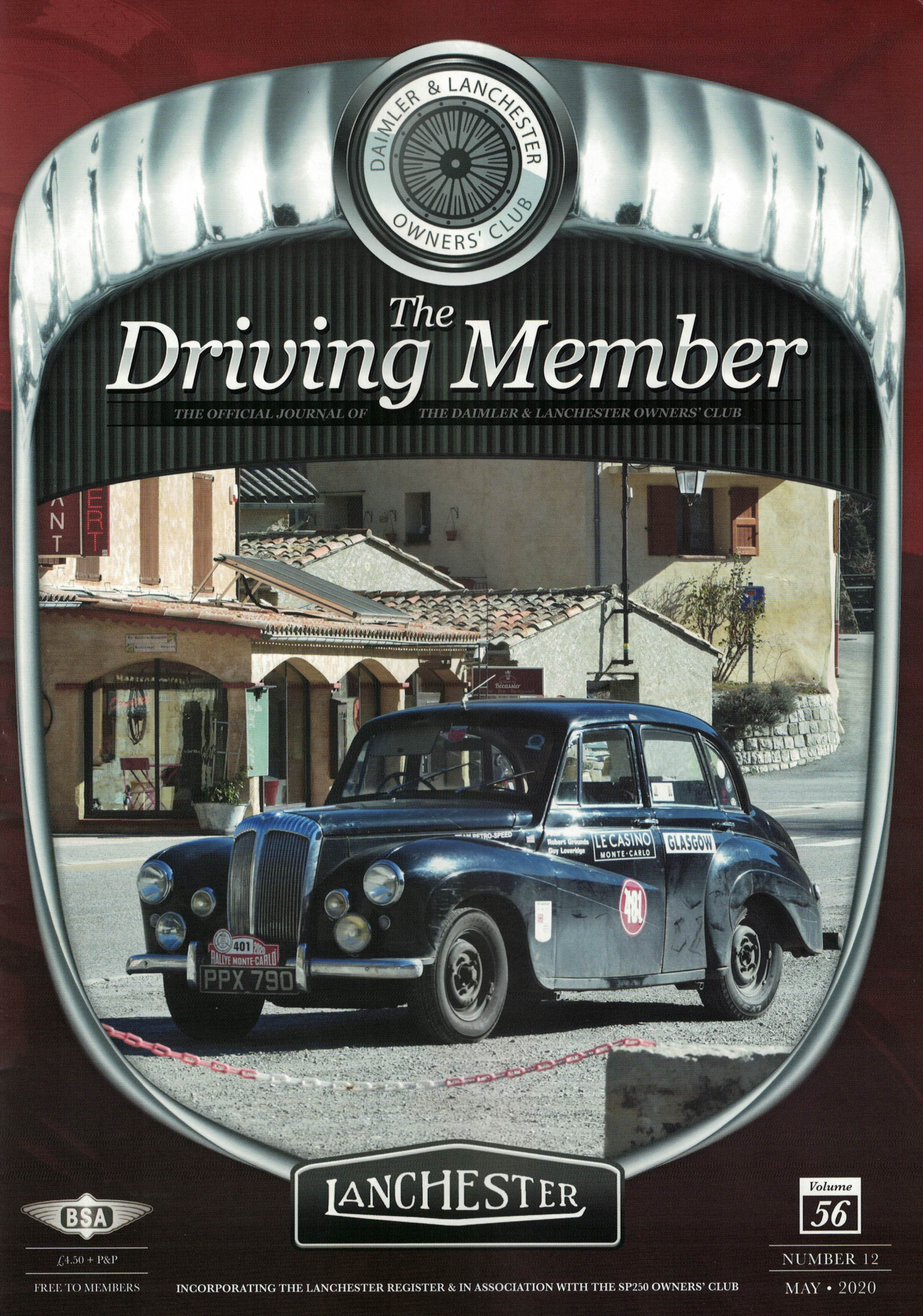

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Eric Goes Toyota

(AND GETS A NEW ENGINE) PART 3

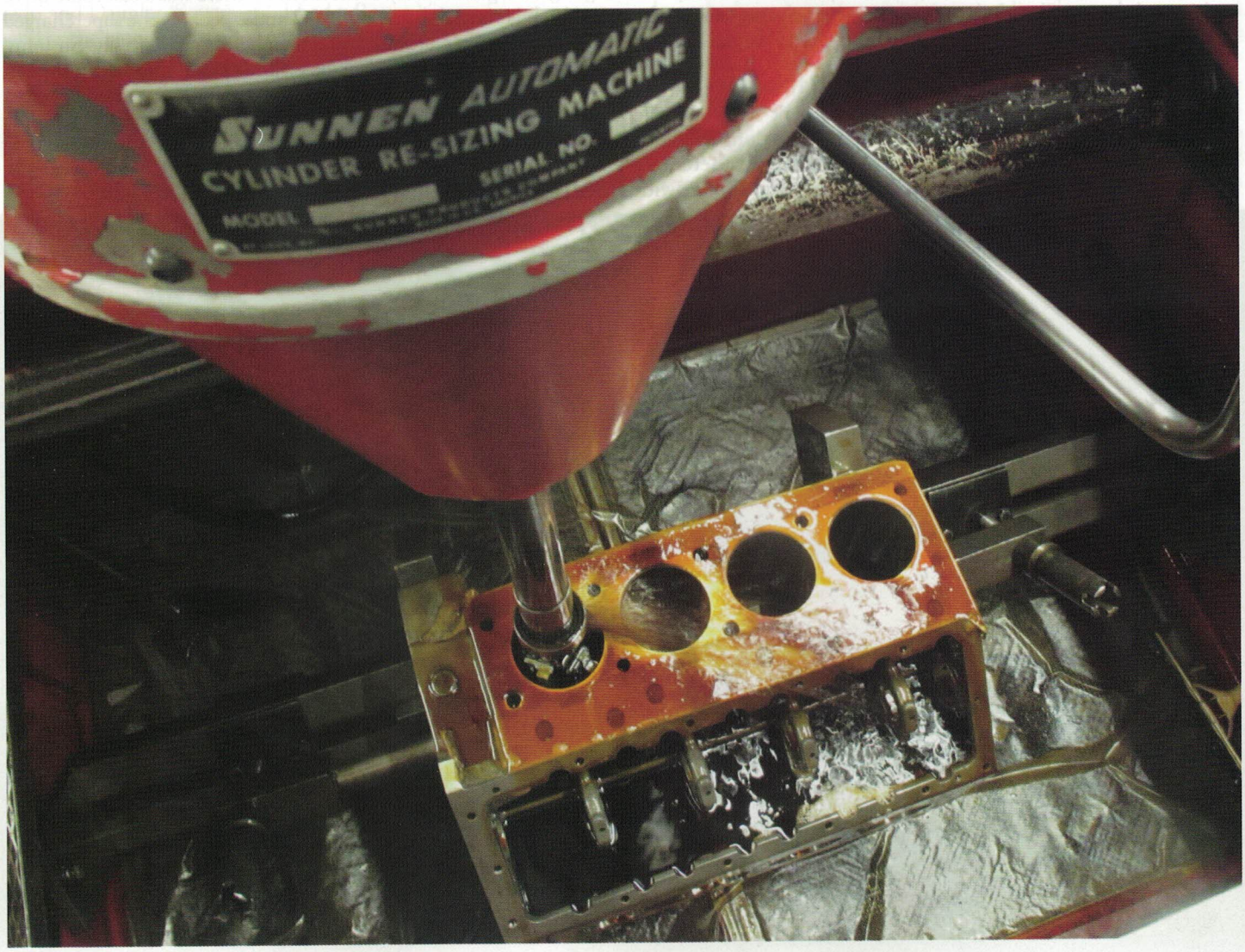
RICHARD LONG

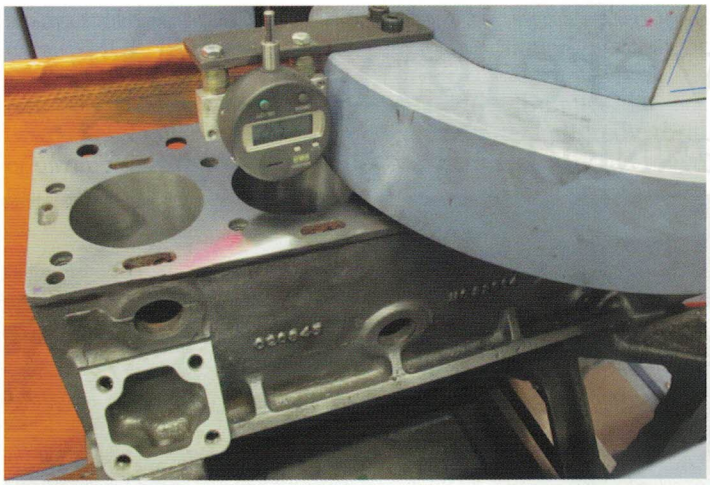
I favour electric fans over metal mechanical fans, as they free-up BHP from engine output and where they are secured to a water pump pulley remove the weight strain from that unit. The viscous fan is a heavy item and liberating the engine of this burden is beneficial. The V8 saloon radiator is decently sized with approx. 13L of coolant and the electric fan needs to be powerful enough to achieve the cooling process when the vehicle is not moving at a speed to promote air flow through the rad. With the viscous fan removed this provides plenty of space, between the rad and engine, to mount a 14" 160W electric pulling fan. In my opinion, there is little point