

WORCESTER & HEREFORD ADVANCED MOTORCYCLISTS

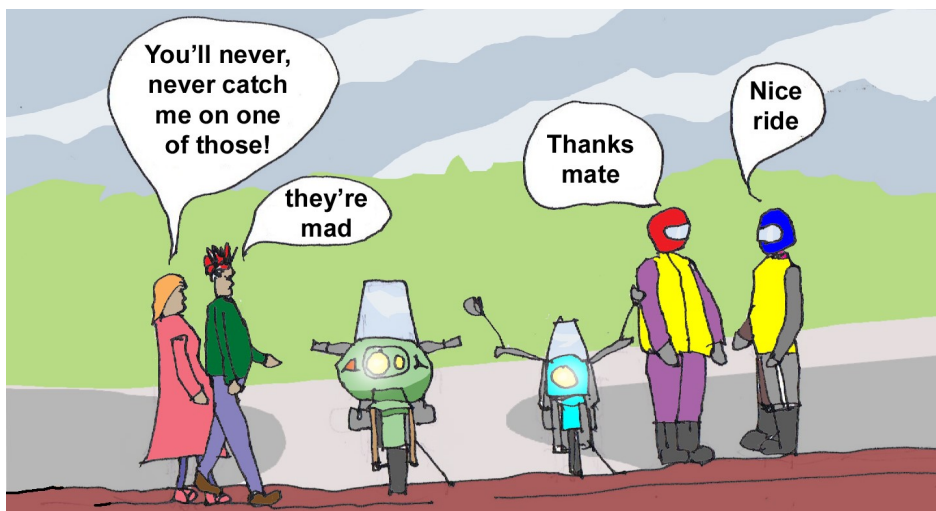


JUNE 2020



CHAIR'S FOREWORD

We've all had conversations with non-bikers who can't understand why anyone would want to ride a 100hp two-wheeled machine that can easily fall over with you on it. They are bemused by our mental state, particularly our risk taking, but are, perhaps, a little jealous of our thrill seeking. No need for white knuckle rides at Alton Towers (other theme parks available).



Our training means we understand and manage those risks. But perhaps it's easier to be aware of 'external risks' than what I'm calling 'internal risks' where we ought to have to look at ourselves and perform a personal risk assessment every time we turn on the ignition and press the starter.

Here's my 'external risk' list just from today's ride from Worcester to Stratford upon Avon:

- The weather (low sun, lying water from overnight rain, blustery gusts, potential heavy showers)
- Road surface (potholes, gravel, wet paint, traffic calming humps, tar banding)
- Other road users (slow vehicles, horses, pedestrians especially in Stratford's town centre, Sunday shoppers in the villages, cyclists and even more cyclists)
- Diversions, satnav variations, bends, contrasting light as we moved from bright sunshine to shady forest



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CHAIRS FOREWORD CONT'D

- Keeping with the group when following
- Managing the group approaching villages/turnings etc when leading

More challenging is to admit my 'internal risks':

- Concern about concentrating after an exceptionally busy week and a slightly sleepless night (I was fine)
- Concern about the route as it contained new roads and new places (it was OK)
- Concern about riding with people I hadn't ridden with before (an unfounded worry)
- On the road:
 1. My speed when at the back and looking to catch up the group
 2. My patience in waiting for an overtake having seen the others ride past the vehicle ahead
 3. My speed and position when leading: riding to the best standard I could
 4. Not becoming frustrated as we followed slow vehicles out of town

We used to mark associates for "RESTRAINT" and I guess this is what I'm talking about. Riding "SAFE and LEGAL" is what we advocate....is what we do! (Isn't it?)

So after being under 'house arrest', aka 'lockdown', restraint becomes even more relevant.

Take it easy, stay genki!

Ant
WHAM Chair

And to finish, a bit of fun....

WHAMgrams

Find the committee and others....who or what is.....

