TEE-ONE TOPICS

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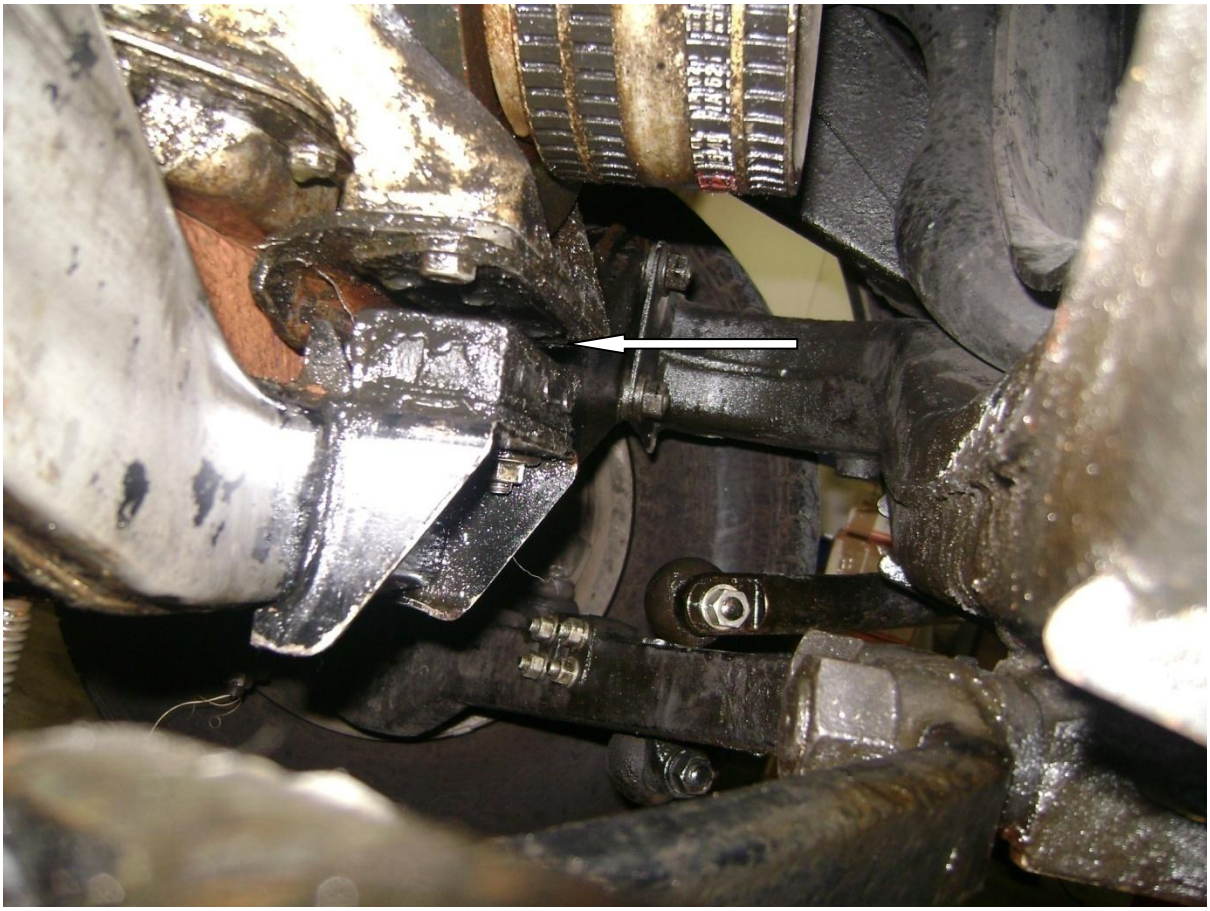


The front end of our cars' engines are notoriously incontinent. This is due to a quaint sealing arrangement between the two castings that close off the front of the engine. The sealing material used hardens and shrinks and oil escapes – all over the front mount. If circumstances prevent correction of this leak and the mount is replaced, wrap it in stout plastic for protection. In the above example the engine has been cleaned albeit too late – the damage has been done.

