You're Slipping

"You're slipping, Doug", my best friend told me, as I confessed that I had totally missed the deadline for sending an article to be published in last month's issue of Vintage Airplane. And sure enough, if I go by a couple of definitions I found in the dictionary, the term slipping would certainly apply. The dictionary defined slipping as "pass or change to a lower, worse or different condition, typically in a gradual or imperceptible way"; it also had this definition: "behaving in a way that is not up to one's usual level of performance". I must confess to being a good example of both definitions.

But the dictionary also had this definition of slipping: "a sideways movement of an aircraft in flight…", and it was relative to that definition that I received the following email from a reader.

"I have a question on forward slips to lose altitude for landing (no flaps). I was taught many years ago to slip 'low wing into the wind' and I have done so for a long time. Recently, though, I have seen where that could cause some trouble, so here is the scenario. We are landing on runway 36, winds are 330 at 8. We could put the left wing down into the wind with the nose headed about 030˚ and land left main wheel first. Wind gusts play havoc on all that wing area pointed into the wind and a go around would be tough in under powered planes (the reader flies a Taylor E-2), as we are low and trying to climb in a cross wind to the runway heading or to the left upwind leg.

All can be done safely, but not without some careful stick and rudder. The alternative is to point the nose into the wind (heading 330˚) and slip with the right wing down. Now transition to landing on the left main wheel is a little tougher, but wind gusts have almost no effect on the plane during approach as the area into the wind is greatly reduced and go around is easy by leveling the wings and climbing into the wind to join the crosswind leg of the pattern."

This reader had indeed shown a great understanding of the dynamics of a forward slip, when the wind is blowing. He had obviously thought the situation through, and then flew his scenarios to confirm his beliefs. Reading between the lines I could also assume that this reader had some good stick and rudder skills!

But before I get to my answer to this reader, let's define not only a forward slip, but a side slip as well. Over the years I have found that confusion about the two (forward slip vs. side slip) exists in more pilots than I might have thought. Understanding the difference between the two is integral to my answer.

A forward slip is a maneuver that is used to lose altitude. In aircraft without flaps it is used regularly to keep an airplane on the glide slope as it descends down

final approach for landing. (It is also used regularly in aircraft with a tandem configuration, when flown from the back seat, so as to afford a view of the runway when on final approach) In a forward slip the longitudinal axis of the aircraft is pointed away from the direction of flight while the wing pointing in the forward direction of the airplane is lowered. Whereas this maneuver can be used in curving flight (as in the turn from base leg to final in the traffic pattern), it is most typically used on final.

In that situation the nose is turned away from the extended centerline of the runway, using rudder to achieve this, while simultaneously the wing toward the runway is lowered using aileron. This configuration produces a great amount of drag as the fuselage is now facing into the relative wind and the airplane increases its descent rate without accelerating. Exactly what we need if we find ourselves above the glide slope on final.

This maneuver is not limited to aircraft without flaps. In fact the practical test standards for every certificate from Sport Pilot through Commercial Pilot include the forward slip as a maneuver to be tested. Indeed, proficiency with the maneuver is integral in a situation when you find yourself in an airplane whose engine has ceased to function, and your only landing area is a small one surrounded by high obstacles. This would not be the time to find that the first two definitions of slipping used in this article would be applicable.

Let us now define a side slip. The side slip is a maneuver that is used in landing in a crosswind. It allows us to maintain the longitudinal axis of the aircraft with the direction of travel (ideally right down the centerline of the runway) without drifting. If the airplane were to be viewed without any form of ground reference it would appear to be drifting (slipping) in the direction of the lowered wing. When we add a ground reference (the centerline of a runway) the airplane is still slipping to the side, but the blowing wind counters this sideways motion over the ground, and the airplane remains centered over the runway centerline.

In a side slip, if you find that you are drifting away from the centerline, into the wind, then raise your lowered wing slightly and reduce the amount of opposite rudder you have been holding. (As in the forward slip, the rudder is controlling the longitudinal axis [heading] and the ailerons the bank.) Conversely, if you are drifting away from the runway centerline and away from the wind, lower the windward wing some more, and add more opposite rudder to maintain heading with the runway centerline.

Hopefully all of this has made sense to you. If not, it is possible that my verbal skills might be slipping, but that’s another story…Understanding the difference between a forward slip and a side slip are important in my answer to the reader’s question about forward slips. My answer now follows.

“For what it is worth, I teach the first technique you first describe, ‘low wing into the wind’. My reason for this is that for the vast majority of pilots it is much easier to transition into the correct, wing low, side slip required for the landing. Let's take your scenario. If you were descending in a forward slip with your right wing low, the airplane would be less susceptible to gusts in that heading, however in order to land, you would still need to swap everything around, and get the left wing low (not as low as in the forward slip) with the nose pointing in the direction of your travel (hopefully aligned with the runway heading), thus converting a right-wing-low forward slip to a left–wing-low side slip. If the wind is gusting, and there are any obstacles to create orographic turbulence, this could be a very challenging maneuver.

By forward slipping with the wing into the wind as the low one, the transition to the side slip required for a cross wind landing is much simpler, with much less risk. If the need to go around arises, I do not find the transition to the crab into the wind that would be required to be that difficult.

You certainly display a great understanding of the dynamics of both situations, and also don't seem bothered to put either wing low. You seem to understand the pros and cons of either way of doing it, and I would assume you are also comfortable in either "configuration". So I would suggest that you do what works best for you. If you have the dexterity of hand, foot and eye to transition from one side to the other, then it shouldn't be a problem.” The bottom line is that you need to end up with the proper wing low to counter the crosswind in the side slip for landing.

As an aside, I have flown with many pilots who, until I point out the problem, will only slip in one direction, regardless of what the wind might be doing. It's kind of like ice skating, or skiing where it is much easier to "cross one leg over" or turn in one direction, than it is the other.” For many pilots, especially those flying airplanes with side by side seating, they are only comfortable slipping with the left wing low. Depending on the wind, however, we need to be able to slip with either wing low.

There might also be the situation when we will have to transition from having the left wing low, to having the right wing low. Suppose we are flying a left base leg in the traffic pattern, and realize we are high. To compound the situation, there is a crosswind blowing from the right side of the runway. We would now have to set up a forward slip with the left wing low while on the base leg, maintaining that forward slip through the turn to final. Then once on final, we will have to transition to having the right wing low. It is a maneuver that requires some dexterity. As an aside, it is a maneuver that all of my clients receiving tailwheel transition training in my PA-12 must demonstrate proficiently.

If it has been some time since you last practiced this maneuver, you might find that the first two definitions of slipping mentioned at the beginning of this article are the ones that would apply to your skills in slipping your airplane. So the next time you are flying, practice a few forward slips. Then when there are blue skies, with tailwinds that shift to crosswinds on your landing, you will be prepared.

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