

Solo Flight: Crosswind Landing

Fly This Lesson Now

—by Rod Machado

What do a weathervane and a runway have in common? The answer is: nothing. While the weathervane points into the wind, the runway stays bolted to the earth, unmovable, stubborn, and that's all there is to it. The problem is that pilots like landing into the wind, which allows them to touch down at a slower speed, making the airplane easier to control. Pilots also like to land on runways, too. Therefore, when the wind blows crosswise to the runway, you have little choice but to land in this condition (unless you go searching for runways that have more favorable winds. This, however, isn't too practical). We call this a crosswind landing, and you're about to learn a few nifty tips and techniques on how it's done.

First, I'm going to assume that your simulator has rudder pedals or your joystick has twisting rudder functions. You need these to make crosswind landings. If not, I'll assume that you'll use the 0 and ENTER keys on the numeric keypad to manipulate the rudder. Using your fingers isn't quite the same as using your feet, but it will do the job nevertheless. For practical purposes, however, I'll just speak in terms of rudder pedals for this class.

Crosswind Conundrums

Learning to land in a crosswind involves only a few additional techniques beyond what you've already learned. All the essentials for landing should be comfortably etched in your brain by now. What we'll do is add a few more etchings to make you a complete pilot. We'll start with learning how to correct for crosswind drift.

There are two basic methods for correcting for drift during a crosswind approach and landing. The first is the crab method; the next is the wing-low (or sideslip) method. Let's examine how we crab an airplane to correct for wind drift; then we'll look at the wing-low method for accomplishing the same thing.

Crabbing

I suspect the term crabbing got its name from the observation of crabs as they walk. Crabs seem to point in one direction while walking in another. I suspect it's just difficult for a crab to walk with all those legs at one time. An airplane, however, can be said to crab when it points in one direction while heading in another. That's why the path your airplane traces over the ground is called its ground track.

If you sit there, fat, dumb, and happy with your compass showing a 165-degree heading, you will track a 165-degree heading over the ground from any given point only when there is no wind (or the wind blows directly on your nose or tail). A little wind, however, changes everything. Think of the wind as being a giant hand. Because the airplane doesn't have its feet on the ground, it gets pushed around by the wind. Depending on how much wind there is and what angle the hand is pushing from, the effect can be anywhere from slight to considerable.

The only way to create a straight ground track is to compensate for whatever wind there is by pointing the airplane's nose (slightly or more so, depending on conditions) into the wind (Figure 1).

