



## **Training: Bob Juncosa**

### **“Landing – When the Wheels Hit the Ground”**

We’ve all been there. Right from the taxi out, you knew this flight was something special. The engine was humming perfectly. The takeoff was so pristine that a hush fell over the spectators as they sensed that they were in for a treat. The wind dropped to zero just for you. You did every circuit of the field with the precision of a brain surgeon. Your maneuvers were flawless and now it was time to bring your Cub (or Mustang or Camel or whatever your favorite taildragger is) in. You lined up perfectly and descended as if cradled by angels. You could swear you heard the crown preparing for your well-deserved standing ovation. And then it happened! In an instant it was all for naught. Your wheels touched down and in the blink of an eye, your pride and joy was on its back, just lying there as helpless as an inverted turtle.

What went wrong? Try as you might, this ignominious end to an otherwise pleasant flight occurs far too often. Each time you try to touch down slower, softer, and if so equipped, with more flaps. Even when in perfect three-point attitude the outcome is all too often the same. The reason and the solution just might surprise you.

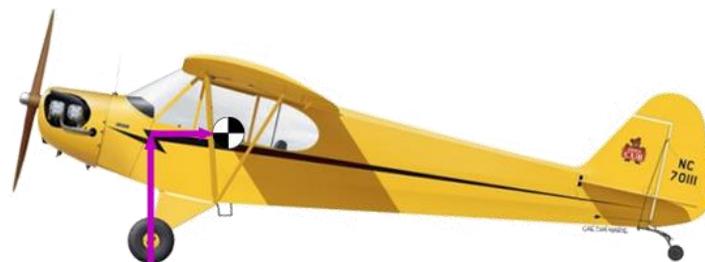
Take a look at the Cub on the left in the illustration below. At the instant the Cub touches down, the forces push on the wheels. As long as the CG remains behind the wheels, the plane won’t ground loop. If these ground forces get large enough, they will exceed forces keeping the CG behind the wheels. When that happens, over she goes.



The typical way to mitigate this is to slow the plane down with the idea that the slower the plane is going, the lower the forces that will be imparted on the wheels.

A three point landing can also be added to help things by moving the CG even further behind the wheels. This increases the forces from the ground that would be needed to cause a ground loop.

This works fine with full scale planes but is generally of only marginal benefit to model aircraft. The reason is that the ground imparts full scale forces on your scaled down version of the much larger plane. It doesn’t take much to flip a slow moving plane over.



So what’s the answer? It may be somewhat non-intuitive but the solution is to land *faster!*

Airspeed has a significant impact on a plane's propensity to flip over. When coming in slowly, the drag forces are less and in this case, drag can be your friend. Drag is essentially a force pushing back on the plane preventing it from tipping forward. Another factor is the effect of the horizontal stabilizer and the elevator. The faster you are coming in, the more effective your control surfaces are. If you slow way down to just above stall speed, the control surfaces have only marginal effect and aren't very effective in preventing a ground loop. The slower you are going, the less effective the elevator is in keeping your tail down.



So if you are having ground loop troubles, try this. If so equipped, use less flaps or leave them up entirely. Come it faster and maintain flying speed all the way to the ground. Touch down just on the mains and “fly” the plane down the runway. Do some touch and goes this way. When you are ready to come in, still touch down on the mains but let the plane slow down by decreasing the throttle. When you are below flying speed, apply up elevator to put the tail on the ground. For WWI and earlier biplanes and triplanes, full scale or R/C, this is the only way to land and keep the wheels from ending up pointed skyward.

OK. You are on the ground but with some planes, it is not uncommon that things can still get a little squirrely. The solution? Apply a little up elevator and a blip of the engine! This throws a burst of air down the length of the plane and gets more air on that tail (hopefully) forcing it back down.

Happy Landings

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