

# TEE-ONE TOPICS

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## PROGRESS

We all like to leave some small monument to inform future generations of any impacts we had on this planet and I suppose I am no exception. Having joined the Septuagenarians Club last month (and thanks to those who sent good wishes, being the uncivilised slob that I am I will not reply but simply bask in your sentiments) I am being a little reflective. The scab of this navel gazing chancre was rudely picked off by the Federal Executive of the Australian Club deciding to index the current series of Praeclarvm (their, our, my) Federal Journal spanning 1974-2007.

In the dying days on 1974 I offered to edit the magazine which had languished unpublished in various peoples' in-trays for far too long. I had just returned from a posting to North America where I was inducted into the American Club and permanently infected! Previous 'Praeclarvms' were intended to be issued on a quarterly basis, no doubt to reflect the then practice of the Company to issue quarterly 'Bulletins' to purchasers of their new cars for the period of their guarantee – three years. If you wanted further copies, you had to buy another car.

The Bulletin was mostly composed of exquisitely prepared photos of owners' cars apparently contributed from various parts of the world, together with erudite articles usually displaying the serenity of the English countryside. All very halcyon and cleverly pitched to make the new owner feel he really had 'arrived' in the world of serene automotive ambiance! For whatever reason the American Club had started their 'Flying Lady journal in 1956 and issued it every two months. I modelled my issue of Praeclarvm on the Flying Lady which has continued to this day...

Step one for indexing our magazine will be to scan every one of the 5000 odd pages which meant collecting a complete set. This I have done. How depressing – the faces that I recognised which have left this world, the cars that have disappeared or been destroyed. But at the same time what a monument to a small group of people, with a small proportion of the output of the Factory, that have built a factual history covering so many people, cars, locations, events and technical (even if amateur) expertise.



## LOOSE WIPERS

Owners of SZ cars hopefully regularly whip that dinky little cover off the wiper mechanism to check the level of oil in the transmission. For those that haven't, the round coloured knob to the left of the picture is the top of the transmission dip stick.

What many do not notice is that the three bolts securing the whole motor assembly to the support rail come loose. This manifests itself as a noticeable

clunk each time the wipers change direction. If you don't have a spanner handy simply grab the motor and give it a good tug. If the bolts are loose, it will move.



## A LITTLE CARKEEPING JOB

This is one of two links at the back of your SZ car that directs the height of the rear end. The rod connects the lever on the height control valve that nestles high up in the rear axle trough, to the rear suspension arm. Gone are the days of the old Shadow with fast and slow levelling, the SZ levels slowly and with a small pause before it starts moving. Considering the antics of the rear axle however, the joints at either end of the link rod really have their work cut out. As you can see they have little rubber boots to keep the muck out and are adjustable to take out any lost motion.

To remove them simply unlock the nuts seen in the picture and unscrew the adjusting screws, DO NOT undo the swivel pins bolted to the suspension arm or body otherwise you will be up for resetting the mechanism. With the pins out the rods simply pull off. A point here, the control arm on the levelling valve, up under the car floor is sprung upwards so best you hold it while pulling the link off so that it does not go SPROING! It doesn't matter if it does but preventing this does keep your laundry bills down!



Clean all the bits fill the cavity with good grease, douse the rubber boots in Armour-All to preserve them, slip them back onto the mounting pins and screw in the adjusters. When you do this feel the mounting pin through the rubber boot to make sure the ball of the pin sits neatly in the middle of the joint. The adjuster should just be tight enough to have no end play. Lock the lock nuts while holding the adjusters with a screwdriver. Check the fit. You should be able to swivel the rods around without any binding and certainly without end play. Tightening the lock nuts often tightens the adjusters so you may have to do the job a couple of times. !987 saw these dispensed with in favour of a single lever arrangement that was operated by the rear anti-roll bar. No maintenance is required here – more's the pity!





## LEVELLING VALVE BITS ON THE SZ CARS

Having got to know your levelling valve links intimately you will recognise the valve itself. In the middle of the picture the drab colour strip is actually a strange circle of material like rubberised foam. Its purpose is to protect a veritable forest of springs and things that are part of the lever mechanism on the valve. They break and fall off. Easily fixed you simply undo the bolt through the centre and dismantle the contents thread the new cover on and refit the bolt. A nice afternoon's job.



