Much to-do about Nines

A collection of articles
written for
The Blue Diamond
by
Noel G. Wyatt

Book No. NZ213

Historian.rileyccnz@gmail.com

https://www.therileycarclub.nz/

ACKNOWLEDGEMENTS

Lyn and Noel Wyatt dressed for the occasion at the 2007 Naracoorte National Rally.

The idea to put this collection together came from the many technical articles written by Noel Wyatt about looking after Riley Nines for the Victorian Club's news letter The Blue Diamond.

Noel and Lyn Wyatt were stalwarts of the Victorian Riley club for many years, both serving as Editor of the Blue Diamond news letter.

Until his death in 2015 Noel was one of the go-to men for Riley Nine information and this book includes many of the articles Noel wrote about a myriad of subjects concerning all aspects of 'The Wonder Car'.

Victor Riley in offering his condolences to Lyn said: *"Anyone working on or restoring a "Nine" will have found Noel's articles tremendously useful, but they will endure as a testament reflecting his skill, knowledge and experience. He will be missed by all who knew him, but we shall remember him."*

The Librarian sought and received Lyn Wyatt's permission to reproduce material written by Noel and Lyn's supply of the original files made the assembly of this book so much easier and is much appreciated.

PREFACE

THE WONDER CAR

The Riley '9' has been termed the wonder car and I have got to thinking that most of our Club members aren't sure what its a wonder of - (if you know what I mean).

Is it because its a wonder it goes at all, or is it a wonder if it will get back home again, or is it a wonder if it will stop somewhere embarrassing, etc. etc.

Take my word for it, it's none of these as the Riley '9' is really a super little car. Driven within its capabilities and in properly restored condition it will perform adequately and never fail.

Why don't we see more '9's at our Club events? At our Cool Art outing I took a few Club members for a ride in Michael McDougall's Mk 1 '9' and they were amazed at how well it went and this is without any special tuning etc. The engine I have just taken out of our Imp, whilst it went well, was never really satisfactory as I had fitted Wade profiled cams and I could never get it to idle nicely. The engine I have in now is fitted with original Riley cams (2 exhaust profiles though) and is far superior. However for normal driving I'm beginning to think that the original '9' motor without alteration has a perfectly satisfactory performance.

Unless you are going to race your '9', simply set it up as originally supplied and with everything in good order you will agree it really is a wonder car.

And if you don't have a '9' I feel sorry for you as '9' motoring is something else. The joy of mastering the silent third crash box, judging just how long to allow the motor to slow down before gear changes, etc., is a pleasure you really should have before you pass on.

The preference among pre-war owners seems to be for the 12/4 motor or even the exotic 6 cylinder, however the humble '9' is more than a match for either of these, at a usually much more affordable price.

Noel G. Wyatt
June 1993

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APRIL 1979.

RILEY 9 BRAKE MAINTENANCE

Noel G. Wyatt

After failing miserably in the braking test in last year's Riley ability trial, I decided to see what could be done with our '32 9 Tourer's mechanical brake system.

The system consists of a 3/16" dia. flexible steel cable starting from one front wheel via pulleys etc. to the back axle and then returning to the other front wheel. The operating mechanism is at the ball joint on the torque tube where a system of levers alters the effective cable length applying the brakes through levers on each wheel at the front and a common lever at the rear wheels.

The front levers rotate in an aluminium bearing and after many years this wears due to:

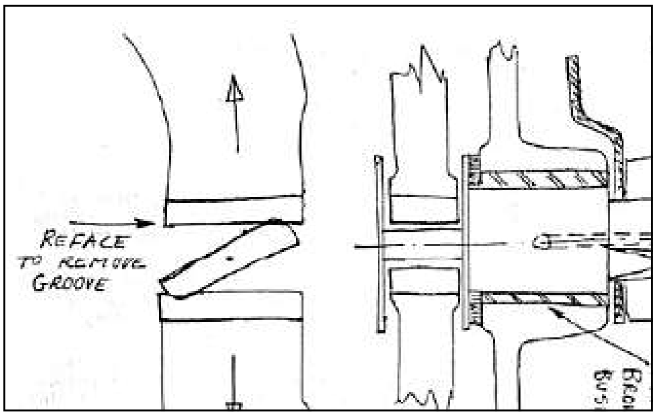
1 . Steel shaft in aluminium bearing.

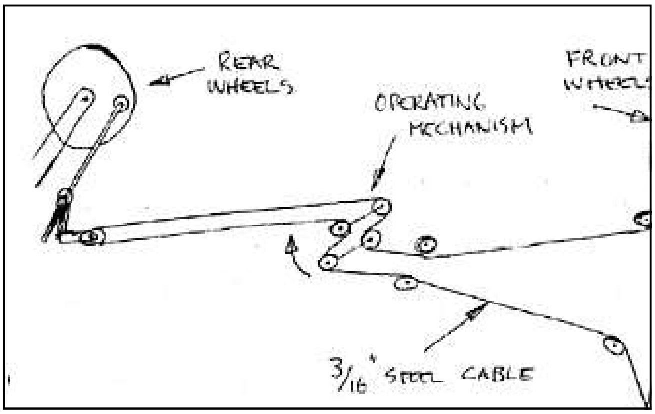
2 . Offset loading on bearing 1-1/8" long and 1-1/16" diameter.

Another problem is in the actuation of the shoes themselves as the cam faces on the lever wear grooves in the bearing plates on the brake shoes.

My repair job consisted of enlarging the aluminium bearing and fitting a bronze bush then grinding flat the shoe bearing plate. After all this a road test showed some improvement, but only marginal.

After close study of the actuating mechanism I decided that shortening the cable would put the system into a better operating position. Approximately 2" less cable made the mechanical advantage appear much better. A road test confirmed the improvement and now it is possible to lock the wheels. I now feel a lot mere confident in the car in heavy traffic and if we have another Riley ability trial we will do better than before.





AUGUST 1981

FITTING LUCAS PRE-FOCUS GLOBES TO ROTAX HEADLIGHTS.

Noel G. Wyatt

After putting up with very poor headlights on our '32 Nine Tourer and the difficulty in buying high wattage old 2 pin dual filament globes, I decided to fit later pre-focus globes to the old reflectors. By chance I had several semi sealed Lucas light units (actually from an early Holden), and it appeared that the reflector was about the same shape and probably had its focal point at the same location as the Rotax light.

The globe holder in the Lucas unit is swaged on to the reflector and by carefully cutting the reflector away to about 6 mm from the perimeter of the light holder and cutting in to where the locating tab is at the bottom of the globe holder I found it easy to pull off the remaining piece of reflector.

Measuring the diameter required for the hole in my Rotax reflectors I found that it was almost exactly as one of the hole saws on my Turner Stanley multi size hole saw.

After making this observation the difficulty was how to guide the hole saw accurately centred on the reflector. By a remarkable coincidence I found that the Rotax globe holder fitted nicely over the boss in the centre of the hole saw. However most of the holder had to be cut off to within about 14 mm of the reflector so that the saw teeth could reach the reflector.

With the hole saw in my drill press at low speed I carefully cut out the hole in the reflector holding the reflector steady but being sure not to get caught up if the saw jammed and spun the reflector around. The brass cut very easily and didn't jam and my good Rotax reflector was now ruined if this project failed.

At first I thought I would have to open up the swaged portion of the Lucas lamp holder and I started to do this with a screwdriver but after one minute only about 5% was undone. At this stage I tried to put it on the Rotax reflector and found that with the small section as a starter I was able to "screw" it on.

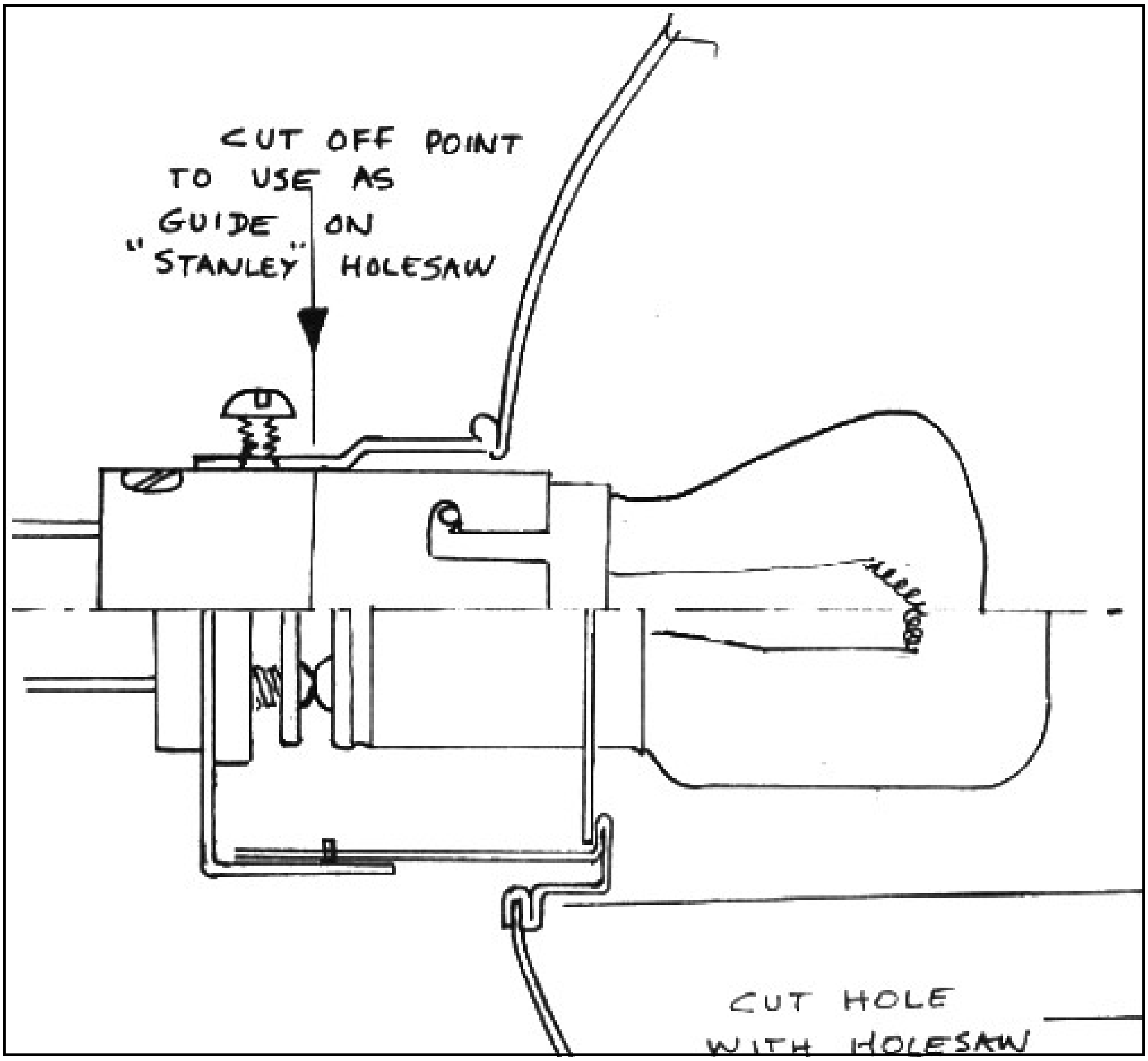
Inserting a globe and with some temporary wiring I tested the light beam and it looked fine.

Tightening the holder was easy with a block to support the holder and gentle taps around with a punch and small hammer making sure that the key in the holder was properly positioned to the bottom of the reflector.

I then converted the other reflector which was the dipping unit. This already had the solenoid assembly removed and the reflector soldered into position. You would have to do this if the unit is complete as the magnet assembly and bracket interferes with the larger diameter of the newer assembly.

On the tourer I have plain glass in the headlights and now on low beam the road is fairly evenly illuminated making night driving much easier. On high beam two very bright streaks of light penetrate the far distant gloom and I'm looking forward to some highway night driving.

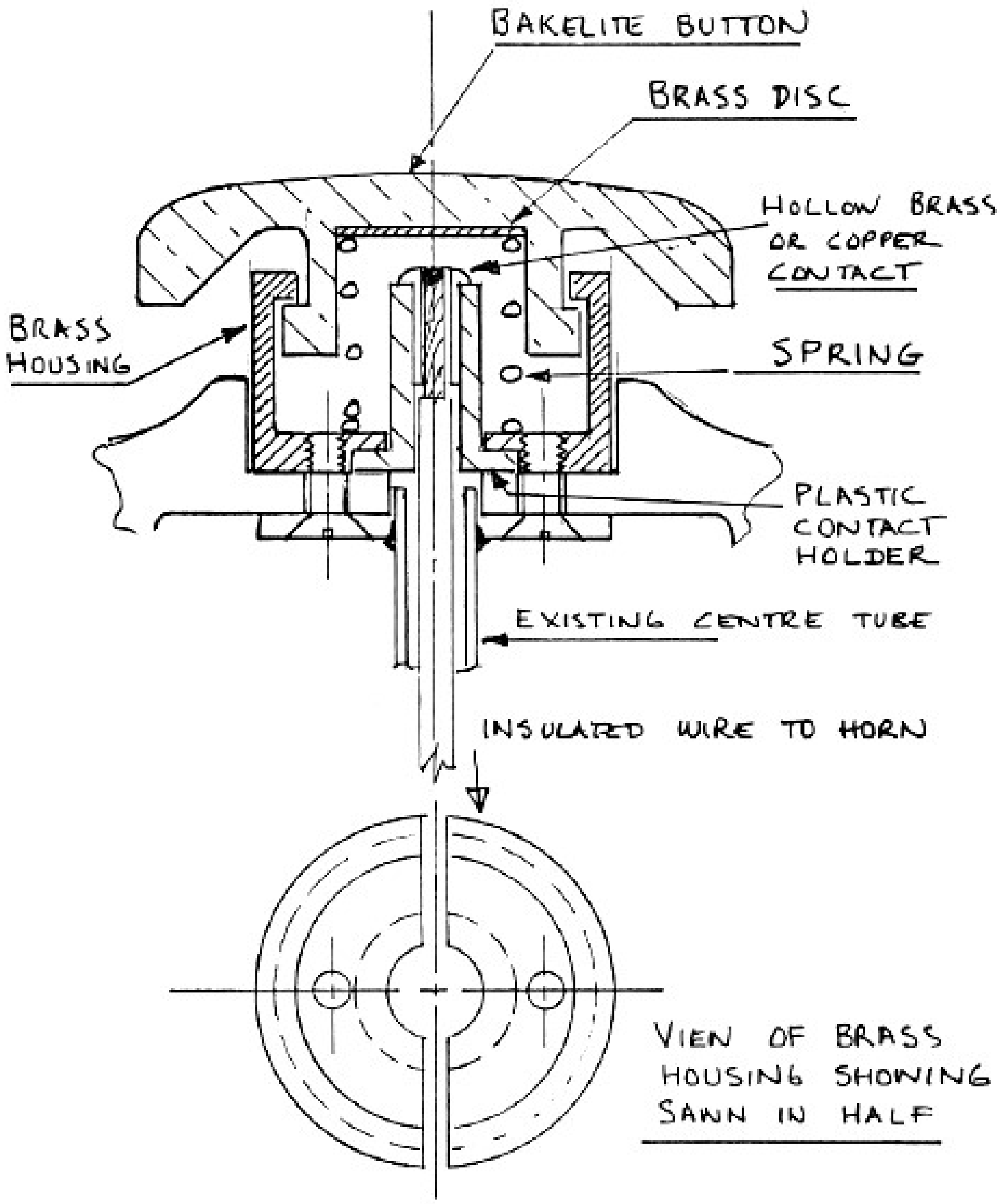
I feel that the lighting would be a bit better with the original slightly figured glass but at this stage I have solved our lighting problems. See Sketch on next page.


CUT OFF POINT
TO USE AS
GUIDE ON
"STANLEY" HOLESAW
CUT HOLE
WITH HOLESAW

DECEMBER 1982

Noel G.Wyatt.

HORN BUTTON FOR '35 RILEY "9"



ASSEMBLY IS HELD TOGETHER WHEN 2 – C'SUNK SCREWS ARE FITTED.

NOTE – DRG NOT TO SCALE
SHOWS PRINCIPLE OF
CONSTRUCTION ONLY.

TIME TO MANUFACTURE – 1 EVENING AFTER DINNER.

MARCH 1983

ABOUT DIFFERENTIALS AND PINIONS

Noel G. Wyatt.

Some time ago when restoring the rear axle of the Kestrel the original C.W.&P. were in poor shape and I decided to fit a post war unit. The 2½ litre ratio 4.11 would have been too high but the 1½ 4.89 seemed just right. However whilst the 2½ unit is basically dimensionally the same as the pre-war 9 the 1½ litre is of different design.

Re-machining the 1½ pinion was beyond my home workshop capability so I decided to rework the pinion housing to accept a different bearing arrangement. This worked out well (by this I mean it looks OK because so far the Kestrel chassis has travelled less that .5 KM), and I have decided to do the same operation on the Imp. The correct ratio for the Imp is 5.25:1 so I feel the performance shouldn't be too much affected by the slightly lower ratio and in any case I have a set of close ratio gears for the ENV-75 gear box which I will eventually fit.

Eddie Ashby kindly sold me a crown wheel and pinion plus the 1½ litre differential housing and I thought other members may be interested in what is involved.

The attached drawing I've done to show the new arrangement for the pinion. This is self explanatory but note that I have provided a seal on the 6006 bearing to minimise oil losses to the torque tube. The intermediate tail shaft bearing is theoretically lubricated by spill from the universal joint lube system so I can't see any problem in this regard. The normal 9 arrangement has this last bearing fitted to the pinion outside the pinion housing but I can't see anything wrong with this new arrangement. The spacers between the deep groove and thrust bearings are necessary to allow diff. oil through for lubrication and clearance between stationary and moving surfaces. Fill the far end up with oil before inserting the housing in the axle and from then on all should be OK.

Again the differential housing is different but the unit I got from Eddie was so good I decided to use it. The alternative was to acquire a post war differential housing (which I don't have) as the post war crown wheels have different bolting dimensions to the pre-war units.

The housing required only part of the bearing extension cut off on the crown wheel side so that the standard 9 bearing assembly could be used - 1 deep groove and 1 thrust race and it will fit beautifully. I hope so anyway because I haven't done this yet (at the time of writing).

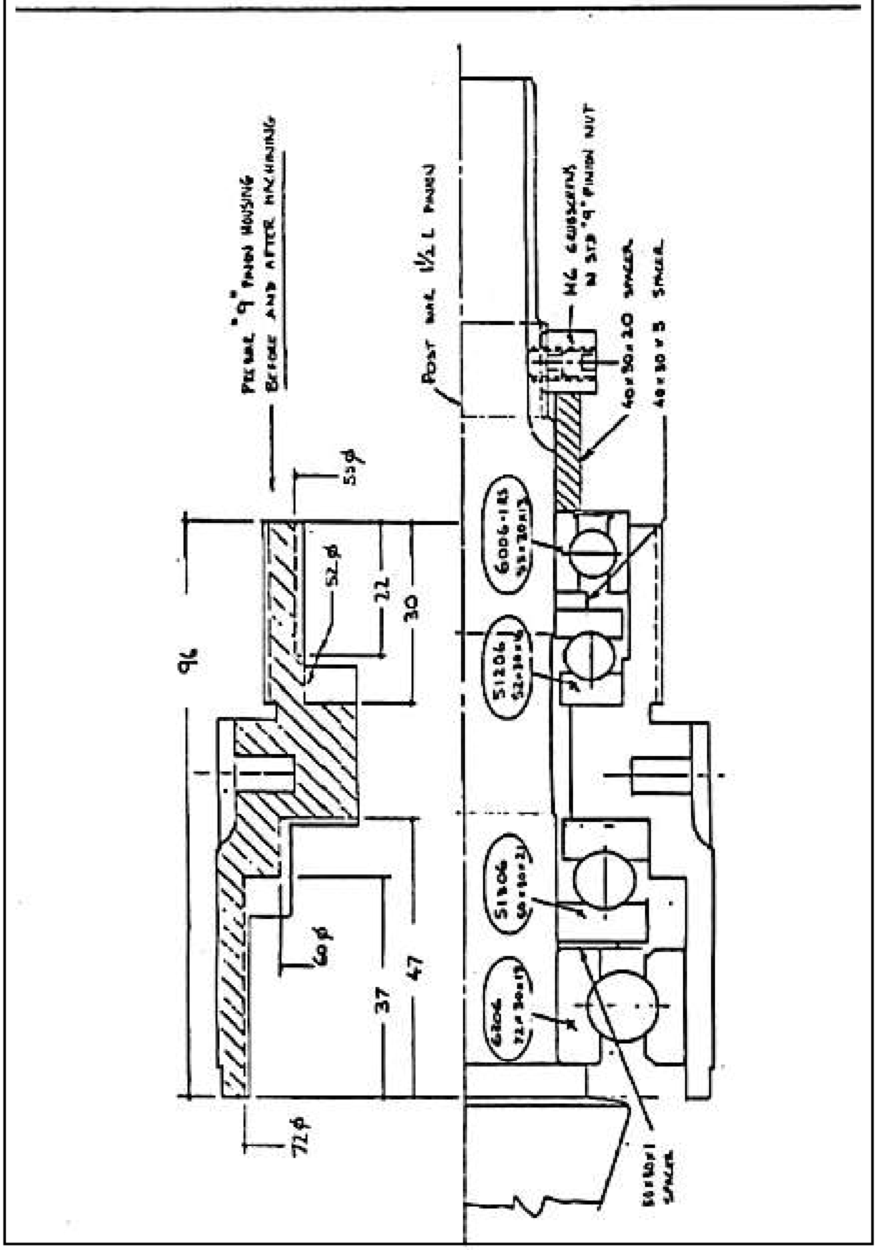
Incidentally, if anyone reading these articles doesn't agree with the contents, please speak up, or better still write in. I'm hoping that 9 owners do find something of interest somewhere and if anyone does have any comments or questions I would be very pleased to hear from them.

As a further item about back axles I strongly recommend that the banjo housing be thoroughly inspected before refitting as it is my experience that whilst the 9 assembly looks like truck strength it is in reality only truck weight as the banjo housing in the centre is very weak.

Of course with a torque tube the car is pushed along by the back wheels via the banjo housing so that there is a considerable bending moment at the centre of the housing. Even larger loads can be applied by the braking system. Applying the brakes fiercely can cause the rear wheels to lock up and the effect can be to bow the banjo housing backwards. I have seen one unit cracked at the bottom to the oil drain plug hole and two units I have are bowed about to the point that the near side half shafts were rubbing on the crown wheel thrust race. I wouldn't be surprised if quite a few 9's are travelling with some degree of "toe out" on the back wheels.

If your car doesn't track straight and you've checked everything else, give a thought to the possibility of a bent banjo housing. Normal driving load is not a problem its rapid clutch engagement or worse, fierce braking, that can really put quite high loads on the back axle assembly.

FITTING A POST-WAR 1½ Litre PINION IN A PRE-WAR HOUSING.



JULY 1990

WHAT THE OIL GAUGE TELLS.

Noel G. Wyatt.

The following is based on an article which appeared in a 1932 Motor Sport magazine and I think is worth studying, especially after reading Ken's article on cleaning out crankshaft oil ways last month. A motor with high oil pressure could well be suffering the dreaded sludge build up. Personally, I would never even run an unknown motor without first knowing that the oil ways are clean. Pre war motors are no different to post war, and "9" crankshafts often have sludge which has to be drilled out.

Oil pressure causes misunderstandings as some owners think that high pressure is especially desirable without considering what the gauge is really indicating and what can be deduced from its reading.

Modern high speed engines use pressure lubrication where oil is fed under pressure to the main bearings thence through oil ways drilled in the crankshaft to the connecting rod big end bearings. A relief valve is fitted so that excess oil is bypassed to the sump.

The purpose of the oil is to form a film between the metal surfaces and flow is required to remove excess heat from the bearings. Basically, pressure at the bearing is required to ensure a satisfactory flow. The higher the pressure the greater the flow. The oil pressure gauge can therefore give us an indication of the flow through the bearings.

In a new engine, or one which has had all its bearings taken up, there is only a small clearance - usually too small - and therefore the pressure required to force enough oil through for cooling is very high, and, possibly more than the pump can generate, unless the heat generated is reduced by running the engine very gently. Hence the reason for running in carefully when the bearings have been fitted tight.

Most engines after an overhaul are definitely stiff and many think this is correct. However, this is incorrect, and bearings should be machined with a definite clearance to accommodate their lubricant. The craftsman’s operation of scraping the white metal bearing is better achieved by machining with a definite clearance of approx. .001 inch. In the case of a complete engine recondition where the crankshaft is ground this is easily achieved, but, when the crankshaft is oval, it is virtually impossible and simply reconditioning bearings in this event is almost a waste of time.

If after reconditioning, the oil pressure is very high, this could well indicate that there is insufficient flow and a change to a thinner grade of oil is indicated. As the bearings wear, the pressure will drop and oil consumption may increase due to excessive flow and too much oil splashing into the cylinder bores. This is then an indication to use a heavier grade of oil.

If over some many thousands of miles the pressure in normal running drops from say 50 psi to 30 psi there is no need for alarm so long as the relief valve has not been adjusted. Just as much or even more oil is circulating and the oil film and heat removal is quite in order. If at this stage the relief valve is screwed in then the increased pressure will simply cause an even greater flow and maybe lead to a higher oil consumption and is not necessary.

A sudden change in pressure down or up is of more concern and should be noted and understood. A sudden drop if the owner is careless could be too little oil in the sump but could also mean that one bearing metal has failed and oil is pouring through this bearing.

This means that other bearings are being starved for oil. In the case of a big end failing, knocking will indicate what is wrong, but in the case of a main bearing this is not so clear, and in the case of a 3 bearing fairly stiff crank, failure of the centre main will go unnoticed. All the time of course big end bearings are being starved and almost certainly will fail in quick time. When you realise that the only oil to the big end bearings must pass through the main bearings where pressure must exist to drive it through the crankshaft drillings, then it is obvious that sudden failure of a main will subsequently cause loss of flow to all other bearings.

Very gentle driving will normally get you home where the cause can be properly investigated.

A rise in pressure is just as important as it is almost certain to be the result of a blockage in the system. Either blockage to one bearing due to dirt particles or even gradual blocking of the crankshaft oil galleries could be the cause and, unless the driver is observant and notes his normal operating condition, could easily go unnoticed and bearing failure will occur sooner rather than later.

Of course, pressure will vary in normal running. For instance on a long hard run the oil pressure will normally drop due to the oil thinning and in particular as the oil level drops the temperature will rise even more. Then when new oil is added the pressure will be improved all of which is quite normal and easily understood by an intelligent driver. There is no point in being concerned about these normal fluctuations.

A point to remember is that all bearings should have similar clearances so that flow is generally equal. If one bearing fails and it is replaced then it is important to replace it with one with a similar clearance as it will otherwise be starved for oil as the flow will be diverted to the units with the larger clearances.

To sum up, the oil pressure gauge is not a perfect indication of the lubricating system performance but, if its movements are understood, can give forewarning of problems occurring so that work can be done before major breakdown occurs.

■

JUNE 1985

RILEY 9 ENGINE IDENTIFICATION

Author: Noel G. Wyatt

Many of our club members are unfamiliar with the Pre War Models and I have put together the following information which I hope will be of general interest.

The Riley 9 engine was first announced in 1926 and the first prototype models were known later as Mark X. For the following decade plus a couple of years small changes were made which are very interesting to understand and hopefully be able to recognise.

Due to this being 60 years ago many 9 models now on the road have a mixture of parts and it is very difficult to exactly tell what Mark No. is actually being viewed.

This is not helped by the fact that the engine number is stamped on the aluminium timing cover which can very easily find its way from one block to another.

Literature references are vague so I hope the information following is accurate. If anyone wishes to correct anything please do not hesitate and if there is any item that could be added I would certainly like to hear of it.

Mark Numbers were given to the chassis and engines were developed approximately in line with the chassis improvements.

1. Mark X

The prototype 9 was basically pre-production and easily recognised in photographs by its removable cylinder block.

2. Mark 1

The first production cars (approx. 1000) also had an easily recognised engine:

round rocker covers same as Mark X.

one piece iron block.

open flywheel housing as Mark X.

cone clutch.

right hand gear change.

The Mark 1 cylinder head is the same as later 9's without the extended seal face for rockers. Removing this extension converts later heads into Mark 1.

3. Mark 2 - 4

The engines in these chassis were all similar with now:

square type rocker covers with square spring clip access covers.

enclosed flywheel.

silent third gear box.

magneto ignition.

Engine numbers up to 20599 generally fit into this category.

4. Plus, Plus Ultra and sloping radiator series used Mark 5, 6 and 7 engines (starting October 1930)

In this series of engines the oil feed to the rocker shafts became internal through drilled oil ways in block, head and rocker covers in lieu of external piping to the ends of the rocker shafts.

Mark 7 engines are coil or Scintilla magneto ignition with distinctively different timing cover. Mark 7 engines use different timing gears and include an additional wheel on the inlet camshaft to drive the ignition system.

5. In 1934 whilst the sloping radiator series cars were in manufacture the Sports Imp Models were produced and these had square rocker covers with round access covers held in place by twist round knobs.

Up until this time the lubrication was supplied by the famous infamous!) two plunger type pump.

I believe the Imp models were the only engines using round access lids and plunger pumps (this may not be correct).

6. Merlin Models

These started with entirely new type chassis numbers in 1935 (Motor Show 1935 released the '36 models) with:

66 series numbers for '36.

67 series numbers for '37.

68 series numbers for '38. Finish

The Merlin engines were fitted with:

square rockers with external oil feed.

round covers same as the Imp model.

new type oil pump with ribbed oil filter (entirely different timing covers).

It is more complicated than set out above but if you can understand and recognise the above features you can nearly consider yourself an expert.

In the Mark 5, 6 and 7 engines various changes were made approx. as follows:

Mark 5 Engine Nos. 20600 - 27999

Mark 6 Engine Nos. 28000 - 41999

Camshaft end thrust revised

Crankshaft 2:1 pinion design change now one piece pinned

Timing gears changed Internal oil feed to rockers

Mark 7 Engine Nos. 42000 - 47999

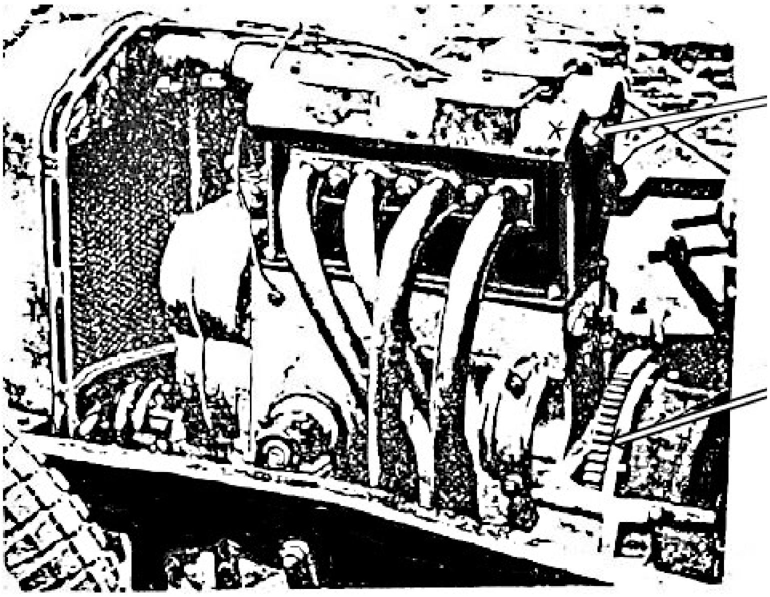
Coil or Scintilla magneto ignition.

Sump drain facility changed.

Big end diameter increased.

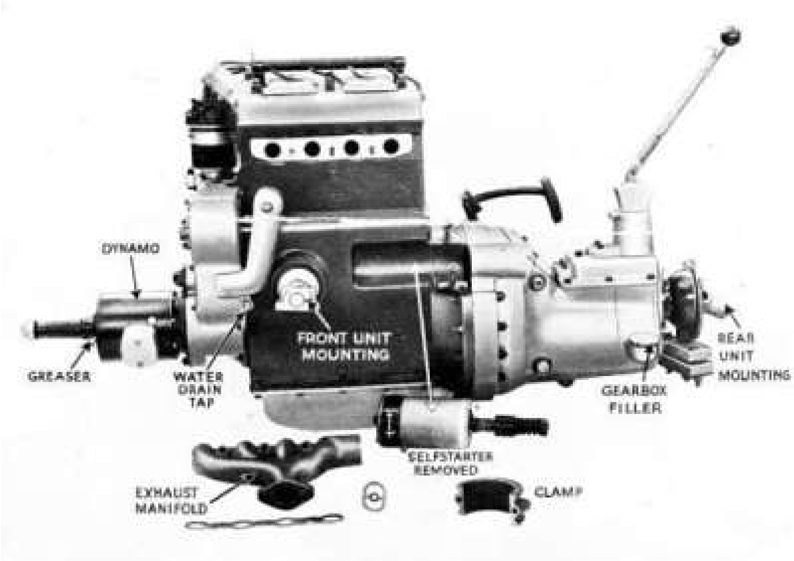
All helical gearbox fitted or ENV preselector - after chassis 6027031 Armstrong Siddeley preselector box fitted except for Imps).

The illustrations on the next page will give you some idea what to look for.



Round Rockers.

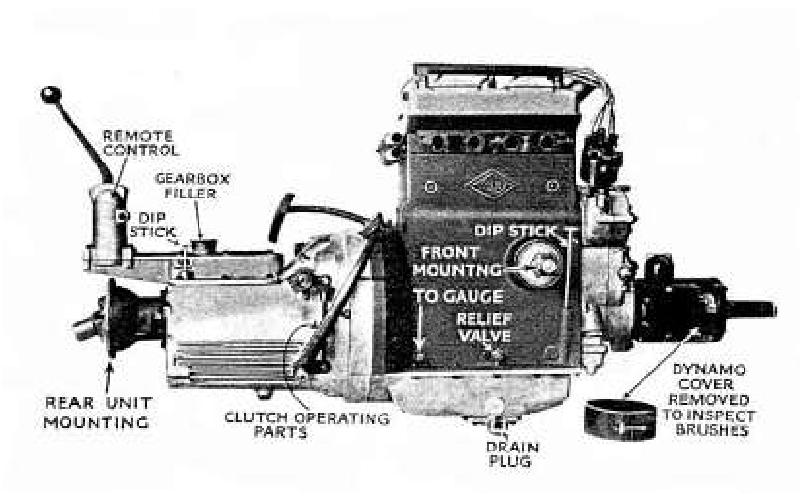
Actually a Mk.X but Mk.1 is very similar except Mk.1 has a one piece iron block similar to later ‘9’ models, but open above the flywheel.



A Mk.6 ‘9’ with magneto and silent third gearbox.

With external oil feed to rockers this could be a Mk.5.

With plain front timing cover, short dynamo and external oil feed this could be a Mk.2-4



A Mk.7 ‘9’ with coil ignition and all helical gearbox.

DECEMBER 1975

TUNING KNOW-HOW

(Assembled by Blue Diamond Editor Ean McDowell from Riley Register Bulletin articles).

As I have mentioned in the past, membership to the Riley Register is just about essential if you own a pre-war car. Over the years their “Bulletin” has contained a wealth of technical and historical information and one of the more interesting articles appeared under the above heading. The article consisted of a series of questions, which were answered in later issues, on how to get a bit more from the 9 H.P. motor. I'm not suggesting everyone should hot up the old girl but one of the special features of the Nine was its receptiveness to a bit of tuning.

The original questions were asked by Tony Bird and the answers were by Bill Muller and Eddie Maher (ex Riley Coventry), R. Neate and Peter Asquith. A summary is set out below with due acknowledgement to the Riley Register.

1. There are basically five different stages of tune of the 9 engine, e.g, Standard, Special Series, Merlin, Brooklands, Ulster Imp. What were the chief differences between these in design and performance?

a). Standard: Approximately 27 B.H.P; compression ratio 6.25:1; single carburetter, crank 1.9/16 in. pin.

b). Special Series: Twin carburettors; approximately 34 B.H.P., compression ratio 6.6:1.

c). Merlin: Single and twin carburettor; compression ratio 6.6:1; approximately 30 BHP.: crank 1 7/8 in. dia. pins: gudgeon pin diameter 1/8 in.: 15/8 in diameter rear main; pistons 54 mm. from piston crown to centre of gudgeon pin.

d). Brooklands. B.H.P. - 90 B.H.P. on alcohol, 40 to 60 petrol fuel, dependant on compression ratio, valve size, valve springs and crankshafts, compression ratio 8.1 and various others up to 12:1; crankshafts various pin diameter 1 9/16 in. up to 1 31/32 in., rear main diameter also increased to 1 5/8 in.

e). Ulster Imp: Cranks, 1 31/32 in. diameter with detachable balance weights, twin S.U. carburettors, 1 3/8 in. diameter, twin exhaust camshafts, 6,500 r.p.m. maximum.

2. In tuning for high power output one still hopes for reliability. In this connection one important factor is size of the crankshaft. Can the 1 7/8" Merlin crank be fitted to any earlier engine? If so, how? What modifications or machining are necessary?

> 2. The Merlin crankshaft can be fitted to the 9 h.p. engine immediately prior to the Merlin engine, that is from Chassis No. 6019800 to 6027900. This is generally 1933/5 models. The crankcase should be machined to take the

larger rear main bearing which is 1 5/8 in. in diameter as opposed to 1 1/2 in. diameter. The front main bearing is, of course, the same size and no modification here should be necessary.

3. Is it possible to modify the big ends to take shell bearings so that, say, lead-indium bearings could be used? Would there be any advantage in this?

3. This is not possible owing to the bolt centres limiting the thickness of the bearing shell. It would definitely be advantageous if it could be done.

4. To ensure adequate lubrication at high engine speeds and power output, what is the best oil pump to use? The Merlin pump differs from the earlier ones - is it better? Can it be fitted to earlier engines? The 6-cylinder pump is bigger than the 9: does it give a greater flow and higher pressure? Can it be fitted to the 9? If so, how? Was the Brooklands pump different from standard - if so, in what way?

4. All oil pumps fitted to the 9 h.p. engine were quite satisfactory. The 7/8 in. diameter plunger pump was the best for output at high speeds. This involved an increased drain suction pipe and was in fact similar to that used on the 6-cylinder series with modifications. The Merlin pump was satisfactory for Merlin engines only and was not suitable for high speed output and operation: the pump cannot be fitted to earlier engines.

The output of the 6-cylinder pump was some 25% greater than the Standard 9 pump. The 6-cylinder pump complete could not be fitted to the '9" engine as the machining dimensions for location and alignment were different. The special Brooklands engines had the 5/8 in diameter plunger. The oil pump being specially machined from the 6-cylinder type pump casting.

5. What is the best type of oil feed to the valve gear, internal i.e., through the head, or external? Should it be at full or reduced pressure for best results?

5. The best type of oil feed to the valve gear is undoubtedly via external pipes. The very early '9' were fitted with this, but from '32 to '34 this was transferred through the block and head and resulted in many instances of leaking between the two components. The factory reverted to the external feed in 1935 and this continued until production ceased. It is very easy to convert an internal feed to an external, by making a Y type pipe tapped from the plug on the near-side front of the cylinder block. The pressure should be reduced by means of a tapered hollow banjo bolt at the top end.

6. What types of cylinder heads are available for increased output, i.e. port sizes and plug positions? Which is the ultimate?

6. Brooklands and special racing engines had cylinder heads specially cast to allow for increased valve sizes and ports up to 1 3/8 in. diameter. The plug position was unaltered. The ultimate power is produced by a separate carburettor per cylinder with matched sizes for valves, ports and choke

tubes.

7. What is the maximum compression ratio that should be used for a best compromise between power output, smoothness and reliability, and how is this best obtained? What is the maximum that should be planed off the various cylinder-heads? Is it best to divide this between bead and block when machining? What is the best type of cylinder head gasket?

7. It is considered that a compression ratio of 7.25:1 should give a reasonable power output with comparable reliability and smoothness on the premium fuels of today. No more than .040 in should be planed off cylinder heads. It is not advisable to machine the cylinder block face. The Klingerite gasket was considered the most efficient.

8. What is the best type of inlet valve to use, and the maximum valve-head diameter possible? Should the exhaust valves be increased in size - if so, to what extent?

8. The maximum size of inlet valve does not give the optimum gas flow. The valve head diameter for optimum results is determined by port and choke diameters for given speeds. Exhaust valves generally should not be increased in size as the larger diameter is subject to greater distortion Maximum possible valve diameter is approximately 1 ½ in. (ex. 12/4 motor)

9. What is the maximum size of inlet port that can safely be obtained? How should this be done, and should the exhaust port be enlarged also?

9. Any size larger than standard will depend on the particular casting and the reply to Query 8 should be noted before any change is undertaken.

10. Some heads had masked and inclined plugs. Is this an advantage, and if so how can it be achieved? What is the best type of plug to use?

10. Masked plugs were used on racing engines in order to avoid plug fouling when starting or running at relatively low speeds with 'hard' plugs. The 'best' type of plug is the one that suits the particular type of engine.

11. What is the best valve timing for high power output with regard to smoothness and tractability? How is this obtained?

11. A valve timing of 20 B.T.D.C. inlet opening, and 25 A.T.D.C. exhaust closing with exhaust form cams will give optimum results.

12. How can the valve gear be lightened and quietened? Should the valve guides be made of any special material? Should the inlet guides be cut off flush with the port?

12. Metal can be removed from the pad of the rocker that contacts the valve stem. The tappets could be made from steel case-hardened having a thinner

section than cast iron. Valve guides could be made from material such as Hidural or Copper nickel. The valve guides should only be flush with the port if power at maximum speed is required.

13. What is the best rocker box to use - circular or square lids?

13. The circular lid rocker box is the better one, but is not readily interchangeable on all models.

14. What is the best form of ignition - coil or or magneto? Is a Scintilla better than an Oil coil (e.g. Rumbaken)? What is the best ignition timing?

14. Coil ignition is preferable since it requires less power to generate the spark. The Scintilla magneto is a very reliable and beautifully designed instrument. It does however, require more power to drive it than a distributor. The Rumbaken oil coil “per se” is most efficient. The ignition timing has to be tailored to the particular engine tune under dynamic conditions throughout the speed range. The original B.T.H magneto has proved reliable except for oil coming up the shaft. Breathers in the rocker boxes help to stop this.

15. What type of carburation gives the best all-round results? What diameter choke, Jet/needle sizes? What is the best inlet manifold?

15. The best all-round results can be obtained with a twin carb assembly. Carburettors of course are a subject in themselves. For general purposes 1 1/8" or 1 1/4" S.U’s have given good results. No. 1 needles are worth trying firstly but be prepared to do a lot of experimenting.

16. Which is the best standard exhaust manifold? What is the best type of fabricated exhaust system?

16. A complete exhaust system where the two outer cylinders and the two inner cylinders are connected together approximately 15 in. from the cylinder head face and then the two pipes run into a single outlet pipe some 13 in. from the double branch connection. The single outlet should not be greater than 18 in.

17. Is a water-pump necessary - if so, what type? Is a fan necessary?

17. A water pump is desirable for high specific power outputs. A fan would be necessary for town operation. For compression ratios above 8:1 a waterpump is needed.

18. What is the best type of clutch to use? By how much can the flywheel be lightened? Can the clutch itself be lightened and if so, how should it be done?

18. The standard clutch of the later design as fitted with crash all helical gearbox is best. It could be lightened by approximately 6 lbs. on the flywheel and pressure plate.

19. What is the best gearbox for all-round performance? Is the Brooklands gearbox interchangeable with the Silent Third and/or All Helical and/or Pre-selecta? Can close-ratio gears be obtained for the Silent Third and All-Helical box, if so, from whom? What types of remote control are available? Does the Brooklands remote control fit the other gearboxes ?

> 19. The silent third was the most reliable gearbox, but not interchangeable with the All helical box. The Brooklands gearbox is interchangeable with the silent third but not the others. Close ratio gears are not now available as far as we know. The remote controls were: (1) Brooklands type; (2) 1933 type; (3) 1934/35 link type. Availability unknown. The Brooklands remote control will only fit to the Silent Third type gearbox, 9 h.p. or 6cylinder.

In summarizing all the above I have left out certain information not relevant to cars and conditions here in Australia (e.g. Merlins as there are only two or three.)

If I may add my ten cents worth here are some further notes:

(a) Up to 125 thou. can be machined off the head BUT (i) The rocker geometry is destroyed and has to be corrected by placing an equivalent spacer between head and rocker boxes. (ii) Watch out for the water holes as these become much larger and can clash with oil return holes.

(b) There has been a lot of controversy in the past about the timing with twin exhaust form cams fitted. Better results can be obtained with specially ground cams of which Wades in Melbourne have a good range. They will make a recommendation based on the other mods and the intended use of the motor.

(c) Don't forget the valve springs. Robson suggests 50 to 70 lb. fitted pressure in "The Riley Nine Manual". Double valve springs can be fitted in which case both should be wound in the same direction. Post war 1 ½ in. L rockers can be fitted and make tappet adjustment much easier and the spring spacers between rockers should be replaced with tubular spacers.

(d) In some cases the All-helical and Silent Third gearboxes can be interchanged by swapping the rear bearing/universal housing.

(e) Having made all these wonderful mods to the motor you will find the rear end is probably unsuitable in which case a change to post war 1 ½ or 2 ½ in. C.W. & P. is recommended.

