

## **How could it possibly get worse? Read on!**

We left the Jag story at the point where the cylinder head had been removed for the second time to try to discover why the engine had lost all compression. The chief suspect was the new composite head gasket but on close examination there was nothing to suggest compression or water leaks on what were still, at this stage, cleaned faces. However, a quick glance at the cylinder bores made it all too clear why there was next to no compression. The bores were horribly scored. All six of them.



The picture shows the scoring but not really how deep those scratches are. So, how did it happen and what to do about it? One decision came quickly, I wasn't going to sell the car "As Is" and cut my losses. Far too daft for that but it was either a complete engine rebuild or a second hand engine replacement.

Replacement engine prices weren't encouraging. Anything with any sort of provenance was in the order of £5,000 and that is without a reliable guarantee. The other frightener is that, whatever the cost, the engine could have been built by someone like me! While the research went on I gave a lot of thought to how such damage occurred in the first place. It was obvious that some abrasive contaminant had got into the cylinders and that must have happened when the engine had been turning over whilst testing for oil pressure and water system leaks. This was all done with plugs out and turning on the starter. I suspect the contaminant got down to the rings and made a very successful job of ploughing up the bores. It may well turn out that the rings are damaged too. The block had been scrupulously clean prior to fitting the head and the head had been returned, "ready to fit". Well not quite as it turned out. In a conversation with the engineers they explained that after the machining work the head goes through a series of

machine washes and a chemical bath prior to assembly but they always recommend that the head bolt holes and waterways are cleaned by hand before fitting. Pity nobody thought to pass on that recommendation to me! In retrospect I should have thought of it for myself and it highlights the difference in the depth of knowledge between professionals and amateurs.

It took a few days to mull over the, "What next?" question before an intriguing option emerged that rekindled the sputtering flame of enthusiasm. I still had the cylinder block from a 1968 Jaguar 420 sitting in my cellar. Why not use the 420 block with the refurbished 3.4 cylinder head I'd spent so much time on? Hmm.....4.2 litre Mk2. Two hundred and twenty brake horse power. Hmm.....rather more poke than the famous 3.8 Mk2. Ah ha! Plan B in all its glory.

The 420 block was buried at the bottom of piles of old Jag junk and getting to it was an archaeological dig. As I went through the layers a surprising number of parts emerged that I had felt sure would be useful one day. I just hadn't expected to wait quite so long for the "ah-ha" moment. Am I alone in hoarding old stuff? When I eventually got to it the 420 block was in a pretty horrible state having been there over thirty years. As always in these cases, the bits and pieces to put it all back together again were successfully hiding in all sorts of places. Even so, the bores were regular though a smidge rusty and the crankshaft, which was separately wrapped and sealed in polythene had survived quite well. With some careful measuring of the 3.4 cylinder head and the 420 block, with close comparisons with a 4.2 head gasket and a parts number check in the manual, it did appear that all the necessary water and oil way holes lined up. The only oddity was that the 4.2 head gasket was longer at the back and stuck out about a quarter of an inch further than the 3.4 cylinder head. With that being the only misfit I could find it did indeed look like this hybrid would work. The 420 block, rods, pistons, crank and bearing caps (well most of them anyway) all went back to the same engineers that sorted the cylinder head. Why, you may ask? They are very good machinists and I would have been hard put to find better.

On examination very little was needed to bring the block to perfect condition but the bores did need to be taken from twenty to thirty thou oversize. All of a sudden I was getting very enthusiastic indeed as expert Ken and the engineering manager came up with all sorts of suggestions to improve the motor beyond what was feasible in 1968. New light weight pistons would raise the compression to 8.7:1 and the total capacity to 4.3 litres which set the scene for what should be quite a powerful engine and one with a considerable torque hike over the standard offering. These changes didn't add much to the overall cost and as this was always going to be a hybrid engine it seemed sensible to get the best out of modern technology where the real benefit to me would be reliability. The beauty of this approach was that I still had the original engine so if the car eventually became the property of a collector, it could still be returned to original.

Whilst the engine was away attention turned to other work that needed to be done. The brief drive when I bought the car highlighted some serious issues with the steering. That coupled with a concern that a more powerful engine should be matched with better brakes, steering and suspension lead to major decision number two. Could we convert the front suspension to full Jaguar 420 specification?

The Jaguar 420 was the last development of the compact saloon jaguars before the XJ6 models appeared in late 1969. With the revised engine capacity came a whole raft of changes particularly to the front suspension. Variomatic power steering was fitted which apart from the hydraulic steering assistance on what was quite a heavy car reduced the turns from lock to lock

from four and a half to two and a quarter turns. This makes a tremendous difference to the driving experience which becomes much more relaxed and makes manoeuvres such as negotiating roundabouts more fluid and so more comfortable for driver and passengers. The brakes were significantly more powerful with larger disks, three pot callipers and brake pads that had almost double the contact surface area of the standard Mk2 specification. Apart from shorter breaking distances they were also more resistant to fade. After some hours of poring through the workshop manuals and parts lists for both cars the only significant difference was the length of the road springs. The Mk2 springs were considerably shorter no doubt because the Mk2 was the lighter car.

With a complete 420 front subframe sitting in the garage the upgrade looked like a goer even though the frame itself was, like the engine block, rather old and nasty. Nasty as it was, it had the bits needed so work could begin straight away. To strip this subframe was an absolute mission. I'm a great fan of television restoration shows and if you watch as many as I have you could easily believe that all old cars come to bits with the lightest twiddle of screwdriver or spanner. A hint of WD40 or PlusGas, for the truly ceased bolts, and away you go.....or maybe not! My new favourite tool in the toolbox became the blow lamp. Without this to heat the many rusted nuts, bolts, fulcrums and set screws the frame would still be together today. One tip for fellow enthusiasts though.....the smell of burning WD40 seems to spread all over the house if you're working in an integral garage and that smell is not attractive to the ladies, apparently.

