THE Lagonda

THE MAGAZINE OF THE LAGONDA CLUB

Number 110 **Summer 1981**

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MAGAZINE

Issue No. 110 **Summer 1981**

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FRONT COVER: 1936 Ulster T.T. Fairfield in the LG.45R chases the Bugatti.
Photo: *The Autocar*

Out and About

THE SPARES Scheme '81 has got off to a good start with an immediate response by over 100 members who are prepared to back the scheme. There must be many more who are wavering about joining but who are waiting to see the initial efforts of the spares team of Alan and Peter and what they bring forth. The Newsletter will be reporting on their activities and their priorities in due course. At least there has been encouraging support to get things moving and Alan and Peter are currently analysing the most urgent needs of spares required by members following their replies. Batch production costs will then be assessed and orders firmed up before going into production.

★ ★ ★ ★

A MOST successful NORTHERN DINNER was held in April at Monk Fryston and the attendance reached 80, which was very satisfying for Herb and his organisers. A report on the evening will appear in this issue (I hope!) provided that the reporter can remember clearly what took place. Herb's speech on the state of the nation and David Hine's recitation on young Albert Ramsbottom's adventures at the Zoo were the highlights of an enjoyable occasion.

★ ★ ★ ★

FOR SOME strange reason the final paragraph of Arnold Davy's "In Register" article in the Spring Magazine failed to appear for which apologies are due. As this was very relevant to the manufacture of gears it is now printed below. Perhaps members can photocopy it and paste it down onto page 13 of the last magazine:

Heat treatment

The gear was carburised overall to a case depth of 0.035". The case hardness is 820–860 HV with a core hardness of 315 HV, equivalent to a tensile strength of 68T/sq.in.

In the '20s the heat treatment was probably a double quench. First, an oil quench from 850–880°C, then reheating to 760–780°C, a second oil quench and then tempering at 200°C. Nowadays, a single oil quench from 800–820°C and then tempering at 200°C would be regarded as quite sufficient.

I HAVE been asked to update some of the advertised Pub meets. Can Area Secretaries, other than those mentioned below, let me have the latest venues and times please? Those that have been confirmed are:

MIDLANDS: Third Thursday in each month at "The Gate Inn", Osgathorpe, Leicestershire.

SOUTHERN: Second Wednesday each month at 8.30 p.m. at the Windlemere Golf Course Club House, West End, near Lightwater, Surrey. Can be found near the junction of the A319 Chobham Road and the A322. For those approaching on the M3, exit at Junction 3. Alec Downie is the organiser.

NORTHERN: First Sunday lunchtime each month at "The Floating Light", Standedge, near Marsden, West Yorkshire.

LONDON: Jointly with the B.D.C., on the third Tuesday each month at the "Bishop's Finger" in Smithfield. Easy parking.

Any others?

★ ★ ★ ★

JOHN BATT points out that there is no July Silverstone V.S.C.C. Meeting as shown in the Fixture. This meeting has of course been transferred to Saturday, 19th September.

★ ★ ★ ★

FREDA ROBERTS writes to tell us that her application to take part in the F.I.V.A. International Rally in Sicily has been accepted. She will be driving her 11.9 Lagonda and we wish her well.

MAGAZINE COPY IS URGENTLY REQUIRED BY THE EDITOR PLEASE.

SATURDAY 26th SEPTEMBER

. . . . .

ARE *YOU* COMING TO THE AGM/CONCOURS?

PJ2716–
A Two-Litre Reborn

THE FOLLOWING is an account of the re-building of my 1932 2-litre. I do emphasise that it is a personal story and not intended to be a suggestion of how it should be done. I have in mind an article, by a member living in the Far East, appearing in the magazine which was subsequently torn apart by another member!

Like Derek Green's car, mine had passed through two abandoned rebuilds by two previous owners. In fact I had to collect parts of the car from two addresses 30 miles apart. I did this with the aid of two friends, one of whom owns a two ton truck and the other a hydraulic hoist!

The chassis had been under a torn polythene sheet and the body left in the open for about six years, while all the "bits" were in a small broken down shed complete with an earthen floor! The "bits" were gathered up with a shovel—earth included. The shed itself was completely covered with brambles which had to be burnt back in order for the truck to get close to it.

I hope the account will be of interest to other members similarly engaged in restoring their cars. I would have appreciated reading something similar in the magazine before I started mine. Mr. Waistell's recent letter had a very valid point on this subject.

As you will have gathered I am not a Concours man and believe, like Robby Hewitt, that Lagondas are meant to be used!

PREPARATION. A major problem was sorting out scores of items, not only of two engines (one sump, nine pistons, seven Con-rods) but literally everything, all completely stripped down, which made up a 2-litre including parts of three clutches and seven shock absorbers of three different sizes. The only units not taken apart were two gear boxes and the back axle.

The chassis, on two 21" wheels and two 18" wheels was stored in a friendly farmer's potato barn and the pile of bits in my own garage. Then started the preparation for the rebuild, the main object being to get the car on the road with what I would call "sensible" restoration without slavish adherence to originality which is costly both in time and money—I was already over 60 and didn't fancy the first drive being that to my funeral!

I have the greatest fortune in having as friends and neighbours the Lead family who run the local Renault agency but in addition own two 2-litres, one of which used to belong to Air Chief Marshal Sir Alec Coryton—if ever there is an original car that is it. Inevitably I was short of the odd few bits and having drawn a blank in Dorset Adrian Lead and his father generously helped me out from their own supplies. The greatest asset however was being able to visit their cars to check on details of assembly, measurement etc.

In my garage I constructed a set of shelves upon which groups of sorted parts were stored and subsequently removed to other shelves when cleaned, checked and, in some cases painted. In this way I could always fill in the odd hour or two in anticipation of ultimate assembly on the chassis although some parts remained on the shelves for anything up to three years! Having cleaned up one of the blocks/crankcase I took it up to London together with a set of pistons and liners and these were fitted and bearings re-metalled. The camshafts went to another firm for re-profiling.

I had previously made up two cradles which would support the engines either with or without sump and which in turn fitted onto a home built castor trolley. This same trolley also contained two screw jacks and the whole would slide under either axle of the car which could then be raised so that I could pull one or other end of the car away from the wall against which it had to be parked. I also made a strong portable bench about 18" high adjacent to a window and with a chain hoist above it. In this way I could work on re-assembling the engine whilst seated! A pull on the hoist and I could face either end or side of the engine. With this equipment and a further hoist point in the garage roof I was able to rebuild and reinstall the engine single handed. A tip however is not to allow the hoist chain to become looped around one of the engine bearers as I did—three alternatives, cut the chain, have a permanent built-in hoist, or start again!

The photo-copy of the instruction book as provided by the club is useful though by no means comprehensive but in addition a booklet was prepared by Davies Motors, the text of which was published as an article in successive issues of the magazine. These two together are helpful but there are discrepancies.

ENGINE ASSEMBLY. The instruction books cover most points but watch out where the crankcase, the sump, and the timing case meet—the latter two must be capable of individual removal. This sounds daft but lack of thought could lead one into trouble—one idea is to cut a screwdriver slot in certain studs so that they can be removed after taking off the nut. DON'T be tempted to tighten *bolts* into the soft castings. I was always taught that one screwed studs with a coarse (Whitworth) thread into a soft casting and nutted down onto a fine (B.S.F.) thread. Lagonda didn't go to the same school with the result that all 2-litres must have had problems with the bolts securing the timing case cover. Alternatives—Helicoil (expensive)—deepen the thread and use longer bolts or fit a size larger. I have used a mixture of the latter two but ground the heads to fit a 1/4" spanner! Bill Hartop wrote an excellent article on this subject in magazine number 12.

