WORKSHOP MANUAL SECTION OO

Wheels and Tyres Supplement

1½ LITRE
and
2½ LITRE

The Wheels And Tyres

"Section OO"

Supplement to Workshop Manual Section O

INTRODUCTION

This "Workshop Manual Supplement" is intended as a top-up to the outdated and sparse information in the original factory-published manual for the Riley RM series of cars. "Section O" of the original which covered wheels and tyres runs to only four pages, half of which are given over to the process of changing a tyre, which few present-day Riley owners will ever need to tackle. We do however need to maintain and replace our tyres and wheels in an age quite different to when Section O was written, and that is what this booklet is for. In style and wording it intentionally mimics the original.

The Supplement is divided into three: information which is additional to the original manual is offered in new sections numbered OO.1 onwards at the front of the booklet. Following those, the original manual sections O.1 to O.4 are reproduced, with some new comments, in the second half. Finally, useful data including other Riley owners' opinions on different tyre makes are at the end in Appendices.

The extra information in this workshop manual supplement will not make you a tyre expert. The average Riley owner just needs a superficial working knowledge to help her or him make informed decisions about the upkeep of their cherished car, and that is all you will find here. For a more detailed insight into the subject you will need to look elsewhere.

This manual is published independently of the owners' club, whose insurers are worried that offering advice on wheels and tyres will expose them to the risk of litigation should someone try and implicate a "wheels and tyres manual" in the event of a road accident. Accordingly, this supplement has been compiled by a freelance writer and is published electronically, rather than in printed form, and must be distributed by personal contact. Those who want to print it will find that it sits comfortably on European A4 sized paper or US "Letter", sticklers for originality will need to find a source of 8¼" x 10¾" paper which is the paper size of the original manual.

An R.M. Chair Production, January 2021

DISCLAIMER

Your tyres are the only physical link between your Riley and the road, and must keep it there in all weathers, during normal cruising or when reacting to unexpected events. Decisions regarding their maintenance are the vehicle keeper's alone. Despite collecting the best possible advice from as many knowledgeable sources as possible, the content of this booklet is no more than the opinions of a number of Riley RM drivers, and is not the official recommendation of a vehicle or tyre maker, or any part of the motor trade, or an owners' club.

It is the responsibility of the car driver to keep her or himself, any passengers and other road users safe by frequent and appropriate maintenance, and by consulting qualified experts when any question arises.

Distributed freely, no copyright applies.

 Distributed freely, no copyright applies

SECTION 00
THE WHEELS AND TYRES
(1½ and 2½ LITRE)

NEW SECTIONS 00.1 – 00.9

ORIGINAL SECTIONS 0.1 – 0.4

APPENDICES

Distributed freely, no copyright applies.

NEW SECTIONS 00.1 – 00.9

These new sections add information which the original Workshop Manual authors could not have anticipated. The original manual sections O.1 to O.4 are repeated, with notes, in the second half of this supplement.

Section 00.1

REPLACING TYRES

If a tyre's tread does not comply with legislation, is worn unevenly or simply worn out, it clearly must be replaced, as is the case when it has sustained sidewall damage. The decision is less clear cut when a tyre has plenty of tread but its provenance is unknown.

The Riley RM is a heavy vehicle (particularly the 2½ litre models) and it needs good, and appropriate, tyres.

As tyre makes and brands change all the time it is impractical to try to provide a list of "recommended" (or even "cautioned against") types. The most reliable way of keeping up with latest advice is via other Riley RM owners using owners' club facilities or social media. A selection of owners' comments is given in the Appendices at the end of this booklet.

TYRES OF UNKNOWN AGE

By virtue of the car's age, a Riley RM's tyres can potentially have been in place for decades. When a roadworthy car changes hands, therefore, its new owner must ascertain carefully the age and condition of all five of its tyres, since they can have good tread but at the same time be unfit for use due to decomposition of the tyre structure. Any cracking of the sidewalls must be viewed with suspicion, and submitted to a qualified person for assessment if there is any doubt.

While many tyres have the date of manufacture moulded into them there is no universal rule on what is the safe life of a tyre, which is influenced by the way it is used as well as the way it is garaged (or not) when it is not in use. In some countries, legislation may impose a maximum age for use on the road.

Remember: failure of a tyre's structure or inner tube while on the road may be sudden and result in the driver losing control.

If a tyre transmits a regular thump or twitch through the steering or suspension as it revolves it is a sign that its casing is damaged and it needs urgent attention. The car must not be used until the cause has been determined and rectified.

Example of a tyre with plenty of tread but whose cracked sidewall shows that it is too old to use.

Remember too that when the car's tyres are equipped with inner tubes, it is the tube and not the tyre which is holding the air. The inner tubes of a car which has been out of service for a long may have aged to the point where they fail suddenly after a short period of use, so fitting new tubes is an important part of recommissioning a dormant Riley RM. An ad hoc test is to examine carefully the valve stem which protrudes through the rim, including flexing it from side to side. If any cracking is visible, assume that the tube is ready for replacement.

SELECTING REPLACEMENT TYRES

According to the driver's "Instruction Book" issued with each car, originally the Riley RM was equipped with Dunlop tyres, 6.00" x 16" for the 2½ litre car and 5.75" x 16" for the 1½ litre. Today these would be called cross-ply tyres and were probably equivalent to the well-known Dunlop RS5 model.

The speedometers were calibrated to assume these tyre sizes, and the Dunlop tyres, being a top quality contemporary make, would give optimum ride comfort and road adhesion. There would have been

 Distributed freely, no copyright applies

little incentive for the owner of a nearly-new Riley to fit anything else when the original set had worn down.

When the present-day owner is looking to replace their tyres the situation is not so straightforward. There are many more tyre brands in existence, coming from all over the world, and there are several factors to consider and balance against one another. In no particular order these are:

- Size, especially circumference, which affects speedometer accuracy and engine speed
- Roadholding, both wet and dry conditions
- Whether radial or cross-ply construction
- Visual appearance
- Comfort
- Lightness of steering
- Compatibility with any existing tyres which are not being replaced
- Budget

Each of these topics is described in turn below.

Circumference

The original Dunlop tyres are believed to have had a circumference of 226cm (6:00 x 16, for the 2½ litre), or 222cm (5:75 x 16, for the 1½ litre). The circumference of a prospective new tyre should always be compared with the original before making a decision. *(Note: where a tyre's diameter is given rather than circumference, convert by multiplying by π, or 3.14).*

As an example of how a different tyre size can affect engine revs and speedometer accuracy, consider the effect of using a modern "Taxi radial" on a 2½ litre. This class of tyre has the attraction of being readily available at low cost but it has a typical circumference of 210cm, which is 93% of original. So, at a real road speed of 60 mph, the speedometer will be showing 64½, and the engine will be running at 3310 rpm instead of 3080. A "Taxi" tyre on a 1½ litre is 94½ % of original circumference, so at 60 mph the speedometer will read 63½ and the engine speed will be 4,000 instead of 3,750.

A "Taxi" rated tyre will also visually be somewhat undersized within the wing aperture, and the ground clearance less than standard by about 1".

These may be acceptable trade-offs, but it needs to be an informed decision by the buyer and the message is to avoid surprises by carrying out adequate research on a prospective new tyre before committing to a purchase.

Note: the circumference (or diameter) specified by a tyre vendor is generally with the tyre inflated, but not on the ground. When loaded with the weight of the car the effective or "rolling" circumference reduces. The effect is likely to be an effective reduction of around 8cm. This is academic, unless carrying out mathematical calculations about engine revs or speedometer accuracy.