I know I have said it before but the reason separate valves were dispensed with was to improve the stability of the car. When the car is cornering hard around a long curve, the valve on the outside of the curve pumps up the strut to keep the car level. If the car then needs to do a smart long fast curve in the opposite direction, the poor old valves and sensor are flat out trying to re-sort their priorities. The same problem occurred with the Shadow but seemed to be of less concern to owners. One very big exception was the delivery of the very first Shadow to Australia through Melbourne. Notables hurried down to see this new creation and drive it back to Sydney only to arrive home ashen-faced having nearly turned the car over three times. Although it was not recognised at the time the same problem occurred as was identified in the SZ cars but worse, the levelling was done on the front axle as well!

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← Seen this little gadget under the right rear floor of your SZ car and wondered what it was? It is a non return valve on the main fuel line where it feeds the Pierberg fuel pump.

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## AN OBSCURE SWITCH

When the cruise control ceases to control there are two places to look before you get worried. This assumes you are operating the thing the correct way. And here I am referring to the system that uses a vacuum bellows to open and close the throttle. And it is the bellows which is fed from the intake manifold, downstream of the throttle plates where there is a vacuum as long as the engine is running. This take off point (actually there re two) operates a variety of servos and valves which open and close simply by turning a 'tap' off and allowing the 'suck' to get in or the air to get in.

In the case of the cruise control, in the head of the bellows assembly there are two solenoids which operate the 'taps'. One lets the 'suck' in and the other lets ambient air in, the latter nullifying the vacuum. So cruising down the road, the impulses from your speed generator on the transmission are fed into a processor which has stored the speed you want to travel at and it then operates the solenoids letting bits of 'suck' into the bellows to speed the car up and letting bits of air in when the car goes over your set cruising speed.



All very simple but there is a safety 'switch' in the system, a picture of which you can see above. This switch operates when the transmission changes into top gear. Note that it is the transmission we are talking about and not the gear selector on the steering column! If this wasn't there and you operated the cruise control setting the speed to 110 kph the engine would be accelerated to the maximum change points for each 'gear' until it reached the set speed in top gear! When the switch fails it is usually saying to the control unit 'I am still not in top gear' so the cruise control simply doesn't work

So the two places to look for a non-operating system are first the bellows. These will eventually crack usually in the folds of the rubber or they tend to loosen their grip on the mounting plates and air leaks in there. In the first situation replace the bellows and in the second carefully seal the bellows to the plates with a little Silastic.

The second place to check is the switch we have been talking about. Simply crawl underneath from the left hand side and detach the wires from the switch. If the cruise control then works albeit in each gear you have a faulty switch!





## HYDRAULIC INCONTINENCE

This is a fairly common sight these days when you pull the rear wheel off an SZ car. The rear struts on these cars have a lot of work to do. Whereas with the SY cars, height control was handled exclusively by dual rams on the rear suspension, (controlling the bump department was looked after by sealed telescopic shock absorbers) modern day struts (and they are not unique to RR) have both jobs to do. In the late series they were further complicated by having variable valving placed between the strut and the suspension spheres.

The life of a strut seems to be on a par with conventional shock absorbers but whereas the former exhibit a desire for retirement initially by excess bouncing, then a knocking noise from the internal valving, struts announce their departure by significant leaking down the centre shaft. Regrettably there is no reprieve and replacement is the only solution.

But the evidence seen on the inner guard in the picture is not so serious. The small flexible pipe leading out of the body of the strut carries away the small amount of hydraulic fluid that manages to get past the main shaft seals. This in turn finds its way back to the reservoirs in the engine compartment. The oil slick comes mainly from the flexible pipe. It is only plastic and given the 'hole lot o shakin goin' on' in the area it probably has a right to fail eventually.

The tube should be fixed as no loss of hydraulic fluid should be tolerated, it being you remember the lifeblood of the brakes!!! Replacement lengths of tube are available together with the various nipples and little glands to seal the system.