When timing the camshafts a useful home-made tool is of a piece of tube with three slots cut in one end to fit over the "spider" and a tommy-bar hole at the other end. The shafts can then be turned accurately. Similarly, make a handle to fit the "spider" of the Bendix gear/starter coupling and with it the engine can be turned slowly. I had no timing marks of use as the fly wheel had previously been on a 3-litre.

Set up all the valve gear but leave all but number 1 valves loose so that when timing those on number 1 the other cams are not

"fighting" you. BUT re-check the number 1 valve's timing when finally all the others are adjusted.

Notes (1) The top sawn off a wooden tennis net post is ideal as a block when fitting the valves in the head!

(2) Pay particular attention to the rocker box oil pipes—mine were nearly all completely blocked.

(3) When changing the oil don't forget to drain the camshaft tunnels—no reference is made to this in any instruction book.

I believe in steel for the block side plates and where the water elbow is fitted I brazed on a couple of nuts internally and blocked the ends off. This prevents water reaching the bolt ends and gives additional thread.

Ballata belting (as used on coal conveyors) makes ideal flexible couplings for the starter; pads for engine mounting, and also for isolating the exhaust system brackets from the chassis. I overdid the thickness for the engine pads and subsequently could not align the gear box!

"Bolt-up" flanges welded to the exhaust manifold and down pipe are the only answer but must be fitted accurately—the old system was doomed to failure.

It is as well, although this means more weight, to assemble and fit the flywheel/clutch prior to putting the engine into the chassis. I painted the whole assembly with Rustoleum, an excellent rust inhibitor. It's not a bad idea to punch mark the ends of a couple of the crankshaft flange plate studs to indicate T.D.C on No. 1/4 and the flywheel with corresponding marks. This aids re-assembly should it subsequently become necessary but do this before putting the sump on while the cranks are exposed. It is advisable to make a special cranked spanner for clutch thrust tappet adjustment.

I have since discovered that a Renault water thermostat valve exactly fits into the top water hose and its installation has been most satisfactory.

ELECTRICAL. Electronics are a closed book to me but getting current from a battery to lamps via switches/fuses/ampmeter is within my ability and as I had to start from scratch I sat down with paper and coloured crayons. I had previously consulted the Lucas cable charts and worked from the colours available. I had difficulty getting some advertised colours and

small quantities as the local depot didn't really want to be bothered. As a shareholder however I got some Executive assistance from Birmingham! Lucas were helpful as to cable load capacities.

I chose a colour for each specific circuit, e.g.; Heads, Side/Tail, Starter etc. and made use of tracer cable with a single main colour for everything on the auxiliary fuse, e.g.; Horn, Dash Lights, Petrol Gauge etc. I fitted junction boxes on the chassis at front and rear so that I can remove the Lamp/Horn brackets complete without disturbing the lamps themselves. I also made use of a pair of multi-connectors behind the dashboard so that this can be unplugged and disconnected electrically from the body which itself can be removed from the chassis without disturbing the main circuitory. Even the side lights can be unplugged, and I was able to wire up the complete dashboard on the bench.

A common cause of failure is faulty earthing and I haven't relied on one piece of chassis being bolted to another. The front and rear lamp brackets and the dash panel are individually cable earthed directly onto the o/s frame member.

The central dashboard multiple switch for the lighting and charging circuits is now used solely for the former and as the dynamo had already had the 3rd brush removed I have unashamedly made use of a modern V.C.U. I have however used an old fashioned fuse/ junction box which was on the car.

Having no Autovac I have had to use an electric pump but this can be hidden under the floor. I had an old Austin 7 spot light (useless as such!) and have fitted this up as a reversing lamp, switch controlled by the gear lever. One 12-volt battery has been used and the car should be negative earthed. The positive lead to the dashboard can be taken from the starter solenoid switch, under the front passenger seat.

I had a catastrophe with the dynamo which had obviously come from a 6-cylinder car as it had a 3-pronged lug on the shaft whereas the crankshaft had a 180° slot. I therefore cut two lugs off and had one welded back on at 180°. Obviously I didn't get them truly aligned with the result that the bearing housing in the mag. end plate fractured. I turned off the broken remains and made another housing to bolt in.

A set of three small windscreen wipers can be made up from modern large blades which are themselves made up in sections; in fact two of them can be produced by cutting one large blade exactly in half. It makes sense to fit corresponding screen washers.

BODY. The body sides fit astride the chassis and fall below the main frame members. The practice was to pull the fabric up over the overhang but when this inevitably rots water gets in and rests on the lower wooden rails with obvious results. An idea is to panel the gap in with aluminium sheet having first splashed plenty of creosote onto the woodwork. If one 12-volt battery is preferred to two 6-volt, one battery box can be enlarged (there is room) and the unused one makes a welcome space for "running spares". The bottoms of both battery boxes and the foot-well tool box were absolutely rotten and I have no welding facilities. I therefore cut away the rusted metal and made three inverted "caps" from galvanised sheet which slid up over the sound portion which remained of each box. These were soft rivetted into position and the exterior joints covered with Sylglaze metal frame glazing strip. The entire outside area of each unit was then liberally coated with an underseal compound.

There was no exhaust system with the car and having got hold of a longer but slimmer silencer I was able to create an additional smaller foot-well tool box. I was fortunate in that the main woodwork was in reasonable condition and only a small amount of scarfing

in was necessary where rot had got a hold. Modern wood glues are far superior to anything Lagonda ever knew about and certain awkward joints I reinforced with metal plates/brackets. Such plates are essential where the lower (forward) rear mudguard brackets are attached to the body.

The windscreen (upward opening) was in poor condition but I had been lucky to get a spare—lucky I thought at the time. Removing and replacing the same windscreen is one thing but fitting another presents all sorts of problems. The screw holes in the pillars do not necessarily coincide and the curvatures allow only one fitting position—too high or too low and the pillars move out of parallel. Then there is the backward rake wherein the important thing is to get the spigot projection for the hood location plumb vertical. I had no hood at this time but due to the flexibility of the frame this is not much help as a guide. In fact there is little or nothing from which to take measurements.

Eventually, three weeks after fitting I noticed a slight one sided lean and this I could not live with! Final procedure was as follows. Fit one pillar by eye with one screw in the centre hole—allow for about 1" from the edge above the centre of the dashboard but bear in mind the location of the side lights. In a wooden batten drill two holes the same distance apart as the two in the leading rail of the hood. Use this to locate the tops of the pillars and fit the second pillar similarly. Check first that the pillars are equal distance at top and bottom and then see if the wooden fillet straddling the scuttle between the pillars fits snugly—mine didn't and had to be lengthened. Get another batten and place it across the rear of the car on the folded hood frame; adjust it for level by taking measurements up either side from the rear spring grease nipples; then from the front of the car check by eye that this and the batten across the pillars are dead parallel. At this stage check the measurements between the top of the pillars rearward to the hood frame pivot points. If they are not equal you could have hood problems. If all is well clamp a third batten between the top of the n/s pillar down to the door post to hold it firm whilst being finally bolted to the body. Before doing the same to the o/s pillar first fit the screen itself and clamp it up in the closed position then clamp in the support batten. When finally fitting the fillet between the scuttle and the windscreen don't rely on the double edged piping for waterproofing—apply some mastic sealing compound.