THE GAPING MAW

It is amazing how many of our cars wander around the streets in this condition. Typically this rather nice Bentley was polished, the leather cleansed and the rocker covers carefully wiped. Yet the engine was not attached to the sub frame at least not in the front. Engine mountings, originally invented by Studebaker, consist usually of a lump of very dense rubber seriously glued to mounting plates. The serious gluing is the Achilles Heel of the fitting. It is achieved by special vulcanising. Quality control in manufacture is essential but does not always occur. Back in the early eighties there was a batch of mountings sold for our cars

which were simply ineffective and sheared off particularly at the rear of the engine where the greatest torque occurred.

As if quality was not enough to be of concern it seems that being soaked in engine oil is the one hazard that causes the greatest problem particularly as it seems that the bonding material and interface layer of the mount is the most delicious to the invading oil. The result is shown in the picture on the front page. Because of the weight of the engine it is hardly practical to check the mountings by a simple wiggle of the engine. In the picture the engine has been lifted with a jack under the sump using a wide strong piece of timber as a lifting pad.

The real hazard with defective front mounts is the sudden stop. As you know the front end always dives when the car is stopped suddenly and you and the bonnet and the seats and the grog in the decanters all dive at the same time. The engine however

Here we have a new mount and the limiting plate that stops the engine from taking a header into the radiator core. The picture below shows how the limiter 'hook' works. The engine in this case is proceeding to the right.

thanks to Isaac Newton, momentarily stays where it is. *(Every body continues in the same state of rest or uniform motion unless acted upon by an external force.)* Now if the front engine mount of your car is intact, the plunging of the front end will pull the engine down with it. If the same mount is NOT intact the engine continues in the same state of motion heading for the little old lady who has wandered into your path and whom you are trying to avoid, and the surrounding body is plunging towards the ground. The next bit of sensing is by ear when you hear the excruciating noise of the fan (remember that this is attached to the front of the engine) being met by header tanks and cowlings as the latter head for terra firma. That is a very expensive noise!

And yet you won't check the front mount periodically!!!

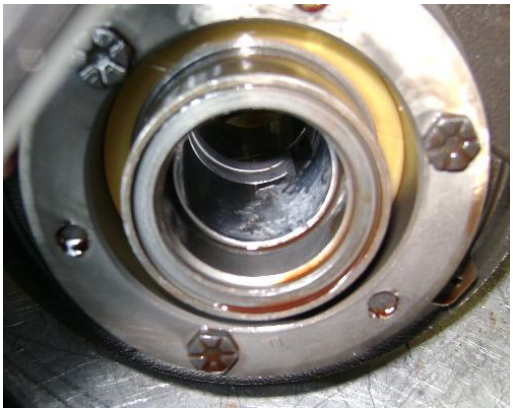
PROPHYLAXIS IS SURELY BETTER THAN REPAIR

If you drive a post 66 car with a three speed transmission hopefully you recognise the sump or oil pan of a GM400 transmission. This particular pan came off a nice, well used T2 Bentley that had done some 200,000 kilometres. The car drove well, the box changed smoothly, there was no apparent slip and there were no leakages of note.

Try to drop the pan at least once a year. When you get a pan like this you should be relieved and reassured that all is well. There will always be some dust from the clutch and band facings, but what you don't want to see is stray bits of metal.

These are incredibly reliable units of which reportedly over ten million were made. First used In Buicks and Cadillac's in 1966, its reputation as a very reliable transmission spread quickly and General Motors found themselves selling the units to, among others, Jeep and Rolls-Royce. It is also used by luminaries such as Ferrari and Jaguar and Volvo as well of course by our iconic Holden among General Motors products.

There is the old saying 'the squeaky hinge is the one that gets the most oil'. Well our poor old GM400 works away under the floor where you can't see him, the dip stick is even neatly tucked away against the bulkhead and in later cars is even hidden under the wiper covers.



Above. The torque converter normally bolted to the 'flywheel' is a sealed unit (by welding). If you get nasties in the sump and either overhaul the box yourself or have it done, be sure to have the unit opened, flushed and repaired since it is impossible to get muck out of it. It follows that you should also ensure that the transmission oil cooler is flushed.

Left. Bushes like these once they start to fail, quickly spread their bits into the whole box. The picture shows the evidence of bush destruction.

