Wheels and tyres

What do we know about wheels and tyres other than the fact that most cars have them at each corner? A closer study will show a number of interesting facts of which some owners might not be fully aware. For instance, the next time you attend an Austin Seven Rally, have a close look at the wheel and tyre sizes of the participating vehicles. You will often find a mixture of tyre sections varying from 3.25 to 4.00 inches and wheel diameters ranging from 17 to 19 inch. Now you may wonder whether it is important to match wheel and tyre sizes and it seems some owners are unconcerned provided the tyres are in good condition.

Well, there are very good reasons for maintaining correctly matched wheels and tyres, otherwise road holding and braking efficiency can be adversely affected. The only exception (if forced to do so in an emergency) is to ensure matched sizes are fitted to each axle. To explain this further let's take for example a standard Ruby saloon that was originally produced with 400 x 17 wheels and tyres. These original tyres can now be difficult to obtain, so most Ruby owners revert to using the more easily obtained 450 x 17 tyres. This half-inch difference in tyre depth might appear not worth worrying about but it increases the overall diameter of the tyre by one inch. The calculation of overall effective diameter is simply two times the tyre depth plus the rim size. Therefore it can be seen that a Ruby using a 450 x 17 tyre has an effective overall tyre diameter of 26 inches (which interestingly is equivalent to a 350 x 19 tyre / wheel combination found on Chummies and Boxes) and compares with an original Ruby overall diameter of 25 inches.

Now, providing that a full set of oversize tyres is fitted to the Ruby then no appreciable difference will be noticed except that the transmission will be slightly higher geared and of course the speedometer will read slower than the actual speed (by 4% Ed). The real problems arise when using unmatched wheel & tyre combinations on the same axle. At the rear, a mismatch will cause the differential to work overtime trying to match the different rotational speeds of the wheels; and at the front the car will tend to pull in the direction of the larger tyre section due to the larger tyre contact area. However, most importantly, using odd sizes on one or both axles can dramatically affect braking efficiency. In simple terms this is because when braking, the larger overall diameter tyre has a greater lever arm effect from the point of contact with the road to the inside diameter of the brake drum which necessarily reduces the braking effect. It should be noticed that these problems become more noticeable during adverse weather conditions.

Therefore in summary, whenever possible fit corresponding sizes all round. However, if you have no choice, then try to ensure the near and offside sizes match on any axle because this will have no effect on steering or the differential. However, remember there will be an imbalance in the braking system due to changed front-back compensation that is difficult to

cure by normal brake adjustments.
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