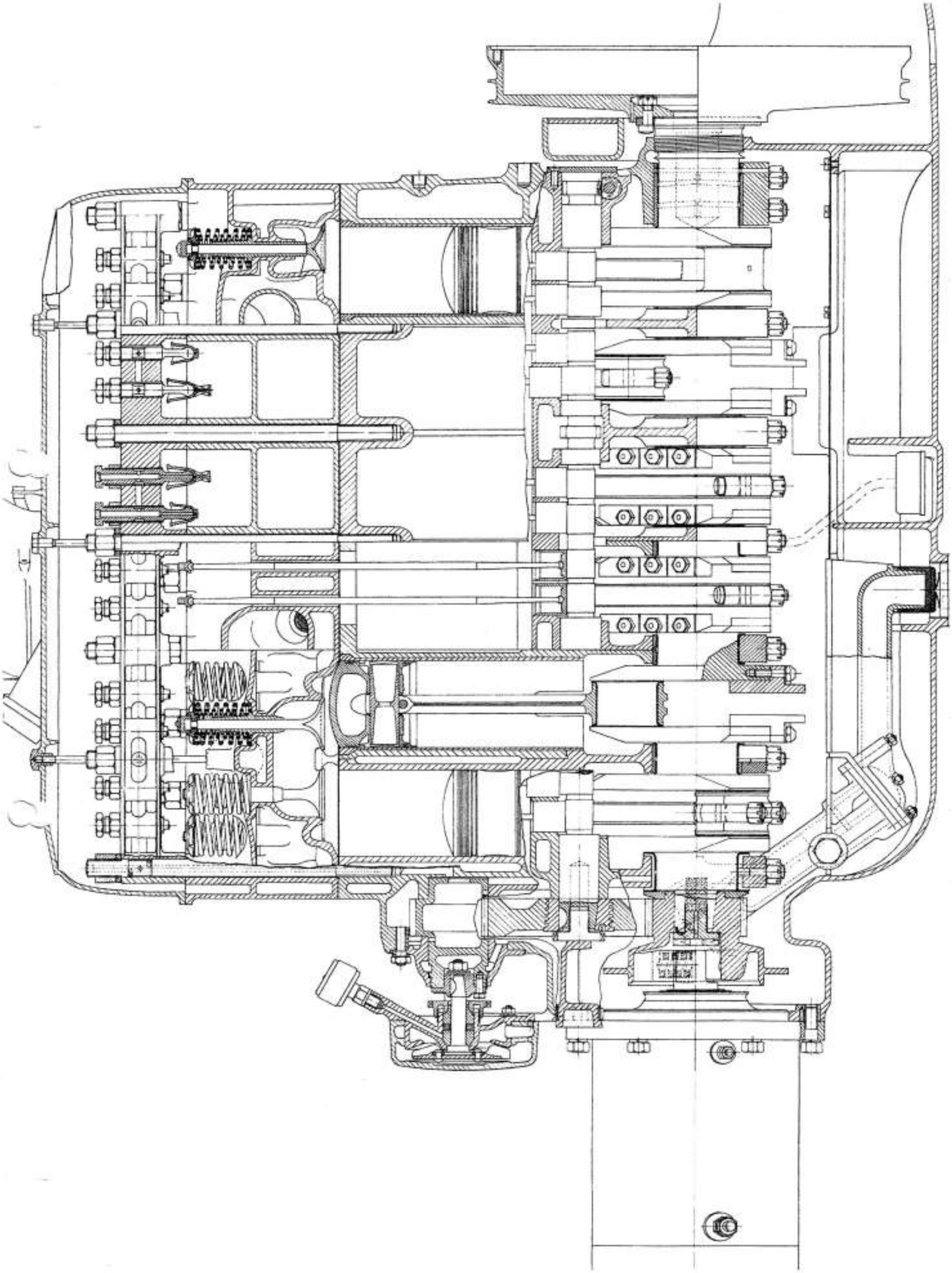
The Talbot Manual
Technical Resource

Engines

Bill Barrott & Martin Bryant

7 Talbot Engines



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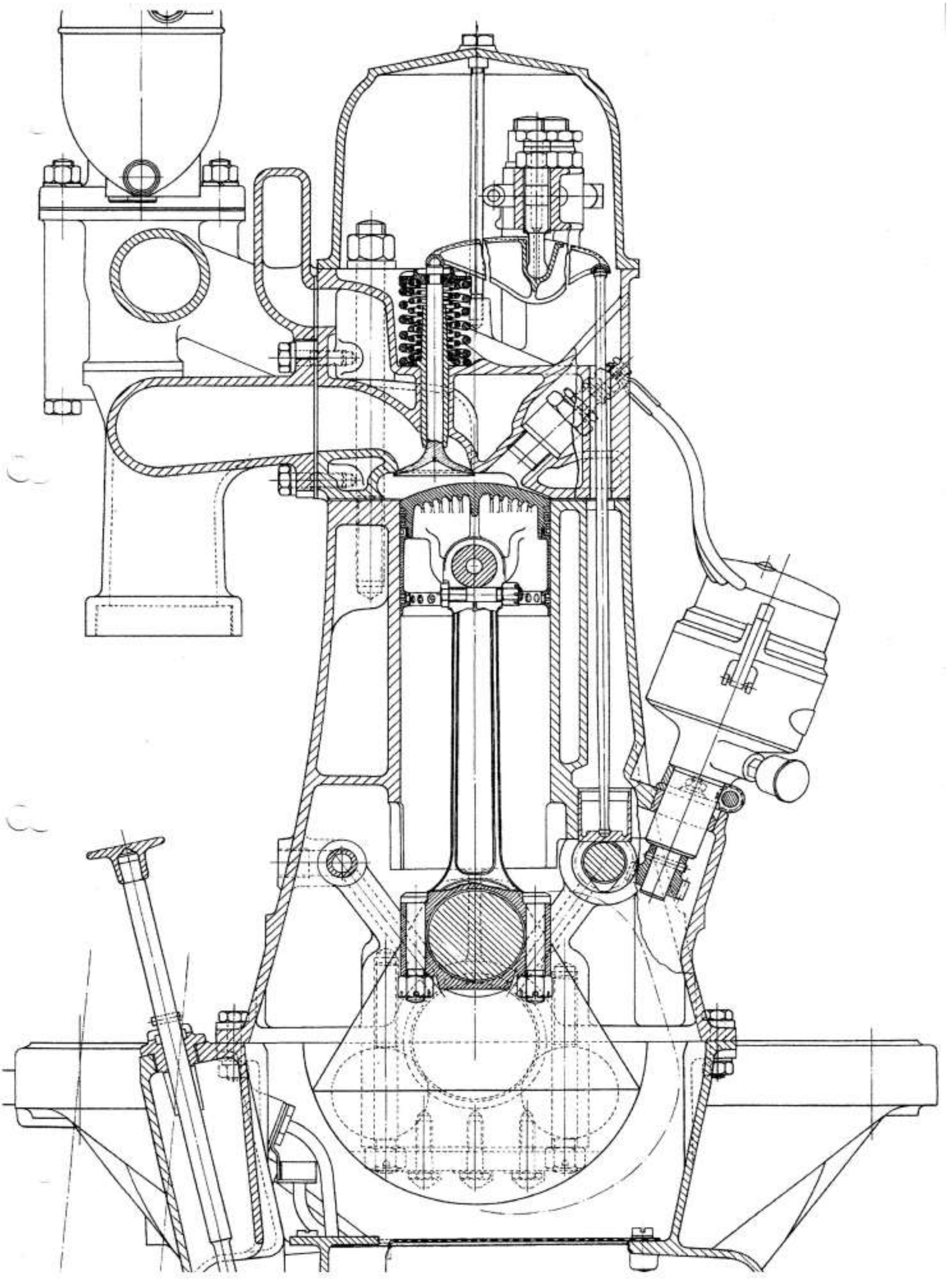
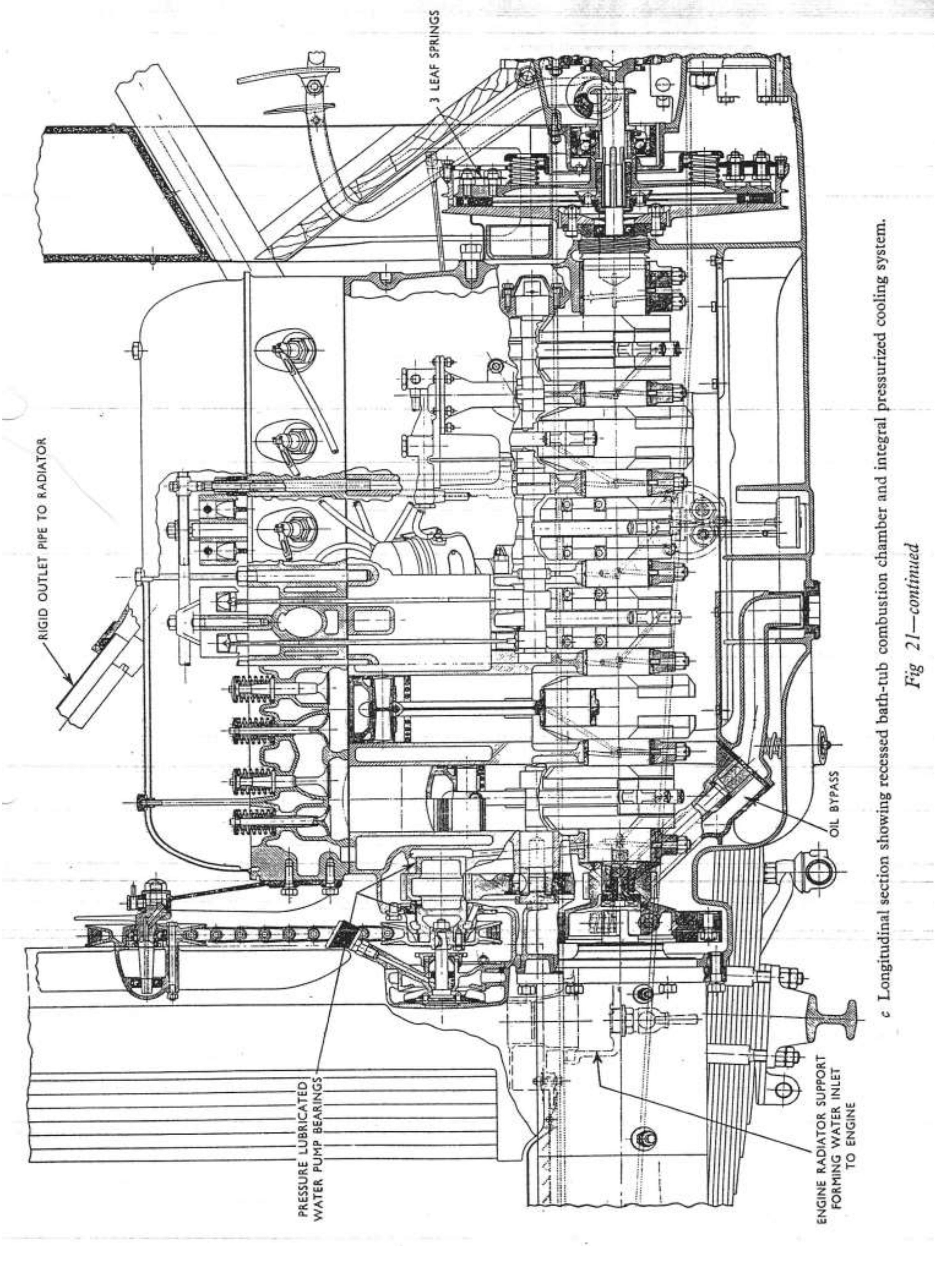


7 Talbot Engines



c Longitudinal section showing recessed bath-tub combustion chamber and integral pressurized cooling system.

Fig 21—continued

March/April 2004

Owners of Roesch Talbots have been able to enjoy the support of a number of firms specialising in the repair, overhaul and rebuilding of these cars; amongst them Arthur Archers of Dunmow, Essex, which has been in existence since 1889 and which, over nearly sixty years, has acquired a vast fund of practical experience of Talbots, (also of early Vauxhalls, Rolls-Royces and Bentleys). We are therefore very fortunate that Arthur Archer, the grandson of the founder, and TOC Member No. 1 (Honorary), should have made available to the Club his notes - which we have called the Archer Archives - based on his accumulated practical experience of our cars. These notes, which were originally written to cover different types and at various times, will be published in this and subsequent issues of the Newsletter, exactly as written, but grouped where necessary so that (as far as possible) like topics may be dealt with in the same issue.

AA 1: TALBOT ENGINE NOTES ON LUBRICATION

On the subject of oil, I have always worked from the principle of using a straight mineral oil and changing it frequently. Any addition of an oil filter to a Talbot engine involves external pipes and, to some extent, spoils the original appearance of the engine compartment. You have to remember that the engine is sharing its oil with the gearbox and that the gearbox functions well on a straight mineral oil. With the straight oil there is less tendency to carry debris in suspension in the oil. The multigrade 20/50 is designed to hold the debris in suspension and with this oil you would need a filter conversion. The filtering arrangements on the Talbot in standard form are a lot better than on most contemporary cars. As an aside, I would remark that, on the one and only occasion I met Mr Roesch (he was talking to a club meeting), and this was at least forty years ago) he said not to clean the filter too often, let it get a little bit blocked and then it would filter the oil more effectively!

You can avoid the problem of gearbox contamination in the engine by running the gearbox with its separate supply of oil and not allowing it to circulate around the engine. As standard, the engine supply merely maintains the level constant. It does mean that you have to add an oil filler to the gearbox lid with a dip stick to check the level from time to time, but they do not use too much oil. It seems that Talbot's idea when providing the oil circulation engine to gearbox was to eliminate the need for a separate filler etc. for the gearbox, thus simplifying everyday maintenance of the car. This was done on all cars, manual or preselector, from about *1926/27* onwards.

A totally different reason for changing the oil frequently is that most specialist cars cover only a limited mileage, therefore they are spending most of their time standing. If the oil is old it will have begun to form acids from the products of combustion, water, condensation etc. (These old engines do not have fume extractors as do modem engines.) These products of combustion can cause more damage to the engine internals than normal wear. We see much of it in our work on reconditioning old cars. The advice is always to change the oil before the car is to stand up, say for the winter period. Before finally putting the car away, do a short run to distribute the clean oil around the engine, and then you have clean oil ready to use in the spring. Most people tend to change the oil when they get the car out again. Very much depends on the individual case.

Please note:
This series of technical articles records the authors experiences, and are not intended as advice or guidance to readers of the TOC Newsletter.

7 Talbot Engines

THE ARCHER ARCHIVES

March/April 2004

AA 2: Notes on the workings of the oil pressure relief valve on Talbot engines

The thing is immediately accessible through the plug on the left-hand side of the sump. Removal of the outer plug exposes the inner plug. If this inner plug is at all loose, it can cause the pump to suck air instead of oil. Any oil passing the relief valve is fed back to the inlet side of the pump to be re-circulated. This is fine, but there is a groove in the pump housing which engages a locking device which prevents the oil pressure adjusting plug from moving on its own. This groove runs out at the end hence, if the plug is loose, a certain amount of air can go in along the groove past the adjusting plug and into the suction side of the pump. This automatically reduces the capacity of the pump to pump oil.

Note - on some engines it is possible to drop the blanking plug into the sump. Whilst it would probably never do any harm, it is best this does not happen. Therefore, I always recommend that one rolls up a tube of stiffish cardboard and inserts it into the hole vacated by the access plug so that there is absolutely no risk of the plug falling in.

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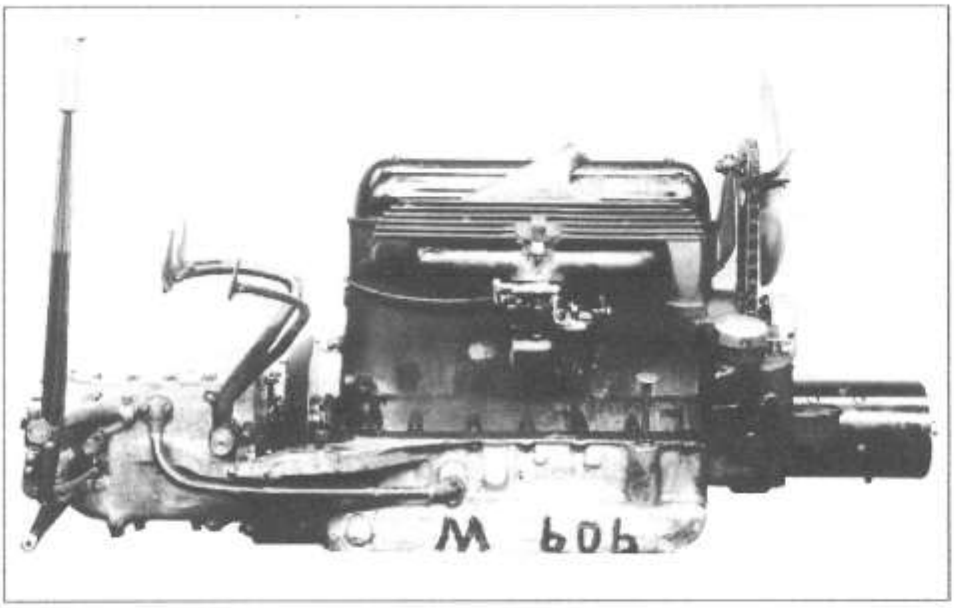
AA13 – NOTES ON SERVICING TALBOT 105 – 110 ENGINES

Including: engine removal, sump removal and gearbox alignment.



(Applicable to smaller models as indicated)

Engine Removal is more difficult than most. The best sequence seems to be: -

Remove radiator, drain engine/gear box oil, disconnect all minor controls, exhaust pipe (if, as is normal, nut is seized, saw through the pipe with a hacksaw an inch or two down, the nut can then be removed on the bench), take out the floor, jack up rear, remove rear axle – or at least draw it back about 12" – disconnect oil pipes, remove front brake rods, lower battery tray, take out gearbox. Then it is easiest to replace the back axle, laying the shackles back in place. The torque tube will rest on a chassis cross member and the chassis can be let down.