It is risky to buy tyres with a greater width or circumference than original. Larger tyres may foul the wheel arches at the back, and chassis and/or body at the front. They may not fit into the spare wheel compartment either.

Roadholding

New high-quality Dunlop cross-ply tyres of the mid 1940s to 1950s had reasonable standards of grip (by comparison with modern tyres) in terms of cornering and achievable braking distances. The chassis designers would have been aware of the characteristics of the tyres which would have been taken into consideration when specifying such items as dampers, hub bearings and brake assemblies.

With a further 70 years' continuous improvement in tyre design and rubber technology a modern tyre, especially a radial ply one, will have a grip on the road far in excess of the originals. This is generally a good thing since the car will corner and pull up more surely in adverse conditions, but there are one or two side effects to take into consideration as described below.

In general it is difficult to find a tyre with a performance inferior to the original, though they do exist and must be avoided. Generally these are sold on the merits of their low price, though not all low priced tyres are of poor quality, in fact some are exemplary. To avoid buying unsuitable tyres make use of the Riley "network" and learn from other RM drivers before deciding.

Undesirable by-products of the extra grip afforded by new designs are increased wear on hub bearings and the risk of permanently distorting the front hub castings, caused by cornering forces; an inability to lock the wheels under braking leading to an (incorrect) belief that the brakes are not as good as they were; extra strain on the wheels risking fatigue cracking of the central wheel pressing or over-straining the rivets which hold the centre to the rim.

Radial versus Cross-ply

This topic has been expanded upon in Section OO.2 below.

Distributed freely, no copyright applies.

Visual Appearance

The size of the tyres make them a prominent part of the side view of the Riley. If the owner wants to retain the appearance of the car when it was new, which had a flat sidewall with a sharp corner to the tread, then a cross-ply tyre or one with a similar side profile is a good candidate. If the tyre is required to be primarily functional then this constraint does not apply. Radial tyres generally bulge more where they are in contact with the road.

If choosing a "Taxi" rated tyre bear in mind that its smaller diameter will make more wheel arch visible, to the slight detriment of the side view, and will make the car sit around 1" lower to the ground.

For some owners the idea of having whitewall tyres is attractive. Caution is advised. While these can certainly add to the car's aesthetic appeal in some circumstances, in others they may detract. What looks good on a red RM Roadster in Palm Springs, California may not impress as much on a black saloon in Birkenhead, Britain.

Comfort

The Riley RM intrinsically has a firm ride. Use of a tyre with too rigid a construction may add materially to that and result in unpleasant amounts of road vibration being passed through to the passengers and also to the car's coachwork. Be cautious about selecting a tyre designed for use on light commercial vehicles (possibly sold as a "van tyre") which may be too rigid, since these are expected to carry a greater weight than an RM wheel does, although some experienced owners report satisfaction with them. They are possibly better suited to a 2½ litre model which is much heavier than the 1½ litre. Avoid tyres intended for off-road vehicles as their tread pattern will lead to excessive road noise.

Lightness of steering

The make and model of tyres on the front axle have a direct effect on the amount of effort needed to turn the steering wheel. Tyres which grip the road well for cornering may require more force than is comfortable for parking in tight places and some drivers will find this unacceptable. Discussion with other Riley RM owners is recommended to try to choose a currently available tyre which gives an adequately light feeling via the steering.

Many owners are surprised by how light and responsive a Riley's steering can be after changing their front tyres to a brand more compatible with the car's characteristics.

Compatibility

Unless replacing all five tyres, consider whether new tyres under consideration will match, reasonably speaking, the ones which are remaining including the spare wheel. Pay attention to tread pattern and size, and of course it is generally not advisable to mix new and old on the same axle.

Budget

In the real world of running an old car as a hobby of course this might be the governing factor. But if money is going to be spent, use the above notes to guide the purchase to avoid making a disappointing decision. Above all, liaise with other Riley owners whether that be in person, by phone, email, a club website or social media.

Section 00.2

RADIAL-PLY TYRES

Background

Radial-ply tyres arrived too late to British car manufacture for Riley Motors to consider them but became established as the de facto type of tyre for new cars during the 1960s. Within a few more years it had become hard to buy anything else, and now cross-ply tyres are regarded as being for niche uses such as vintage and classic cars. Outwardly the most obvious difference is the squashy and fatter appearance of a typical radial compared with a cross-ply.

Radials did not suit every contemporary car when introduced, but the Riley RM front suspension and steering has proved ideal for them. (Perhaps this is down to it having been derived from the French "Traction Avant" Citroëns which were an early application of Michelin radial-ply tyres). A straw poll of Riley RMs at any gathering will show that radial-ply tyres are now the more popular type.

High on the list of reasons for this choice will be availability and price. Importantly, many radials offer worthwhile improvements in roadholding over cross-plies; detractors will point out a loss of original appearance, that the steering can be heavier, and feedback via the steering wheel perhaps less delicate. Some cheap cross-ply tyres which have appeared in

 Distributed freely, no copyright applies

recent years can be truly awful in use and this may have converted some drivers to radials – only reputable (often meaning costly) cross-plies are any good.

In practical terms, a radial tyre is usually wider than its cross-ply equivalent and may not fit into the spare wheel compartment without surgery to (or removal of) the tapered wooden block which is screwed to the underside of the boot floor for the spare wheel to abut against.

Cutting down the spare wheel abutment block in-situ.

Tyre size equivalents

In most cross-ply tyre designations the first number represents the casing width and the second the rim diameter, both in inches. The height of the tyre sidewall is generally equal to the width.

Unless a radial tyre is marketed as if it were a "cross-ply replacement", its size designation has either two or three numbers,. The first is the tread width, in mm; the optional second is the "profile" or "aspect" which is the ratio in percent between sidewall height and tyre width (if absent, it is 80); the third is the rim diameter, either inches or mm. The "R" before the rim diameter designates a radial tyre.

Radial size	Nearest cross-ply equivalent
175/75 R16	5.25 x 16 ("Taxi" rated)
185/80 R16	5.75 x 16 (original to 1½ litre)
195/80 R16	6.00 x 16 (original to 2½ litre)
205/80 R16	6.50 x 16 (oversize for RM)

(A more complete table of tyre size cross-references is given in the Appendix to assist in comparing tyre brands).

Because of the ratio between sidewall height and width of a radial tyre, the measurement across the tread is greater than that of the cross-ply equivalent. This has a bearing on the tyre pressure.

Radial Tyre pressures

As radial tyres were never standard fitment to Riley RMs there exists no table of tyre pressures equivalent to those given for cross-plies, as shown in Section O.1. The extra width of the typical radial tyre's tread means that if the same pressure is used, the tyre will be under-inflated. The footprint of the tyre on the ground will be rectangular rather than square, measuring more across the width than from front to back. The goal to use as a starting point is to achieve a footprint which is a true square (which the original tyres achieve, to a close approximation).

This can be done by trial and error, or a start can be made by calculation; you will need to know the weight on each wheel, and the width of the tyre which is in contact with the ground. The sum is:

Pressure = weight / width squared.

The weight of a 2½ litre is approximately 890 lb on each wheel, that of a 1½ litre 700 lb front, 750 lb rear. Be careful not to mix units; preferably work in pounds and inches, and if need be convert to bar or kPa afterwards.

The optimum pressure will be one which gives reasonably light steering but without causing a harsh ride, and (depending on the tyre) may be as much as 25% higher than the equivalent cross-ply recommended pressure (see Section O.1).