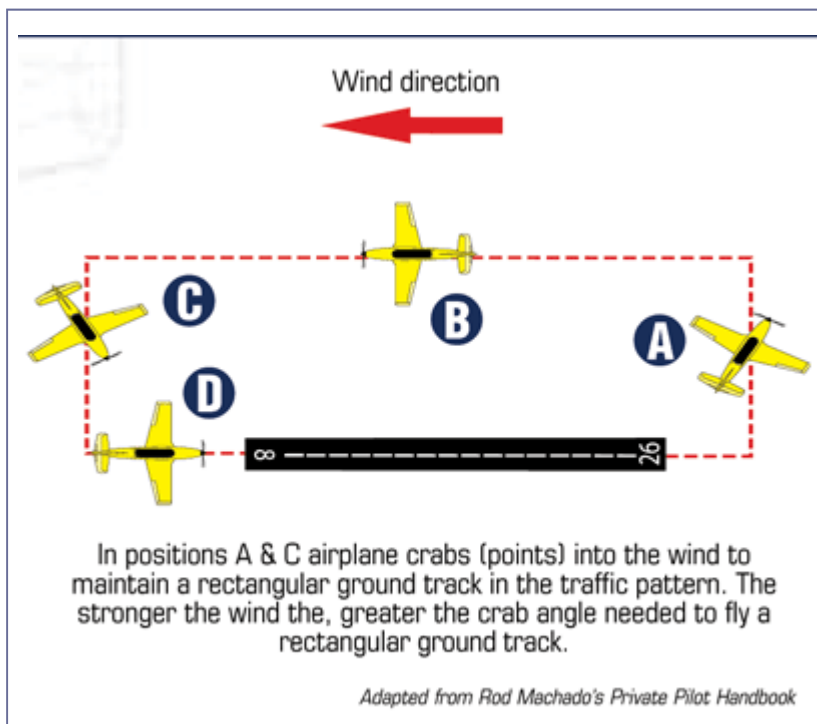
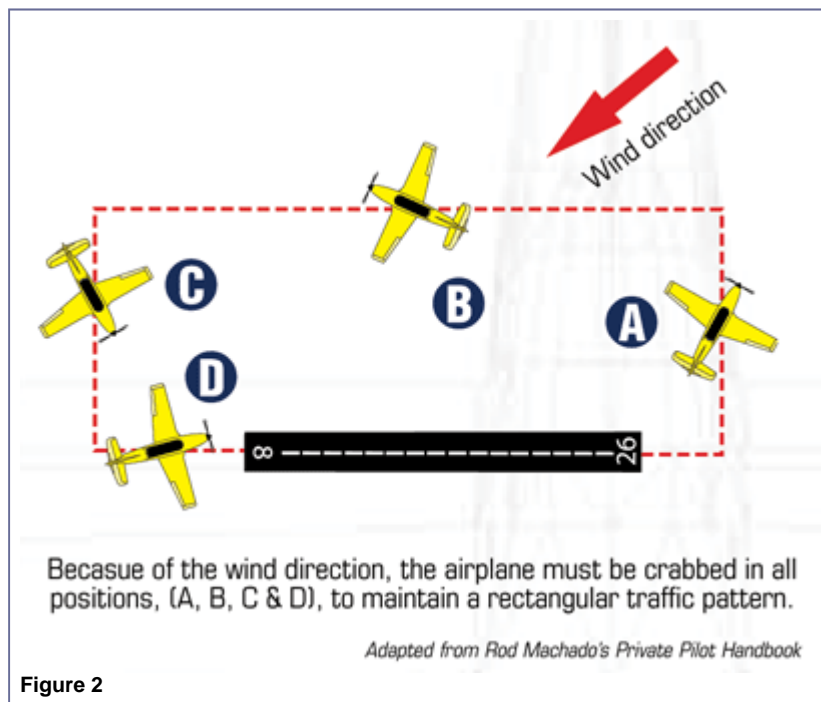


Figure 1

If you head the plane to the right a bit and the wind pushes to the left a bit, everything balances and you make your intended straight line over the ground.

How do you know the precise amount to crab? Make a slight coordinated turn (say 5 or 10 degrees at first) into the wind, level the wings, and watch the results. Keep in mind that I said coordinated turn. We don't crab by applying only rudder. We use rudder and aileron in coordination to turn into the wind. Don't forget this. It's very important.

If the airplane is crabbed properly, it will make a rectangular ground track about the runway, as shown by the dashed line in Figure 1. The airplane's ground track is now perpendicular to the runway, as flown by Airplane A. Similarly, Airplane C is crabbed to the left—into the wind—to maintain the desired ground track while on base leg. Of course, if the wind is not directly aligned with the runway, you'll have to crab on all five segments of the traffic pattern to maintain a rectangular ground track (Figure 2).

**Figure 2**

If you let yourself get pushed around by the wind, you won't be where you're supposed to be. This is a particular problem in the traffic pattern. Other pilots and the tower expect you to fly a traffic pattern that tracks straight on each leg, and crabbing to take account of the wind is the only way to do it.

