar lighters available, but the front ones do not, so a half solution improving the grounding on the passenger's door is the only easy one, but it gives a 100% result anyhow. My LH rear window was inoperative from the driver's door because of the poor conductivity, but now zips up and down like a new one. It had 4 volts across the motor terminals when operated locally, and 2 volts when operated from the driver's door. I used 2.5 sq.mm power automotive cable for the power side of the mod.

The front passenger's door uses one module, the rear doors two each.

I reused the original motor plug connector unaltered, so the motor and its supply plug and lead are strictly original in case of replacement. To the existing socket fitted to the car, I fitted new spade receptors. To do this, cut the existing motor supply wires at the socket and remove the old receptors. Use a pair of identical spades and sockets to connect the existing pair of wires to your new relay set, so that if the motor direction ends up incorrect you may reverse them.

### Window Control Module for Silver Shadow and SZ Series Cars.

Basic module: 5 units required: two for each rear door and one for the front passenger's door.



Along with the modification, it is advisable to replace the 20A cigar lighter fuse with a 30A one, in line with the original window fuse ratings. I raised all four windows at once and the fuse did not blow.



### IRONIC HUMOUR

A Volkswagen driver pulled up at a stoplight next to a Rolls-Royce where the following exchange took place..

VW owner: Hey, mate, that's a nice car. You got a phone in your Rolls? I've got one in my VW!"

RR owner: Yes I have a phone

VW owner: Cool! Hey, you got a fridge in there too? I've got a fridge in the back seat of my VW!"

RR owner: Yes, I have a refrigerator

VW owner: That's great, man! Hey, you got a TV in there, too? You know, I got a TV in the back seat of my VW!"

RR owner: Of course I have a television. A Rolls-Royce is the finest luxury car in the world!"

VW owner: Very cool car! Hey, you got a bed in there, too? I got a bed in the back of my VW!"

Realising that he did not have a bed, the Rolls-Royce owner sped away, and went straight to the dealer, where he promptly ordered that a bed be installed in the back of the Rolls. When it was finished the driver of the Rolls picked up the car. The bed looked superb, complete with silk sheets and brass trim. It was clearly a bed fit for a Rolls Royce.

So the driver of the Rolls begins searching for the VW, and he drove all day. Finally, late at night, he found the VW parked, with all the windows fogged up on the inside. The driver of the Rolls got out and knocked on the VW. When there wasn't any answer, he knocked louder. Eventually the owner stuck his head out, soaking wet.

"I now have a bed in the back of my Rolls-Royce," the driver of the Rolls stated smiling, the driver of the VW glared at him and said, "You got me out of the shower to tell me THIS?!?"



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You could be forgiven for not recognising the above. It is the base of the fuel tank, removed from a rather overheated early Spirit. The interest is in the fuel outlet which normally depends from the floor of the boot through a large hole. Cars with fuel injection are of particular interest since these are fitted with additional filters in the tanks which are often neglected. A very nice SZ car returning from Griffith recently apparently limped home with fairly obvious fuel starvation. The filter in this case was found to be seriously clogged. It is not an easy extraction I believe. One other bit of trivia, you may notice the strips of something on the base of the tank. These are the remnants of the mounting pads on which the tank normally sits and the pads which effectively glue the thing in place. The tank is held in with straps but to extract it the grip of the strips has to be broken with wedges gently applied underneath over a period.



### **AND HERE IT IS!**

George's new Spirit with George immediately starting to dismantle under the close supervision of Warwick Grigg. As dreadful a fate as a fire is to a car, there is a fascination at what survives. The picture below on the next page gives a rare view of the car's side intrusion bars which are an Australian special in the field of design regulations. In this case the outer door skin which we all know is aluminium along with the boot lid and bonnet, has melted revealing the steel structure inside.



## SOME FAIRLY SERIOUS TINKERING

**George Shores**

Some will know that I was fortunate enough to purchase a burnt out Silver Spirit and a few will have seen me begin to strip working parts from the hulk. It is dirty work as everything is coated

with soot. The engine and gearbox came out as a single unit attached to the front sub frame. Thanks to some sound advice from fellow enthusiast Phil Sproston I changed my mind about removing the engine through the bonnet space. Disconnection of the exhaust pipes, the electrical wiring, removal of the suspension tower plates and the shock dampers and springs only took a couple of hours. The drive shaft was disconnected at the front universal joint, the sub



frame was unbolted and the front of the body jacked up about four feet then the whole unit was wheeled out.

As the photographs show, all work was carried out by a pair of “tinkerers” (as we were once disparagingly referred to), one of whom who wasn’t even familiar with the cars, in the driveway using common hand tools other than the specially purchased engine crane. Someone named Colin was so eager to leave his



mark in a way that was



permanent but not easily detected that he painted his name on the sub frame as shown in the photograph.

The wreck is yielding many perfectly serviceable parts and promises many hours of informative tinkering. I love it.



## POSTSCRIPT

George emailed the foregoing pictures late at night and I thought they were too good to delay them for detailed explanations and placement. It is certainly sad to see such a wreck but sobering to think that if the wreck was that of a 1912 Ghost George would probably have to



mount a 24 hour guard on it for protection. The Silver Spirit will never, I imagine, rank with the likes of the Silver Ghost; the only thing they have in common is the Factory name. But the newer car is still a fascination and if we can effect any conservation of the dwindling stock now is the time to start.