Be advised that although using non-standard tyre pressures may potentially contravene the strict letter of road traffic regulations, fitting radial-ply tyres is itself non-standard. If the tyres are inflated and maintained responsibly, the car will be as safe, if not more so, than when it was new.

Mixing Radial and Cross-ply

Although it may be feasible to fit both radial and cross-ply tyres, that must never be on the same axle, and (by law in the UK) the radials should go on the back wheels - when much of their advantage is lost. Having both types on the car also creates the dilemma of what to carry as a spare.

It is strongly advised to have all five tyres of the same construction.

Section 00.3

INNER TUBES AND TUBELESS TYRES

The debate on whether or not it is better to equip a Riley RM with inner tubes is probably as old as the advent of the tubeless tyre itself. Originally of course all Riley RM tyres had inner tubes, and the tyres and

wheels were designed with that in mind. Although most currently available car tyres are designed for tubeless use, that is not the same as saying that it is always wrong to fit tubes.

The argument goes more or less thus:

For no tubes: Tyres designed without inner tubes in mind may have moulded ribs or other features on the inside, where they could abrade the tube and cause it to fail.

For fitting tubes: Wheel rims designed for tubeless tyres have a "safety hump" to prevent a tyre coming right off the wheel in the event of deflation. Riley RM rims do not have this feature.

Both points of view have merit, and Riley RM owners will be found who claim complete reliability with both tubed and tubeless operation.

As far as safety goes, the following statement was issued by the reputable manufacturer Pirelli in December 2020, as relayed by their UK classic car tyre distributor Longstone Tyres:

The following precautions must be taken when fitting an inner tube in tyres branded tubeless.

Using an inner tube in a tubeless tyre is possible on certain types of vehicle when the wheel is designed for mounting with an inner tube such as:

- *Non-safety wheels (without safety hump) or multi-piece wheels.*
- *Wire spoked wheels where air could otherwise escape through the spoke holes in the wheel (so not completely air tight).*

Application Restrictions

- *Only in tubeless tyres with a series or aspect ratio equal or higher than 70, i.e. 185/70 x 14 would be ok, 185/65x14 would not.*
- *Only in tubeless tyres with a speed symbol equal or lower than V (max speed 149mph).*
- *Not for motorsport application.*

Recommendations

- *If an inner tube is to be fitted with a tubeless tyre it is imperative to carefully examine and ensure there is no feature inside the tubeless tyre or on the inside of the wheel rim which could cause premature tube failure, e.g. any paper or plastic identification stickers must be completely removed.*
- *Always ensure that the inner tube is suitable for the specific tyre size.*

Section 00.4

SPECIALIST TYRE GARAGES

Since the days of Riley RM production ended it has become customary for a car's tyres to be attended to at a specialist tyre supply centre rather than a general garage. The equipment used by these establishments is sensitive and sophisticated which is generally a good thing, but sometimes tyre fitters used to the world of diagnosis by computer are unfamiliar with the concept of dealing with older vehicles.

If taking a Riley to such a place it is recommended to watch carefully the following points, which may not occur to the operator. In particular, whatever the general policy on allowing customers into the working area, you should try to negotiate your way to watch operations in person.

Balancing machines

Many computerised balancing machines use a cone attachment, not the five wheel stud holes, to find the centre of the wheel. The hole in the middle of the Riley RM rim was not manufactured with that in mind and may not be dead centre; instead of the cone, request that an adaptor plate is used which bolts to the wheel's stud holes. Otherwise, while the machine may balance the wheel to perfection while it is centred on the cone, it may still be out of balance when refitted to the car. This is surprisingly common.

The warning at the end of Section O.2 about not placing balance weights inside the rim may safely be ignored provided the owner is satisfied that the hydraulic brake hoses are well clear of the rim under all circumstances. If not, they must be adjusted – see original manual Section M.14, and for better detail, the Braking System Supplement published by the owners' club, Section M+14.

Wheel inspection

If the tyre has not been removed recently, take the opportunity to look closely inside the well of the rim since rust can form here due to condensation and cause nuisance puncturing of the inner tube.

If rust is found it is not a lasting solution just to wire-brush the worst away and refit the tube and tyre, which is all that the tyre fitter can offer; the rim really needs re-painting internally. If it can be arranged, suspend the tyre fitting operation, take the

 Distributed freely, no copyright applies

wheel away and treat it, and return a day or two later when the paint is fully cured.

Inner tube fitment

If an inner tube is to be used within a tyre marked "tubeless" be prepared to argue the point with the fitter, armed with the comments in Section OO.3 above. Do check carefully that there is nothing inside the tyre casing which could damage the tube.

If an inner tube is to be used, to prevent the risk of it being creased or wrinkled within the tyre its rated size must be no larger than for the size of tyre in use, and slightly narrower is acceptable. After initial inflation the tube should be completely deflated again, to allow the tube to settle evenly within the tyre, before final inflation.

Note that in recent years a smaller diameter of valve stem has begun to appear on inner tubes. It is vital that the valve stem is a snug fit in the wheel rim and a purpose-made adaptor collar must be used if a tube with the smaller valve stem is to be used.

Refitting the wheel

Watch that the fitter uses a nut spinner or socket whose hexagon accurately fits the size of the car's wheel nuts, which may be Whitworth or inch sizes A/F but never metric.

Request that the final tightening is done by hand to a modest torque. The powerful pneumatic drive in common use is quite capable of taking the thread right out of original brass Riley RM nuts if fitted.

Make sure that the hub disc is not pushed beyond the groove in the three wheel buttons as described in Section O.1 below.

Section 00.5

UNEVEN TYRE WEAR

Typical causes of uneven tyre wear are well understood and documented and a modest amount of research will disclose common causes, typically involving persistent over- or under- inflation or incorrect steering alignment.

When fitted to a Riley RM all the normal causes still apply but to those can be added further possibilities which relate to the age and design of the car and the possibility of incorrect re-assembly after maintenance work. These may appear to be the result of incorrect steering alignment (that is, track rod adjustment) in that one or both tyres wears more towards one side, but the alignment proves to be correct when measured. Possible causes are:

1. Upper wishbones reversed front to back: the top suspension wishbones (Workshop Manual page K.6 items 70, 70a) are nearly but not quite identical. If the two are accidentally exchanged the top of the swivel pin is held in the wrong position. The one whose arm is nearest to 90° to its spindle axis goes to the front.
2. Lower wishbone inner bush(es) distorted: the lower suspension wishbones pivot on substantial rubber bushes (Workshop Manual page K.6 items 35). Although robust they can occasionally distort or even collapse, putting the front suspension out of alignment on that side.
3. Bent swivel pin: hard collision with a solid object can cause the bottom of a swivel pin (Workshop Manual page K.6 item 8) to be bent backwards or inwards, mis-positioning the hub on that side.
4. Slack hub bearing or bearing loose in hub: any play in a front wheel beyond about 3/32" (2.5mm) when jacked up will allow a wheel to run slightly out of true. This may simply be worn hub bearing(s) but an increasingly frequent cause is that the bearing race has become loose in the hub (Workshop Manual page K.6 item 83).

Note that if adjusting the tracking on a Riley RM it is important that the work is done with the car resting on its wheels on a level floor, and that it is rolled forward, not backward, to the place where the adjustment is to take place. The track changes substantially according to the attitude of the car and is very much linked to the suspension height. Workshop Manual Section K.2 provides directions on the suspension height and track adjustment.

Section 00.6

THE WHEELS

The wheels of Riley RMs were manufactured by Dunlop and are size coded 4½" J x 16. The five stud holes are on a 4.75" pitch circle. The wheel is made up from two pieces rivetted together, a hub of 14" diameter and a rim with well depth $1^{9}/_{16}$".