This is a bit long winded and probably boring to those not likely to fit a windscreen!

I had the fabric and internal trim done professionally and am now saving up for the upholstery! A word about the weather equipment and a personal opinion. Double duck is both bulky and clumsy, it fades badly and for what it is has a very short life. Once again it was the best available at the time. P.V.C. is far better both in wear and looks for the tonneau cover and hood bag and these take most of the weather. When it comes to the hood itself P.V.C. again or there is an excellent German made lined material (but expensive) which Rolls-Royce use. It looks admirable, is pliable and durable; difference in material cost about £80. Single duck or P.V.C. for sidescreens. I have had the tonneau cover studs fitted to the *side* of the body where they double up for use with the sidescreens. This makes the cover more water/wind proof.

BRAKES. Here again the instruction books cover most aspects but they contradict themselves over the rear brakeshoe levers. The pair closest to the springs operate the foot brake shoes which are on the *inside* of the drums, i.e.: nearest to the wheels. I found that whilst the spindles of the cams operating the foot brakes were badly worn the bronze sleeves through which they pass were in good trim (strange). I therefore simply had the spindles built up slightly oversize. Virtually every operating lever in the whole braking system has alternative hole positions. Nowhere can I find any comments. Change merely alters the leverage and all adjusted in one or other direction would create an undesirable extreme. A happy medium seems to be the answer but equality is desirable either side except possibly a judicious experiment should the front brakes be particularly difficult to equalise. I was impressed by George Dean's ideas in magazine number 15 on this subject.

One thing is certain however and that is that the rods between the front brake drums and the intermediate drop arms on the chassis should be pivoted *above* the rods going back to the cross shaft. The cross shaft is provided with a stop but this becomes inoperative when

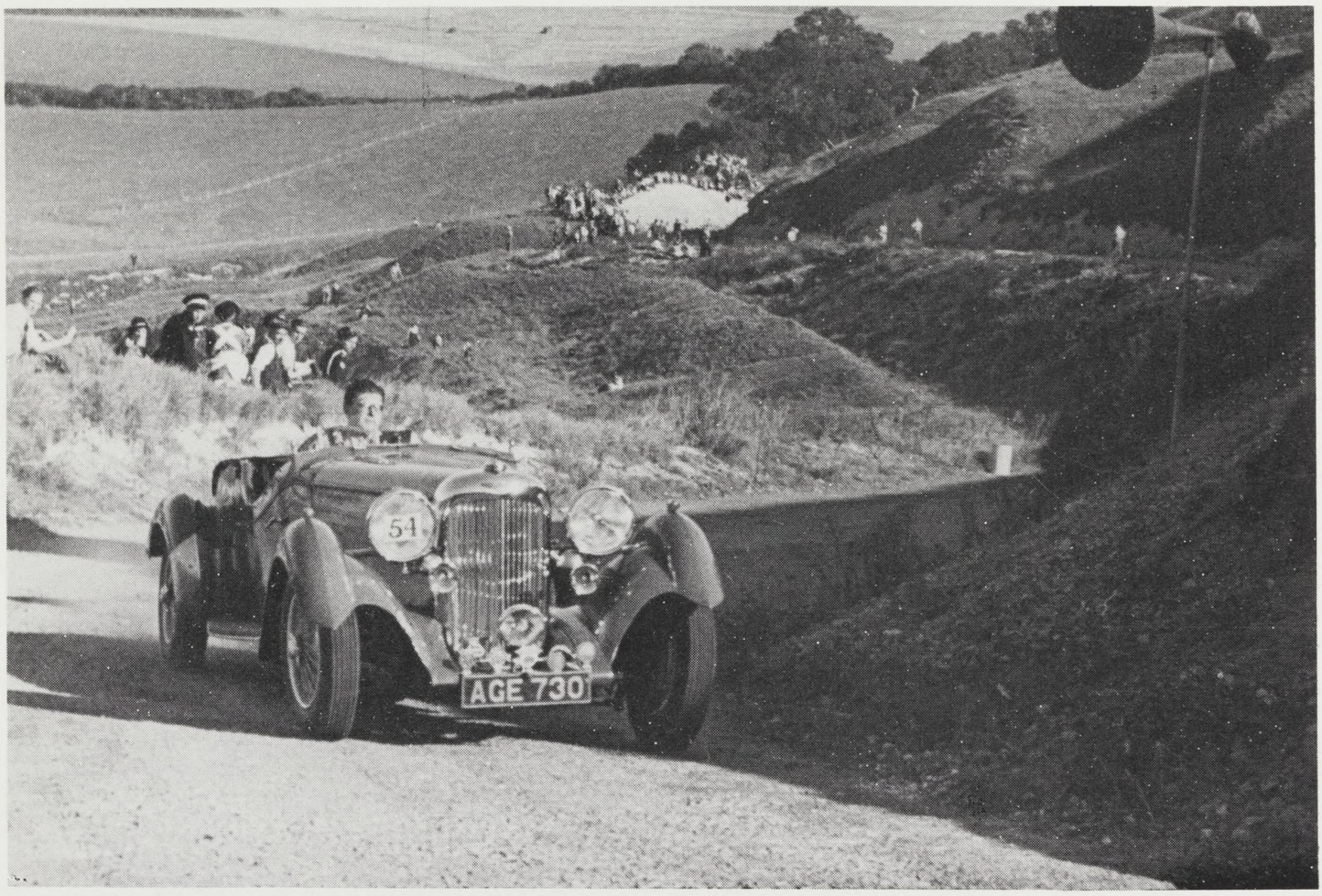
use is made of the hand adjuster on the foot brake pedal. I don't like the pedal bashing up against the foot boards so have fitted a rubber padded stop to the bulkhead. By far the greatest wear on the many joints is taken on the pins passing through the yoke-ends as distinct from the levers and I simply replaced these. I found not only mud but stones in the compensator box and to prevent this I have fitted soft leather gaitors through which the cables pass on entry.

Views vary as to the settings for the shock absorbers but the main thing is to get them equal on the bench before fitting. All that is needed is a spring balance and a vice. Suggest 12/15 lbs. and thereafter adjust in accordance with running conditions. In spite of numbers and pointers nobody will convince me that each pair remains equal on adjustment!