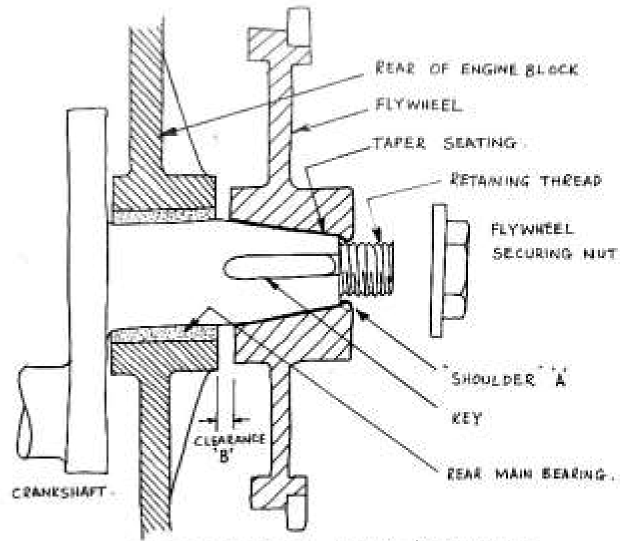
Ean McDowell.

SEPTEMBER 1981.

CURING A LOOSE ‘9’ FLYWHEEL.

It is well known that the Riley Nine flywheel has an unfortunate tendency to rattle loose, particularly on newly reconditioned engines. The flywheel is held on by a single nut to a taper on the crankshaft as shown in the adjacent sketch, unlike other Riley engines which have flange-mounting and retention by six studs and never give trouble (we hope!)

From bitter experience I can recommend the following procedure to rectify the problem per favour Keith Harris.



PART SECTION ALONG ℄ ENGINE.

1. File, or otherwise machine off the nasty shoulder shown "A" on the sketch which is sure to have developed on the flywheel seating through years of misuse, until there is no interference here with the fit on the crankshaft. A little over-relieving here will cause no harm.

2. Lap the flywheel onto the tapered seat on the crankshaft with valve-grinding paste until markings show across the whole of the seating.

3. Ensure that there will be adequate clearance "B" between the flywheel and the rear bearing housing when the flywheel is fitted. Note: the flywheel will pull up a lot further than you think.

4. Ensure the key tightly fits the slots for minimum angular movement, but does not affect the bearing on the crankshaft or flywheel seating.

5. Stand the engine up on the timing chest, jam crankshaft with wooden blocks in the engine block and apply Loctite or similar thread compound to the retaining thread.

6. Heat flywheel in a domestic oven to maximum temperature, carry it to the engine with asbestos gloves, drop over the crankshaft and very quickly fit the securing nut and tighten.

7. Check still a sufficiency of clearance "B".

8. Explain to wife the mess in her stove.

BLUE DIAMOND 243 - February 1983

ABOUT CAMS, TAPPET CLEARANCES and VALVE TIMING

Author: Noel G. Wyatt.

I decided when reconditioning the Imp motor to fit the Imp standard inlet camshaft (normal 9 exhaust profile) and requested Geo. Wade to build up and profile the cams accordingly.

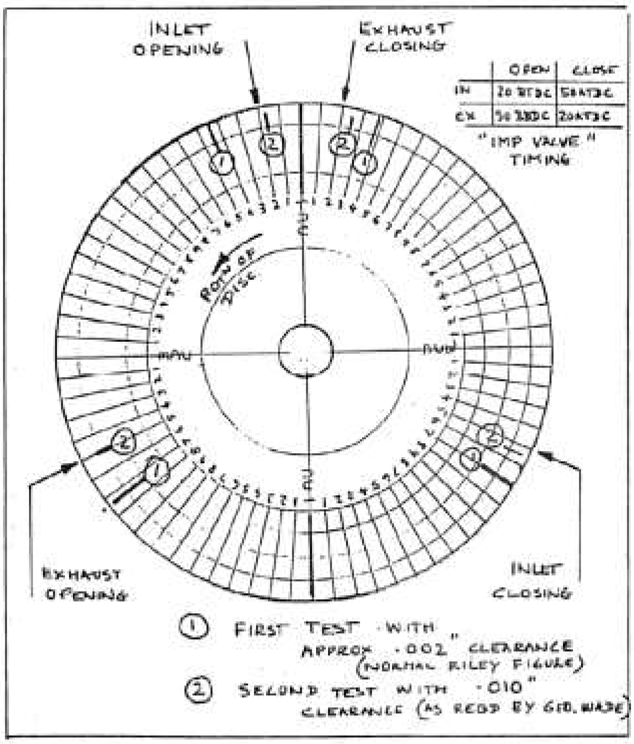
This presented no difficulties to Wade but they did say their standard 20-50 profile was a high lift. This actually pleased me as we were after a 9 with a sporty performance: this did give a problem though - more later.

After running the motor I found it impossible to get it to idle at all well and didn't know what to blame - carburettors, valve timing, magneto?

I decided to check the valve timing and used the method shown on the following tech. sheet. In half an hour you can easily find what the actual valve timing is.

The Geo. Wade grind required .010" tappet clearance but I must admit I had set the clearance to a normal .002 - .003 without checking and was horrified to find the result as shown below for test 1. After reverting to .010" clearance the angles worked out almost exactly right and the idling of the motor is as good as can be expected with this particular inlet cam profile.

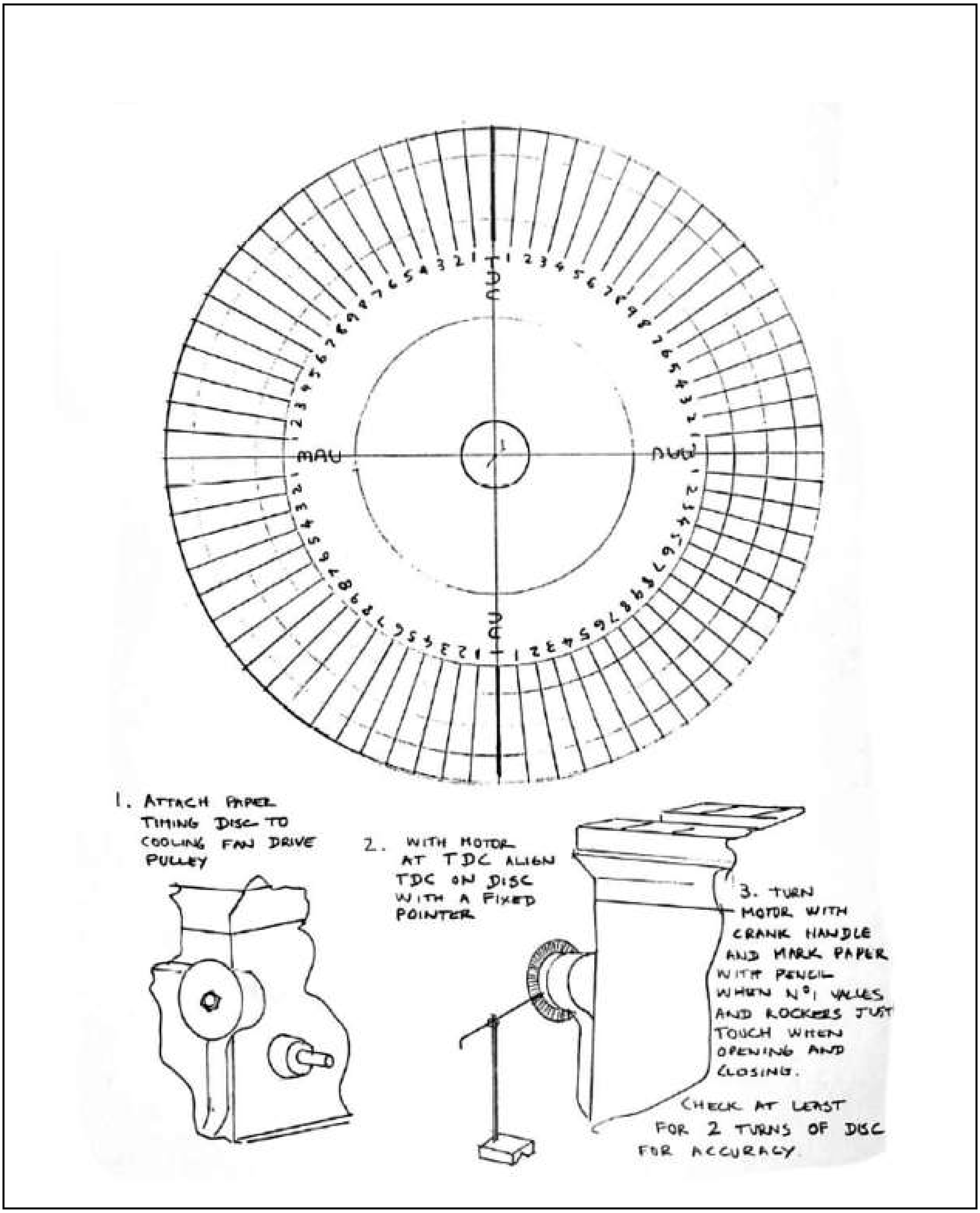
It is interesting to note the difference on both sides of the cam made by this change in tappet clearance - approx. 25° on opening and 15° on closing. This is due to the cam profile giving low velocity on opening to minimise tappet noise.



The high lift profile provided a problem which I hadn't envisaged in that the radius of the high point of the cam is bigger than the radius of the outside of the front cam bearing making it impossible to install the camshaft with the bearing fitted.

Fortunately there was just enough play in the back bearing so that the camshaft could be inserted and the front bearing fitted afterwards. It would have been a terrible job if the back bearing had to be fitted afterwards as well as it would have been virtually impossible to remove later. What I do have to remember is that when I remove the camshaft, hopefully many years from now, it won't come out without taking off timing gears and front bearing first. If you want to avoid this problem tell your camshaft grinder to keep the cam smaller than the bearing!

NOTE: The above calculation is not strictly correct as the rocker has arm lengths of 27mm on the valve side and 17mm on the adjusting screw side so; .005@ clearance on the valve stem would involve (1/8 x 17/27) of a turn.



BLUE DIAMOND 243 - May 1990.

RILEY "9" CAMSHAFTS

Author: Noel G.Wyatt.

The very first "9" camshafts are, in my opinion, the best. The front bearing is cast iron and a collar is provided on the camshaft at the back of this bearing to locate and control the camshaft position. Between this collar and the timing gear which is held in position with a nut is the cast iron bearing and a ball bearing thrust race. The exact clearances can be arranged before mounting the camshaft and you can be sure of its end float.

Later camshafts do not have the collar and require complicated springs and thrust races to hold the camshaft timing gear back against its thrust race.

Of this latter design there are two different types. In engines up to the 1933 model which went to internal oil feed to the rocker shafts, the front and rear camshaft bearings are lubricated by oil dropping into a large hole in the top of the camshaft bush. Oil comes from the head through the front and rear drain holes and drops onto the bush and oil generally spraying around in the crankcase is sufficient for this lubrication. From 1933 the front camshaft bush is entirely different and has a hole in the bottom of the bush which connects to the oil gallery fed from the oil pump feed to the rocker shafts in the head. Later engines again reverted to external oil feed but the method of lubricating the front camshaft bush stayed the same.

It is very important to use the correct type of camshaft bush in your engine. A later internal oil feed type used in an earlier engine, i.e. before '33, will be starved for lubrication so cannot expect to perform properly.

You can't expect the average engine reconditioner to know these finer details of "9" engines, so when you work on your motor make sure you have the right parts for your motor type. The wrong parts could have been used 20 or 30 years ago at some previous engine rebuild but that just means you've been lucky so far not to have an engine failure. If you want to be sure of your reconditioned engine, ensure all your parts are correct and compatible.

Incidentally, if you intend to have high lift cams built up on your camshafts, make sure the radius to the top of the cam is not more than the outside of the front bush or you will have trouble installing the camshaft.

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BLUE DIAMOND 323 - May 1990

REMOVING AND REFITTING A "9" FLYWHEEL

Author: Noel G. Wyatt.

You might wonder why it is necessary to write about removing and refitting a flywheel. Normally this operation is very straightforward - remove some set screws and off it comes - refit and do up the set screws and its on. But a "9" is not a normal car. The flywheel is held on a taper with a woodruff key and secured with a nut hidden under the gearbox mainshaft steady bearing. Removing the flywheel is often fairly difficult but later refitting so that the flywheel does not come loose at some very inconvenient location as you drive your wonder car along is even more difficult. This is the voice of experience!

Removal

Using a screwdriver, gently lever the bearing from the centre of the flywheel. Loosen the nut using a 1-5/16" socket or tube spanner. Don't remove the nut completely at this stage, just undo it about 2 turns. Make up a puller using a strong steel bar with holes to use 2 bolts to pick up the tapped holes provided for this purpose and a threaded hole for at least a 20 mm dia screw at its centre. Place a small steel plate over the end of the crankshaft and flywheel nut to protect the thread and save damaging the centre hole in the crankshaft and use the jack screw to force the flywheel off the shaft. A timber block inside the crankcase will stop the crankshaft from turning when loosening the flywheel nut. If you find the jack screw just will not do the job, sometimes a sharp blow on the end of the jack screw will break the taper loose. Before doing this insert some steel flats between the flywheel and the crankcase bell housing flange, making sure they are wedged firmly in position, otherwise your blows will transfer through the crankshaft to the timing cover. Preferably remove the crankshaft timing gear pinion first as this allows the shaft to pull away from the timing cover when you insert the steel flats.

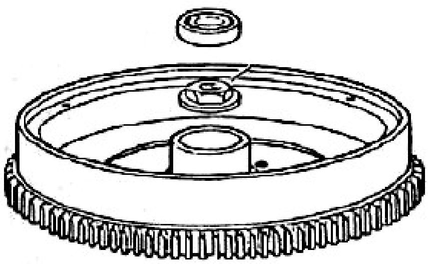
Refitting

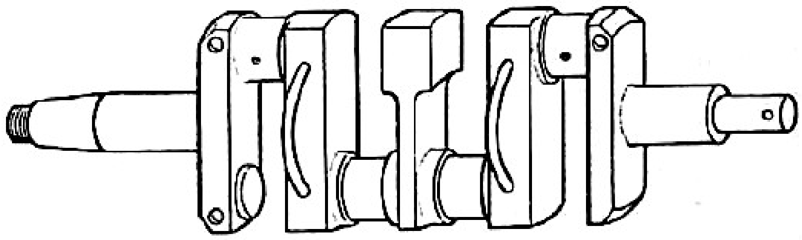
After all your engine work is completed and its time to reassemble the motor, prepare the bare crankshaft and flywheel for fitting. Using fine valve grinding paste gently lap the flywheel onto the shaft taper, just a little at a time, and make sure that you don't groove the shaft. Now comes the most important part.

Where the shaft has been lapped, carefully file away the ridge that has been formed on the shaft so that the flywheel can fit further onto the shaft than the lapping marks. Also, inside the flywheel taper, remove the ridge so that the shaft can go further than the lap marks. Clean away all the emery powder and check that the woodruff key fits perfectly. If necessary make a new key as there must be no slack in the key fit.

When its time to refit the flywheel, remove all oil from the shaft and flywheel taper and heat the flywheel in your domestic oven to about 125° - 150°C for about 30 minutes. Then fit the flywheel and give it a couple of gentle blows to force it onto the taper and fit and tighten the flywheel nut. Give the flywheel a few more gentle blows and re-torque the nut until you are sure its really tightened firmly. Hopefully you will be using a new Register nut bought from your Pre-war Spares Department and at this time fit and tighten the grub screws to prevent the nut from coming loose.

If you have done all these jobs correctly there is absolutely no reason why you should experience trouble with the flywheel coming loose. Incidentally, make sure that the key has some top clearance so that it doesn't prevent the flywheel from finding its final position.





BLUE DIAMOND 329 - November 1990.

Oil Pumps - Steering Joints & Tiller Rods - Brake Pulleys - Rocker Covers

Author: Noel G. Wyatt.

Based upon my experiences working on various prewar cars, the following are some items which I have not seen commented on previously.

1. '9' Oil Pumps

There are 3 types of pump plungers as original equipment on '9' engines. (I am referring to the pump plunger not the valve plunger).

A . Solid type

B . Hollow type with .25" hole drilled and open at bottom

C . C. Hollow type with a plug fitted with small hole at bottom

My experience is that type A is OK, type B is absolutely no good and type C is not as good as A. The probable reason that type B was produced was to operate much like an air bell to dampen pulsations. However the result is that this type has much difficulty in priming and difficulty in building up high pressure. Imagine the hollow plunger full of air. When the plunger travels upwards to suck in oil from the sump, the process is of course not that the pump sucks but that the reduced pressure inside the pump chamber allows atmospheric pressure to push oil into the pump.

With a solid plunger there is no air in the pump so the upward stroke attempts to draw a vacuum so there is full 15 psi to fill the pump. With the hollow plunger (and to some extent the type C) the air in the plunger, and it's virtually impossible to get rid of it, slowly reduces its pressure as the plunger goes up so that hardly any oil is forced by atmospheric pressure into the pump.

If you are having priming problems and low pressure, drop the pump body off your engine and check the pump plunger. If its type B simply tap it out 5/16" Whit. and fit a grub screw tightly in the open end. If its type C think about changing it to a solid one.

2. Steering Joint and Tiller Rod End Lubrication

Have you noticed the difference between the tie rod and tiller rod ends on chassis' from about '34? The tie rod ends are solid but the tiller rod end is hollow with a small hole drilled into the side of the bush socket. I'm sure the idea was to drill a hole also through the side of the bronze bush so that at the same time as the ball joint is lubricated some oil also passes into the tiller rod through the small hole and flows down the rod to lubricate the tiller rod ball. Bear in mind that with the Desmo cover fitted you can't lubricate the joint at all. If you are reconditioning your steering and fitting new bushes, don't forget to drill the interconnecting hole and, if you are like me and prefer to use grease instead of messy oil in the steering joints, (Moly grease is good stuff) then it's necessary to completely fill the tiller rod with grease at this time. If you don't it could be 50 years before grease gets to the tiller rod end.

3 . '9' Brake Pulleys

It is necessary to attempt to line up the pulleys with the brake cable. This applies to the two pulleys situated directly under the springs at the front axle. These brackets are easily bent and you will find many old pulleys worn very obviously by cable running off on an angle. This effect causes rapid wear to the bore of the pulley and inhibits free running. If you spend a little time adjusting the shape of the bracket so that the cable runs in proper relationship to the groove, with the weight of the car on the axle, you will get good results from the original design.

Incidentally the original design is with a stainless steel (probably our old friend Staybrite) bush locked up on the steel axle with the bronze pulley turning on the bush. A few drops of oil on the pulleys every so often is a good idea. Coat the bush with Moly grease when you put it all together.

4 . '9' Rocker Cover Gaskets

'9' cylinder heads are difficult to find in good uncracked condition. The main weakness is in the cross bars into which are screwed the rocker cover studs. You can almost guarantee that any head you see at an auto jumble will have one or more cracks at the centre where the stud screws in. WHY? Well I have a theory that it's all to do with the paper gasket. Not being quite old enough to be working on a '9' in the thirties I don't have first hand knowledge of the original paper gasket but I believe that it was probably very thin - like brown paper. If you look at

the Spare Parts Books for the '9' the rocker cover gasket costs 2d and the much smaller inlet manifold paper gasket costs 3d. The inlet manifold gasket would be about .8 mm thick as now supplied by the Register, hence my reasoning that the original spare part was only paper thin. Using this same .8 thickness for the rocker box leads to cracking the head.

The problem is that the rocker cover is very strong and has large bearing area along the length of the head. However the bearing area on the cross bar is very small and consequently when the cover is bolted down the cross bar is pulled up into the paper gasket compressing it and therefore imposing a large bending moment on the cross bar. Cast iron is very weak in bending and if the cover is overtightened the bar cracks. Screwing the stud in further worsens the crack and eventually the head can crack down the corner.

So I recommend that you don't use a thick gasket. Thin paper with goo is OK but I now use Silastic (silicone rubber) gasket goo without paper and avoid the problem. If you have a head that is cracked don't reject it. It is quite possible to get around the problem and it is also possible to adapt an internal oil feed head (easier to buy one of these in good condition) to use it on earlier and later motors. In a future article I will explain how I have gone about these jobs.

Noel Wyatt's Mk.I

OCTOBER 1990

UNDERSTANDING THE HOBSON K-S TELEGAUGE

Noel G. Wyatt

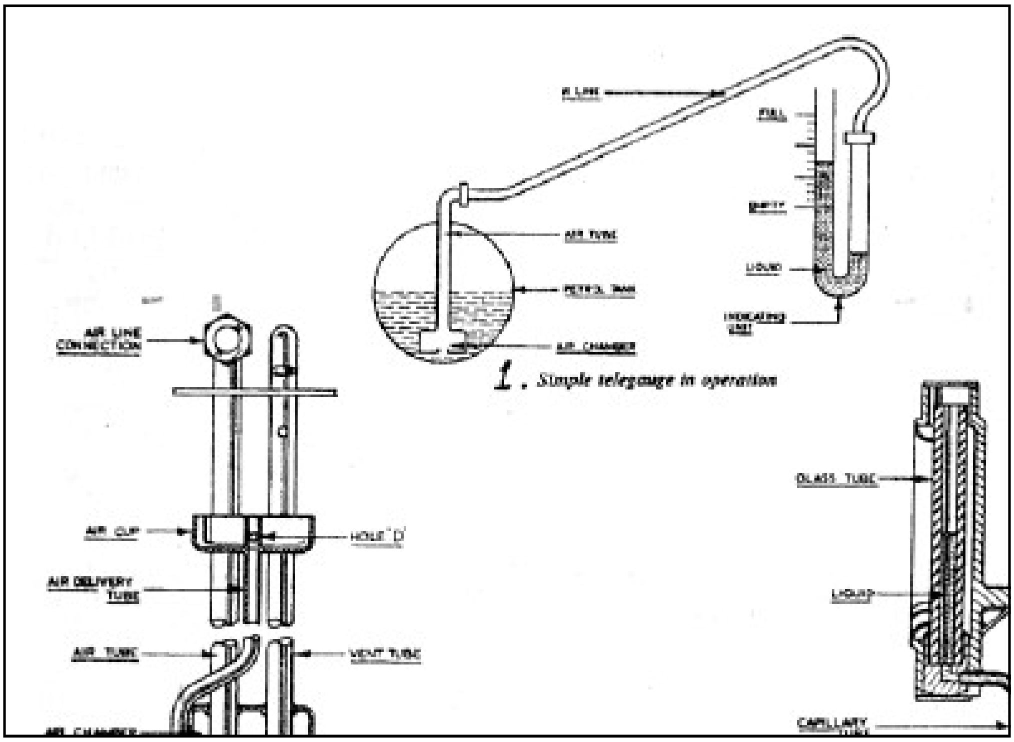
The Telegauge fitted to some Rileys in the early thirties to indicate petrol level in the tank is a very simple and interesting instrument. Because we have two cars, '33 Kestrel and '35 Imp, that were originally fitted with this type of gauge, I have spent some time studying the operation and carrying out some calculations to properly understand how to "sort" them out. The following is an abbreviated explanation of the gauge. If anyone is restoring a gauge and would like more detail then please give me a call.

First, to explain the operation, the following is a typical Handbook explanation.

The system consists of indicator and tank units connected together with a small bore pipe as shown on fig. 1.

The tank unit consists of an air chamber and air tube as shown in fig. 2.

The indicating unit shown in fig. 3 is made up in the form of a 'U' tube containing a special heavy red liquid.

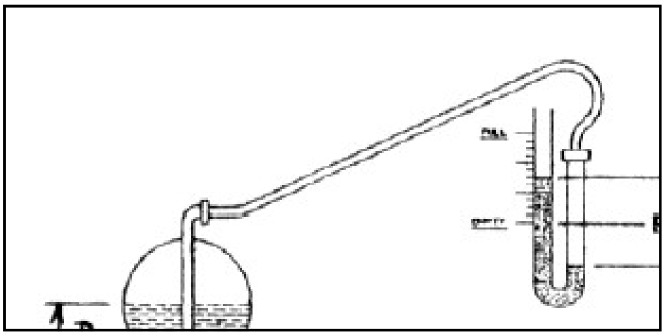


1. *Simple telegauge in operation*

One half of this 'U' tube is of glass, open at the top end and visible on the instrument board together with the scale marked off in gallons and litres, the other half being of brass and acting as a reservoir. The calibrating wires in the reservoir are used to compensate for differences in the bore of the glass tube.

During the process of filling the tank the increasing head of petrol exerts a pressure on the air in the air tube through the air chamber which is open to the tank through the hole 'C'. This pressure is exerted through the air line to the indicating unit and causes a rise in the red liquid in the glass tube. Conversely, as the amount of petrol in the tank decreases the air pressure is lowered and the red liquid falls in the glass tube, thus indicating the amount of fuel in the tank. The bent tube, open at the top, is a safety device to protect the gauge against excessive pressures.

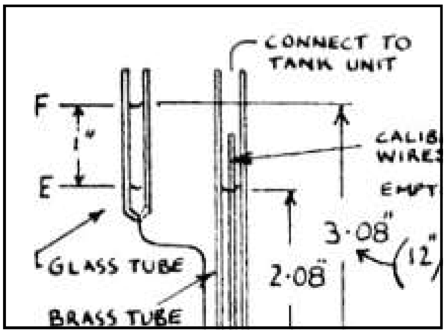
The remainder of the tank unit, namely the air cup and air delivery tube, act only as a means of supplying air to the air chamber to overcome any loss of air due to absorption in the petrol or contraction caused by a drop in temperature. The air supply to the tank unit is obtained by making use of the movement of the petrol in the tank. The air cups are constantly being filled by the splash of the petrol when the car is in motion. This petrol flows through the drain hole 'D' and down the air delivery tube, drawing with it bubbles of air which are released at the bottom of the tube under the air chamber, entering the latter through hole 'C' and displacing any petrol which may be in the air chamber. When the air chamber is full of air any further air passing down the tube is released into the tank."



I think this is fairly self explanatory except that the calibrating wires really are used to match the depth of the tank to the range of the gauge.

The fluid normally used is acetylene tetra bromide dyed red. Geoff Burford tells me he has discovered that the specific gravity of this is 2.92, i.e. 2.92 times heavier than water. This means that if the contents of the tank were water the manometer would measure 1/2.92 the depth of the liquid in the tank, however as petrol has a S.G. of about .75 the ratio becomes .75/2.92 = 1/3.89.

As all the gauges are basic 2" dia and the scale length from empty to full is fairly well fixed at around 1" then it is quite possible for a tank depth of say 12" and a simple manometer with both legs of equal diameter that the fluid will move upwards ½ x 12/3.89 = 1.54 inches. This is obviously beyond the length of the glass tube hence the need for the calibrating wires. To calculate what is required, study the following sketch:



i.e. when fluid in the glass goes up 1" the fluid in the brass tube must go down 3.08" - 1" = 2.08" i.e. the cross sectional area of the brass tube must be reduced to equal area of glass x 1/2.08 i.e. to be 48% of area of glass tube.

Knowing the diameters of the glass and brass tubes it is very easy to work out the calibrating wires to drop into the brass tube.

If you have a very deep tank you will need to have a gauge unit with a long brass tube and almost fill it with calibrating wires.

Originally, the units were connected up with a special small bore brass tubing and special fittings and you can buy these if you really must. However, it is easy to work out the performance if you use another size tube by knowing the volume of the air bell, the volume of the tubing and gauge.

If you remember your early physics, Boyle's law states P 1 V 1 = P 2 V2 where

For example with 12" deep tank:

$$\text{New volume } V_2 = \frac{P_1 V_1}{P_2} = \frac{32 \text{ ft water}}{32 + (12'' \times .7}$$

$$= \frac{32}{32.75} V_1 = .977V_1$$

temperature is constant and P is absolute pressure. Using this it is possible to calculate the change in air volume when the air pressure in the system increases as the tank is filled with petrol.

The important thing is that when the tank is filled, the compression of air in the system still leaves air in the measuring bell, i.e. the volume of the air chamber must be more than 2.3% of the total air volume.

The above initially looks a bit complicated but if you think about it carefully and make a calculation on your sender and tubing system you will easily understand what is involved. I worked out that Festo air line tubing, with 3mm bore, was quite satisfactory in an Imp which has a very deep tank and I'm sure in sedans it would be totally satisfactory. It is easy to install in a continuous length and simply pushes on to the special end fittings and is trouble free as far as leaks are concerned.

In carrying out testing on my Imp system I found the following problem with the original design of the sender unit. The hole "C" in the bottom of the air chamber is extremely small and because the vent tube is full of petrol to the same depth as the petrol in the tank, the gauge is actually measuring the height of petrol in the vent tube and not directly the depth in the tank. This is good in principle, as petrol swishing around in the tank has a very delayed result on fluctuating the gauge, i.e. as the level outside the tank unit goes up and down petrol has to flow in and out of the small hole "C" thus dampening the system. However, if you bounce the tank unit up and down as happens as you drive along a rough road, the column of petrol in the vent tube simply hammers down and causes large fluctuations in the gauge. My opinion, after carrying out tests is that it is actually better to have a larger hole "C" which won't easily block up and dispense with the vent tube in the tank unit, i.e. block it up at the mounting flange or lower.

Incidentally, all the tank units I have seen have omitted the small hole just under the mounting flange which appears in all explanatory literature. As long as your tank is properly vented either with a vent in the fitting pipe or in the tank cap you will not have a problem.

I hope that the above explanation has not been too boring for the majority of club members who don't have a Hobson's Telegauge but at least when you look at one in a car, (and many different makes fitted them in this period), you will understand how they function. Really they are not so mysterious as they first appear.

AUGUST 1991.

PERCY RILEY'S "UNIQUE OIL PUMP

Author: Noel G. Wyatt

Having experienced some trouble recently with oil pressure on '9' engines (pre Merlin) which are of course fitted as standard with the well known plunger type oil pump, I had to admit to myself I didn't completely understand how it worked.

So I measured up the parts and actually fitted a pump to a bare block, and, with the eccentrics and connecting rods fitted, took some basic dimensions so that I could draw up a diagram to make sure I knew the operation.

The final result really surprised me and I wouldn't mind betting that there are not many '9' owners who know the full story.

First, for non 9 Riley enthusiasts a small explanation of the device.

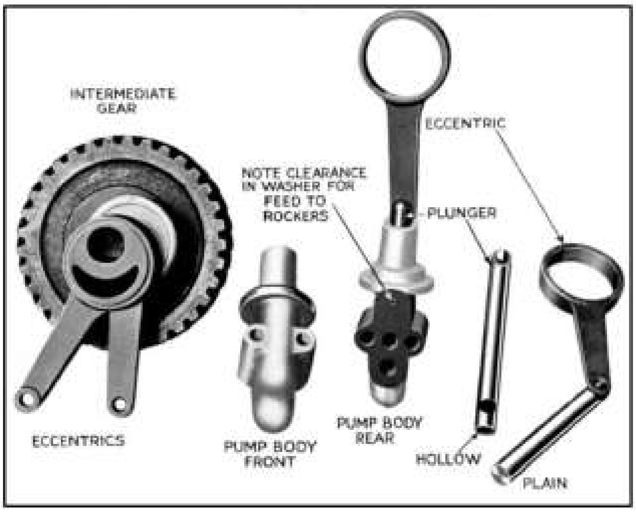
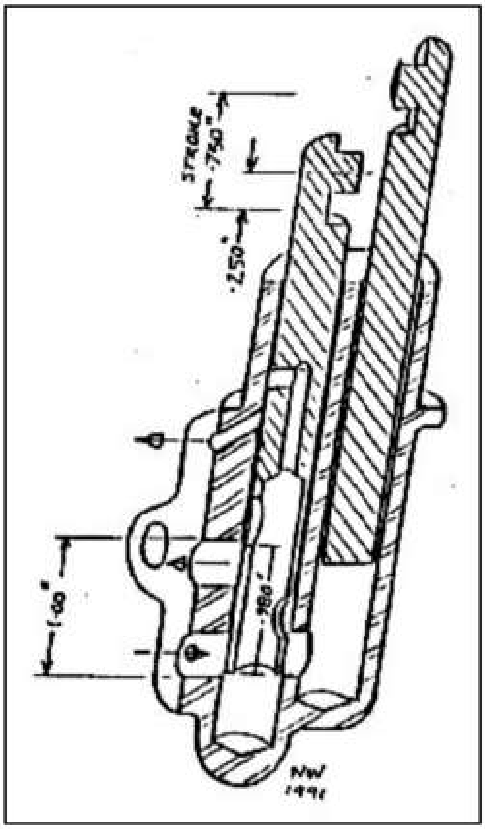


FIG.1 PUMP COMPONENTS.

FIG.2 (On right) SECTION THROUGH "9" PLUNGER PUMP SHOWING VALVE PLUNGER AT CHANGE OVER POINT SUCTION - DELIVERY



A double eccentric is driven by the intermediate timing gear which, via two connecting rods, operates two plungers in the small oil pump bolted externally to the engine block just below the timing cover. The eccentrics both have a stroke of 0.75" and the valve plunger leads the pump plunger by 90°. The pump plunger is a plain 0.5" dia rod oscillating in a cylinder on the outer side of the pump body. The valve plunger is a partly hollow 0.5" dia. rod oscillating in a cylinder on the inner side of the body pump.

This part of the pump body has drillings for the suction and delivery connections and there are holes in the valve plunger which open and close the ports as the plunger oscillates.

A smaller secondary delivery port is arranged to feed the intermediate spindle and hence the timing gears and also a connection to the valve rocker shafts, and, on later engines, the front camshaft bearings. This port opens for a short period only when the valve plunger is at the bottom of its stroke.

By measurement the change over from suction to delivery is 0.25" up from the bottom of the 0.75 stroke of the plunger.

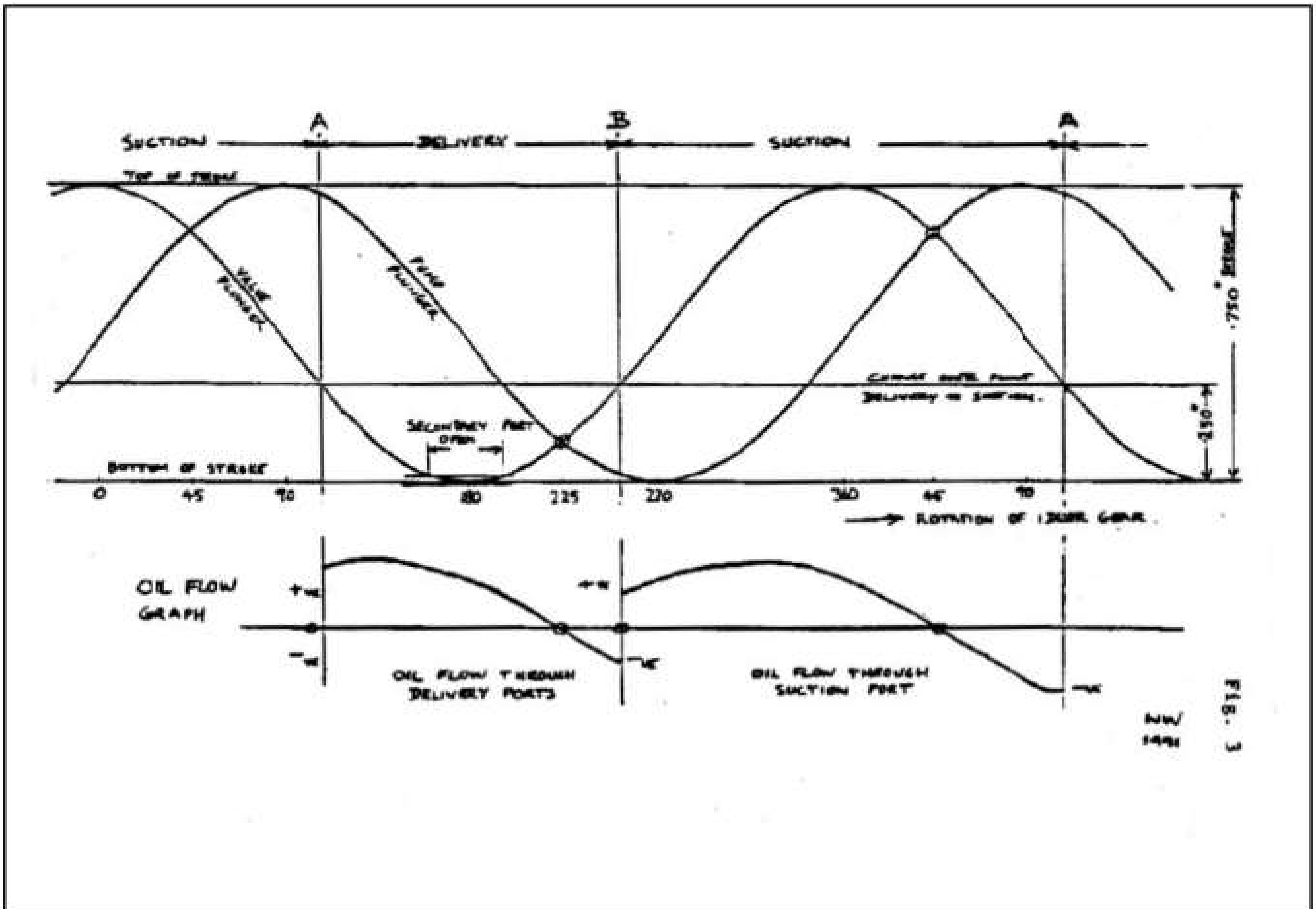


Fig. 1 is from an early Handbook and shows the pump components. Fig. 2 is a sectioned view of the pump to show how it fits together. Fig. 3 are charts showing the pump operation.

Now, if you look at the upper chart you will see the movement of the two plungers plotted vertically against the angular rotation of the intermediate gear. Also note that the valve plunger is shown 90° ahead of the pump plunger.

The top line represents the upper point of the stroke of the two plungers and the bottom line, (disregard the oil flow chart at present), is the lower end of the plunger's stroke. The horizontal line is the height at which the valve plunger changes the pump over from suction to delivery cycles.

Therefore, when the valve plunger is above this line the pump is sucking and when it is below it is delivering.

This then establishes the vertical lines A and B which set out the angle at which the pump changes its operating mode.

Right on the bottom stroke line you can see the secondary port opening and at this point oil flows out through both delivery ports.

At this stage of my drawing it occurred to me that the valve plunger didn't only operate for this purpose but also performs a suction and delivery function as well. In a word, I was amazed to see that after the valve plunger passes its bottom position, its upward travel works to cancel out the displacement of the pump plunger. The point where they cross at 225° is where the pump plunger's discharge equals the valve plunger's suction and from this point to above 253° - when the valve plunger reaches the change over port - the pump actually takes oil back out of the delivery line. Similarly on the suction cycle the plungers, whilst starting off helping each other, reach a point at 45° when they cancel each other out and from here to just before 110° the pump stops sucking and actually pumps oil back into the engine sump.

The bottom graph I drew to show what actually happens. Drawing this was quite a brain teaser but I think it's fairly accurate. At particular angular positions I measured the angle of the stroke curves and added or subtracted the tan of these angles to give the flow rate. (The tan of the angle of slope gives the rate of change of stroke against angular movement of the intermediate gear and is therefore directly proportional to the displacement of the plunger).

Before I started this exercise I had been thinking that a non return valve in the suction line would be a good idea so that the pump starts pumping as soon as the engine is started. '9' engines always show a considerable time delay in building up oil pressure as the hot oil at the end of a run almost always drains back to the sump as the plungers are not liquid tight and, even depending where the engine stops, ports can be left open allowing immediate draining of the pump.

Now of course I realise that a check valve is impossible as this would overload the mechanics of the pump by stopping the reverse flow of oil through the suction line.

A critical aspect of the pump also is the dimension of the drilling in the valve plunger if you are thinking of making new ones.

The two ports in the pump body are 5/8" centres and 3/8" dia making an overall distance of 1" from outer to outer of the ports. The valve plunger has a port on the block side which, on an original Riley part, is .980” up from the bottom of the plunger. This gives a small .020" dimension at which both suction and discharge ports are both open. The pump is near its maximum capacity at this point with oil actually speeding back into the pump through the delivery port, and, as it closes off, flow changes over to high speed through the suction port into the pump. If this overlap didn't exist the pump mechanics would be overloaded as on the suction changeover the pump would draw a vacuum, not too serious), and on the delivery changeover, very high pressure would be built up in the pump virtually jamming the plungers (unless they are a very loose fit and lots of leakage).

So make sure the .980" dimension isn't 1" or more.

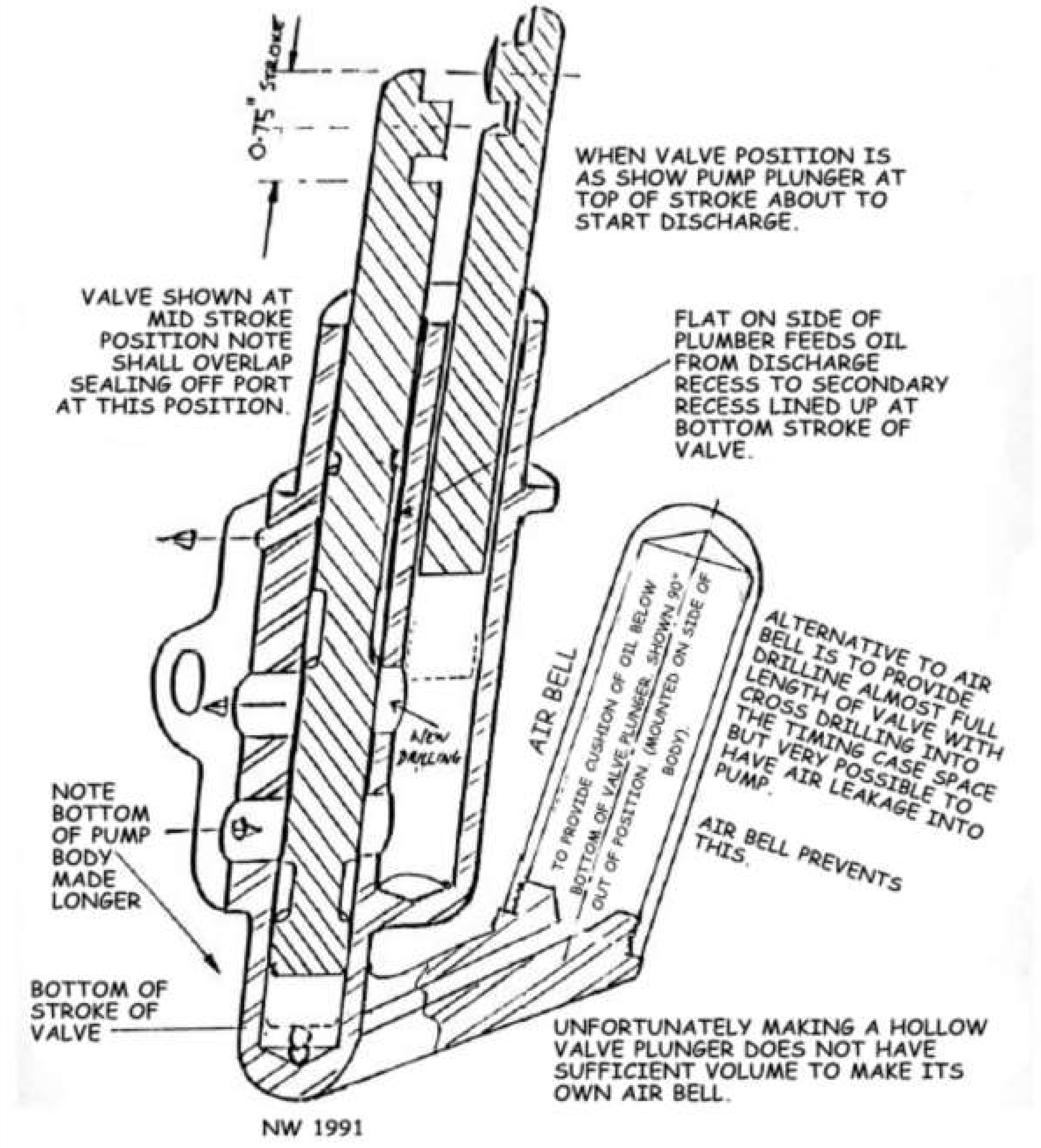
The drilling on the other side of the valve plunger is also critical and it is .350" up from the bottom. This port opens at the same time as the main discharge port and if anything could be reduced but not increased.

I think in about 1934-5 the oil pump was produced with an air bell as part of the pump. This air bell was connected into the suction port of the pump and its purpose here would be to try to keep the oil flowing in the suction line always towards the pump, i.e. when the pump is sucking strongly oil would he drawn out of the air bell causing a low air pressure in the space at the top of the bell. Then, during the discharge cycle of the pump the low air pressure would keep oil flowing from the sump up into the air bell ready for the next cycle. How it coped with the oil being pumped backwards out of the pump would be a good question.

Another modification at an earlier date was a hollow pump plunger. This in my opinion, was a bad design and simply serves to reduce the oil flow capacity of the pump as the air trapped in the hollow plunger expands and contracts with pressure change. If your pump has one of these hollow plungers, tap the bottom of it 5/16" B.S.W. and fit a grub screw and the pump will work much better, but make sure of the .980" dimension before you do. The hollow valve plunger is not a problem as the secondary discharge port in it comes from the very top of the hollow and air is immediately blown out as soon as oil is pumped.

The Merlin oil pump overcame all these difficulties and on paper looks to be a much better design. I personally have no experience with the Merlin engine and would be interested to hear how these pumps are after over 50 years of operation.

A SUGGESTION TO PERCY RILEY (60 YEARS TOO LATE) AS TO HOW TO MODIFY THE RILEY "9" OIL PUMP TO PREVENT REVERSE FLOW IN CONNECTIONS. ALSO POSSIBLE TO FIT SIMPLE BALL CHECK VALVE IN SUCTION PIPE TO PREVENT OIL LINES DRAINING OUT.



JULY 1991

A RILEY RE-CYCLE

A Use for old steering joint bushes.