In all but the very earliest 1946 cars the only apertures in the wheel were the shallow gaps between the rivetted areas; on those first cars the

wheel hubs had circular drilled holes, perhaps for brake cooling. This practice was soon discontinued. Beyond this, two types of wheel are known to exist differing only in the gauge of steel used in the central hub, one weighing 17 lb and the other 21 lb.

Note that the wheels fitted to the later Pathfinder model look identical but the pitch circle of the studs is very slightly different, and the wheels are not in fact interchangeable. If buying secondhand wheels this is a pitfall to bear in mind and it would be wise to enquire what the donor car model was.

In service the wheels are robust but not indestructible especially when mistreated. Instances are known of the central hub developing a crack which grows until it breaks away leaving the centre with fixing nuts still in place. Early warning of this is the need to fit more balance weights than normal, especially if the amount of weight needed increases periodically; any wheel requiring more than about 150g of rim weights is suspect and should be examined carefully for signs of cracks, particularly near the wheel nuts and on the curved part of the central hub.

If the wheel exhibits a persistent wobble check it for run-out (where the rim moves in and out along the hub axis as the wheel is turned). This can arise if the car is driven against a kerb or other roadside obstruction. A run-out of up to 1/10" / 2.5mm may be acceptable, though some recommend 1/16" / 1.5mm maximum. A wheel with excessive run-out may be recoverable by someone with the right equipment.

If the wheel has hit an obstruction hard such that the rim has been visibly dented, the wheel is essentially a write-off and a good second-hand replacement should be sought.

On occasions when a road wheel is removed to attend to other servicing, for example inspecting the brakes, take the opportunity to remove the road dirt which accumulates inside the rim. If left too long, the effects may be to upset the wheel's balance, and also lead to rust.

Encrusted mud is best dealt with by first soaking it with water for a good while and then brushing away with a stiff brush, repeating as necessary; leakage of oil or grease will need some mild solvent to remove it. Once the wheel is clean and dried, decide whether it might benefit from corrosion treatment and/or a re-paint.

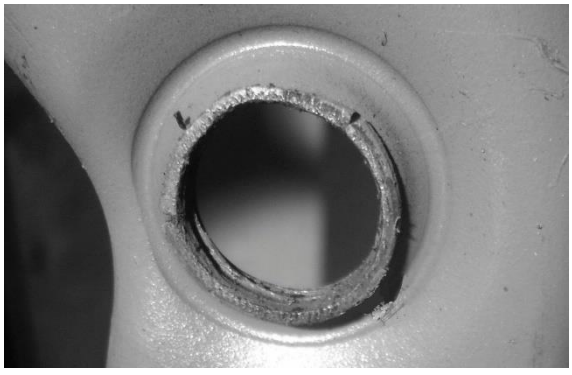
Never use a corrosion inhibitor such as a non-setting wax (e.g. "Waxoyl") on the wheels since the heat from the brake drums will liquefy it. A new coat of paint is best, applied over a well prepared and primed surface.

Section 00.7

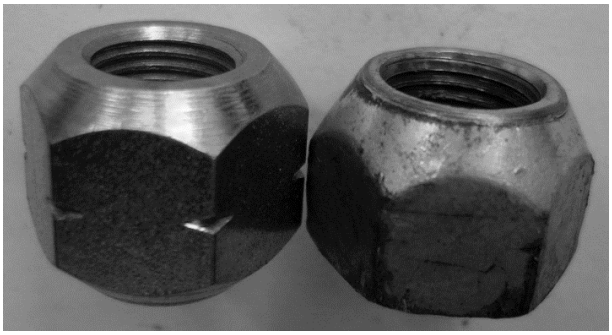
WHEEL FITTINGS

Wheel nuts

Models RMA to D had wheel studs with 1/2" BSF threads, using brass nuts with a 7/16" Whitworth spanner size. Models RME and F have 1/2" UNF threads and have steel nuts with 13/16" A/F spanner size. All Riley wheel nuts have a shallow angled cone each end, so they can be fitted either way round.



This wheel stud hole has been forcibly expanded by a nut with too steep a taper angle, as shown on the right below.



The wheel nut on the left has the correct taper for RM wheels.

Sometimes original wheel nuts are lost or damaged and replacements are fitted. It is critical that the angle of the tapered ends is the same as original or the wheel centre will be irreparably damaged, as shown in the photographs. As well as damaging the holes, nuts with too acute a taper will bottom against the brake drum and leave the wheel inadequately fastened.

Distributed freely, no copyright applies

Hub caps

Hub caps need a certain finesse to fit them properly – see the note in Section O.1 below.

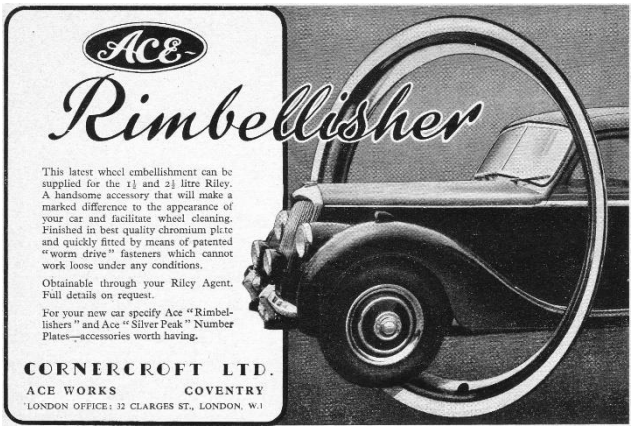
Original hub caps were of chromed brass. On all saloons and Dropheads, the flat zone between the outer raised chromed rim and the central embossed feature was painted to match the car's body colour. (As few cars left the Factory with two-tone paintwork, there is no convention for which of the two colours is used on the hub cap). To provide a key for the paint, the chrome of the flat zone was matte finished. Roadster models had all-chrome hubcaps.

Sometimes steel hub caps are encountered. These are reproductions, and while they may be a faithful facsimile of the original shape some have proved susceptible to rusting, unlike original brass ones many of which still have their original chrome plating.

Rim Embellishers

A common accessory when the cars were new or nearly new was a chromed ring fitting to the wheel rim, providing a contrasting band between the tyre and the main part of the wheel. These were marketed as "The Ace Rimbellisher". Modern reproductions continue to be available.

Original "Rimbellishers" were secured using a worm-drive type of fastening, however other makes may be no more than a push-fit into the well of the wheel with multiple sprung tags, and with a consequent scraping of the paint when being fitted or removed. Purists may choose to avoid these.



Section 00.8

STEERING WHEEL SHAKE

If the steering wheel shakes perceptibly at certain speeds it suggests that one or more of the wheels is out of balance. While the primary cause may indeed be imbalance, it might be very slight and the effect can be magnified by other deficiencies. There are a number of possible contributing factors, particularly if the tendency to shake develops without having had any of the tyres removed or the wheel having been subject to impact damage.

Do not assume that only the front wheels can be responsible; a problem at or near a rear wheel can sometimes also be felt at the steering wheel.

Possible causes are listed below.

1. Wheel out of true, see Section OO.6 above.
2. Damaged tyre casing (e.g. a "blister"), potentially on the inside face where it is hard to see it.
3. Slack steering track-rod ball joints.
4. Excess play in steering rack gearbox or double-eye, or loose rack mounting bolts.
5. Incorrect track adjustment (workshop manual Section K.2).
6. Wrong caster angle or severe suspension bush wear, see Section OO.5 above.
7. Slack hub bearing, or loose wheel nuts.
8. Weak damper (shock absorber), or loose mounting.
9. Over inflated tyre.
10. "Flat-spotting" occurring after a period without use, reducing as the tyre warms up; caused by under-inflation, and/or tyre being old, often in combination with cold weather.
11. Coachwork deterioration, e.g. corrosion damage to mountings, wood rot, mounting packing decay, will magnify any imbalance.