## CHANGING THE FUEL FILTER

On the later Shadows and all Spirits this little filter hangs under the floor of the car immediately under the driver's bum (RHD that is!). When you are roaring drunk and fall flat on your face beside the car, if you turn your head slightly the thing stares back at you. Yet people don't change it. For the small band of owners who feel it their quest in life to find alternative parts for their cars – be advised – these filters which use a cartridge element are no longer made! Rolls-Royce apparently holds the remaining stocks!

For those intrepid souls who will do the job themselves, you will need to buy a hose clamp – a plastic one is perfect which are available at any Autopro or similar and you can then pinch off the fuel line anywhere near the end of the car where there is a rubber pipe. You lose a little bit of fuel when you undo the centre bolt on the filter housing and need to ensure that you replace not only the filter but the various rubber seals. These usually come in a kit.



## JUST CHECKING

Have you been keeping an eye on these mounts on your SZ under the back seat. The holes in the floor were pulled through by the bracket that holds the exhaust pipe. If they start to crack make up a plate to go inside with the right placed holes and thread the bolts holding the pipe through the plate and the floor and you should have no further trouble



## RENEWING REAR WHEEL BEARINGS ON A SHADOW

First up I have to say that this is not a job that the average handyman would want to take on. At the same time the job does not require a fully qualified rocket scientist. Many owners are happy to change their front wheel bearings although they wear so well this is a rarity. Not a bad idea though to clean them out every now and then and get some nice fresh grease into them.

The rear wheel bearings are simply not readily accessible hence they are usually left until there is this awful crunching noise from a back wheel. Inevitably the rear wheels get far more detritus flung at them and into them since the front wheels stir up the porridge and the back wheels then have to plow through the mix!!! And after 40 years or at the least 27 years if your kit is still running on its original grease I suggest you are tempting faith and fate!

Few owners realise that the Shadow and Spirit rear wheels are full floating. This means that all the dead weight and cornering stresses are taken by the axle and all the driving forces are taken by a drive shaft. This is a much better setup that the Lady in Spain enjoyed (remember the broken axle and no bill forthcoming and 'Madam, Rolls-Royces don't break axles)!

If you have no noise coming from the hubs, try jacking up each wheel and shake Hell out of it, there should be just the slightest trace of looseness. If there is a noise and you are not sure which side the sound is coming from, find a clear space with a smooth surface and drive at a reasonable pace and swing the car from side to side. The side with the wear or bad bearing will make a lot of noise when the load goes on.

If you are as big an amateur as I am you will want to talk to someone who has done this job so that your eyes are wide open before you start! As to equipment you will need a large socket spanner 1-11/16" and a decent size break bar. Access to a large press capable of at least 50 tons a device for holding the hub while you are pressing it in and in my opinion one for holding the hub while you are doing it up! All this spends money I hear you croak, but whether you decide to outfit yourself with the necessary gear at your expense (and I am not advocating buying a press – that service is available from most fitting or engineering shops) you have to compare the total cost to what you would pay someone to do the job!

And there is nothing like fronting up to the next Club barbeque and interspersing the conversation about, who is doing what to whom and who has the better car and did you hear about so and so and his girlfriend – with stories about presses exploding trying to push your hubs apart and did anybody have an opinion on the best end float to set up the rear axle bearings. Better still develop a routine where as one of the tea and bikies brigade drive slowly past you, swing round with lantern jaw agape and stare at their rear wheel. They will notice of course and say nothing, being in mortal terror that you have noticed something they do not want to know about.

At the right moment – and you will become very good at this, casually wander up to them with your glass of champers and ask how far they have to go to get back home. When you notice their hand taking on the clutch of a passenger from the Titanic clinging to the leg of a Louis XV tea trolley in a freezing ocean, enquire off-handedly as to when their rear wheel bearings were last checked. Why, they will cry in a strangled croak? Well it is an old car and they are fairly exposed to road grime and you thought you heard a familiar grind normally only heard with failing bearings. If they feign dismissal and even turn their back to you, note that their ears have actually turned to hear any other mal mot you may drop that is relevant to their car. Turn then to the nearest person looking slightly distressed and mutter (audibly) 'You have to be so careful with these things. Did you hear of so and so who had this problem – poor Devil he lost it at high speed, thing seized – I hear he is coming

good – never be able to drive again but still as long as he wears both braces he should be able to at least ride in the car again!