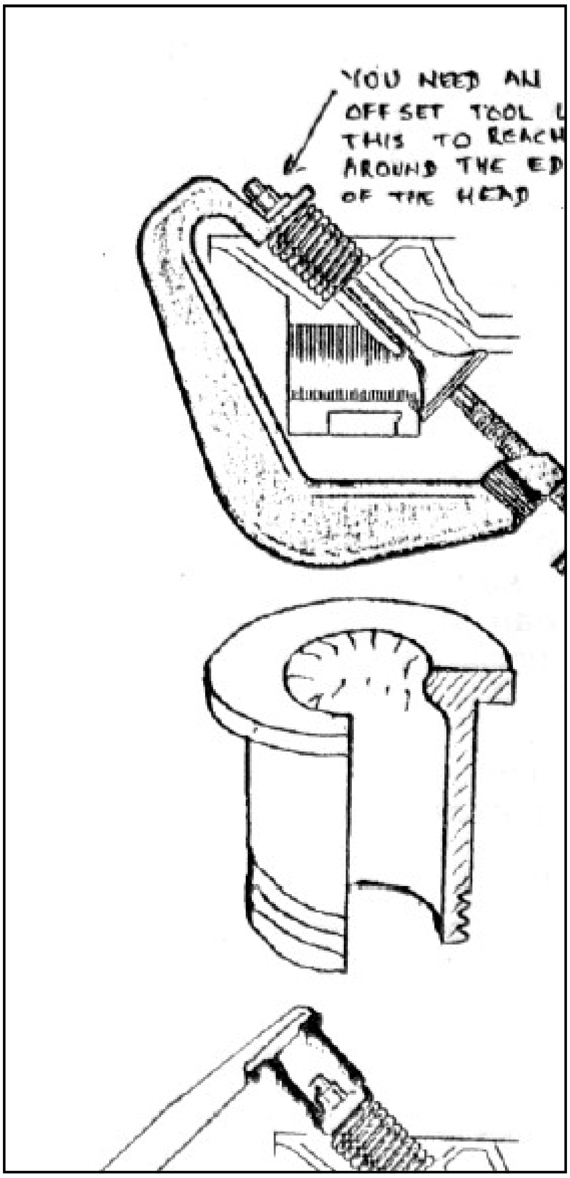
Noel G. Wyatt

No, this is not a story of a long lost Riley bicycle hopefully discovered by your Editor. If you study the sketches you will see that it is using an old Riley part to perform a functional purpose.

Pre war steering joint bushes are best removed by cutting through radially from the inside with a hacksaw. They are then very easily pushed out. You are then left with a useless bush and I have a small box full of these.

Struggling with removing collets from a Riley head I realised that an extension would enable a standard valve spring compressor to be easily used.

Simply cut a quarter segment from the bush and use it as I have described.



NOVEMBER 1991.

RILEY '9' CRANKSHAFT CLEANING

Author: Noel G Wyatt

If you have your '9' motor apart it's wise to make sure the crankshaft is free of sludge. If the drillings opposite the ends of the crank pins still have their original aluminium plugs fitted with no apparent way of removing them, maybe you could tackle it the same way as I did recently

Obtain a suitable hex socket plug. I happened to have 3 that were 7/16" BSF thread about 8 mm long. So I drilled centrally through the aluminium plug with the correct size tapping drill and then tapped in about 10 mm long full size thread.

This reasonable size hole allows you to use a drill to remove the majority of sludge and then by soaking in a suitable solvent, (I used petrol), you can poke around with a wire and get out all the remaining debris. The crank I was cleaning was absolutely, completely, blocked and the sludge was so compacted I really did have to drill it out.

Sealing the plugs with a setting gasket compound will hold them in place and as long as you don't use Loctite you will be able to get them out again at some future date using a hex key.

The oil lines on the crank are another problem and you must remove these as the drillings and probably the pipes too will be solid with sludge.

Heat the copper tube with a blow lamp until the solder softens and forcibly remove them and throw them away.

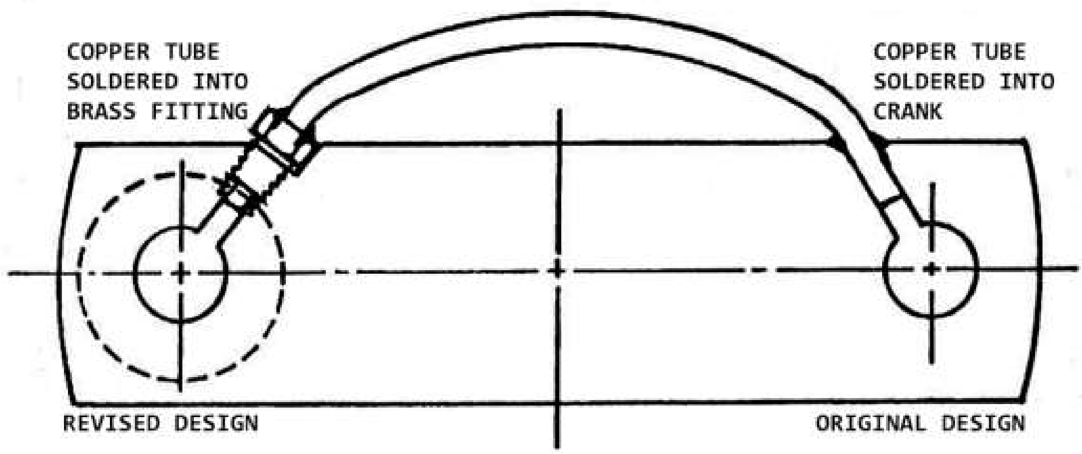
At this stage I thought why use copper pipes at all when a drilling through the length of the crank will do the same job. I referred to an early textbook and after a bit of guesswork and rough calculations proved that at high revs there was not enough oil pressure available to pump in to the centre for the oil to come out the other side.

Checking this with lan Ruffley confirmed this view as he related that a particular American racing engine attempted to have drilled crank oil ways and invariably ran big end bearings until he fitted lines similar to the Riley '9' and this solved the problem.

To me, soldering the 1/4" O.D. copper tube into the solid steel mass of the crank is a dubious business and requires acid flux so this time I decided to experiment a bit. I drilled out the existing 1/4" dia. hole in the crank and tapped it 1/8" pipe thread and then fitted some brass 1/8" gas fittings I made with "4" holes in them.

These fittings I screwed tightly into the crank and then very easily soldered the copper tube into these in the normal way - see the sketch which I think is self explanatory. One end shows the original method and the other end as modified with the brass plug.

Make sure you don't run too much solder in as it would be quite possible to block the oil passage off.



SECTION THROUGH "9" CRANK

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APRI 1992

ABOUT MAGNETOS AND RILEY '9's

Noel G. Wyatt.

After the Sunday outing to Phillip Island historic racing, (the Shannon's run), our car was covered with dust picked up on one of the internal tracks at the race circuit. So, up on the hoist to give it a clean down underneath ready for Kalorama and what a mess. The chassis was coated with oil which I immediately traced back to the front of the motor. One of the rocker feed oil line bolts had come a bit loose and with my new 80 psi oil pump fitted we had lost quite a lot of oil (at least 2 litres) which was the major problem and easily fixed.

Another leak has been annoying me for some time and this was oil coming up around the Scintilla Magneto where it fits into the timing cover, not up through the magneto shaft itself as this is easily detected as there are drain holes from the bottom of the base of the magneto itself.

The solution is to fit an "0" ring to the 1-1/16" dia. spigot of the Scintilla so, off with the base of the magneto to machine the "0" ring groove. This is easily done by removing the two special nuts on the base of the magneto and the drive end separates from the automatic advance assembly which is mounted on the bottom of the internal magneto shaft itself. On my car I have actually reversed half of the centrifugal plates to lock this mechanism up as I am happy to control the ignition advance manually rather than have the very large centrifugal advance incorporated in the unit.

A short while later all was complete and reinstalled on the motor with a special "0" ring made up from some 3/32" Buna N cord. Super glue joins up the ends and you can easily make an "0" ring to any size you want.

On with the top after checking the timing and - nothing. The motor would not start and this could only be the magneto. Virtually no spark at all and this mystified me completely as I hadn't had the business end apart at all. Everything seemed OK so I suspected the internal condenser. This is hard to get to and impossible to check as its connected internally inside the magneto barrel underneath the contact breaker mounting plate. So I fitted a new Lucas condenser above the plate where there is plenty of room, but still no spark.

Further deeper thinking and the trouble became clear. The rotor button is keyed on to the top of the 4 lobe cam and in handling the unit with the top cap off I must have accidentally knocked it and the cam itself had moved around on the magneto shaft. This is a strange arrangement as the cam simply fits on to a taper and is held with a special nut which you have access to after removing the rotor button. This nut must have been not fully tight or had loosened up and a small load was enough to move the cam around.

Its important that the contact breaker opens when the rotating magnet is rapidly changing the flux in the low voltage coil in the magneto and its easy to reset once you realise what the problem is.

Actually a few years ago I managed to buy a vertical B.T.H. magneto which mounts exactly as the Scintilla, (i.e. similar to a distributor), with the idea of having it as a spare. It cleaned up really nicely and I was happy with it apart from it having its coil cover, a special Bakelite moulding, missing. Fortunately the last time we were in the U.K. we went to an historic race meeting at Oulton Park which also incorporates an auto jumble and lo and behold amongst a lot of useless bits was a B.T.H. cover exactly what I needed. You can be lucky and for I think $4.00 it was mine.

So after the above small problem with the Scintilla I decided to fit up the B.T.H. and give it a trial run. A bit of fiddly work but I now have it on the motor and it works really well. The Imp hasn't ever started so quickly and this is because the B.T.H. unit is an impulse type. To explain just briefly this is a system where the magneto locks itself up when the motor is stopped and to get it going the drive shaft starts rotating against a spring and after about a quarter turn it unlocks the magneto shaft which springs rapidly forward giving a good spark at very low revs. Centrifugal force then holds the brake off while the motor is running.

For some reason the motor seems to be running much smoother and revving more freely so it will be interesting to see how it goes on the road.

The Scintilla is wrapped up and in the Imp tool box until I'm confident the B.T.H. is reliable.

P.S. It is now after Kalorama and the B.T.H. is going well.

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DECEMBER 1992

AN ENGINEER'S THOUGHTS ON CON ROD RECONDITIONING

Noel G. Wyatt.

I'm not specifically a mechanic having been trained in Mechanical and Electrical Engineering so my thoughts on automotive methods may well not agree with how mechanics are trained - so forgive me if my views differ from what could be called conventional practice.

Having re-metalled some rods and machined them myself and also having a few sets restored professionally, I consider it is best to do some preparatory work before taking rods for re-metalling.

My experience is mainly with '9's and virtually every rod I have looked at has been offset to some extent. By this I mean the small end is not on the same centre line as the big end. I can't explain why this is so but it could be from the original machining. The effect is that the little end is not central in the piston and could even use up all the side clearance and press the piston to the back or front of the cylinder bore.

If you don't correct this before rod reconditioning you may well end up with this same condition later. This is because some rod finishing machines locate the rod by locating the small end bore parallel to the machine axis and machine the newly white metalled big end centred on the big end bolts.

From my observations most machinists don't seem to understand the problem and of course are not being paid to fix your con rods if they are technically in error when you give them to them.

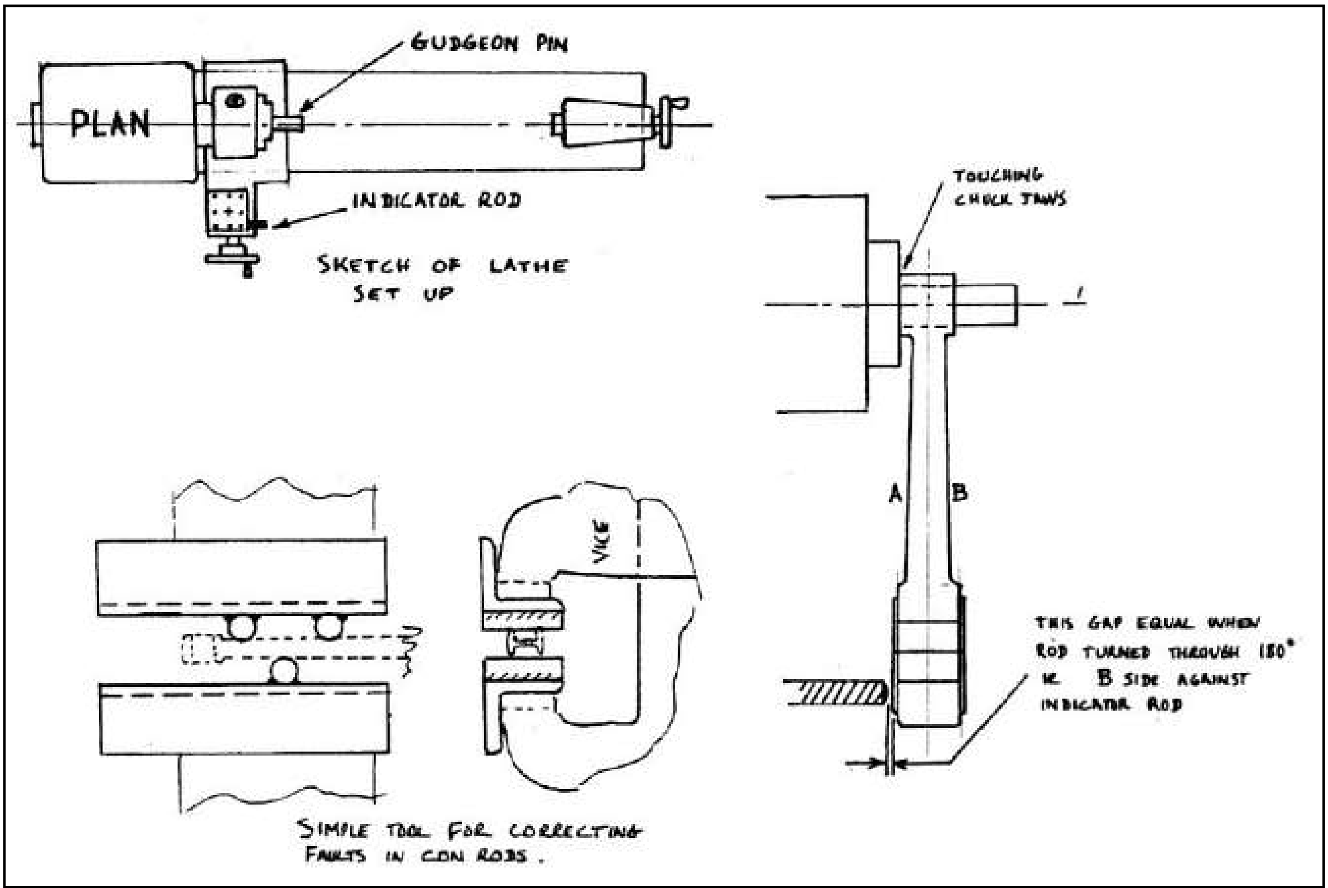
Its very easy to check them and get them right before anyone gets to work on them. All you need is a simple lathe and a bit of clear thinking to get them right.

The end result of seeing the small end nicely centred in the piston and the piston not cocked at an angle' in the bore makes the little bit of initial trouble well worth the effort.

1. Make sure the small end bush is replaced if not in good condition. Only then can you prepare the rod correctly. The gudgeon pin should be a light push fit in the bush with no discernible radial clearance.

2. Mount a gudgeon pin in the lathe chuck and with the little end pushed on to the pin first from one side and then the other, find out which way the rod is offset. Then, using a suitable bending tool, correct the error by bending the rod close to the little end. A simple tool is sketched to use in a strong vice. Ideally melt the old white metal from the rod and check the rod accuracy against the sides of the bare rod. Don't accept a rod until you have it within about max. 1 mm gap one side when it is touching the other way around, i.e. 2 mm offset.

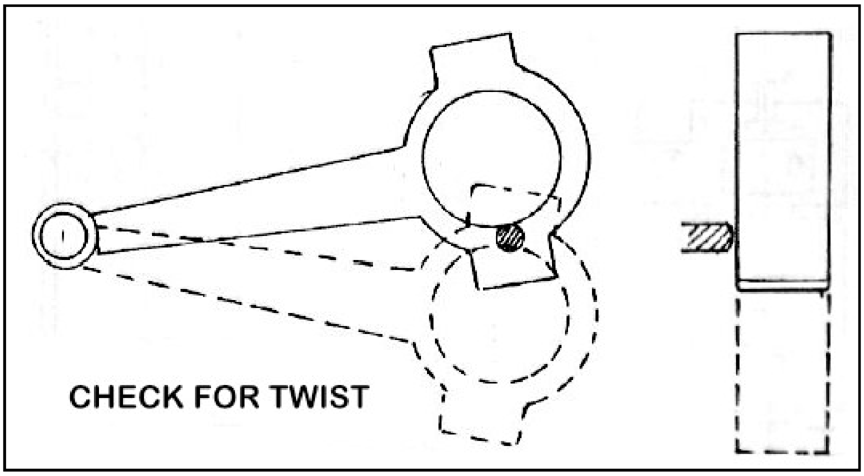
3. At this stage you can have the rod professionally re-metalled and machined. But don't just accept that the rod will be machined correctly. Ask to see the machine used to bore and face the sides of the new big end. It's important that this is done with the same set up and ideally without removing the rod from the machine so that the sides are exactly at 90° to the rod axis. It's pointless trying to achieve something like .002" clearance if when you fit it to the crank pin it's twisted around by incorrect machining. The radial clearance must exist for an oil



film to be developed.

4. After machining you can now check the rod again and from my own experience you will have to make further adjustments. This time not only check the rod from the small end but turn it end for end by holding the big end bore against the gudgeon pin in the chuck and the side faces against the chuck jaws. You can easily also check for alignment now in both ways.

By sliding the small end on the gudgeon pin still in the lathe you can check for twist in the rod by making sure the side face of the machined rod has equal clearance as it is swung past the tool post as shown.



OCTOBER 1992

FITTING A MERLIN CRANK TO A PRE MERLIN '9' MOTOR

Author: Noel G. Wyatt

Having just completed this task I thought a few notes may be of interest to describe what is involved.

1. The major change is the larger rear main bearing which requires the block to be bored out slightly. I made up a new bronze unit white metal lined and had the machinist first of all line bore the block to suit and he then inserted the bearing and line bored the new mains to suit the ground crank.

2. To centre the crank throws on to the cylinder bores requires a slightly thinner thrust flange on the front main bearing. This is easily determined by measurement comparing the 2 different cranks.

3. Connecting rods. I used some 12/4 rods which are the same length as the original Merlin units but the 12/4 gudgeon pin is larger than the '9's. Pre Merlin pistons have a 9/16" pin and the Merlin a 5/8" dia. pin. I simply made up special bushes but have since been told that the thicker bronze bush might cause problems by deforming under high speed. If you thought this was a problem it would be easy to make a steel insert with a bronze insert to suit.

4. The rods just clear the internal piping so these represent no problems. Make sure the small line to the pressure gauge connection at the rear of the motor is out of harm's way as clearances inside the crankcase are certainly less with this bigger machinery inside, If the internal piping incorporates an air bell this has to be flattened to clear the rotating web of the crank.

5. Flywheel. I have used a Merlin flywheel which already has the correct taper of course but there is enough material in the standard flywheel to enable it to be machined out to suit. The journal on the flywheel with the oil scroll is the same size on both motors. As the Merlin crank I used was scored in the taper areas I cleaned this up and had to extend this journal as the flywheel moved into interference with the rear of the block. Actually this was just as well as the type 3 clutch, even in this new forward location, fouls the pre Merlin preselector bell housing that was originally fitted to my car. This was cracked and I now have, I think, a Merlin bell housing on the Imp motor so hopefully this will be just that little bit bigger inside to suit the later clutch.

Also I found that the type 3 weights which protrude through-the flywheel interfered with the recess for the starter motor which required a bit of grinding back. Fortunately I checked all these things very carefully as I went and didn't have to remove the flywheel after finally fitting it as this is always a difficult job.

6. Balancing. I had the machinist dynamically balance the Merlin crank after grinding and he had to take a reasonable amount off. I statically balanced the flywheel myself, gradually building up the clutch components as I went, balancing each part, and I think this should be quite acceptable. I preferred to do this myself as with the quite complicated centrifugal clutch I think it's too much to expect to have this done properly by others. I made a small shaft with a suitable taper and mounted it on 2 small open ball bearings, only 3/8" spigots each end, and these bearings running without grease tum easily and very small weights turn to the lowest point.

To conclude, the job is really quite easy. The biggest problem is getting all the various parts, especially the Merlin pistons which I eventually sourced.

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BLUE DIAMOND 376 - June 1995

"9" TAPPET NOISE

Noel Wyatt

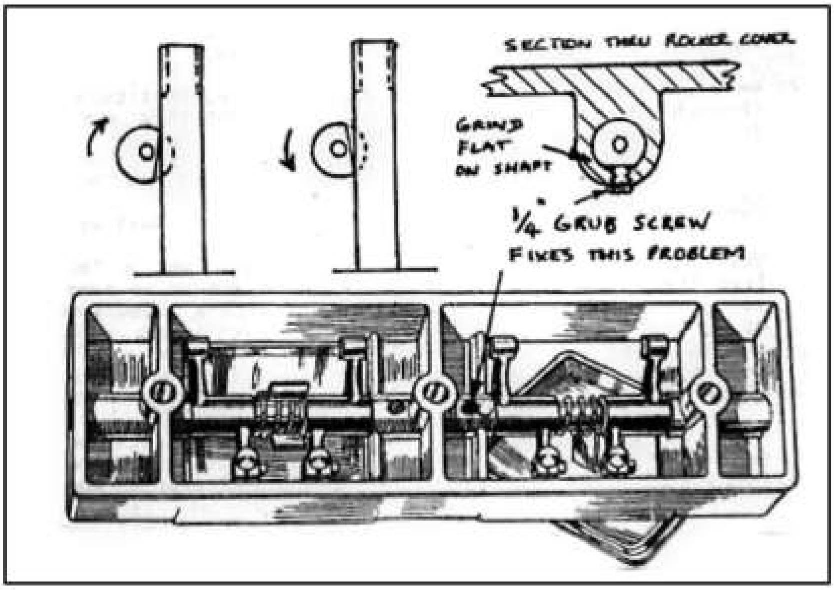
When I started up the Mk 1 motor there was a "tap" from the top end of the motor which no amount of tappet adjustment could decrease. I listened with a screwdriver up to my ear and just couldn't discover which rocker was at fault. Eventually I did find the problem after seeing some marking on the studs which hold the rocker covers in position

What was happening was that the rocker shafts were no longer a tight fit in the aluminium cover and were turning in the cover, using up the clearance where the D shaped cut-out in the shaft fits around the mounting stud. This backwards and forwards rocking was making the noise and I found that once I knew what to look for it is simple to see if the problem exists.

Simply hold a ruler or the end of a screwdriver on to the shaft between the coils of the spring separating the two rockers and the movement is easy to feel.

Fitting new rocker shafts generally isn't the answer unless they are oversized, as the hole in the cover will be oversize and one can't just ream out the hardened rockers. I found the best solution was to grind a flat on the rocker shafts where they insert into the centre section of the rocker cover and drill and tap a ¼” BSW hole for a grub screw to screw in, to clamp down onto the flat on the shaft. Use some Loctite on the screw and it won't easily come loose.

I prefer BSW threads in aluminium as a BSF thread is far too thin in section to have much strength in aluminium. It's interesting I think that ENV in their manufacture of the Wilson Patent-preselector gearbox used special studs - BSW one end where it screws into aluminium and BSF the other end for the nut.

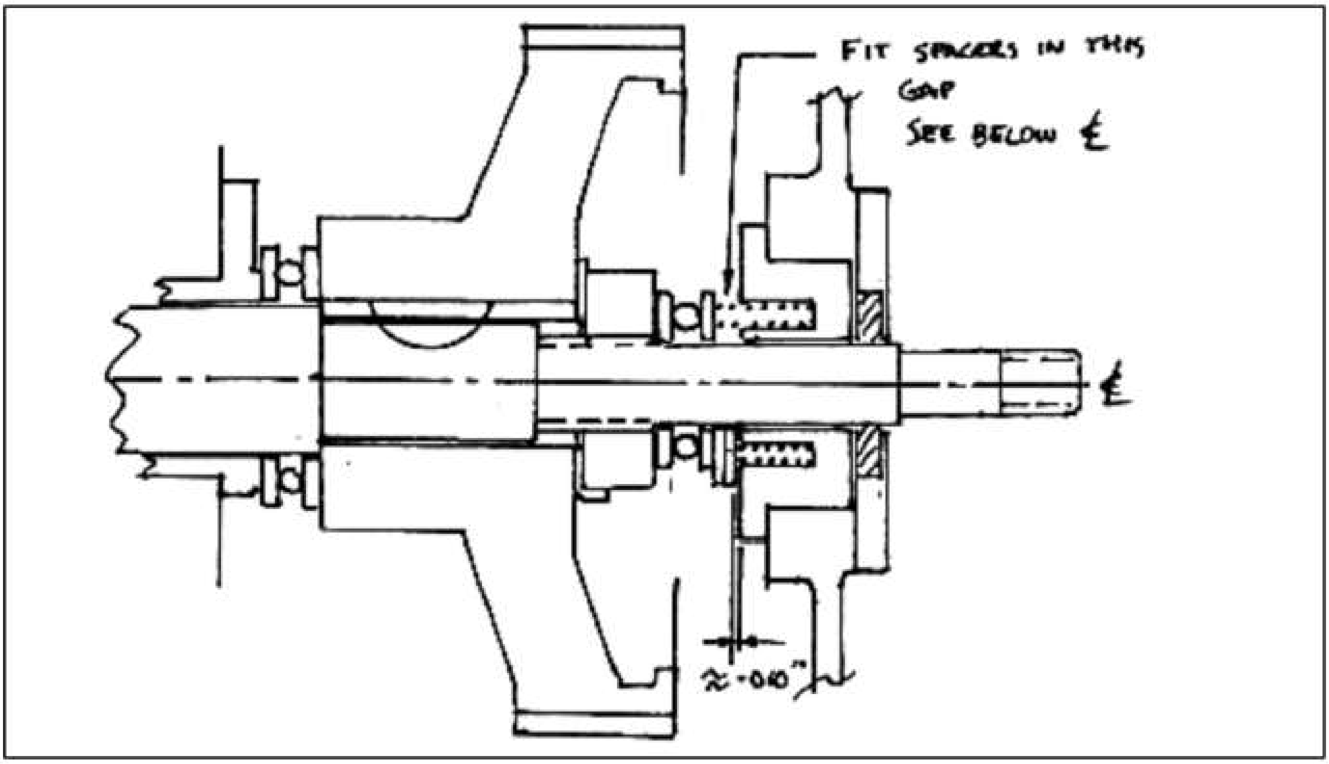


BLUE DIAMOND 376 June 1995

REBUILDING A '9' MOTOR
IN THE TIMING CASE AREA.

Noel G. Wyatt

There are a few interesting points in rebuilding a '9' motor and, having just worked on a later coil ignition model, I thought a few notes on what I have found in the timing cover area would be of interest.

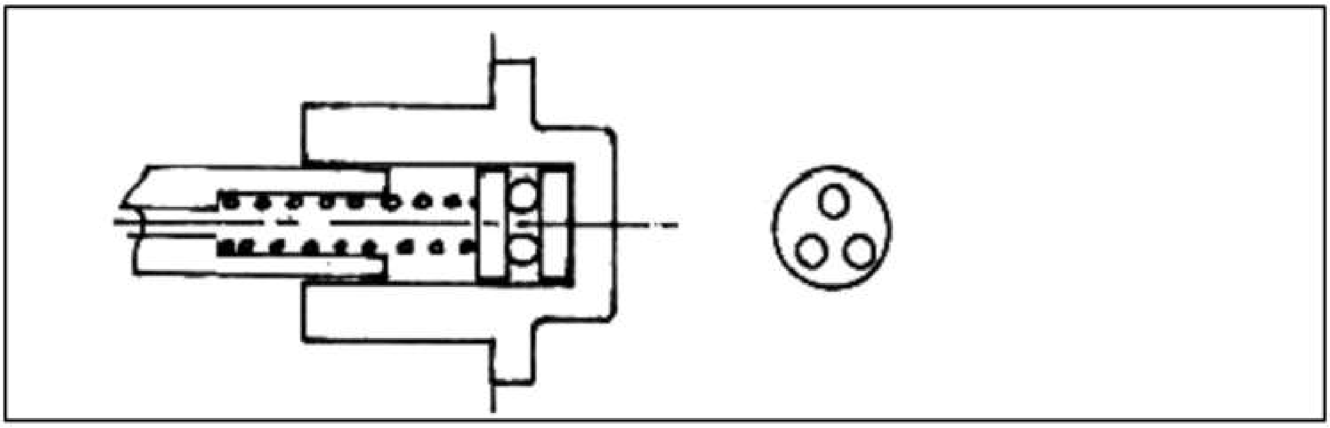


1. The Exhaust Camshaft.

The camshaft gear is held back against its thrust race by 4 small springs mounted in the steady bronze bearing in the front cover. These springs press against the washer of a 3/4" thrust bearing seated on the timing gear retaining nut. What happens is that the springs have about ¼" unsupported length between the holes in the bush and the thrust race washer and tend to bend in the direction of rotation and stop acting as springs. My suggestion is to insert spacers into this gap to essentially cut out nearly all of this clearance. It's easy to initially measure this gap by fitting the cover without the springs and simply push and pull the camshaft and measure its movement. Fit spacers to give only about 10 thou movement. Adjust the length of the springs to suit a reasonable pressure when pressed nearly back to the face of the bush.

2. The inlet camshaft.

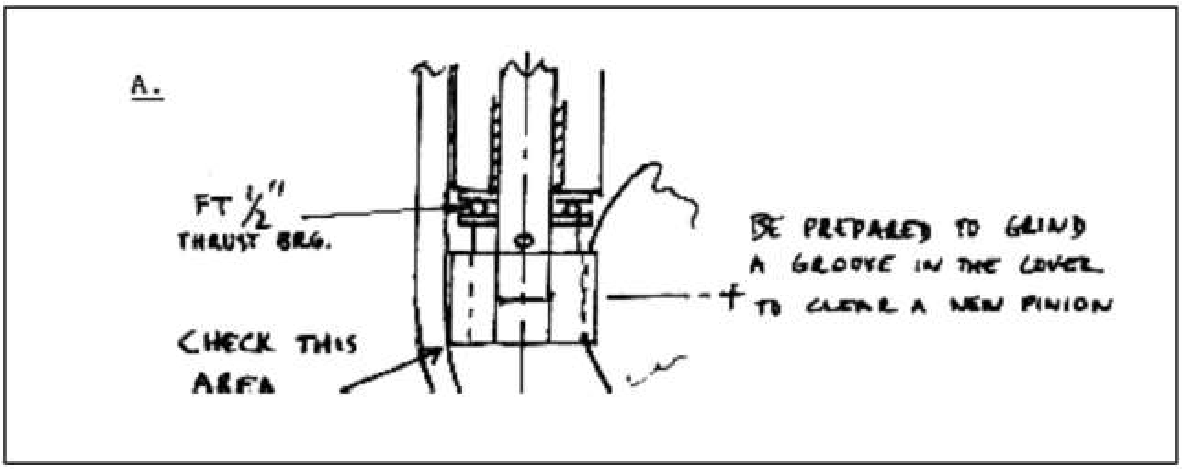
This has a different arrangement for end thrust and works well if the special 3 ball thrust bearing is okay.



Invariably the balls wear rough grooves in the hardened flat steel washers and the balls fail. The balls can be replaced, ¼” O.D. readily available, and with luck you can turn the washers over to use the unmarked side. Don't forget the washer down in the end of the bronze cover - a magnet can be a help in removing this if tapping the bush on a wooden block doesn't jar it out. Note that the camshaft is hollow and oil fed in from the front, camshaft bearing under pressure comes down through the spring to lubricate the thrust bearing and bush.

3. Distributor Drive Gear

This is an area worth looking at closely, and before completing assembly of the motor you should fit the camshaft complete with timing gear and check with the distributor in its mounting that the worm and distributor pinion mesh nicely. I have found that if a new distributor pinion is fitted, the drive can be very rough which is due to a fault in the original set up. There are two things to look out for:



Make sure the pinion clears the inside of the timing cover. If necessary grind a bit out of the cover to clear the pinion.

B. - See sketches at the end of the article.

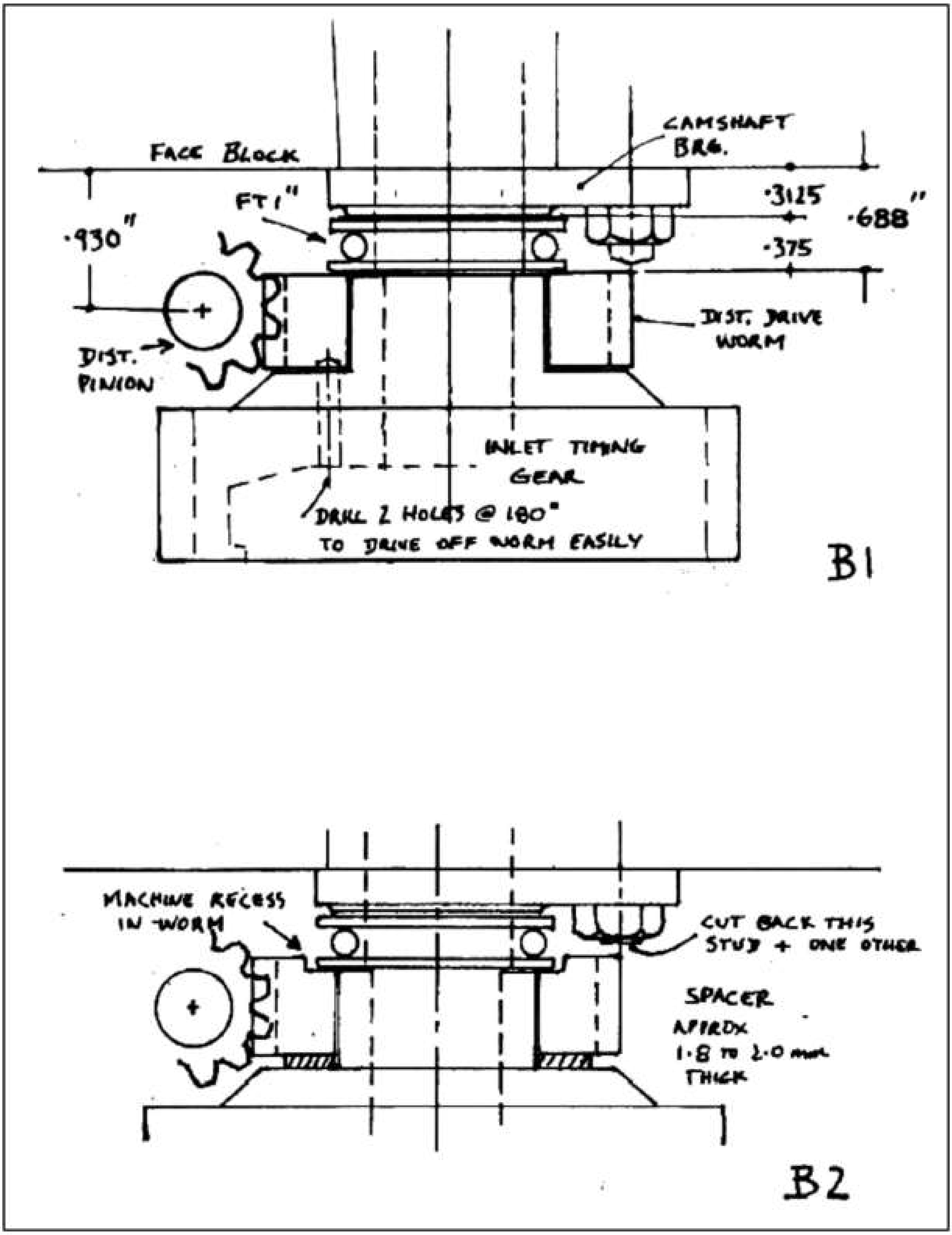
Once the worm is worn and if the teeth are at all bent, the drive will be very rough. Removing the worm and reversing it will put an unworn face into place to drive the new pinion. To remove the worm it's easy if the timing gear is of the spoked design as a punch can be used without damaging the worm, but if its a solid type gear, as later ones are, drill 2 holes as shown on the sketch to allow the worm to be punched off.

If you look at the drawing Bl. which is fairly accurate to scale, you can see that the worm is not central on the pinion of the distributor. This is all very well when everything is nice and new but with some wear the entering teeth of the worm catch on the pinion and make for a rough drive and noise.

I have found that centering it up with a spacer as shown in B2 the drive is very smooth even with worn gears. When you have pressed on the worm simply have the recess machined as shown on the sketch. You will also have to shorten back 2 studs as shown, one holding the camshaft bearing, and the other being a stud for the timing cover connection to the block. I have also found that initially these studs have been too long and have rubbed against the worm. It's hard to believe that the factory actually produced this poorly designed arrangement.

Not having really worked on the later R.M. motors I can't say if there are dimensional problems "designed in. Perhaps someone who has gone through it all can write up what they found, and a solution, for future editions of the magazine. It takes a while to write it up and make some good sketches but I think it's worth the effort for the benefit of other members. I can think of at least two experienced people working on post-war cars who could do this.

See Sketches on next page.



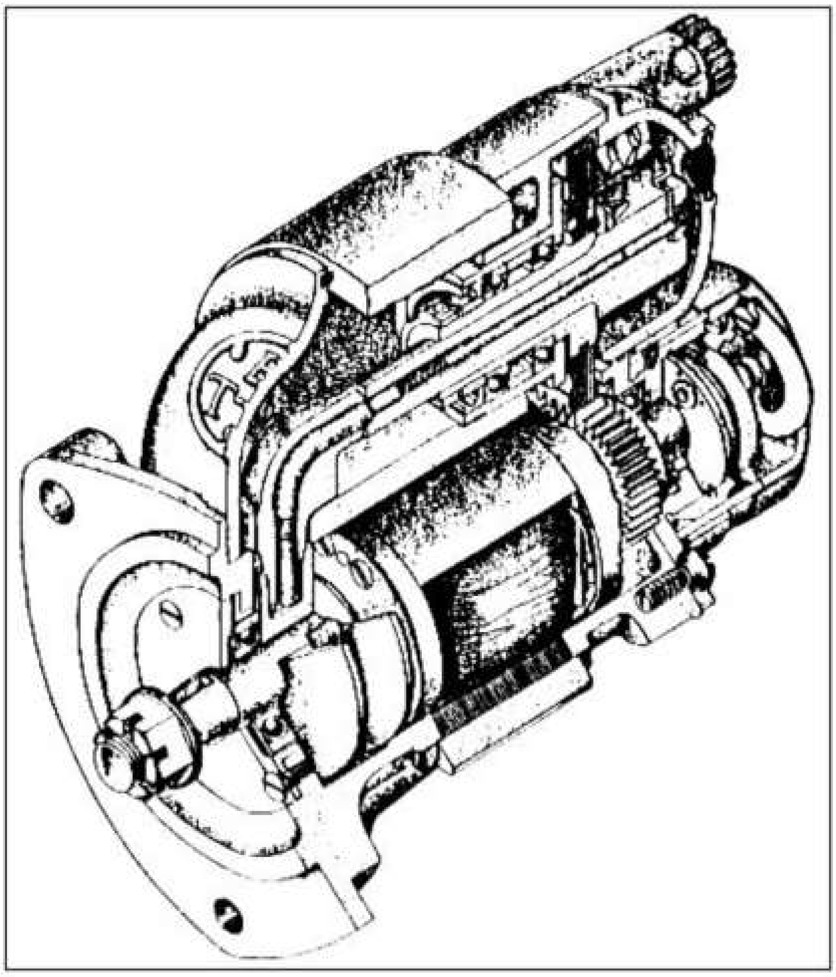
FACE BLOCK
CAMSHAFT BRG.
FT1"
·930"
·3125
·688"
·375
DIST. DRIVE WORM
DIST. PINION
INLET TIMING GEAR
DRILL 2 HOLES @ 180°
TO DRIVE OFF WORM EASILY
B1
MACHINE RECESS IN WORM
CUT BACK THIS STUD + ONE OTHER
SPACER APPROX 1·8 TO 2·0 mm THICK
B2

MAY 1992

A LITTLE ABOUT IGNITION

Noel Wyatt

Having a Riley and belonging to a motoring club brings one in touch with many interesting people and is instrumental in the making of friends around the world. Lyn and I have been to the Register's Coventry Rally a couple of times and we have met many Register members. Geoff Barwick who lives in Coventry, has been very helpful, and on our last trip when I was asking about technical details on B.T.H. magnetos, he was able to give me some valuable information.



The following extracts and comments I feel would be of interest to our Club members. The points raised of course originate from technical staff of B.T.H. up to a half a century ago and may not be to latest thinking, but they make sense to me.

1. There are two systems of electrical ignition in use in automobiles, battery-coil ignition and high tension magneto.

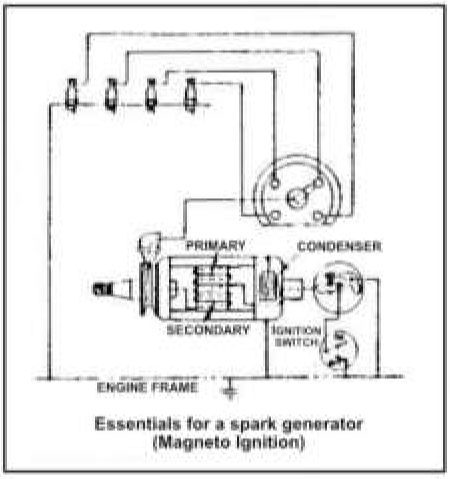
2. The change from magneto to coil fitment in new automobiles is unquestionably one of cost as a magneto is more expensive than coil ignition.

3. The magneto and coil systems work in a similar fashion in that the high voltage spark is created by a rapid change of magnetic flux by interrupting current in a primary winding thus inducing a high voltage in a secondary winding wound around a common iron core.

4. Function of the condenser. When the contact opens in the primary coil there is a relatively high self induced voltage generated in the primary winding which tends to maintain the flow of current causing arcing on the contacts after they have separated. This arcing not only burns the contact points but also prevents the rapid change of magneto flux and therefore reduces the high tension induced in the secondary coil.

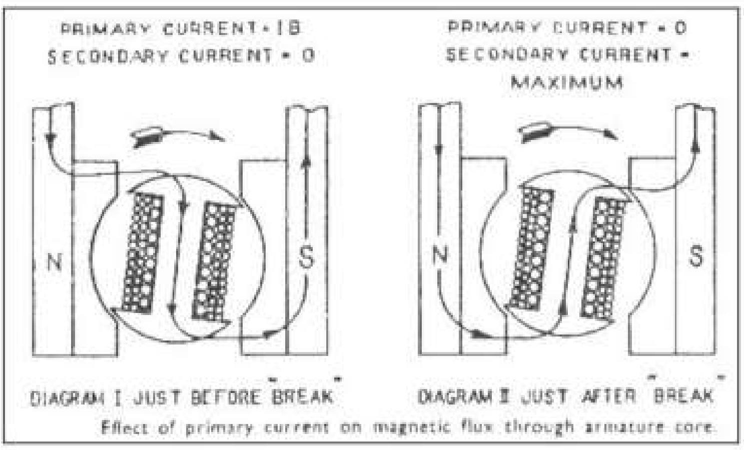
5. A magneto is a self contained device which generates its own low voltage current and is independent of the car's battery and lighting systems.

This sketch shows the essentials of a magneto spark generator.



Essentials for a spark generator (Magneto Ignition)

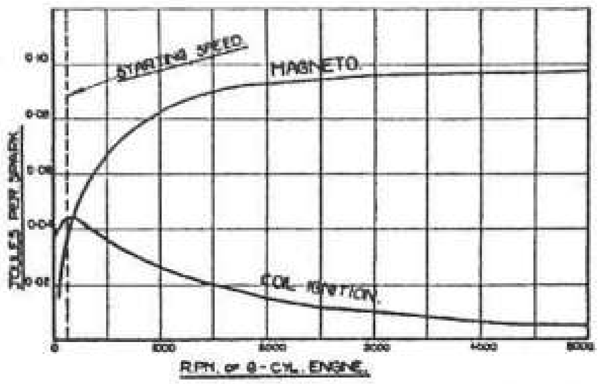
6. The contact is arranged to break at a point when the magnetic flux through the coils is rapidly changing and in actual fact reversing. See sketch.



Effect of primary current on magnetic flux through armature core.

There is a well-known law of electro-magnetic induction which states that an induced current always tends to oppose the change in magnetic flux producing it. The effect then of the primary current is to oppose the reversal of magnetic flux through the armature core which gives rise to that current. Consequently the magnetic flux through the core is dragged round in the direction of rotation, as shown by diagram 1. Immediately the contacts separate, the primary current, which is constraining the magnetic lines to take a very extended path, is interrupted and as a result the magnetic flux reverts back with extreme rapidity to a more normal path, as shown by diagram 11. In this way an almost instantaneous reversal of magnetic flux through the core is produced, and it is this rapid reversal of flux which induces in the secondary winding of a great many turns, the necessary high voltage for the spark. The action of the primary winding just described also renders the magneto practically independent of speed in regard to the induced secondary voltage and explains why so high a voltage as several thousand volts can be generated at such a low speed of, say, 50 R.P.M.

7. The following graph shows the differences between the two systems.



Spark energy characteristic of comparable coil and magneto ignition systems.

Coil ignition gives a maximum voltage at low speeds which reduces as the engine speeds up and the time building up primary current is reduced. The magneto overcomes this problem as the increased speed of the machine generates a higher primary voltage thus giving an entirely different characteristic, i.e. lowest at low engine speed and increases as the engine speeds up. In general the performance is equal at about idling speed and above this the magneto gives a better performance

8. Tests show that a magneto gives better performance than coil when there is current leakage at the plugs, i.e. dirty insulators etc.

9. Condition of the contact points in either system is very important. They should be absolutely free from oil. When testing the gap with a feeler gauge clean the feeler gauge with a clean cloth moistened with some degreasing liquid. Do not over lubricate the contact breaker cam as this can cause oil to be transferred to the points.

10. When cleaning the ignition components, i.e. distributor housing etc., use lead free petrol.

11. The B.T.H. magneto is fitted with an earthing brush which, with its mounting, screws into a tapped hole in the housing and bears on the top area of the armature. This must be in good clean condition and spring loaded on to the armature. (The earthing brush is not shown in the sectional drawing). The earthing brush on the contact breaker base should also be in good condition.