Initially ease head nuts ¼ turn each, working in a spiral pattern from side to centre. Take off cylinder head as a unit with manifolds (these are best dismantled on bench), remove rear four head studs, take off the flywheel (not strictly necessary but it makes life easier, although if a BD with ring gear where you most need the room, you cannot take the flywheel off without first removing the sump. The nuts securing the traffic clutch assembly are in FRONT of the crankshaft flange. The block is relieved and the crankshaft end modified to allow for this. It is a point to bear in mind when changing blocks or cranks.) Undo rear engine bolts, engine will drop onto support bolt which secures timing pointer over centre of cross member, remove front mounting nuts, washers and studs. Remove dynamotor, make a lifting plate and bolt same over centre head studs, using head nuts and tubular distance pieces (to avoid bending studs), take weight with crane, slide front alloy feet back and out. Remove support bolt and timing pointer. Lower crane to allow engine to drop off rear bolts, push back down and lift front up. When clear, engine can be lifted forward and up. Refitting is roughly the reverse of the above.

The foregoing is the time-honoured method of removing the engines. However, if you are removing the engine it is likely that you will want to remove the sump, therefore proceed as follows: -

Drain sump, remove track rod. Remove all sump nuts and bolts, don't forget the two bolts housed in holes just ahead of the flywheel. The sump may then be lowered. Usually it is necessary to remove the dynamotor. Sometimes the sump can be made to slip down between the dynamotor and the gearbox without disturbing anything else.

Having removed the sump, there are two ways to go: -

1) If it is a traffic clutch model, remove the 8mm nuts securing the crankshaft to the flywheel. Take out the front engine bolts, remove oil pump to avoid damage, take off cylinder head complete and radiator complete. Use tubular spacers and lifting bars on the head studs, making sure that the nuts securing these plates and spacers are tight to avoid bending studs. The engine weight may be supported on the plates which should be in the middle. Take off front engine nuts. Take out front engine studs. With a piece of wood, start to drift the engine support shoes backwards, take the weight on the crane. The support shoes should then be removed completely. The block can be lifted a little at the front and slid forward off all the flywheel bolts. It is then free to lift clear. Re-assembly is in reverse order.

2) The second path is for a non traffic clutch model. In this case the flywheel bolts have to be withdrawn. The nuts for these bolts are accessible from the gearbox side. They should be undone and the bolts gently tapped forwards. You will find that the bolts cannot be fully removed because of the rear main bearing cap. This latter should be taken down, whereupon the bolts can be pulled forward to clear the crankshaft. The crankshaft is then disengaged from the flywheel and the engine is free to move as in case 1) above.

Talbot engines, in common with the rest of the car, have many clever features. One can set up a convincing argument to prove that they are too clever for their own good. They are inaccessible and, although broadly following conventional engineering practice, differ in detail. Complete dismantling is more or less standard practice. It is quite feasible to remove the sump with the engine in the car. The piston assemblies may then be removed upwards by 'feeding' the big ends round the crank. This, of course, necessitates removal of the head. No way will the pistons come down. Investigation should reveal a boss projecting from the back of the cylinder block, over the centre of the cross member. This should have a long-headed bolt in it which also serves to retain the timing pointer (the latter is usually missing).

You will appreciate, however, that the combination of bolt head and boss would allow the rear of the block to rest quite securely while the sump is removed. You need to loosen the rear shackles, then the bolts securing the gearbox to the sump. Take notice that the two top outer bolts should be locating bolts. The gearbox should be supported on the cross member immediately beneath it. Get a short crowbar in the back shackles and get a friend to apply pressure to it in such a direction as to bias the gearbox backwards. It cannot move much, but it should move enough to stop the sump being trapped beneath the dynamotor flange and the gearbox flange. If, as is often the case, your friends desert you in this dire strait, you can achieve the same result with two wooden wedges between the face of the flywheel and the gearbox. You should still loosen the back shackles, though, to allow them to pivot. Do not forget there are two 8mm bolts to the sump, just discernable in the two holes immediately ahead of the flywheel (¼" socket with extensions).

The sump will come down if you don't take these bolts out but it will bring a bit of the block down with it! Obviously you have to undo three of the dynamotor set screws. It is as well to take the track rod off too and swing it round out of the way. Tie the loose end up with string, though. There are no gaskets fitted to the sump, it goes up metal to metal and I find Wellseal is the best sealant. If you have luck, the dynamotor gasket will stay with the dynamotor. If it tears you will have to make a half gasket out of the same thickness of material, stick it to the front face of the sump with Bostick or similar, weighting it with a surface plate so that it is really held flat on the sump then, when you are struggling to push the sump up again with the gearbox forced back a little, it should stay put. Extra lashings of Wellseal up the corner will help and don't forget to coat the dynamotor set screws with Wellseal before inserting them. The bottom one in particular is prone to leak oil.

To remove the sump with the engine out of the chassis, remove the head studs.

Note: Left-hand front stud is hollow for rocker oil feed – it is essential that this stud at least be replaced in the correct hole.

Make sure that the oil is out – remove the filler/filter assembly at an early stage – this unit is a rather fragile casting. Invert the engine onto a wooden surface (to avoid scratching head joint face), remove all the 8mm bolts securing sump.

Note: There are two bolts securing the sump, deeply recessed in the two holes in the bottom of what, in any other engine, would be the bell housing. Any attempt to remove the sump without removing these bolts is fraught with peril. You can break the block flange.

Gearbox Alignment: Owing probably to its great weight and the paucity of flange area where it meets the sump, the gearbox can work loose. It is as well to check if your vehicle has suffered from this malady when the units are clear and dismantled. There will be tell-tale fret marks on the flange and the holes may be noticeably oval. I think that the upper outer bolts each side were originally fitted bolts to ensure location. To re-align, proceed as follows (engine and gearbox complete).

Take off the flywheel and cush drive coupling or traffic clutch, refit the gearbox with all bolts in firmly. Engage top gear to ensure easy rotation of gearbox. Clamp a dial indicator to the gear shaft, back near the gearbox. Fit it up so the stylus of the indicator runs around the crankshaft flange. Ideally, the indicator hand should not move relative to its dial. If it does move, ease the gearbox-sump bolts and endeavour to move the gearbox about on the bolts in the right direction to minimize the pointer movement. Clamp up and try again.

When you have the best position, tighten all gearbox-sump bolts except the upper outers each side. Remove and discard these bolts, and carefully ream the holes oversize with a small adjustable reamer. When you have two clean parallel holes, turn up two special bolts oversize on the shanks to match the holes. Mark the bolts for correct assembly.

If the engine and gearbox are both completely dismantled, the same result can be achieved by making concentric collars to fit the main bearing housings and gearbox shaft housings. You then need an accurate close fitting arbor to press through the rings. Armed with this lot you can proceed as before – reaming, making bolts etc. Either way, it is a lot of trouble, but that's a Talbot!

AA4 Notes to be sent out with Reconditioned Engines
All Talbot Engines

1. It is imperative that the gearbox be cleaned thoroughly of sludge and foreign matter. Failure to do this may result in the said contaminants reaching the new bearings etc. The 'ideal' is to totally dismantle and clean the gearbox, but failing this a really comprehensive power hosing and frequent oil change thereafter is recommended. In any case, the oil should be changed after the first 400 miles of running, both engine and gearbox. In connection with the gearbox, do not forget that there are two drain plugs, the rear one serving the upper gallery. We usually remove the gearbox lid and prime the gearbox with about one gallon of oil. The engine oil should be checked frequently after the complete oil change until the level has stabilised between the two units. It is a good idea when filling the engine initially to remove the filter/filler assembly and prime the filler box with clean oil.

2. The gearbox splined shaft should be coated with as tenacious a grease as you can find. The material sold in aerosol form for motor cycle chains is as good as anything.

3. The oil pressure valve has been set to approximately 50 PSI. It may be reset through the access plug in the left front of the sump. Do not attempt pressure adjustments without replacing the inner plug every time otherwise you will get a mysteriously low reading due to the pump sucking air. The distributor contact points should be set at .018", and the timing should be set so that the spark occurs at T.D.C. The automatic advance in the distributor box takes care of the rest. If the distributor is of the two point variety, take great care to have both points at an equal setting. Ideally this type of distributor should be synchronised on a test bench.

4. Engine tappets should be set to .008".

5. The cylinder head should be re-tightened after the initial run using a torque wrench, working out in a spiral from the centre.
   Torque settings:

65	2 stages 25 – 35 lbs (34 – 47 Nm)
75,90	2 stages 35 – 50 lbs (47 – 68 Nm)
95, 105, 110	3 stages 50 – 75 – 85 lbs (68 – 102 –115 Nm)

6. Do not overtighten the rocker box securing nuts - the steel ones pull in and the aluminium ones crack!

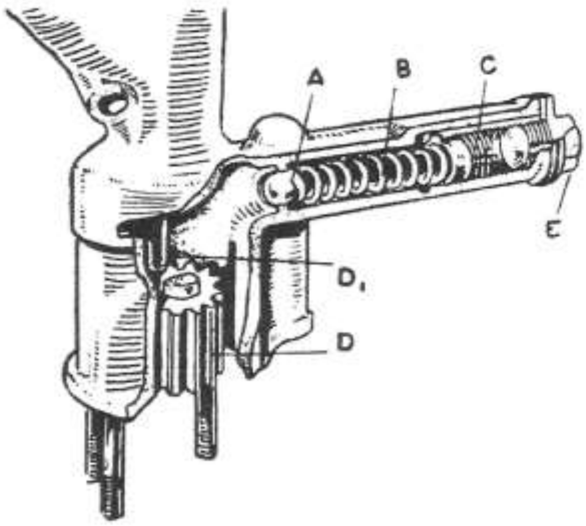
7. Water is the most important fluid in the Talbot. Check it before every start-up.

8. When fitting the dynamotor, coat the bolts with a jointing compound, otherwise you will be troubled with oil leaks along the threads. Make certain that these bolts are the correct ones – too long a bolt can jam the crankshaft.

DISMANTLING ENGINE; OIL PUMP, CRANKSHAFT, CAMSHAFTS & OILWAYS

Oil Pump

Remove the pump as a unit, it should be completely dismantled and cleaned. Reconditioning of the pump is as with any other gear pump. Make sure the gears are of common length and that the teeth are not unduly worn. Lap down the body on a surface plate to reduce end float of gears to .001" - .002". Reface or replace the oil pump end plate to eliminate leakage from outlet to inlet due to scoring of this component. If replacing the end plate, make the new one from hard brass sheet. This should wear better than the original alloy. Check the fit of the driving gear spindle in the pump body. Excessive wear at the upper end (as installed) can result in lost pressure. (The upper spindle bearing is in direct communication with the pump outlet port.) If wear is present, the best remedy would be to look for a pump in better condition, Failing that, the pump should be re-bored and a new oversize spindle made up – easier said than done! The relief valve which is incorporated in the pump, is of straightforward design. Replace the ball and spring as a matter of prudence. When refitting the pump to the engine, make sure that the mounting surfaces are free from deep scratches or burrs. I prefer to fit them without a gasket, using one of the modern components such as Loctite 'plastic gasket'. If you decide you need a gasket, do not use thicker than .006" paper. Thicker material can cause the pump flange to crack. The resulting internal oil leak is very difficult to diagnose. Do not forget that if you do fit a gasket under the flange, you must make a small washer of the same material and fit it under the third mounting point.



Oil pump and pressure relief valve. (A) ball, (B) spring for loading ball, (C) block, (D and D_1) pump gears, (E) plug.

Crankshaft

Take the crankshaft out complete with the timing gear damper etc. Knock back the lock tag and loosen – but do not remove – the special heavy slotted (right hand thread) screw, securing the damper. Clamp the shaft in a large bench vice and administer a sharp clout with a brass drift and at least a 2lb hammer, to the tapered portion of the timing gear, immediately ahead of the teeth. Normally, one crack will do it because the taper is fairly steep. If it does not remove the gear, do not go on hitting it because you will raise a burr, but gently warm the gear portion of the assembly with a welding torch (keep the torch moving to avoid overheating individual teeth), then repeat the brass drift and hammer routine. When the assembly comes loose, fully remove the retaining screw in the centre, and take it off. Watch for the key in the crankshaft because it is a non-standard article. The damper assembly should be fully dismantled, the rubbing surfaces of the damper flywheel polished, broken springs replaced etc.

The dynamo drive blocks can be levered in and out with big screwdrivers; they do not usually want any treatment apart from cleaning and polishing, but:

a) Note that we have found cracks in these blocks.
b) If you lay the set of blocks upside down on the bench, you will find letters stamped on them. These should be reassembled so that all the letters stand the right way up. This is how the blocks were originally made.
c) Take note that there are oil holes through the damper flange which should be cleaned, also a small oil bleed hole to feed to the assembly through the damper retaining nut. Behind this, in the crankshaft, there is a felt plug which it is best removed with a corkscrew. It will be plugged solid with sludge and should be discarded and replaced.

The crankshaft, connecting rods, connecting rod caps, connecting rod bolts, should be cleaned and sent for magnetic crack detection. The crankshaft should then be measured with a micrometer on all journals and the decision taken whether or not to regrind. Practically every shaft we come to needs regrinding. We normally instruct the grinders to 'regrind all journals, remove minimum material and preserve fillet radii'. (With white metal bearings the exact size does not matter as the clearances are allowed for in machining the bearings.) Regrinding the crank means that you have to take off the balance weights. This is no great problem, they are marked for reassembly. Before the shaft is ground it should be crack detected. They have been known to break through the rearmost web. When replacing the balance weights, make up a new set of lock plates. As an aside, I would remark that when working on a unit like the Talbot, it is as well to gather up all the lock plates and have a session making a new set, then you will have them all to hand when the time comes to reassemble. This removes the temptation to make the old ones do again in your anxiety to hear it run, go to the rally, whatever! Harking back to the crankshaft, make sure that no part of the balance weight lock tabs projects beyond the face of the relevant crank web.

Camshaft

Returning to the cylinder block which still has the camshaft in it. Remove the end cap from the rear of the block/ rev counter drive and the thrust pad from the front of the block. The slot headed bolt retaining the camshaft gear has a right hand thread. Obtain a suitable C spanner, wedge the gear as best you can with a piece of wood and give the handle of the C spanner a sharp crack with a hammer (you are relying on the inertial of the timing gear and the shaft, plus the water pump gear underneath, to react to the blow)!

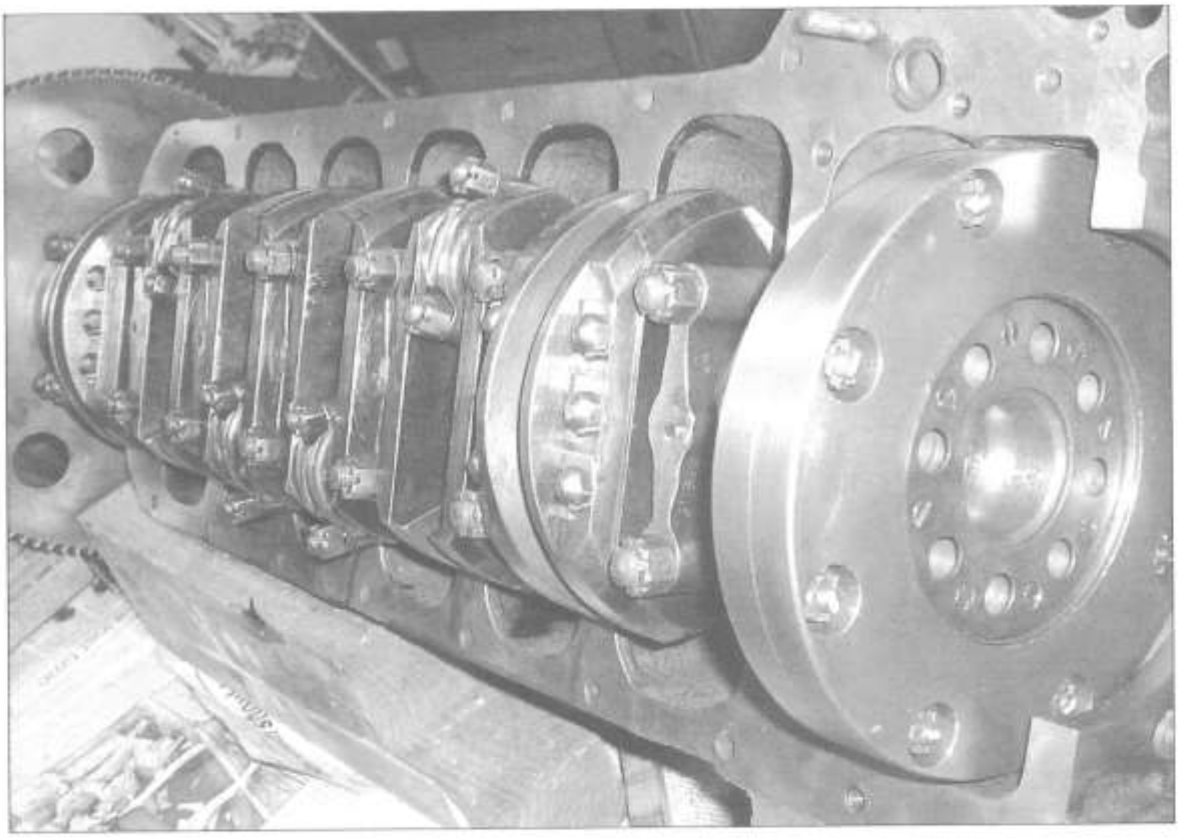
If the timing gear teeth are worn to half thickness, you need not be inhibited with the gear, you are going to need a new one anyway. Loosen the slot headed bolt one or two turns. Obtain a mild steel or, better still, brass drift, apply to the head of the bolt through the thrust pad opening. Address it (the drift) sharply with the 2lb hammer. This will dislodge the camshaft from the taper in the gear. Remove the nut and draw the camshaft out rearwards. Push out the 12 tappets.

Originally the camshafts were chrome plated all over to resist wear. Not 70/90 models. With knowledge born of hindsight and experience garnered by peering at what must now amount to dozens of grotty Talbots, this was not a very good idea. The camshaft bearings are prone to score. If this is only mild, do not worry about it, if it is very bad it can cause a loss of oil pressure and then the only thing to do is to have the journals hard chromed oversize and the block opened oversize to suit. Even so, the chromed shaft/iron block combination is prone to seizure (we had one do it last year), and the camshaft is best left with a running clearance in its bearings of .003" - .004", certainly not less, more won't hurt. New, replacement bearings are currently available (2005) for the 105. These are to the specification of the shafts fitted to the later models and give reasonable performance with good road manners.