Well the Factory had great faith in the adopted box, but they did not count on owners completely

forgetting their little treasure and relying on service people to do the job for them. If the latter overlook the task and damage is done – nobody's to blame and you the owner wear the bill.

I hope it follows that to monitor the performance of the box you need a few yardsticks to make a judgement. There are two ways you can expect to destroy the box; one is heat and the other dirty fluid. Any mechanism operating at high speed will generate heat through friction but with a system where large amounts of kinetic energy are inserted, in this case by the flywheel of the car, that energy has to go somewhere. If it cannot turn the other half of the fluid coupling or torus, the unused energy is transformed into heat.

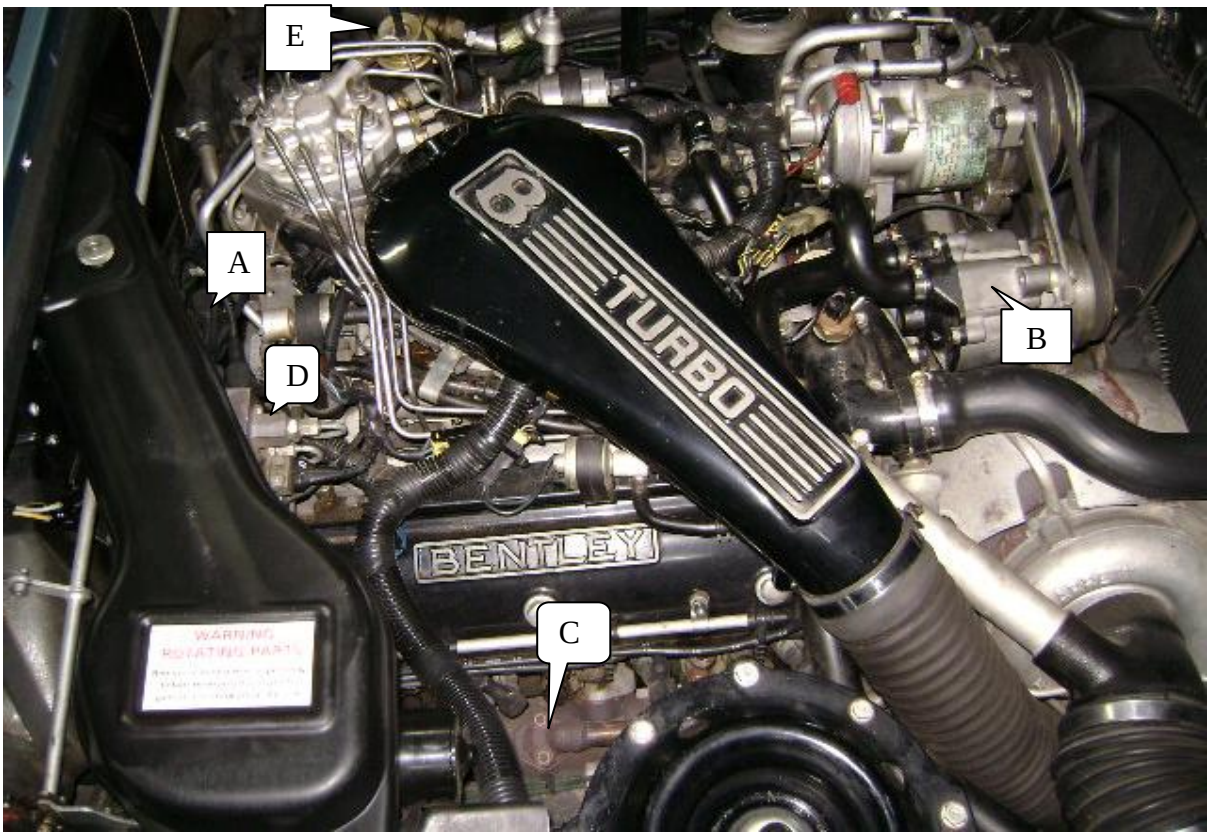
The heat generated in the transmission is radiated from the outer casing and the oil is pumped through a small radiator behind the grille. These two outlets have their limits which when reached, the temperature of the fluid can easily exceed the boiling point of water. Heat causes predictable failure of band and clutch facings not to mention the destruction of oil seals. Dirty oil like engine oil is thought by many to be a destructor but the nasties in suspension in the oil are for the most part filtered out. What does get destroyed through simple use are the various specific compounds incorporated in the oil by its manufacturers to protect the mechanisms from destruction. The solution is simple, change the oil frequently.