12. The correct contact gap for the B.T.H. magneto is 0.012" ± .001" which should be maintained as variation to this alters the dwell timing and also of course affects the angular position of the armature when the contacts open. Note that with the B.T.H. magneto as illustrated here, advance and retard rotating the cam ring is also altering the angle at which the contacts open and it is recommended that the magneto be set so that normal driving is with the cam ring in the fully advanced position, i.e. don't set the magneto up on the motor too advanced and then drive with the manual control fully retarded. This affects the operation of the magneto and B.T.H. say causes burnt contacts.

These latter remarks don't apply to the Vertex type magnetos as the manual control of these is by rotating the complete body of the magneto without altering the setting of the contacts opening position.

TRACING OF CONTACT-BREAKER DEFECTS—(*Continued*)

DEFECT	POSSIBLE CAUSE	EFFECT
(3) Contacts pitted or blackened.	(a) Oil or foreign matter on contact faces due to either:— (i) use of dirty feelers. (ii) excess of lubricant on contact-breaker generally.	Excessive arcing at contacts with resultant poor slow speed. Misfiring at high speeds probable if arcing very bad.
	(b) C.B. lever movement sluggish.	
	(c) Weak main spring pressure.	
	(d) Incorrect fit of lever on pivot pin.	
	(e) Contact faces roughened.	
	(f) Contact loose in either lever or contact block.	
	(g) Timing incorrect too far retarded.	NOTE
	(h) Magneto being run continually in retarded position.	
	(i) Primary connection to insulated side of capacitor not satisfactory.	
	(j) Defective capacitor.	
	(k) Contacts badly out of line or not	

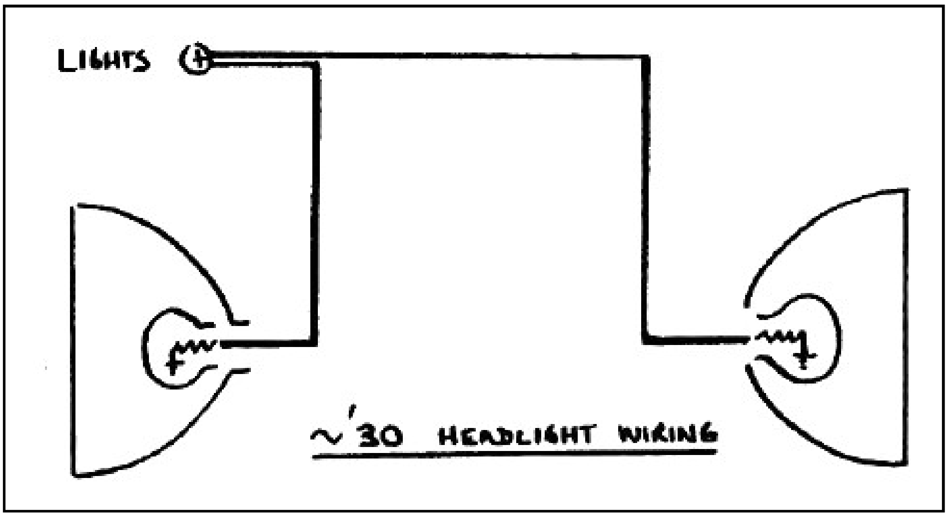
FEBRUARY 1992

PRE-WAR HEADLAMP WIRING

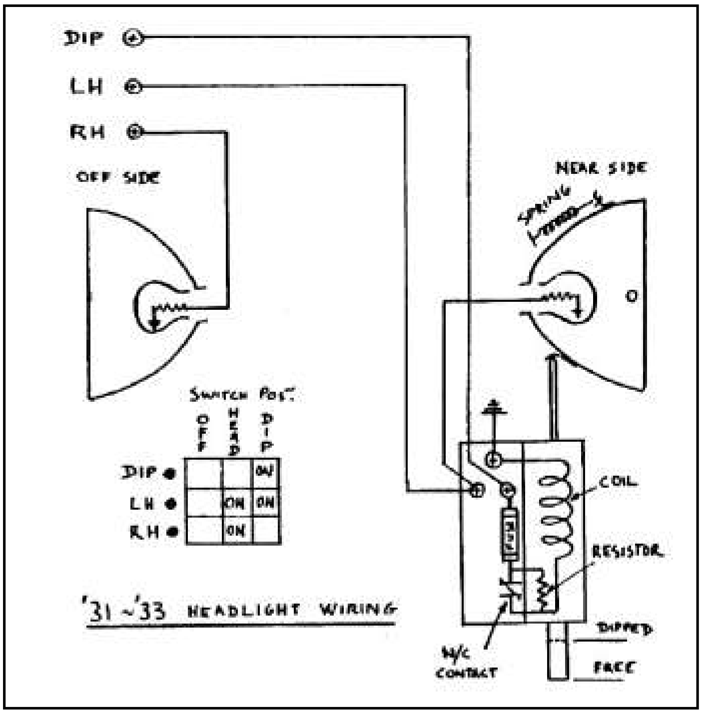
Noel G. Wyatt.

Up to about 1930 Riley headlamp wiring was very simple. A single filament in each headlamp and an ON/OFF switch, i.e. lights or no lights. At this time side lights were fairly large, about 3" diameter, and were fitted with reflectors so it's possible that vehicles were driven in street lamp lighted areas with only the side lamps illuminated. In any case the headlamp globes were low wattage and hardly likely to dazzle oncoming traffic.

In 1930 the Riley wiring diagrams show that dipping of headlights became a requirement and this was achieved still using single filament globes but actually realigning the lamp using a solenoid on a pivoting reflector inside the headlamp body. The strange thing is that when dipped, the off side (R.H.) lamp was extinguished completely and the near side lamp was angled down. This rather dangerous practice, (in the writer's view), continued up to at least 1938 or thereabouts. Certainly when Rileys were built again after the war the familiar twin filament high/low beams were fitted.

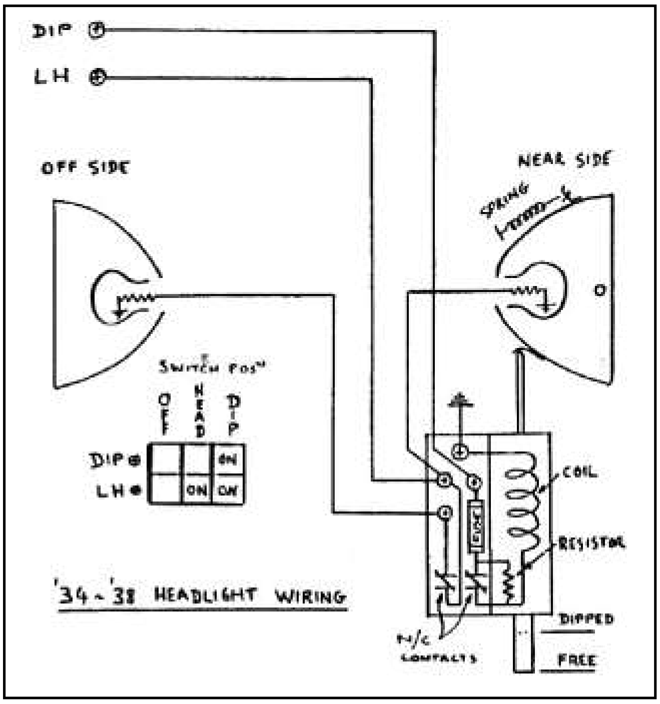


From '31 to '33 the wiring to the off side lamp was taken from a terminal marked R.H. and the near side globe from a terminal marked L.H. The dipping solenoid was fed from a terminal marked DIP. All these three terminals being on the steering column switch and operated by the control lever in the centre of the steering wheel. In the head position the L.H. and R.H. terminals are powered with DIP off. In the Dip position the L.H. and DIP terminals are powered with R.H. off. The solenoid in the headlamp was simply required to dip the reflector and it did this with a dual powered solenoid, i.e. full voltage with a reasonably high current to attract the solenoid plunger over its approximately 3/8" stroke, and when fully dipped the voltage is reduced by inserting a resistor in the solenoid circuit using a switch built. into the solenoid assembly. A coil spring returns the reflector to its normal high beam position.



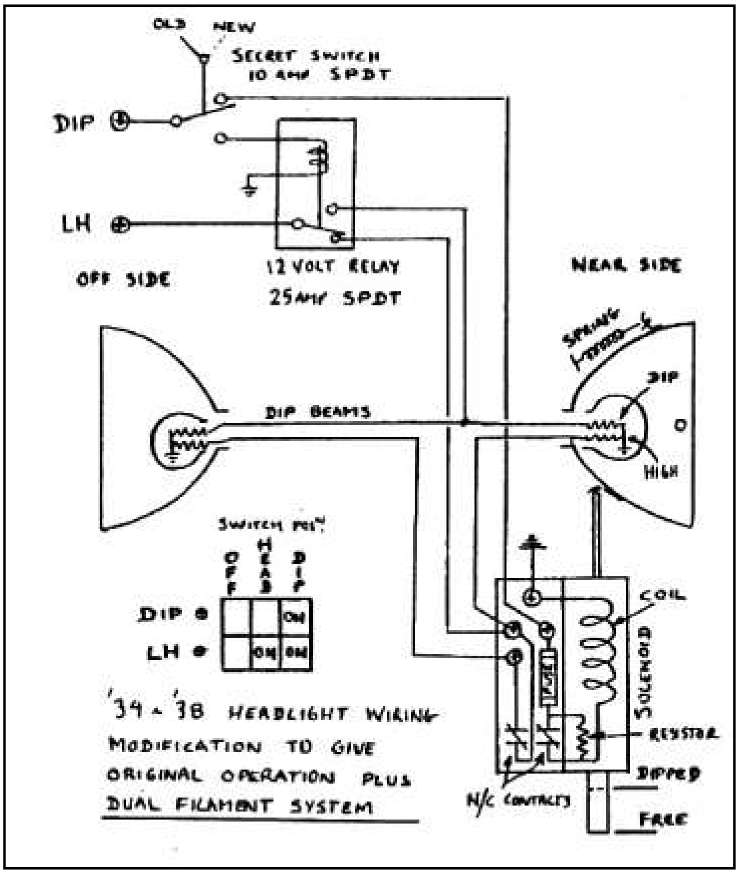
From 1934 on the wiring changed so that there was only one headlight wire from a terminal marked L.H. which is wired to the nearside globe and a wire from a DIP terminal to the solenoid fitted to the nearside reflector. This solenoid incorporates an additional switch which has two terminals on the solenoid unit and which open circuits when the solenoid is energised and has dipped the reflector.

This switch is used to feed the off side lamp with the same power from the L.H. terminal, i.e. a wire comes from the near side lamp across to the off side lamp.



All the above of course is what was originally intended from the factory and it would be a rare car indeed that was running with the wiring still as above. There have been several modifications described over the years which make both lamps operate with high and low beams as is now required by law but none of these leave the lamps able to operate as originally designed.

A system to enable the lights to be fully legal using twin filament globes but with a secret switch to enable original operation is possible and is now fitted to the Wyatt Imp as follows:



Description of Operation

The secret switch is concealed up behind the dashboard in a convenient position. When in the "old" position the lights operate as per 1935 specification. When in the "new" position the headlamp relay is brought into operation, i.e. the Dip solenoid in the near side lamp is disconnected and the high beam lamps operate when the relay is de-energised and low beam when the relay is energised.

It is necessary to go to some trouble to make sure the reflector pivots nicely and that the solenoid is set up correctly. There is an adjusting screw that operates on a ramp to open the two contacts and this should be set to operate just before the solenoid plunger is right in. Also the reflector return spring takes a bit of trial and error to set to the right tension.

I have found that most people have not seen the lights operating as originally and it is worth going to the small amount of work described to be able to demonstrate the system.

■

MAY 1992

‘9’ EARLY KING PINS - Mks. 1, 2 & 3.

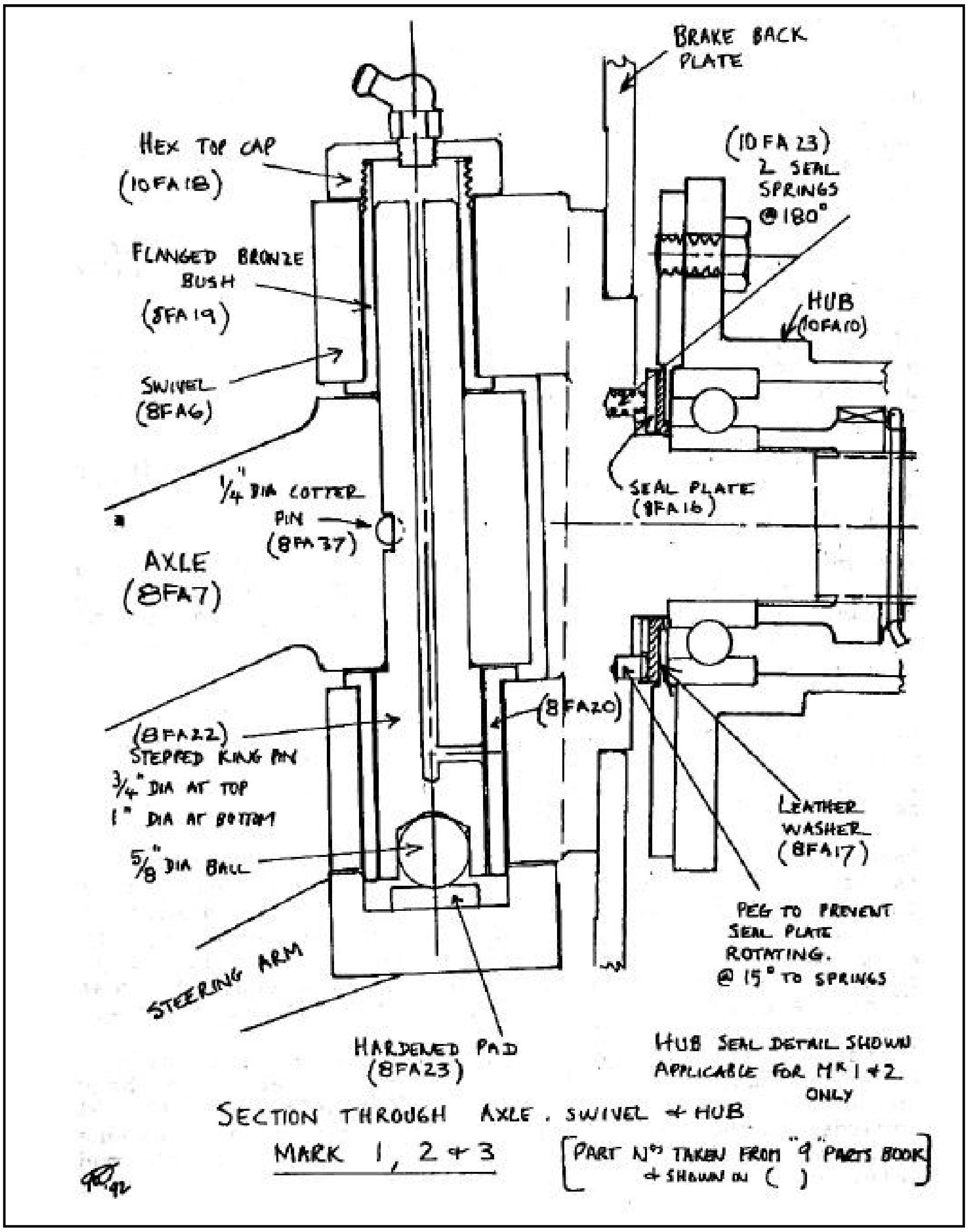
Up to Chassis 60 4293.

Noel G. Wyatt

There is a complete absence of detail of the Mk 1, 2 and 3 front axle swivel and oil seal arrangement and I thought the attached sketch may be of interest not only to Riley owners possessing these models but to enthusiasts in general.

Haddleton and other service booklets say that all Riley models with beam axles were similar and describe the mid 30's models.

However, the early cars were entirely different as you can see from the sketch. The weight of the car is actually taken on the steel ball resting on a hardened pad whereas on the later cars there is a hardened steel thrust washer between the axle eye and the swivel.



Also the kingpin is rather complicated having an enlarged section at the bottom approx. 1" dia. which is counter bored to accept the 5/8" die hardened ball bearing.

Lubrication is interesting as the top bush is plain and there is a helical groove in the upper section of the king pin. At the lower section the small hole feeds to the bottom bush and there is a helical groove from this hole down to the bottom of the pin and on the other side of the pin another helical groove feeding lubrication up to the level of the top of the bottom bush. The cotter pin is also different, being only 1/4" dia. on these early models.

Incidentally the Mk 1 axle that I have pulled apart had the hardened steel pad under the steel ball deeply indented and split from the heavy point loading.

Disassembly is easy as you simply remove the steering arm at the bottom (2 nuts) and then drive out the cotter pin and press the king pin down from the top. This is exactly the opposite to removal of the later models.

For some reason the later '9's used 7/8" dia. kingpins and then for the Merlin models reduced this to 3/4" dia. otherwise similar to the 7/8" design.

The method of retaining grease in the front hub is also quite different and its design for Mk 1 and 2 is shown on the section drawing. Mk 3 I believe is something similar to later cars with assembly riveted onto the back cover of the hub.

Two springs recessed into the front swivel/stub axle unit press onto a hardened steel washer, sandwiching a leather washer onto the back plate of the rotating hub unit. The leather washer is a tight fit on the stub axle and would seal reasonably well at this point.

One thing that I can't explain is how the hardened part is kept central in the recess in the steering arm. Also the Parts Book calls up a swivel pin felt (8FA21) which I believe sits in the top of the upper bush on top of the king pin and releases oil slowly to the swivel, (only use this if you intend lubricating with oil and not grease). If anyone can help with these points please let me know.

Incidentally the front wheel bearings on the early '9's are much smaller than the later ones. In fact Riley heavied up almost every part of the '9' models from the Mk 4 onwards. Maybe because they shared many common components with the heavier and more powerful 6 cyl. and 12/4 models later on.

■

NOVEMBER 1992

A SOLUTION FOR THAT DREADED BRAKE JUDDER.

Noel G. Wyatt

Recently I have been working on a Side Valve Riley, (a Redwing), and after a short test run along my drive I instantly experienced severe brake judder. This particular car was originally not fitted with front wheel braking and many years ago a braked front axle from another vehicle was installed - I think someone told me from an Adler but I'm not sure about that. It was an excellent job and it looks good.

I have always had a theory about brake judder ever since my first experience with cars. Our family bought a new 1950's English car which operated really well until the clutch free play had to be adjusted. After this we had clutch judder with starts from rest really difficult without the engine oscillating wildly on its mountings. The clutch operating mechanism was mechanical on this car with a chain linking from the pedal to the clutch lever. The adjustment is with an L shaped rod with threaded end-and locking nuts. After experimenting with this rod it was clear that you could affect the judder by the angular position the rod was locked up in. If movement of the engine in the direction of increasing torque tended to disengage the clutch then all clutch judder disappeared.

My thinking with regard to braking problems, based on this past experience, is that as the brakes are applied, the front axle twists against the braking torque and this movement increases the braking, then brake judder is experienced. What I believe happens is that the springs wind up, applying the brakes, which makes the spring wind up further to the point that the front wheels lock up and skid. This skidding reduces the load on the springs and they unwind which automatically releases the brakes and the wheels regain their road friction and the cycle repeats itself. This cycle is about 0.2 seconds or shorter and the car vibrates in a frightening fashion. My driveway being loose, stones accentuates this problem and with this particular car it was virtually impossible to apply the brakes without judder. The problem did not appear when braking with the car in reverse.

The Adler axle, (if that's what it is), has over axle braking. The brake rods are 5/16" dia. and the brake mechanism is a flat cam as sketched i.e. movement of the brake lever normally towards the rear of the car with the brake rods in tension applies the brakes but also moving it forwards with brake rods in compression also applies the brakes.

It was a very simple job to reverse the levers on the brake cross shaft and make up a set of push type brake rods, (out of .75 x 20 gauge tube), and road test again.

Now all brake judder is gone, (except now it judders with the car going backwards), and it is far more pleasant to drive. As the brake rods are in compression it was easy to make them adjustable for length so that balancing the front brakes is easier. On this car there is a balancing lever between front and rear brakes but not side to side which requires the length of brake rods to be adjusted rather exactly.

This exercise confirms my theory is correct but of course how to apply it in other systems is not so easy. The rod braked '9's have under axle braking with the brake lever coming back over the top of the axle. Just about all these cars suffer from brake judder which has been partially cured by various owners in a multitude of ways, i.e. graphite on the linings, cutting back the linings on the leading shoe, using stiffener leaves on the front springs and completely re-bushing and renovating the linkages.

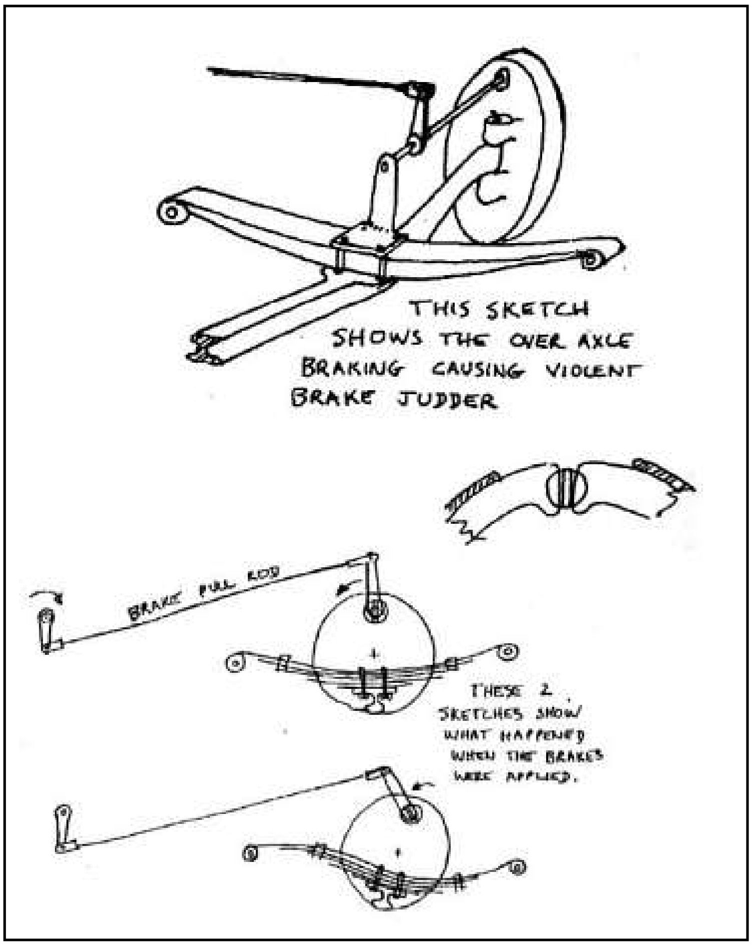
Note that if the spring itself is not clamped together firmly at the spring leaf ends the brake reaction forces will give even greater rotation of the axle forwards accentuating the judder problem.

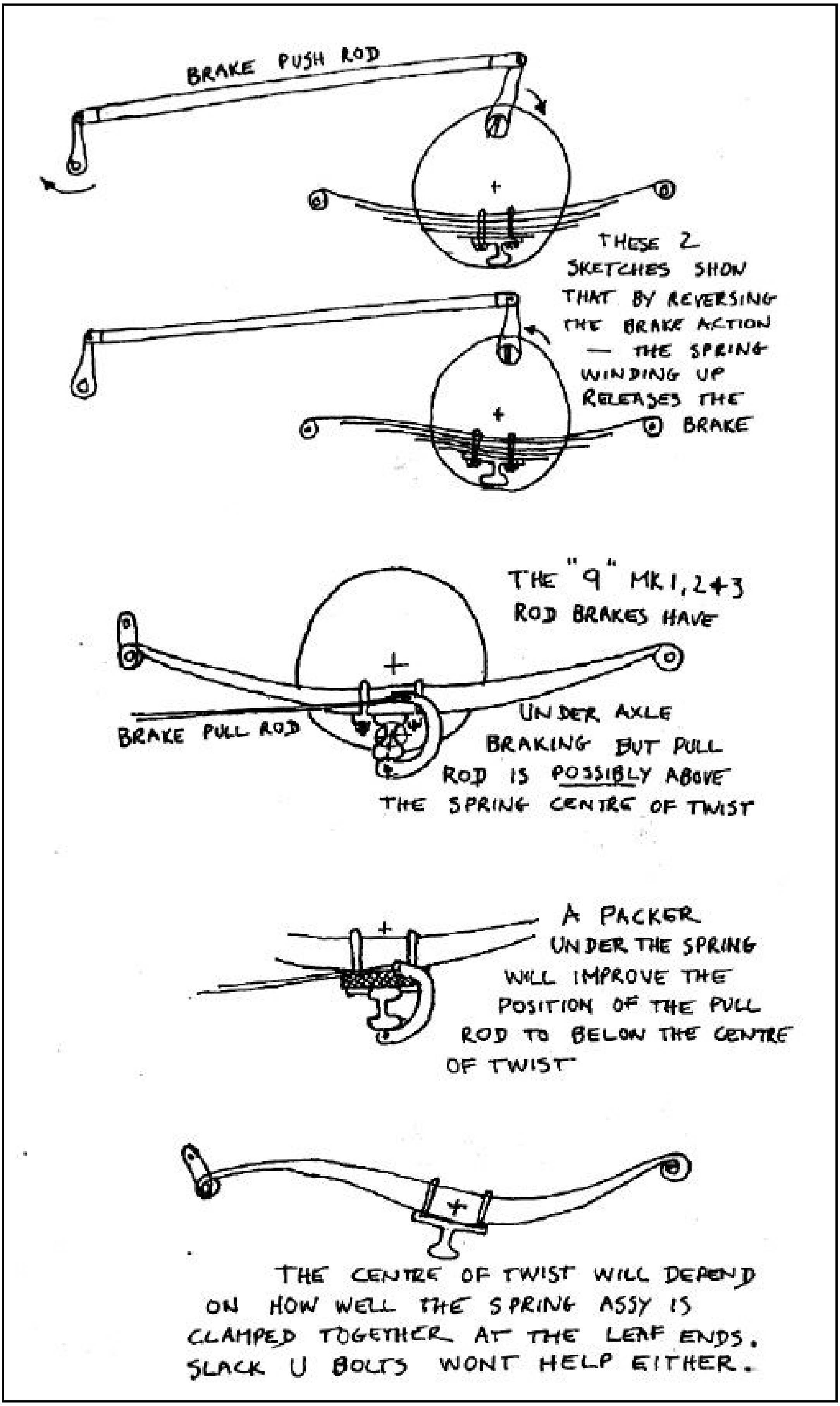
Unfortunately its not possible to do what I did on this Side Valve chassis but it may be possible to adjust the brake lever to a lower point beneath the centre of twist of the axle so that as the axle moves it doesn't apply the brakes but rather tends to let them off.

One possible solution would be to lower the axle with a packing piece below the springs. This would, I think, go a long way to fixing the problem. See the sketch which, with an exaggerated packer, shows what I am thinking.

Perhaps one of our Club members who drives one of these cars with this particular problem might care to try this out and let me know how it goes. I'm afraid our Mk 1 is quite a few months (or years) away from running to try it out myself. I would try a in packer for a start. It might just be enough to solve the problem.

Don’t forget of course to either extend the spring locating/clamping bolt down through the plate or locate the plate on the U bolts so that the axle doesn't slip on the spring and endanger your life!!




BRAKE PUSH ROD
THESE 2 SKETCHES SHOW THAT BY REVERSING THE BRAKE ACTION — THE SPRING WINDING UP RELEASES THE BRAKE
THE "9" MK 1,2+3 ROD BRAKES HAVE UNDER AXLE BRAKING BUT PULL ROD IS POSSIBLY ABOVE THE SPRING CENTRE OF TWIST
BRAKE PULL ROD
A PACKER UNDER THE SPRING WILL IMPROVE THE POSITION OF THE PULL ROD TO BELOW THE CENTRE OF TWIST
THE CENTRE OF TWIST WILL DEPEND ON HOW WELL THE SPRING ASSY IS CLAMPED TOGETHER AT THE LEAF ENDS. SLACK U BOLTS WONT HELP EITHER.

SEPTEMBER 1992

‘9’ GEARBOX MOUNTING.

Noel G. Wyatt

Up until the 1933 models when the all helical gearbox was utilised, Riley used their quite famous Silent Third gearbox which mounted at its rear end on a single stud screwed up through a strange rubber mounting inside a chassis cross member. As there are a few members working on '9's at this time I thought a sketch showing how this mounting worked would be of interest.

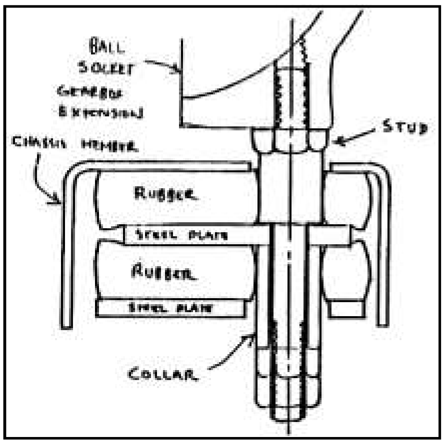
Note that the collar is clamped up hard on to the gearbox mounting plate and that this plate is then clamped between the two rubber blocks by two 3/8" bolts which pass down through the chassis cross member, the two rubber blocks and the lower clamp plate.

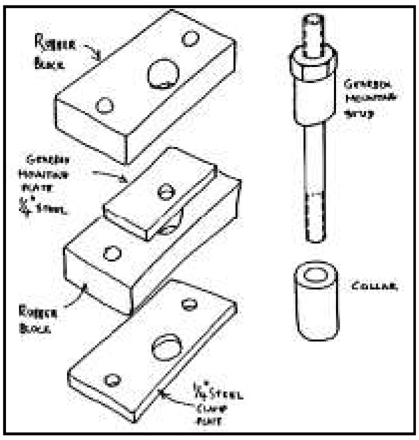
The rubber blocks are around 1" thick and because of the oil in this area are usually unusable when restoring your car. The best bet is to use neoprene or a reasonably soft urethane would be quite OK. Because it is usually difficult to get at the hexagon on the stud to tighten it into the ball socket it is a good idea to make the stud long enough to fit two nuts so that they can be locked together and used to fit the stud to the ball socket. Then, when the motor is to be removed simply slacken off the nuts freeing the stud from the central plate, lock them together and unscrew the stud from the ball socket. The whole assembly can then stay in place in the chassis cross member.

When fitting initially make sure the engine is in the correct position in the chassis with the gearbox on the chassis centreline before clamping the rubber in position.

If you are removing only the engine and not the gearbox at any time it is still a good idea to unscrew the stud because its necessary to tilt the gearbox up at the front so the engine can be extracted forward over the front chassis cross members and forcing the gearbox up with a jack simply ruins the stud and its threads as the mounting itself is really not very flexible.

As a matter of interest the all helical box mounting is with two ears which mount on rubber washers. Later this was changed to a special rubber moulding which clamps around the spigot on the extended ball socket on the back of the gearbox. This special rubber moulding is available from your Club's Pre-war Spares Dept.





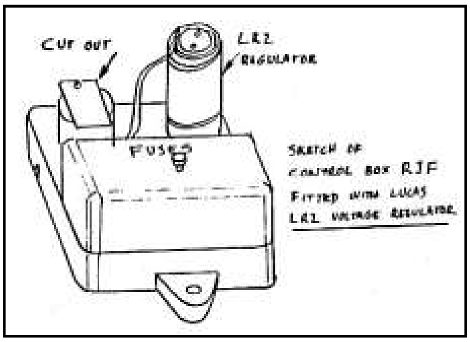
SEPTEMBER 1992

LUCAS CONTROL BOX - LR2

SOME THINGS ARE HARD TO MAKE GOOD.

Noel G. Wyatt

A lot of years ago my father subscribed to a magazine called "Radio & Hobbies". One regular feature was "The Serviceman Tells". It was always interesting, describing the sometimes trivial things that are wrong with appliances left with the local electrical serviceman and also some that were extremely difficult to determine the cause of the failure. This serviceman said you could sometimes spend hours fixing something and in all honesty you couldn't ever justify the cost actually involved. It sometimes cost more to fix than to buy a new one.



Well, I was reminded of this recently as I endeavoured to repair a Lucas control box for one of our country Club members. The LR2 is a real mystery when you first look at it. This particular unit, off a 1936 model Riley, had not worked for some time and the car apparently had a modern voltage regulator mounted alongside. The first thing was to replace the missing parts, i.e. the field resistors with their asbestos backing plate and mountings. Fortunately I had a box in bad condition with these parts intact so that didn't take too long. The adjustments on the voltage regulator canister had been butchered sometime in the past so I cleaned up all the threads etc. and refaced the internal contacts which seemed to be silver as they were quite easily cleaned.

Putting this unit together I dug into my "Technical File" and brought out an article written by Nev Farquhar for a Riley Register. Bulletin many years ago, and a book I have, called Newnes Motor Repair, which covers the repair of a few different types of regulators. The former article, whilst being very good, assumed that the regulator was working and only needed final adjustment, but the Newnes book, whilst not specifically describing a Lucas LR2, covered the full adjustment of a C.A.V. unit which, from the illustration, is absolutely identical and probably made by the same supplier to both companies.

On the following page is reprint of all the instruction book says about this type of unit. When it is assembled in the Lucas body the end with the first contacts faces outwards and the end with the second contacts is buried in the base and is not accessible as the field resistors and asbestos sheet completely hide it. Written around the first contact end is a warning - DO NOT ADJUST - and if you don't understand how this unit operates you could disobey this warning at your peril. Winding it in no more than half a turn, you short out the field and burn or weld up the internal contacts as the field resistors are also shorted out at this time.

So to adjust it you have to remove the canister to be able to get at the hidden end and then try to follow the instructions. It is necessary to fit a wire from the body of the canister to the right hand side mounting post as this is the connection

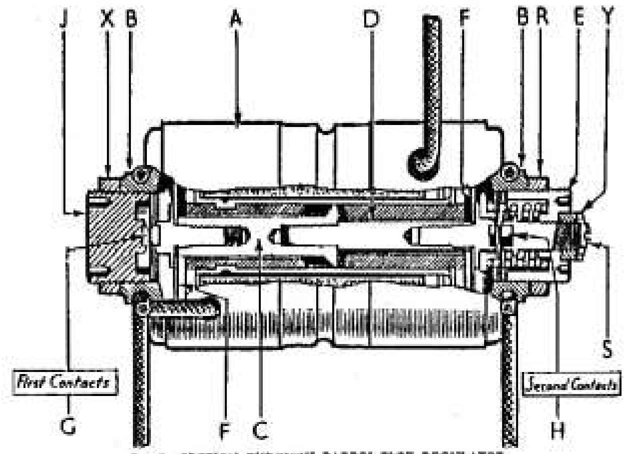


FIG. 7.—SECTION THROUGH BARREL-TYPE REGULATOR
(A) Barrel casing. (B) End cap. (F) Support springs. Other key letters in text.

To adjust proceed as follows (see Fig. 7):

a. Slacken lockouts X, R and Y-tools 659X and 657X.

b. Screw back contact -tool 660X.

c. Screw back second contact S as far as possible -tool 638X.

d. Screw back sleeve E-tool 660X.

e, Screw in first contact J as far as possible, until armature C makes contact with sleeve D.

f. Screw back first contact about 1½ complete turns.

g. Lock first contact screw J by locknut X.

h. Run dynamo at 1,000 r.p.m. (approx.).

j. Screw in sleeve E until voltmeter reading is within limits of setting.

k. Run dynamo for 1 minute.

l. Adjust sleeve E until first contact setting is not more than 0.3 volts above lowest limit of setting, e.g. limits of open voltage setting 15.9-16.5 volts, first contact setting must not be higher than 16.2 volts.

m. Lock sleeve E in position by locknut R.

n. Stop dynamo. Screw in contact S as far as possible, then turn contact S back one complete turn with lock nut Y.

o. Run dynamo up to 2.000 r.p.m. Voltage setting on second contacts should be at least 0.2 volts above first contact setting, but within general limits of open voltage setting of 15.9-16.5 volts.

Assuming first contact set at 16.2 volts, second contact must be set at 16.4-16.5 volts.

p. If second contact voltage is above limit, stop dynamo and screw J in slightly. Recheck first contact setting and then proceed as in n.

q. If second contact voltage is below first contact, stop dynamo and screw J out slightly. Recheck first contact setting and then proceed as in n.

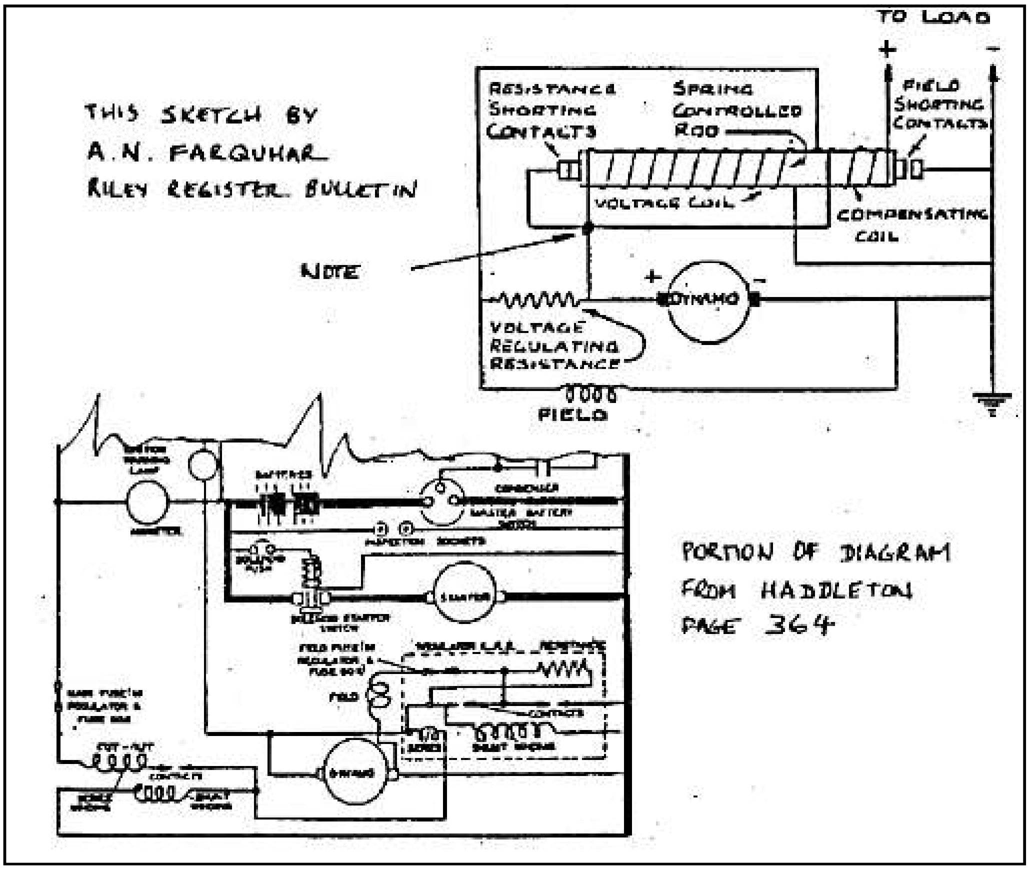
Note. Adjustment of contact S is only possible while dynamo is stationary. If contact is screwed up while dynamo is running, a short-circuit is set up on dynamo, resulting in fusing or welding of regulator contacts.

that short circuits the field resistor. Also of course you have to keep the canister horizontal during adjustment and testing as gravity has an effect on the operation of the internal armature.

On the following page I have made a copy of some relevant information from Nev's Register article plus part of the schematic diagram from the Riley wiring diagram which shows the two internal contacts.

To put it simply, the armature is spring loaded on to the first contact which shorts out the field resistor and puts full voltage on to the dynamo field giving max. output. The voltage or shunt coil measures the dynamo voltage and attracts the armature until it is sufficient to overcome the spring, and the first contacts open thus, inserting the resistor in the field circuit and reducing the dynamo output. In practice this would of course drop the voltage and the armature dances on the contact in the same way as the normal voltage regulator operates.

The series winding takes the current being taken from the dynamo and its magnetic pull subtracts from the voltage or shunt winding causing the dynamo to increase its output without waiting for the battery voltage to decrease first.



The second contact is arranged to close if the voltage continues to increase and this shorts out the field bringing the dynamo output to zero. There is about half a turn of adjustment between the opening of the first and closing of the second, and I guess, depending on the inertia of the armature, you can imagine the armature. vibrating inside the canister between full output, reduced output and zero output when the car is running with a fully charged battery.

Any dirt inside the canister such as particles of steel would be a problem and whilst the adjustments can be removed the whole unit is swaged together and it is not possible to clean it internally.

Naturally you can only make all the necessary adjustments with a generator set up so I broke into the wiring on one of our cars and used it to charge a spare battery and endeavoured to follow all the instructions.

What with finding corroded connections in the regulator unit, i.e. resistance where it shouldn't be, the time slips by and before you know it one day is gone and you are through the next one and all for a "simple" voltage regulator.

I ended up with the unit adjusted and operating on my temporary set up after a fashion but my generator is a third brush unit which I temporarily converted into a two brush design for this test and the field is different so, with the unit fitted into its own system, the .operation may well be much improved.

In any case I had to advise the owner that because of the rather complicated nature of this type of regulator it may well pay him to convert it to a later type by installing a post-war cut out and regulator into the original control box. I feel that after 50 or 60 years this barrel type unit is past its use-by-date.

■

TABLE 1. PART NUMBER CHANGES

DESCRIPTION	Book No. 1 Mark 1.	Mark 2.	Mark 3.	Mark 4.	Book No. 2 Mark 5. A	Mark 6. B	Mark 7. C	Special Series. B & C	Book No. 3 60 22601 Std. 1934	Special Series.	Imp Parts Square	Round	Book 4 66M101 Merlin
Cylinder Head	9E2 →	→	→	→	→	9E335 →	→	9E480	9E335	9E480 →	→	9E686	9E699
Cylinder Head Gasket	9E145 →	→	→	→	→	9E350 →	→	→	→	→	→	→	→
Rocker Box R.H.	9E51	9E195 →	→	→	→	9E330 →	→	→	→	→	→	9E511	9E511
Rocker Box L.H.	9E51	9E195 →	→	→	→	9E331 →	→	→	→	→	→	9E512	9E512
Rocker Box Gasket	9E171	9E182 →	→	→	→	9E351 →	→	→	→	→	→	9E685	9E685
Inlet Manifold	8E53 →	→	9E264 →	→	→	9E327 →	→	*EX780 **9E422	9E327	9E422	9E677 →	→	9E327 std. 9E422 s/s.
Exhaust Manifold	8E28 →	→	9E247 →	→	→	→	→	→	→	→	→	→	→
Rocker oil pipe	9E244 →	→	→	→	→	-	-	-	-	-	-	9E682	9E682
Crankcase	9E3	9E180 →	→	→	→	9E336 →	→	→	9E366 →	→	→	→	9E687
Crankshaft	8E96	9E194 →	→	→	→	9E349	9E440 →	→	→	→	→	(9E747)	9E747
Connecting Rods	9E7 →	→	→	→	→	→	9E439 →	→	→	→	→	(R363)	R363
Piston, Standard	9E43 →	→	→	→	→	9E394	9SE303	-	6SE303	-	-	(9E746)	9E746
Piston, S/Series	9SE43 →	→	→	→	→			9SE375		9SE375 →	→	-	-
Timing Case	9E45 →	→	→	→	→	9E372	9E437 →	→	→	→	→	→	9E683
Timing Cover	9E46 →	→	→	→	9E301	9E357	9E438 →	→	→	→	→	→	9F27
Sump	9E4	9E156 →	→	→	9E181	9E461 →	→	→	→	→	→	→	→
Mounting Rubber	9E144 →	→	→	→	→	→	→	→	9E534 →	→	→	→	→
Distance Rubber	-	-	-	-	-	-	-	-	9E533 →	→	→	→	→
Centre Tube Rubber	-	-	-	-	-	-	-	-	9E535 →	→	→	→	→

*up to Eng.No.35846
**after Eng.No.35846

(P.D.A. Banner, March 1983)

A very interesting Table taken from June 1983 Register Bulletin,

AUGUST 1993

RILEY '9' RADIATORS

Noel G. Wyatt

Recently a Club member rang and asked me about dimensions of a particular '9' radiator he had seen. Unfortunately I didn't have this information to hand and I thought it would be valuable to have it on record.

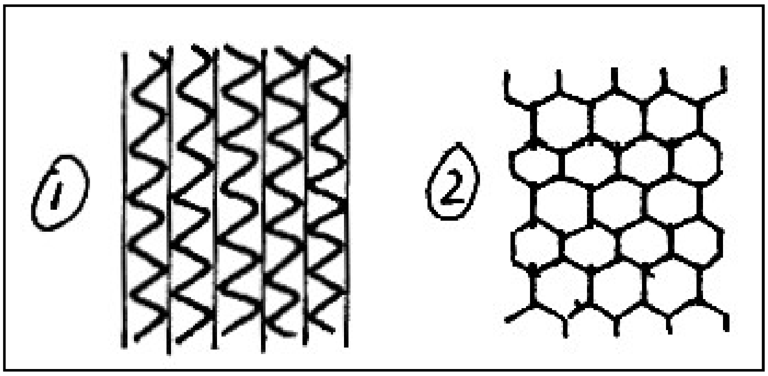
The following sketches and dimensions are self explanatory and show the main radiators on our cars here in Australia. Rileys used more than one manufacturer of radiators and therefore design of the tanks may be different to my sketches. The Mk 1 radiators generally had the top and bottom tanks of brass with the side partitions soldered between being dry and of steel sheet (very subject to rusting away).

The later Mk 2 etc. units were slightly different shape at the top and had unusual tank design. The side channels are part of the water circulation, i.e. the top and bottom tanks and side channels are all one compartment with the radiator tubes in effect in parallel with the side channels. This means the tubes can't be pressure flushed and so these radiators are very difficult to clean properly.