Oilways

The screwed in plug in the rear end of the cylinder block oil gallery tube should be drilled out to allow thorough cleaning of the oil gallery. If possible, after a preliminary wash with paraffin (kerosene), the block and indeed all the engine components, should be cleaned in a solvent tank to remove all the carbon and oil sludge. In this connection, do not overlook preselector gearbox which will probably contain a few pounds of sludge, some of this could find its way round your new bearings. The least you can do is remove the lid and hose out the gearbox with a paraffin emulsifier spray, afterwards following with a high pressure water jet. Blow it out with compressed air and let it stand somewhere warm, with the lid off, to dry out the water. When satisfied that the internals are dry, pour about a pint of engine oil over the gearbox internals. The policy of perfection is to completely dismantle the gearbox.

Returning to the engine parts, make sure that the push rod and filter compartments are clean, also check that the 'roof' of the sump, where it projects from the lower crankcase portion, is free of sludge. Take note too that there is an oil spray hole from the filter box angled to the point of intersection of the camshaft and the crankshaft timing gears. Make sure it is clear but do not enlarge it. It is good practice to paint out the inside of the block with a sealing paint such as I.C.I. Engenamel Red, however this is becoming difficult to obtain and may well be out of production. An alternative called Glyptal is marketed by Frost Auto Restoration Techniques. This painting, of course, can only be done when the block is clean and dry.



Above: The 105 block assembled with the crankshaft fitted.

AA6 - METHOD FOR MAKING CORE PLUGS

Procure a length of brass bar of the correct diameter but longer than you will need.
Turn down and screw tap sufficient length for as many plugs as you are making, plus as many parting off cuts as may be needed. We usually, at this stage, leave the thread slightly oversize. Then start to part off each plug cutting in a diameter of say ¾" on the larger plugs. It does not matter too much what this diameter is as long as you go consistently to the same depth for all the partings off. You now have a piece of bar with a lot of embryo core plugs attached to it.

Then, using a hand chaser and a rest, slightly taper the thread on the end on the first plug. Take the bar out of the lathe and try it in the core hole you are sealing. If it screws in to within about two threads of the end so well and good - if not, take it back to the lathe and continue hand chasing until you reach this state of affairs. Then, with a hacksaw, cut about half way through the parting adjacent to the end of the plug which you are fitting. Coat the threads with Loctite or a similar joint compound and screw the bar in tightly using a Stillson wrench on the machined end of the bar. If you have done the job really well, the bar should fracture at the hacksaw point just as the last threads are flush with the face of the block. If you do not achieve this, do not worry. If it sticks out about a thread that is okay. Carefully sand it off with a grinderette blending it in with the surrounding surface. Avoid too much heat at this stage as it may adversely affect the sealing compound.

To avoid doing all this work unnecessarily, we usually test the existing core plugs by drilling a 5/32" hole through it so that we may judge the thickness. If there is about ¼" of metal left we leave them alone, tap the hole 2 BA and screw in and rivet over a small aluminium stud, thus sealing it up again.

If you want to remove an existing core plug, drill a hole in the metal, say 75% of the outside diameter or as big as you can manage by hand then, with a small cross cut chisel, cut into the hole at three points 120° apart. You should then be able to break out the remains of the core plug in three pieces without in any way damaging the threads in the block. If the threads in the block are damaged, about the only way to reclaim them is to go round them with a hand chaser or a thread file, except in the case of the very small holes when you can oversize them.

AA 15 – NOTES ON SERVICING TALBOT 105 – 110 ENGINES
CORE PLUGS, BEARINGS , BLOCKS, PISTONS & CON. RODS.

All the alloy core plugs in the head and block should be regarded with the utmost suspicion. To save taking them out unnecessarily, drill a 5/32" hole through the plug (not central, but towards the bottom edge). If there is, say, at least 3/16" - ¼" of alloy, then it should last some time. Re-seal by tapping the hole 2BA and screw in a suitable plug made from aluminium welding rod or similar. Seal with jointing compound, cut off flush and hammer over. If the plugs are very thin, then they must be removed. Take care not to damage the thread in the cast iron. New plugs are best made from brass or mild steel in a continuous length. They have to be screw cut in a lathe because of the odd outside diameters and metric pitch. All have the same pitch thread – 1.5mm. There should be small plugs between the groups of oil return/push rod holes in the head on the joint face. Do not leave the holes open, the gasket should seal them but all too often they can leak, either externally, or worse, down the push rod drillings.

Both main and big end bearings are of the run-in variety and can therefore be re-metalled. Only brand new metal should be used. In the case of the con rods, run out the old metal and discard it, deburr the rod eyes, fit to bolts and nuts and check for cracks and alignment. Rectify as necessary. The white metal lining is very thin and misalignment can cause breaking through the white metal on machining. By the same token, rods with excessively filed caps should be avoided. After metalling, both rods and main shells should be lightly hammered to relieve the cooling stresses in the bearing metal. The main caps should be checked for cracking (rare). The main shells must be thoroughly deburred and backed in to ensure intimate contact with the housings, the shells should be 'blued up' as a check on this. When satisfied that all is well, the shells should be reassembled with a .003/.004" nip. This is achieved by filing/machining the caps, shells as appropriate. When dealing with the con rods, it is best to check the basic con rod for alignment <u>without</u> the white metal (the white metal is very thin, about ½mm with a standard shaft; any misalignment and you are through it). If this is okay, proceed with the metalling. Set up the rod for whatever method of boring is to be used, having first made sure that the bolting faces are true. Check that the outside machining on the top half of the rod is concentric with the boring tool. The cap will not appear concentric due to filing. If it has been filed more than ½mm – and a lot have – then you have either to add a metal faced shim or find another con rod.

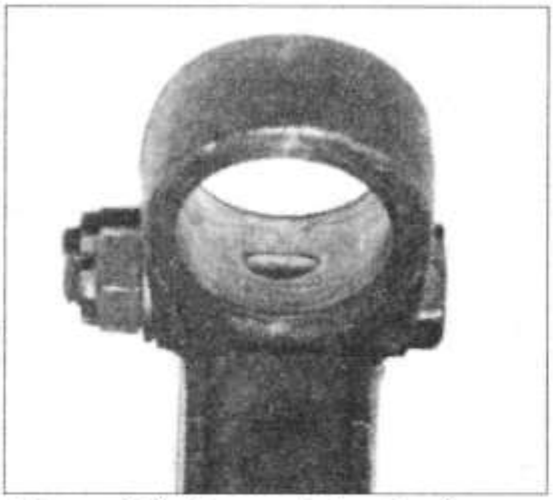
When facing the thrust faces of the big end, try to centralize these on the shank of the rod, not as is sometimes done, on the bolts (necessary because there is very little clearance between the rod and the balance weights on the crankshaft). Do a trial assembly of all rods on to the crankshaft with the weights in place to check this clearance. Sometimes you have to turn a rod over to get it right. Experience has shown that if you get the con rods nicely centred between the balance weights, they are usually okay between the piston bosses.

New connecting rods are now available for both the 75/90 and 105 engines. These can either be white metal lined or made to accept modern thin-wall shells. The disadvantage of the shell bearing is that they are designed to run with a hardened crankshaft and, although the Talbot shaft can be put through a process known as 'Tuftriding', it may be easier to retain the white metal design for the new rods. These new rods will have a much wider small end to mate more easily with the Triumph/Toyota piston and incorporate a fully floating gudgeon pin.

110 cylinder blocks were the ultimate stretch of the design and if, as is probable, they have been re-bored a few times over the years, the chances are the cylinder walls may be getting too thin for the comfort of the pistons therein. The ultimate failure is if a piston forces its way into the water jacket with obvious results. We have salvaged several blocks damaged in this way by boring out the remains of the cylinder, cutting a thread in the lower platform of the block, forming a recess in the top face and screwing in a special new, thick, wall liner. This has the advantage of putting the sleeves in tension, and the block in compression, has the advantage of tying the top face of the block (and the stud bosses) more effectively to the bottom. Final bore size can be reduced to 78mm, for which Mazda 21460 pistons are available in standard and oversizes, the slight reduction in bore is compensated for by the need to chamfer the pistons as they project above the block face resulting in a slightly higher compression ratio.

Pistons are a bit of a problem. 75/90 pistons are still about, at least in sizes up to +.030". Modern Triumph 2000, GT6, pistons (Hepolite 19270), do go into a 105 reasonably well, as do Toyota 21046. The main snag with these, as with any foreign pistons in a Talbot, is the very narrow end of the Talbot connecting rod. Standard bore of the Triumph is 2.9405" whereas the 105 was 2.953", so you start with a .0125" disadvantage. The Toyota however has a standard bore of 75mm and the piston is of modern design nearer to the weight of the original Talbot type. If, as is probable, at this point in time, the block is out to +.040" or more, you will have to resleeve to use these pistons. Fortunately both the Triumph and the Toyota gudgeon pin is somewhat smaller than the Talbot article, so we bush down the connecting rods to suit. The bush proper is made with a flange to increase its strength where it projects beyond the connecting rod and at the other side a loose ring is fitted over the projecting part of the bush.

Before final assembly, the end of the connecting rod is tinned, taking particular care with the bore. Both the bush and back-up ring are also tinned, the whole lot is then assembled and heated up sufficiently to melt the tinning. Additional high strength solder is added. The next step depends on whether the connecting rods are of the split or plain variety. If split, we drill out the pinch bolt hole and reamer it 5/16" (.312"), make special oversize bolts, fully tighten the nuts, rivet over etc. If the rods are unsplit, then we do the drilling and reaming as above, but as there is no need to hold the eye of the rod in tension with the pinch bolt, we merely rivet in a mild steel pin as a kind of belt and braces device, to doubly secure the bush. Finally, the bush is fine bored to a running fit on the gudgeon pin.



Above: Talbot con rod showing the cotter pin for securing the gudgeon pin.

If using the original gudgeon pin fixing in any of the engines (105, 110) and also with the smaller dimensions, the 65 – 75 and 90, great care is necessary. The gudgeon pins have a minute cut out for the cotter bolt. In early engines this was a pinch bolt with the con rod shank split on the neutral axis of the 'H' section. This was okay, but it is common to find that this split has extended itself right down the rod shank. Later engines did not have the split but relied on a really good, almost press fit, between the pin and the rod eye. These later rods definitely seem to be stronger. In either type the gudgeons can work loose. Once they move, the very small pinch bolt groove is not adequate to hold them endwise. The end product of this is a badly scored cylinder bore! Therefore, unless the pinch bolts are in excellent condition, completely unmarked, they must be renewed.

This is easier to write than to execute because they are of a totally illegitimate size - .295" (7½mm) x 0.75mm pitch (105s only; the following instructions are okay for the smaller models providing you modify the dimensions). The only remedy is to make new from EN16T steel or similar. I always make them plus .002" on the central locating portion. This can then be carefully polished to ensure a drive in fit on assembly. When locating and fitting the gudgeon pin a useful aid is a small probe turned to .285" - .290"/.292" in short steps. When the larger step enters, you are ready to try the pinch bolt. An 0BA spanner is ideal to tighten the pinch bolt nut. With the pinch bolt tight, the piston should move on the gudgeon pin freely but without shake (excessive tightness in the piston is to be avoided; as with any clamp fitted gudgeon pins in any engine, the pins can seize in the piston bore). If, with either type of con rod, the gudgeon pin is at all loose in the con rod eye, then you must do something about it. If you do not then, as sure as God made little fishes, the pin will work loose and score the cylinder.

Remedies I have tried:

a) The Triumph piston conversion completely eliminates the trouble by converting to full floating pin – no good for 110s though.
b) Hone out the rod eye and make o/s gudgeons – means boring out the pistons as well – works all right, but expensive.
c) Bore out the eye, say, +.010" and have the bore nickel plated. This is okay, but troublesome, in that nickel is difficult to machine.
d) Try and find better secondhand parts. As already mentioned, the con rods should be checked for cracks and alignment.

AA 16 – NOTES ON SERVICING TALBOT 105 – 110 ENGINES
ENGINE ASSEMBLY AND CLEARING OF WATER PASSAGES

I have never met anyone who knew what the poundage setting for the crankshaft damper was. If the thrust washer is badly scored, it should be reground. Lap in the taper on the crank, make sure the key is good. Polish all the damper faces in the lathe, using fine emery sticks or similar. Reassemble 8 damper flywheel nuts tight, thus drawing bolts up to shoulders. This apparently gives correct spring tension. The damper unit should be fully assembled on the crank before the latter is put back in the engine. Don't forget the thrust washer!

Assemble the engine, starting with the water pump gear. Note this gear inadvertently functions as a centrifugal filter, it will be full of hard sludge. Clean out interior and hole to front bearing. Try to adjust this for minimum end float (also see water pump notes in AA 8). Coat the 8mm set bolts with Wellseal on assembly, to eliminate leaks from the threads. A gasket is not necessary but may be used to adjust end float. Next, fit in the twelve cam followers, regrinding the faces or replacing as necessary, then the camshaft. Lap the gear onto the taper and check the key. Polish end face of gear retaining bolt, tighten fully and knock up lock tab. Set camshaft end float to .004"/.006" by machining or fitting gasket to the alloy thrust bracket. Fit in the upper main bearing shells. Then, with the aid of an assistant, lower in the crankshaft assembled complete with damper, balance weights and rear studs. Make sure, as you lower it, that the loose thrust washer on the damper does not dig into the soft white metal on the front bearing. Also watch the timing marks. Turn shaft a little each way to make sure the marked teeth are in mesh. If okay, proceed with fitting the main bearing caps. Smear all parts with oil. Oil stud threads and torque down to 45-50lbs.ft. 75/90 engines 40-45lbs.ft. Shaft should be free to turn if all is well. The piston/ con rod assemblies can be inserted one by one down each bore. Turn engine over after fitting each assembly to make sure none are unduly tight. Check also that you can see a little bit of gudgeon pin shining between the con rod ends and the piston bosses. I do not have a torque for the big end nuts but they should be tighten "solid" with both hands on an 8" bar with oiled threads. Crankshaft end float .004"/.006".

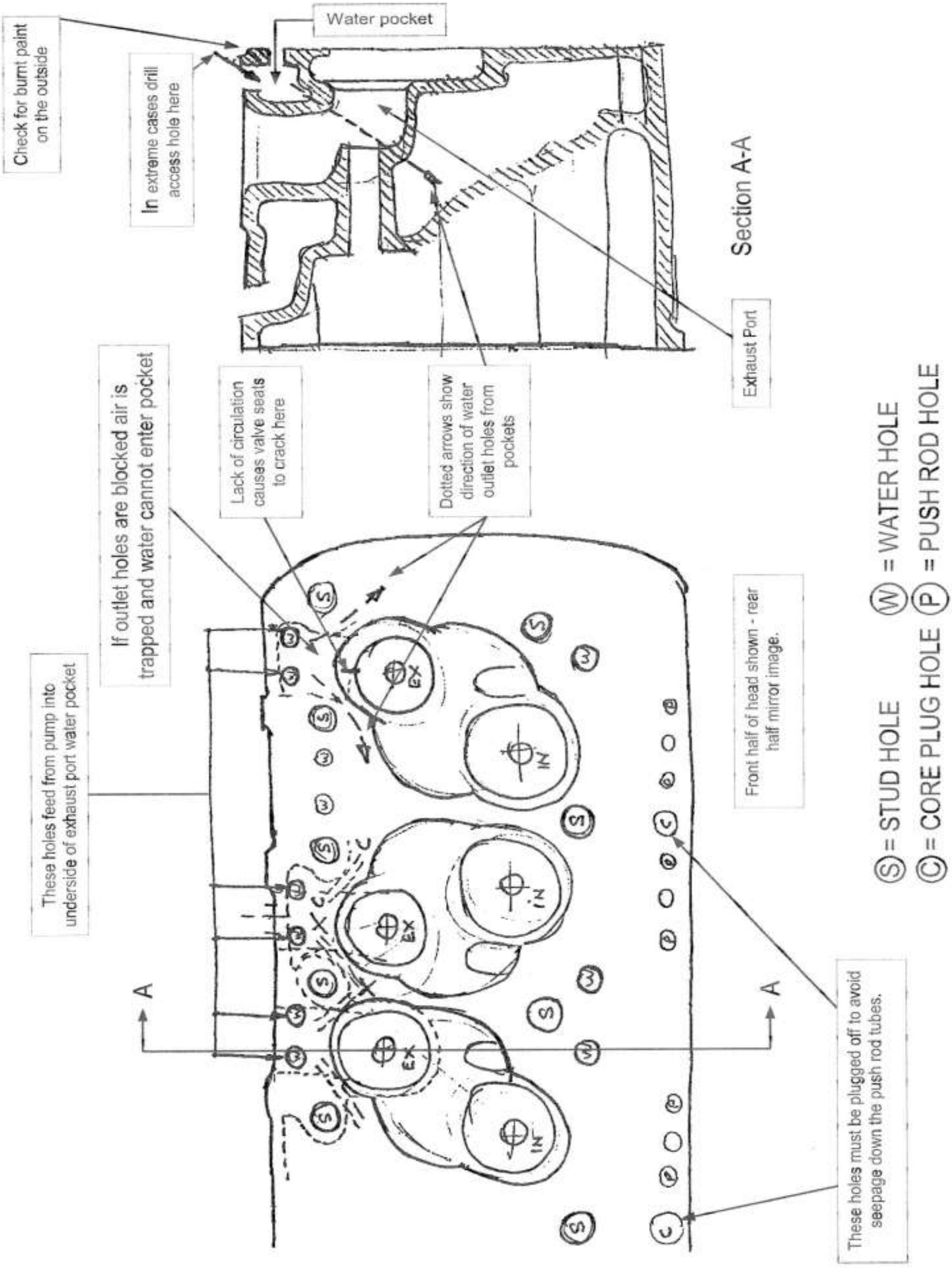
Next refit the oil pump assembly. Note that it is loose on the studs and may be moved about to get a good mesh for the gear. Fit plain washers under the 8mm castle nuts and tighten evenly. We usually secure these nuts with a single twisted locking wire. Fit and press over new plug to rear end of oil gallery. If you have a slave pump and gauge, connect it to the oil gauge take off. Screw an undrilled head stud into the left-hand front position. Dismantle, clean and replace the oil filter with new fibre washers. Make sure filter seats properly; it is subject to full oil pressure. Pump up system with clean oil, note that the oil should come out at all bearings. Eventually it will come back through the pump. You should be able to see when the relief valve is opened from the gauge. Adjust it to 60 p.s.i., fit the end plug. Any leaks around the pump flange to be eliminated. Overhaul sump plug as necessary. If the sump crankshaft outlet is worn (and they mostly are), it is better to build up using a modern epoxy resin material such as "Belzona". Follow the maker's instructions faithfully. We use "Sellotape" on the crank to act as clearance and parting agent. Bolt up sump before compound sets. With care you should have a perfect job, without the "agro" associated with welded repairs. Make sure the sump in no way fouls the oil pump. No gasket is fitted to the sump, both surfaces to be clean and coated with Wellseal. A gasket should be fitted between the Dynamotor and the engine, say .010" thick. As with the pump gear flange, the bolts go into the oil space, so coat the threads with Wellseal on assembly. With the sump on, the water pump may be fitted, although it is not critical at which stage this is done. Fit the correct head stud to the left-hand front position. Refit all the other head studs, except for the rear four. If it is not intended to fit the chassis lubrication system up, this pump is best discarded and replaced with a simple blanking plate.