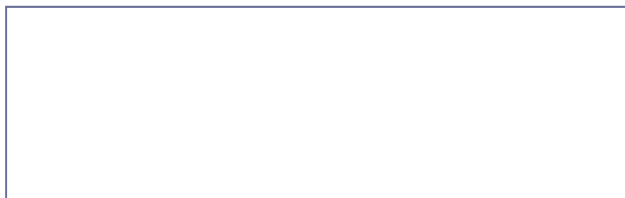
Where crabbing becomes especially important is when you're lined up with the runway on final approach. That's why you want to turn into the wind and establish the proper crab angle as soon as possible so that your ground track is aligned with the extended runway centerline. It may take a few turns to find the proper crab angle. That's fine. Just do it.

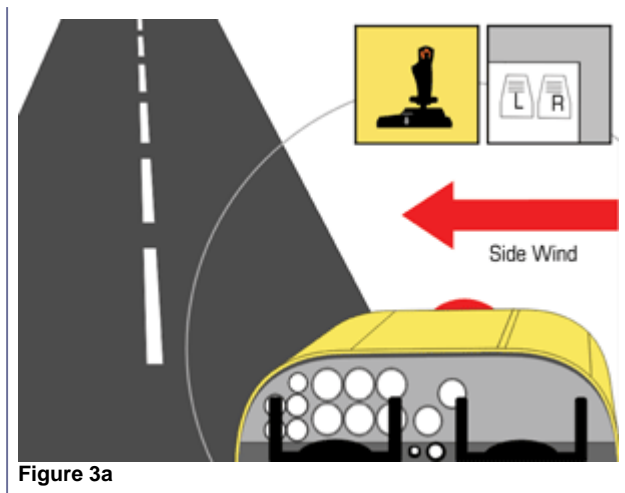
Once the crab angle is established, you fly that angle all the way to the runway. In fact, you'll flare the airplane while still crabbing. It's only when the airplane is just about ready to touch down as it flares that you do something known as kicking out the crab.

Kicking Out the Crab

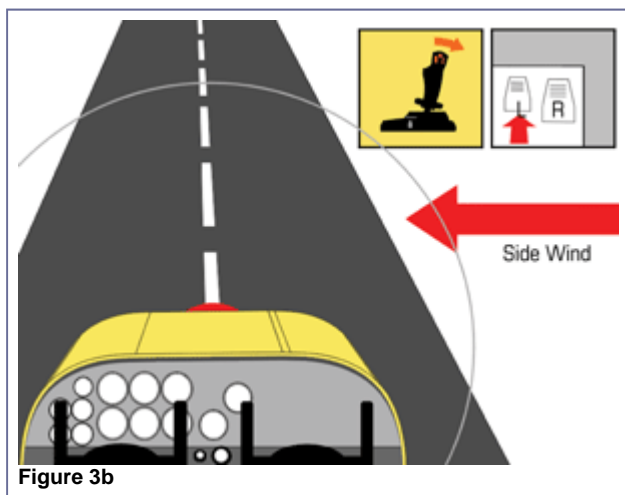
No, this has nothing to do with booting a grumpy instructor out of the airplane. It has everything to do with using sufficient rudder to align the airplane's longitudinal axis with the runway centerline before it touches down, as shown in Figure 3A.

Yep, you just add sufficient rudder to straighten out the airplane before touching down. That's it. Okay, there is just one more thing.





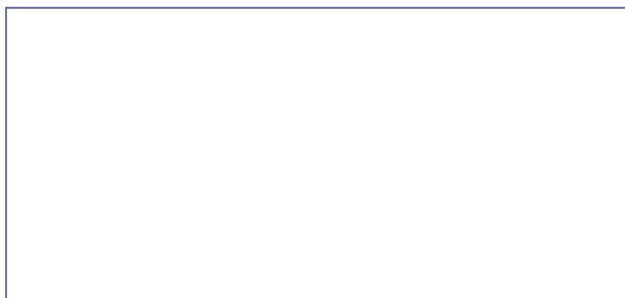
If we assume that you are crabbing to the right, then you'll add left rudder to straighten out the airplane before touchdown. As you apply left rudder, the airplane will want to bank to the left. So you must add a tad of right aileron to keep the wings level as you kick out the crab, as shown in Figure 3B.