Anal ride where? Benders onions Lean critic Chat with rider Ye lax hole As pig Stork axman Dean's nu gear Ceylon riders	Hint a navy sod Mr el dunk camel Petrol autos Grab 'ani' norm Ran by gears He josh dong Car based hymn A rain brand Try neuroses
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SIDECAR OBSESSION—JOHN NIXON

The Start of the Build Process

Hi Good People of WHAM.

You may recall my Engineer was going to think about what he might build in the way of a sidecar that could be within my budget. I duly arrived at his works and asked what his thoughts were. Much to my surprise he said: *"I'm going to build what your son has designed"*.

"Why would you do that?" says I. "It may cost you more than the agreed budget!"

"Well, it will be a good showpiece for my business", says Engineer.

So I asked what would be included and received an outline specification at a fixed price within a budget that we agreed. Things like paint and upholstery were extras I'd have to find for. And the contract was exchanged.

With the benefit of hindsight, I now see that we had entered into an agreement that was fundamentally flawed. Flawed because it contained inherent conflict should we disagree on a matter of *real* importance. And since Pete's design required a great deal of work, there would come a point where all the budget would be used up and effectively the Engineer would be working for free – just for the promotion possibility. And as we shall see later, that is exactly what happened.

But for now it all went swimmingly. The K1200R was stripped, a jig was made and a maquette of the sidecar was constructed in 10mm steel.

My K1200R - not so good looking now!



SIDECAR OBSESSION—JOHN NIXON

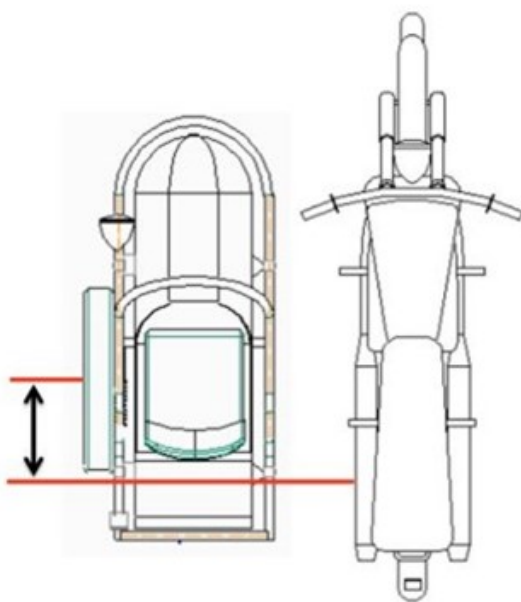
The early maquette in 10mm steel – to get the idea



Discussion took place over The Details. Such things as a 600mm wide seat which in sidecar terms is 'child adult'. This is crucial to my plan because it allows the 'sidecar pilot' (Paul Lumley's term) to move a significant distance across their domain to assist the rider negotiate corners. Car wheels and tyres look *so good*, can be smaller in diameter than bike wheels and thus lower the whole rig, nice!

Then there's the issue of sidecar wheel 'lead'. This is the amount by which the sidecar axle is positioned in front of the rear wheel axle and the overall wheelbase needs to be taken into account. A 'build criterion'.

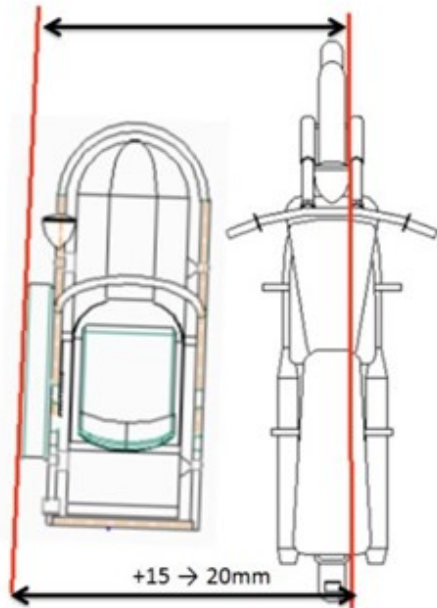
Sidecar Lead. Diagram courtesy of www.steves-workshop.co.uk