Transmissions don't 'use' oil but they do leak it. The worst leaks are at the front and back of the unit both of which require removal of the unit to fix. But then there are various switches and servos plugged into the box that all have a neat little seal and those will often start a telltale drip. The more spectacular 'leak' is through the modulator, a fairly large tin-can-like attachment on the side of the box. Inside the modulator is a plunger attached to a diaphragm. The plunger pokes into the box and controls various functions of the box. The diaphragm which operates the plunger is moved by vacuum piped from the engine manifold. Eventually the diaphragm rusts through and the vacuum then sucks transmission oil through it into the manifold where it is burnt. At first there will be a small wisp of whitish smoke from the exhaust which will steadily grow as the puncture in the diaphragm enlarges.

In summary don't take your transmission for granted, avoid overheating it, check the oil when hot every month and if it starts to play up, go to a specialist for advice.

ANATOMY OF A TURBO

How often have you looked at the scene below, particularly at exhibitions and being terrified that some innocent spectator is going to ask you what something in the mess of things, actually does. This is a 1989 car, Australian delivery and unmolested or as we used to say



very original. So I thought a series of 'Cook's tours' would not be waste of time.

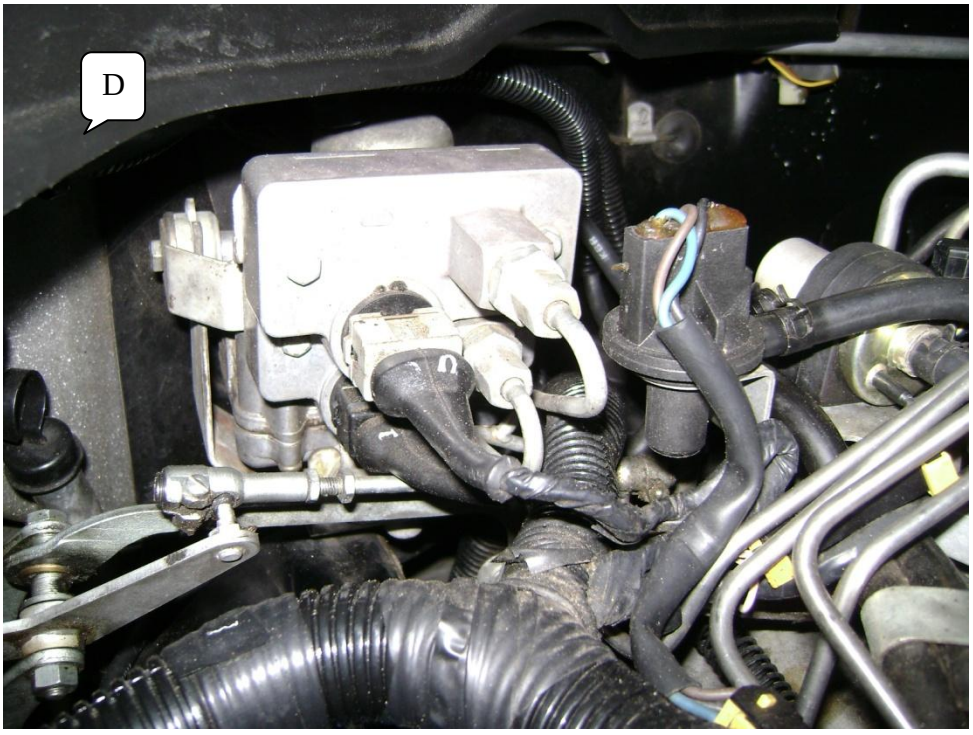
You will have seen the pre-war Phantom III with two distributors each firing 12 cylinders since there two plugs per cylinder. But here we have at 'A' twin distributors. Apparently two distributors are better than one if you share the load. Hence two units of 4 cylinders each with their own cap, leads etc. Here we are leaning over the mascot and looking to the back of the engine compartment. The distributor on the right is the 'main' unit being driven conventionally. The other is driven from the first one by a notched belt. Belts to me spell breakages much as 'fan' belts do. Apparently the factory overlooked this small prolepsis but finally issued a bulletin stating that the notched belt should be changed every 5 years.