Valve seat trouble can be caused by a badly seated valve or a maladjusted tappet. Once there is a leakage path for the hot gas, it will rapidly gouge out a path for itself and cause local overheating. One precaution which we now apply one hundred percent to Talbot heads, is to treat the inside of the water jacket with a dilute hydrochloric solution to remove any lime deposits. In an old engine these can act as an insulating layer between the iron of the head and the water, which is trying to cool it.

A further prolific source of trouble is the blocking of the outlet passages from the water pockets situated under the exhaust ports. (Not the 75/90, although the head should be de-furred.) These pockets are fed with water from the pump, by six outer pairs of holes on the right-hand side of the head. The outlet from these pockets is via two small holes (3/16" dia.), which lead upwards at about 30° between the adjacent stud bosses and the combustion chambers. The head should be inverted on the head (chambers up). Pour a little water into one of each of the six pairs of holes. It should run straight through and re-appear at the manifold ports. If the water stands in the holes, or only sinks slowly, the holes must be cleared. This can be done mechanically by "puggling" with a stiff wire (bicycle spoke). If this does not do it, try pouring a little hydrochloric acid into the affected pocket. (For ordinary cleaning dilute the acid 75% acid i.e. 25% acid, 75% water. For the pockets try a stronger solution 50/50 solution.) When treating the whole head or block you should, of course, blank off the joint faces. This can be done with suitable tapered wooden plugs (similar to the vent pegs used in wooden beer barrels). Leave the acid in for up to 16 hours, drain it off, then wash out with water. Following this, any acid residue should be neutralized with a strong caustic soda solution (½lb to two gallons). Again hose out with cold water. It may be necessary to repeat the acid/caustic soda treatment in stubborn cases. Prior to all this messing about with acid and water, all machined surfaces of the components should have been greased up or, better still, coated with Shell Ensis oil or similar repellant protective.

Despite conscientiously carrying out the above routine, the little pools in the exhaust pockets may remain steadfastly stagnant. If this is the case, the remedy is to drill an access hole approximately ½" diameter in the exhaust port face, midway between the port and the cylinder joint face. (See Figure 1.). Through this hole the water outlets can be seen and drilled part way at least, with a 1/8" long series drill. Once you are satisfied that the holes are clear, the access hole should be tapped and a screwed plug inserted. Any suitable thread for which screwing tackle is available will do. The thread on the plug should taper so that it jams on insertion. Warning: do not use excessive force or you might add a crack to your troubles! Use jointing compound on the threads and carefully cut and file the plug flush after insertion. Not the 75/90 models. Figure 1 will, hopefully, illumine the above. It may seem like a lot of trouble but it is <u>absolutely essential</u> if cracked valve seats are to be avoided. When the holes are blocked, the pocket becomes air locked and water cannot reach it. Any which does, will instantly be flashed into steam. Any symptoms, such as bubbling in the radiator (audible when the engine has just stopped), or burnt paint on the head below the exhausts, are outward indications of the condition.

Figure 1: Talbot 95 - 105 - 110 Cylinder Head to show critical water pockets.



AA17 – NOTES ON TALBOT 105 – 110 ENGINES FOR THE WATER PUMP, CYLINDER HEAD, VALVE GEAR & OIL FEED TO GEARBOX

The water pump is a thing on its own – like no other. Basically it suffers from the disability of having a spindle composed of three elements – the gear, the fan drive pulley and the water pump spindle proper. Correct functioning of the gland is dependent on the water pump spindle running true – a condition difficult to obtain in the first place and difficult to maintain. (See AA 8). The water is the most important fluid in a Talbot. There isn't much of it and there's not even a header tank to contain a reserve. It pays, therefore, to try to eliminate all leaks and check the radiator every day. Use rain water.

Water passages excepted, work on the cylinder head follows standard practice. Valves were originally KE 965 or similar material. They were very good but, of course at this point in time, likely to show signs of wear. The valve material has a high co-efficient of expansion, therefore the valves, cold as assembled, should have perceptible clearance in the guides, say .0015" - .002". New guides can be made; if they are, great care should be exercised to ensure that the bore is concentric with the outside. They should be fitted to the head with .0015" interference. If the valve seatings are badly pocketed, they should be blended in with a large seating stone. It is possible to reclaim the seatings by welding, but this is best avoided if possible. On assembly, the gaps between the cotter ends in their cups should be sealed with a paste type jointing compound. This is because there is a surfeit of oil in the rocker box, thanks to the ball pivoted rockers. The inlet valves, by far the most susceptible, are almost under the pivots and are really swamped with oil. It is all too easy for this oil to be sucked down the inlet valve guides and burnt. A puff of oil smoke on starting up is a sure sign of this condition.

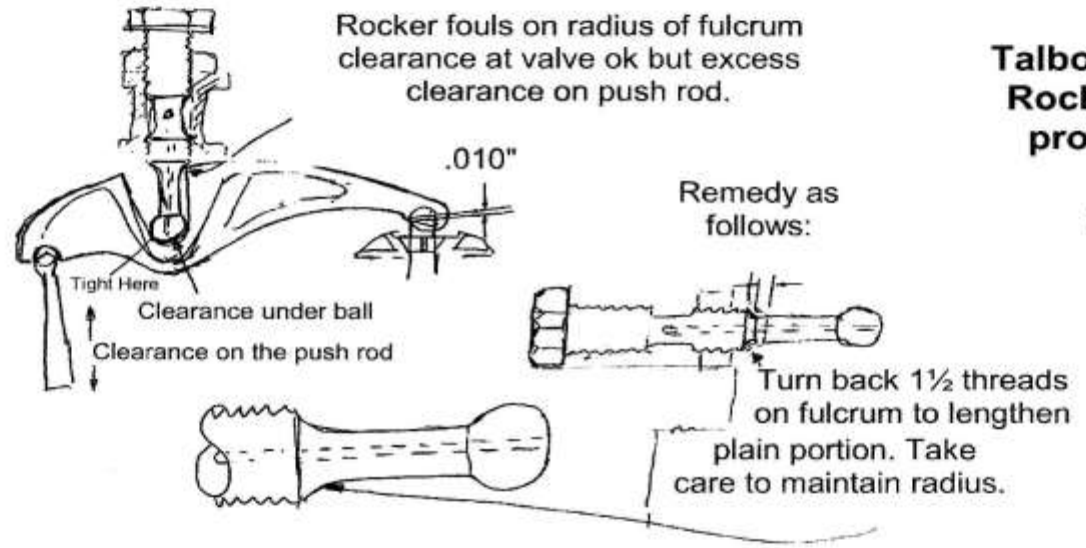
Ways in which valve gear noise can be caused - even though clearances appear to have been correctly set - together with appropriate remedies, are illustrated by the accompanying sketches. Figure 1 shows how in the cases of the 105 and 110, interference between the rockers and the fulcrum pins can be caused by the valves being over-length, the push rods too short, and also by valve seat recession. This can give rise to excess oil flow. Figure 2 shows how these factors can cause the rockers to foul both their fulcrums and the valve spring caps in the case of the 75, 90 and 14h.p. models.

The rocker cover gasket should be 1/16" reinforced cork. It is best to stick it to the cover with something like Bostik when the cover is clean and dry. Put no gasket cement of any sort on the other side, then for years to come you can lift off the assembly of cover and gasket, secure in the knowledge that the gasket cannot get damaged or broken or slip out of place. Do not over-tighten the rocker cover securing nuts, particularly with the engine cold. The cover expands quite a lot when hot and they have been known to cave in! (This applies to the alloy cover of the 105/110).

When refitting the gearbox oil feed union, with the externally fed gearbox, note that the gearbox is only fed by a 1/16" hole. If the union is arranged with this hole at the bottom, sludge can collect along the bottom, inside the fitting, and obstruct the hole. Better to assemble it on the side and arrange the pipe accordingly. There is a small filter fitted here which should be cleaned whenever the oil is changed. It is desirable to modify early gearboxes to the external oil feed but work on the gearbox is, as our American cousins would say, "an entirely different ball game".

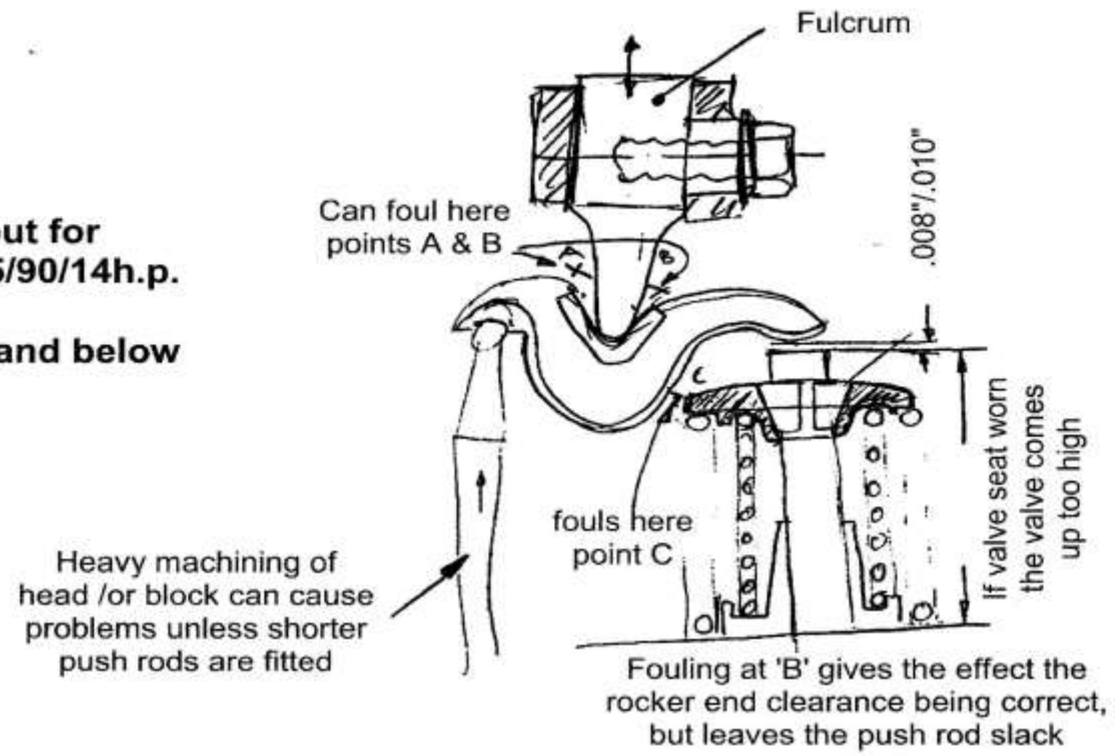
Talbot models 95/105/110 Rocker/Fulcrum fouling problem and remedy.

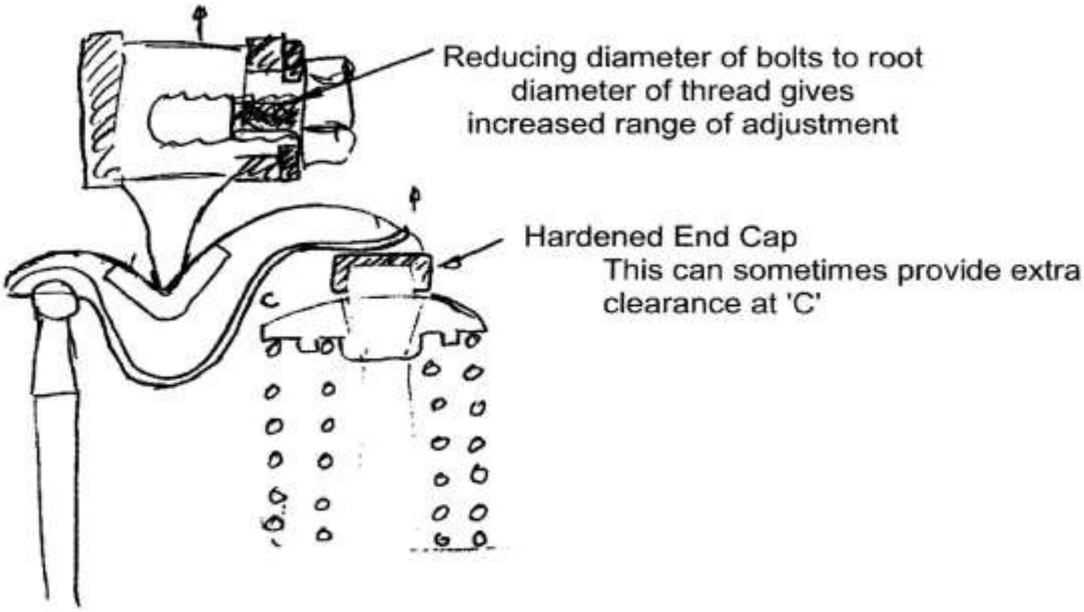
Figure 1 ~ Left



Rocker Layout for Talbot models 75/90/14h.p.

Figure 2 ~ Right and below





AA 8 – TALBOT WATER PUMP FITTING INSTRUCTIONS INCORPORATING THE MODERN FACE SEAL

(To be read in conjunction with diagram opposite)

NB: These notes are not applicable to the old 'gland packing' type of pump: they assume the use of a new spindle having the necessary face for the carbon seal to run on.

1. The seal used in this modification is of exactly the same type as that fitted to modern cars. It runs on the face of the spindle flange. It makes the sealing much less sensitive to spindle run out than the original packed gland which relied on the diameter of the spindle running true, (a condition very difficult to achieve with a Talbot of advanced years). The new seal fits the old components with a minimum of modification. The original gland nut and greaser can remain for appearance sake, but they are only for appearance and not used. For the seal to work effectively it has to be compressed by about 2 - 2½ mm. The gland nut lock plate MUST be fitted.

2. Make sure that the taper on the spindle, bore of pulley, locating faces on pulley and driving gear, are all clean and free from burrs.

3. Check that the pulley is not riding on the small key.

4. Whilst the pulley is free, mark it for the best fitting position for the bolts. They will only fit in one location.

5. Make temporary assembly of pulley and spindle and bolt into engine. Fully tighten all bolts.

6. Rotate the engine and check that the spindle is running reasonably true. The ideal equipment for this is a dial test indicator. If it is true – all well and good. If it is not true it can sometimes be trued by a judicious tap with a soft hammer. Sometimes run out of the spindle is due to inherent inaccuracy in the pulley and this can only be corrected by re-machining. With a modern oil seal .005/.010" is tolerable.

7. As with all centrifugal pumps, it is imperative that the clearance between the impellor and back plate be kept as small as possible, otherwise if too far away the impellor merely splashes impotently around in the water. With most pumps you can measure this but it is not possible with the Talbot.
   The best way is to cut the end out of an old pump body so that you can see the inside of the pump and experiment with different thickness gaskets to obtain minimum clearance. This set up is also ideal for determining the amount of 'trap' on the seal which should be as specified in paragraph 1 above.
   Thicker gaskets under the centre flange will increase the impellor clearance and decrease the trapping of the seal. (If the correct clearance cannot be obtained, the only remedy is to re-machine.) Thicker gaskets under the mounting flange will have the opposite effect i.e. decrease the impellor clearance but increase the trapping of the seal.

8. Having checked the spindle, re-assemble it through the pump. Fit the bolts and lock washers to the puller FIRST and then refit the pulley to the spindle.
Tighten the nut and split pin. Assemble the two components of the pump body with the gaskets selected at 6 above. Refit to engine, tightening each bolt a little at a time. Turn the engine by hand to make sure nothing goes solid as you tighten the pump.

WARNING

Handle carbon seals with the utmost care, any scratching on the face will scrap it.

