OK, here goes:

I'll get to the issues by a roundabout route & shall paint a bit of relevant background first. This post will be quite long. If anyone would find it easier to have a Word or PDF version, then message me & give me a regular email to send it to.

First: pressures. Renault recommends low front pressures and higher rears. Mind you, this is a point about *relative* pressures, not absolute ones. Recommended pressures are also absolutely low. The reason the recommended pressures are absolutely low is ride. Leaving them that way is unwise if one is interested in handling and roadholding. Have a look at contemporary tests of R8/RI0s in extremis and you will see the outside rear tyre has suffered severe lateral "tread migration" and the rim is about half an inch off the tarmac.

For handling & roadholding, what is wanted is a relative pressure differential to give the balance one wants and absolute pressures high enough to increase roadholding (by avoiding tread area diminution through distortion) without making the ride harsher than one finds acceptable.

The cars are factory set up to understeer initially and then transition to greater neutrality & possible oversteer. The main exception to this is tight (especially wet) corners where understeer simply worsens. On a clear sight-line dirt road, one can flick the tail to counter this but in most road driving situations the best one can do is trail-brake or judiciously lift-off at the apex. However the situation can be alleviated by attention to tyre pressures. I have observed repeatedly in the past that the easiest way of improving a car's handling is by playing with tyre pressures (the second easiest is judicious tyre choice).

Some framework theory:

Imagine cornering at 1 kph. Almost no lateral load on the tyre and the angle of the front road wheels would be as geometrically demanded for the treads to follow the corner's arc. Now imagine cornering at speed. In an understeering car, the front wheels would be at an angle that points inside the geometric corner arc and, in an oversteering one, at an angle that points outside that arc. More lock than geometrically demanded, or less lock, respectively. (The tyres, of course, follow that arc - I talk of the *wheels*). What is going on and what has it to do with pressures?

First, the notion of a *slip angle*. Tyres vary as to how far the front wheels have to be turned from the geometric arc in order to develop the tyres' maximum cornering capacity. That angle is the slip angle. A large slip angle means that there is a large angle between the direction the wheel (or bead area) is pointing

& the direction the tyre's tread is pointing. Obviously such an angle is possible owing to sidewall deformation. A smaller slip angle involves less deformation. I'm explained the concept using a front tyre; at the rear, it's more a measure of sidewall tuck-under before it takes its "set".

The major variable for a tyre's operating slip angle is sidewall flexibility. Another causal ingredient is tread stability. If the tread elements move about & have to distort & "take a set" before transmitting an input force, then much the same behaviour manifests itself as with a sloppy sidewall. One could have a taut sidewall & unstable tread elements (especially at the outside shoulder) with small blocks, extensive siping or deep tread & still have the tyre operate at a relatively high slip angle before the tread elements "take their set" & transmit force. To repeat: this might be so even with a taut sidewall.

The connection to the ideas of understeer and oversteer is clear I trust. To develop a given cornering force, if one has a high slip angle tyre at the front then the wheels will have to be turned more than if one had a low slip angle tyre - the former will be more prone to understeering than the latter (other things being equal).

Tyres vary as to their slip angles. What we think of as crisp tyres operate at low slip angles (think PS2 Michelin). This is usually achieved by the bead area structure - fabric fold-ups called 'flippers' or stiffish triangular section "rubber" inserts called 'fillers' & by stable outer tread elements. Those we think of as sloppy operate at high slip angles (think Michelin X). Mostly this is a matter of their structure and we have no direct control over that beyond buying crisp tyres. And, in the small sizes used by RERs, such are generally not available; some are better than others though & better in both sidewall transmission of steering commands & in tread stability.

But we do have one causal lever to tweak re slip angles & thus handling balance - tyre pressures. A given tyre will operate at lower slip angles with increased pressure because the sidewall deformation under twisting stresses is less. Other things being equal then, one way of affecting whether a car tends to oversteer or understeer is to modify front and rear slip angles by modifying relative pressures. To lessen oversteer, lessen the rear tyres' operating slip angle by increasing pressure &/or increase the front tyres' operating slip angle by decreasing pressure. To lessen understeer one wants the fronts to operate at a lower slip angle relative to the rears, so increase front pressures &/or decrease rears. Of course this remediation will be of limited use if tread instability is the major causal factor.