SIDECAR OBSESSION—JOHN NIXON

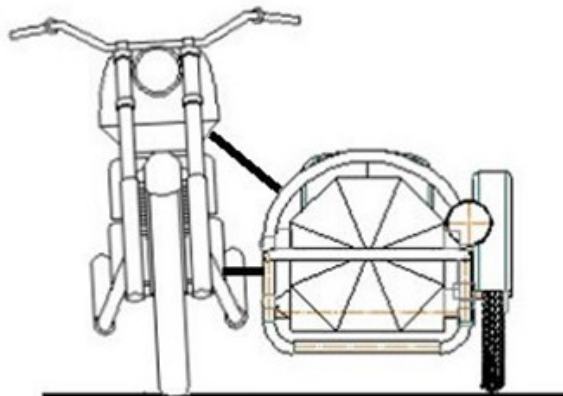
Next there's 'toe in'. The offset weight of the sidecar means it is always dragging the bike towards it. It's been likened to having a pendulum on the side of the bike. As the bike moves off, accelerates and decelerates, the weight of the sidecar affects the steering 'dragging' it to the left or right. This can be countered by setting up the sidecar angled towards the bike slightly. Toe in is generally adjustable. Another build criterion.

Diagram: Toe in courtesy of www.steves-workshop.co.uk



Third is the matter of 'lean out'. Said to be necessary to correct the tendency of the rig to track into the kerb due to the camber of the road when travelling in a straight line. Generally achieved by leaning the bike away from the sidecar a little. Again, ideally adjustable. Third criterion.

Diagram: Lean Out courtesy of www.steves-workshop.co.uk



SIDECAR OBSESSION—JOHN NIXON

Much as the idea of adjustability makes sense, I already knew that experienced sidecar builders like Jean-Louis of DJ Construction in France, know what works and build to a pre-determined geometry of these criteria without significant adjustment. He was kind enough to furnish me with his measurements.

But in our case, and given my Engineer had not built a sidecar rig before, we opted for adjustment of all three. This meant a lot of engineering thought, particularly as he was adamant about building wishbone type sidecar suspension in preference to the more customary and, it has to be said, vastly more simple, leading or trailing link suspension. Thus his design had to accommodate both 'lead' and 'toe in'. Adjustable top connections between sidecar and bike would accommodate 'lean out'. It all needed his genius.

The maquette was approved and matters progressed slowly as Engineer had a business to run at the same time, producing all manner of things. Soon we had a subframe fitted round the bike to carry the sidecar frame, a superb CNC milled alloy rear hub to accept a car wheel and fabricated sidecar wheel suspension, more on this in a minute.

Then the sidecar body spaceframe was made. Engineer did a fantastic job of working from Pete's sketches. Scaling up and using his nous. Then came the bodywork. He works in aluminium only, no fiberglass, and his fabrication skill with this metal is exemplary. Truly amazing! As the bodywork took shape I was pleased and excited in equal measure.

Bodywork in aluminium takes shape



SIDECAR OBSESSION—JOHN NIXON

Make no mistake, this sidecar is deliberately uncompromising in its approach. It's super sport. No concessions to weather protection. It's not for comfy touring. It's all action. It's all fun. Both 'driver' and 'sidecar pilot' are responsible for the outfit's behaviour in the bends. No passive 'passengers' please!

At this point we have the makings of a good rig. Next comes *the most crucial part* of sidecar outfit construction – the steering. Without going into too much detail, the issue is that conventional forks and even 'Hossack' style forks, as on the K1200R, are not good for swift sidecar action. Lateral forces are not much of an issue on solos, which compensate through lean, as well you know. On outfits, it's all about lateral G. Just imagine someone exerting huge lateral forces on your legs at the knees. Wince worthy! They simply aren't designed for that and nor are telescopic forks. Bikers lean, skiers lean! Sidecars don't (with some exceptions). On top of that, your bike's forks carry far more trail than outfits need. If standard forks are used on outfits the steering is mighty heavy and immensely prone to wobble from the 'pendulum effect' of the chair and needs strong, stiff damping.