The distributors have no points or capacitors nor electronic sensors, they are there purely to distribute the high tension current from the coils (they have one each) to each plug. The firing order is fixed as are the distributors. There is no swivelling the units to advance or

retard the firing. In short the whole system is digital and controlled by an electronic control unit (ECU). For comfort you will be pleased to know that should the notched belt break the engine will still run but only on four cylinders. You should notice a drop off in power!

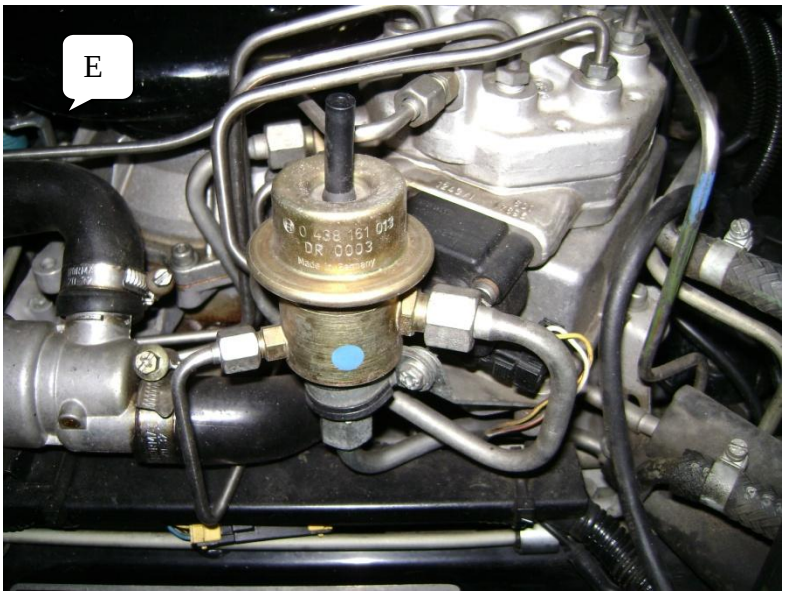
Recently we had one of these cars with the strangest quiver when it idled. The car was wheeled into my favourite electronic whizz kid who called to enquire the firing order. Now that I understood and was able to provide the information. Seems somebody had been in there and put the wires back in the wrong places. Yet the car performed quite satisfactorily! Apparently the computer getting all these strange inputs worked out what was really required and ignored everything else. Now that is black magic surely!

The Air Pump. 'B' This is a gadget spawned by those people who object to being choked by automotive emissions. They have been on the Shadows for years particularly for those cars delivered to the West Coast of America. Given the speed that the engine has to suck in a mixture of fuel and air, set fire to it and get rid of what's left, you will not be surprised that there is still some unburnt fuel to be found in the exhaust. The air pump therefore fires air into the exhaust manifold and the extra oxygen actually burns up the fuel that has exited the cylinders. The connection to the exhaust manifold is at 'C'.



This is the air pressure transducer see 'D' in the pic. Transducer as a word has been around for a long time but little used apparently. It simply means a device for converting one type of energy into another.

Here we are converting the energy generated by air pressure to an electronic signal. The transmission of all our cars from the Shadow II on have transducers that convert the kinetic energy of whirling shafts to electrical energy to drive your speedometer. But here this gadget's job is to monitor manifold pressure and send the results of its efforts to the ECU. The main job it performs is to limit the turbine and compressor efforts so that the engine does not suffer from over performing!



The central bit ‘E’ here is the fuel pressure regulator. If you are not familiar with fuel injection it comes as a shock to find that the system runs at pressures in excess of 85 psi! This compares alarmingly with the old SU pumps and the Pierburgs running at a pound and a bit! The fuel system is of course recirculating and this little gadget makes sure that the main working bit, the Fuel distributor seen behind the regulator has a constant correct pressure.

Let’s look at some more bits next issue.