This tyre slip angle variation is one reason for caution in fitting different tyre types front/rear. One can upset a car's handling balance with a mismatch. Mind you, one can also improve a car's balance with judicious deployment of such differences.

Slip angles also explain why, even with four tyres the same, a change of tyres can change the car's balance (even with unchanged pressures). This is because the fronts have to "take their set" before the rears & a crisp set of tyres (operating at a low slip angle at each end) will thus feel more responsive than a less crisp set. Moreover, a less crisp set can feel “taily” if the fronts have stabilised & achieved cornering forcc while the rears have yet to stabilise.

Note that these handling traits are present prior to any contact patch losing grip so the old quip that understeer is losing the front & hitting the scenery frontwards & oversteer, hitting it backwards is not quite correct. That said, the terms will still apply after a slide has begun. With understeer, it's still the angle of front road wheel to the contact paths arc, just now it's a probably undesired arc as one feverishly winds on lock (&, with oversteer, joyfully winds off lock).

RERs corner with the wheels in initial positive camber at the front (resting setting is about 1° as I recall) with some caster-induced move to negative camber with increased wheel angle. At the rear, initial camber is negative (about 1° as I recall with more for R8Gs). Under lateral load however, all move to positive camber. This can only be prevented with heroic droop restriction (or relative roll stiffness fiddles - another story). Because of this increasing positive camber as cornering forces increase, another variable looms. Tyres vary in their cross-sectional profile. Some, like the “stop” pattern X, have very square edges. Others, like the Xas, are more rounded. Other things being equal,, the latter are more suited to positive cambering swing axles. This is because the tyre tends to climb up on the edge & lift off the ground further in. Thus the contact patch is diminished & grip is reduced: Because of the differing camber behaviour of the front & rear ends when cornering, this will manifest itself more at the rear & the car will oversteer in a similar way to if it had tyres operating at greater slip angles at the rear. But tyres are not equal in other things. If the tyre has very flexible sidewalls then it won’t so much climb onto the tread edge as the stress will be accommodated by sidewall flex with the (still flattish) tread migrating inwards & the sidewall moving from vertical towards horizontal. Of course such flexibility has its own drawbacks - see the discussion of slip angles above.

So, three tyre influences on handling behaviour: operating slip angle caused either by sidewall structure or by tread stability or tread jacking caused by shoulder profile or sidewall stiffness.

Now back to the original question about tyre/wheel choice.

I have written on several occasions about tyre & wheel choice for rear-engine Renaults. Summarily put, the situation is fairly dire almost no matter what option one chooses. And things are generally getting worse, not better, as time goes on.

As remarked previously, I think that any wheel size choice should be partly dictated by tyre availability to suit.

13" is the traditional update choice. But, as I've discovered with my Moke, it is now devoid of performance tyres (apart from "track day" tyres which, given that I live in Tasmania, I wouldn't fit as I'd be fanging outside of their best operating temperature for compound wet grip) yet performance is a major reason for fitting them. So, short of such tyres, what are the options? Some tolerable stuff still exists in 175/70 but, for a road car, I can't see why one would bother unless one already had a set of 13" wheels which one wished to keep & use.

I have suggested in the past that *14"* is the sweet spot for these vehicles as some good tyres remain available I'll return to the point later.

So, what of *15"*? In this thread's context, the current fitment is 4.5" rims - R8G (though Citroen GS rims on Renault centres & R10S are 4.5). However, I'll widen my remarks to cover standard 4" rims & ones widened beyond 4.5" (usually 5" or 5.5"). I'll also speak of tyres for the various options. (My major criteria of choice are wet grip under braking & laterally & benign limit behaviour.

4"

In the past, I have spoken against the usual 135/80 & 145/80 (actually 82 originally but . . . .) choices of Michelin ZX & XZX &, now, Nankang CX 668. In each case, my complaint is lack of wet grip. It's unclear where Michelin are currently at with "Classic" range tyres' compounding but the XWX did poorly in a 2019 test (then again, the presumably inferior XVS did comparatively better a few years later against much the same rivals so compounding might now be acceptable). I've also suggested avoiding 155/80 Vredestein & Xas FF (wet grip in each case & soggy response for the former & particularly aquaplaning when worn a bit for the latter - an issue with the light front of these vehicles - although the FF is nicely compounded for merely slick conditions).