fitting the commonly obtainable 80W units; as these have inadequate power to cool sufficient amount of coolant quick enough for these cars. Additionally and where possible, but sometimes it is not practical to do so, an electric fan should not be mounted in front of the rad; as this goes some way in defeating free airflow through the radiator which is a premium requirement. I did consider a 220W fan, but it's a little over the top plus slightly concerned that it might suck in small dogs and young children, which would certainly restrict airflow through the rad !! The OE shroud is currently dispensed with, as I want to design & make a bespoke aluminium shroud for the electric fan in due course; the drawings are complete and the next step {at some stage} is to make a wooden template.

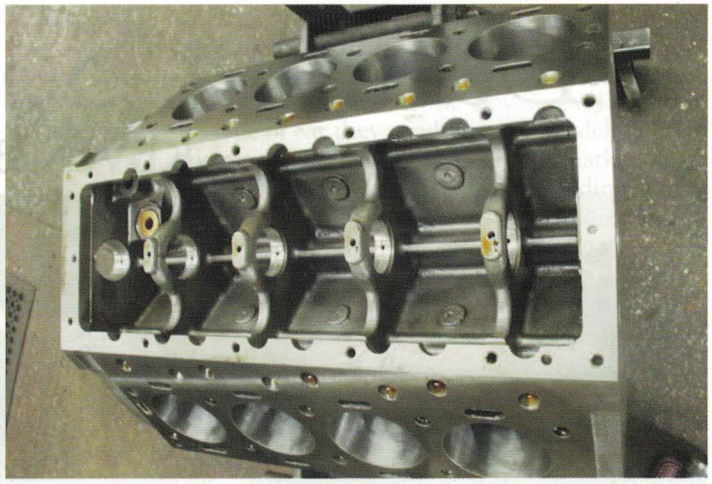
Activation of the fan is via a thermal switch in the rad and I have incorporated a manual override in the cabin. Locating a position for the override switch proved problematic, in so much as I did not want to make a hole in the main section of the dash; which would be out of keeping with the other switches etc. Fortunately there is an area of dash at the very bottom RH corner, which is out of your eyeline but still easy to access the switch; this became the nominated position. The other head scratcher was that the Daimler dash is a quality item and of some thickness – gazing at the dash the answer was staring at me straight in the eyes: obtain a HRW switch and use that. The benefit is that it is the correct length, matches the original switch gear and does the job !! A small fan warning light was also added alongside and the whole system was wired-in via a relay. The set-up works perfectly, it is neat and does not clash with the other OE instrumentation.