## STARTING A SPIRIT

One of the further nails the Factory drove into the Lucas coffin was its decision to use Nippondenso starters. One is pictured at the left. Unbelievably small, it is a very

powerful little unit with two reduction gears, positive pinion engagement and best of all it can be removed without dropping half the exhaust system. The pinion seen protruding from the casing is shoved into the flywheel by a simple linear solenoid. As the armature of the solenoid comes to the end of its travel it joins two terminals and turns on the starter motor. These terminals are the only Achilles heel in the unit since the unavoidable arcing eventually wears away the contact points.

The lower picture shows the solenoid armature with its contacts either side. To the front is a new set of points for comparison. The erosion by arcing can also be seen on the contact plate surrounding the armature.

Unfortunately despite the most careful design and manufacture one contact is always going to make before the other and this exacerbates the erosion problem.

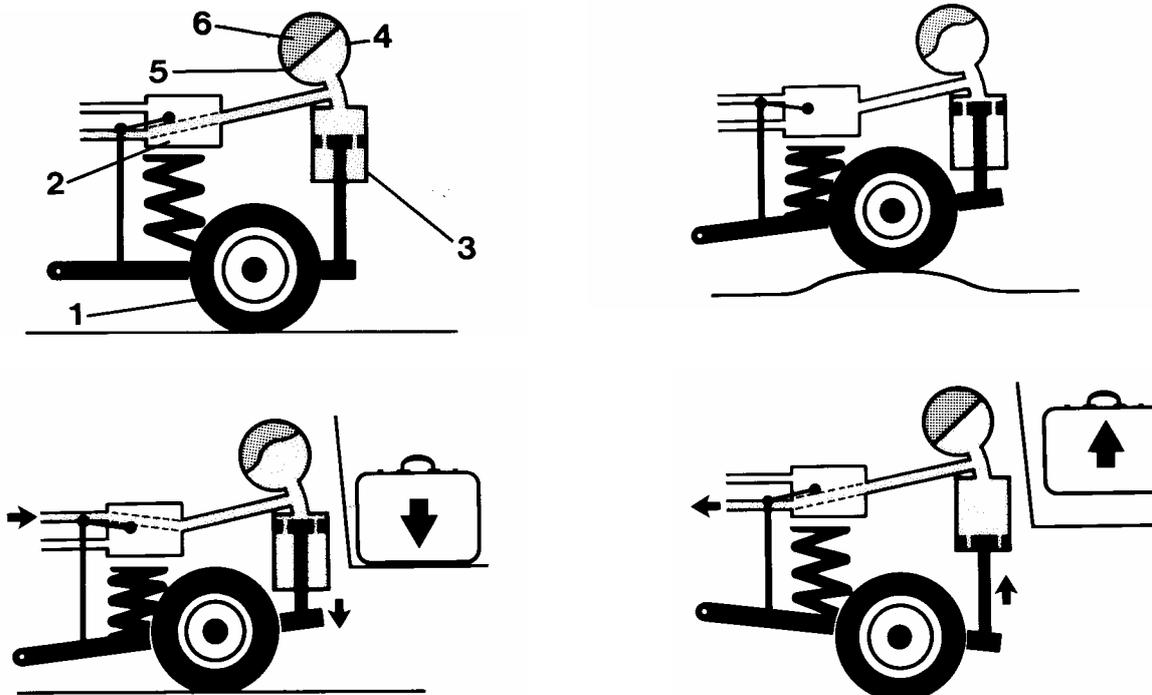


✿  
**BATTERY SAFETY**

Even though your car may have a battery cut-out or as in the Shadow a quick earth disconnect point, if you are going to do anything but the most minor work on your car disconnect the battery at both terminals. This is cheaper than the electrical damage that can follow otherwise.



**Silver Spirit System Of Height Control**



See page 329. This neat little diagram turned up in a training booklet and made explanation so much easier.

## **IN CASE YOU WERE WONDERING**

'Tee One Topics' has been put together since May 2001 for the benefit of anyone who wants to read it. The old Factory kept technical information about the cars very close to its chest principally to protect the interests of its dealers. The other motive was to minimise the spread of any accounts of 'failures to proceed' as the spin merchants liked to say. This worked very well in the rarefied population of original owners but as the cars were passed down the food chain, lesser mortals, who enjoyed the cars for what they were, found that they needed to know how to adjust a servo or tune the engine usually because they either could not afford to pay the high man-hour rates that dealers are obliged to charge or knowing that the cost of repairs could easily well exceed the value of the car. There was another reason; they simply liked fixing the cars! Fortunately most technical information on the post-war cars is now available and forms an invaluable reference. But most enthusiasts like to read about how someone actually 'did it' – hence these pages. The 'Topics' grew from the activities of a group of owners in Canberra and it is pleasing to see other Branches of the Rolls-Royce Owners' Club following suite. Any efforts by anyone to preserve Rolls-Royce or Bentley cars made by the old Factory have to be applauded since there simply will be no more.

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