On the other hand you may just like to drink the Champaign and hopefully find some kindred soul you can talk wheel bearings to!

In summary the job is not complicated, just awkward and needs a bit of gear. If you are mad enough to take it on and you should succeed it will be very satisfying, otherwise after reading all this drivel you will hopefully sympathise with your repair man when he is doing the job and appreciate the effort involved.

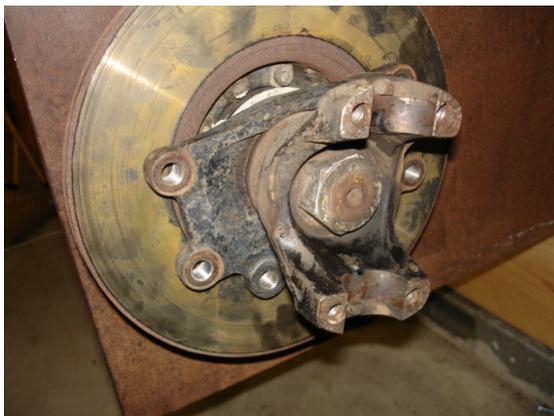
I hope the captioned pics give you some encouragement or educate you. Over to you!



Well first step is to get the assembly off the car. Four bolts and the drive shaft is disconnected at the outer end. The shaft is then tied up to the spring, If the universal joints have been replaced the caps won't be tied – best you do so otherwise Mr Gravity will slide a couple off and you will have to put that together again. There remains disconnecting the two brake lines and the handbrake cable. You can also remove the calliper to lighten the assembly.



The first problem is to hold the assembly while you undo the yoke nut. I have a piece of ½” steel plate cut and drilled to take the hub which can then be bolted to it. Another approach is to release the nut after the tail shaft is disconnected and immobilise the hub by having someone apply the brakes. This however requires the car to be hoisted so that enough leverage can be applied to the socket. The plate seen here can also be used for tightening the nut when you have replaced the bearings. Being much cleverer than I, you may devise a better way!



And here is the fabled nut. It is NOT a standard thread so don't run down to your local bolts and nuts shop for new ones. It is tightened to a torque figure of 550 ft-lb which is so tight it conceivably distorts the threads militating against its re-use. The removed nut looks OK but the Factory directs that it not be re-used. The yoke which you see here is forced onto a taper with a substantial keyway. If the nut on re-assembly is not sufficiently tightened there is a good chance the key will shear and the yoke spin on the drive shaft.



If the nut was correctly tightened it will take some effort to undo it. The bar you see is the old handle from a trolley jack and the  $\frac{3}{4}$ " break bar is made of the best steel known to mankind. The only way the nut would release was for me to stand on the end of the jack handle which is nearly 5' long. I come in at 250 lbs so multiply that by 5 feet and you understand the requirement. Hanging onto the rafters I bounced up and down a bit before the nut came undone!



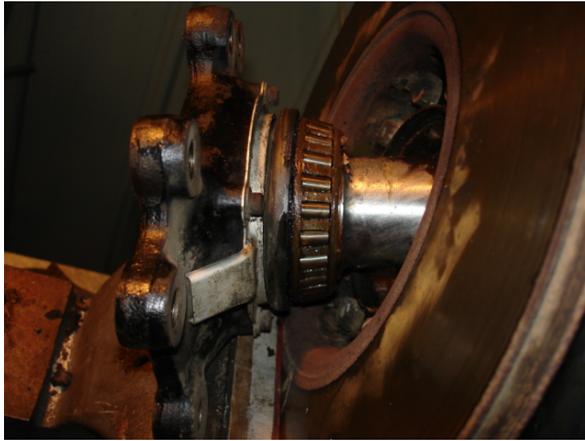
A friend kindly lent me this jig to hang the hub assembly minus the nut. Note the arbour placed through the hole in the centre. The whole thing which I could just lift was placed on the bed of a large press which pushed on the arbour. At 54 tons the drive shaft gave up its clutches to the yoke and we (the press operator and I) got our breath back having held it during the process. The four high tensile bolts seen around the arbour screw into the tapped holes in the yoke.



Here the drive shaft has been unbolted from the hub and the drive shaft is about to be withdrawn.