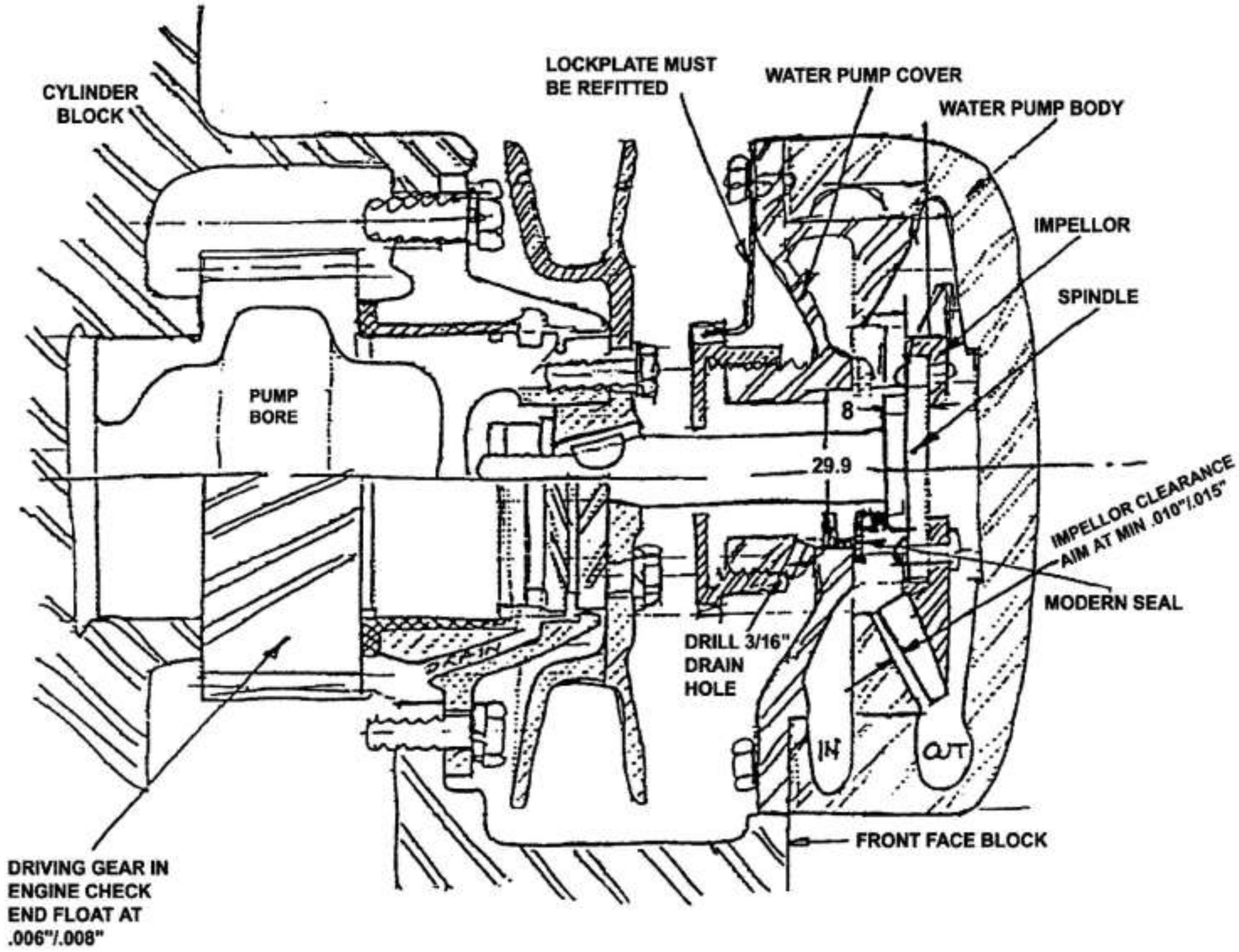


Diagram to illustrate the water pump modern seal conversion.

THE ROSS 'POP' EFFECT ON OIL PRESSURE

By Michael Marshall

If you have the patience to read to the end of this brief account of the application to steam locomotives in the late nineteenth century of the Ross 'pop' safety valve you will understand the apparently paradoxical phenomenon whereby your Talbot's oil pressure may *decrease after* increasing speed on leaving a restricted area, and *increase* again when you have slowed down for the next town.

Figure 1 shows a pre-Ross safety valve which allows steam to escape when the upwards force due to the pressure acting that portion of the underside of the ball exposed to the boiler exceeds the downwards force of the spring. Though simple and effective, these spent much of the time partly open, allowing the steam to erode the valve seating so that the valve no longer seated properly and required frequent maintenance to prevent continual dribbling and wastage.

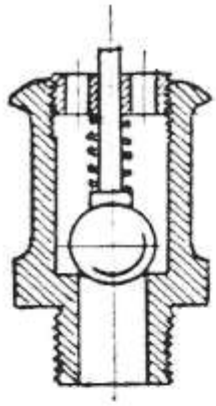


Figure 1

Mr Ross's brilliant solution to this problem was to reduce the diameter of the chamber in which the ball sits in order to provide less clearance around the ball; so that when the ball was lifted by boiler pressure acting on the area of the underside of the ball when seated, the escaping steam, then acting on the whole underside of the ball prevented it from reseating itself until pressure had dropped significantly, i.e. the valve was designed to be fully closed or fully open - nothing in between. All spring-loaded pressure relief valves require a higher pressure to open, than to remain open, but this is particularly so (and deliberately intended) in the case of the Ross valve.

In our days most, if not all, locomotives had Ross 'pop' valves, and many of us will recall standing close to an engine in a station and being startled by the deafening rush of steam when its safety valves suddenly lifted; and being left shouting at one's companion when the valves re-seated themselves suddenly with an audible 'thunk', leaving the engine to sizzle quietly as before.

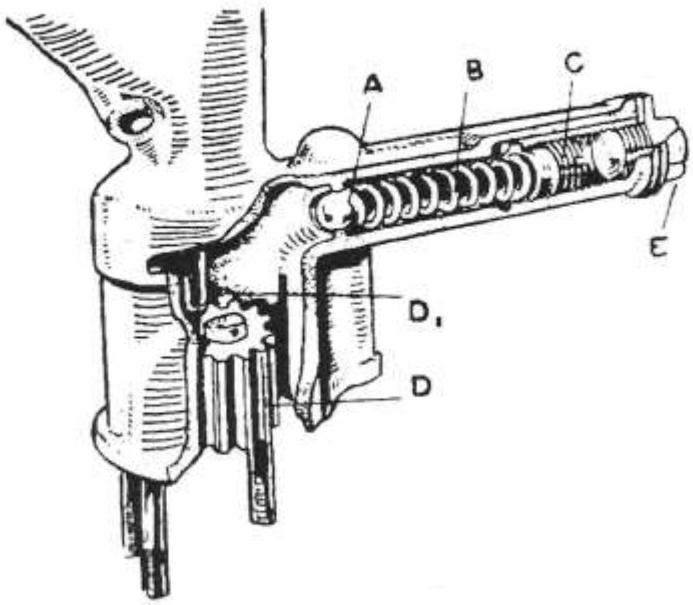


Figure 2 - Oil pressure release valve

(A) - Ball *(B) - Spring for loading ball*
(C) - Block *(D, D1) - Pump gears*
(E) - Plug

The relevance of this to our Talbots' pressure regulating valve will be clear from Figure 2. Apart from the valve lying horizontally and the fluid being oil, not steam, the arrangement is basically similar to that described above: once the ball lifts, the escaping oil acting on all of the underside of the ball will tend to keep it off its seat until the pressure drops significantly. On my 14/45 running on Classic 20-50 oil the pressure drop on increasing speed from 35 to 45mph is from 40 to about 35psi, and when cruising at 50mph it rises again to the low 40s.

If your drop is significantly greater it might be worth checking that you don't have an oversized ball. The correct diameter is 11/16" i.e. 0.687" (available from AA) but someone under the mistaken impression that Talbots are totally metric may have popped in a standard metric ball of 18mm (0.708").

It is interesting (to me at any rate) that this phenomenon is not noticeable on Rileys. These don't use a steel ball but a cube shaped brass 'bucket' recessed to take the spring and presenting a flat face to the oil orifice. The ingenious feature is that whilst the four corners serve to guide the valve in the valve body, the four segments corresponding to the flats allow the surplus oil to get away easily i.e. with less tendency to keep the valve off its seating. Regrettably, as I know to my cost, the rest of the Riley system, relying on it does on soldered copper pipes, some whirling around with the crankshaft, is not at all ingenious. The Talbot design, in which there is no internal pipe-work, is far better.

Finally, it's worth pointing out to new Talboteers (and reminding older ones who may have forgotten) that the other Talbot feature: the re-circulating of oil from the relief valve through integral drillings directly back to the suction side of the pump, requires the end plug E seen in Figure 2 to be securely fitted. If not, or if the plug has been omitted, air will be drawn into the pump causing frothing of the oil and random variations in pressure.

RECONDITIONING TALBOT LITTLE ENDS

By Michael Marshall

Introduction

These notes apply to early little ends of the type shown in Fig. 1 where there is a saw cut in the connecting rod and the necessary firm grip of the gudgeon pin is assured by a cross-bolt. This was used on Talbots until at least the early 1930s, but for exactly how long I cannot say.

Figure 1

Roesch adopted this arrangement to minimise weight and cost. The purpose of the saw cut was to provide a little 'give' to aid initial fitting of gudgeon pins in holes which could not be bored precisely with the equipment then available. With the pin inserted into the newly bored circular hole, the cross-bolt would be firmly tightened to hold the pin securely and restore the integrity of the little end assembly. If the pin should come loose in operation, allowing the little end hole in the connecting rod to become worn and bell-mouthed, further tightening of the cross-bolt will not solve the problem and may risk the bolt breaking and coming adrift entirely – with expensive consequences! The only practical way to test for loose little ends is to grip the pin firmly in a vice using a pair of steel buttons; if you can detect ***any*** axial movement at the big end then you have a problem. (Fig. 2)

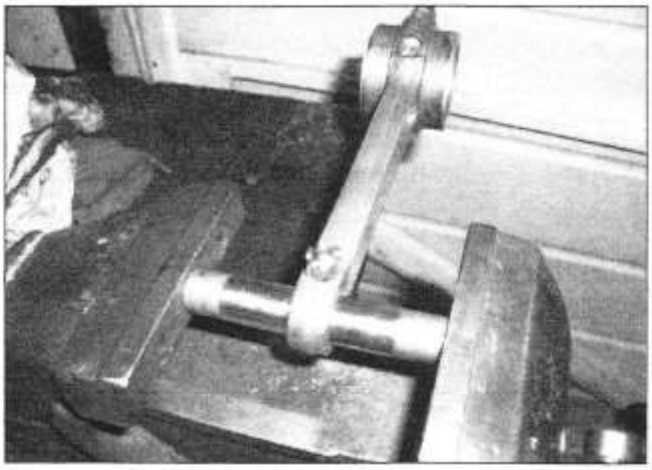


Figure 2

There are three possible solutions: finding a sound original con, rod; reconditioning the loose little ends of otherwise re-usable original rods, or scrapping them and fitting brand new rods.

Using a sound original rod

If the crank is to be reground, It is possible, though unlikely, that you might locate a sound original rod which you could have remetalled to suit – although you should get a balancing firm to check that its little and big end weights (and those of the rest, which may be a mixed bag) do not differ to an unacceptable degree. Con. rods made as a set are likely to be uniform but those made at different times can be significantly different in weight. I offset these differences by fitting oversized big end bolts (in EN19T steel) to the lightest. Fig. 3 shows an oversize and a standard bolt. Although some owners have successfully used remetalled rods on existing worn cranks, I would not recommend this unless you are very sure of the condition and dimensions of the journal. It's best to do the job properly as Talbots are not amenable to 'quick fixes'.

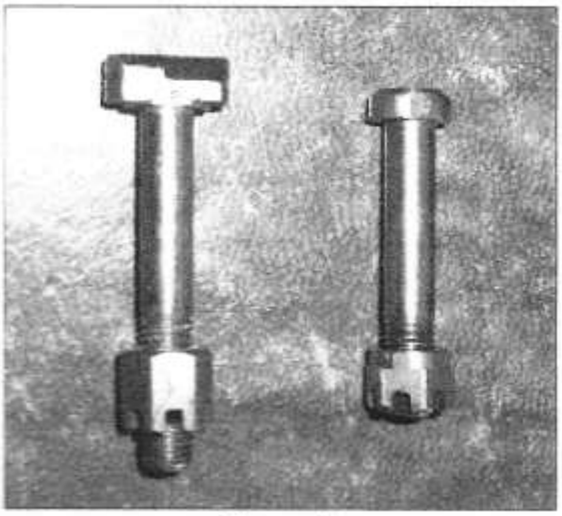


Figure 2

Reconditioning little ends

As my rods were in good general condition and free of cracks I decided on reconditioning. This can cure the problem, but calls for very precise machining and assembly to tool-room standards. When I did mine I had a suitable lathe and fifty years experience in its use, plus invaluable advice and encouragement from Vincent Rawlings (who, unfortunately, no longer has the facilities to take on this kind of work himself). If you don't have a good lathe and are not skilled in using it, I would recommend you give the job to an experienced machinist who is familiar with this operation; as, if he gets into difficulties you could lose a good rod and not find it easy to get a replacement.

Once you have determined the diameter at which the worn little end hole will clean up you will have to source an appropriate gudgeon pin. I couldn't find anything suitable, so had some made identical to the Talbot design, apart from the slightly increased diameter, by Weymouth Pin, whom I strongly recommend. In 1928 the pin diameter was increased from 14mm to 16mm, which remained standard for all 14HP Talbots. I have used increased diameters of 16.06 and 16.5mm.

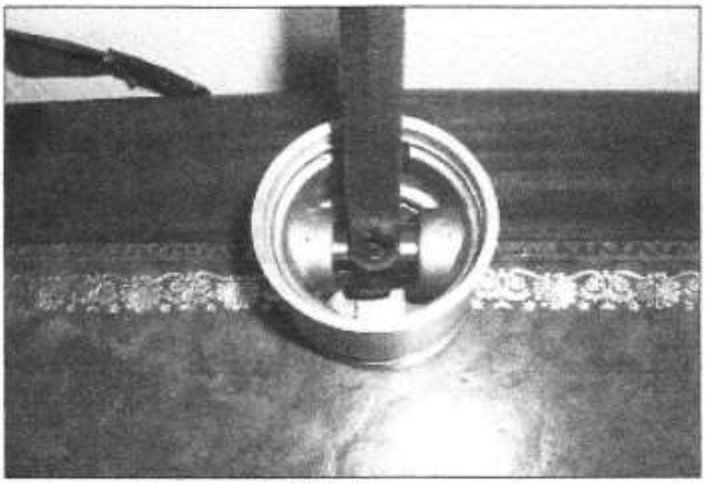


Figure 4

As I was fitting new pistons, I had two of them bored out to suit.

The original two-piece pistons were satisfactory when new, but rattled when worn, and from the early 1930s were replaced by one-piece all-aluminium split skirt pistons. Those in my engine (Hepolite) were also longer in the skirt making the job of removing and fitting the cross-bolts very fiddly. Hepolite no longer supply split skirt pistons and, whilst there may well be others available, I chose JP pistons, whose skirt length is identical to that of the originals. The shorter bosses of the JP pistons (Fig. 4) provide rather less support to the pin than the Hepolites (Fig.5), but, in view of the increase of pin size from 14 to 16mm, and after seeking advice from various experts I decided this is not a fundamental objection.

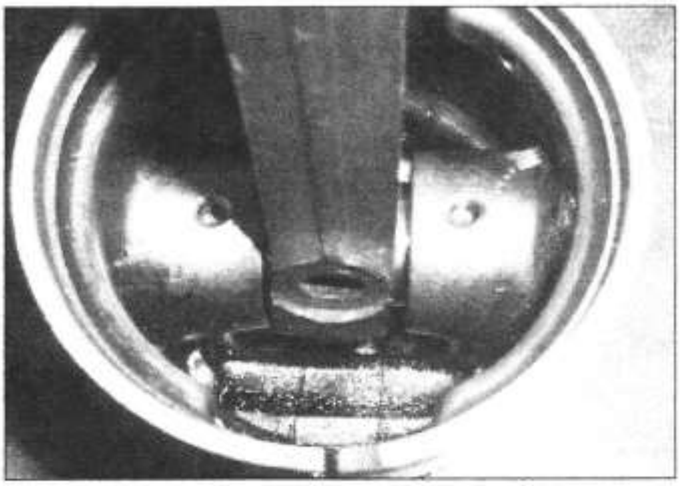


Figure 5

Figure 6

I replaced all the JP gudgeon pins whose cross-bolt notches were far too deep and which, with their small diameter parallel bores were unnecessarily heavy - by a set made by Weymouth Pin to the Talbot design. These have the correct reinforcing rib in the area of the notch and varying bores as required to equalize the weights of all six little end assemblies. They were made without notches so I could notch them once new cross-bolts had been made and fitted. As all the cross-bolt holes were oval and the bolts in poor condition I restored them all to a true circular condition using brass laps - all under the direction of Vincent Rawlings - (see Figs. 6 & 7). It really is surprising how quickly you can remove metal and produce true, parallel, holes by this method.

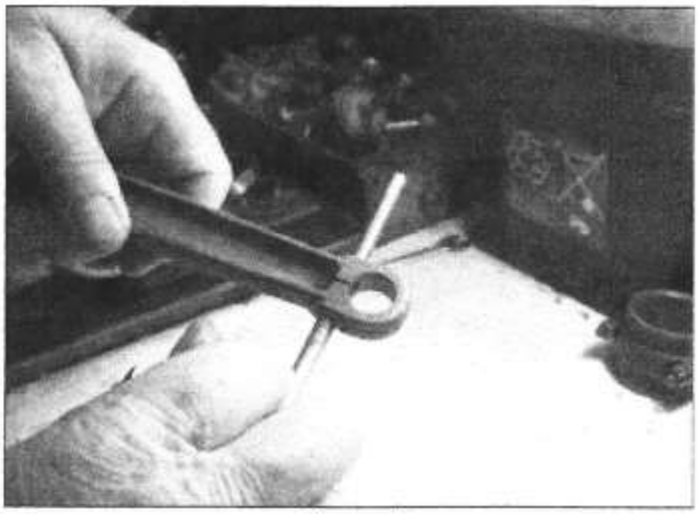


Figure 7

Having fitted a set of cross-bolts made from EN19T steel, I measured the amount by which they intruded into the hole occupied by the gudgeon pins and, with a suitably profiled grinding wheel, put the appropriate depth of notch into each pin to ensure a truly snug fit (Fig. 8).

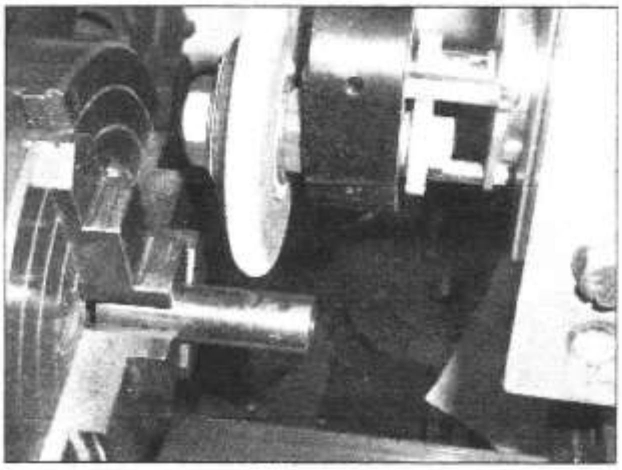


Figure 8

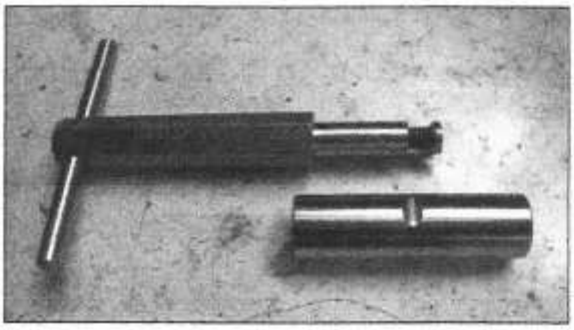


Figure 9

With a tool I made to hold the gudgeon pin (Fig. 9), a stepped locating arbor as recommended by Arthur Archer and the shorter skirt of the JP pistons, alignment of the pin and insertion of the cross-bolt was quite straightforward (Fig. 10).