The German Silver radiators Mks 1, 2, 3 have a small diameter male thread on the filling connection and the later Stainless Steel models have the larger female threaded connection. Starting at the sloping 1932 models, the overflow connection in the '9' models had a spring loaded ball in the top of the overflow pipe which theoretically is accessible by unscrewing the top off the pipe. This valve in effect pressurises the radiator and if it is jammed can cause very high pressures in the radiator.

The stainless steel surround was actually called Staybrite at the time as stainless had only just come into use. It is approximately 18% nickel 8% chrome, i.e. an .18/8 alloy. Don't think because its stainless it will not be corroded as I have seen many that have small corrosion pits over their surfaces which can't easily be polished out, in fact it can be virtually impossible. I think these may be caused by small particles of iron corroding on the polished surface and in effect eating into the Staybrite. Also, electroplaters advise that stainless steel cannot be electro plated so copper plating and polishing this, followed by nickel and chrome is not on.

As regards core design, all the original radiators I have seen have been as sketch



1. I have only seen the honeycomb type core of sketch 2 on rebuilt radiators and they are not as original and whilst okay, would drop the value of the unit to some extent.

The sketches of the radiators naturally don't show every detail and the dimensions are approximate but overall they would be of use to recognise a particular '9' radiator.

A 1927 Mk 1 German Silver. Manufacturer: Randle Radiators, Coventry, Serial No. A21435

B 1929 Mk 2, 3 German Silver. Manufacturer: Serck Radiators, Serial No. B29543

C Approx. 1930 '9' Vertical Stainless Steel Removable surround. No makers name. Serial No. 586510

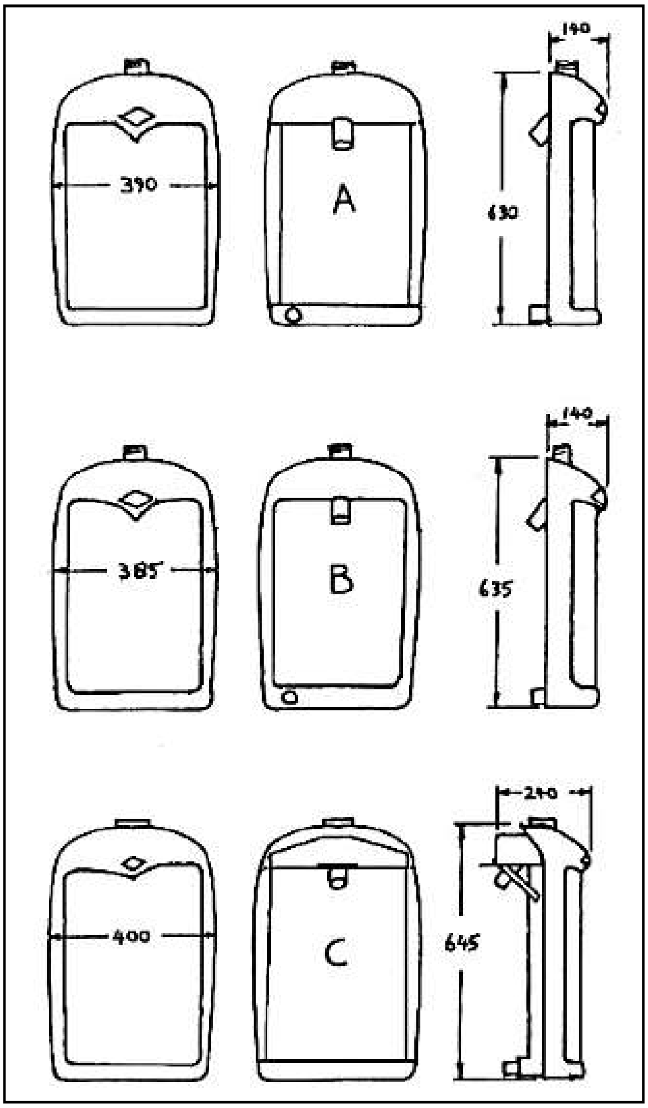
D Approx. 1931 & 1932 '9' Colonial model Sloping Stainless Steel Removable surround. Manufacturer: Randle Radiators, Serial No. A3530

E Approx. 1933, 1934, 1935 '9" Kestrel, Lynx etc. Sloping stainless Steel Removable surround. Manufacturer: Randle Radiators, Serial No. A35842

F 1934, 1935 '9' Imp Sloping Stainless Steel Removable surround. Manufacturer: Randle Radiators, Serial No. A59289

There are of course many other pre-war cars other than Nines and I know there are members out there who have access to many of the radiators fitted to them. Perhaps someone would like to do a similar exercise with the other cars.

See illustration on following page.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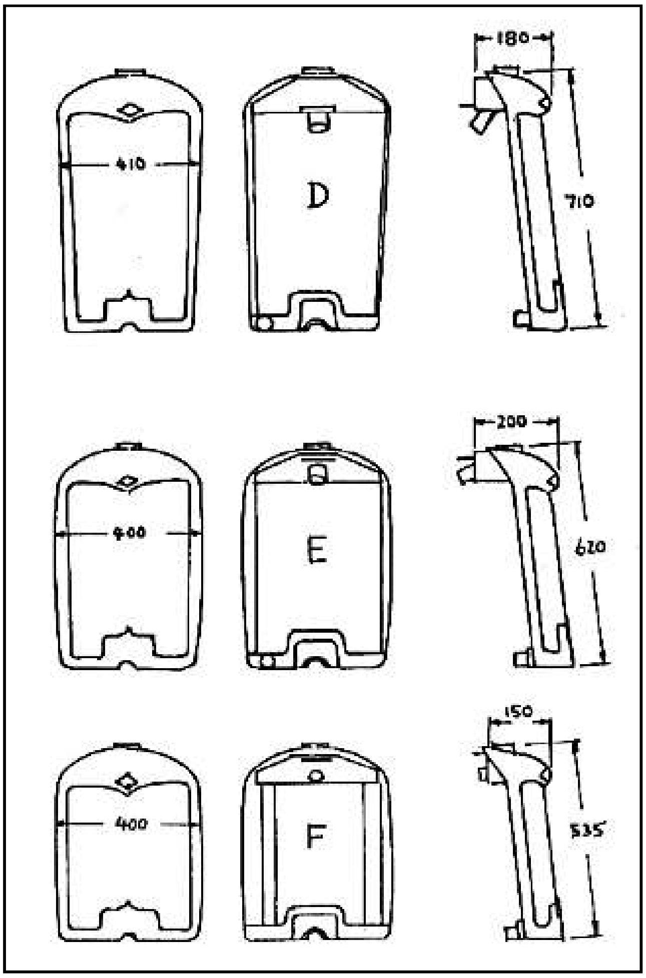
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MARCH 1993

IMP MOTOR TRANSPLANT & MODIFYING A TYPE 3 CLUTCH.

Noel G. Wyatt

For some time I have had my replacement '9' motor built up and early in February came time to fit the unit. As I have fitted a Merlin crank which uses special conrods and different flywheel with 3rd type clutch I expected some difficulties but not quite as many as I eventually struck.

I decided to leave the gearbox in the car as it's a very easy job to simply slide the clutch on to the gearbox input shaft and bolt it all together. The first problem I found was that the 3rd type clutch is deeper than the 2nd type and won't fit into the bell housing - interfering by about 6 mm. So out with the motor again and remove the flywheel and re-machine the taper to move it a bit more than 6 mm forward. This puts the ring gear partly into the housing on the block and also requires some work on the front face of the flywheel plus some grinding of the extension on the rear main housing to allow it all to fit together. Also, the flywheel nut required a special washer to allow it to clamp the flywheel on to the taper.

After all this I tried again and found I still had an interference problem which was solved by making up some 3 mm shims between the block and bell housing.

The next problem arose when I started the motor as it was okay at low speed but obviously something was hitting as the speed increased. As the speed increases the centrifugal weights swing out and whilst I had allowed for this by grinding out part of the housing where the starter clamps in I hadn't reckoned on the weights hitting the starter itself. It took a while for the grey cells to work out that this was the problem so relieving the end of the starter fixed this.

The next problem was another noise which was more like a rattle than a rubbing and so I experimented with a piece of leather glued into, the flywheel so that the arms bed into it when they are fully out and this fixed the problem.

My intention, as explained in an article I wrote for the Register Bulletin, was to experiment with different size centrifugal weights to see if I could improve the performance of the car on initial acceleration. Most, if not all, sporting Rileys using preselector boxes have had the centrifugal clutch removed and the clutch in effect bolted up solid to start on the preselector bands. I didn't want to do this as this is not good for the bands or the gearbox and I calculated that the original weights fitted were far too heavy. The effect with the standard unit is that, as the engine speeds up, the clutch starts to engage at about 600 RPM and, as it becomes fully engaged with very few additional RPM, the motor struggles to accelerate the car away, slowly increasing in speed as the car speeds up.

My theory was that with lighter weights fitted it should be possible to allow the clutch to slip with full power as in a quick sporting start and only become fully engaged at about 1500 RPM.

To allow the weights to be accessed I cut out a section of the rear of the sump where it extends on the '9' to protect the front of the flywheel and, with an access cover fitted to the cut out, I should be 'able to change the weights from under the car. This worked out really well and it's possible to change the performance easily, taking only about 5 minutes to change the 3 weights.

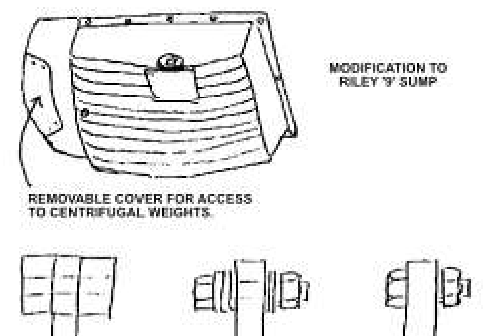
The weights fitted to a Type 3 clutch for a 12/4 motor weigh 5½ oz and for a '9' they are 3 oz. each. My first trial was with the standard weight and the effect was exactly as with the original type 2 unit. The motor struggled to accelerate the car quickly. A nice smooth and quiet start but definitely not sporting. Next trial was with the weights reduced to l oz. This was decidedly better so I then reduced them to the figure I had originally calculated would be okay, 3/4 oz. This gives a decidedly better start. The car idles nicely without the gearbox pulling at all and for a nice smooth start the revs increase to about 800 and the car moves smoothly away. Giving a harder push on the accelerator the engine revs up to about 1200-1500 RPM and the wheels spin a bit, (if you are on gravel), and the car speeds away.

For the members who aren't familiar with the 3rd type clutch I've copied the drawing I did to explain how it works in the Register article inside the rear cover of this issue and it's really quite simple to calculate the forces involved and what the effect is of changing the weights.

I was pleased to confirm that what I had calculated works out pretty well exactly in practice.

Incidentally the new motor is running very nicely and quietly, (as much as a '9' can run quietly), and it will be interesting to see how it goes as it runs in.

At least if I find it necessary to change the centrifugal weights, it's not a difficult job. I believe what I have achieved would have improved the acceptance of the Riley system if they had experimented like this back in the '30s.



EXPERIMENTS SHOWED THAT FOR A '9' THE 3/4 oz. WEIGHT GIVES EXCELLENT RESULTS. A 12/4 WOULD OBVIOUSLY NEED A HEAVIER WEIGHT AS IT DEVELOPS MORE POWER.

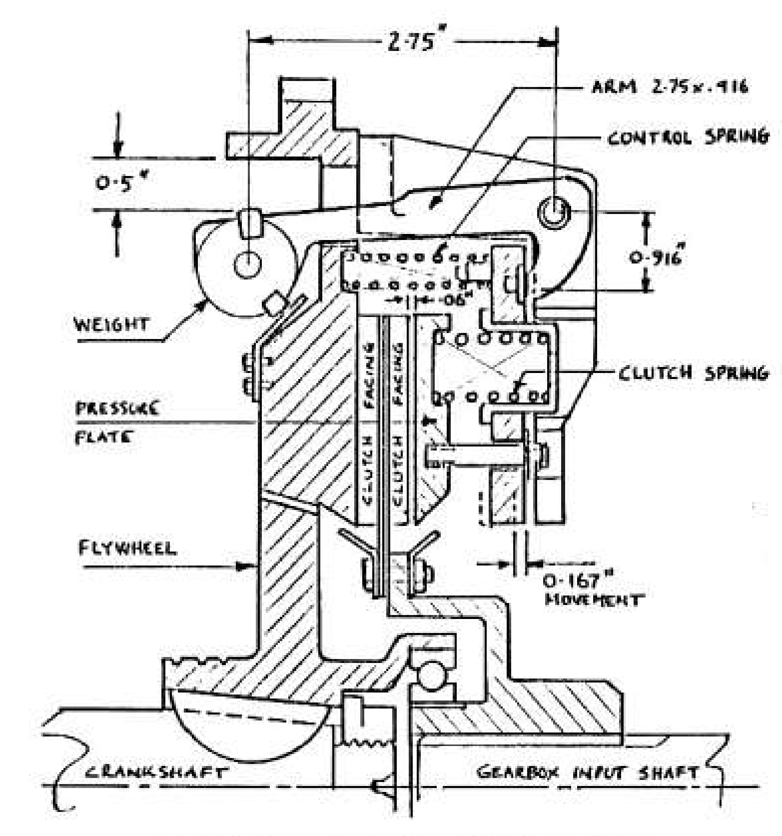


DIAGRAM SHOWING THE TYPE 3 CLUTCH
Parts not to scale and out of normal position to show operation

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MARCH - APRIL 1993

GERMAN SILVER RADIATOR REPAIRS.

Noel G. Wyatt

Unfortunately the radiator for our Mk 1 '9' was rather badly dented in various areas and, as a replacement unit seems impossible to obtain, I decided to try to repair it without unsoldering it completely.

These early radiators use the shell as the top and bottom tanks and have the core soldered into the shell all around and are both difficult and expensive to have repaired.

Testing the radiator with water indicated there were no leaks so it seemed a shame to have to dismantle it just to remove dents.

I drilled three holes each about 3/4" dia in the back of the tank in such positions that the dents could be touched with the end of a rod. The end of the rod was then machined to a spherical shape and, holding this behind the dent and tapping around the edges of each dent, the shape was fairly quickly improved.

Next came more careful work to remove all the small dents I had made in the first operation. Knowing the position of the end of the rod was easily indicated using a small diameter magnet on the outside of the shell and once located, tapping with a light engineer's hammer whilst working the rod around the area to be flattened was fairly simple.

A quick rub over with 240 grade wet and dry quickly shows up high and low spots and it requires quite a few operations before the shape is good again.

Curved areas are much easier to fix than flat ones as you will see if you inspect the job I have done but overall I think its possible to achieve an acceptable job with only very limited access to the inside.

A quick go over on the buff puts enough gloss on to enable the remaining bad areas to be seen and repaired.

A final go over the whole radiator with 400 wet and dry using water provides an even matt finish with no marks or scratches from the earlier 240 grade paper.

Final buffing is then very easy and apart from a few small areas I am very happy with the result.

Some brass discs soldered into the holes previously drilled in the back of the tank is easily done and a coat of paint to follow makes them not too obvious. I spent nearly two days making my radiator acceptable but its two days well spent.

An early text book of mine, under the heading of Nickel-Copper Alloys explains German Silver as follows:

The alloys containing copper, nickel and zinc are well known as "nickel silvers" and were made at least two thousand years before nickel was isolated. Known under the name of "Paktong" these alloys were produced in China by mixing a copper-nickel ore with zinc ore and smelting the mixture. It was not until 1849 that the alloys were made in Europe by mixing the constituent metals. Up to 1914 such alloys were generally known as "German silver", the name later being changed to "nickel silver". A number of these alloys are available, with nickel contents from 4 to 35 per cent, and the colour ranging from nearly white in the high nickel alloys to pale yellow with low nickel content. ■

SEPTEMBER 1995

UNDERSTANDING AND DRIVING A PRE-SELECTOR RILEY.

Noel G. Wyatt.

There is a lot of pleasure to be had driving a pre-war Riley. It's very simple but it takes a while to get the best performance from the car. As most of our Club members haven't had the experience I thought an explanation of the basic principles might be of interest.

I guess the initial thing is to open the garage and admire the elegance of your Riley. In every case the lines are just right and, in common with the later Nuffield cars, the radiator surround is a design perfection. A check of the fluids, water and oil, and look around the wheels to see that all is okay and you are ready to start up.

I should first explain the operation of the preselector gearbox. It’s often called a Wilson box, named for its designer, and various companies were licensed to manufacture to this design. Daimler and Lanchester used the Wilson design. A number of cars used gearboxes produced by ENV, a specialist gear manufacturer. Armstrong Siddeley manufactured a unit for their own cars and the Riley company used Armstrong Siddeley units from 1935 onwards. The '9' models in 1934 were the first Rileys to be equipped with a pre-selector gearbox and they used the ENV 75 unit. The Imp in 1935 continued with the ENV 75.

My own experience is that the ENV unit is well engineered incorporating needle roller bearings and the gears are very well made and heat treated. Unfortunately the Armstrong Siddley units were not so well executed and suffer from problems with bronze bushes and certain gears wearing excessively.

The Riley incorporating a preselector is not fitted with a conventional clutch and the normal clutch pedal is replaced by a pedal used to actually change the gears, i.e. depressing the pedal to the floor and releasing it sets the gearbox into the gear that has been preselected on the quadrant mounted on the right hand side of the steering column. Markings on the quadrant cover, R N 1 2 3 4, don't require explanation.

Before attempting to start the motor it is most important to select neutral and operate the pedal to make sure the gearbox is actually in neutral. Also make sure that the hand brake is engaged as usually, with cold oil in the gear box, the tendency is for the car to roll forwards even when in neutral.

So, with the gears properly in neutral and hand brake on, turn on the ignition. Wait of course for the carby to fill up, i.e. for the petrol pump to stop pulsing, and with the mixture control for rich, press the starter and the motor should kick over and start up. Allow the engine to warm up so that it runs smoothly and you are ready to drive off.

Now there is something else to explain. Rileys used an automatic clutch engaged by weights which are linked to the pressure plate and centrifugal force is utilised to provide the pressure to engage the clutch. At rest and below about 650 RPM the clutch is disengaged. As the revs are increased the clutch is engaged progressively until at about 1200 RPM the clutch will transmit the full motor horsepower.

When the motor is warm, to move off you select first gear, operate the gear change pedal, letting it out completely and with a slow idle the car will still be stationary. Press the accelerator, and as the revs build up the clutch engages and the car moves off.

However with a cold motor you may find that a slow idle just isn't possible so, in this case, as the gear change pedal is released the car will move off as the automatic clutch is already partly engaged. In a short time however the motor will warm up and idle nicely so that normal driving is possible.

Many Rileys have had their automatic clutches removed or bolted up, I think principally because their operation was not considered to be "sporting". I think that's a shame as part of the pleasure obtained in driving these cars is the smooth and easy operation of the clutch when moving off the line. With these modified cars it's necessary to start on the gear box bands every time and personally I would sooner wear out clutch plates than preselector bands.

As you nicely move off in first gear, select second, and, as with an ordinary car, change into the second gear by depressing the pedal to the floor and releasing it, judging the revs as you do so to ensure a smooth transfer. It's impossible to crash the Wilson box but as with any manual transmission, you wish to drive smoothly and not jerk as you gather speed.

Continue changing gear and accelerating until you are in top gear (4th). Note that the position of the preselector lever in its quadrant does not tell you which gear you are actually driving in and for this reason I think its best to leave the selector in 4th until just before a change is necessary, i.e. into 2nd as you slow and enter a sharp bend, or 1st if you are -stopping at a traffic light. If you see a hill ahead its smart to preselect 3rd just in case you need to make a change and if your Riley takes it in top then slip the selector back into 4th position so you remember the gear you are running in.

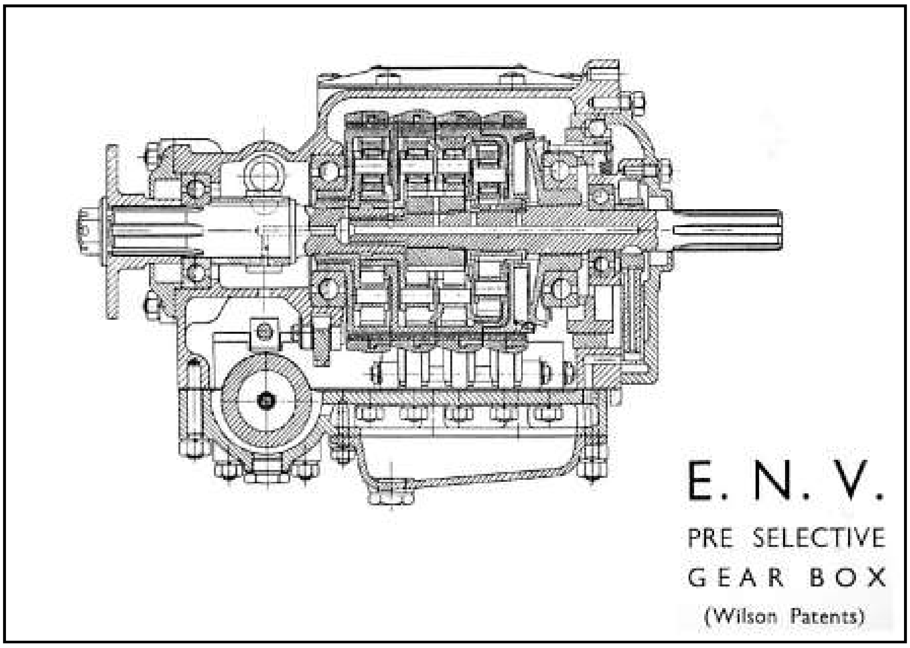
To make a change down into 3rd on a hill is simplicity itself. Select 3rd gear and then, without lifting your foot from the accelerator, quickly depress, the gear change pedal and release it and a very smooth change will result. If its a really steep incline or you need to proceed slowly, you can change like this right down into 1st gear without any complaints from the gearbox. Just remember that you can actually change into first gear while you are travelling at 60 mph with the result that some damage may be done either to the engine or transmission as you release the gear change pedal. There are also no interlocks to prevent reverse being selected as you travel forwards so some care is needed as you travel along.

When pulling up at an intersection its dead easy. Simply apply the brakes and, as the car stops and the engine revs drop to the 650 RPM figure, the automatic clutch disengages the engine so its not necessary to depress clutch pedals etc. Simply preselect 1st, operate the gear change pedal as you wait for the lights, and then as you get the green, accelerate smoothly away.

Earlier I stated it was important to make sure the gears were in neutral when starting the car. It you don't check this and a gear is in fact engaged then as you crank the car it will simply sit there as the cranking speed is less than 650 RPM. Then as soon as the motor fires it will dash forward and probably cause some damage, i.e. a hole in the end of your garage, or worse, the radiator. A number of people have actually had their cars run over them as they hand cranked them to start without taking elementary precautions.

A lot has been said about preselector gearboxes and about how they soak up power. but this is really very exaggerated. Top gear is as efficient as any other form of transmission and I'm sure very little power is lost in the other ratios. A preselector box does not have cooling fins and does not run very hot. An inefficient gearbox produces heat - 1 hp loss is around 0.75 KW of heat - so if you can imagine a single bar radiator in your gearbox and the heat it would develop, then I think you will agree the losses are not high.

Driving a pre-war Riley is an acquired skill but not at all difficult and very satisfying when you do everything right.



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JUNE 1993

TIGHTENING CYLINDER HEADS.

Noel G. Wyatt

Some things are obvious and some things are not so clear but I believe instructions for fitting cylinder heads could be explained better.

The normal instructions just tell you to tighten nuts in a certain order to a torque figure. What they don't tell you is to slowly build up to this tightness working around the tightening pattern.

A novice hobbyist could easily damage his block and/or head by torqueing up the centre studs first with all the others still loose. The stud tends to pull the area around it up into the soft gasket and with an old cast iron block a lump is likely to be pulled up out of the area around the stud hole.

Better to work around the pattern at least 10 times, increasing the torque gradually and, if you can, leave the assembly for a few hours or overnight and then go over it again.

Also make sure the stud and nut are oiled so that the torque setting does what you want it to do.

■

JUNE 1993

FITTING HELICOIL INSERTS.

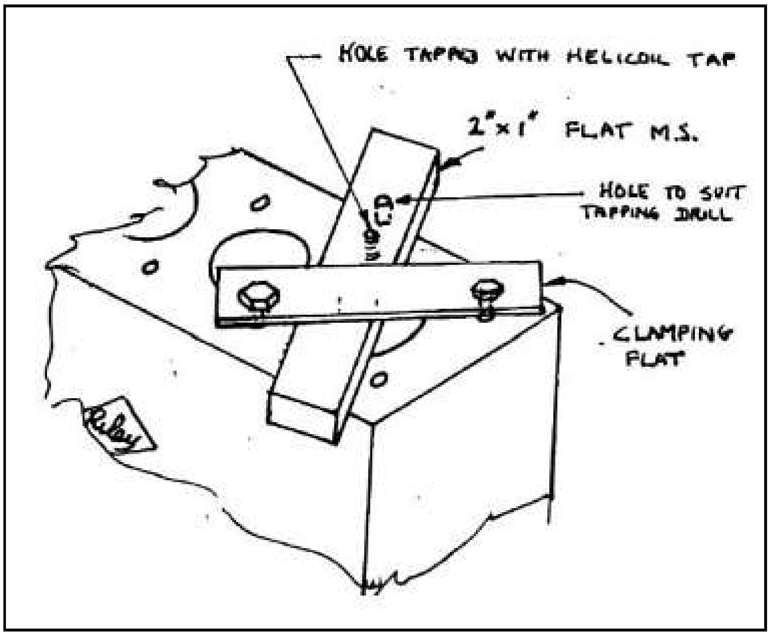
Noel G. Wyatt

If you are unable to place a job requiring inserts into a machine to have the inserts fitted at right angles to the joint face, it is possible with a simple jig to do the job anywhere. I have made myself the following simple tool which makes the job very easy.

Use a piece of steel bar 2" x 1" and about 6" long and drill two holes.

1. Firstly a plain hole to suit the insert tapping drill size, (25/64" in case of 3/8" studs).
2. Alongside this drill a hole which gives about 50% thread for the insert tap. (I used an 11 mm. drill for the 3/8" size).
3. Then very carefully tap it perpendicular to the bar. It's best to do all this in a lathe and at the same time face the side of the bar to ensure it is flat and the tapped hole is perpendicular to the face.
4. Then with a suitable clamp bar, locate first the tapping drill over the damaged stud hole, (a stud popped in the hole will ensure you have the flat located correctly), and drill carefully through.
5. Next locate the tapped hole over the newly drilled stud hole and, with the tap screwed just through the flat bar, clamp it firmly in position and run the tap down through the hole.

A little bit of work to make the jig certainly saves a lot of trouble later if the studs aren't correctly located.



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JULY 1993

THERMOMETERS - HINTS ON REPAIRS.

Noel G. Wyatt

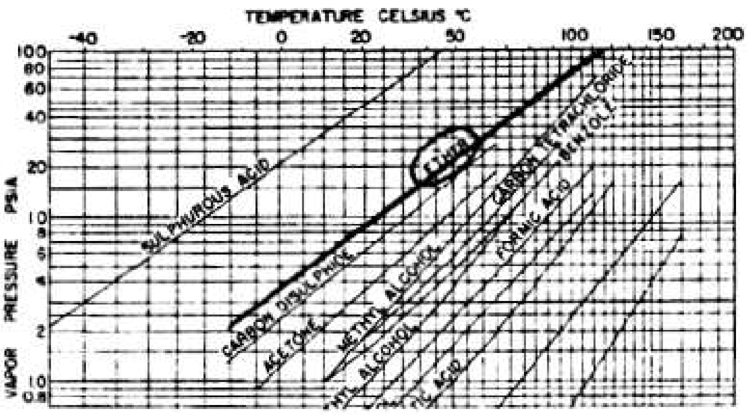
Having recently had the need to repair a thermometer I thought an article explaining how they operate and what is involved in repairing them may be of interest.

Basically there are two different types of bulb and capillary type instruments:

1. Mercury expansion type.
2. Vapour pressure type.

The former has a perfectly linear scale and I believe is probably beyond the scope of home workshop repair. The latter has a non linear scale and is the more common type used on our cars.

First you should understand how the unit works. Generally the fluid used is Ether which is a very volatile fluid having an extremely low boiling point. Vapour pressure curves for ether are approximately:



Note that at 100°C pressure is about 75 PSIA.

i.e. about 60 PSI gauge.

Ether in the bulb immersed in the engine coolant boils and the vapour continues to be generated until the pressure in the system reaches the figure corresponding to the temperature on the curve and the system comes to equilibrium. The indicator is actually a pressure gauge calibrated as per the vapour pressure curve.

It's not necessary for the system to be completely full of ether, in fact this is no good as the unit then operates as an expansion type unit and works in an entirely different manner. However there has to be enough ether to fill the gauge and capillary and perhaps about half filling the bulb.

Most instruments have been filled initially at the factory through a small bore capillary inside the gauge itself but as this means pulling the whole system apart, my suggestion is to forget about it and use the method described as follows.

Usually failure of the unit is in two locations:

A. In the capillary tube by rubbing or vibration causing a fracture.

B. Where the capillary joins the bulb.

B is the most likely location, especially if the bulb tends to turn as the union nut is rotated. Usually the bulb is provided with flats so it can be held with a spanner whilst another spanner is used on the union nut but this is not always the case.

Leave the system in the car and with the capillary unclipped so the bulb is fairly free to work on, immerse the bulb and the first inch or so of capillary in nearly boiling water. A leak should show very quickly with small bubbles coming from the damaged spot. If a leak doesn't show, finding the fracture is not quite so easy but sometimes a stressed area is easy to locate.

If it's in the capillary, simply use a slightly larger bore of copper tube as a sleeve and solder it as a joiner after first cutting the damaged area out and cleaning ready for soldering. Take a lot of care to make a good joint and be sure you don't seal off the whole repair with solder as it will never work if you do.

My suggestion now is to remove the bulb after unsweating it from the end of the capillary which of course is vital if that is the location of the leak. Take care as the bulb itself is usually made in two pieces soldered together so you only want to heat the end or you will have a larger job on your hands.

My idea is to drill a hole in the end of the bulb and solder in about a 2" length of capillary tube leaving the end open at this stage. Clear up the capillary to bulb joint area and carefully solder the bulb back on to the capillary tube.

Now all you need is a small bottle of ether and a hypodermic syringe and needle. Your local chemist can provide these after you explain why you want the ether and you will probably have to sign his book for him.

Fill the syringe with ether and inject this into the open ended tube you have fitted into the bulb until you find it won't hold any more. It's doubtful that this will fill the system completely as the capillary and gauge are probably empty. Remove the syringe and crimp the end of the tube and double it over about the last ¼" so it's sealed off.

Immerse the bulb in boiling water and watch the gauge in the car. It will probably go upscale and jiggle around a bit and then drop back to its rest point. This indicates that you need to put more ether in the bulb as what happens is that the ether all evaporates and condenses elsewhere in the system leaving the bulb empty with no ether to do the job required.

Simply cut the end off the piece of filling capillary and, with your pliers, open up the squashed end by squeezing it at right angles so your syringe will fit into the tube again. Hold your finger over the open end while you refill the syringe and inject another dose into the bulb and repeat the sealing off and testing procedure.

Eventually you will find the unit works correctly. If you find the gauge suddenly becomes super sensitive and races up to boiling point before the water in your pot boils its probably because you have over filled the system and it is working as a thermal expansion type. Open up the end and let a bit of ether out of the bulb.

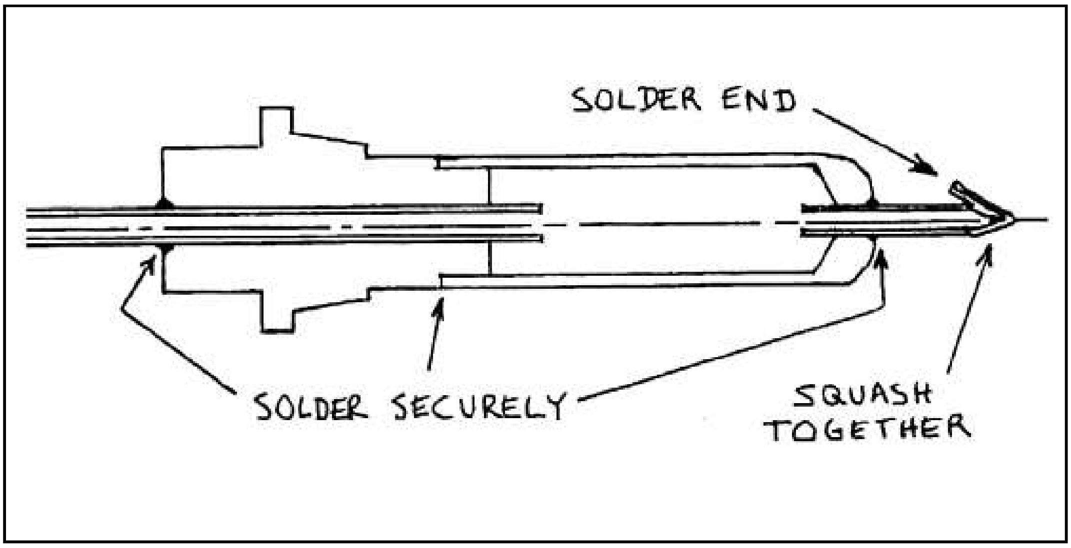
Once you have it working correctly you may decide to shorten your piece of filling tube at the end of the bulb so simply squeeze it together, cut off the excess and fold it over again, as shown. Finish by soldering up the end of the tube.

It's a good idea to test the bulb by holding it in hot water and looking for bubbles of vapourised ether leaking from any of the joints you have made.

Make sure you leave the union nut on the capillary as you won't be happy if you find it's not there when you come to re-install the bulb in the radiator.

Take care when handling the ether as it's extremely flammable plus you don't want to go to sleep on the job.

The first unit you repair will take you a while but the sense of achievement when you make it work again makes it worth the effort. After this the next one you do really is a breeze.



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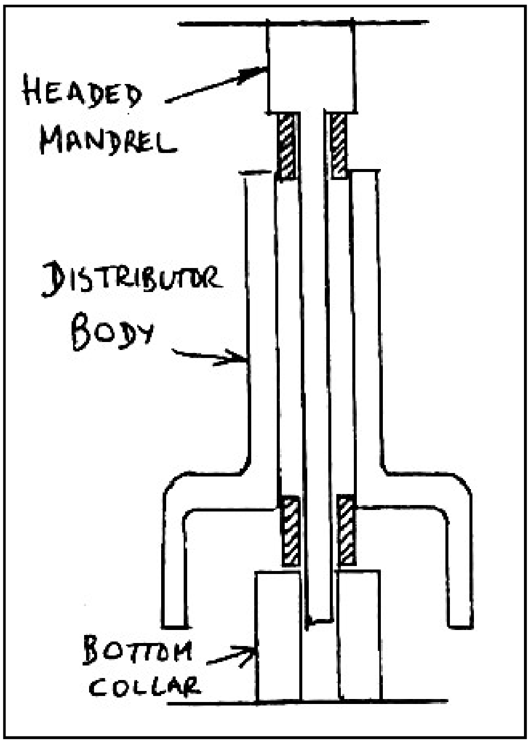
JULY 1993

BUSHES - Putting them in and pulling them out.

Noel G. Wyatt

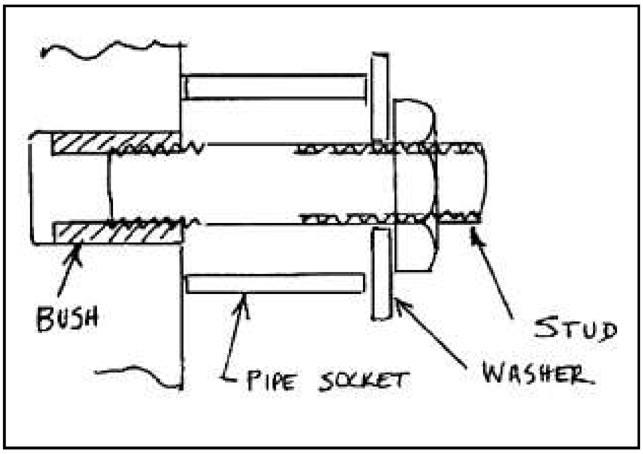
Recently I saw an article on inserting bushes into distributors using an interesting idea.



The correct way to insert a sintered bush is to soak it in oil for 12 hours and then, using a mandrel, press into position. However if 2 bushes have to accurately line up as in a distributor, correct way is to use a long mandrel and press them both in together.

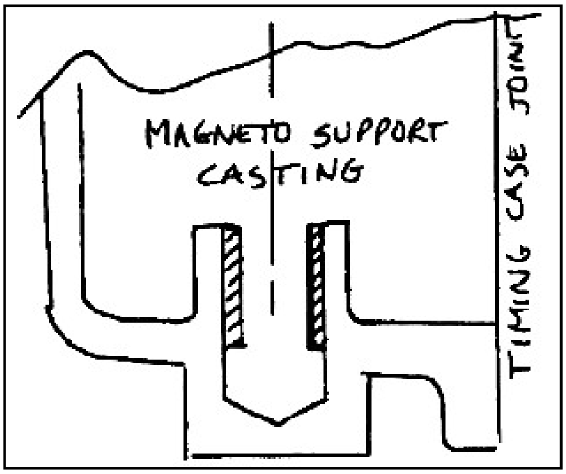
This is quite simple to do and ensures the bushes are pressed in correctly.

In a recent classic motor cycle magazine another simple idea makes removing bushes very simple, especially if they are in blind holes.



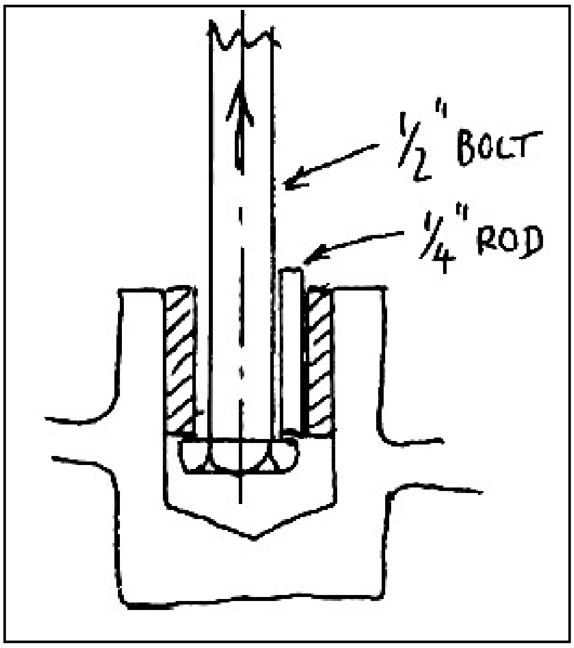
Tap a thread into the bush and then, using a threaded rod or stud, simply extract the bush as shown in this sketch.

There aren't many bushes used in pre-war Rileys that are difficult to remove but one in particular is a little difficult and in every motor I've seen, is badly worn.



The bottom bush in the magneto drive assembly.

This is about 3/4" ID and a difficult one to tap as in the above description.



I've removed these very simply by putting an ordinary ½" bolt head down the hole and then, with some scrap rod holding the bolt to one side of the bush so that the head can't pull out, extract it all, as per the sketch.

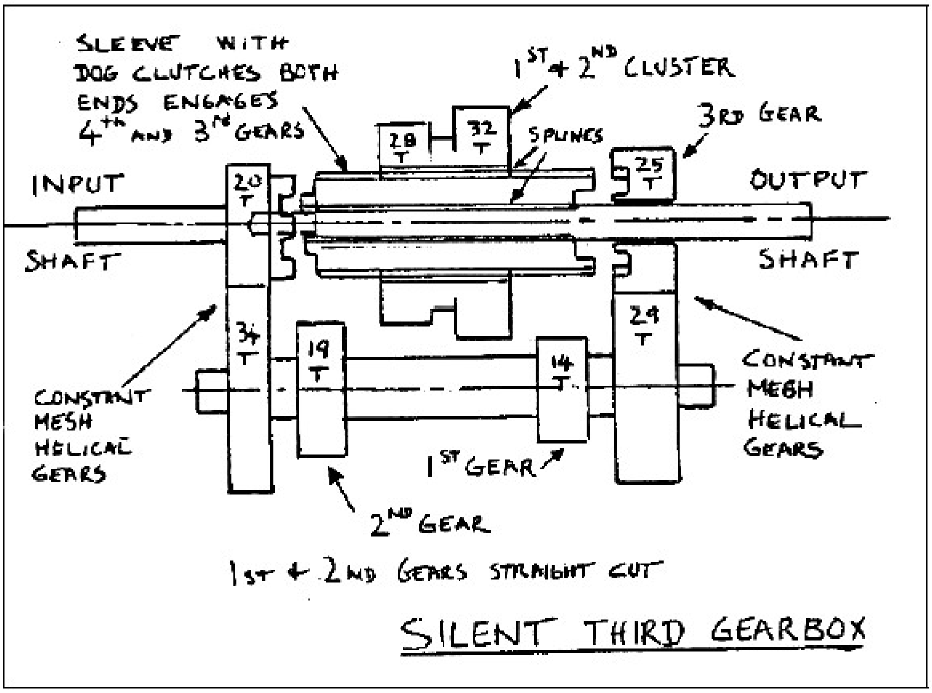
APRIL 1994

RILEY '9' GEARBOXES AND RATIOS.

Noel G. Wyatt

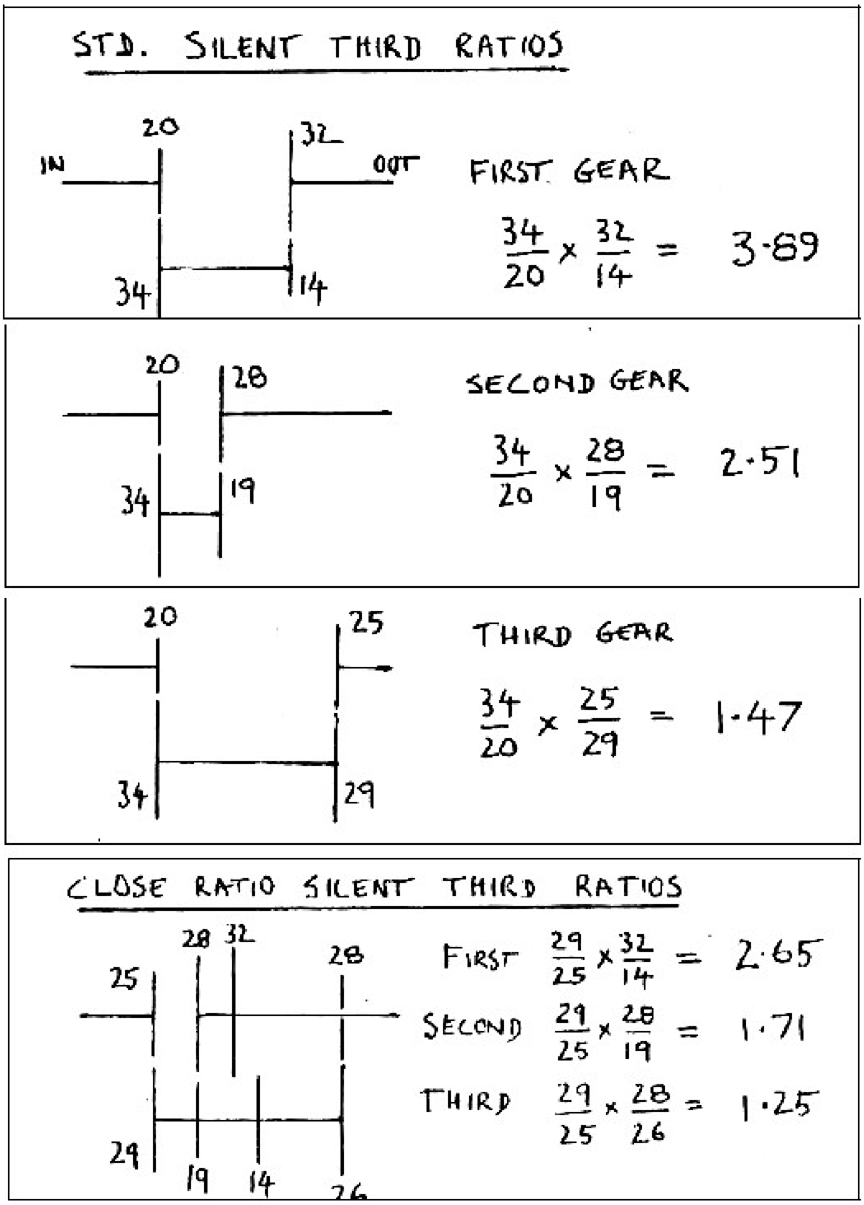
A brief investigation into the Silent Third, All Helical and ENV Preselector gearboxes and ratios.

In 1926 Riley introduced the silent third gear box on the new 4 cyl. 9 HP motor. This gearbox is an extremely rugged unit and after 60 years of use most are still in good order. The earliest Mk 1 units, which were fitted with right hand gear change, were slightly altered for the following seasons; i.e. slightly smaller diameter input shaft and gear case changes; but the gear train itself for the four forward ratios remained virtually unchanged up to late 1932 when the design was altered to the all helical unit.



Some silent third units were manufactured after this date and I believe the Imps produced in 1934 and supplied with manual boxes used the silent third box with straight cut first and second gears but I don't know the ratios. Probably close ratio and not standard silent third as listed by D. Styles.

In 1934 '9's were generally fitted with ENV 75 preselector boxes and two different ratio sets were provided. The Imp was fitted with a close ratio set and the boxes were stamped HR. Even closer ratio internals were available and its unclear exactly which were actually originally fitted to Imps. Our car, for example has a closer set which were fitted when we bought it, but I can't tell if they are original or not. I obtained a few gear trains from Lance Dixon which I believe may have come from Imps and are, I am fairly sure, the HR ratios.