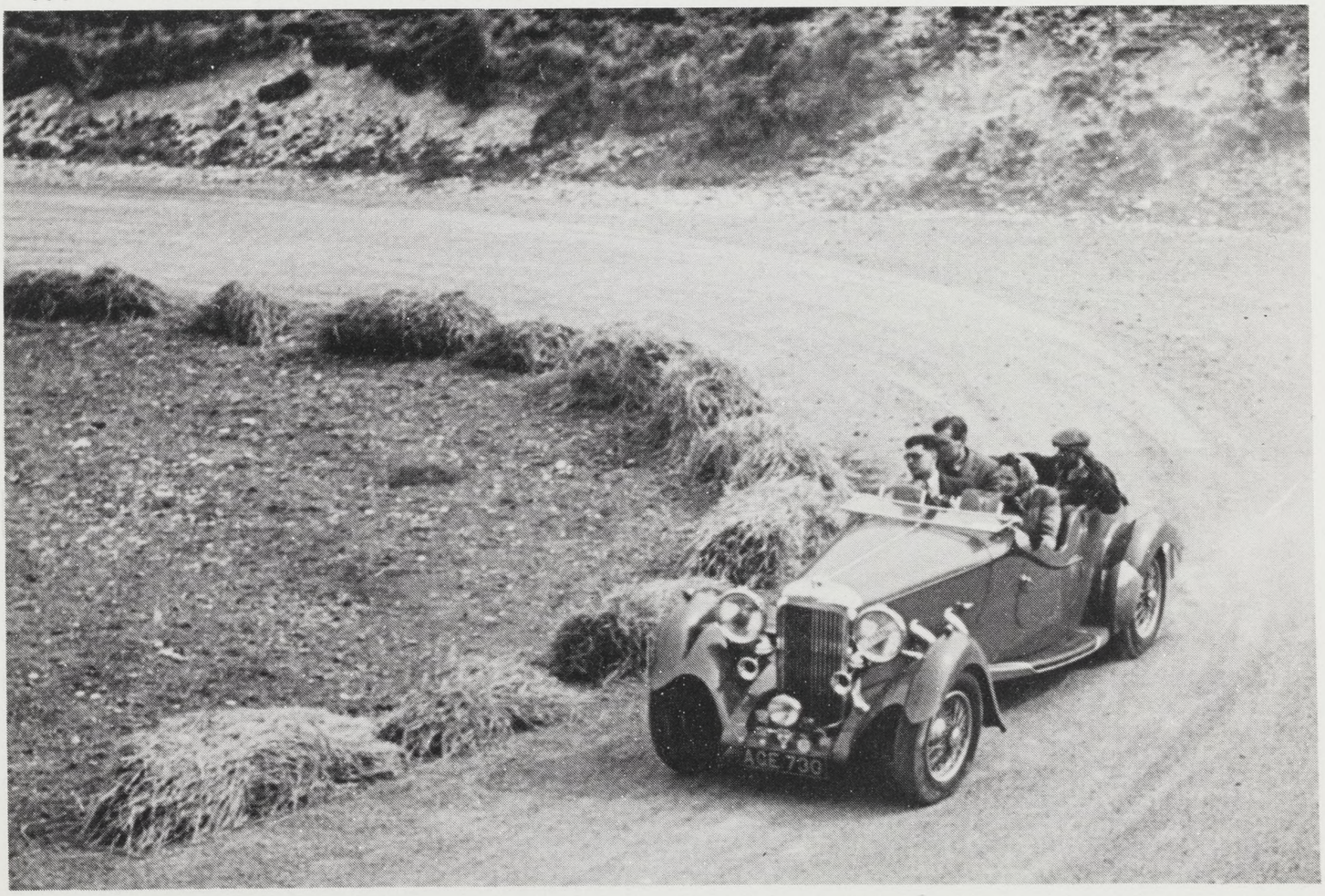
TAILPIECE. When PJ2716 was put back on the road again Adrian Lead did the M.O.T. and the local licensing people were helpful as the log book had disappeared and of course I wanted to keep the original number and the car had to be registered for the first time at Swansea. On renewal the following year I was not required to produce an M.O.T. certificate. Upon enquiry at the Post Office I was told "the car is not yet three years old"!

In September 1980 I drove the M.P. for Dover, the Right Honourable Peter Rees, the full length of the Sandwich By-pass which he had just opened. This had been talked about for the past 50 years and the car was about to achieve its 50th birthday!

JOHN ANDERSON



Happy days at Firle. Bob Freeman-Wright swings through the bends *Photos: Temple Press*



"The Quality Car"
Ramblings of a Club member

BY THE Spring of 1961, when a gallon of National Benzole cost less than a half of bitter does today, and the roads of Britain were flush with old bangers, my little Morris Minor on which I had learnt to drive not far from where Alfred burnt his cakes, began to feel small. It was not that it had shrunk, and I had finished growing by then. It was a grand little car, an open two seater with quite a pretty body, very reliable with excellent hydraulic brakes. I looked around, scanned the back pages of Motor Sport, visited a Riley Redwing in Brighton, tried a high chassis 4½-litre Invicta with extraordinary aerofoil shaped running boards at Jack O'Lanterns near Romsey, and generally drooled over an impossibly expensive range of interesting machinery. As a cadet at Sandhurst my enthusiasm had been fired by a breathtaking (literally) drive to Marlborough College in a Hyper Leaf of a fellow cadet. Sadly he was killed in 1964 while driving a Frazer Nash in the Johore Grand Prix, just before I was able to visit him in Kedah where I think he also had a 3-litre Bentley. I later saw the 'Nash in Butterworth in a healthy state of rebuild.

Anyway, on the way to London one day in a friend's V8 Pilot, we saw what appeared to be a Bentley parked on the forecourt of a garage on the A2. The car was in reality a Crossley, not a make that I had heard of, and was in useable order and for sale. It looked good, so after 24 hours thought my bank manager and I bought the car for today's price of two 21" tyres (actually 1980 prices).

I learnt that Crossleys were built in Manchester by the firm "of gas engine fame", that this one had a thing about shedding pushrods, and that the electrical system was depressingly far removed from anything intended by Rotax. Over the next few months many people were to become familiar with the weight of the car, at least until I coaxed more life out of the magneto. Why I kept it is hard to understand: the last straw could have been shearing a half shaft on the way back from Spain in August 1961 at the end of an incredibly badly organised touring holiday. However the machine carried three of us plus camping gear most of the way, with very little trouble.

Not far from the ancient smugglers lane in Ridley Wood on the western side of the New Forest lies the village of Burley. In those days John Shutler ran the local garage and then owned that lovely 4½-litre Invicta FHC (as advertised in Motor Sport recently), and the garage had some three or four Invictas lying about for as long as I can remember. In the nearby village of Burley Street a Clyno 9 was in regular use, although somewhat more pedestrian than the Shutler car! It was then that I learnt that there was a make of car called a Lagonda, that they used a Crossley engine in one of their models, and that at a place called Longham was a house and an orchard full of Lagonda bits and pieces, presided over by Ivan Forshaw. This marked the beginning of the Crossley's reformation. Not only was Ivan able to furnish me with spares which I had quickly learnt were scarce, but he was always willing (and is still) to lend a sympathetic ear to my mostly hyperthetical mechanical worries. By the end of 1962 the Crossley was reasonably reliable. At about this time I tried the 16/80's induction and exhaust system in favour of the cooking plumbing and non-original Zenith I found on the car. There was no noticeable difference but those twin SUs looked nice and polished up well.

It is now 1981 and the Crossley has given me over 150,000 miles of almost trouble free motoring, and, God willing, contiues to do so. A brass plate screwed to the bulkhead is inscribed "The Quality Car". I agree.

On reflection this must all be quite boring to anyone but myself—a self centred, biased ramble indeed! I suppose the message is that a sound, good quality vintage car will, with regular maintenance and sympathetic driving, provide reliable and charming motoring, and the more regularly used the better. A penalty for such use might be the somewhat non-Concourse look, indeed I would be prepared to challenge Jeff Ody for the Dirty Engine award! But does this really matter: serviceability and useability must come first and The Quality Car fulfills both.

I have heard that Lagondas are quite good cars too.