Section 00.9

SNOW CHAINS

Owners of Riley RMs who choose to fit snow chains may benefit from the instructions (following pages) in the February 1951 Riley Motors Ltd "Sales and Service Bulletin". While originally written specifically for the 2½ litre car with its larger tyre size, it is equally applicable to the 1½ litre if it has been re-equipped with 6:00x16 or equivalent tyres.

Distributed freely, no copyright applies.

Riley

Sales & Service Bulletin

FEBRUARY 1951
VOL. 4 No. 9

CONFIDENTIAL TO RILEY DISTRIBUTORS AND DEALERS

IN THIS ISSUE

BODY MODIFICATION

PRESSURE COOLING CONVERSION

Distributed freely, no copyright applies

2½ LITRE BODY CONVERSION

IN order to fit snow chains to the rear wheels of the 2½ litre car a slight modification is necessary to the wheel-arch and body sill.

The procedure is as follows :—

(*a*) Remove the rear seat and seat pan.

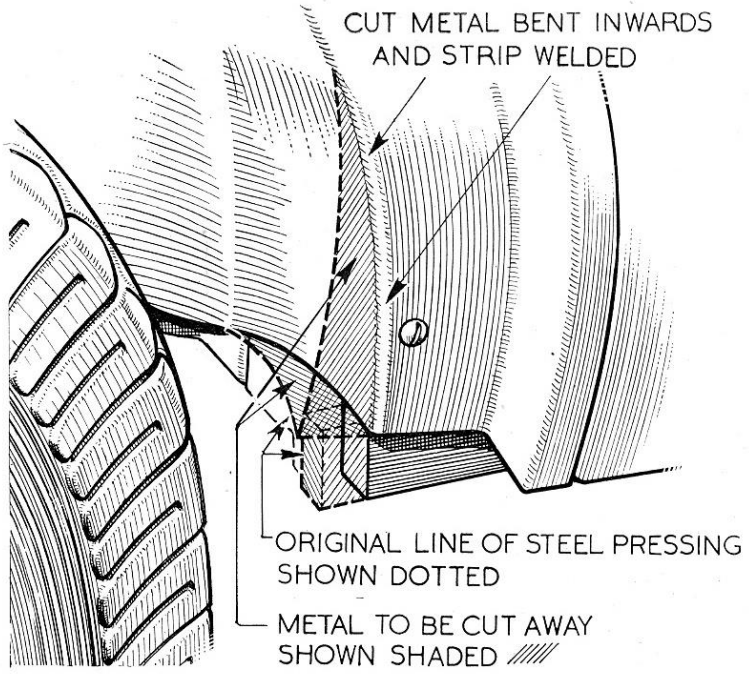
(*b*) Take off the trim-board and trim from the vicinity of the arch and peel back the trim stuck to the arch itself.

(*c*) Jack up the car and remove the rear wheel.

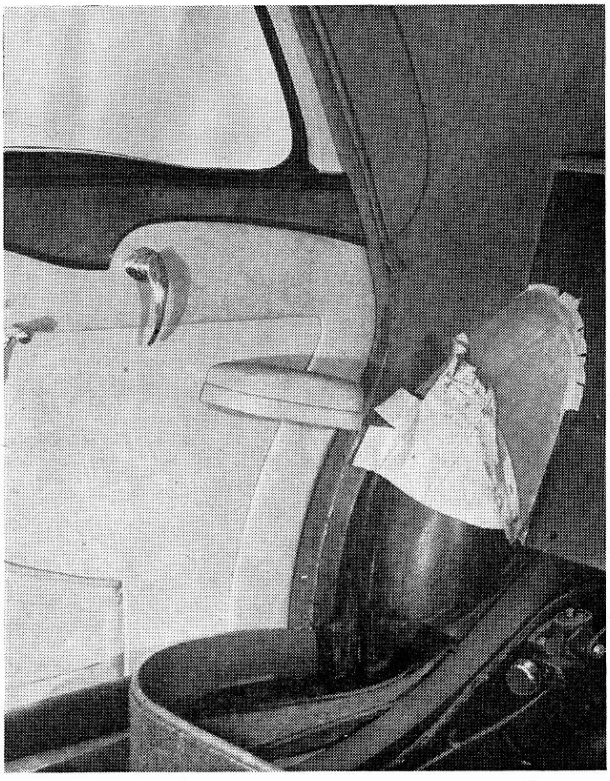
(*d*) Make sawcuts as shown in the sketch, so that the two V-sections may be removed.

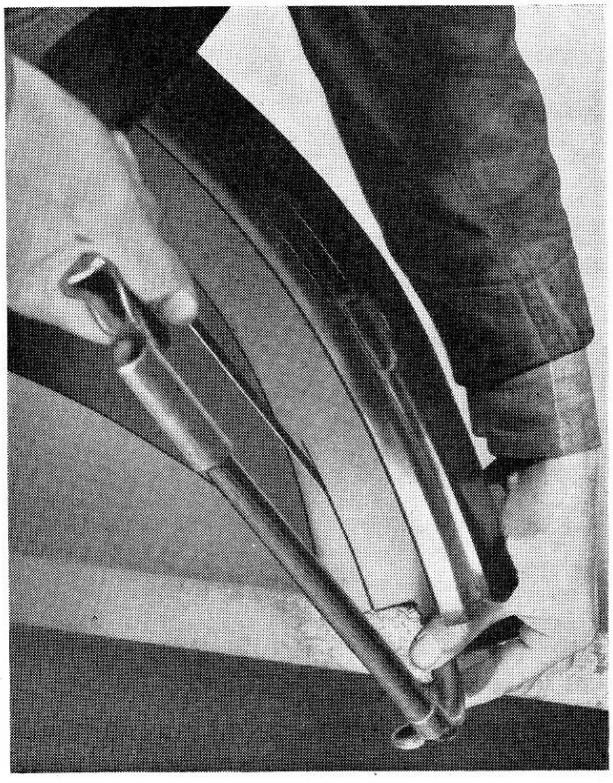
(*e*) Remove a portion of the sill to fit and press back the portion of wheel-arch that remains.

(*f*) Edge-weld the two portions of the wheel-arch together.



This sketch shows the positions of sawcuts and weld in order to give extra clearance for the snow chain.





Above left. The first operation is to remove the rear seat and pan. This will reveal the method of securing the interior trim which must be dismantled to the point shown in this illustration. One of the wheel-arch fixing bolts will also be revealed.

Above right. The sawcuts can be made with an ordinary hacksaw, starting at the wheel-arch and then removing a portion of the sill to fit. Make sure that the fixing bolt still holds the wheel-arch.

Distributed freely, no copyright applies.

 Distributed freely, no copyright applies

ORIGINAL SECTIONS 0.1 – 0.4

These sections replicate those of the original Workshop Manual, with notes and comments added.

Section 0.1

GENERAL

Tyre pressures

It is of the utmost importance that the tyres be carefully maintained at the following recommended pressures :—

When carrying two passengers :—

Front and rear (normal): 24 lb./sq. in. (l.7 kg./cm.^{2}) for the 2½ litre car.

Front 22 lb./sq. in. (l.55 kg./cm.^{2}); rear 24 lb./sq. in. (1.7 kg./cm.^{2}) for the l½ litre car.