This strange looking nut secures the hub on the axle (as distinct from the drive shaft) and controls the amount of end float of the hub. Before you start fainting, the drive shaft when installed with the yoke on the inside also stops the whole assembly coming to pieces! The nut has a soft flange on it which as you can see is indented into slots in the side of the axle tube keying it in position. It follows that this retaining nut can only be used once!



The retaining nut having been removed the axle can be slid out of the hub. Here behind the bearing can be seen the grease retainer which has a helical groove designed to return any grease that may slip out back to the inside of the hub. If some does escape it should be caught by the collector seen bolted to the axle flange complete with a drain tube.



The hub runs on two conical ball races, inner and outer. The races lift out but the cones on which they run require extraction. This is best done by a puller and slide hammer. Note the soft pads in the vice to avoid damaging the surface of the brake rotor.



When rebuilding the axle note that the drain plate as I call it is handed and if you mix them up simply establish where the axle will be when it is bolted to the swinging arm of the suspension and remember that the 'exit tube' will need to be pointing downwards! Also seen here is the spacer that abuts the inner roller race.



Preparing the hub for assembly, first press the new bearing cones into the machined recesses. Check with a mirror that they are pressed right home and when pressing try to avoid cross binding the cones. The next step is to coat the inside of the hub with grease. The book says about 2 ounces but using a spatular plaster a good layer around the inside of the tube as seen here. You should be able to thread the axle through this tunnel of grease with out moving it. Fit the bearings after they have been thoroughly greased.



The axle and hub ready to be assembled. Note that the grease retainer has been fitted to the hub. These are definitely handed and the book carefully tells you that they are clearly marked. I have not yet seen marks. If you mix them up look carefully and realise that the acme thread around the inside has to wind inwards during the normal rotation of the wheel. That way any wayward grease that may have escaped gets flung back into the axle. Here the bearings have been fitted and are hidden under the grease.



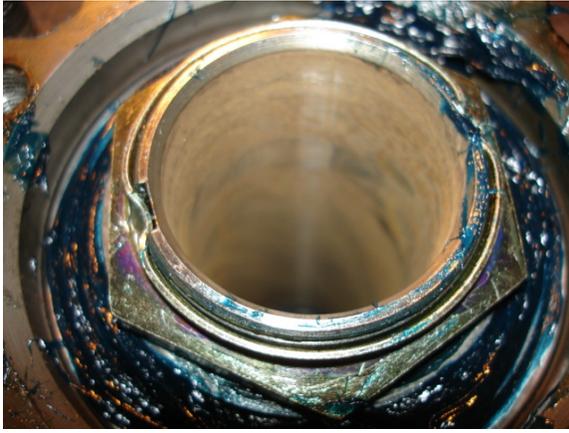
A close up view of the acme threaded grease retainer. Inspect these square threads carefully and ensure that they are not as usual filled with crud. If they are not cleaned out you may as well throw the things away!



A new staked nut for holding the outer bearing in place



Settle and centralise the bearings by screwing the new nut down tightly while spinning the hub. You can then undo the nut to set the end float. Before staking the nut, a .002" thick feeler gauge is inserted under the nut before it is screwed down. When the nut lightly clenches the gauge that is the point at which the staking takes place. This gives the hub .002" end float as required.



The new nut is staked. Beneath it is the keyed thrust washer



The drive shaft has a greased 'O' ring around its flange to keep out the crud. There is a small chamfer around the mouth of the axle to accommodate it.



At the base of the axle there is a retainer with a felt seal squashed into it. This should be replaced and lightly greased to allow the drive shaft to be inserted. Here the shaft is waiting for the Woodruff Key to be inserted, the yoke pushed on and the nut applied to secure the assembly.



In production, the Factory supplied special grease for tightening the nut. In its absence my engineer friends suggested I use this product which beds in the threads and lubricates them.



Ready to receive the yoke and nut. Note the fitted Woodruff key and vestiges of the felt seal around the shaft.



This requires some weight.



Weight applied. In the absence of a 600 ft lb tension wrench, I calculated that a suspended 250 lb carcass at 2 feet up the bar would approximate to 550 plus ft lbs!

Footnote: - I am having the pressing jig duplicated so if anyone needs a drawing let me know. It is not expensive to make.