STEPHEN WELD

Technical Notes

Dismantling the Steering Head

APPLICABLE TO all 2-litre models, 16/80 Special Six, and 3-litre prior to ZM series in 1932. Jack up the front axle; remove road wheel; remove brake drum—note two diametrically opposed holes tapped 5/16" B.S.F. for insertion of bolts to jack the drum off its register. Remove screwed cap sealing the interior of the hub and wipe out grease, exposing the castellated and pinned nut on the end of the stub axle; remove screwdriver plug at the root of the hub splines and through this hole withdraw the split pin locking the nut. This may be rather fiddling as the legs of the split pin must first be straightened; a loop of wire and a pair of pliers, using the edge of the hub as a fulcrum point for the pliers, will be found useful in straightening a split pin bent inwards—do not brutalise the pin as this will aggravate the task. With a suitable box spanner remove the nut from the end of the stub axle—this will only be finger tight as it is the means of adjustment of the two Timken taper roller races on which the hub runs. Grasp the hub firmly with both hands and tug sharply outwards, when the hub complete with its races will be pulled off the stub axle. Do not mislay the shaped outer steel washer, which is positioned by a flat on the stub axle thread. Check that the races have not been runing round on the stub axle.

If cycle type wings are fitted these must now be removed by taking out the ring of bolts securing the sub-frame of the wing to the brake backplate, and the two larger bolts holding the main frame to the platform on the stub axle. Remove the four fitted bolts securing the backplate to the stub axle; it is not necessary to remove the brake shoes unless relining or other work on these is intended, Slacken the pinch bolt securing the brake operating lever to the operating cross shaft; this lever has a parallel bore with Woodruff key. If leather gaiters are still fitted to cover the exposed part of the cross shafts, loose these off by removing the two small bolts securing the clamping plate to the axle beam; note that the outer ends of the gaiters are secured by a twist of copper wire locating in an annulus in the bronze universal joint housing; such gaiters are found only on low chassis type axle assemblies.

Now pull the brake backplate outwards away from the car, and with a light hammer tap the brake operating lever inwards towards the centre; the backplate will come away complete with the Perrot shaft and universal joint mechanism. If any difficulty is encountered in drawing away the brake cross shaft in this manner, it may be due to a thin steel washer which is located between the brake operating lever and the axle beam, fouling the Woodruff key and this washer must be raised over the key.

This leaves the stub axle alone on the end of the axle beam; the steering joints must now be dismantled so that the steering arms are free. Remove grease nipple from top of steering head and lift off mushroom shaped dust cover with a screwdriver. Remove split pin from castellated nut, remove nut and lift off thrust race complete. Remove cotter pin locking the king pin in the eye of the axle beam. Using a copper hammer, the king pin may now be tapped out downwards, thus freeing the stub axle. Check that the king pin has not been "working" in the axle beam; if there is evidence of this it will be scrap and must be replaced; if there is consequential wear in the eye of the axle beam this too may require replacing, or boring and sleeving to bring it back to original size; it must not be expected that the cotter pin will hold a king pin which is slack in the axle beam, and bad steering will inevitably result.

If new king pins and bushes are available the existing bushes in the stub axle may be pressed out if there is access to a suitable press, or pulled out with a simple rig of tough bolt, suitablly sized washers and tube. The new bushes are similarly pressed or pulled into position and finally reamed to suit the king pin. Check that the greasing hole in the lower bush has been properly drilled and fitted.

If new parts are not available the existing king pins may be ground on the worn diameters, hard chromed, and ground again to finish size, and new bushes made up and reamed to suit. In cases where the wear is not

severe, it may be found possible simply to grind the worn diameters true, and make up and fit new bushes to suit; in many cases the upper wearing diameter may not warrant such attention. That part of the pin which is located in the axle beam must not, of course, be ground.

The Perrot shaft and universal joint assembly may be dismantled for cleaning and examination by removing the two bolts securing the bronze housing to the backplate, and gently knocking out the assembly with a drift from the cam end; remove the bronze housing and the steel sleeve and expose the joint proper. The Perrot shaft and cam may be freed from the orange by turning first one and then the other squarely through 90°. Examine the forks of the Perrot shaft for distortion, and for signs of cracking at the roots; if damage is detected the shaft must be replaced, as it cannot be straightened or repaired.

Re-assembly of all parts of the steering head and braking assembly is the reverse of the above detail, and attention is drawn to the following points—the adjustment of the steering head thrust race will best be made by drawing up the nut until all play is taken up and then slackening back about half a turn. The nut on the end of the stub axle provides adjustment for the hub races; taper roller races must not be adjusted too tightly or damage will result. The adjustment will be correct when just perceptible play can be felt at the rim of the road wheel, the latter being locked up tight.

The following notes will be of assistance in checking the extent of wear of certain component parts, or in obtaining replacements:

Original Internal Diameter of Front Brake Drum	13 5/8"
Original Thickness of Brake Linings	1/4"
Inboard Front Hub Bearing. Timken Taper	Cup 333 Cone 339
Outboard Front Hub Bearing. Timken Taper	Cup 1920 Cone 1986

Hub bearings are of generous size and rarely give trouble unless they have been adjusted too tightly or lubrication has been neglected. The inner race and rollers of the outboard bearing are immediately removed for examination after the hub leaves the stub axle; the inner race and rollers of the inboard

bearing may similarly be removed after the dished plate housing the felt seal has been carefully levered out of the hub with a couple of screwdrivers or small levers. Should it be necessary to remove the outer races from the hub, the interior must first be thoroughly cleaned; it will then be seen that the shoulders against which the outer races rest are relieved in either two or four places to permit the races to be tapped out with a suitable drift.

The hubs should be well packed with grease on re-assembling; Filtrate Super Lithanode is excellent for this purpose, or Duckham's HBB. Subsequent lubrication is by grease gun, using an adaptor which replaces the screwdriver plug in the hub splines; such adaptors are available on loan from me; they differ from ordinary hexagonal grease nipples in that they have an American thread: $^{7}/_{16}$" × 20 T.P.I.

Replacement parts of any kind for these axles are normally available from me, and advice on any specific points, and on the best specifications of friction lining material, will readily be given.

Slight variations from the above procedure will be evident on high-chassis cars, particularly insofar as the brake Perrot shaft is concerned, but all general principles will apply.

All threads are RIGHT hand with the exception of the centre lock nut for the off side road wheel.

IVAN FORSHAW

FOR SALE

Photostat copy of Instruction Book—please state which required: 16/80, 2-litre H/Chassis, 2-litre L/Chassis, 3-litre/3½-litre., M.45, LG.45, Rapier, LG.6, V.12	4.50
(DB 2.6 litre, DB-litre available only from Aston Service-Dorset)	
Photostat copy of Meadows Engine Catalogue	1.50
Car Badge (enamel and chrome)	o/s
Lapel Badge (enamel and chrome) (brooch fitting)	0.50
Tie maroon Terylene	2.00
Overall Badge	1.00
Badged Car Key Fob (leather)	o/s
Magazine binder (holds 12 issues)	2.00
Short history of the Lagonda	0.25

Available from the Secretary

Silverstone—11th April

"A Musical Start to the Season"

SATURDAY 11th APRIL saw the first V.S.C.C. Race Meeting of the year falling a little earlier in the month than usual. The previous two days had been glorious, but Saturday dawned wet, although, fortunately, cleared for the racing and everybody enjoyed a dry and warm day.

This year's entry totalled 151, which is reasonable, although there were a large number of non-starters. Only three Lagondas were entered, Colin Bugler defending club interest with his beautiful LG.45 and two Register members, the most notable being Peter Evans, who appears to have forsaken his GN for the ex-Richmond single-seater twin supercharged Rapier.

The programme started with the usual 40 minute high speed trial, being then followed by eight assorted races, including the Itala and Lanchester Trophies Scratch Race.