Meanwhile back in Lancashire the engine rebuild was progressing very nicely. The block was now re-bored at +40 and on completion the finished cylinders are round & true. Any corrosion or / and distortion is eradicated making this the required stage to be at, prior to cylinder honing. With the re-boring ticked off the list, the next stage was to engineer fly-cutting or decking (skimming) of the block. This ensures correct surface flatness and finish for the relatively unforgiving Daimler single layer shim steel head gasket. To obtain a correct "true" level, approximately .004" - 0.1mm is removed from the block deck faces and of course this is a double process being a V engine.

In the previous article, the cylinder re-boring process at "J&E Engineering Services" was discussed. Cylinder re-boring gets the finished job to within .005" - 0.13mm of the required finish and







it should be pointed out that the re-bore is NOT the finished process; the finite process is honing each of the eight cylinders. Cylinder honing removes the final amount of metal whilst creating the correct clearances and surface finish required for the all important cylinder lubrication and sealing. It is this process that really ensures that during the initial & critical running-in process, that the bedding-in of the cylinders plus cylinder rings within the bores is a perfect and long lived marriage.

With the above cylinder work now completed, attention turned to the camshaft section. Camshaft bearing replacement is always neglected when rebuilding these engines because good quality bearings are difficult to obtain and the replacement process is difficult as the bearing tunnels require line boring to the final size. Just because it is difficult does not mean that it shouldn't be done and again Jonathan at J&E set to work on ensuring the camshaft procedure was carried out correctly.

The camshaft bearing replacement procedure consists of the following: First the old bearings are driven out taking care not to damage the parent holes machined into the cylinder block. The new bearings are then driven in to the block, ensuring correct orientation plus accurately confirming that the oil holes are aligned with those in the block. The new bearings are then machined perfectly in line without deviation, this process being known commonly as Line Boring. This ensures correct valve geometry front to rear, plus the correct bearing to journal clearance and of course that the shaft turns freely if the above has been done correctly – needless to say, the tested rotation was the essence of perfection. As with all these machining tasks it comes down to proven skilled experience, the critical factor here is the setup - there is very little margin for error. As a result it is a very time consuming part of the engine rebuild, but the final result is worth every minute of the set-up and in essence it is a non-negotiable procedure if the job is to be done properly.

Of note these camshaft bearings are a single piece and you would not normally refer to these as shell bearings. That well known phrase "Shells" is usually referred to when describing main or big end bearings, as these are normally in two separate pieces. The camshaft bearings are of a Bi-Metal construction, comprising of an aluminium alloy with a steel backing.

The camshaft from my original engine, was in decent condition and more than suitable to be used. It was vapour blasted, checked and measured before the bearing journals were polished; with that done it was ready to be fitted when required.

Part of this project is to convert Eric from auto to manual transmission. This conversion warranted an additional engine block improvement – that being the provision for an additional thrust washer. The Daimler V8 engine, in OE auto transmission specification, makes use of only one thrust washer on the rear of the centre main bearing. The conversion to manual transmission meant that a significant increase in thrust load would now be created because of the clutch action. To counter this, the block was modified to accommodate an additional thrust washer which would help disperse this additional load. Again the camshaft line boring machine was used to facilitate this complicated modification. Suddenly, the engine rebuild was starting to take serious shape and as a bonus all was progressing well. Ironically, some other engine rebuild companies do not bother with this modification. That is for two simple reasons: (1) have not got the machining knowledge or (2) worse, cannot be bothered to carry out this important modification. The upshot of this, is your crankshaft will have an extremely harsh life with accelerated crank wear – a costly oversight !!

The next task to require attention, with a skilled approach and the necessary machinery, {which I will cover in Part 4, of this series} is the balancing of the crankshaft, pistons, rods and clutch assembly – both individually and combined. Fortunately, J&E Engineering Services has this elaborate and clever machine "in-house" which is excellent news. Equally important, it also means that the balancing process does not have to be farmed out to another company whereby your chosen engineer no longer has full control of your engine rebuild. By keeping all the required machining processes under one roof, which Jonathan provides, you know that the same level of engineering skill plus attention to detail is being applied to your project. There can be no doubt, this must provide customers with even more confidence.

To be continued.....