Fitting brand new rods

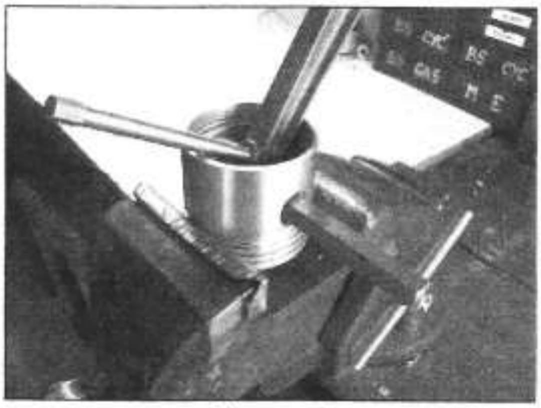


Figure 10

Whilst the process described above is involved and demanding it is effective and, by using the original lightweight Talbot rods (as Roesch would no doubt have approved) avoids the expenditure of well over £1,000 on new rods. That said, if my originals had not been in good condition, or if more than one or two required reconditioning, I would be tempted to go for brand new rods machined from solid with gudgeon pins located by cotter pins and longer little ends to take more advantage of the greater distance between bosses of modern pistons. Modern machining techniques should ensure equal weights. Ian Polson tells me there are potential problems relating to bolt size and clearance in the bore. However, these can be, and have been, overcome.

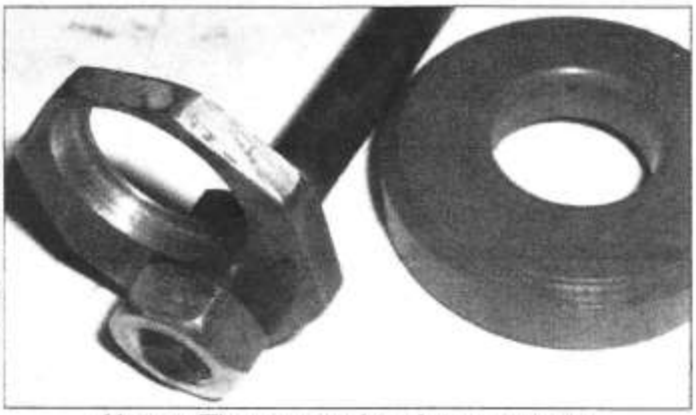
If any member wishes to have more detailed information on these processes, or has any queries, I would be very pleased to hear from them.

VALVE REMOVAL AND REPLACEMENT

By Michael Marshall

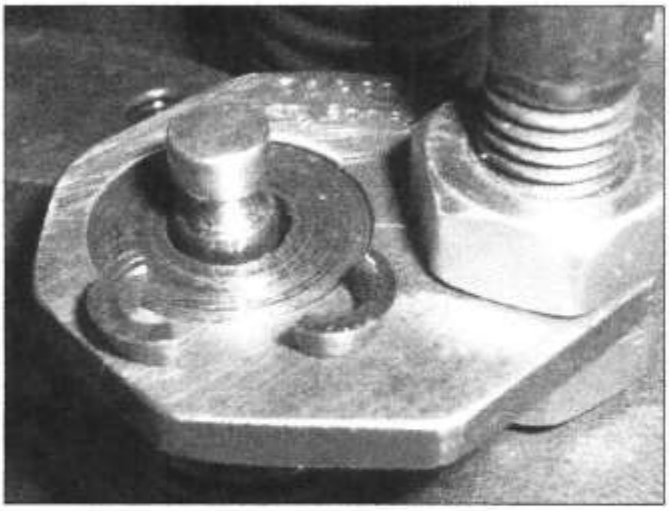
In the 1920s and 30s, Clement Talbot didn't encourage owners to tinker with their products; for example, although the oil pressure regulating valve is illustrated and explained in my 1929 *Handbook of Instructions* for the 14/45, we are told *"This valve should never be touched"*. However in the days when 'decoking' was accepted as a periodic chore, several pages are devoted to removal of the head, decarbonisation, and grinding of valves; which, I suspect, is still carried out by many of today's owners who leave more fundamental work to the specialists. This of course calls for removal of the valves which, according to my Handbook, "*...is done by holding the valve head with the finger in the combustion space, pressing the spring down with the other hand, withdrawing the two split collars and the valve can then be withdrawn*". Apart from its defective syntax, this offers no advice as to which fingers, of which hand, to use to remove the collets (or to replace them when refitting the valves) and must surely have been written by the office boy - certainly not by anybody who had ever attempted this operation.

On 14/45 Talbots with the original combined inlet/outlet manifold, possibly also on others, it is best to leave the manifold securely bolted to the head so as not to give it the chance to spring into an awkward shape. This makes for an unweildy assembly on which to use a commercial valve spring compressor as another 'hand' and can easily result in those pesky little collets 'pinging' off into those furthermost reaches of your workshop or garage that you never clean, and where you are reluctant to rummage because you know that's where the very largest spiders live out their silent and sinister lives.



Above: The removal tool components

With these problems in mind, I recently made up the simple tool whose construction and use in the drill press as shown in the illustrations. If you have access to a lathe it is a simple matter to make the 'foot' from any scrap of 5 or 6mm thick steel; it requires only to be bored to a diameter just less than that of the valve caps, then counter-bored to a diameter to clear the valve and spring (22mm and 24mm for a 14/45 or 65), with a tapped hole to take an old M8 or M10 stud and nut for the 'leg'. If you don't have access to a lathe, I can provide a sketch showing another method which is not that much more difficult.



Above: The tool shown over the valve allowing the collets to be removed.

In use, with the head supported on a piece of wood on the drilling table to avoid scratching the joint face, the leg of the device is held in the chuck; then, with a suitable spacer in the combustion chamber to locate the head of the valve, the drilling head is lowered to compress the valve cap and springs, so that the collets may be removed and the spring pressure gently released. Reassembly is equally easy: the foot is lowered over the valve cap to compress the springs, the two collets are lightly pinched into place in the groove 'twixt finger and thumb and the drilling head raised - all under cool, calm, control. This method minimizes the risk of putting you into a foul mood for losing a collet - or the need for any confrontations with spiders.

7 Talbot Engines

OIL FILTER CONVERSION FOR TALBOT 14/45

By Michael Marshall

Until I acquired my 1929 Talbot AG 14/45 some eight years ago, my knowledge of oil filters was very limited. I can just about remember cleaning a rather nicely made filter on my 1936 MG, but that was over fifty years ago. Since then, I've left filter changes to the garage, and my beloved 1932 Riley Nine has no filter at all. After thoroughly cleaning its oil ways and pipes twenty years ago, I have relied on Castrol GTX 15-50 (latterly Classic 20w-50), changed every 1,000 miles, and been very pleased with the low rate of wear that I've noted. I was therefore tempted to do the same with the Talbot, but as it *did* have a filter (of sorts), decided to see if it might be possible to take advantage of modern technology by converting to a cartridge-type full-flow arrangement.

Not wishing to spoil the elegant simplicity of the engine department by the addition of external pipe work, I looked around for an internal filter arrangement as a direct replacement for the original, which I felt could be improved upon. (For those models with a Wilson box which share oil with the engine, I can see that a larger capacity filter might well be required to cope with contamination of the oil by debris from the friction bands, and that this would probably have to be arranged externally). There appeared to be two possible ways of arranging an internal system: the outward flow type and the inward flow type, both using a proprietary cylindrical paper cartridge in place of the Talbot gauze filter unit. Both types have been proved to work very well.

The outward flow type seems to have been first devised in the Antipodes. It appears to involve cutting off the lower part of the original *Mazak* filter unit (also its conical "roof") so that it serves only as a filling funnel; and uses a Ryco TRZ0027 filter cartridge having a capacity (when new) of about 18 litres per minute at a pressure differential of 1 psi. This is located by washers on the oil delivery tube, the upper one being held down by a coil spring pressure applied by a new "bell" clamp that seals the whole assembly once the original nut is secured. The design requires an additional hole, or holes, in the central tube to admit oil to the inside of the filter, and incorporates a spring-loaded relief valve.

The inward flow type that I decided on uses a Crossland 356 filter cartridge (Fram equivalent CH5153), which, though physically smaller than the one used in the outward flow arrangement, has a similar flow rating. It also sits around the oil delivery pipe, but is housed in an aluminium can in which the pressurized oil from the pump surrounds the filter element and then flows inwards through it.

Rather than fiddle about with the original *Mazak* filter, I obtained from A. Archer a rough casting for a bronze filter unit intended for a Talbot 75, or 90, from which I cut off the bottom part and machined the upper part to suit the 14/45. This provides a useful increase in the height of the neck (whilst not interfering with closing of the bonnet), and reduces any tendency to throw out oil on tight left hand turns - see Fig.1. It also requires the securing nut to be lengthened – see Fig.2, and an aluminium can to contain the cartridge, which I bored out from solid bar - a laborious but satisfying operation – see Fig.3. A filter element and all parts required are shown in Fig.4.

The need to lengthen the securing nut by about 10mm arose only because the top of the conical part of the 75 pattern bronze casting was lower than that of the original unit by this amount; for the same reason, I had to provide additional holes a little further down the oil delivery, to allow the oil to pass to the outside of the filter cartridge, then inwards through the filter to enter the pressure chamber between the outside of the pipe and the bottom of the can. None of this is necessary if you are re-using the original *Mazak* unit.

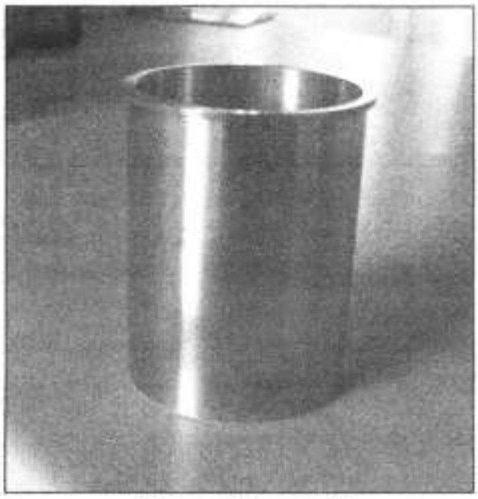
The original of this design also incorporated a pressure relief valve, but I considered its operation might be problematic and decided, for the sake of simplicity, not to provide this feature. My experience is that there's no need for it, as there are no signs of any reduction in the normal indicated pressure (when warm) of 40psi at 40mph at the end of the 1,000 interval at which I normally change the oil and filter. I could probably extend this mileage, but have just had the crank ground and the mains and big ends re-metalled, so will continue to change every 1,000 miles - at least until I feel everything is nicely bedded in.

The tricky part of this modification was the adaptation of the 75 bronze oil filter casting. This involved a lot of machining, silver soldering and re-machining to seat in the apertures of the 14/45. It might be possible to achieve the same end modifying the original *Mazak* component. However, I'm glad I did it the hard way, as it is far more satisfactory in bronze, and I just don't like *Mazak* - who does? If anybody is contemplating a similar exercise I would be happy to provide the required dimensions of the various parts.

Footnote: There is no reason in principle why internal filter conversions of the types described above should not be used on other Talbots with manual boxes. Indeed, I understand that at least one Talbot 90 in Australia has been successfully converted using the Ryco TRZ 0027 outwards flow filter element. However, my personal experience relates only to the 14/45.

Above: Figure 1

Above: Figure 2



Above: Figure 3

Left: Figure 4

Michael Marshall, as your Technical Editor, has carried out extensive and intensive research into the correct references, and availability of, bearings for all Roesch Talbot models. His findings were summarised in Magazine 20 earlier in the year, along with details for the 105 chassis. I will publish others from time to time, and following now is that relating to the 90 chassis. Michael is very willing to supply copies direct if you wish, either by post or e-mail, if you make contact direct.

(*Copies of all papers have been passed to the STD for their records also, to give as wide a coverage as possible*).

ORIGINAL BEARINGS DATA SHEET NO. 3 FOR TALBOT 90~1930 to 33

Models AO 90, AM 90 & AW 90
Grouped as in the Talbot Catalogue of Spare Parts
NB: See also separate list: Original Bearings and Modern Equivalents – All Models

B - Single row ball   ACB - Angular contact ball   DB - Double row ball
R - Single row roller   DR - Double row roller   TR - Taper roller
SA - Self aligning (ball or roller)   Spl. - Special

Consult a Talbot Specialist first! He can provide application knowledge and sometimes, unused original bearings!

7 Talbot Engines

PART No.	POSITION	TYPE & SIZE	No. off	ORIGINAL BEARINGS
ENGINE:				
Rotax Dynamotor bearings - All types:				
-	Front	B ¾" x 1 7/8" x 9/16"	1	SKF RL56
-	Rear			SKF 6107, or Hoffmann M35N
Fan:				
309207	Front	B 10 x 30 x 9	1	?
303066	Rear	B 17 x 40 x 12	1	?
Clutch - Early AO 90 only:				
307023	Spigot	B 17 x 40 x 12	1	R&M LJ17
30413 ?	Clutch withdrawal	B 40 x 80 x 18 ?	1	Hoffman 5615 ?
Clutch - AM 90, also later AO90:				
307023	Spigot	B 17 x 40 x 12	1	R&M LJ17
310999	Clutch withdrawal	B 35 x 76 x 16	1	R&M 7/LJT 35
Spur Gearbox - Early AO90				
?	Direct Shaft Front	R....................?	1	Hyatt
310289 ?	Driving Shaft Front	R....................?	1	?
Silent Third Gearbox: - AM 90 also later AO90:				
309963	Direct drive pinion	B 1¾" x 3¾" x 13/16"	1	R&M LJ 1¾"
310840	Driving shaft front	R 1½" x 2 3/8" x 13/16" Spl.	1	Hyatt cage & rollers No.206
309964	Driving shaft rear	B 1 3/8" x 3½" x 7/8" (?)	1	R&M KJ 13/8"
309965	Layshaft front	B 20 x 80 x 21	1	R&M LHJ 20 Y
Wilson Preselector Gearbox - AV 105 from Oct. 1932, BA105 & BI105:				
303060	Driving shaft	B 35 x 72 x 17	1	Hoffmann No. 135
303060	Driven shaft	B 35 x 72 x 17	1	Hoffmann No. 135
312054	Clutch cone	B 55 x 100 x 21	1	Hoffmann No. 155
312054	Reverse brake drum	B 55 x 100 x 21	1	Hoffmann No. 155
312134	Reverse planet gears	DR ....? Spl.	3	Hoffmann Type ?
312137	Forward planet gears	R ....? Spl.	9	Hoffmann Type ?
STEERING: Steering column - All models:				
303122		SADB 30 x 62 x 20	1	SKF No. 2206
Hubs - All models:				
306628	Hub outer	TR .75" x 2.0" x ¾"(?)	2	Timken 1351/1330
306627	Hub inner	TR 1.3" x 72 x .748"	2	Timken 317/313
REAR AXLE : All models				
308603	Prop shaft	B 28 x 2¼" x 5/8" Spl.	1	R&M LJ1 Spl. NB: 28x2¼"x3/8"
303392	Pinion (shank end)	ACB 30 x 72 x 19	1	R&M MJT 30
308393	Pinion (gear end)	ACB 30 x 71.9 x 19 Spl.	1	R&M MJT 30 Spl.
308391	Pinion (gear end)	DR 30 x 72 x 28	1	R&M Type ?
Differential - AO90 and AM90				
306231	Differential	TR 40 x 80 x 9/16"	2	Timkin 11315/11157
AW90 only:				
311583	Differential	TR 45 x 85 x 5/8"	2	Timken 29177/29334
Rear hubs : All models:				
301697		DB 40 x 80 x 23	2	R&M LDJ 40

TALBOT BEARING INFORMATION

As announced at the AGM, details of the ball and roller bearings used on all Roesch Talbots from 1926 - and of modern equivalents - are now available. This information is contained in two separate lists: a two-page Bearing Data Sheet, one for each of the seven group of models, and a separate four-page Original Bearings & Modern Equivalents list covering all models.

The Bearing Data Sheets cover the model range as follows: No.1 for 14/45s and 65s; No.2 for 70s and 75s; No.3 for 90s; No.4 for 105s; No. 5 for 95s; No.6 for 110s, and No.7 for all Ambulances. They give the location, function, type, dimensions and original supplier's designation for each bearing, together with its unique Talbot part number.

Using the Talbot part number as the link, the Original Bearings and Modern Equivalents list provides the current standard reference code for modern replacements. Where identical bearings are no longer available, the nearest modern equivalent is suggested, together with details of any modifications required to accommodate it. As yet, there are only two cases of obsolete bearings (for the rear of the dynamotor and the inner bearing of the front hub) where modern solutions have not yet been found. When they are, the lists will be updated.

If you let me know the model concerned, I will send you the appropriate Bearings Data Sheet, and the list of Modern Equivalents, either by e-mail or by post. Some members have expressed interest in having similar lists for their 8/18s and 10/23s. If they care to let know whatever data they have, I would be very pleased to extend the above to include their cars. Thanks, in any case, to all who have contributed so far.

Michael Marshall

TALBOT BEARING SAMPLE SHEET

ORIGINAL BEARINGS DATA SHEET NO. 4 FOR TALBOT 105 1931-35

Models AV 105, BA 105, BD 105 & BI 105
Grouped as in the Talbot Catalogue of Spare Parts

NB: See also separate list: Original Bearings and Modern Equivalents – All Models

B - Single row ball ACB - Angular contact ball DB - Double row ball
R - Single row roller DR - Double row roller TR - Taper roller
SA - Self aligning (ball or roller) Spl. - Special

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He can provide application knowledge and sometimes, unused original bearings!