THE RATIOS ABOVE ARE FORMED BY CHANGING THE CONSTANT MESH GEARS AND IS I BELIEVE THE NORMAL MODIFICATION.
PRODUCTION BROOKLANDS CLOSE RATIO BOXES ARE LISTED DIFFERENTLY FOR EXAMPLE: 1st 2.47 2nd 1.5 3rd 1.25

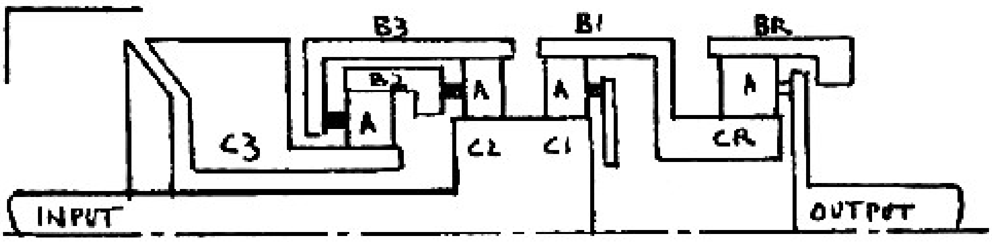
In 1935 '9's other than Imps were fitted with the Armstrong Siddeley preselector box and used different ratios to the 12/4 gear boxes. I haven't listed these ratios as I don't know of a running '9' in Victoria using the A.S. box.

The all helical gear box is very similar in design to the silent third unit except that, of course, all the gears have helical cut teeth. This made the unit more expensive to make as the sliding 1st and 2nd gear cluster has to move on a helix spline. The unit itself is easily identified as the casing has cooling fins and a quite different operating lever set up. Two versions were made, the first with the operating gear change unit rigid with the gear box and the second which was somewhat isolated with a rubber tube enclosing the change levers to isolate the gear change from engine movement as the engine mounting rubbers design was altered.

ENV 75 RATIOS

THE FOLLOWING TABLE LISTS SOME DIFFERENT INFORMATION

MODEL	SOURCE	1	2	3	COMMENT
STD "9"	D STYLES	3·90	2·23	1·46	✓
"	CALC FROM ACTUAL UNIT	3·90	2·24	1·46	✓
IMP	D. STYLES	3·90	2·41	1·46	???
"	CALC FROM ACTUAL UNIT	3·46	1·96	1·33	✓
WYATT IMP	" "	2·92	1·81	1·36	✓
ULSTER IMP	D. STYLES	2·47	1·5	1·25	?
NORMAL	– THESE THREE FROM FRIENDS OF G. BURFORD	3·9	2·24	1·46	RATIOS AS FITTED TO MG's ?
CLOSE	K3	3·4	2·02	1·36	
XTRA CLOSE	QA	3·1	1·84	1·31	



FIRST $\dfrac{B1 + C1}{C1}$ SECOND $\dfrac{\frac{B2 + C2}{B2}}{\frac{C1}{B1 + C1} + \frac{C2}{B2}}$

THIRD $\dfrac{\left(\frac{B2C3 + C2(B3 + C3)}{B2C3}\right)}{\frac{C1}{B1 + C1} + \frac{C2}{B2C3}(B3 + C3)}$ REV $\dfrac{B1\,BR - C1CR}{C1CR}$

REF. PETER BANNER

The chart shows the effect of all these different ratios on operation of the car. What I have done is assumed a speed in top gear and then plotted in the speed in the different gears, taking the engine to the same revs/min. I.E. The chart doesn't take into account different drive ratios or ability of different motor tuning to rev higher or develop more power. Its purely to show the different ratios available in a bar chart form.

Incidentally, it's quite easy to calculate the preselector box ratios if you refer to formulae published by Peter Banner in the Riley Register Bulletin some years ago and reproduced here with, I'm sure, Peter's approval.

AUGUST 1994

CASTOR - IMP & LINCOCK COMPAIRED.

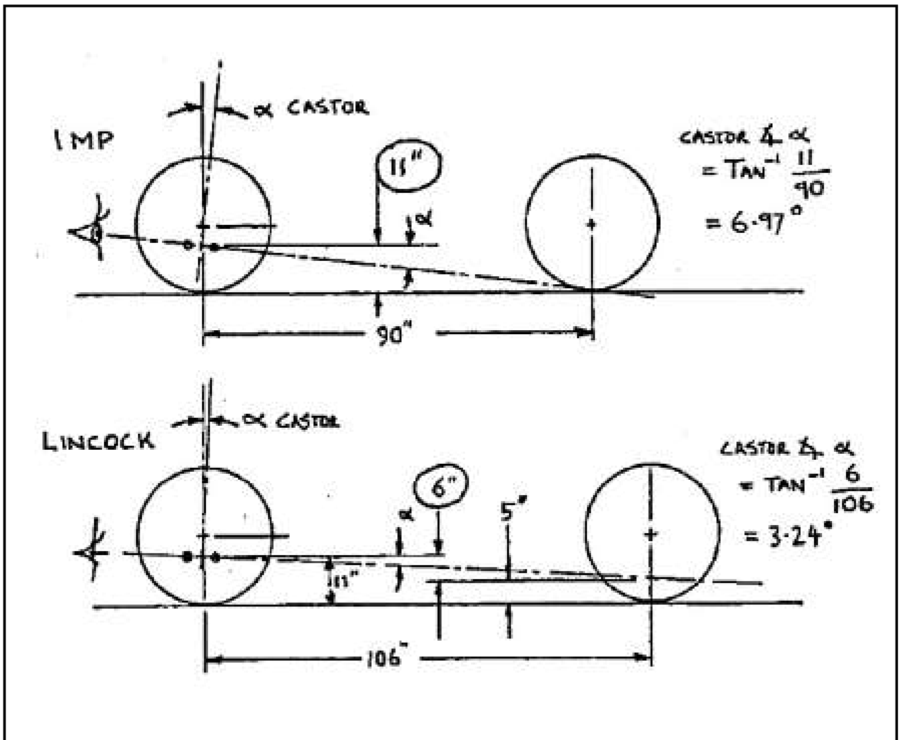
Noel G. Wyatt

The Lincock has steering which leaves a lot to be desired as it tends to wander and is greatly affected by road surface undulations. Compared to this, the Imp is spot on not heavy to steer, corners well, drives straight - in other words I think hit's how Rileys are intended to be.

Obviously there is a major difference between these two cars and today I spent half an hour comparing them to see if I could see the difference. I had already checked the toe in on the Lincock and found that someone had set it to 1" (should be 1/8"). Setting it correctly didn't fix the problem and actually didn't make much difference to the steering stability.

So, I looked at the king pin area to try to judge how the castor compared. It's difficult to easily measure until I saw a relatively easy way. The two bolts that hold the steering arm on to the stub axle assembly are at right angles to the king pin and it is easy to position your eye in line with them and project this line back to the rear tyre. I found it easier to do this first on the near side as the off side is a bit obstructed by the forward part of the steering arm.

On the Imp this line just about exactly coincided with the bottom of the rear wheel but on the Lincock was 5" above the bottom of the tyre. So obviously the Imp has more castor. Using some school trigonometry I found the following:



Some time ago, Graeme Miller sent me an extract from an A.G. Healing Manual which sets out:

Castor 3 ¼°

Camber 2°

Pin inclination 8°

From this I can see that the imp has rather more castor than specified and the Lincock is correct. I won't change the Imp of course as it is really nice to drive but will experiment with the Lincock. As I should add about 1.5° to bring its castor to 4.8°, i.e. a bit closer to the Imp and somewhere over the specification, a wedge is called for between axle and spring. A .063" taper over the 3.65" is required for 1° castor change so I need about .1" taper to give an extra 1.5° castor.

Since writing the above I have made up two wedges and fitted them and there is a vast improvement. The steering is not heavy and the wandering effect seems to have gone. The sighting line now is about 2" above the ground at the rear tyre and this, by my calculation, is 4.8° castor - exactly what I was after.

(It's interesting to note that there are no wedges fitted to the Imp axle.)

You may ask - why did I change the Lincock? Well, my experience with the Imp has made me believe 3 ¼ ° castor is not sufficient.

Have a look at your axle and try lining up the two bolts and see how your steering compares with mine. Incidentally, you can get a reasonable view on the off side once you know how to view the line and it should be the same as the near side if your axle is not twisted. Also, the car doesn't have to be on a level floor for this test but avoid a twisted surface.

This method can also be applied to the original rod braked Nines, i.e. Mks 1-3, but in this case the steering arm bolts to the underside of the king pin housing and it's not quite so convenient to project this line to the rear of the car - but it's not impossible. The later rod braked models, which I personally don't think are as interesting as the earlier models, have the same steering arm attachment as the cable braked cars.

■

AUGUST 1994

SQUEALING BRAKES CURED.

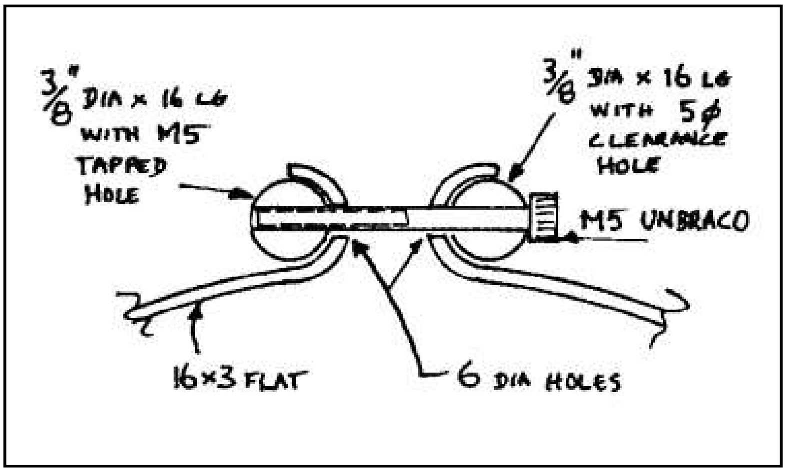
Noel G. Wyatt

When we first became owners of our Lincock the brakes were very quiet. They didn't work too well but there wasn't a sound from them. However, oil dripping from the drums told it's own story and, as part of the mechanical rejuvenation I fitted new oil seals and of course new brake linings. Ever since the brakes have worked well but the noise! Anyone who has travelled near us will tell you that they knew we were there. I have inspected the linings and filed back the ends but all to no avail.

Later '9's have steel bands shrunk onto the brake drums but fairly generally the cars up to 1934 had drums without these bands.

Talking to Marshall Maclean about this matter one Club night he suggested an easy alternative was to use a spring curtain carrier wound a couple of times around the drum. Well worth a try at least to see if deadening the drum was the answer. Unfortunately curtain springs are not what they once were as they are now PVC coated and really not suitable for this job anymore.

It seemed I had no alternative to fitting steel bands but to make the job a bit easier I decided to make a set of bolt-on units. Some 16 mm x 3 mm steel flat cost about $6.00 and I decided to make a nice job thinking that if they worked it was quite probable they would stay on. Some 5 mm Unbrakos looked good for the job and I had some 3/8" dia. stainless steel rod so I decided to make the bands to the following design:



A couple of hours work had the pieces made and then a coat of black paint and they were ready to fit. Fifteen minutes after the paint dried I had them all fitted and ready for a test drive.

It was like a miracle. Not a sound from the brakes - all the squeals have gone - I hope for good. You would think that deadening the drums like this would simply make the squeals quieter but in actual fact they have completely removed the noise. The brakes even seem to work better but this is probably a result of now not worrying about the noise. Now if we follow Brian Graham and family they won't know we're there. ■

DECEMBER 1994

STEERING PROBLEMS - CURE SUGGESTIONS.

Noel G. Wyatt

As you know, I like to have at least one technical article each month to give members something to think about. As you read this one you will realise it's getting harder as each month goes by. This item relates to the pre-war beam axle cars and not the later models with rack and pinion steering.

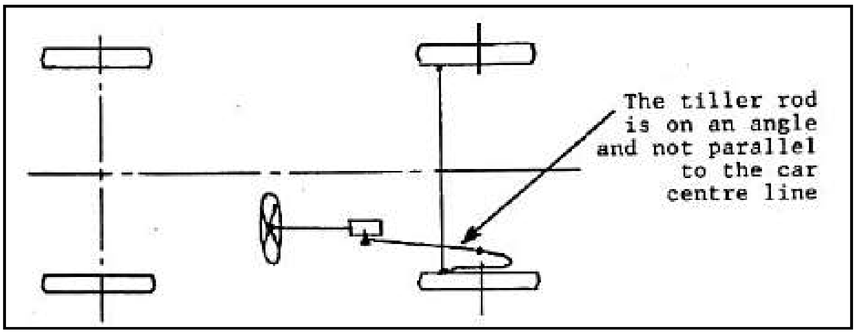
There have been a number of articles in the Riley Register Bulletin recently about wheel wobble with, I believe, no real solution coming forward. It's funny how fate seems to work, but I've just recently had a car in with exactly these symptoms to correct. So, prior to writing to the Register about it, I thought I would see what our local Riley experts think. Please read the following carefully and let me know what you think.

My theory is that when the cars were new, the front springs and shackles were all tight so that there was virtually no sideways movement of the front axle as the car went over ridges and pot-holes 'in the road. Crossing rail tracks on an angle is the sort of bump that sets -up violent wheel wobble which is frightening and can only be escaped by virtually stopping and starting again.

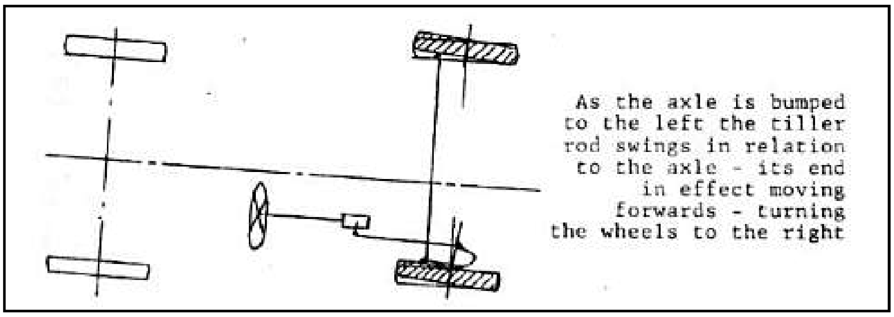
In November 1992 B.D. issue 350, I explained how my theories regarding brake judder had cured a car which had terrible problems. The theory in that case was that if the axle in moving as the brakes are applied causes the linkages to actually pull the brakes on harder, then almost certainly brake judder will occur. There won't be brake judder if the reverse of the above happens.

In the wheel wobble disease my theory is similar, i.e. if by going over odd bumps in the road the front of the car is pitched to one side and this swaying motion causes, in effect, the axle to move sideways under the body, and this movement in itself through the steering linkages turns the wheels in the same direction as the body is thrown, then the wheel wobble will start.

For some reason virtually all the pre-war Rileys had steering linkages which allowed this problem to occur. Study this sketch and you will understand what I mean.



What I believe happens is that as the car is, for example, thrown to the right, the body moves in effect sideways on the axle - worn shackles, spring flexibility etc., and a car which previously was steering straight ahead is now steered to the right.

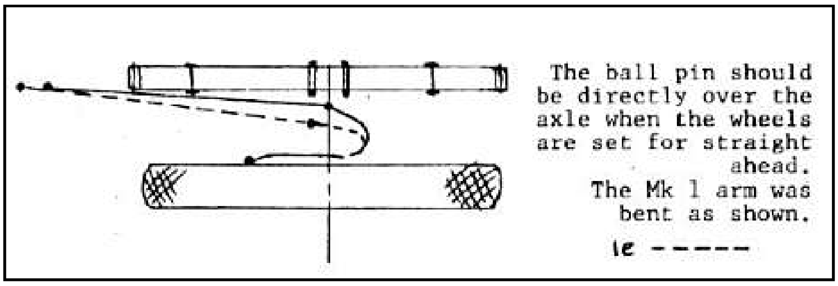


The springs of the car bounce back and the body jumps back to the other side which causes the wheels to try to move the car further to the left, amplifying the sway, until the body springs back the other way again and the. wheel wobble or shimmy is set up.

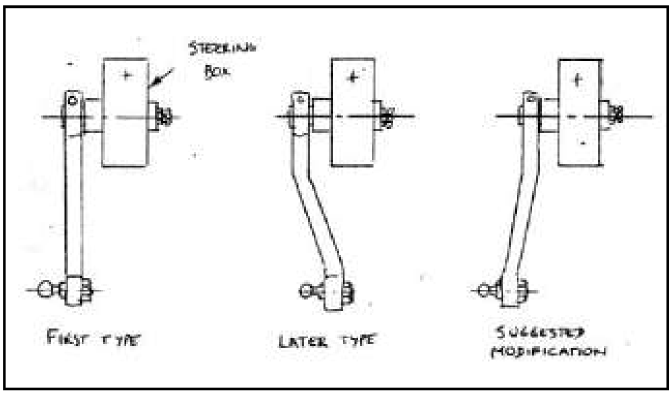
Weak shock absorbers make wheel wobble more likely as with good shockers the body will not sway as easily.

One solution put up in the Bulletin was to fit a steering damper which puts friction into the steering which reduces the tendency for the wheels to turn in to the sway.

I've studied lots of pre-war Rileys and looked at the steering linkages and found lots of variations. The Mk 1 I am rebuilding for example had a bent steering arm which would have accentuated the problem.

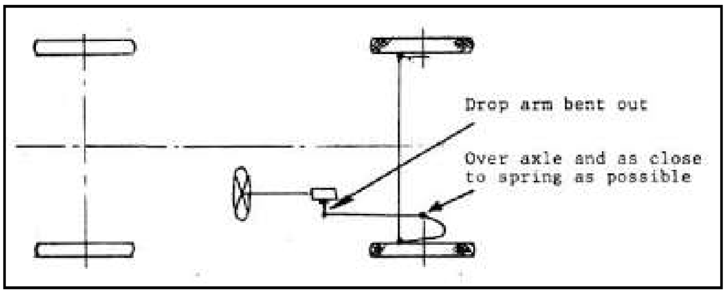


The car which I have just been working on had a similarly bent arm which was one fault. The other item affecting the angled direction of the tiller rod is the steering box drop arm. The earlier '9' cars had a virtually straight arm compared with the early '30s cars as shown. My guess is that the later change was to place the tiller rod closer to under the steering box so there was not an overhung load, but I consider the steering box bearings are quite capable of handling some overhung loading and to improve the steering it's best to rework the drop arm to the third sketch design.



This change moves the tiller rod away from the rear shackle of the front spring and the main thing to check is that the tyre clears the rod on full right hand lock. The steering stops will require to be re-adjusted Also check that the steering arm clears the chassis rails on full right hand lock.

As a result of these changes the steering should look more like this:



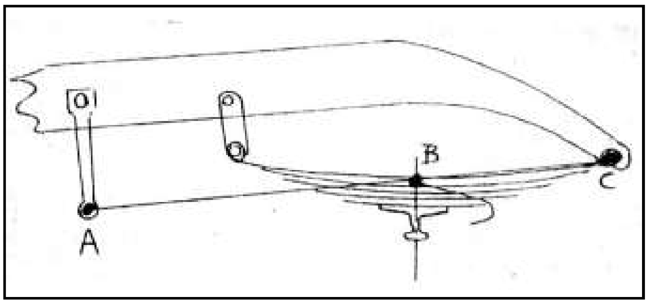
When the cars were new, springs were tightly clamped, shackles were good and shock absorbers were effective, plus all the steering pivots were tight. Obviously all these things loosen up as the years and miles roll by and the design fault, (just my opinion), becomes a problem.

If you have a pre-war car having very free steering with a tendency to wobble, have a look at how the tiller rod is positioned.

If you have to bend the steering arms, heat them to red heat so that they bend easily and allow to cool naturally. Don't water quench them as they may crack.

Another aspect of the steering which I believe is fairly important is that spring deflection should not tend to steer the car to the left or right. To explain what I mean, study the sketch on the next page.

With the steering set straight ahead it would be best if the 3 points, A, B and C, are in line.



For example, if the steering arm on the driver's wheel is bent up, i.e. point B set too high, then the car will steer to one side when it goes over a bump.

Comparing various years of Riley '9' models, the steering drop arm is at varying heights due to different mountings of the steering box and consequently this aspect of the steering geometry varies considerably, as basically the other points, B and C, remained fairly standard on all models.

Personally I believe it is also desirable for the front springs to the fairly flat when the car is in normal trim. Reset springs with too much camber definitely would exaggerate this problem.

■

FEBRUARY 1994

THE FIRST TYPE CENTRIFUGAL CLUTCH AND IS PROBLEMS

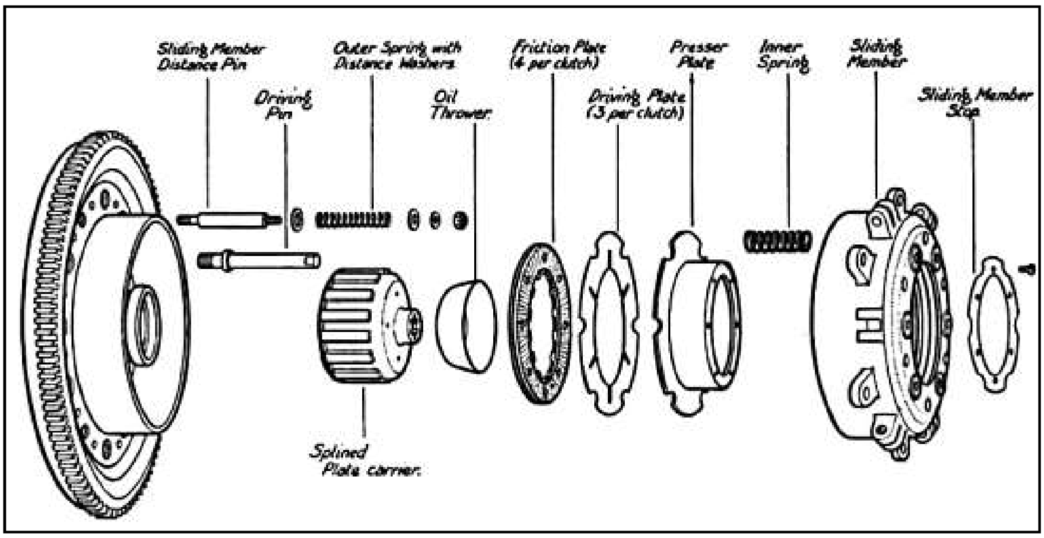
Noel G. Wyatt

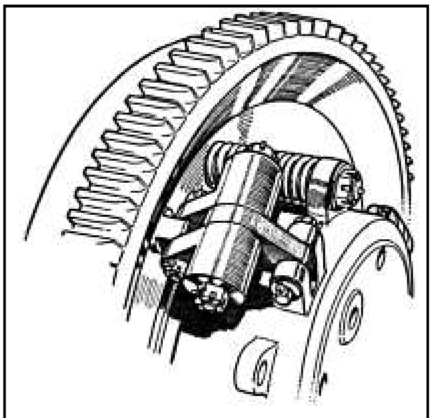
For some part of 1934, Rileys used what is now known as the first type Newton clutch before changing to a simpler design later in the year. The second type is generally thought to be the best of the three designs, principally because it is of all steel construction compared to the alloy casing used on the first and third type units.

Slightly more than a year ago I changed the Imp's crankshaft to a Merlin heavier crank and with this, fitted a third type clutch and wrote an article describing an analysis of how it worked. Since then it has, with much reduced weights, operated almost exactly as the calculations showed, and made the starting performance much more sporting, in keeping with how an Imp should perform.

While my back is on the mend I decided to prepare a first type unit for another project I have in hand. (Light manual work but a bit heavy on an ageing mind). I acquired a complete unit - flywheel and clutch complete and also have a few odd parts from other broken units. On dismantling, the complete unit appeared to be in good order but on closer observation the internal splines on the clutch plates were badly worn and it looked as if they had recently been re-lined, (manufacturers names still clearly readable on the friction surface). However on trial assembly in the clutch they were obviously too thin a lining and there was too much clearance before the pressure plate clamped the assembly together. Fortunately amongst the parts I have was a usable set of plates with good splines and very good linings so I decided first of all to understand how the unit worked and what problems could be foreseen.

First of all an explanation of how the type one clutch works. The following drawing is the usual illustration of the type one but it doesn't really explain the unit completely, so I have prepared the section drawing on the next page to help explain the operation of the clutch. Bear in mind that these clutches are used only in conjunction with pre-selector boxes and are used only to put the car into motion when accelerating from rest and do not disengage when changing gear.

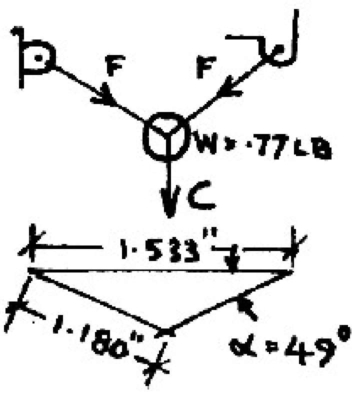



Governor Mechanism—First Type.

This drawing is from Sales and Service Bulletin Vol.2 No.4 and it shows one of the 6 weight units.

The weights, 6 off equally spaced around the unit, move outwards under centrifugal force and the links attached to the 6 lugs on the sliding member move it towards the flywheel. 6 control springs shown at the top of my sketch have to be overcome before the sliding member can move and basically control the speed at which the motor has to run before the clutch starts to engage. There are 4 friction plates with Ferodo linings on both sides and these are splined and slide on the inner splined plate carrier which in turn is splined on to the gearbox input shaft. The drive to the clutch plates is via the flywheel surface, 3 driving plates and the sliding member presser plate. The 3 driving plates and the presser plate have 6 grooves on their outer circumference which engage on 6 pins fitted to the flywheel. As the weights swing out, the sliding member moves until it rests against the face of the flywheel, a total movement of about 5/16". The splined plate carrier is fitted with a ball race which locates into the centre of the flywheel. There are 6 clutch springs which compress between the presser plate and the sliding member as the member moves forward.

Assembling the clutch without the driving and driven plates, I found that the sliding member bottoms on the flywheel before the centrifugal weights contact the flywheel so that the pivot lugs on the sliding member must withstand the full centrifugal force at up to top engine speed.

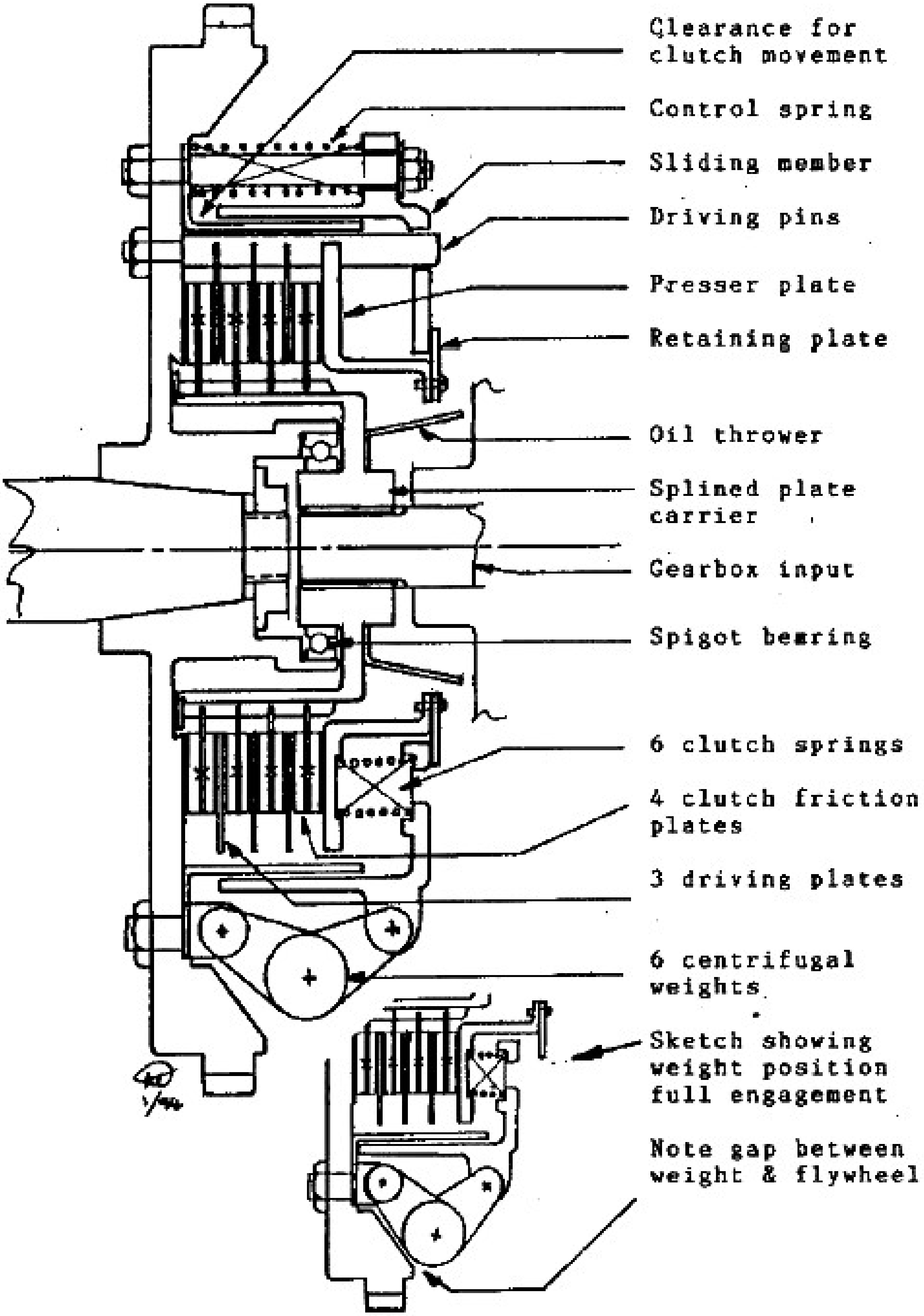


Centrifugal force

$$C = 2.8416\ Wrn^2 \times 10^{-5}$$
$$= 2.8416 \times .77 \times 5 \times 5000^2 \times 10.^{-5}$$
$$= 2733.5\ \text{lb}$$

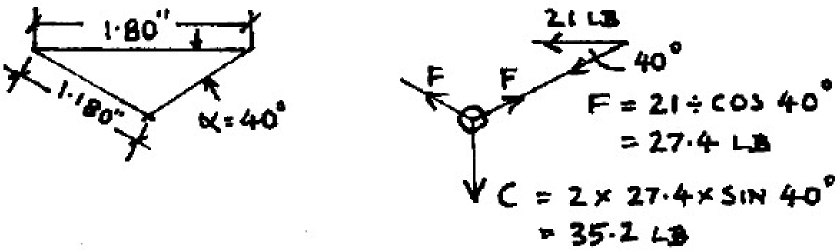
$$F = 2733.5 \times \frac{1}{\text{SIN } 49°} \times \tfrac{1}{2}$$
$$= 1811\ \text{lb}$$

SKETCH OF '9' TYPE 1 CLUTCH.



Personally I feel that this load is excessive so the first thing to do is to make it possible to have the weight swing right out to touch the flywheel. Either machine some off the end of the sliding member or fit a stop to the flywheel at each weight location. Machining some off the sliding member is the easiest solution but it is necessary to "check if the control spring has enough clearance and doesn't become solid before the weight reaches its new stop.

Another point. I wanted to check was the speed at which the clutch starts to drive. By measurement the control springs (6 off) have a load rating of 21 lb at this position and the geometry of the weight unit (6 of them too) is:



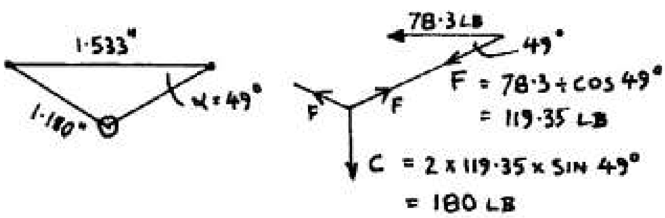
Using the centrifugal force formula, the speed at which the clutch has to rotate for the weight to produce 35.2 lb for the pressure plate to just begin to clamp up on the clutch plates is:

$$n^2 = \frac{35.2 \times 10^5}{.77 \times 5 \times 2.8416} = .3217 \times 10^6$$

$$n = 567 \text{ RPM}$$

Personally I think this is a bit low as this is really a slow idle for a spirited '9'.

Another thing to check is the speed at which the clutch is fully engaged. Tests on the clutch springs show that a total force of 266 lb is produced when the sliding member is right on its stop, which relates to 266 x 1/6 = 44.3 .lb/weight assembly. Added to this of course is the control spring load which by test is 34 lb, i.e. a total of 78.3 lb/weight.



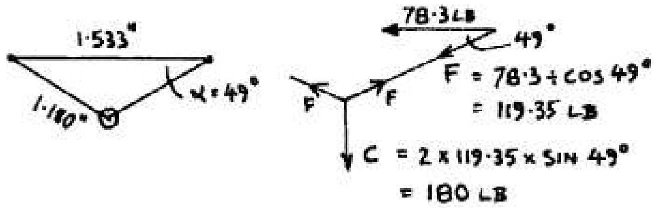
$$n^2 = \frac{180 \times 10^5}{.77 \times 5 \times 2.8416} = 1.645 \times 10^6$$

$$= 1282 \text{ RPM}$$

It seems obvious that the weights are far too large so a check on actual force required to transmit the motor HP would be interesting.

There are 4 clutch plates so actually 8 friction surfaces.

Formula for a disc type clutch:



$$n^2 = \frac{180 \times 10^5}{.77 \times 5 \times 2.8416} = 1.645 \times 10^6$$

$$= 1282 \text{ RPM}$$

For a '9' a figure of 50 HP at 3000 RPM is more than enough.

$$HP = \frac{\mu r F N S}{63000}$$

μ coeff of friction
r mean radius inches
F axial force lb
N number of surfaces
S speed RPM

μ for ferodo on steel is apparently constant at 0.3

i.e. the existing springs are adequate as the clutch springs actually provide 266lb.

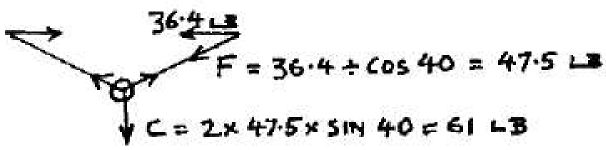
From my successful experience with the type 3 clutch the weight should be sized to transmit the '9' motor developed HP at 1200 RPM which I have previously worked out to be approx. 10 HP.

Therefore thrust on the pressure plate must be:

$$\text{Thrust} = \frac{63000 \times 10}{0.3 \times 2.375 \times 8 \times 1200} = 92.1 \text{ lb}$$

There are 6 weight units so each unit has to provide 92.1 - 6 = 15.4 lb. Additional to this the weight also has to compress the control spring.

By measurement the clutch springs are preloaded to a total of 140 lb so that in actual fact the pressure plate has come into contact with the friction plates but as 92.1 lb is less than 140 lb the sliding member has only moved on the control springs to the point of initial contact. This I have measured to be 21 lb on each spring. Therefore the weight has to provide a pull of 15.4 + 21 = 36.4 lb



Using centrifugal force formula:

$$W = \frac{61 \times 10^5}{2.8416 \times 5 \times 1200^2} = 0.3 \text{ lb}$$

This is low compared with the actual weight of .77 lb i.e. about 39% .of that provided.

This result is similar to what I calculated with the type 3 clutch.

Assuming the weight is reduced to 0.3 lb then the first calculation to determine actual load on the pivot lug at 5000 RPM.

$$C = 2.8415 \times .3 \times 5 \times 5000^2 \times 10^{-5}$$
$$= 1066 \text{ lb}$$

$$F = 1066 \times \frac{1}{\text{SIN}49^\circ} \times \tfrac{1}{2}$$
$$= 706 \text{ lb}$$

This is still high so having the weight land on the flywheel is still desirable.

If the weight is changed to .3 lb, the speed at which the clutch starts to drive is:

$$n^2 = \frac{35.2 \times 10^5}{.3 \times 5 \times 2.8416}$$

$$n = 908 \text{ RPM}$$

35.2 lb is the centrifugal force required to apply 21 lb to the sliding member to just move it into contact with the clutch plates.

This is perhaps a little high compared with the 800 (approx) start speed of the type 3 on our Imp. Increasing the weight to .39 lb would fix this. .39 lb increases the pivot lug load to 917 lb and the clutch is fully engaged (i.e. sliding member at its stop) at 1802 RPM.

Conclusion

After this careful study of the type 1 and my earlier investigation of the type 3 it now appears obvious that the automatic clutches were not matched to the '9' motor. It's no wonder that the type 1 was only used for a few months as there are two very obvious faults:

1. The weights are at least 2 times too large.
2. The heavy weights, which do not end up resting on the flywheel, exert far too great a load on the lugs on the alloy sliding member and this load, associated with the vibration inherent in an assembly on a 4 cylinder 4 stroke motor, could be expected to cause failure at high engine speeds.

The unit I have now in preparation will address these problems and it will be interesting to see how it performs.

If anyone has any comments or corrections to apply to my calculations, please let me know.

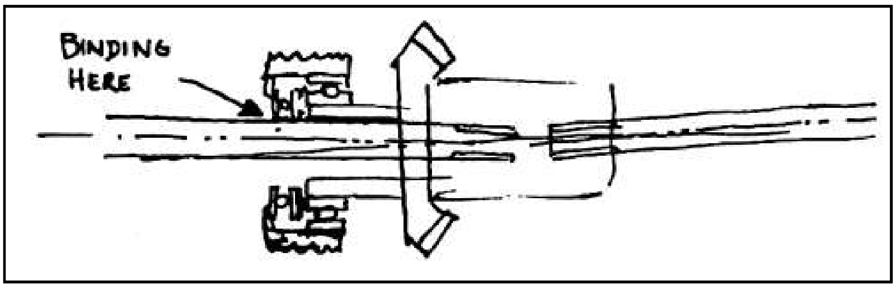
Note: It is generally considered that the '9' became underpowered in its later years. It's my opinion that the complete mismatch of the centrifugal clutch to the '9' motor created this impression as all 3 types engage too quickly and don't allow the engine to rev to develop any power for a quick getaway.

JULY 1994

A BENT BANJO AND HOW TO STRAIGHTEN.

Noel G. Wyatt

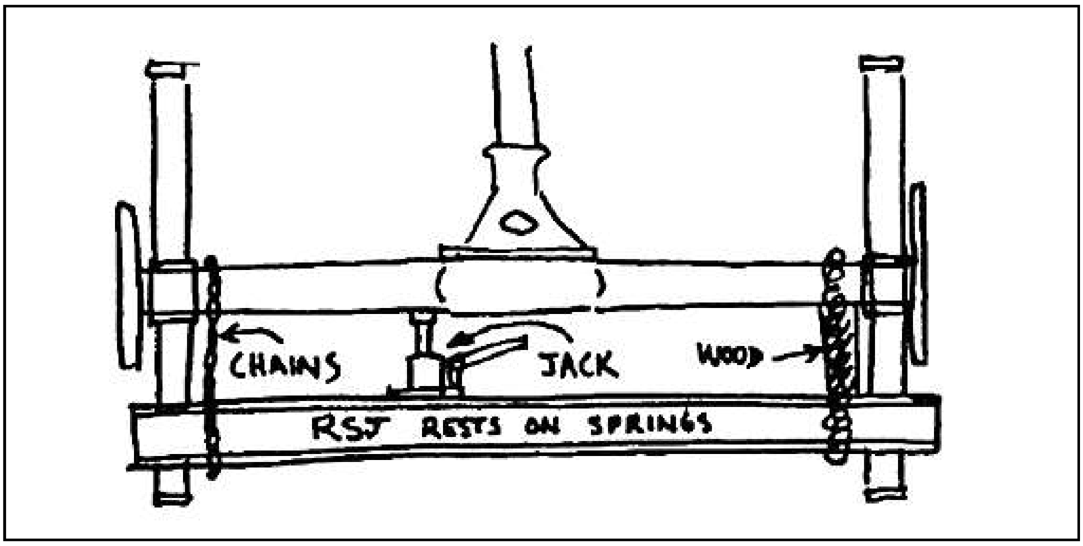
Working on a pre-war Falcon recently I found that the banjo housing was bent causing the near-side half shaft to rub inside the crown wheel thrust race, i.e.



The housing was bent forwards as a result of the force of the wheels pushing the car along with the torque tube taking the full load in the centre of the car. The rear cover being off I thought it was worth a try to straighten it without removing the whole unit from the car. The petrol tank was already out so there was plenty of space behind the axle to play in.

I had a suitable piece of RSJ and, using a block of wood, some chain and a car jack, I found the banjo housing deflected very easily. After a few trial bends, I got it correct in line.

The post-war cars have braces to stiffen the back axle plus the rear cover is welded on so they don't suffer from this weakness which I have found on a few occasions. Even a '9' can bend banjo housings so if you are working on your back axle it's worth checking to see if it's straight.



MARCH 1994

HOW HEAVY IS A CLUTCH?

Noel G. Wyatt

Over the past few years I have worked on a number of different Riley '9' motors equipped with a range of clutch types. Using my garage set of bathroom scales I have weighed them and I thought the results would be of interest to the membership.

The weights are the total of all rotating parts, i.e. flywheel and clutch assembly but excluding the gearbox input shaft. They are also the standard unit without any weight reduction and, in the case of the centrifugal clutches, are the standard centrifugal weights as originally fitted to '9's.

Mk 1 cone clutch assembly 39 lb

Manual clutch assembly 46 lb

Type 1 Newton clutch 40.5 lb

Type 2 Newton clutch 40 lb

Type 3 Newton clutch 39 lb

I think it is interesting that the manual clutch is so much heavier and this certainly backs up the normal desire to machine large lumps off the flywheel on this particular unit.

Unfortunately it is not possible to measure the radius of gyration, or for that matter, to easily calculate it so the figures don't actually mean a lot, but if you are familiar with the different units, I think you would agree that the manual unit has much more of its mass near the outer rim and this makes the moment of inertia even worse for this assembly. The Mk 1 cone clutch has a quite heavy design in the centre with a heavy flywheel boss and the clutch spring with two sets of thrust bearings etc. concentrates the weight near its centre, all of which lowers the moment of inertia for its 39 lb weight.

To me it's surprising that the Type 2 centrifugal clutch is no heavier than the Types 1 or 3 as it is completely steel construction compared with aluminium castings. My guess is that the radius of gyration would be about the same in these three units.

The significance of all this is probably lost on Club members who drive RM's with synchromesh gears but if you have ever driven a Riley '9' up a hill and experienced the difficulties of changing up with a heavy manual clutch you would understand why these weights are interesting. Many times I have been on a hill in Nellie, (our 1932 Tourer), and easily travelling in second gear with plenty of power to handle third gear, so, slip into neutral and double declutch waiting for the engine revs to match the road speed for third gear only to find that it takes 'too long to rev down so that third gear is so good anymore and its back into second again. Actually the wide gap in the ratios between second and third in the standard silent third gearbox don't help.

■

SEPTEMBER 1994

PRE-WAR BONNET CATCHES.

Noel G. Wyatt

Bonnet catches on pre-war cars are an unlikely subject for a magazine article but I have had so much difficulty recently in putting some good sets together and I believe a record of what I discovered as I worked through this exercise is worthwhile. So here goes.

I am referring here to the '9' models but generally the same applies to the 12/4, 6 and 8 cylinder cars.

The first type of catch used I believe up to 1931 or 1932 is the RIPAULD screw type fastener. This is very nicely made and consists of a right angle bent spindle which is pulled up by turning the chromed handle many turns. Generally the body of the catch is brass and painted body colour with the hexagon mechanism retaining nut and Ripauld operating handle chromed. Attachment to the bonnet is with 4 screws around the mounting flange. The drilling is not interchangeable with the later types.

The second type was bought in from REMAX and was provided for 2 or 3 years. The operation is very simple and consists of a spring loaded assembly with a hooked recess. The unit self centres when fully up using a pin in the natural V of the opening in the body of the catch. Construction of the catch is with the handle and body of brass with steel pin, spring and catch unit. Body drilling is identical to the later types.

In my opinion this is the best unit provided by Riley as it is very simple and has few moving parts. Operation is simply to pushdown on the handle to catch the bonnet and to release you simple push down and rotate ¼ turn in either direction and lift the bonnet holding the catches in this rotated position. The makers name is stamped on the side of the handle unit and the word Patented is on the face of the body bolted on. to the bonnet.

The third type has no makers name and is probably made by or expressly designed for Riley cars. It has a body made of 2 brass pressings which are riveted together in a complicated way making it very difficult to disassemble. This type were used for 2 or 3 years, certainly around 1934 and 1935 and it is difficult to find a set in good condition. The hook assembly is steel which rusts. Internally it has a spring which also rusts and which is used to both pull the bonnet down and to rotate the handle and hook assembly to a central position. A special washer inside the catch is designed to stop the unit at its centre position but as the hole in the bottom of the pressed brass body wears this washer stops being effective so the handle rotates further than its proper central position. Also, the brass handle has a thin brass cylindrical section which enters the pressed body and vibration over the years wears a hole through the brass tube. Altogether not a very satisfactory unit after 60 years of use.

My feeling is that Riley tended to make their own fittings and remembering that the early 30's were a depression period it made sense to make it yourself but in this case the designer got it wrong.