When carrying five passengers and luggage the front and rear tyres should be inflated to 26 lb./sq. in. (l.8 kg./cm.^{2}) for the 2½ litre car. For the 1½ litre car the front tyres should be inflated to 24 lb./sq. in. (l.7 kg./cm.^{2}) and the rear tyres should be inflated to 26 lb./sq. in. (1.8 kg./cm.^{2}).

Note: for advice on radial tyres, see Section OO.2.

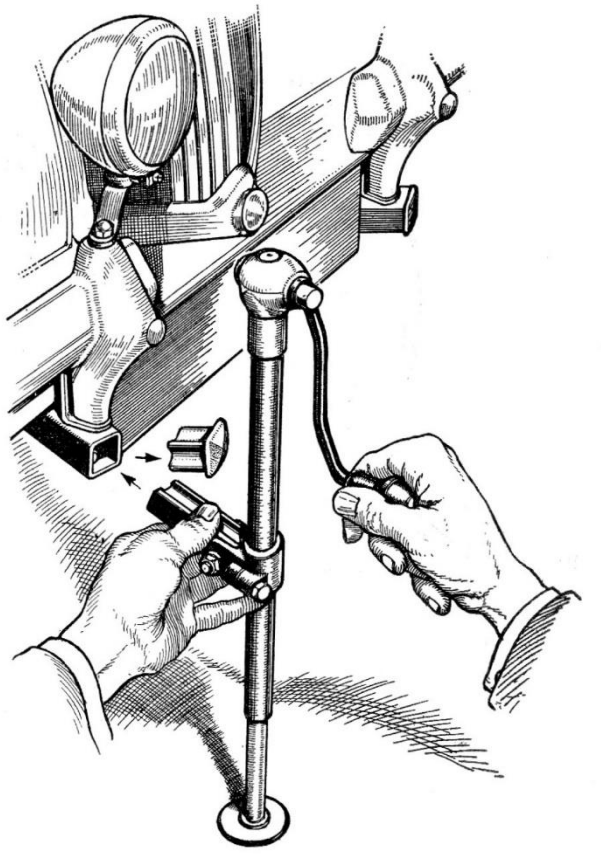
Spare wheel

The spare wheel is carried in a separate compartment beneath the boot lid and is secured in position by a wing nut and clamp plate, which must be removed before the wheel can be withdrawn. Keep the tyre inflated to the correct pressure for use on the rear wheels.

The jack

WARNING: for some years it has been evident that the factory supplied Smiths jack (illustrated) is liable to fail without warning. It is very strongly recommended never to use it other than as a visual accessory. Always carry a reliable jack which has been tested to verify that it will fit under the car's suspension even with a deflated tyre.

When using the special jack, apply the hand brake and remove the rubber plug from the square section tubes which are welded to the frame at either end beneath the over-riders.



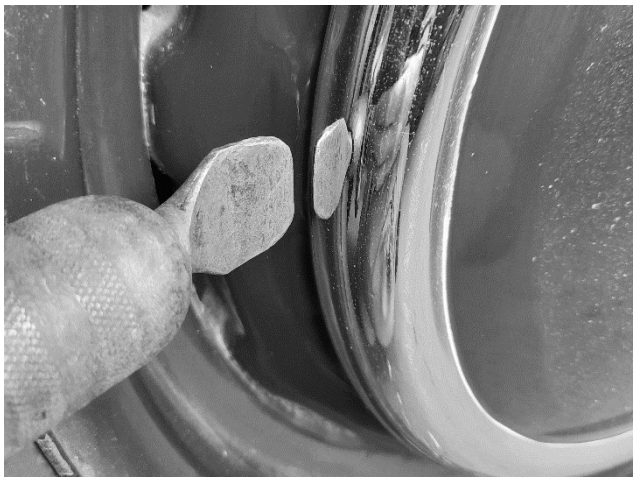
The method of applying the jack is the same at the rear as at the front.

Road wheels removal and replacement

Remove the hub cover by inserting the flattened end of the wheel nut spanner adjacent to the retaining studs, then give the spanner a sideways twist.

Note: The factory supplied wheel brace had a flattened and slightly hooked end for prising off the hub cover (hubcap). The shape allows it to be inserted under the hubcap at one of the three flattened areas on the wheel. As the original wheel brace may well have been lost over the years, it is advisable to carry a tool like it to avoid damaging the paint on the wheel.

Distributed freely, no copyright applies.



The shaped end of an official wheel brace slips into the gap between hubcap and wheel at one of the three flat areas.

Remove the five nuts securing the road wheel to the hub. The wheel nuts have right-hand threads, i.e. turn clockwise to tighten and anti-clockwise to remove. Lift the road wheel from the studs.

Reverse this procedure when replacing the road wheel and ensure that the wheel stud nuts are tight.

This is important.

To refit the hub disc, the rim should be placed over two of the buttons on the wheel centre and the outer face given a sharp blow of the fist over the third button.

Note: If the hub disc is pushed fully on to the buttons so that it is in contact with the wheel, it will rattle. Worse, it is liable to spring off the wheel altogether while on the road and be lost or ruined. Only push it on as far as the groove in the button.

Rather than the recommended "sharp blow of the fist", use a firm, steady push on the rim of the hubcap.

A thin smear of grease or petroleum jelly on the wheel buttons will ease hub disc removal in future.

The valves

Valve caps, in addition to preventing dirt from entering the valve, form a secondary air seal and should always be fitted. The valves may be tested for airtightness by rotating the wheel until the valve is at the top and inserting its end in an egg-cup full of water. If bubbles appear the seating is faulty and should be removed and replaced by a new one. It is advisable to change the valve interiors every twelve months.

Tyre wear

Even tyre wear is promoted by changing the positions of the tyres on the car at intervals of about 2,000 miles (3200 km.).

Attention should be paid to the following points, with a view to obtaining the maximum mileage from the tyres fitted to the car :—-

Test the tyre pressures daily by means of a suitable gauge, and restore any air lost. It is not sufficient to make a visual examination of the tyre for correct inflation. Inflate the spare wheel to the correct rear wheel pressure at the same time.

Should any tyre appear to lose an appreciable amount of air between short intervals, have it removed and checked for air leaks.

Regularly remove and examine both covers and tubes. Keep the tread free from grit and stones, and arrange for any repairs to be carried out.

Clean the wheel rims and keep them free from rust.

Paint the wheels if required, and replace the tyres and tubes. Keep the brakes and clutch adjusted correctly and in good order. Fierceness or uneven action in either of these units has a destructive effect on the tyres.

Misalignment is a very costly error. Suspect it if rapid wear of the front tyres is noticed, and correct the fault at once. See Section K for details of front wheel alignment.

Keep oil and grease off the tyres. Should the tyres get oily, petrol should be applied sparingly and wiped off at once.