So the choice is between Leading Link and Hub Centered suspension. I'd had leading link forks on my Suzuki 'Busa Charnwood outfit and like some leading link set ups, it was prone to steering wobble and needed stiff damping. Set up well, they aren't bad at all but, in my opinion, not so nice to drive as hub centered, possibly because their design is still more sensitive to lateral forces than hub centered, and also when the wheel turns it lifts tread off the deck.

My Suzuki with Leading links – great paint job.



Leading link forks



SIDECAR OBSESSION—JOHN NIXON

So hub centered, like I'd seen and ridden in France, was what I asked for and this was agreed.

Now there's a difference between genuine 'hub centre' steering like Difazio and what we can call '*hub centric*'. The former has the swivel parts **within** the wheel hub itself. The latter is car-like with ball joints top and bottom of a pin.

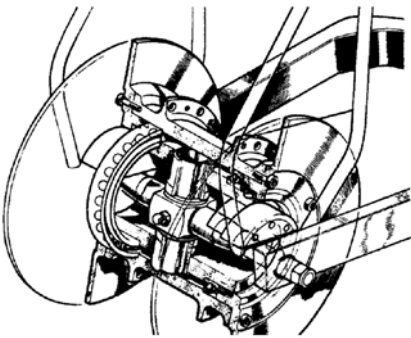
Hub Centric steering on Jean-Louis' outfit which Derek and I rode at Annecy.



And these pictures seek to give the idea of hub centered steering. Can you see how the front tyre would stay much more flat on the turn.

Hub Centre – Difazio

Difazio Ducati



Basic layout of the Difazio system. The wheel hub splices on large diameter bearings, and the non-rotating axle is integral with the steering "king-pin". A forward facing swinging fork connects the axle to the main chassis, whilst the upper frame-work controls steering and takes care of braking reaction. (Motorcycle Mechanics)



The complexity and therefore cost of true 'hub centre' steering was out of reach so 'hub centric', like a car, was the way forward.

SIDECAR OBSESSION—JOHN NIXON

All in all, sidecar steering and front suspension is, to put it mildly, challenging to engineer correctly. Especially without deep knowledge and experience of sidecar geometry. I visited my Engineer's workshop on a two to three week basis typically and on one such visit there was a cloth obscuring the front end of the bike. "What's under that?" I ask. Engineer says: "I don't want you to see that yet".

Hidden steering 'solution'



He made it clear he didn't want me to see the route he was choosing for the steering and front suspension engineering solution. His style of operating was to develop a solution and reveal it, to the hopefully to be delighted customer, when he's ready. All very exciting but yes, you've got it, that carries a risk, does it not?

By now we had a truly beautiful sidecar body coming together, attached to the machine and beginning to look the business. I was very pleased with progress. I had a concern that the wishbone suspension added more width to the already wide rig than I had anticipated, but I was prepared to go with it due to the clever adjustment for Toe-in and Lead the Engineer had created.

Wishbone sidecar suspension



SIDECAR OBSESSION—JOHN NIXON

I was looking forward to the next visit and the reveal of the front-end steering and suspension arrangement. Without any doubt this is the heart of a good handling outfit. Caster and rake, camber, spindle offset and trail are all critical, as are bump steer, suspension velocity ratio (VR), sag and much more.

I'm sure you can grasp the inherent awkwardness of such an unbalanced three-wheel machine come a corner. With no drive and associated differential to accommodate the sidecar wheel's different radius from the bike's wheels as it tracks round a bend, being a tighter radius on a left hander or greater on a right, the sidecar wheel has to scrub or 'slip' as does the front and the rear to some extent. And this is part of the thing that makes them so challenging to ride and such incredible fun. In reality it's more complicated than that in terms of 'slip angle' and I'll maybe have a go to explain more in a future part.

Part 8 Coming Soon. The steering solution is revealed.

PS. Should any reader or readers' partners be interested in what's gone before here are the issues of previous Articles, all available in the Library.