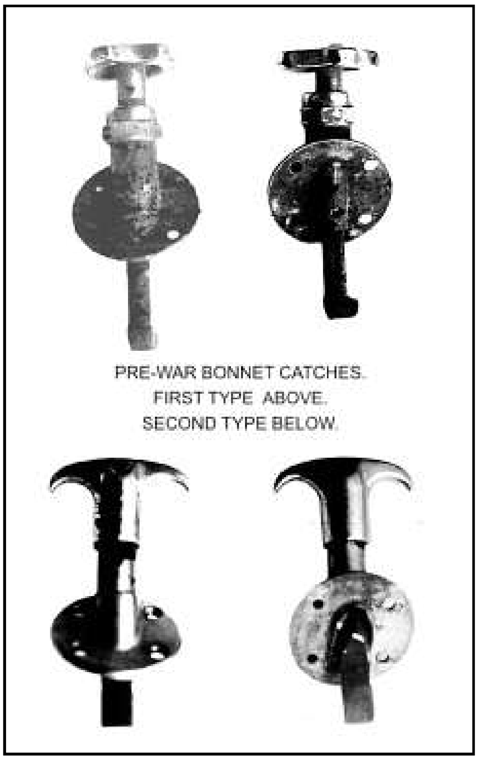
Operation of the catch is similar to the second type requiring a push down on the handle to latch the bonnet and to unlatch you push the handle down and rotate ¼ turn clockwise against the spring pressure and lift the bonnet using the handles in their rotated position. Incidentally, the handle on this third type catch is the first of the units to incorporate the Riley diamond shape and features a rather nice R in a diamond in the centre of the handle.

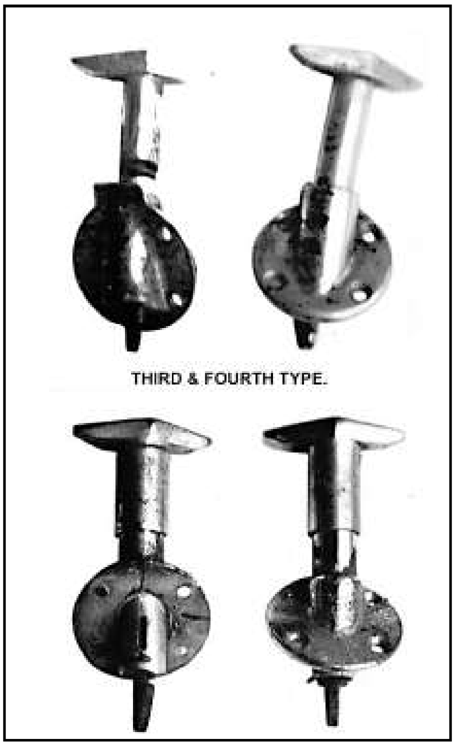
The fourth type catch was probably an improvement on the previous pressed body unit and used a similar operating method but featured an alloy die cast body. Unfortunately these bodies have suffered over the years and with the internal mechanism rusting and the die cast body fracturing its rare to find a set in good condition. The body is chrome plated and has usually failed. Restoring this type is very difficult. The handle is similar to the third type with a diamond and the letter R and doesn't suffer the same wear problems as the earlier model. I'm not sure how many years this catch was supplied but I think it started in about 1936 and probably continued for 37 and maybe into 1938.

The fifth type catch, not illustrated, is very similar to the fourth unit except that the body is brass and not aluminium alloy. Again there is a problem with rust inside the catch but, in common with the fourth type unit, the handle is designed to prevent water entering the catch body from above, similar to the design of the second unit. For some reason this fifth unit has a longer handle than the earlier units which is maybe to make it easier to hold but in practice makes no difference to the operation of the catch.

Generally speaking these all brass bodied catches are good but their operation is complicated with the internal spring performing two functions with an additional special washer to operate as a centre stop. They are difficult to repair if the spring is broken or rust has taken over.

With our Imp I had only broken third type catches available plus some parts of the fourth type catch and I made stainless steel bodies and internal parts. Anyone interested might like to have a look at what I achieved. No matter what you do bonnet catches on pre-war cars are complicated and difficult to repair.





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APRIL 1995

RILEY '9' WATER LEAKS.

Noel G. Wyatt

With the Mk 1 body etc. nearing completion, I thought it was about time to start up the motor with only 5 weeks to go before the National. Rally. With everything connected up and wiring completed I filled the watering can and started filling the radiator. One can and then another and yet another. Can a Mk 1 motor and radiator hold so much water? There was a gurgling inside the motor and lo and behold water was overflowing out of the rear bearing assembly! I'm afraid to say that I had basically filled up the entire motor with water.

Of course my first thoughts were to give up planning on driving her to Nowra at Easter but, after a few minutes, sanity returned, so off with the head, thinking naturally it must be the head gasket, but no. The water level was half way down into the block water jacket. Pouring more water into the motor using a funnel into the water jacket and the source of the leakage was clear. Looking down the exhaust side rear oil drain hole, (drains oil from the rocker area down to drip into the rear exhaust camshaft bearing), it was easy to see water pouring into the hole about half way down. Close examination showed a hole about 2 to 3 mm dia corroded through from the water jacket.

My solution to this was to fit a copper tube coated with Loctite down the hole and seal it off but still allowing oil to flow down to the camshaft.

With that done it was necessary to drain the sump and remove it to clean all the yuk out. Bits of rust and general junk from the water space had entered the motor and had to be removed. With all that cleaned out I refitted the head' and refilled the radiator leaving the sump off just to be sure the problem was solved. Imagine my disappointment when drips of water still fell out of the open crank case.

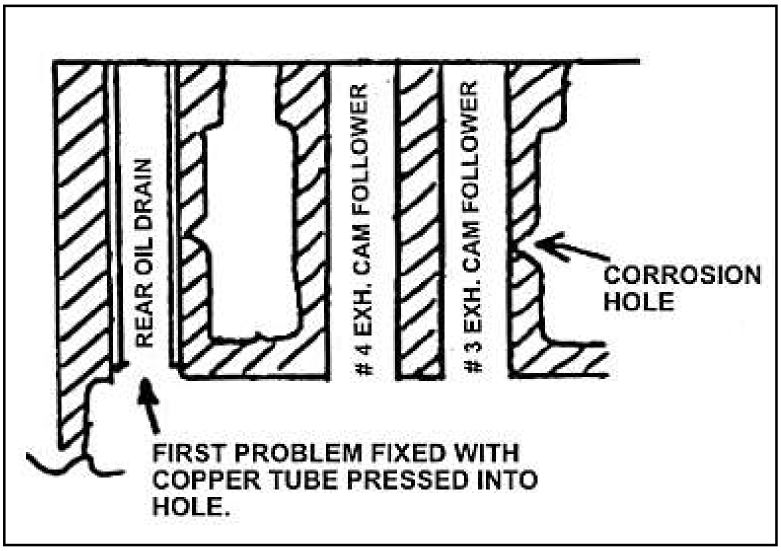
Looking up inside the motor with a torch I was half pleased to see the water was not coming from the same place but was mainly coming off a lobe of the exhaust camshaft for number 3 cylinder. A drip every 2 seconds or thereabouts. I imagined a crack in the bottom of the water jacket and despaired again.

It was suggested to me that I try some of the new chemical treatments available to solve this small leak so, back on with the sump and a fresh change of oil and I started the motor. This took a little while as the twin Zenith carbs were a bit unusual but eventually she fired up. I poured some Chem-I-Weld into the radiator and ran it for 10 minutes or so and crossed my fingers. The only way to check if the leak was sealed was to remove the sump again so off it came and looking up the leak was gone. No drips to be seen. I turned the motor a couple of turns with the crank handle and the leak started again.

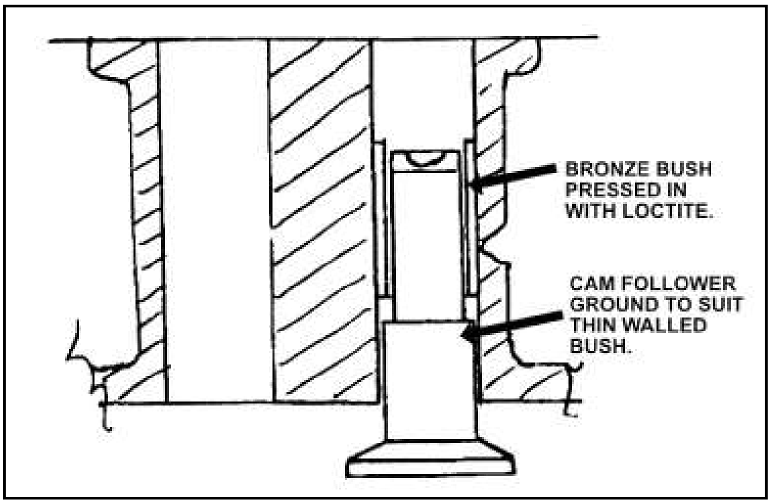
Let's face up to it I thought, the motor has to come out. I imagined all sorts of things of course and dug out my spare Mk 1 block, thinking I would have to build up another motor.

With the motor out I removed the exhaust camshaft and slid the cam followers out. Number 3 was coated with milky oil compared to the others clean oil. This indicated to me that the crack or hole was somewhere up inside the cam follower hole. Sure enough, looking with a torch, there was a rough area about 2 inches down from the head face and this was clearly another corrosion-hole from the water jacket. I probed around and found it was only in this one position with what seemed like a recess as per this sketch.

My first thoughts were to ream the bore out say 30 or 40 thou and make up a bronze bush and press it in.



This would entail a lot of work and still another leak might appear somewhere else. So I decided on the solution which I think the following sketch makes clear.



I completed this job and re-assembled the motor and, with fingers crossed, fitted it all to the car again. With the radiator full of water there was no leak at all and after quite a long time running there appears to be no more leaks. Of course I have my fingers crossed but so far it looks very promising. Close examination of the water jacket didn't show, any more corrosion pitting like that described and I believe the problem is solved. Time will tell. When I have nothing else to do I will build up the other motor and fit it, keeping this first motor as a spare but this in not in the near future.

JUNE 1995.

SOME THOUGHTS ON SINGLE CARBURETTOR '9' INTAKE MANIFOLDS.

Noel G. Wyatt

This advertisement is worth studying. Even if you don't have a Riley '9' you may well have noticed that basically all single carb. '9's (apart from the later hi-charge design), had the carburettor placed at or near the rear of the motor. Have a close look at the advertisement and you will see that the S.U. kit offered in 1931 included a manifold with a carburettor right in the centre. All for £5 too. I haven't ever seen one of these and I wonder if many were sold in England, and if any still exist.

From my own experience the off-set design by Riley is not very good as, even with the later design with the carb. placed between 3 and 4 cylinders, 3 and 4 run rich and 1 and 2 run lean. I guess even with one of these S.U. manifolds the mixture to 1 and 4 will be different to 2 and 3. The ad. does say the engine will run smoother and I gave this a bit of thought.

Without any doubt there is more power with a slightly rich mixture compared to a lean one. The firing order of a Riley is 1,2,4,3 so, with the original design, the effect in pulling power is - weak, weak, strong, strong. However with the S.U. unit - weak, strong, weak, strong. Perhaps this is why the motor runs smoother. I guess in particular at idle, the exhaust note would be more even and a nicer idle would be possible.

Any thoughts as to why the advertisement is directed at Riley '9' owners other than 1931! Perhaps they didn't want to upset the Riley Company by rubbishing their current model as the "Record" is the Riley Motor Club magazine and the Club was heavily backed by the Company at the time.

■

NOVEMBER 1995

A MK 1 ROADSTER PROBLEM SOLVED.

Noel G. Wyatt

Having a couple of days available for myself, I decided to investigate the reason our 1927 Mk 1 '9' Roadster failed to proceed a couple of months ago. As Lyn mentioned in the September Blue Diamond, I had determined that the problem was ahead of the speedo drive which is taken from the torque tube on the earlier pre-war cars.

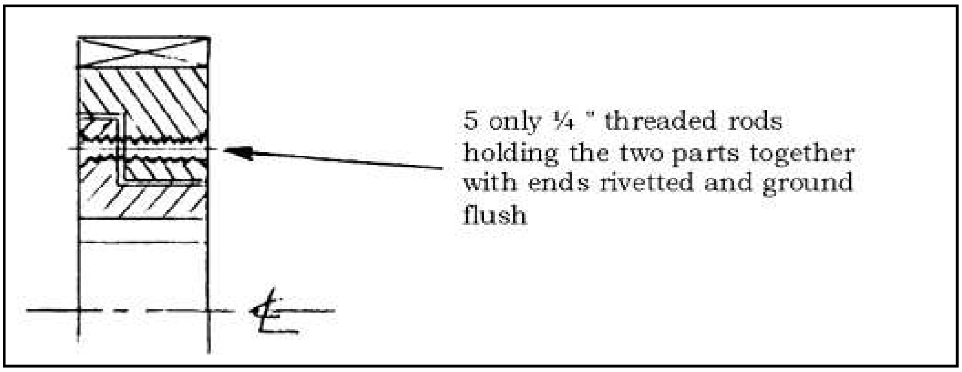
I decided to first check in the gearbox as I couldn't see the universal joint itself failing completely and I knew the associated splines were in good condition. Also, the gearbox input shaft turned even though the car remained stationary with gears engaged.

Out with the seat and carpets and remove the floor boards and the gearbox is readily accessible. With the top off and first gear engaged I cranked the motor over on the starter with first gear selected and the clutch engaged. Sure enough, the input shaft and its gear turned but nothing else. This had to be a fault in the layshaft cluster. Looking down into the box I could see the front end layshaft gear turning but the rest of the assembly stationary. This gear is fitted to the layshaft with very strong splines so how could this be happening?

It suddenly occurred to me that top gear should be okay and, sure enough, it was. So I could actually have driven the car home from the Club event in top gear, however starting in top with a cone clutch and my very tall, 4.77:1, rear axle would have been virtually impossible.

Next step of course was to remove the engine and gearbox once again and a few hours later I had the gearbox apart. What I found was interesting and explained something that had puzzled me previously.

When I had the box apart, probably four years ago, I cleaned everything and found it all in good order and that was that. Now with the layshaft cluster in my hand I could see that the front gear was actually in two pieces and made from the splined centre of the normal 29 tooth gear with a new 31 T fitted to it in a rather weak fashion -



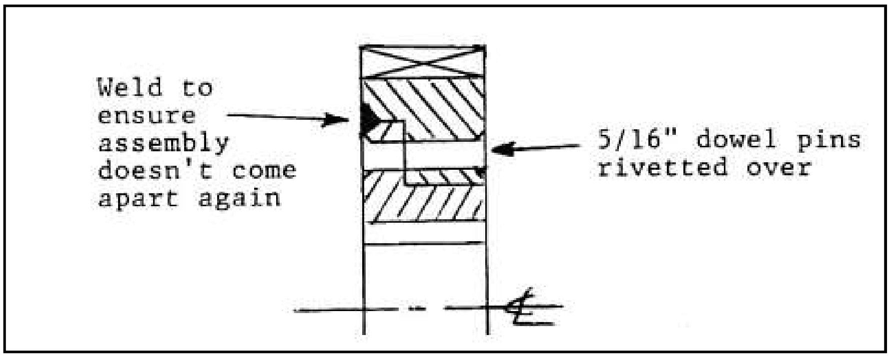
When I had worked on it four years ago I hadn't picked the way this gear was made. Now after over 1,000 miles of a hard time, (i.e. a rather fierce clutch), these five rods had sheared off and the gear was simply turning on its hub.

Of course I now wondered why this had been done this way and I found that both this gear and the gearbox input shaft gear were not standard size. Normally a silent third gearbox has a 20 tooth driving a 29 tooth which is the start of all the gear ratios other than direct drive. This gearbox had been modified to a 22 tooth driving a 27 tooth which closes the gap between 3rd gear and top but, without changing the first and second gears, there is still the same gap between 1st and 2nd, also 2nd and 3rd.

This explained why I had thought the gearbox in the Mk 1 was nicer to drive than Nellie's silent third box. Something like a close ratio box but not quite.

The modification was actually nicely done, apart from this method of mounting the cluster gear, as it was a remade gearbox input shaft complete, incorporating new hardened splines and top gear engaging dogs and 22 T gear all in one piece. I didn't want to lose this nice high 3rd gear and as the spare Mk 1 gearbox I have has very worn splines on the input shaft, I decided to repair the 22 tooth gear and reassemble. The only difference between the gear in a Mk 1 and later boxes is in the input shaft. The Mk 1 is a bigger diameter than the later cars.

What I did was to drill out the " threaded holes to just under 5/16" and fit 5 dowel pins which had to be pressed in and then the ends riveted over. I then machined a V groove into the outer recess and ran a stainless steel weld around followed by grinding it flush.



As an observation on the troubles we have had with the Mk 1, apart from the savage cone clutch which is another story, both failures, i.e. no drive through a rear hub and this latest problem, have been with non standard parts. If these parts had been faithfully made the same way as the factory made them then there would have been no problems. I'm sure there is a message here.

■

JUNE 2000

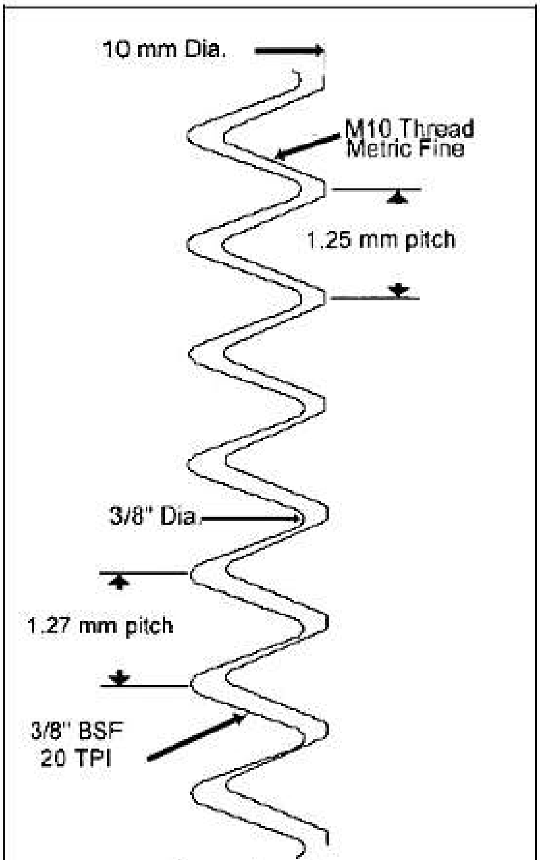
SUFFERING LOOSE HEAD STUDS?

Noel G. Wyatt

Working on pre-war Riley engines I have, with a little lateral thinking, come up with a simple cure for slightly worn head stud threaded holes in engines fitted with 3/8" head studs. Please note first of all that what I am describing will not fix stripped threads - only those where, as you screw in a new stud, it wobbles and you just know that if you torque it up properly, it will simply be a disaster.

My idea is to rethread the holes to M10 x 1.25 pitch (metric fine) and make up new stepped studs.

First, study the zig zag drawing. This shows the difference between the two threads, i.e. 3/8" BSF and M10 x 1.25. The area between the 2 zig zags is in effect what is removed when you tap out the existing holes with the new thread. Actually it is not this much as the original holes are now showing signs of wear etc. You will see that in 6 threads the M10 thread starts to be not full profile. In actual fact the process of tapping the new thread starts 'off pitch' as it were so that the drawing is showing the threads 6 pitches down from the top, i.e. the bottom 6 pitches of 12. 12 pitches of 1.25 is 15 mm, i.e. totally through the threaded section in the block.



Comparison of
3/8" BSF & M10 x 1.25
Superimposed on each other

I think the best part of this idea is that it is very simple to rethread the holes correctly, i.e. all parallel and square to the top of the block. There is no need even to take the engine from the chassis. The existing holes in the heads are just a clearance on 10 mm dia. so by making up an extended M10 tap, the cylinder head itself can be used as a jig to do the job properly.

I researched materials available for the studs in 10 mm dia. and decided on stainless steel as it is usually quite accurate to size and would not suffer the usual rusting away problems of ordinary steel studs. 18-8 stainless is not really suitable as its thermal expansion is considerably more than steel or cast iron so I decided on a 400 series chromium only material. I found a source of 403 grade which threaded and machined quite readily and has the same expansion rate as mild steel.

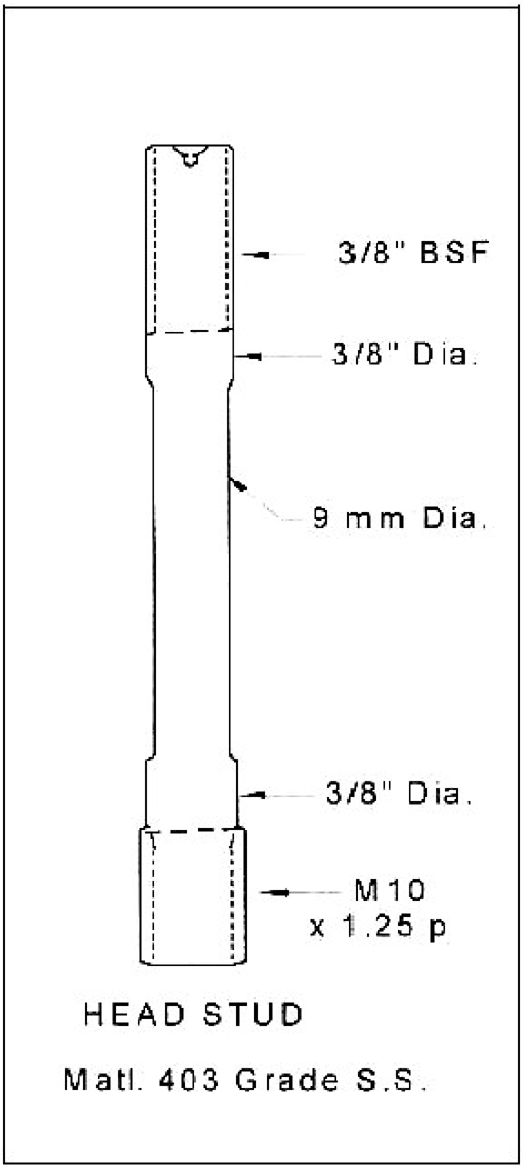
An intermediate tap is the best choice and I drilled a suitable hole into a length of the stainless bar and pinned in the tap at one end and at the top, cross drilled a hole for a tommy bar.

Making up new studs isn't difficult with a lathe and its important that the threads are correctly formed. A button die in a holder using the tail stock to start it off square is a good way to tackle it and some tapping compound will give a good result. I use "Rocol Ultracut" which works very well on stainless steel.

How you make the studs is really up to you but this is how I do it. First, cut the bar into lengths and, after clamping it very tight in the lathe chuck with about 1" protruding, slightly chamfer the end and thread on the lowest speed the M10 thread for about 5/8" long. The die has a lead in so it doesn't thread right to the end but this is okay as it enables the stud to really tighten up in the new threaded hole.

Second, turn the stud end for end and machine the other end to 3/8" dia. about 1-1/2" long and thread 1" to 3/8 BSF. Also drill a centre hole in the end ready for the next operation.

Third, obtain an M10 nut, (or tap out an old 3/8" BSF nut), and cut half way through with a hacksaw. With this screwed on to the M10 end of the stud you can hold the nut in the chuck and it will clamp on to the stud securely holding it. Then, with a centre in the tailstock, turn the length of the stud to 3/8" dia or less, (see later), right up to the end of the M10 thread. Test the first one in one of your newly tapped holes and confirm that it is correct.



Modern practice is to neck the studs between the 2 threaded ends which is a really good idea. Why? Well, the studs weakest point is then not the root diameter of the thread and also the stud becomes more elastic, i.e. it stretches like a spring under the tension so that, as the head gasket collapses in time it is still clamped under tension. This is a concept that you have to think about for a while. A thin stud will stretch more than a thick stud under the same tension - for example, (very much exaggerated), say 9 thou compared with 3 thou. Then, if the gasket collapses by 3 thou the head fastened with the stronger studs would lose all clamping tension and fail - the one with necked studs would still have 2/3 of its clamping pressure. Obviously, necking the stud down to close to the root diameter of the 3/8" thread does not cause the stud to fail but should improve its overall performance.

■

MARCH 2004

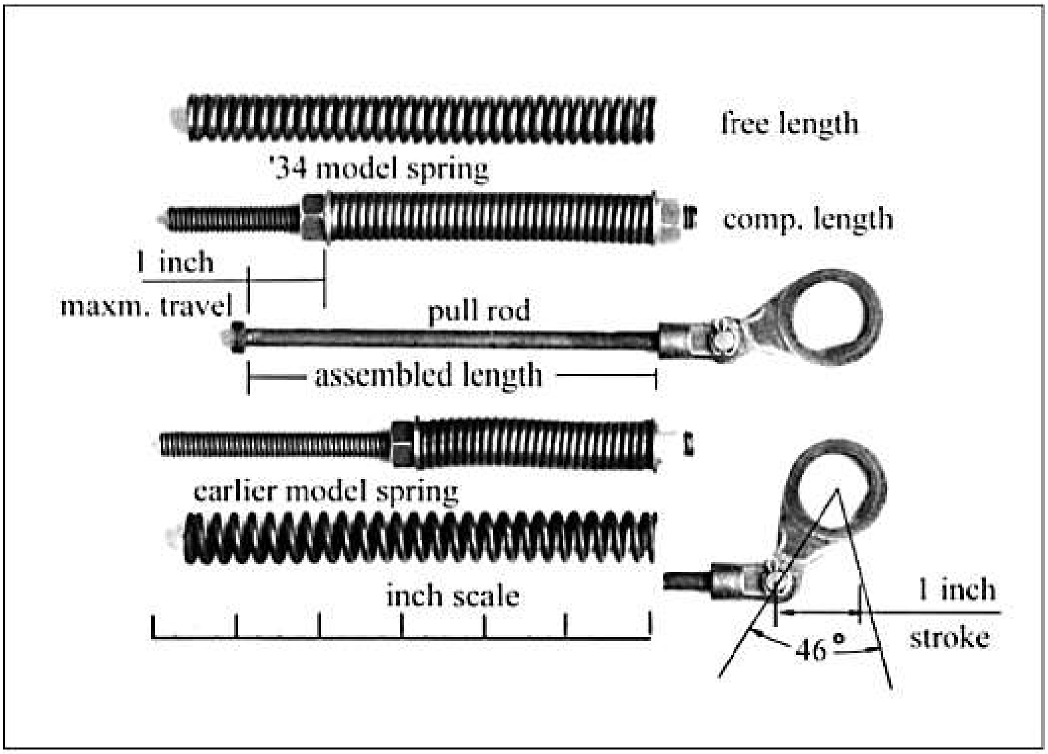
‘9’ BRAKE RETURN SPRINGS.

Noel G. Wyatt.

Some time ago I wrote an item about an experience I had with the cable brakes on our Imp. What I had found was that the cable return spring on one of the front brakes was different to the other side and was becoming solid before the brake shoes were engaged, with the result that only one of the front brakes was retarding the car - with obvious results.

With this experience in mind I of course checked the springs during the restoration of the Lincock and found that all four springs, i.e. both back and front, were of this closer wind design. After some research I have found that somewhere around 1934 the spring was changed and given a different part number.

I prepared the following drawing using some photos I took of the two different springs and the compressed length is very clearly different.



The top image shows the later spring in its free length while the second shows its length when compressed solid. Note that this happens with only about 1” of travel when the spring is mounted on its pull rod. You can see that I mounted the spring on a threaded rod with a nut on each end to determine its compressed length.

The third image is the pull rod. The fourth and fifth images illustrate the free and compressed length of the earlier spring and the differing length is clearly seen. 1” travel of the spring requires only about 46° movement of the brake cam unit.

I guess the question is - Why did Riley change the spring? My guess is that someone had a brainwave and decided that the earlier spring was too stiff, i.e. lb/ inch compression and this could be solved by fitting a spring with more active coils which gives a lower lb/inch rating.

The thing is that for every lb. or, as we now say, kilogram, that you apply to the foot pedal, a proportion is taken up simply compressing the cable return springs leaving less for the actual braking. I believe that, if this was the reasoning, they got it right - but went a bit far resulting in the sort of results that worried me.

My advice is to check your springs and definitely replace them if you have the later ones fitted. The springs supplied by the Riley Register are the correct ones and are readily available.

I had intended to submit this item to the Riley Register's Bulletin magazine sometime ago but as the Register's policy is now one of actively discouraging the exchange of technical views between its members for fear of being held responsible, I hope you'll find it interesting.

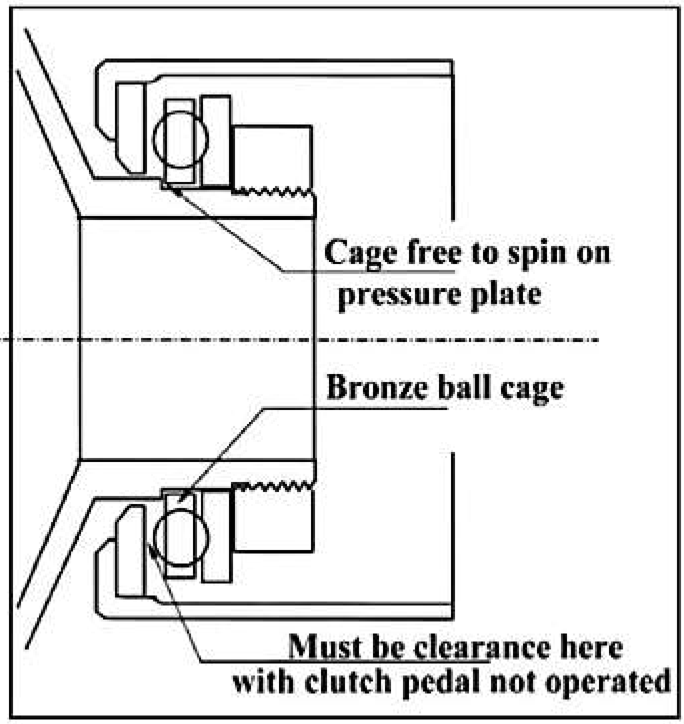
■

NOVEMBER 2003

‘9’ CLUTCH WITHDRAWAL BEARING.

Noel G. Wyatt.

A detail which isn't published in any of the literature is how to assemble the above mentioned item. The special bearings are available from our club’s spares to order and its important that they are set up correctly. The flat surfaced half is a tight press fit in the withdrawal housing and the idea is that with the clutch engaged the balls are not in contact with it.



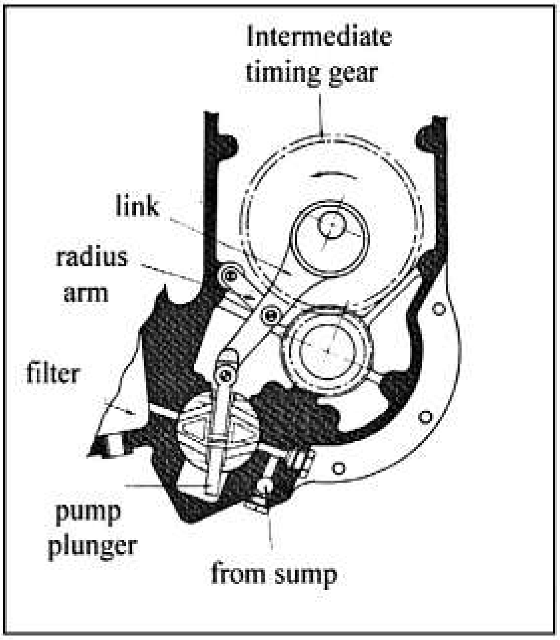
Tighten the nut to the point that the cage is free to rotate with a small clearance on the step in the pressure plate extension. Don’t forget to fi the locking screw. Adjust the clutch linkage to give the necessary clearance as shown. RM owners should note that these clutches are released by directly pulling the pressure plate back against the clutch springs and are not similar to their modern cars.

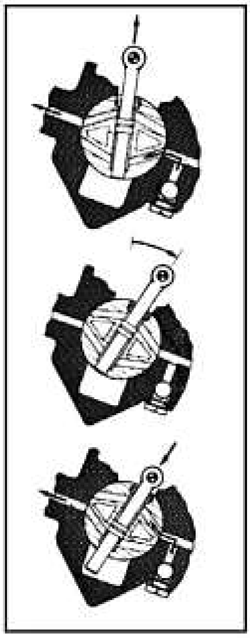
NOVEMBER 2003

‘9’ MERLIN OIL PUMP - QUITE A RARITY.

Noel G. Wyatt.

In 1936 the ‘9’ engine incorporated some significant changes from the top down. The rocker boxes were the type introduced solely for the Imp, con-rods were shorter and basically the same as the 12/4, pistons had the gudgeon set lower in the skirt, crankshaft made much sturdier with 1.875” big-ends and mains, and finally, the oil pump completely re-designed to a single piston double acting type. Driven from an eccentric machined on the back of the intermediate timing gear, a very clever link and radius arm assembly connects to a piston rod moving it both longitudinally and transversally as shown on the drawings below. (These drawings appeared in a Register Bulletin in 1974.)

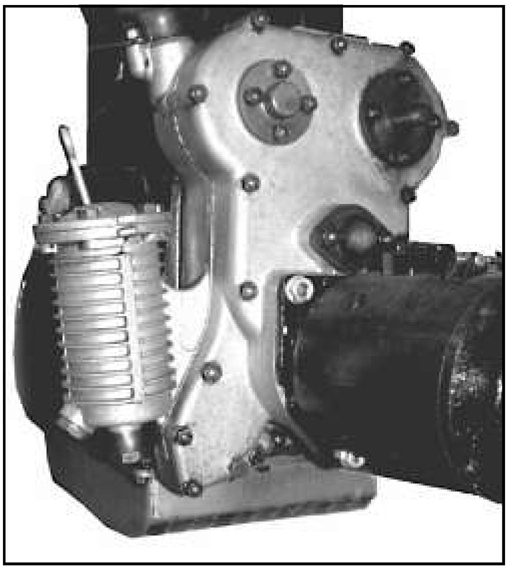




This design has received some criticism, however Merlin owners in the UK seem to report favourably on its operation and ease of restoration.

The earlier twin plunger pump is of course much easier to remove and replace without the need to dismantle the timing cover.

This photo shows the design of the timing cover with its built-in full flow oil filter. Removal of the generator and the front of the cover gives access to the gears and oil pump.



The Riley Special constructed by Ron McKay quite a few years ago was originally a ‘9’ Merlin-engined saloon and is the only one of this type running in Victoria. I have heard of a Monaco in storage and it is to be hoped it will eventually be restored as a Monaco. Don’t confuse the 12/4 Merlin model with the ‘9’ Merlin engine. There is no connection.

Of the 1500 Rileys listed in the last Register Membership List there are only 24 Merlin chassis with ‘9’ engines listed.

DECEMBER 2003

RESTORING THE 2nd TYPE CENTRIFUGAL CLUTCH.

Noel G. Wyatt.

Most Riley models sold from 1934 to 1937 were fitted with Pre-selector gearboxes and automatic centrifugally operated clutches. Three different types were used basically as follows:

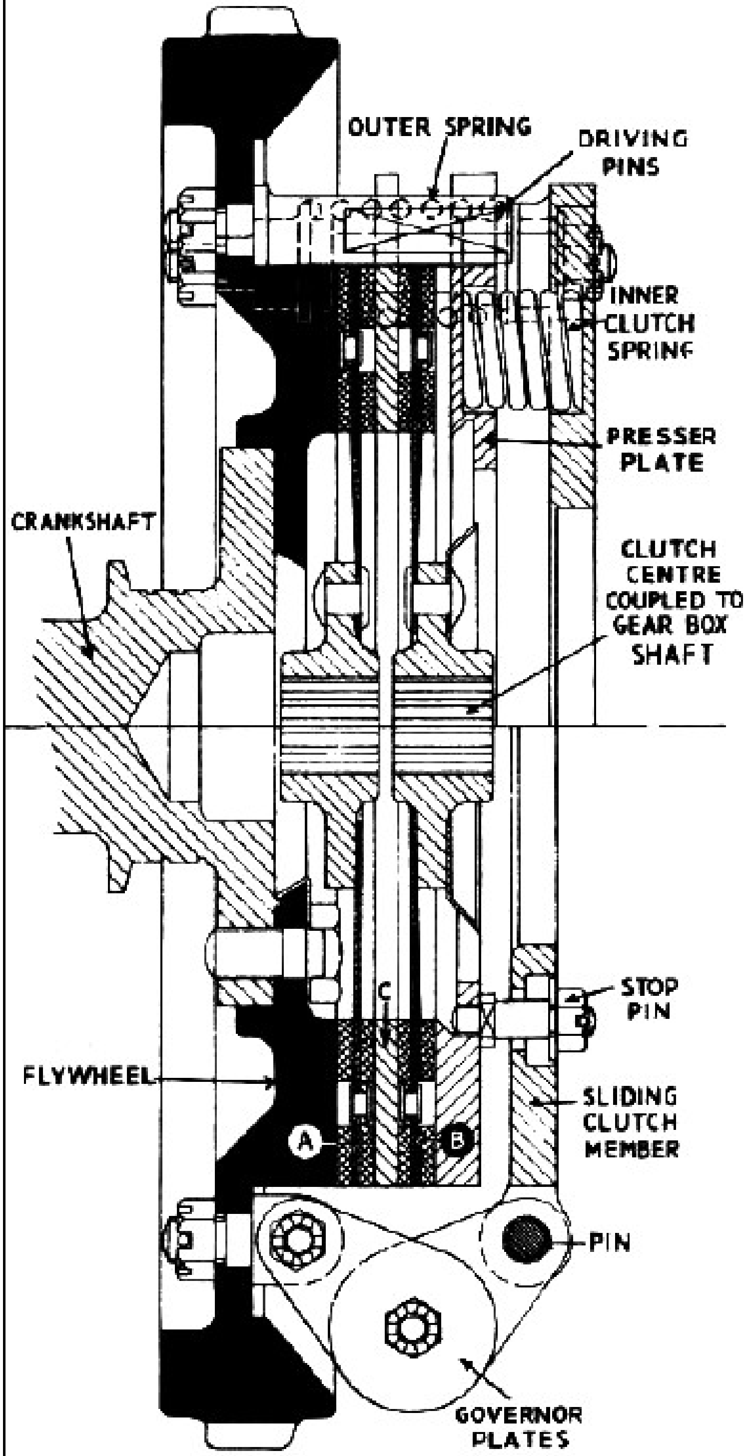
1934 used the Type 1 which is a multi-plate design which suffered considerable wear in use and which generally are not restorable.

1935 and 1936 incorporated a Type 2 version which was a vast improvement and can usually be easily made to work as the makers intended.

1937 saw the introduction of the Type 3 which has received bad press due to some failures of its cast aluminium casing, however, I feel this has occurred due to improper setting up when reconditioning.

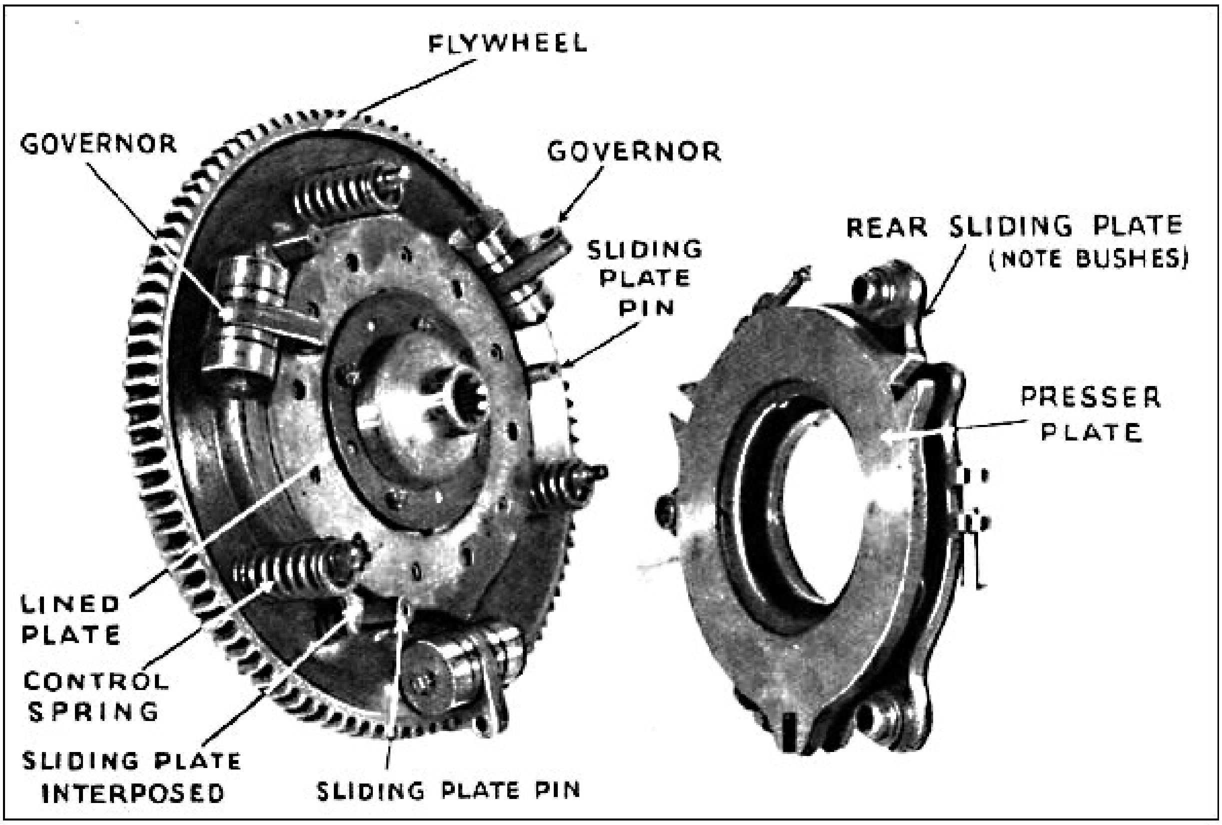
The second design is definitely superior and when repaired will almost certainly give satisfactory service.

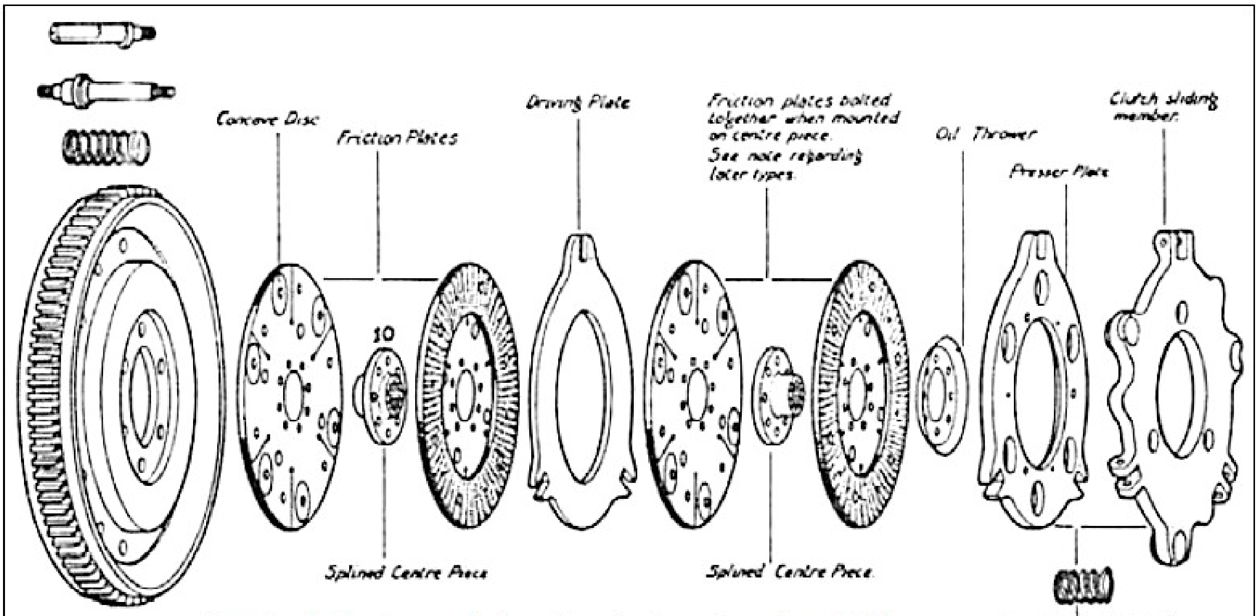
The section drawing shows the arrangement when fitted to the 12/4 motor. The '9' set up is slightly different due to the design of the taper fitting of flywheel to crankshaft. The photograph from a Riley '9' Handbook shows the design as used on the '9' and apart from



Sectional view of Centrifugal Clutch. A and B are friction-lined plates; C, centre plate attached to driving pins.

the clutch plate centre is exactly the same as the 12/4 clutch. The 12/4 actually has two entirely separate clutch plates with splined centres compared to the '9' which, while it has two clutch plates, these are assembled onto a single centre with the centre driving plate mounted sandwiched between with a small clearance.



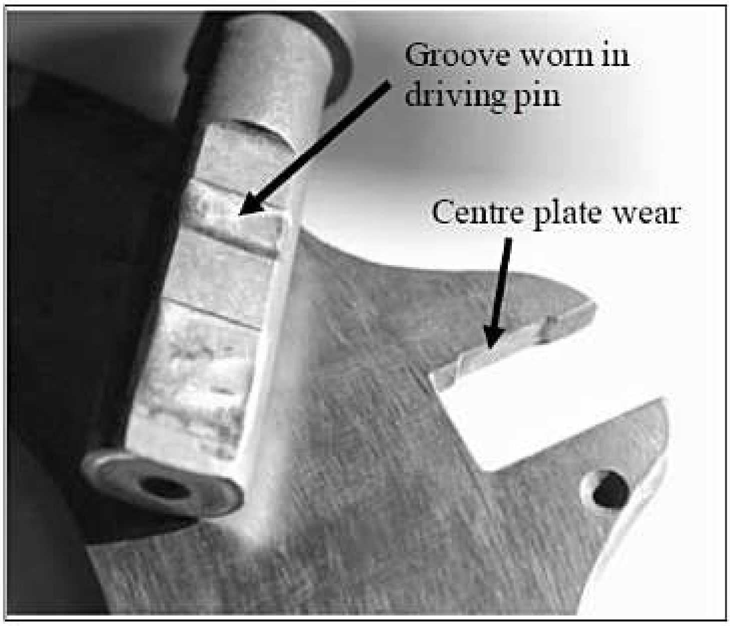


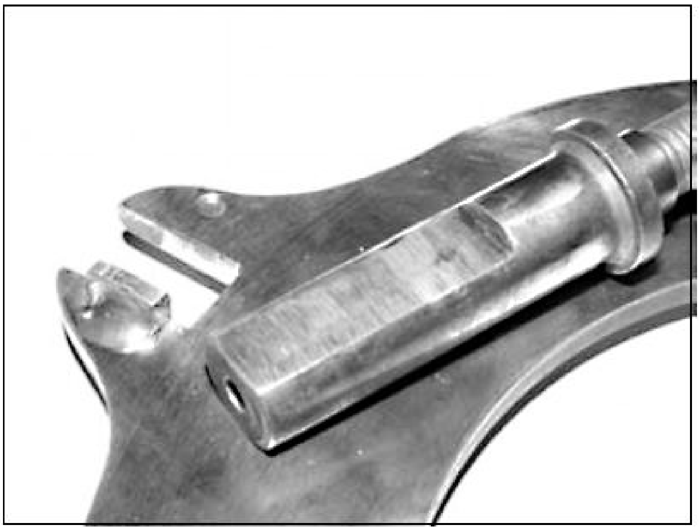
Exploded view of the clutch fitted to the 12/4.