As a few froggers have observed, the (145) XZX is better than the (135) ZX. I don't know what structural differences there are but the shoulder treatment in the case of the XZX is noticeably stabler. Any "classic" tyre costs more than modern mainstream alternatives & the CX 668 is a popular cheap choice (available in 135/80 & 145/80). It is also the fitment with which this thread began. I have noted that, as with other Nankangs, the CX 668 is not a tyre I'd choose given my interest in wet grip. That said, I've never fanged a RER with them on.

Bgbiteme's concern with the Nankang is not wet grip however but balance & limit behaviour on fast sweepers. He has 145/80-15 on 4.5" rims with 20psi F & 28psi R. What might be going on here?

Drawing on my above background analysis, there are two hypotheses: a relative slip angle problem (with two possible causes) or tread edge jacking. Let's consider each in turn (& note that they could all apply).

First, sidewall sloppiness. Were this the only factor to apply, then the remedial intervention is more relative pressure at the rear & greater absolute pressures The R8G is currently on 20 F & 28 R. When I was fanging a standard R8 & my (basically Dauphine G based) second 4CV on 135/80 ZX back in the day, I ran around 23 F & 39 R. It's worth trying upping pressures & seeing what happens.

Mind you, it might not fix the problem as, looking at the tread, I surmise that it would be unstable enough at the outer edge (small blocks & much grooving & siping) to be a cause of a large operational slip angle in its own right & upping the pressures won't fix that.

Moreover, looking at the tread edge, it's fairly square shouldered (not as much as an X but hardly rounded). So tread jacking might be occurring as it moves to positive camber. This would be mildly exacerbated by a bit of extra sidewall pre-tensioning from the 4.5, not 4, rims & increasing rear pressures would only make the problem worse by reducing sidewall flexibility & thus inhibiting tread migration.

I wouldn't be surprised if all three problems obtained with the CX 668. The only available causal lever to pull is playing with tyre pressures but, depending on what the main cause is, that might not help.

Tyre choice is not a matter of what's good or bad but of what's best in the sizes suitable to the planned wheels. Is anything better available for 4" than the standard choices?

Again in the past, I have recommended avoiding the above & fitting 145/65 Continental EcoContact EP tyres (shorter gearing than 135/80 by 4.7% & 145/80 by 7%). Regrettably, it's no longer available here. 4" is very constraining but another option in in this size is another Nankang, the AS-1. Not a wonderful tyre (&, anecdotally, inferior to the EP in the wet) but currently the best thing available here for 4"x15 wheels. It's an old type (so are all the other options) & I hadn't seen a test until recently (I was astonished to see it tested at all). The link is below & it comes last in every discipline but I make 3 comments.

First, it is irrelevant that everything else in the test is better as none of them are available in a size to suit RERs. Second, I shudder to think how ZX, XZX or CX 668 would have gone. Third, although last, it is not woefully adrift from some halfway decent (though not class-leading) tyres in some key disciplines of significance to RER drivers. The test confirmed me in my thinking that the AS-1 is a not disastrous choice & that retaining 4" rims is not a completely lethal decision. Much depends on one's tolerance for a bit of under-gearing. My two RERs & my Djet each have tyres of the same circumference as 145/65-15. At 100, I'm on around 3,800 rpm & at 110 around 4,100-4,200. Each toy is "warm" but none is as aggressively cammed as an R8G. In each case, the sweet zone begins at around 4,000. I like to be cruising in this rev range on responsiveness grounds & don't find it at all wearing; YMMV.

[url=http://www.tyrereviews.co.uk/Article/2019-Auto-Zeitung-Summer-Tyre-Test.htm]2019 Auto Zeitung Summer Tyre Test - Tyre Reviews[/url]

4.5"

Some of the 4" discussion of options applies here too but other options open up & the quickest fix of the high speed corner instability problem (if upping pressures doesn't work) might be to re-tyre. I had always considered 4.5" to be a nice choice as it allowed access to a very good wet tyre, the Continental EcoContact3, in 155/60. Like 145/65, this is an early Smart size & the two are equal in circumference & thus gearing. One frogger I know switched from CX 668s to these in his warm 4CV & was favourably impressed.