A certain well-known "Vintage Insurance" company's hospitality suite provided an excellent lunch, during which time the assorted machinery participating in the 40 minute trial, battled against the clock. This was followed by the first Five Lap Handicap which passed uneventfully and then onto the big race at 2.45 p.m. for the 1908 G.P. Itala and Lanchester Trophies.

It was a fine sight to see three almost identical 35B Bugattis on the front row of the grid and further back the recently repainted and slightly modified Straker-Squire of Adrian Liddell, looking like a black and white humbug. The story goes—the car was originally painted in this striking fashion as the original owner sported some socks, which he liked so much, the car was decked out in similar fashion. A good story, whether true or not! Of special interest, was a recently completed Becquet-Delage of Arnold-Forster, dated 1923/17 and of 11.9-litres. This is a V8 aero-engined monster, but in the tidy Delage chassis looks quite small, and after a hesitant start, ran extremely well. The race was both interesting and exciting with Bugatti again running out the winner.

A further Five Lap Scratch Race followed, then the Hagger Pre-War 10 Lap Allcomer's Scratch Race, which brought the heavy metal out for the first time. Peter Evans joined in with the Rapier. Paul Morgan, whose father, Brian, rebuilt the aerodynamic bodied V.12 some years ago, brought out his newly completed Talbot Lago, having driven it to the Circuit on the road!! Morley was again spectacular in the Bentley Napier, but E.R.A.s showed the way home.

Event seven was a Ten Lap Allcomers' Event. This was for the more modern cars and an excellent duel took place between Chapman in the Monza Lister Jaguar, Halford in the Lotus 16 and Corner in his superb V.12 3-litre Ferrari Dino. Throughout the race one had the impression Corner was playing with the other two, and sure enough on lap nine, he came through ahead of Chapman and appeared to run the last lap holding a comfortable lead, to win by around four lengths. Three more Talbot Lagos appeared, all with slightly different coachwork, and it seems the V.S.C.C. has four of these appearing regularly. With their six cylinder 4½-litre engine, they are not unlike the 4½-litre Lagonda!

Two Five Lap Handicaps closed the meeting, Event eight having an excellent mixture of vehicles of all shapes and sizes, and seeing Colin Bugler getting in as reserve with a 40 second handicap. He pressed hard throughout the race and just came through the winner. An excellent reward for all his hard work in finishing off such a wonderful car. So the meeting ran to a close with the usual pleasant stroll round the paddock and farewell to friends. Several club members were around during the day and it was pleasant to see Mike Hoare and family down for the weekend with their caravan. Many regulars were missing, presumably, as for the first time Silverstone fell the day following the Northern Dinner!

It was most pleasing to have a "Bugler" up at the front.

JOHN BATT

Putting the "go" in CGO62

by L. S. Michael

THE STORY of my modification and development of a 1935 M.45 Rapide is one of more hard luck than most 4½-litre owners can relate. I can think of several cars which have led as strenuous competition lives and far more arduous daily existences than mine, that have had scarcely more than a decoke, and a set of tyres in five years. The history of what became, undoubtedly, the finest car I have ever possessed (and this includes a very good example of the "best car in the world") is sufficiently sprinkled with undeserved competition successes to compensate in some degree for mechanical tribulations.

CGO62 was purchased in 1949 as a successor to an Alvis Speed 25 Saloon. Its previous owner was Lance Comfort the film director, who was also a Lagonda enthusiast. He had the engine extensively overhauled by University Motors sometime before selling it. When I took over it was in excellent order, both mechanically and bodily. Painted two shades of grey, it had a twin brother in the club, the property of Mrs. Thelma Ruffer.

After the Alvis it seemed immensely powerful (there was an extra litre of engine), and immensely awkward to handle. A "Speed 25" handles beautifully, having the right amount of oversteer to warn when you were overdoing it. By that, I mean that its tail would start to slide very gently when cornering too fast, but it would respond instantly to correction. The M.45 Rapide would not. In standard form the weight distribution on its 10 ft. 3 in. chassis put too much weight on the front wheels. In the case of my car this was aggravated by having two spare wheels mounted one each side forward of the scuttle. The result was, it understeered enough for one to be able to corner appreciably *faster* than the Alvis *without sliding*, but if you overstepped the mark it was impossible to correct. On slippery roads it would charge straight on completely ignoring the direction taken by the front wheels, and on dry roads it was tiring indeed, to drive over the winding country lanes, favoured by rally organisers. In addition, on more severe, fast main road curves, one never seemed to finish winding on whichever lock the bend required. These characteristics were not shared by the ordinary M.45 cars on the 10 ft. 9 in. chassis, which had different weight distribution.

On the track the only method of finding how fast a corner could be taken was to try it faster and faster in practice until you spun. There was never the slightest warning when this was about to occur. No preliminary lurch or slide, no hint that all was not well until suddenly you were revolving in front of the oncoming traffic! This experience in M.45 Rapides was also enjoyed many times by the principal driver of the other M45 Rapide, "Bunny" Henry, and also by Maurice Leo, when he drove that car.

Broken Ribs—Bent Car

On one occasion shortly after reading Nuvolari's advice to racing drivers to "drive by the feel in the seat of the pants". I was able to take corrective action the instant she started to go. The result was that instead of spinning harmlessly in a tight little circle and ending up on the grass at Woodcote (Silverstone) I described an enormous arc, and landed up on the banking at the *inside* of the track with a broken wheel, a bent front axle and three broken ribs. I am happy to say that this was the very first time I had ever insured a car for competition! Joe Kingston's Garage of Blakesly near Towcester towed the car away. Joe, being a long standing member of the V.S.C.C., supervised the restoration meticulously, everything being carefully checked and measured, and the axle rebuilt by Blakers before being returned to duty.

After that, which was in 1949, a great deal of fiddling with tyre pressures, spring settings, and shock absorbers was undertaken. The original dampers, Girling Luvax Vane type and Andre Telecontrols were found to be working perfectly. The hydraulic built-in jacking system cluttered each axle with two heavy hydraulic rams. This entire system was removed and effected a worthwhile saving in unsprung weight. Trial and error established that the best shock absorber setting for the car in its 1949 form was to have all the front ones

really tight, and the rear not quite so tight. Tyre pressures of 40 lb. in *front* and 36 lb. in the rear were most satisfactory for racing. On the road a comfortable ride and good handling resulted if all tyres were given 32 lb., the telecontrols slacked right off, and the hydraulic dampers set at half way.

Getting Nowhere Consistently

At this time in road trim, with a little fuel in its 32 gallon tank the car weighed 36 cwt., and was pulling a 3.31:1 back axle. I was thoroughly enjoying racing this rather heavy handful but getting consistently nowhere. In those days of course, pump fuel was about 72 octane and my engine had a massive "compression plate" inserted between the block and crank case, which succeeded in making it run very sweetly on pool, but I could not get even 3,500 in third gear anywhere on the club circuit. The only reason for going into top was to practice gear changing and because I felt it indecent to stay in third the whole time!

The car would do 85 quite readily on the road and a true maximum of 3,250 r.p.m. in top—a little over 90 m.p.h., could be achieved on the relatively empty Oxford by-pass of those days. In 1949 that was a respectable speed, for on pool petrol, only the most expensive sports cars could equal it. The acceleration figures then were 0—50 in 10⅗ secs., 0—60 in 17 secs., 0—70 in 25. Nevertheless it was below the performance expected of the car pre-war.