No. 1: April 2015

No. 2 June 2015

No. 3 Sept 2015

No. 4 October 2015

No. 5 June 2017

No. 6 May 2020



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SKILLS DAY @ CASTLE COMBE—WILL MORGAN

I had expected the Wilts & Bath Advanced Motorcyclists Skills Day to be 'covid off', but just in time lockdown eased, track days resumed at race circuits including Castle Combe, so WaBAM were in luck. To minimise human contact comprehensive briefing notes on the day's activities and covid precautions were emailed in advance. The aim of the day was to experiment & challenge some preconceptions about motorcycle control. Activities would be in small groups, with riders to maintain their own safety bubbles for social distancing or face eviction from the event. First everyone had their temperature tested by the circuit paramedics, then all bikes were noise tested. The targets were 37°C for riders and 105dB for bikes. Everyone passed OK but it was a close thing for some of the bikes.



SKILLS DAY @ CASTLE COMBE—WILL MORGAN

The day started with moto-gymkhana techniques as an alternative to more conventional & sedate slow riding methods. The email briefing said: *“Gymkhana riders are skilled at the application of power using throttle, front and rear brakes in combination to get just the right application of power. They develop an innate feel for picking the bike up on the throttle which can only be done reliably without the unnecessary complication of the clutch”*. With positive steering input that you might not expect to use at low speed, you make the bike lean into a tight turn. Balancing the throttle & brakes simultaneously maintains the gyroscopic effect & contains speed, and you turn without dropping the bike. Outward upper body positioning helps counterbalance the bike and more throttle will lift it out of the turn. Sounds easy, the instructor made it look easy *“without the unnecessary complication of the clutch”*, and I probably could too on a small old Honda like his, but not on my big new KTM. Next came braking exercises. These were straight forward for anyone who has done WHAM’s Throckmorton slow riding days, except Castle Combe car park had some invigorating sprinkles of gravel to liven things up.



Then out on the circuit for briefings at several corners by Castle Combe’s own race instructors. They included reference points & racing lines for each corner, the difference between race & IPSGA road positioning, and trail braking into corners instead of the getting all braking done before a corner on the road. They also warned about little things like an innocuous looking undulation on one corner that at speed can (ahem) ‘unsettle’ a bike, and the adverse camber on the exit of another that you can’t see until it’s too late, both nice to know about in advance. After this it was back to the car park for some lunch time entertainment: a local moto-gymkhana team practicing against the clock round a course in the car park (I noticed they had brought their own push-along gravel sweeping machine!). Inevitably they made all our earlier attempts look a bit dismal, especially riding the course in pairs. “Only a fool breaks the 2 second rule” clearly did not apply.

SKILLS DAY @ CASTLE COMBE—WILL MORGAN



The afternoon was on track in groups of about 12 riders. The groups were not skill or experience based, with a mix of abilities & bikes in each. Every session was led by an instructor for the first lap, then we rode as we wished. The briefing was to experiment using road positioning and/or racing lines, trail braking etc., but to ride your own ride. To reassure the less confident and calm down the over-confident they had no overtaking zones on the more technical sections, so out braking someone into a corner was verboten. Violation meant a black flag & expulsion from the track, but everyone behaved themselves and waited for the straights. Every group got four sessions, enough for an average road rider to do about 7 or 8 laps per session. It great to be able to build up confidence lap by lap, session by session. The breaks in between gave time to re-hydrate, cool off in the shade, reflect on the previous session and plan for the next. My strategy was to follow an instructor thru' a corner, attempt to keep up with them for the next one, then watch them disappear into the distance, and repeat the process again the next time one of them passed me. As the sessions progressed everything began to gel and I was lapped less frequently as I began to ride smoother & faster. Nevertheless, I clearly do not have the talent of Marc Marquez. But oh boy it was fun finding that out!

The day was great experience thanks to organizer Eddy Lambah-Stoate & Wa-BAM. Unlike nationally organized Skills Days, it is a significant undertaking for a local group to put on a circuit-based event like this. In the past Eddy said "Never Again", only to relent. I'm on his mailing list so I'll let you know if he does!