Section 0.2

THE IMPORTANCE OF BALANCE

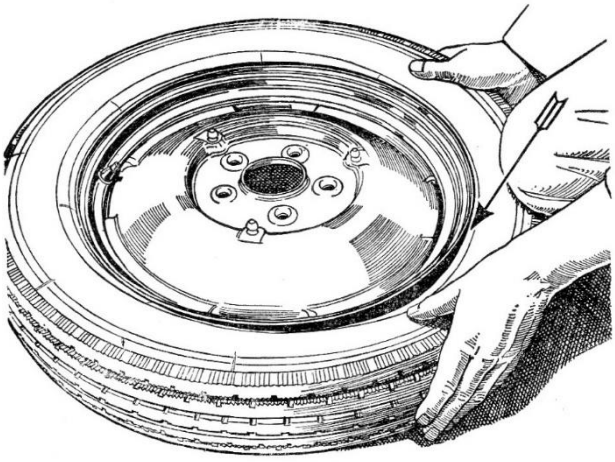
In order to obtain good steering it is of importance to ensure that the wheels, with tyres fitted, are in good balance. To assist this, the tyre manufacturers are now marking their tyres with a white spot or spots in the neighbourhood of the bead at the lightest point of the cover; similarly, they are marking the inner tubes with a group of coloured spots to indicate their heaviest point. When tyres are assembled care must therefore be taken to see that they are assembled with the white spots on the cover

Distributed freely, no copyright applies

coinciding with the coloured spots on the tube, and not opposite to the valve as recommended hitherto.

It must be noted, in addition, that special balancing discs are fitted to the inside of the cover casing in some cases and that these should on no account be removed, as the tyre balance will be upset if this is done. These balance discs are not repair patches and do not indicate any fault in the tyre.

The maximum out of balance of the tyre and wheel assembly permissible to ensure good steering is 20 in./oz. (.015 m./kg.). Assemblies which are out of balance beyond this amount should be balanced by means of special rim weights obtainable from Messrs. Dunlop Rubber Co., Part Nos. WBW/1 to 7, which cover a range of weights weighing from ½ oz. to 3½ oz. in steps of ½ oz. **On no account must balance weights be placed on the inner rim of the wheel.**



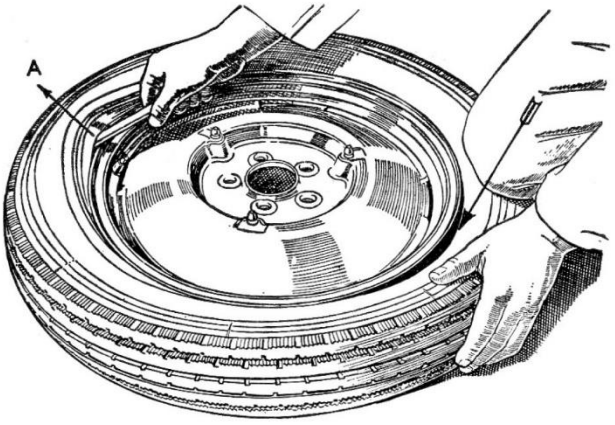
The first step in tyre removal is the pushing of the bead into the well of the rim opposite the tyre valve.

Section 0.3

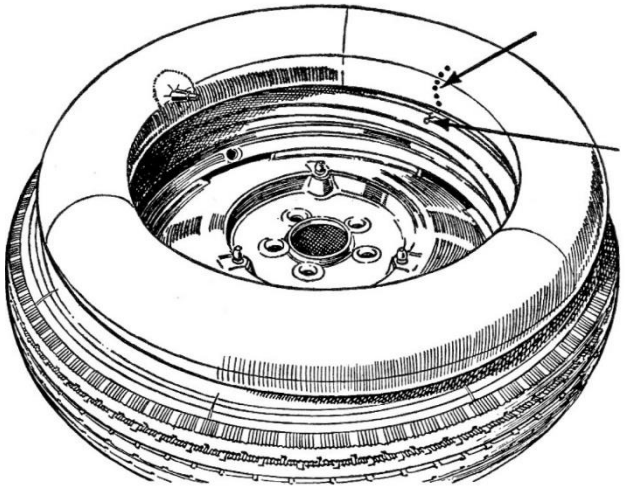
TYRE REMOVAL

(The note on wired edges has been moved here from Section O.1 of the original manual, where it seems to have been placed in error).

Remove all valve parts to completely deflate the tyre and push both edges into the base of the rim at a point diametrically opposite the valve, then lever the cover edge near the valve over the rim of the wheel (see "A," figure opposite), using two levers at intervals of 6in. (15 cm.) apart. Remove the tube carefully, do not pull on the valve. Stand the tyre and wheel upright, keeping the head on the base of the rim. Lever the bead over the rim flange, and at the same time push the wheel away from the cover with the other hand.



Tyre levers can then be inserted close to the tyre valve and the tyre lifted over the rim without difficulty.

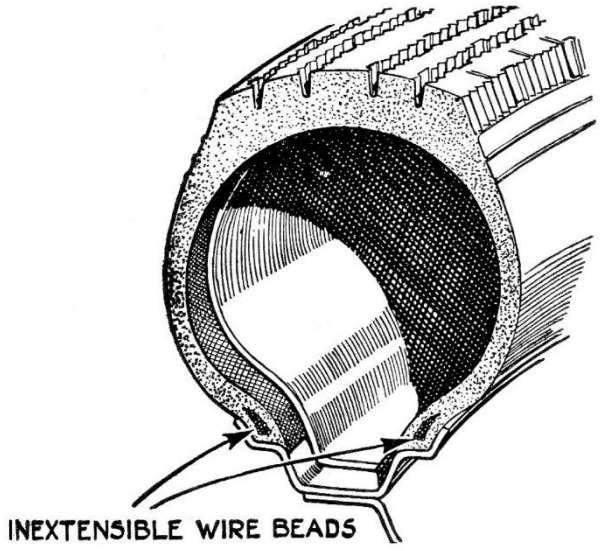


When replacing a cover and tube make sure the balance marks on the tube and cover coincide.

Distributed freely, no copyright applies.

Note:— *Inextensible wires are incorporated in the edges of the tyres. Do not, therefore, attempt to stretch the edges of the tyre cover over the rim edge.*

Force is entirely unnecessary and detrimental, as it tends to damage the wire edges and serves no useful purpose. Fitting or removing is quite easy if the wire edges are carefully adjusted into the rim base; if it is found to be difficult the operation is not being performed correctly.



The Dunlop tyres fitted as standard to Riley cars have wired edges and no attempt must be made to stretch them.

Section 0.4

FITTING TYRES AND TUBES

See Section OO.3 for notes on fitting tubes to tyres marked "Tubeless".

Note that in recent years a smaller diameter of valve stem has begun to appear on inner tubes. It is vital that the valve stem is a snug fit in the wheel rim and a purpose-made adaptor collar must be used if a tube with the correct valve stem is not available.

The following procedure is recommended when fitting tyres and tubes to well-base rims :—

1. Inspect the inside of the cover carefully and remove all dirt. The wheel rim must be clean, free from rust and undamaged.
2. Dust the inside of the cover evenly with french chalk.
3. Inflate the tube until it begins to round out, then insert it in the cover.
4. Apply a frothy solution of soap and water generously around the entire base of the tube, extending upwards between the tyre beads and the tube itself for at least 2 in. (5.0 cm.) on both sides. Also apply the solution to the bottom and outside of the tyre beads. Do not allow the solution to run into the crown of the tyre. The solution must be strong enough to feel slippery when the fingers are wetted with the solution and rubbed together.
5. Mount the tyre on the rim immediately, whilst the soap solution is still wet.

   Push one edge of the cover over the edge of the rim. It will go quite easily if the part first put on is fitted on the opposite side to the valve and is pushed right down into the rim base. Move it round so that its balance spots coincide with those of the inner tube when it is inserted with the valve passing through the hole in the rim. (Take care that the valve, which is fitted in the side of the tube. is on the correct side of the rim.)
6. Before inflating, be sure that the tyre beads are clear of the well of the rim all the way round.
7. Inflate slowly until the beads are fully seated.
8. Remove the valve core to deflate the tube completely.
9. Re-inflate to the correct working pressure (see Section OO.1). This procedure must be followed whenever a tube is fitted.