With a great deal of heating, hammering, twisting and pulling the assembly did come apart with only one minor fire along the way and a few bolt casualties. Reusable parts were cleaned and painted but I drew the line at refurbishing the brake callipers which were too rusty to clean up. I have previously used, and heartily recommend, Classic Car Spares in Macclesfield who can restore any calliper to better than new. Even the housings are disassembled and re-plated to a much better standard than the original manufacturer's with the benefit that they stay looking good long after being refitted to the car. Most of the new components, bushes, discs, springs etc., were sourced through Jaguar club events and recommended club suppliers and once everything was collected together the rebuild could begin.

You know how sometimes you do something and wished you'd thought it through a little more



before you started? Well this was one of those occasions. For ease of access when rebuilding the subframe I set it up on a builder's step which was on a raised plinth just outside the garage door. Very particular care went into siting the step and mounting the subframe to it as you can see in the photograph. Plenty of access all round especially for fitting the long fulcrum bars would make the build-up a real pleasure. The build went well and after a few hours spread over three days we had a completed subframe. Such

a pity then that I hadn't thought about how it was going to get off the builder's step and back under the car. Still at least it looked great.

This really was a puzzle because I couldn't get the engine hoist close enough to the centre of mass of the suspension unit because of the brick plinth. It weighed a ton and was far too heavy to man-handle. I was beginning to think I might have to partially dismantle it to make it

moveable but after much trial and error, with two winches, a builder's plank and a jack handle I was able to slide the axle down the plank until the engine hoist could gain a safe purchase. Talk about stupid!

With the road wheels back on the hubs the subframe was wheeled across the garage entrance, out of the way, and wrapped up in polythene to await the full transplant operation.

During the subframe removal from the car at the outset of all this work, we noticed that when the steering wheel was turned the lower end of the steering shaft moved a good half inch in whichever direction was the path of least resistance. This is a typical symptom of failed bushes in the steering column and quite common on this era of Jaguar. The final fix for the steering then was to remove, dismantle and refurbish the steering column. As expected the lower column bush had disintegrated completely and the upper bush was so worn that you could move the steering wheel laterally from left to right. This is the sort of job I like as it can be done sitting at the bench, in comfort with good light and a vice. Cleaned, painted and with new nylon bushes fitted, it looked great but..... I could barely turn the inner shaft. Why is it that every job seemed to need doing at least twice and sometimes three times over before it came right? I tried everything, lubrication, fitting the inner column into a drill to spin it in the bushes at 2000 rpm. Nothing relieved the drag which if left would mean no self-centring and unacceptably heavy power assisted steering.

Internet research suggested you have to be very careful in resizing nylon bushes. If the centre aperture is not perfectly round and correctly sized to the moving part, the wear rate is so high it will, in a very short time, become sloppy. Ideally the bushes should have been removed and resized with a reamer. Even more ideally the manufacturer should have sized them correctly in the first place. The final solution was to glue some 1,000 grade glass paper to a correctly sized



wooden dowel with a tapered lead in. The principle was to allow the glass paper on the lead in to resize the aperture of the bushes and then the

correctly sized dowel and glass paper to ensure the aperture remained properly rounded. Not a proper engineered solution but it worked in as much as the turning drag was gone whilst leaving no lateral play at all. Time will tell if it is going to wear excessively.

After five weeks and still no engine the time was used to clean up the engine bay and rebuild the heater box whilst also modifying it somewhat to possibly add a little heat in the cabin and



on the windscreen. I had heard that a heater matrix from an Austin Metro would fit the Jaguar heater box and contacted the long suffering Ken again to see if he'd heard of this modification. "Why don't you fit the upgrade kit from Clayton Classics?" was the sage advice and "mainly because I'd never heard of it" the less informed answer. One very reasonable internet purchase later I had a new high-flow heater matrix core and a much more powerful fan motor.

I rather enjoyed this rebuild too because, well you've guessed .....it could all be done whilst sitting at the work bench. The heater box was pretty rusty inside and although only surface rust it was extremely difficult to get to. It made sense therefore to have it professionally media blasted. The company I took it to confirmed they could blast-clean it safely but also recommended that they powder coat it inside and out, including all its internal air flaps. They explained that the powder coating system is ideal for a job like this because the powdered paint is electrostatically attracted to the charged metal surfaces. This means everything gets a coating even where the gun cannot get direct access as the powdered paint will be attracted to all of the metal surfaces. The net result is that I got back a better than new looking heater box which should now be resistant to rust for a good few years.

With both internal flaps free and moving through their complete arcs of travel, with new gaskets and seals made from sheet materials and with the matrix and flap control springs fitted, the now more efficient heater was ready to fit. As previously mentioned, the Mk2 engine bay is quite restricted with such a large engine in it so the finished heater box was left to one side until after the engine was refitted to give some very useful access space. With all that done I looked forward to basking in the warm cabin of this Mk2 Jag with clear windows and no old car condensation ever again! Did I say how I seemed to do every job at least twice? Well no exception here because once fitted to the running car again the enhanced heater box didn't give any heat at all but again, that's a story for another time.

Finally, after a two month wait I got the call to come and collect the fully machined engine. This time it would be me who rebuilt the whole thing and despite receiving it back in a "Ready to Build" state, I was definitely going to clean it again myself. I can learn my lesson you know. Especially the more painful ones!