Apart from replacement of the clutch plates, a used Type 2 clutch will show wear on the driving pins both where the centre plate connects and where the main sliding clutch plate operates. This second wear point is not generally as severe as the plate is quite wide, however, the groove formed by the centre plate causes faulty operation interfering with smooth engagement and disengagement. The image below shows a typical worn pin and corresponding wear of the lugs on the centre plate.

A fix for this is to build up the worn pins. I use Stellite and hand grind the repair with satisfactory results. Repair to the centre plate is a bit trickier and the method I use is to file a bigger groove and fit a small rectangular plate as shown on the later images. This modification widens the point of contact with the driving pins and will give much better service life.

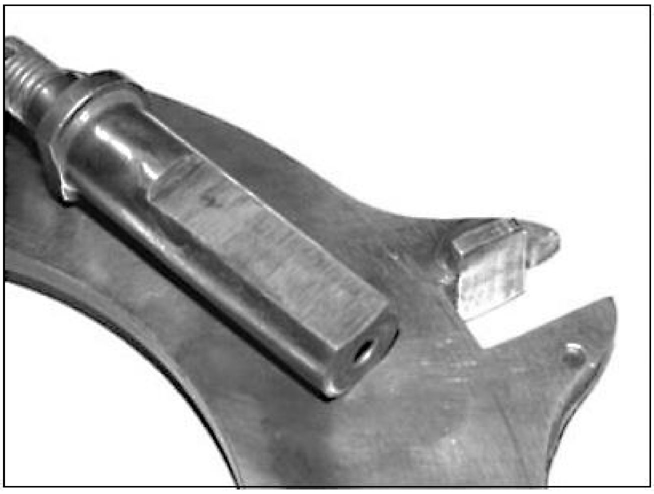
This photo shows the significant wear on the driving pin and also on the driving side of the centre plate. The small hole on the other side of the lug was added to later versions in production for the fitment of a tension spring to hold the centre plate against the driving pin. This prevents clutch rattle on idle.





This view shows the repair made to the centre plate as described above and the driving pin with its grooves made good.

Another view of the repaired components.



Another point which has to be checked is the condition of the inner clutch springs. If the clutch has been slipping in service it is possible that the clutch plate has been seriously overheated to the point that the first few coils of the springs have collapsed. The springs in this event must be replaced.

With regard to the clutch plates, the simplest way to replace these is to modify a modern plate to fit to an original clutch centre. A suitable plate is PBR R7541W from a ‘80-’82 Nissan Pulsar HN10 1400cc or 1500cc. I'm sure there will be other modern plates with similar dimensions if the Nissan plates are not available. Selecting a replacement for a ‘9’ restoration is difficult as the modern plates are too stiff to allow the plates to spring sufficiently to press against the centre plate. In this case it is probably necessary to have new ferodo plates manufactured and repair the originals.

Remove the sprung centre and machine the original centre boss spigot to suit the hole in the centre of the new plate. Drill 8 new holes and bolt the new plates to the splined centres.

This Image shows a Nissan plate attached to an original centre.

OCTOBER 2008

RILEY '9' CRANKSHAFT LOCATION.

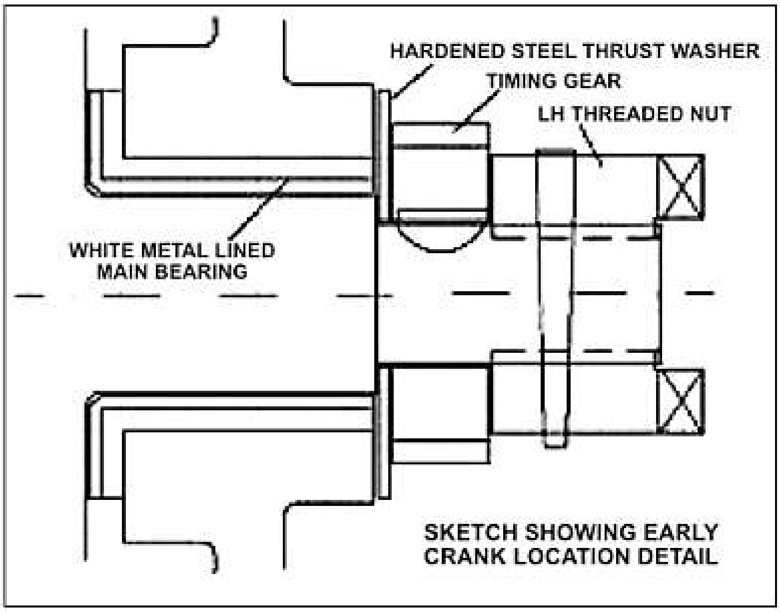
Noel G. Wyatt.

The first Riley '9's, i.e. the Mk 1 models, were equipped with a cone clutch which was disengaged by pressing in the driven cone against a single spring fitted to the flywheel. The force required to compress the spring is taken by the crankshaft against the inside face of the front main bearing.

The bearing is a flanged unit with the flange and bore white-metal lined. This bearing is pressed into the half of the alloy timing cover.

To control the location of the crankshaft a hardened steel thrust washer is used on the front side of the bush with a clearance of 0.002". Here the thrust washer is clamped firmly against the front of the crank by the crankshaft pinion with a left hand threaded fitting which is then held with a morse taper pin. This fitting is the drive for the crankshaft driven generator which is bolted to the very front of the outer half of the alloy timing gear case.

This sketch shows the arrangement.

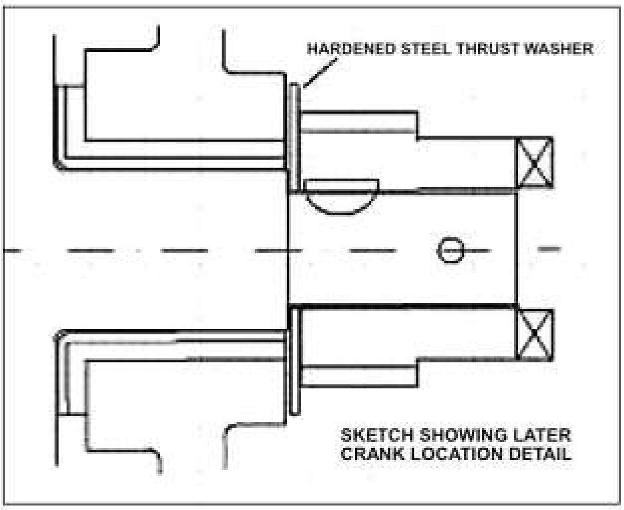


After the Mk 1 the clutch design was changed and this reversed the load on the front main bush so that the thrust washer takes the clutch disengaging force on the other side of the bush assembly. For some reason the Engine Company did not change the bush to have the white-metalled flange take the load of clutch withdrawal.

Initially the threaded drive dog was retained until in 1930-31 (Mk7 engines) the crankshaft pinion was revised to include the drive dog and it is the fitting of a morse taper pin which is required to clamp the gear and the thrust washer against the front of the crankshaft.

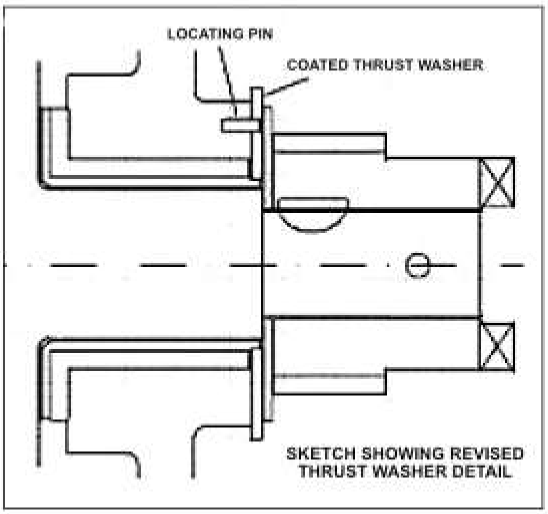
It is important that the thrust washer is firmly located and turns attached to the crankshaft. This usually requires shims to be fitted between the gear and thrust washer.

This sketch shows this later design.



Having worked on several '9' engines I fully endorse an idea which Marshall Maclean developed which is to specially machine the front face of the bush and its housing to allow a special pinned thrust washer to be incorporated to control the location of the crankshaft and take the clutch disengaging load.

This sketch and photos show the detail of these improvements.



The special thrust washer is not inexpensive but is readily available to special order at bearing suppliers. The one to use is Permaglide PAW42P10.

A small pin has to be fitted to prevent the washer from rotating and machining has to be carefully done to give the required 0.002" axial clearance. It is also necessary to use a perfect steel thrust washer which is available from Club Spares.

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FEBRUARY 2009

'9' INLET MANIFOLDS.

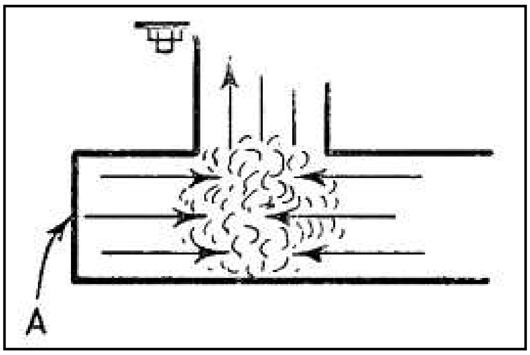
Noel G. Wyatt.

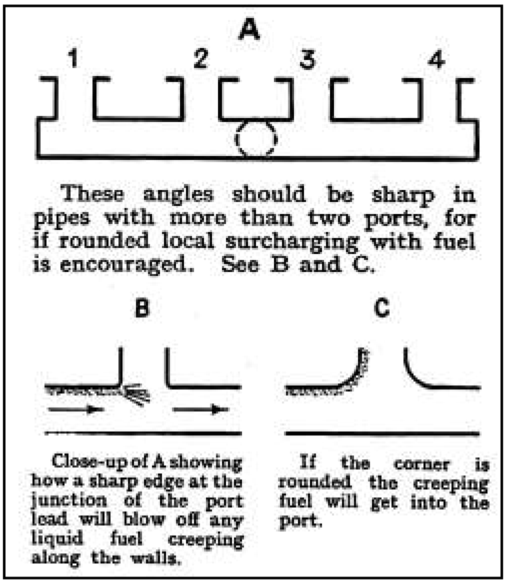
My article on Smiths Dampers in December's magazine was prompted by the contents of the set of Newnes books I purchased during the Colac long weekend. Further reading found a thought-provoking seven page article on the design of engine inlet manifolds. Keep in mind that this was back in about 1933 so its certainly not the latest thinking by any means, but it interested me enough to look at some Riley '9' manifolds that I have and compare them in line with the design thoughts expressed in the article.

First I will list salient points that the writer covered. The item is titled "Induction Pipe Design" by L. Mantell.

1. Induction systems have to be designed bearing in mind that the induction is not just a gas or vapour but is in fact a well disintegrated spray plus a little vapour held in suspension in a rapidly moving air current, all moving at a carefully determined speed to keep it from depositing en route or coalescing into coarse drops.
2. In a multi cylinder engine the problem is distribution. Mr. Mantell points out that what is required is even distribution of the fuel - the air will look after itself. Air travels fairly easily around bends and corners but fuel droplets have inertia and tend to travel on so that some cylinders may have a higher fuel content that others.
3. The interior of the pipe should be polished as a rough interior will cause drag resulting in a slow moving air stream at its proximity causing the liquid content to deposit on the walls of the pipe.
4. The design of the pipe should be such that spiraling is minimised as centrifugal force in the moving stream will also tend to deposit fuel on the walls of the pipe.
5. Mr. Mantell prepared a sketch showing a modern inlet pipe with buffer extensions beyond the port leads.

This sketch shows how the rebound from the buffer extension A meets the oncoming charge and corrects the bias so that the resultant direction is straight into the port head.





6. In a pipe with more than two ports where the fuel mixture passes a port to enter one further downstream, the port edges should be sharp and not rounded as Mr. Mantell indicates on these sketches.

The above 6 points are, as mentioned, only extracts from 7 pages of fairly expanded discourse on the subject. If anyone would like a copy of the complete article, you have only to ask.

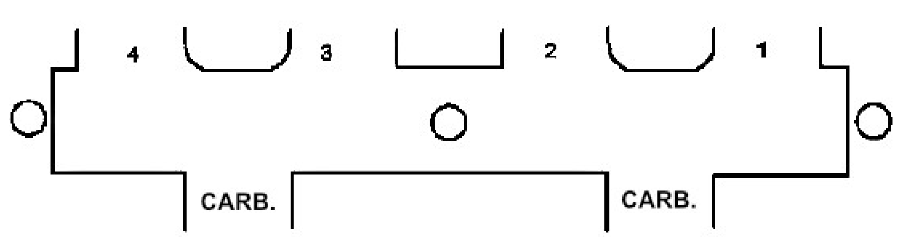
So now we look at the Riley '9' manifolds. I have four which are shown overleaf. I'm not sure when the design changes were made but certainly the first was used for a few years, with the latest one being used first on the Special Series models in about 1933. The Imp model used a twin carb. set up without the hot spot additions and without pulling my Imp apart I can't tell you how the port entries are shaped.

An interesting thing is that all four, which haven't been cleaned internally (and probably never), are coated inside so that when you feel inside your finger becomes covered with a dirty film which is probably dirt caught in a fuel layer made worse by the fact that these early cars were never fitted with air filters.

The shape of the port entries are also of interest. The earliest has nicely rounded entries which, if you hadn't read the article, would appear to be highly advantageous but its as if Mantell's thinking found its way to Riley so that the second and third designs are quite sharp.

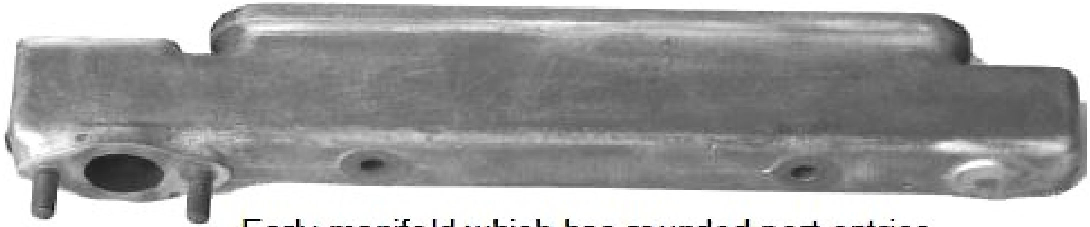
The later twin carb. model has some areas radiused which is interesting when you consider that when, for example, cylinder 1 is drawing in fuel, some of the mixture from the far end carb. passes through the full length of the manifold and, if Mr. Mantell is correct, some of the fuel would be lost on the way.

This sketch below shows approximately the interior of this manifold.



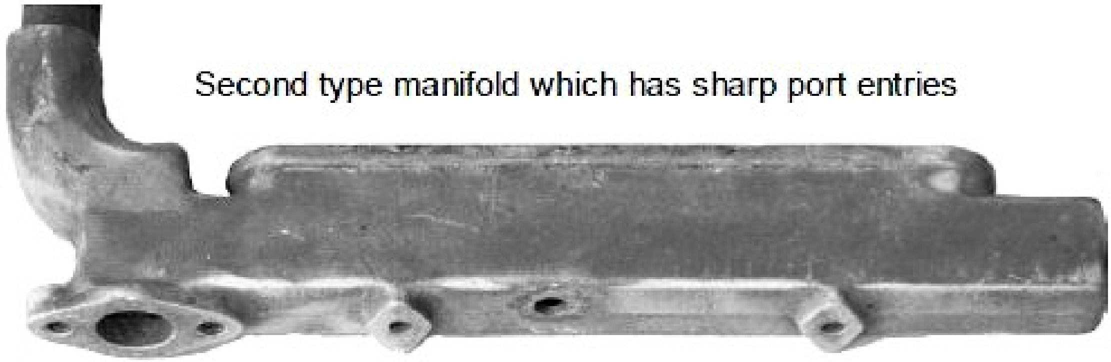
SHAPE OF THE INTERIOR OF THE RILEY '9' SPECIAL SERIES MANIFOLD
THE 3 CIRCLES REPRESENT STUDS SHOWN AT 90 Deg. TO ACTUAL POSITION.

'9' INLET MANIFOLDS.

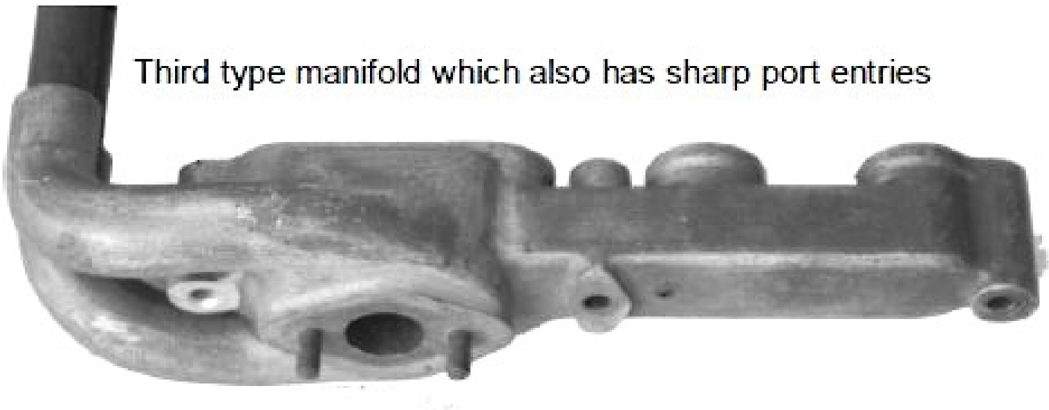


Early manifold which has rounded port entries

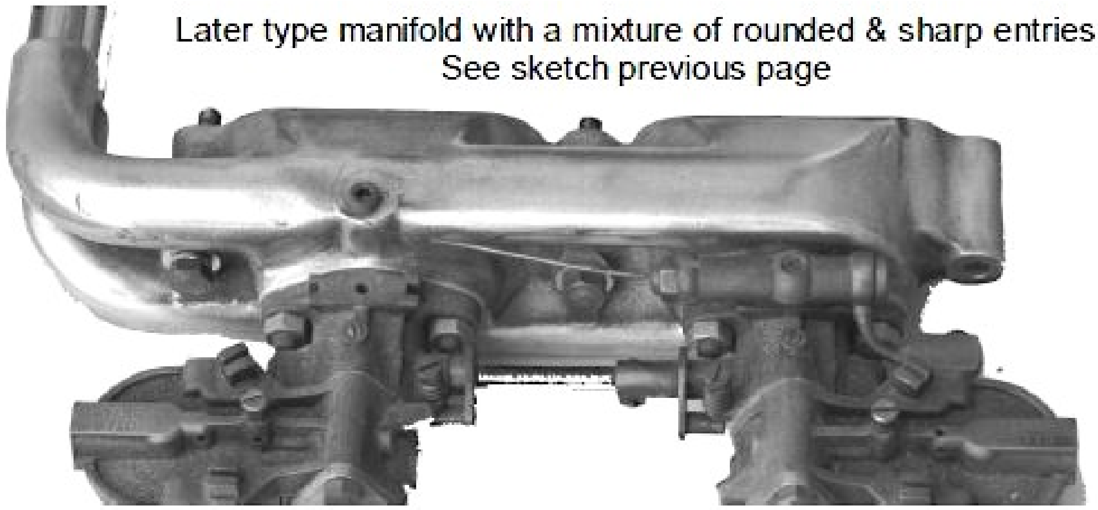
Second type manifold which has sharp port entries



Third type manifold which also has sharp port entries



Later type manifold with a mixture of rounded & sharp entries
See sketch previous page



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MARCH 2009

‘9’ EXHAUST MANIFOLDS.

Noel G. Wyatt

Following on from the Inlet Manifold article in the February Blue Diamond, I thought images of three of the standard Exhaust Manifolds would be of interest. Image 1 is a very early type and I had some difficulty in determining which model used it. Press articles in 1926 announcing the new Riley ‘9’ included a feature of a hot spot. A Mk 1 Owners Handbook clearly shows a manifold as in Image 2.

IMAGE 1

IMAGE 2

Eventually I found a photocopy of a release from Riley titled "The New 9". In it there are some photos showing clearly the exhaust side of the engine with this Image 1 design with no hot spot. Of special interest is a small photo of the inlet side and this shows a manifold with a vertical carburettor below the manifold similar to the Side valve models - most unusual.

It would appear that this publication was released after testing of the '9' in the Alps but, like all these early Riley Sales Releases, it is a mixture of all sorts of details and not really accurate. For example the test mentions - "the specially designed inlet manifold in which is incorporated an exhausted heated hot spot" - not as shown in the drawings.

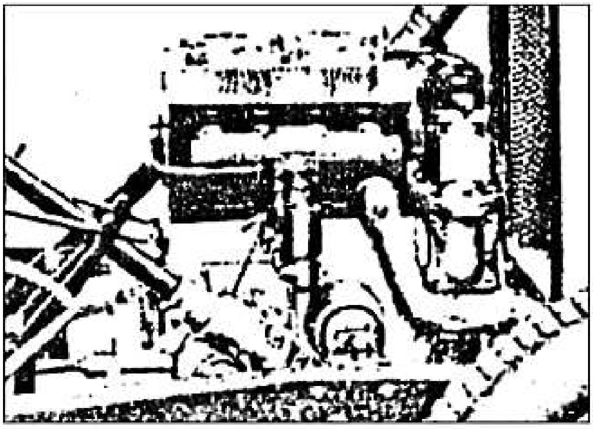
As an aside, one item that took my attention was a description of the 'Riley Clutch' as follows: "There are other distinctive features throughout the complete chassis, a cone clutch of advanced design that engages like silk but is entirely free from slip." My own Mk 1 experiences can't agree with this!!

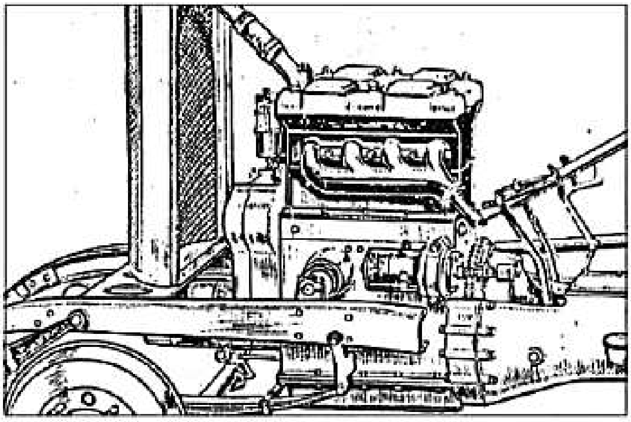
Image 2 shows the normal Mk 1 to 3 design with outlet for the hot spot.

Image 3 is, I believe, that used on all subsequent Rileys up to and including the Merlin engined Rileys.

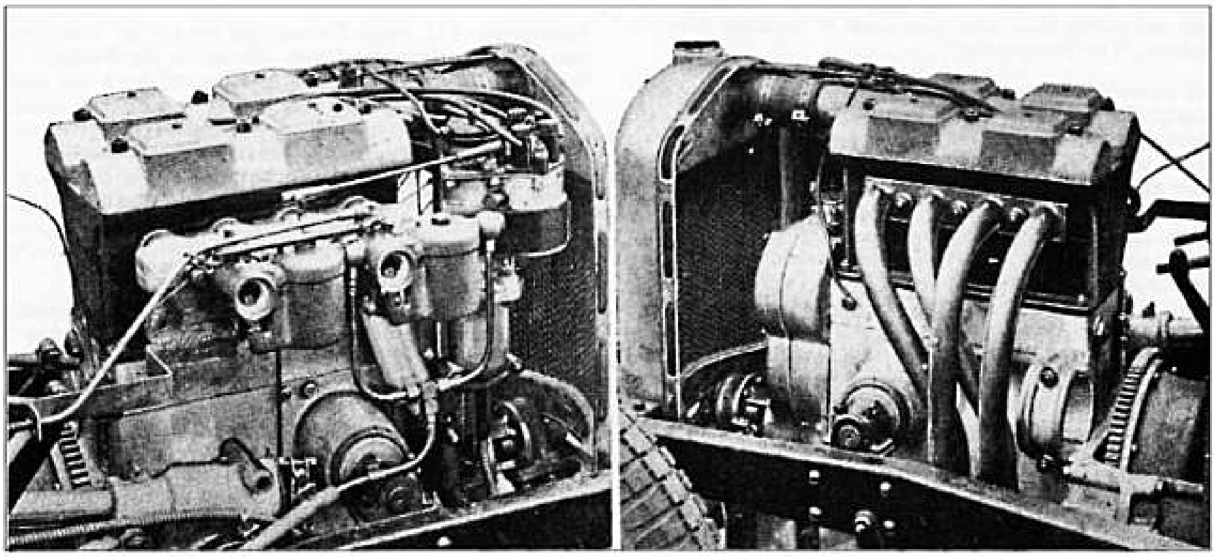
IMAGE 3

Images from “The New 9” brochure showing the exhaust and inlet manifolds are shown below. Note that the ‘9’ engine shown is the pre-production cylinder block (Mk X) with design similar to the Sidevalve engine. i.e. aluminium crankcase with cast iron cylinder block.





If you haven't a photo of the Mk X engine, page 38 of David Styles book “Sporting Rileys – The Forgotten Champions” shows the prototype Speed Model which was based on the Mk 1 chassis and includes views of the engine. This one was fitted with extractors but the inlet side shows a nice twin carb. manifold. The images below are taken from that page.



It seems obvious that this manifold without hot spot tube continued and almost certainly with sports engines with twin carburettors. I have two and have seen more. Actually some Mk 1, 2 and 3 cars now fitted with twin carburettors have the Image 2 type with hot spot tube cut off and sealed over.

JULY 2009

‘9’ CAMSHAFT THRUST BEARING - A MODERN ALTERNATIVE.

The specified thrust race to be fitted behind the timing gears is a 1” size FT1. This particular bearing is no longer available. It consists of 2 plain flat “washers” with a caged set of fairly small balls between. This bearing is shown on the right in the image. Failure of this bearing is invariably caused by rough grooves being caused in the flat side plates.

I researched alternative bearings and found the best alternative is a metric unit which is readily available. It does however require some modifications to be made to the camshaft and the timing gear.

The FT1 is to suit a 1” shaft and has a thickness of 0.375”. The best metric size to use is a 51105. This is to suit a 25mm shaft and has a thickness of 11mm.

Modification to the camshaft is to grind a length of about 12mm long to 25 mm dia. as shown in the image.

Modification to the timing gear is to machine the rear face as shown to a diameter of 25mm to a depth of (11mm - 0.375”) = 0.058”.

Grind of 12mm long to 25mm dia.

The metric bearing shown on the left in the image, is far superior to the FT1 and is well worth considering if you are renovating a ‘9’ engine.

■

MARCH 2010

‘9’ ROCKER ASSEMBLIES.

Noel G. Wyatt.

I was about to title this item ‘9’ Rocker Covers however I believe a more apt description is ‘9’ Rocker Assemblies

Most engines have the valve operating rockers mounted on brackets firmly attached to the head with simple pressed steel or cast alloy covers.

Only 44 of our 282 members own a Riley ‘9’ and most of these 44 have the later models, so I think a majority of our members may not realise where it all started.

The early 6 cylinder engines were of similar design to the ‘9’ but in 1935, when the 12/4 engine was designed, the ‘6’ went the same route with what one might call the traditional method. Only the ‘9’ continued with its separate rocker assembly - as illustrated in the following images.

But there were changes over the 10+ years of ‘9’ production. First the narrow round profile shape of the first 1000 Mk 1 engines were followed by the wider rectangular profile - initially maintaining the lubrication via external piping, then changing to internal supply through ports in the head face of the block. This didn’t prove to be entirely satisfactory, due mainly to the possibility of oil seepage at the front corners of the head gasket. The holes in the gasket must be fitted with ferrules and I believe there is then no problem.

In any case, the design changed again to external piping and finally came a major change initially with the Imp engine and followed by the later Merlin ‘9’ engine. These had a rectangular section but were fitted with round access lids compared to the rectangular lids which were simply held in place by a spring clip - which in some cases didn’t work all that well. Some owners fitted clamp bars to prevent oil leaks. The new round lid was an improvement in this regard as the spring loaded lid attaching cap provided good sealing.

A disadvantage though is access to the rockers to adjust and measure the tappet clearances. Its not easy - not that the earlier rectangular lids were perfect, but you have to experience the round lids to fully understand the problem.

Studying the pictures on the following pages you will see the early design utilised a spring between the pairs of rockers as compared to the later round lid type with rockers fitted separately in allocated pockets. This design allows better support of the rocker shaft with the central web which is necessary for the lid attachment.

This is all part of the magic of a Riley ’9’ and makes owning and driving one an experience no-one should miss.

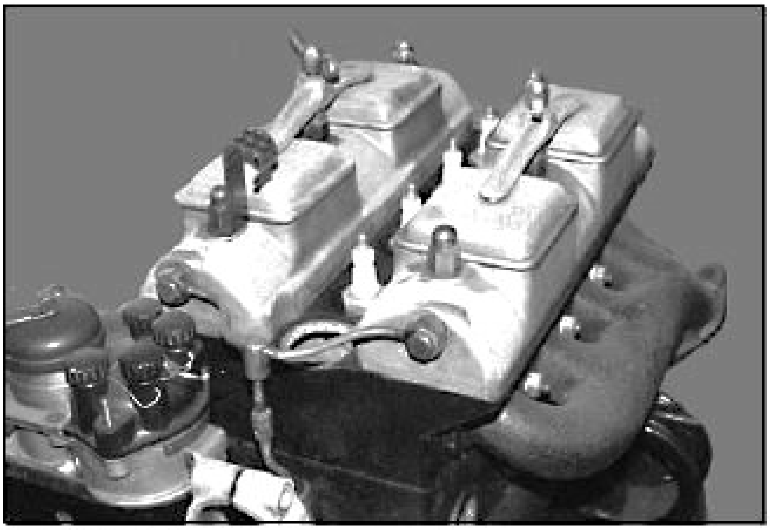


Image A

This shows the external oil feed rocker assemblies - in this image fitted to a Mk 1 '9'
Note the aftermarket lid clamps

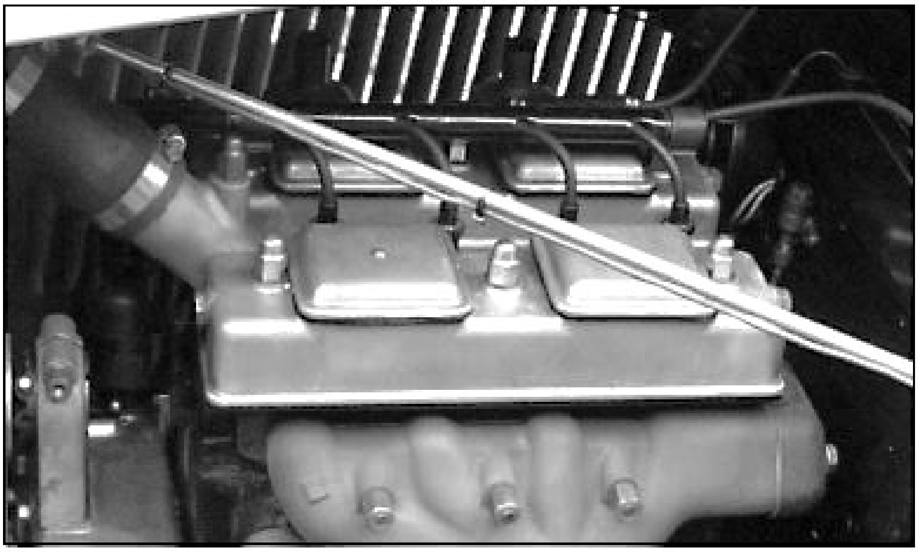


Image B

This shows the internal oil feed rocker assemblies as fitted to the 1934 Riley '9's

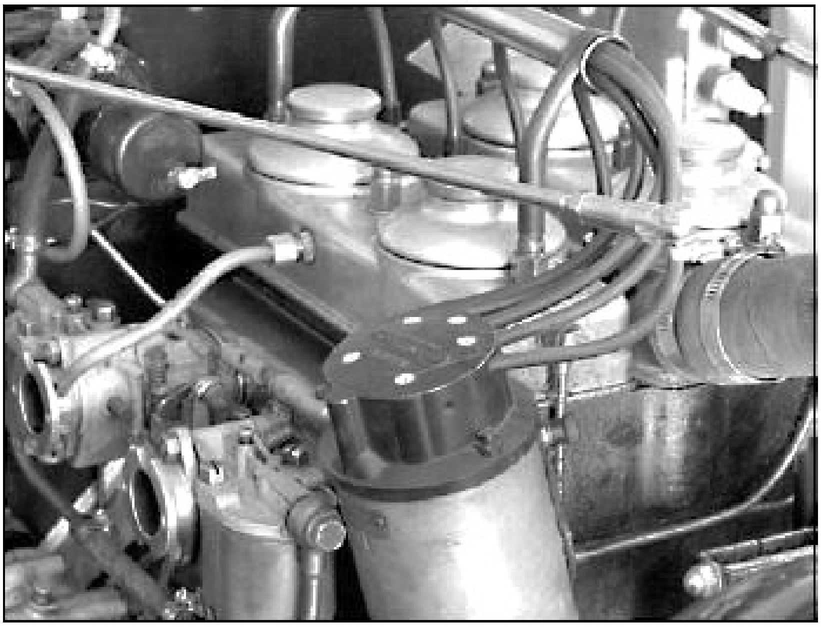
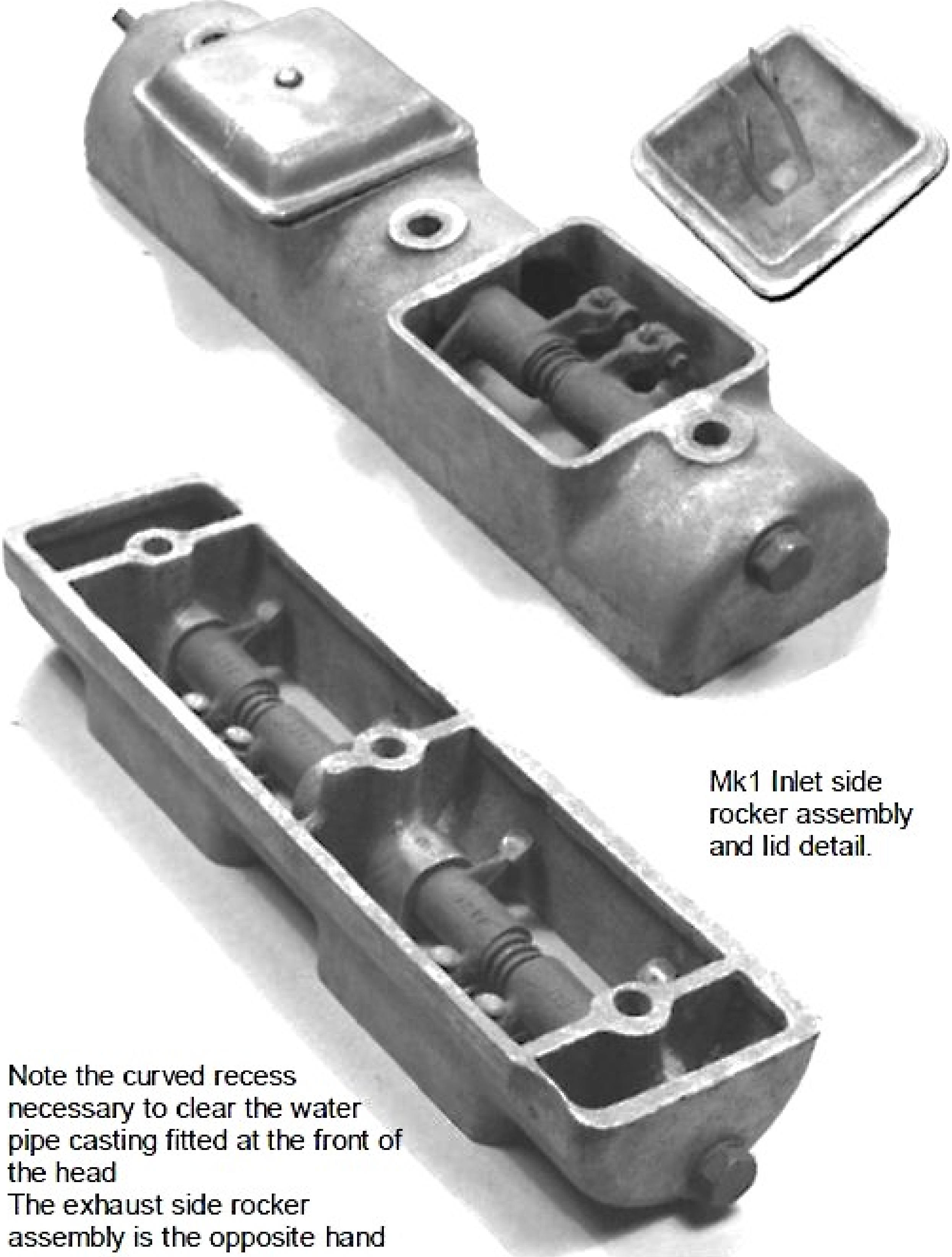


Image C

This shows the external oil feed rocker assemblies as fitted to the Imp and Merlin '9' engines

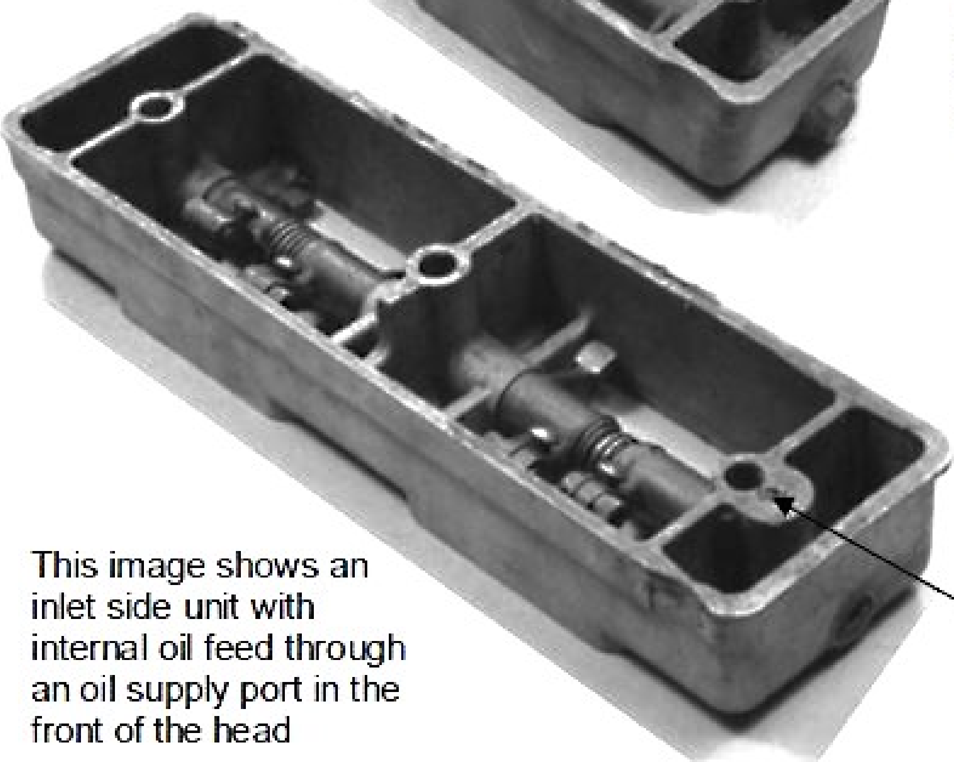


Mk1 Inlet side rocker assembly and lid detail.

Note the curved recess necessary to clear the water pipe casting fitted at the front of the head
The exhaust side rocker assembly is the opposite hand

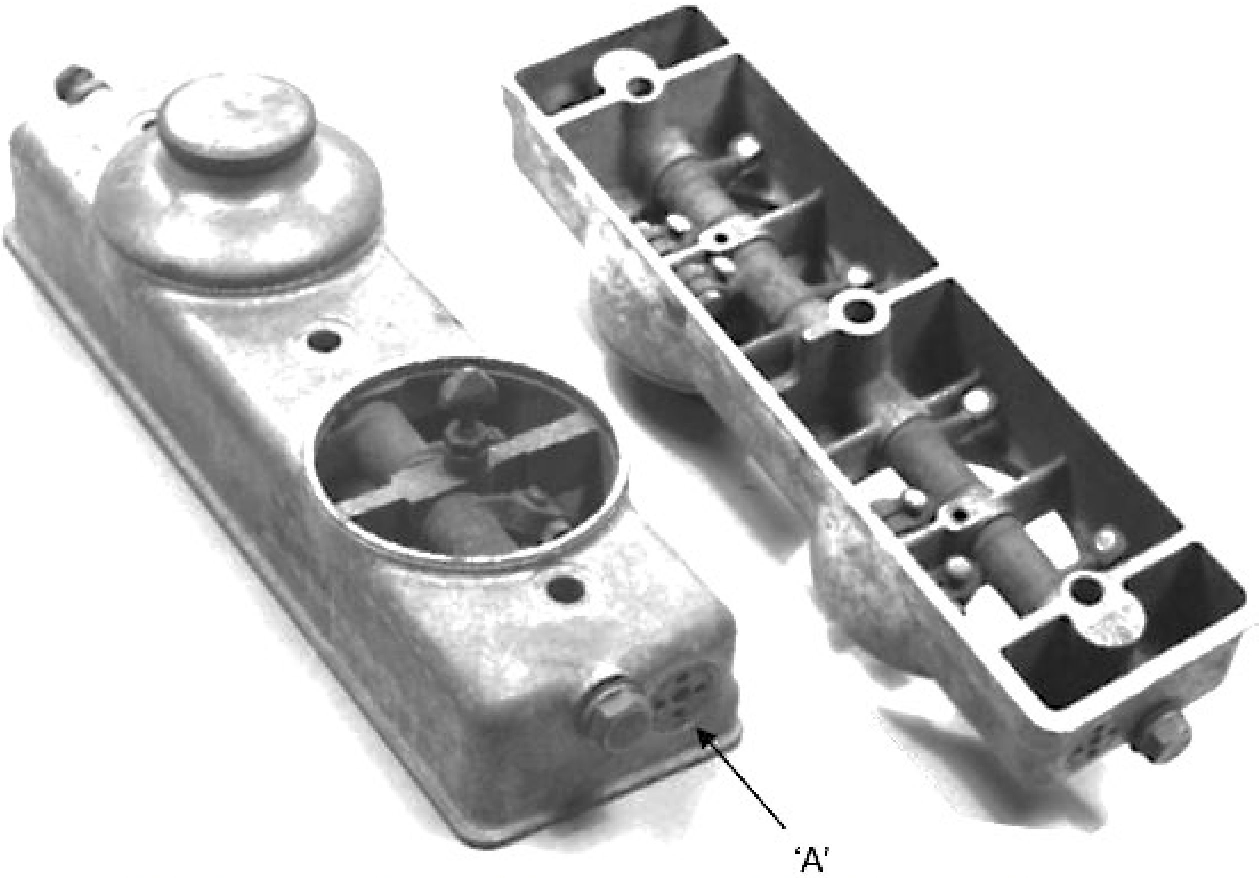
Mk 2 up to Mk 6 all looked like this inlet side rocker assembly

The Mk 2 up to Mk 5 engines had external piping for oil feed to the rocker shaft and this image shows an inlet side unit

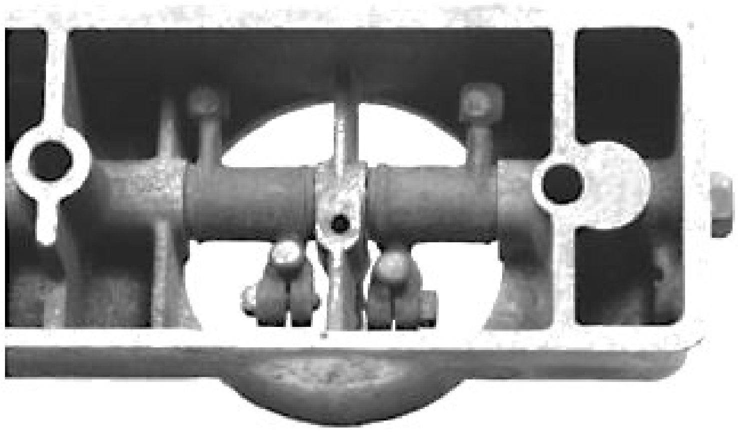


This image shows an inlet side unit with internal oil feed through an oil supply port in the front of the head

Oil supply to this hole.



Imp and Merlin engines used rocker assemblies of this design. Oil feed reverted to external piping. Note that the alloy casting incorporated provision for internal drilling but this was not used. This unit is an exhaust side and these engines had provision for venting with a cross tube connection 'A'. See Image C to see the tube to finally vent the inlet side to the carburettor inlet.



Underneath side of the lid with its spring mounted cam plate