Next summer CGO took me on an extensive tour to the Riviera. The only trouble occurred when leaving "Eden Roc", after visiting some friends. The clutch stuck in the fully depressed position. A "garagiste" was summoned from Antibes several miles away, and I was towed in. He and his mechanic fell on the car with gusto. They dismantled the clutch, having first removed a chassis cross member, and then reassembled it. All this including the tow was accomplished on a Sunday for £10. It was impossible to get out of them what they had done. In fact they had done a great deal as their floor was, for a time, alarmingly strewn with bits, but all their work was quite unnecessary. The reason why the clutch jammed out was lack of lubrication of the splined shaft on which the withdrawal mechanism slides. On subsequent occasions when this happened, I have merely opened the inspection plate at the top of the clutch housing, dropped some oil on the visible portion of the splines and forced the clutch out with a jack handle. A few drops of oil on the splines every 1,000 miles or so is really the answer. There is no other form of lubrication for this particular part, although the handbook claims that the camshaft is drilled to permit an "oil mist" to penetrate to the splines.

For the 1950 season I was determined to go faster, so I removed the compression plate and like everyone else located a secret source of Benzol. This was used to bring "pool" up to about 80 octane. CGO62 was now running on the standard Rapide C.R. of about 7.5:1 and a much livelier car it was. I could push the rev. counter needle into the red in third whenever I wanted to, and celebrated by going off the road twice on the East Anglian Motor Clubs two day National Rally. Fortunately the only damage was loss of time.

The car now had a maximum of practically a 100 m.p.h. two up with the screen erect. Acceleration figures taken over the same road, and with the same watch as before were 0—50, 9⅘ secs.; 0—60, 15⅗ secs.; 0—70, 22⅗ secs. These figures were slightly inferior to those attained by the road testers of the *Autocar* and *Motor* in 1935. It was motoring quite nicely at club races and it was pleasant to finish in the middle of the field, instead of hotly disputing the tail end.

Pub Experts Adrift on Plugs

About this time I was still pretty gullible on the subject of Lagondas, and listened with wide eyes and open mouth to the wisdom of the numerous saloon bar experts, who had even managed to get as far as changing their own plugs, while some of the real "gen men" had actually read the instruction book. As anyone who has seen a 4½-litre instruction book knows, the information contained therein would not even sustain a public bar conversation for more than ten seconds in the club today. Nevertheless, under the influence of eight pint barristers and bearded giants in check shirts, oil coils were purchased, carburettors fiddled with, ignition timing over advanced and harder and less suitable plugs installed. All this consumed an immense amount of time, and some money, with absolutely no improvement in performance and a tendency to oil plugs in traffic. KLG M60

plugs have suited very well even in the "hottest" state of tune, and M50, which are softer have done equally well.

As my car was going considerably faster than during the previous year, I was engaging the clutch at about 3,500 r.p.m. for racing starts, not only to try and make an impression on my handicap, but also to try and make some impression on the spectators, of whose existence I had suddenly become aware. This technique enabled me to leave long black lines of rubber on the track, and secured an invitation or two, to represent the club in inter-club driving tests. It also burnt out the clutch, which finally gave up the ghost as I was turning across heavy traffic, from Knightsbridge to Sloane Street. The long suffering lady, who is now my wife, helped me to push all 36 cwt., across a line of hooting buses and taxis to come to rest outside Harvey Nicholls.

The car was towed away by an expert, who resided in a mews. By the time the engine was out, and the clutch away being refined, he disappeared leaving a couple of half built cars behind him (one mine), which his creditors made frenzied attempts to seize. I must say that I never received a bill for the part of the work already done, but I was compelled to put the thing together myself with the aid of a part-time fitter.

Massive Meadows Machinery

This was not the first time I had laboured thus on the internals of an engine, but the Austin Sevens, Standard Twelves, and even Alvis Speed Twenties, which I had cheerfully assaulted with spanners and hope had, it seemed, weighed less as complete units than each individual bit of the massive Meadows 4½-litre.

The clutch restored I found that the way to get round the track reasonably quickly was to push up the revs in the gears. The red line on the M.45R rev counter appears at 3,800. I was consistently going up to 4,000 and sometimes more in second and third. This combined with the fact that oil pressure was now below standard, oil surge in the sump when anything but full right up, reduced oil pressure to zero on the corners and the partly choked radiator boiled under racing conditions, produced the inevitable trouble. At the end of the 1950 season, while proceeding at full bore in third towards Becketts, an anvil chorus arose from the engine, which proved to be bigends giving their farewell performance, and a broken push rod was thrown in for good measure.

Ex-W.D. Light Tank Engine

Rather than face the expense of rebuilding this engine I purchased from Henry Meadows one of their ESTB engines for £30. These engines were built during the war for the War Department. Some had been intended for light tanks, and some for Marine use. In fact the Marine version was still built after the war and sold as the "Comorant" for about £400 each. So the ex-W.D. ones whatever their condition were a bargain.

Most of the ESTB engines were not new, but fully reconditioned, and were lying crated, and wrapped in their tropical packings, outside the works at Wolverhampton. They were fitted with Solex carburettors, mechanical petrol pumps, single magneto ignition, huge flywheels and starter motors, no fans, and most had a certain amount of superficial rust about them.

The sump filter which held nearly 5 gallons of oil was a completely different shape from the M.45R, and had a scavenge pump as well as the usual main oil pump in it. In spite of these differences they were basically the same as the old M.45 engines, even the mountings were disposed at the same centres.

I borrowed a lorry, hauled my engine home and started to take it to pieces. This led to the discovery that the pistons were of a much lower CR than my original ones. The old dynamo had to be fitted to take the drive to the distributor to fire the exhaust side plugs. The original flywheel and starter motor were also used. All this involved dismantling both engines, so it was decided to have some Martlett pistons made of slightly higher compression than standard. The teeth on the flywheel were built up, and all reciprocating parts were balanced by Laystalls in unit with the clutch and flywheel.

The oil feed from the ESTB scavenge pump was led through a large bore copper pipe looped to act as a mild cooler. Some ex-Invicta exhaust manifolds were obtained from a breaker and fitted. These provided a separate pipe from head exhaust port similar to that used on the later LG.45 sanction 111 Rapides. These manifolds were led to separate exhaust down pipes which emerged from the side of the bonnet passed unobtrusively through the wing and terminated in the twin exhausts.

Thus the front three cylinders and the rear three cylinders each had a completely separate exhaust system with no sharp bends or restrictions. It was a considerable improvement on the standard layout. This arrangement undoubtedly contributed to cooler running—the exhaust valves have never shown any sign of wear since—and greatly reduced the back pressure in the exhaust system.

It was impossible to fit the vibration damper from the old engine to the new crank shaft, nevertheless, when finally assembled in the chassis the unit proved smoother, and more free from engine periods than the old one. The omission of the damper also reduced the inertia of the engine which contributed to better acceleration and gave a quicker response to the throttle when revving up between gears. It is interesting to note that the damper was offered as an optional extra in the Meadows catalogue describing this engine, and that it was not specified for service requirements in spite of the many expensive modifications the War Dept. had made to the original specification.

Lower Ratio for Back Axle

During its last race the old radiator had well and truly boiled in about three laps, so a new one was made by Sercks with a larger capacity than standard. The extra capacity was probably unnecessary, but it did enable me to race without a fan, and so save a few extra b.h.p. for propelling the car.