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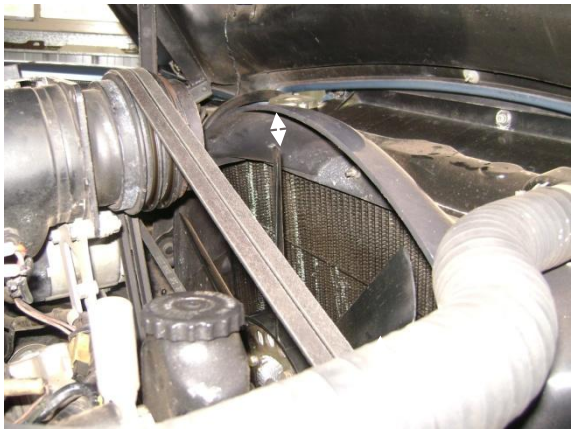
MIGRATING ENGINES

We have a very steep drive and I was getting rather piqued to hear the fan munching on the cowling every time I put the brake on at the bottom of the slope! Worse, one of the leading lights in the fixit world enquired why the engine of my Spur was migrating to the left hand side. The following pics may be of interest.

And here is the culprit, the front engine mounting. These circular mounts were used for a while but presumably proved unsuccessful. Note the mount insert is protruding here about ¼”. In addition the whole insert has rotated lowering the engine about an inch.



Here you can note the distance between the top of the fan blade and the cowling. Adverting back to the top pic, the rubber insert is shaped to keep the cross bolt nice and high in the holder. In practice the whole thing manages to rotate and lower the engine. A solution to this problem is to install a standard

Silentbloc bush. The rubber is much more dense that that in the original but you would be hard pressed to tell the difference.

Here note the almost nil clearance between the fan and cowling at the bottom. The location of the engine in post55 vehicles has always intrigued me. The rear mounts of the vee eight are adjustable (at least vertically) and the front mount sometimes has and sometimes hasn't an extra spacer or two to lift the front of the engine. But I have yet to see any guide as to where the engine should actually sit!

The solution was to replace the front cross member (4 bolts) and install a standard block type front mount with the standard limiting bar to stop the engine eating the radiator! Here the limiting stop has been slipped to one side to show the projection on the front member that it bears against.

A LITTLE HOUSEKEEPING

This is obviously the inlet manifold from a vee eight and for the coffee table boys it's out of a Corniche!!! The rod running along the 'A' bank with levers attached to either end of course operates the throttle. At the rear or left end as you look at this picture there is an adjustable rod that hooks up with the accelerator linkage. At the other end the lever connects directly to the carburetter linkages. The rod itself runs in bronze bushes pressed into the inlet manifold casting and seldom gets lubricated. Now that you know where they are perhaps you can make a point of dripping a few dribbles on these long suffering bearings!

DOOR TIPS

Panel clips to hold the trim onto the interior of the body are older than I am (waits for gasp). They have improved however. The old Mk VI used to fix the 'holders' two of which are seen here, by fitting them with prongs and bashing them into the ply wood. When they pulled out it was a major job to fabricate longer ones and bang them into different places.

Later this method evolved which was greatly superior; they pop riveted the holders in place. If they pulled out you are usually up for replacing the whole board. The actual clips however do break mostly through rough handling or sometimes rust. They are readily available and can be screwed into the holder.

When removing the panel do not pull on it, use a wide spatula, slip it in between the panel and door pressing, slide it up or down until it meets a clip then twist the spatula, this way you will be prising the holder from the door rather than using the panel to pull the holder away!

When you have a door panel off give the leather a good soaking in your favourite hide food.

If the plastic damp seal between the panel and the door frame is badly torn, get some builders' plastic and make a new one. This is essential otherwise the wood panel which is only plywood will absorb moisture, the leather will rot and the door will be largely destroyed.

At left is a common source of heavy rattles. The wiring has been pulled free from its clips to make repairs and not fastened back in place. Easily fixed. The car for interest is an '89 Turbo R.

OVERHAULING THE RAMS

These are the gadgets that lift the rear of every Shadow except the dropheads, when necessary to keep the car reasonably level and prevent the destruction of the universal joints on the rear swinging axles. They are probably the first part of the hydraulic system to start leaking with fluid dribbling down over the rear springs. The car will not lift unless the number 2 system can generate at least 1400 psi which means you need accumulators in good condition and with plenty of gas! The rams are in the corners of the boot (trunk) and are easily accessed unless you have an American spec car with the fuel tank jammed in the front of the boot.