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-	Rear			SKF 6107, or Hoffmann M35N
Fan:				
309207	Front	B 10 x 30 x 9	1	?
303066	Rear	B 17 x 40 x 12	1	?
Gearbox and Clutch				
Clutch - AV105 to Oct. 1932:				
307023	Spigot	B 17 x 40 x 12	1	R&M LJ17
310999	Clutch withdrawal	B 35 x 72 x 16	1	R&M 7/LJT35
Clutch BD105 only:				
307023	Borg & Beck spigot	B 20 x 52 x 15	1	Hoffmann 320
Traffic Clutch - BA 1935 and all BI105:				
307023		28R X 6 X 8 102 x 118 Spl.	2	Hoffmann L/480 Spl.
Silent Third Gearbox: - AV 105 to Oct. 1932:				
309963	Direct drive pinion	B 1¾" x 3¾" x 13/16"	1	R&M LJ 1¾"
310840	Driving shaft front	R 1½" x 2 3/8" x 13/16" Spl.	1	Hyatt cage & rollers No.206
309964	Driving shaft rear	B 1 3/8" x 3½" x 7/8" (?)	1	R&M KJ 13/8"
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303060	Driven shaft	B 35 x 72 x 17	1	Hoffmann No. 135
312054	Clutch cone	B 55 x 100 x 21	1	Hoffmann No. 155
312054	Reverse brake drum	B 55 x 100 x 21	1	Hoffmann No. 155
312134	Reverse planet gears	DR ....? Spl.	3	Hoffmann Type ?
312137	Forward planet gears	R ....? Spl.	9	Hoffmann Type ?
Humber gearbox - BD 105 only:		No details available		
STEERING:				
Steering column - All models except BD 105:				
303122	BD 105:	SADB 30 x 62 x 20	1	SKF No. 2206
306309		SADB 25 x 52 x 18	1	SKF No. 2205
Hubs - All models:				
306628	Hub outer	TR .75" x 2.0" x ¾"(?)	2	Timken 1351/1330
306627	Hub inner	TR 1.3" x 72 x .748"	2	Timken 317/313
REAR AXLE : All models				
308603	Prop shaft	B 28 x 2¼" x 5/8" Spl.	1	R&M LJ1 Spl. NB: 28x2¼"x3/8"
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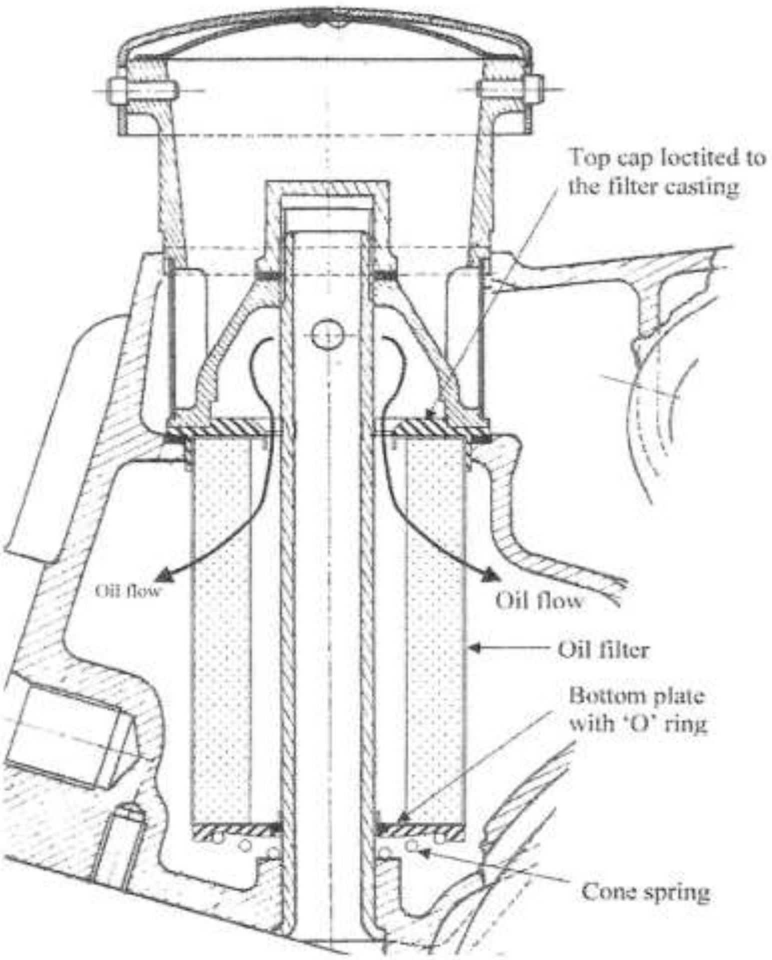
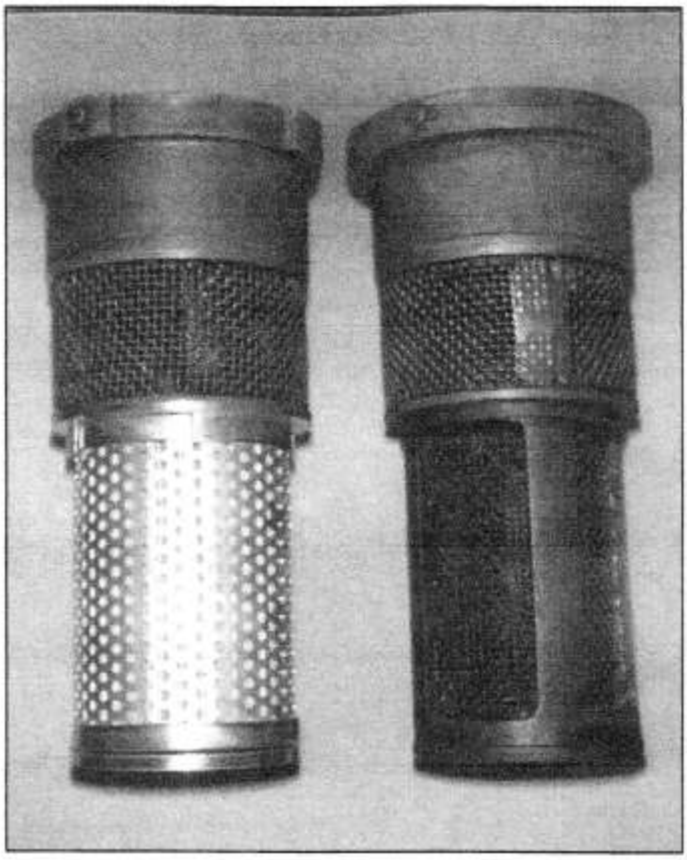
311583	Differential	TR 45 x 85 x 5/8"	2	Timken 29177/29334
Rear hubs : All models:				
301697		DB 40 x 80 x 23	2	R&M LDJ 40

AN INTERNAL FULL FLOW OIL FILTER

By Ian Potts

This article describes how I installed the 'New Zealand' reverse flow oil filter. This is a filter specially manufactured for Talbots as the oil flows in the opposite direction to most filters. I liked the idea of a full flow filter that leaves the under-bonnet view unchanged and it seemed easier to implement this system on a 75 with a front exhaust pipe than put in an adaptor with pipes to an exterior filter. The drawings and pictures show my design which also manages to incorporate a relief valve. The filter casting needs to be machined, a top plate and bottom cap need to be made and a stock cone spring obtained. The drawing shows an 'O' ring on the bottom plate, but in the end I just made the bottom plate a good fit on the oil delivery pipe. No engine dismantling is required.

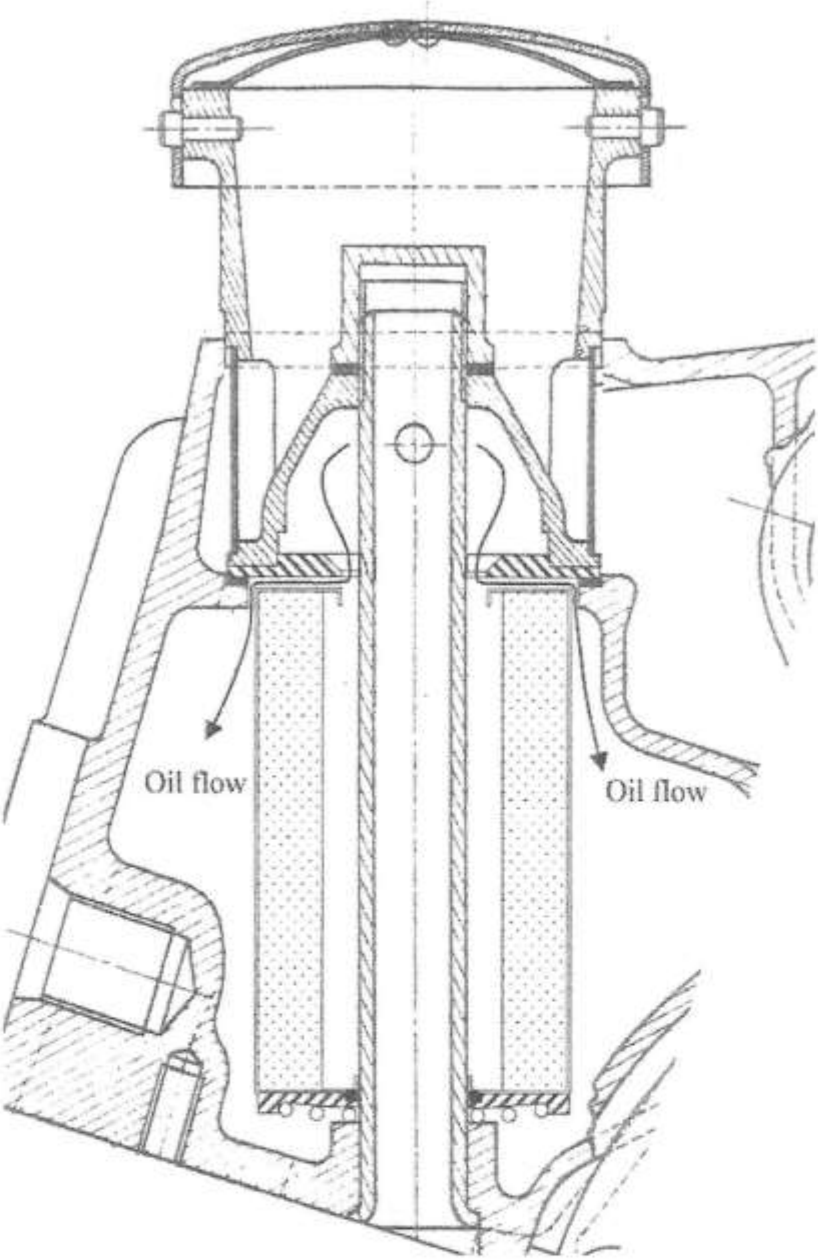




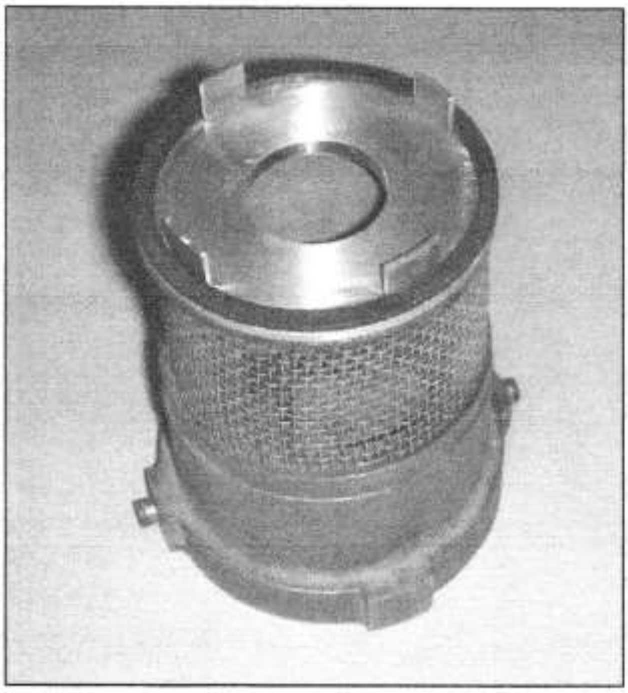
Above: The new and old filter compared.

I had an old filter casting with cracked legs which I used. The legs and gauze were cut off and the casting then machined to accept the top cap, which is then loctited to the filter casting.

A relief valve to deal with excessive pressure drop which might occur with cold oil or a partially blocked filter is essential. I incorporated a relief valve by modifying the top cap to allow oil to pass over the top of the filter. With a pressure drop of around 10 psi the filter will move down until the cone spring becomes coil bound. By cutting away most of the filter locating ring in the top cap, leaving four locating lugs, (see picture) there is an escape path for the oil, this path having a greater area than the area of the three oil holes in the supply tube.



Above: Diagram shows the oil flow with blocked filter or excessive pressure drop



Above: By cutting away most of the filter locating ring in the top cap, leaving four locating lugs, there's an escape path for the oil.

Your oil pressure gauge should show you if the filter is clogging, as the oil pressure will drop from its usual value. Changing the filter should solve the problem. Changing the filter is easy, as when the filter casting (plus the loctited-in top cap) is removed the cone spring pushes the oil filter up about 15mm when it can be removed (I use one of those magnets on an extending shaft or the hooked end of a bicycle spoke).

Both of my cars have been fitted with these oil filters, and I have done over 12000 miles including thrashing around Montlhéry and up the Stelvio with no problems. I can supply further information and full drawings to anybody who requests them.

Currently the supply of the filters is under review for availability and possible manufacture in the UK.

TALBOT CYCLINDER HEAD GASKETS

By Michael Marshall

One of the charms of Roesch Talbots is that they introduce you to problems never previously encountered. Whenever new head gaskets were required on my 1933 Austin 7, 1936 MG PB, 1950 HRG, 1932 Riley 9 or 1965 MGA I simply cleaned the joint faces, oiled the studs and tightened the nuts as far as felt right without giving the matter much thought; nor did I ever need to, it was 'fit and forget'. Now however, fifteen years of experience of both AF and AG blocks and three AG heads on my 1929 Talbot have taught me that things are not so simple. As this seems to have been the experience of a considerable number of other Talbot owners I thought a few notes on how I would *appear* to have overcome these problems might be of interest.

When the more sophisticated high output engines appeared in the 1920s, cars such as Alfa-Romeos, Sunbeam 3 litres and all Bugattis employed one-piece cylinders and heads, i.e. fixed heads, to avoid potential problems with head joints. (For the same reason, joint faces on Alvis 12/50s have no water apertures, circulation being from a connection to the rear of the block and forward through the head to the top of the radiator).

Whilst fixed head engines eliminate joint problems they call for high casting skills and machining costs; which Roesch, rightly, judged inappropriate for the high quality but very reasonably priced 14/45 intended to save Talbot (and with it STD) from commercial failure. He therefore adopted a detachable head sealed by a very thin (.030" thick) solid copper gasket, shaped to compress uniformly when installed. This was an excellent arrangement at the time because the solid copper gasket, being far less compressible than the contemporary copper/asbestos sandwich type, provided better mutual support between block and head and conducted heat more effectively.

Blocks and heads were finished at Barlby Road on a grinding machine having a large diameter rotating carousel on which they were mounted in batches of six or more, which carried them under a large diameter vertical spindle grinding wheel. [Fig.1]

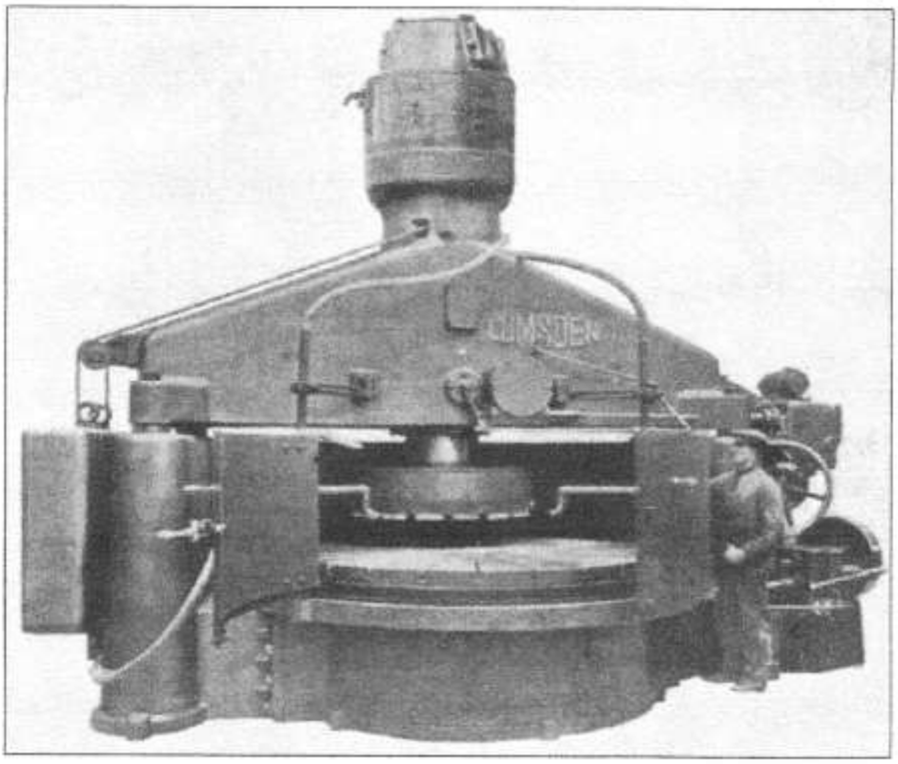


Fig.1 - The Barlby Road carrousel-type grinder.

This ensured the necessary flatness for solid copper gaskets to work successfully - whilst the cars were relatively new. The problem now is that now blocks and heads have been subjected to eight decades of use (and possible abuse) not to mention eighty summers and eighty winters, and many are now not as flat as they need to be to allow the use of solid copper gaskets as originally intended; also fuels, jointing compounds and gasket materials have changed since then.

What's worse is that very few blocks or heads have not 'benefited' from having since been given one, or several, 'licks' on modern grinding machines; on which the component is traversed longitudinally under a *small* diameter grinding wheel, commonly set out of vertical to avoid a criss-cross pattern, resulting in a hollow-ground longitudinal furrow. This causes no problems with easily compressible copper sandwich gaskets or modern reinforced gaskets, but with a less forgiving solid copper gasket can give rise to water in the oil, oil in the water, and leakage between adjacent cylinder bores.