After the new engine was fitted the back axle failed, and it was rebuilt with a 3.58:1 crown wheel and pinion supplied by Davies of Staines. I had always considered that 3.3:1 was too high a ratio for a car of this weight on the circuits available in England. It did give effortless cruising in the eighties at under 3,000 r.p.m. which was excellent for continental touring, but it was too high for maximum acceleration it being quite impossible to reach the peak of the power curve in top gear on any of the circuits then open.

The result of this work was to produce a smoother car with much more rapid acceleration. In 1951 I did a number of rallies and hill climbs, seldom getting into the award winning brakcets, but finishing in the top half of the results rather than at the bottom.

Acceleration now Impressive

The road maximum speed did not appear to have been increased very much by the installation of the ESTB with slightly raised compression (approx. 7.6:1). The Oxford by-pass (still relatively free from traffic in 1951) was used to obtain a maximum speed of just over the 100, with windscreen and side screens erected two up. This was a very slight increase over the previous maximum but it reached it with decidedly greater ease and 90 would come up whenever one felt like it. Acceleration figures were now impressive: 0—50, 9 secs.; 0—60, 13 secs.; 0—70, 19½ secs. At that time with the exception of the first XK120s there were few road cars that equalled the Lagonda's performance.

The 1951 racing season was fortunately free from trouble, and although I did not collect many prizes I was frequently within striking distance of a place—quite enough to encourage me to keep trying. Only minor adjustments and the fitting of rebuilt modernised S.U.s were carried out at the end of this season. I had the car re-sprayed a beautiful shade of ruby red maroon. This work was done by Davies Motors of Staines who thoroughly overhauled the coachwork replacing any doubtful timbers and making sure everything was thoroughly sound, as by now I had quite decided to keep this car for the rest of my life!! When it was completed it looked absolutely magnificent, but unfortunately it did not last. In less than three months white lines had appeared on the bonnet top and wings and back it went to be re-sprayed again. This time it stood up better, but in a little more than eighteen months I had to have it all off and another colour applied. So be warned against falling for rich maroon.

New Ideas Bring Big Improvements

I had a certain amount of mechanical work done at Staines but they were very much against departing from standard Lagonda practice in search of extra speed. Their view was that the reliability of this pre-war machinery would be seriously impaired if it were subject to greater stresses than had been envisaged by the works. Events have shown that perhaps there is something in what they said, but in any case I was prepared to make *some* sacrifices of reliability in favour of performance. So when Leo set up on his own I visited him in the hope that he would have some ideas. He had quite a few, and I must say that as a result of his advice and work, really substantial improvements were made. In the final stage of development under his care, it was without doubt the fastest and the best handling M45R in the country if not in the world. It was very much faster than the standard LG45 Rapide at Silverstone, and Woodwards at Firle Hill Climb. Both these gentlemen were experienced competitors and no doubt would then have done better than I did, if they had been driving my car. The only faster Lagondas competing then were Bob Wright's and Joe Goodhew's. These two were very highly tuned Sanction III LG45 Rapides, both appreciably lighter and slimmer than standard. At its lightest, CGO62 weighed 4½ cwt. more than Bob's and over 6 cwt. more than the Goodhew car.

To be continued

ARRANGEMENTS FOR THE AGM

Saturday 26th September

FOOD—The hotel serves lunch from 12–1.30 p.m. Afternoon teas also available or bring your own picnic. There are two "take-aways" near the hotel entrance.

DRINK—The hotel is unlicensed but you can bring your own; the Club will run its own bar while there is a local pub at the hotel entrance.

For anyone staying overnight at the hotel or wishing to drop in on their way home there will be an informal House Party starting at about 8 p.m. on the Saturday a few minutes from the hotel.

Further details will appear later. The hotel provides lock up garaging at 70p per car.

THE OATLANDS PARK HOTEL, near WEYBRIDGE, SURREY.

Letters to the Editor

Midlands Notes

Dear Sir—The March pub meet was held at a member's residence—Malcolm Wells, who along with his sister and brother-in-law put on a fine slide show, a most enjoyable supper and a few glasses of beer. The slides were mostly of the Midlands Section activities during 1980 and were so good that I think this could turn into a "first of the season" every year.

I have to go abroad sometime during May for several months so it seems I will miss most or all of this year's activities. Nevertheless I have secured the A.M.L. Works visit again for Friday 24th July. Meet at 1 p.m. at the Works. Anyone wishing to go please contact Malcolm Wells, 21 Charlton Grove, Chilwell, Notts. (0602 250 646) who will be dealing with all the Midlands activities in my absence. There is a limit of 16 plus the normal stipulation of you must be in a Lagonda.

I hope you all have a good season.

HARRY TAYLOR

Club Competitions—are they dead?

Dear Sir—I am very concerned that our Club would seem to be uninterested in the continuance of competitive activities for Lagondas. This is surely to deny one of the basic principles upon which the Club was founded?

A succession of Competition Secretaries have tried to keep the enthusiasm going but Club members have always been a bit difficult to stimulate. It is my opinion that Club Officers have to beg, threaten, cajole and generally encourage us to take an active part in competitions. Remember Mike Wilby's efforts in this respect?

John Batt has struggled manfully to maintain a competition calendar but with only spasmodic support, apart from the small collection of stalwarts from the North. Nevertheless I do not think that the Club can afford to close down this part of its programme. The V.S.C.C. takes pride in its active support of motor sport. *Somebody* in the Club must surely be willing to take on this thankless task? Perhaps we can stimulate a bit of the old competitive spirit and get a few members to take their cars out to exercise them.

There has to be a lot of "chivvying up" to revive matters—is it too late?

IAIN MACDONALD,
Cornsay Village,
Durham.

Technical Articles

Dear Sir—With reference to your note in "Out and About" concerning the writing of technical articles, surely most of the meaty ones have already been written.

My own copies of the magazine go back to No. 27 of Spring 1958, and as plenty of technical articles have appeared since then, I would suppose that others had appeared previous to that date. Is there very much more which could be written about the vintage and P.V.T. Lagondas of use to the average owner/driver?

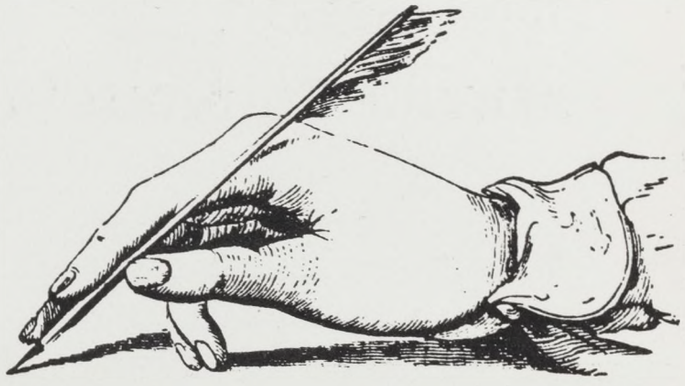
As many new owners have joined the Club in the last two years or so, might I suggest reprints of earlier articles as possible space-fillers.

TONY ADAMS (A.14)
Whitley Bay,
Tyne and Wear.

P.S. reprints of some of the early photographs of Lags in competition might also give some pleasure—have any members got photographs in dusty drawers which could be of interest to others?

MAGAZINE CONTRIBUTIONS

AUTUMN: AUGUST 15th
WINTER: NOVEMBER 15th
SPRING: FEBRUARY 15th
SUMMER: MAY 15th



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