The second picture shows the ram fully extended some three inches. The bottom of the plunger is threaded to screw into the top of the spring holder. The turning is effected with the aid of a 'C' spanner. Very early cars regrettably used a fine thread on the plunger head which with the aid of a little rust requires the patience of Jobe and the strength of Hercules to unscrew it. When replacing the assembly think of the next operator and liberally coat the thread with anti-seize grease.

Here is the whole thing in bits.

To keep the high pressure fluid in the ram, a special seal is used inside a metal cup and after this is installed a second 'seal' is pressed in, known as a wiper. This is precisely its function – to clean the shaft as it returns to the cylinder. It should be remembered that the shaft although housed in an under body extension in the boot still gets plenty of dust and road grime which in time would destroy the main seal.

The primary seal however has not been available from the Factory for nearly two years and a number of alternate seals have been used for the job. This particular one is made and marketed by RA Chapman in Bayswater Melbourne. The seal housing and wiper are in one unit, are easily installed and apparently very effective.

At left can be seen the recess for the seal in the ram housing. The upper groove carries the retaining circlip. With the Chapman seal it is important that the walls of this recess are smooth to aid sealing with the seal's outer 'O' ring.

The worst problem you are going to have with ram overhaul is the bit below. As mentioned, very early cars had a very fine thread on the ram end. This is very helpful when the thread has been attacked by salt or even general corrosion. The notches or serrations are designed to be gripped by a 'C' spanner but if this is not effective resort is usually had to cold chisels and a brickies hammer. This does little for the notches. Assuming you get the thing unscrewed, before replacing it pick up your angle grinder and straighten up the notches, not only for your benefit in refitting but for the next poor coot who has to remove it. And of course as always lather plenty of non seizing grease on the thread before assembly. 🛠

HYGROSCOPY

Don't turn the page it concerns you. Hygroscopy is the ability of a substance to attract water molecules from the surrounding environment through absorption. And we know that because of their affinity for atmospheric moisture, hygroscopic materials need to be stored in sealed containers. Materials and compounds exhibit different hygroscopic properties, and this difference can lead to detrimental effects, such as stress concentration in composite materials. A common example where difference in this hygroscopic property can be seen is in a paperback book cover. Often, in a relatively moist environment, the book cover will curl away from the rest of the book. The unlaminated side of the cover absorbs more moisture than the laminated side and increases in area, causing a stress that curls the cover toward the laminated side. But back to our real concerns.

You will have guessed that the purpose of all this information is to emphasize the importance of regular changes of the car's brake fluid. This stuff is subjected to very high temperatures, especially in the wheel cylinders and callipers, hence it must have a high boiling point to avoid vaporizing in the lines.

The picture at left is of the control valve that polices what goes on in the accumulator which screws into it. Briefly the bobbin seen at the bottom of the pic fights the big spring, upper left and moves in the housing at the top. The moving force is the pressurised brake fluid coming down from one of the pumps. When the accumulator has reached a pressure of some 2,500 psi the bobbin slides back and redirects any further fluid coming from the pump, back to the reservoir.

These bits are all a bit important and are not helped in their function by having to wade through a field of rust seen here liberally dusted around the various components. This valve came out of one of the much vaunted Corniches which while polished to perfection with quintessential leather and woodwork had a hydraulic system riddled with rust through sheer neglect!

This is a problem because vapour released into the lines is compressible giving no brakes and a keen ear for harp music!. Quality standards refer to a brake fluid's "dry" and "wet" boiling points. Wet boiling point, which is usually much lower of the two, refers to the fluid's boiling point after absorbing a certain amount of moisture. This amount is usually around 3.5%, which is considered the safe limit for moisture content. Brake fluids that we use are hygroscopic.

Brake fluid should be flushed, or changed, every 1-2 years. Moisture diffuses into the fluid through brake hoses and rubber seals and eventually the fluid will have to be replaced when the water content is too high. Electronic testers and test strips are commercially available to measure moisture content. Our brake fluids are also mixed with corrosion inhibitors however these degrade over time. New fluid should always be stored in sealed containers preferably in small ones to avoid moisture absorption.