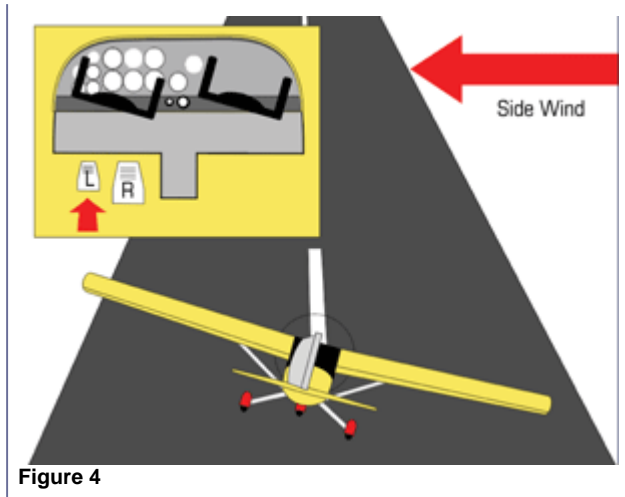


The crabbing method isn't my preferred method for handling crosswind landings. It requires good timing to do it properly. To complicate things, as the airplane slows down during the flare, you often need to increase the crab angle to continue tracking down the runway centerline. The reason for this is that the airplane slows down during the flare, and a slower airplane requires a larger crab angle to compensate for wind drift. Therefore, as you flare, you often need to increase the crab angle and, just before the wheels touch down, you've got to straighten the airplane out again. Whew! That's a lot of work. Here's another way that's a lot easier on everyone: you, the airplane, and your passengers.

One Wing Low

To use the wing-low method of crosswind correction, all you need to do is bank the airplane in the direction of the crosswind. Use the ailerons to do this. If the wind is from the right, then add a little right aileron. This causes the airplane to slip sideways into the wind, as shown in Figure 4. This is also why the same method is known as the sideslip method of crosswind landing. If you bank sufficiently, then the sideways slippage of the airplane will cancel out the sideways push of the wind. The result is that the airplane tracks down the runway centerline. There is one additional thing you must do, however, to make this maneuver work.





As you add sufficient aileron to compensate for the wind, the airplane will want to turn in the direction of bank. Don't let this happen. Add enough opposite rudder to keep the airplane's longitudinal axis aligned with the runway centerline. In other words, if you add right aileron to lower the right wing and correct for the right crosswind, you must also add a little left rudder to keep the airplane from turning right. How much left (opposite) rudder do you add? Just enough so that the airplane's nose points straight down the runway. That's it.

From this position, fly the airplane all the way to the runway and begin a normal flare. Don't do anything different. As you begin the flare, the right wing will be low (right crosswind assumed here), and you'll touch down on the right, or upwind, wheel first. This is not only normal, it's expected. Airplanes are designed to do this while correcting for the crosswind. Of course, once you touch down on the upwind wheel, you'll want to lower the other wheel to the ground because it's going to go down on its own sooner or later. You won't find airplanes taxiing on one wheel. If you do, take a picture and send it to me. I gotta see this.

Combo Crab and Wing Low to Go

Do you see the basic difference between the crab and the wing-low method of correcting for crosswind? The wing-low method is a lot easier and requires a lot less skill to perform. It's also a more effective overall method for crosswind correction. Nevertheless, I combine both methods during crosswind landings.

I use the crab method while on final approach. Then, when I'm about 100 feet above the runway, I transition to the wing-low method. This prevents my passengers from feeling squished to the side of the airplane during a long sideslip.

There you have it. Crosswind landings aren't that tough. They do require practice, and I want you to get your share. Practice your crosswind landings in the solo session, then meet me back here for the next ground school section.

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