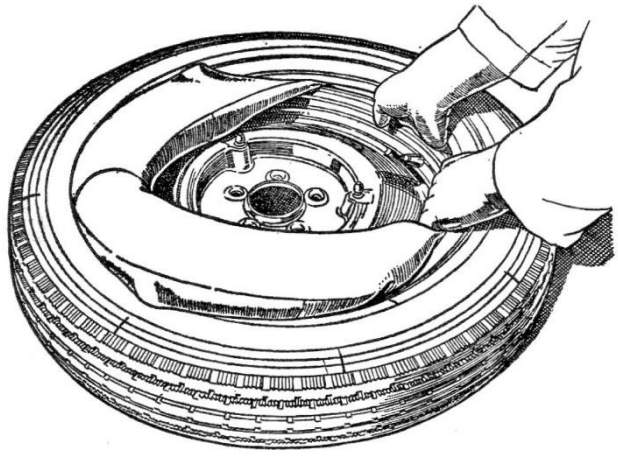
The object of the double inflation is to permit any stretched portions of the tube to readjust themselves in the cover and relieve any local strains in the tube.

In an emergency french chalk may be used as a substitute for the soap solution, provided it is evenly and generously applied. This practice, however, is not recommended.

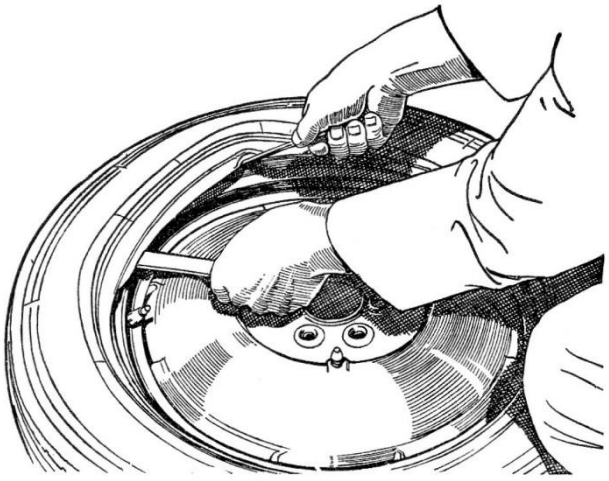
Repairing tubes

Punctures or injuries must be vulcanised. Ordinary patches should only be used for emergencies and cannot be relied upon.

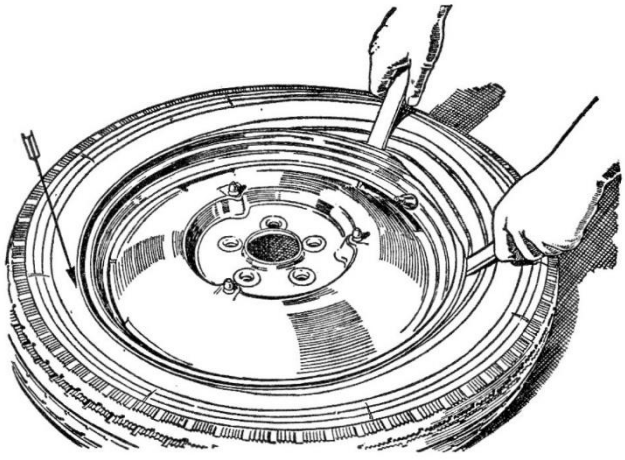
Distributed freely, no copyright applies



After slight inflation the tube is introduced into the cover. fitting the valve in position first.



When refitting the cover, start at a point diametrically opposite to the valve and finish at the valve.



If the portion of the cover first fitted is kept well into the well of the rim no difficulty will be encountered in replacing the last portion of the cover.

Distributed freely, no copyright applies.

APPENDICES

TYRE PRESSURE MEASUREMENT

Use of the S.I. system of pressure measurement (the kilopascal, or kN/m^2) is not universal and tyre pressures around the world are expressed in any one of psi (pounds per square inch), bar (multiples of atmospheric pressure at sea level) and kPa (kilopascals). At the time of writing psi is the de facto unit in many English-speaking countries. Luckily, American pounds and inches are the same as British ones, or there would be a further conversion to do.

The table provides a quick, round-numbers look-up of tyre pressures which might be found on a Riley RM, which derives from 1 bar = 100 kPa = 14.5 psi.

psi	kPa	bar
20	140	1.4
22	150	1.5
24	165	1.65
26	180	1.8
28	190	1.9
30	205	2.05
32	220	2.2

TYRE DIAMETER AND CIRCUMFERENCE

As there is no universally agreed way in which tyre manufacturers disclose the precise size of their products, this table can provide a basis for comparing the outside measurement (whether given as diameter or circumference) of different tyres. It is based upon the nominal diameter of each standard cross-ply size which is the wheel rim diameter (16") plus the tyre sidewall height top and bottom. Remember that "rolling circumference", which is the distance a tyre actually covers per revolution on the ground, is not the same as "inflated circumference" which is measured with the wheel off the ground. The "rolling" value may be about 8cm less for a typical radial tyre.

Note that not all of the radial sizes listed may be readily available.

RM Model	Cross-ply size	Diameter (in.)	Diameter (mm)	Circumference (cm)	Nearest radial size
-	5.50 x 16	27	686	216	175/75 R16 (Taxi)
1½ litre	5.75 x 16	27.5	699	219	185/80 R16
2½ litre	6.00 x 16	28	711	223	195/80 R16
-	6.50 x 16	29	737	231	205/80 R16

OWNERS' EXPERIENCES OF TYRE BRANDS

The list below comprises comments made by experienced Riley RM owners about tyres which they have fitted to their cars. It must be emphasised that these are the personal opinions of a number of individuals and are made impartially. Comments were made between 2015 and 2021. Tyre brands and detail designs change all the time and there can be no guarantee that what was said of a particular tyre still applies now.

Readers must make up their own minds in conjunction with advice offered elsewhere in this manual and via the Riley owners' network as to the best solution for them, their model of Riley, and its intended use.

MAKE/TYPE	FITTED TO	EXPERIENCE (Roman numerals denote multiple reviewers)
Avon Tourist	RMA	Light, positive steering, good braking and road-holding.
Avon Turbospeed	RMA	Stops on a sixpence; would buy again.
Austone Taxi	RMA, RME	i) Good road-holding but reduced size is noticeable. ii) May be better suited to a 1½ than 2½. iii) Very pleased, cheap and good tread, but small in diameter. iv) Excellent grip, though wet weather braking average. Very low rolling resistance. 28psi front, 32psi rear.
Coker radial	RMB	Suit the car admirably, 6.50 size.
Englebert	RMB	Long lasting.
Excelsior Crossply	RME	i) Really good in all conditions. ii) Good for a crossply.
Excelsior Stahl	RMB	Steering really precise and light.
Freeway remould	RMA	Ideally suited, steering light and direct, corners very well.
Michelin X 185R	RMA	i) Ride and handling vastly improved; cost measurably greater, but life expectancy far, far superior to others. ii) Superb road-holding at the expense of heavy steering when parking.
	RMB	Ride & handling much improved over the previous Pirelli taxi radials.
	RMC	Handling transformed, road-holding impeccable, directional stability perfect. Run at 30psi.
Michelin X Taxi	RMD	Smaller size caused grounding. Immediately replaced with 185R.
Pirelli Chrono	RMB	Reasonable cost, car runs well on them.
Vredestein Sprint	RMB	Cheaper than Michelin, good performance.
Waymaster	RME	i) Squeal badly. ii) Indifferent grip.