But: Continental now no longer has it available either. So, what now? Well, again, the Nankang AS-1 is available in 155/60 also & the above remarks apply But with 4.5" rims another option arises: 165/65. This size has the merit of being identical in circumference to 135/80 so gearing is unchanged & a 135/80 can be used as a spare without diff. stress in a flat rear tyre scenario.

There's not much available in this size in oz either but one tyre is appealing. The Kumho Ecowing ES01 KH27. Not a wonderful wet grip tyre but not rubbish either (it seems to have had a recent beneficial change to compounding). It's obsolescent now (replaced by the ES31) but seems still available. Browse the below linked tests (but look especially at the latest) at:

[url=http://www.tyrereviews.co.uk/Tyre/Kumho/Ecowing-ES01-KH27.htm]Kumho Ecowing ES01 KH27 - Tyre Reviews[/url]

I think that it would not have tread instability & any sidewall sloppiness would be remediable by pressure changes.

Not that I recommend it but another tyre available in 165/65 is the obsolescent Maxxis MAP-1. It is of some interest because it was the "modern" tyre representative in a recent, above-mentioned, classic tyre test. Generally considered to be weak to mediocre in the wet, it nonetheless beat the Michelin XWX. The latter is a decided step up from ZX, XZX & Xas, so some indirect comparisons can be made. In short, even fitting the MAP-1 would improve matters over the default-fit Michelins most people choose (& the CX 668). The KH27 (especially as recently upgraded) is another step up again. So, in summary, my choice for 4.5" rims would be 165/65 KH27.

5" or 5.5"

One could, of course, go wider in 15". Once one gets to a 5" rim, decent tyre availability improves dramatically. (If these are widened standard Renault rims, then I note in passing that the centres are fragile but that a simple reinforcement cures matters - details on request.)

One can fit earlier-mentioned tyres to these & gain beneficial handling crispness from increased sidewall tautness but better to take advantage of the better tyre types that become available in larger sizes.

Three sizes are relevant: 175/65, 185/60 & (with a 5.5" rim) 195/55. The first gives mild over-gearing (around 2%) & the second & third are pretty well identical in circumference to 135/80 (again a cheapo CX 668 could be used as the spare).

In my view, RERs benefit from a front/rear size differential, both in tyre & wheel width. The wider rear tyre gives a shorter but wider contact patch for a given pressure & the wider rear wheel pre-tensions the sidewall more. Unless taken to extremes (causing tread jacking) the former increases cornering force & the latter lowers the operating slip angle. It's easier to get good behaviour

without large F/R pressure differentials. Were I to be doing 15” “widies”, I’d have 5” front & 5.5 rears.

So, my two scenarios here are 175/65 fronts with either 185/60 or 195/55 rears. Unless one is very aware of the tyres' characteristics, the closest way of avoiding handling oddities caused by different structures &/or different tread stabilities is to use the same tyre type front & rear. Not that it always works & tread instability problems can’t, as I’ve said, be fixed by playing with pressures.

So, what's available in a *175/65 F & 185/60 R* combination?

Fortunately, one very good tyre type: Dunlop's FM800. It’s an excellent wet tyre with generally good limit behaviour .

How about *175/65 F & 195/55* rear?

Again, the FM800.

So, a very good tyre (much better than what's available for either 4" or 4.5" rims). It would generally delight but which rear tyre size to choose?

I'd choose 185/60 for two reasons.

First, I worry about 195/55 given the camber changes of these cars (even with shorter 330 mm droop straps). The 195/55 sidewalls are the same height as 185/60 but the sidewall to width ratio is not.

Second, 195/55 requires a 5.5" rim but 185/60 can be fitted on a 5" one. This is not an issue if one is prepared to accept different size wheels for front & rear tyres but if, for fitment flexibility reasons, one wants the same front & rear, then 5.5, although receiving a front 175/65 happily, will, I suspect, require non-standard front offset. This might not matter as it won't be by much but is still a consideration.