> *Talbot owners with time on their hands are recommended to read the account of my first five years of head gasket tribulations: "A Tale of Double Pathology" published in 2003 and now available to download from the Forum.*

After 2003 I had reasonable success with a freshly annealed solid copper head gasket, checking for no raised threads in the block, using Wellseal, ensuring the nuts were entirely free on the studs and tightening progressively in the recommended sequence to 35lbsft.

Then, on removing the head in 2011 to fit new valve guides there was further evidence of gasket trouble, evidenced by gurgling from the radiator when cranking the engine on the handle and two poor compressions (though no signs of water in the oil or vice-versa).

Lifting the head revealed positive contact between the block and head around the studs, together with discolouration indicating leaking between two pairs of bores [Fig.2], so I decided to try a new copper sandwich gasket which I was confident would solve the problem – even at the cost of reducing the compression ratio by a couple of points.

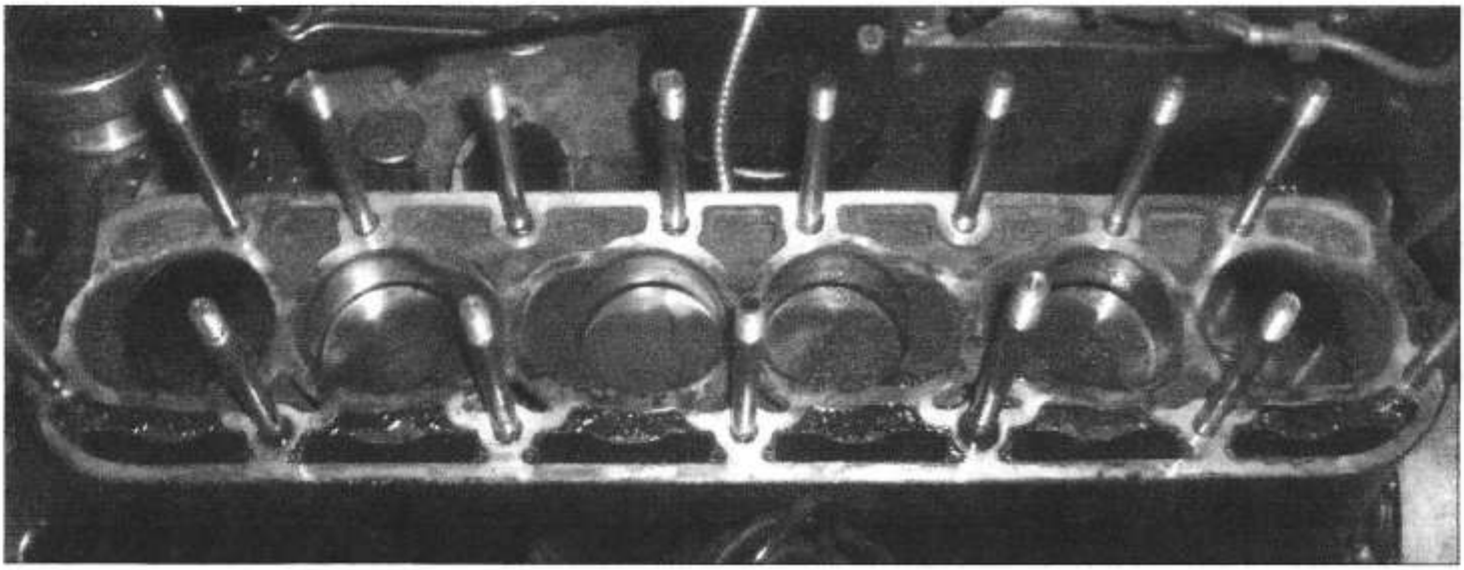


Fig.2 - Evidence of solid gasket making positive contact around studs, but leaking along centreline between bores.

It didn't: when cranking by hand a year later I heard the gurgle again, accompanied by some very rude noises, and was amazed to note the same evidence of leaking between adjacent bores [Fig.3], so I resolved to revert to a freshly annealed solid copper gasket. This time, I left no stone unturned. After two years and 3,500 miles all *appears* to be well. I don't know *which* of the various stones I turned did the trick, so have included all of them in the checks and procedures suggested below.

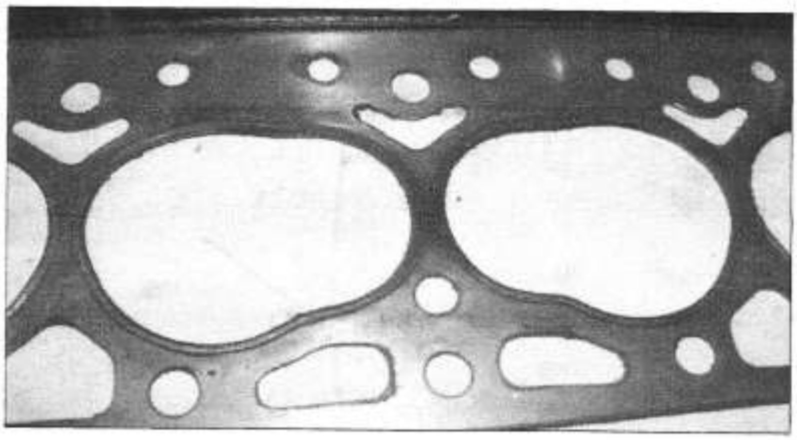


Fig.3 - Close-up of sandwich gasket also leaking between bores.

1 - Determine and record symptoms of head joint failure

Misfiring and steam from exhaust?
Water in oil?
Oil in water?
Some low compressions?

NB: Dense white clouds from the exhaust doesn't necessarily indicate a blown gasket. If accompanied by a strong smell of petrol it may be, on cars with an Autovac, that the float has sunk, allowing the engine to ingest neat petrol through the vacuum line! See "A Tale of Double Pathology" mentioned on page 13.

2 - Condition of joint faces of block and head

Any signs of leaking where it shouldn't? If so, compare with face of gasket.
Any signs of lifted threads in block?
Any stretching of stud threads?
Check for hollowness across block or head? If over .001" will probably need correction for use with a solid copper gasket, but may be alright with composite gasket.

3 - Check thickness of flanges in block through water passages in joint face

Fig.4 shows one of my 14/45 heads that had had nearly 2mm skimmed off to increase compression ratio, leaving a flange thickness of 7mm. Replacing it with an untouched head having a flange thickness of 9mm [Fig.5] seems to have cured the problems.

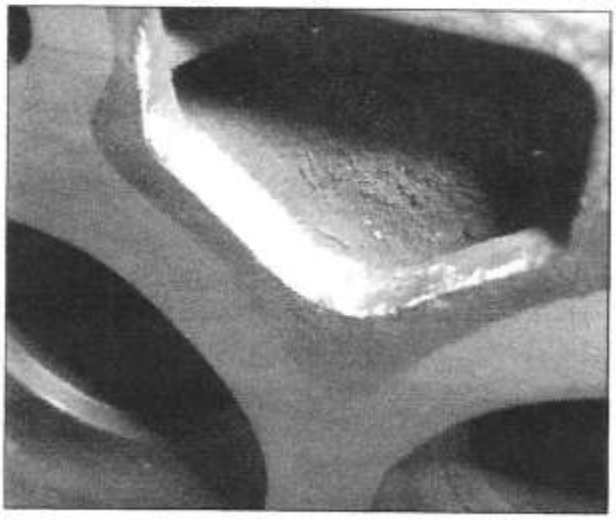


Fig.4 - Close-up of the 7mm thick joint face of my No.2 head, possibly over-ground.

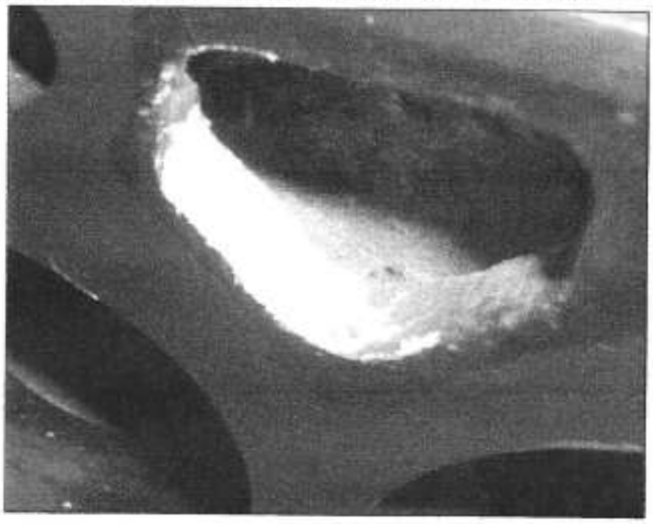


Fig.5 - Close-up of the 9.5mm thick joint face of my No.1 original 14/45 head, never reground.

4 - Condition of gasket faces

Check for any signs of leakage and compare with corresponding faces of block or head.

5 - Grinding to correct hollowness

Ideally done on a horizontal spindle grinder, but these are not easy to find. If on vertical spindle grinder the spindle must be set truly vertical and operated by someone who understands what is required; otherwise you will lose money and metal and be no better off.

6 - Lapping to correct hollowness

A long and laborious procedure, but ultimately satisfying and effective. With appropriate precautions, may be carried out on block in situ. [Fig.6] Requires special tackle, much patience, and must not be rushed (approx 4 days per surface). Best left to an expert, otherwise surfaces may be left worse than before!

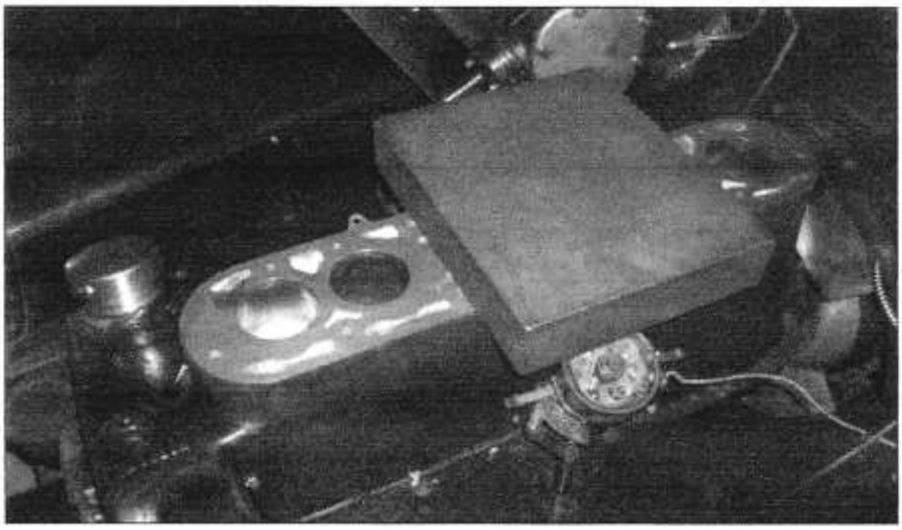


Fig.6 - Lapping the block flat in-situ with a cast iron lap.

7 - Check studs

If any threads stretched or not perfectly straight, replace with new set (also nuts) from a trustworthy supplier who will certify the steel used. Studs should be put into the block no more than finger tight so as to avoid pre-loading the threads to no purpose. Nuts should be perfectly free on the studs; also, to spread the loads from nuts to head I use thick hardened steel washers by American Racing Products, available from Arrow Components.

8 - Types of gasket

Hallite: Looks like dull black cardboard and just about as good. OK to have in your tool kit and might get you home, but is not worth lifting your head to install.

Copper/Asbestos: Effective in accommodating lack of flatness in head or block, but no longer available as any asbestos considered a health danger by H&S.

Copper/Asbestos substitute: Also effective - for a while - but the substitute material is not much stronger than icing sugar and crumbles away at the edges.

Composite with metal Reinforcements. I have had no experience of these, but understand that they can give satisfaction.

Solid Copper: The best as it provides the best mechanical support and doesn't reduce designed compression ratio – **provided joint surfaces, threads, studs and nuts are in good condition!** Also adapts to any out-of-flatness in block or head and can be re-used time and time again – **but must be thoroughly annealed just before fitting!**

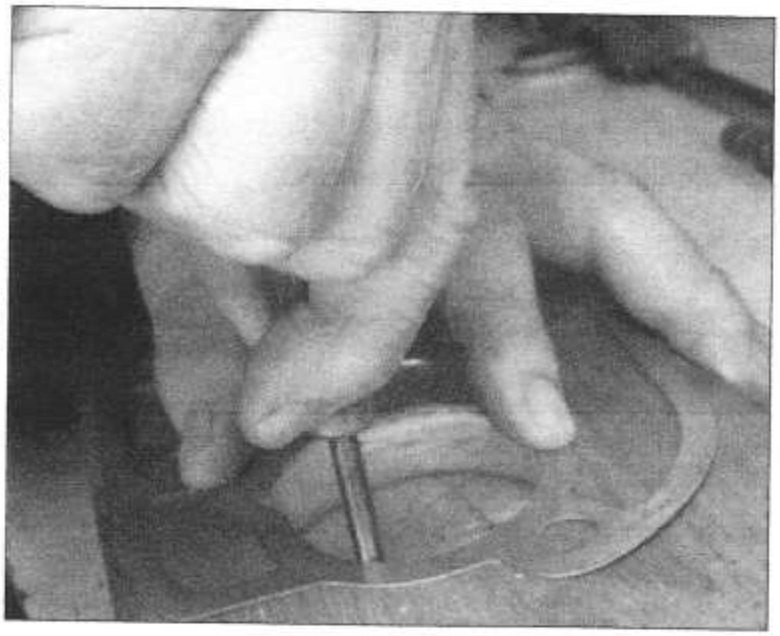
9 - Annealing a solid copper gasket

I do this with a propane torch having a large burner, the gasket being continuously supported on a bed of refractory bricks, bringing the copper to a medium cherry red glow (not an incandescent orange as this indicates burning).

It isn't necessary to bring it to the required temperature along its whole length at the same instant; you can work along it progressively from end to end, keeping the torch always on the move. Pre-heating the bricks for five minutes makes this much easier to achieve.

10 - Preparing an annealed gasket

This procedure, recommended by Tony Ward, involves 'raising' the edge of a freshly annealed gasket slightly by rubbing it with a smooth hard steel tool to help ensure good sealing around its apertures, the gasket being supported by a piece of plank with a hole in it as shown in Fig. 7.



Fig,7 - Preparing an annealed solid copper gasket with a hardened steel rod to raise its sealing edges.

11 - Jointing Compounds

Some experts advise just a little oil to help the gasket to 'settle'. This may be all right for sandwich gaskets, but for the solid copper type between less than perfect joint faces I believe a suitable jointing compound is required.

I used to rely on **Wellseal,** but tests have proved to my satisfaction that it can be easily swilled away by fuel containing ethanol (see the March/April 2012 issue of the Magazine) and I suspect this as contributing to some of the problems I have experienced. I still use it, but not where contact with fuel is involved.

I found both **Red Hermatite** and **Hylomar Blue** to be unaffected by fuel containing ethanol, but of the two prefer the Hylomar Blue aerosol spray as this makes it much easier to apply a truly uniform coating than attempting to spread the original gel type with one's finger .

12 - Torquing

On 14HP engines I would tighten the head nuts in two stages: firstly to 25lbsft and then to not more than 35lbsft. If any oversize studs have been fitted they should be stepped down to the original diameter and not torqued to more than 35lbsft. After one or two hundred miles the radiator should be temporarily drained to allow all the head studs to be completely slackened in the reverse of the tightening sequence and then re-tightened as above.

For 75/90 models, tighten in two stages to 35, then 50lbsft, and for 95/105/110 engines, in three stages to 50, then 75, then 85lbsft.

So as not to obscure the wood by the trees; also, to avoid reader fatigue, the above suggestions have been only briefly outlined. I have a lot more information, data and photos which I would be happy to provide to anyone on request.

Exhaust manifold to pipe flange gaskets

The original dreaded copper asbestos gasket on my 14/45 gave every satisfaction until it simply fell apart a few years ago. I tried a silver coloured metal replacement both with and without Fire Gum, but with no success. I then tried some copper sandwich gaskets filled with an asbestos substitute acceptable to H&S. These also failed because like Fire Gum, this material has no mechanical strength or cohesion and any wiggling of the exhaust pipe causes it to crumble away at the edges. See Fig.8, the upper gasket being new and the lower having become useless.

Fig.8 - New copper/asbestos substitute sandwich type manifold/ exhaust pipe gaskets before and after 500 miles use.

I then made a solid copper flanged gasket (plus some spares) by spinning some 16 gauge copper tube on the lathe. Fig.9

This (Fig.9) is installed with the flange against the manifold i.e with the 'skirt' downwards, and is sealed with Geocel Plumba Base high temperature (300°C) silicone sealant intended for domestic gas flues. This does not set hard or crumble away to dust like asbestos composition substitute and has completely solved the problem - so much so, that I *might* be tempted to use it on the cylinder head joint if I have any more trouble in that area.

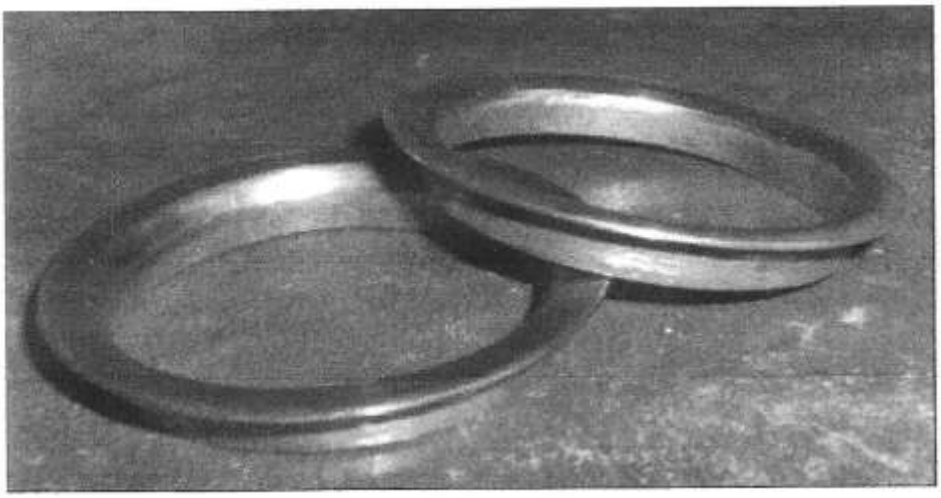


Fig.9 - Sold copper manifold/ exhaust pipe gaskets spun from 16 gauge copper tube.