

Sidecar Construction 101 - [Andrew Fairbank](#)



I can't explain what drives me to pick up a hacksaw and start cutting up an inherently unstable vehicle, a motorcycle, and build it into an unstable and asymmetrical one, a sidecar.

In many ways, a motorcycle is an unsuitable vehicle to make into a racing sidecar. The steering geometry is all wrong, the riding position is too high, the wheelbase is too short, and the wheels are too large in diameter. Although one could bolt

a sidecar platform to a stock motorcycle and go racing, I wouldn't recommend it. The classic and super vintage sidecars we race should be able to be driven around corners with one hand, they shouldn't wobble uncontrollably, and they should be able to withstand at least a seasons' racing without major failures. These are not lofty goals. These are aspects of our class we can assume as long as those building rigs take care to adhere to sound engineering principles.

A racing sidecar should be a purpose built vehicle with a frame structure suited to the particular stresses to which it will be exposed. This requires quite a bit of reconstruction of the donor vehicle. I like to use a portion of the frame which the engine came in because the engine mounts are there, the swing arm is aligned to the trans output shaft and usually some part of the front down tube or tubes is long enough to attach the new steering head to. When I design a new rig I start with the steering geometry. I have used rake angles ranging between 26° and 22°. I would use steeper angles but the head tube moves further forward with less rake and becomes impractical. I like 1/2" to 3/4" of positive trail (see fig.1). I decide on tires and wheels because tire diameter affects trail. I allow for some adjustment of trail to compensate for replacement tires and driver preference.



I lower the frame/engine to 3.5" or so off the ground. Next I set a goal for the wheelbase keeping in mind the goal of a 40-40-20 percent weight distribution. I limit the suspension travel to 2" front and 1.5" rear. Before settling on the wheelbase, I look at the drivers ideal position on the rig. Ideally, the driver is positioned in such a way as to be able to weight any of the wheels by changing his/her position by leaning forward, sliding backward and/or leaning sideways with the neutral position being a reasonably comfortable one. I set the length of the rear swing arm next. This generally means lengthening it. Now is a good time to check the squat caused by the lowered engine and

generally larger rear sprocket. I adjust the engine height and swing arm angle and location of the swing arm pivot with the goal of minimizing the squat and jacking tendencies.



The track and sidecar wheel lead are related to each other. I like to use 38?to 40? inches track width and around 11? of lead. I set the sidecar wheel with zero toe in. I've found the tires last longer that way. I also set the bike portion of the frame vertical or leaned in towards the sidecar a degree or two. Leaning the bike towards the sidecar helps keep the rig from lifting; this can be important to a light and mildly skittish passenger. I try to limit the distance the

passenger has to travel in changing position from over the rear wheel to off the platform. Two approaches are to lower the frame over the rear wheel and to raise the platform. Making the sidecar fender low and close to the front of the wheel helps with this goal too. A good passenger will make use of the space between the front of the sidecar wheel and the front of the platform to stabilize the rig in corners. I always make the sidecar platform integral with the bike frame. I use a large diameter tube running under the rear of the engine/ trans out to the sidecar wheel. I put the other attachment points all in different planes. This prevents them from forming an undesirable hinge.

At this point with a rolling chassis designed and hopefully built, Spring is rolling around and you've used up your patience, money, and spare time. Now the hard part begins, adding all of your own controls and cables, since you cant just open a catalog and order them. When you climb over the rig and start making motor noises there's nothing but empty space to put your limbs on. In the past year or so I've seen the controls on USCRA rigs conform somewhat. The shifter tends to be a straight rod with 2 pegs that your boot fits in between. The rear brake pedal is often attached directly to the backing plate. It's really important that the handlebars or clip-ons be very strong.



I've touched on some of the more salient details of building a racing sidecar rig and realize I shouldn't try to cover the entire process in one article. I started out by trying to illustrate the enormous amount of considerations and compromises it takes to make one of these incredibly fun to drive racers and characteristically, have run out of time.