My only hesitation in recommending the FM800 is initial tread instability. This will, unfortunately, generate the same fast sweeper “tailly” ‘instability as constituted the problem that started us off. I’ve had rear FM800 tyres (I85/60-14) & had just that problem. However, the instability doesn’t last long & disappears with a bit of tread wear & the wet grip is so good that I’ll choose them again when my (no longer available) current Pirelli P6s chop out.

If that transient initial instability is an issue and the FM800 is rejected, then one is stuck with the same size F and R.

My choice would be *175/65* (I don’t favour anything wider at the front on offset & clearance concerns).

Fortunately, the afore-mentioned P6 seems still available in this size (dodge the Powergy on wet grip grounds). This is my current RER fitment & I'm well pleased. Not quite as wet-grippy as the FM800 but with a very stable tread & so easy to tune F/R relative slip angles with tyre pressure. Given the concerns raised about the CX 668, it's probably the best 15" option. If the P6 is falsely listed as available, then back to the FM800 & enduring the initial bit. I can't see anything else in our 3 sizes which is worth choosing over it except the P6.

14"

As already remarked, I wouldn't choose 15" in any variation. My choice as the sweet spot for RERs is 14".

The easiest way to do this is to get a set of 14" R16 rims & get a wheelwright to remove the rims from the centres, reverse them, reweld with as much offset as possible & weld a patch on the valve hole & drill a new one. My Djet has such a set (R16TX in my case) & it's very feasible & without clearance or steering "crabbiness" problems. It doesn't matter which vintage of R16 is the donor although the last have a decent centre hole (useful if your tyre guy doesn't have the relevant adaptor for balancing) & the safety ridges are useful if you have a fast loss of pressure. Any would do though & one advantage of the early ones is that they'll take a hub cap not unlike that of the R8G (if that is of concern). Another is that earlier wheels with riveted rims are easier to separate. Any will take a tubeless tyre & fitting tubes is not advised (details on request).

As for tyres, 4.5" R16 rims will happily take a *175/70* tyre & the afore-mentioned P6 seems available & would be my choice (stable tread & easily pressure tuned). If it isn't still available, then one other tyre might suit. This is Kumho's ES31. Wet grip is not as good as the P6 but it seems very taut for an eco tyre. Nothing else attracts. One merit of 175/70-14 is that its circumference (& thus gearing) is near-identical to 135/80-15 (which, again, would be the spare).

What else can be done? Two things: Cut down 15" wheels & fit new 14" rims & cut R16 centres out & fit new, wider, rims. I have gone down both paths & the R16 centre is very strong (not needing reinforcement like the R8/R10 ones) so, if possible, it's the preferred path. It might not be possible though. This is because the new rims have to have an internal diameter which can be mated to the R16 centres (that is, identical or smaller). Cut down 15s can accommodate

any internal diameter 14 rim by cutting to suit & may be the only path forward. Provided the centres are reinforced (a simple fix) this is quite satisfactory.

In my case, I have 5.5 rears & 4.5 fronts but were I to be doing things again, I'd choose 5" fronts on tyre-choice grounds. Again, I'd have the wider 5.5 rears to pre-tension sidewalls. What tyre sizes then?

My choice for rears is *185/60. Again*, I'd live with some transient initial fast-sweeper edginess at the rear & fit FM800 tyres. The situation resolved itself with but a little wear. My second choice would be the Kumho ES31 as mentioned earlier.

What of the fronts? I'd choose *175/65* & my choices of tyre type would be the same.

So FM800 for wet grip with some initial tread instability or ES31 for more stability but less wet grip.

185/60-14 is about 3.2% smaller in circumference than 135/80 but I don't consider this dramatic (see earlier comments). The spare would be a Nankang A5-1 in 145/65-15 (tubeless on a standard R10 rim with no tube) which is identical in circumference to 185/60-14.

In summary:

The quickest solution for you is to reinforce the existing rims & fit 165/65-15 KH27 tyres (with a 135/80 CX 668 spare).

The second easiest is to reverse some R16 rims & fit 175/70-14 tyres (P6 or ES31). Again a 135/80-15 spare.

Better than either is wider 14s (5" F & 5.5" R) with 175/65 fronts & 185/60 rears in FM800 or ES31 & a 145/65-15 AS-1 spare.