MID-GEORGIA SOARING ASSOCIATION

Directional Control on Landing

One task area that I see problematic as an instructor is directional control during landing rollout. This article is an attempt to identify some of the problems and provide possible solutions. And for the sake of argument, we shall assume we are properly landing into the wind, for we know landing in a tail wind exposes us to far greater directional control issues on rollout.

Unlike some commercial flight schools that offer a relatively wide grass runway with sometimes nebulous centerline references, our 75' wide runway has advantages and disadvantages. The advantage is a clearly marked dashed white line as a centerline reference. The disadvantage is the relative narrowness of the runway compared to some grass strips, and the absolute imperative to take off and land on or near the centerline to avoid runway edge lights and other potential obstacles.

It's an axiom of aviation that a good landing starts with a good pattern and approach. Soaring training has evolved over the years to increasingly discuss vertical angular relationships (how steep or shallow) one is to the runway, beginning on downwind thru final, and glider pilots need to understand and correct for a proper vertical angle as needed. This, of course, can be done by using spoilers, modifying the pattern, and/or slipping to control height.

Next, knowing the winds that day and applying pattern corrections is vital. Rolling out at a minimum of 200-300 ft AGL on final should allow the pilot time to assess lateral drift due to any cross wind and setup an appropriate sideslip to lineup with the extended centerline. Realize, of course, that surface winds may be somewhat different than 300 ft winds, but on most days the difference is very manageable.

On final, my focus is three things: aim point, airspeed, and controlling lateral drift due to any crosswind. It is a rapid update cycle as I constantly evaluate these three parameters, and make smooth, positive, and generally SMALL control inputs to stay wired. Hopefully we have judged our base turn well enough to be in the normal angular "cone" on final and do not need to complicate the situation with a forward slip to reduce altitude. Back to my three priorities, aim point is controlled with spoilers, airspeed is controlled with pitch, and lateral drift with sideslip - a shallow bank into the wind while keeping the fuselage aligned with the extended centerline of the runway. Rapid updates of these three parameters is the early key to a good landing and precise rollout on centerline.

Aviation requires we be good multi-taskers. But we can control and often prioritize the importance of mental and physical tasks to smooth out workload. The round out is an example. We've discussed our three objectives on final, and the cockpit controls need to adjust these parameters. And as we begin our round out we have all three nailed; rounding out at our aim point, proper wind-corrected approach speed carried until the round out process starts and sideslip controls as need to keep fuselage aligned with the dashed white strip passing underneath us. So now, what to do with these controls? The answer gets back to task prioritization. The real event going on here is the smooth pitch change from approach attitude to the touchdown attitude. The timing and magnitude of this back stick pressure simply takes practice. But the answer to the other control inputs - in the basic case here for discussions purposes - is to leave the control inputs alone that existed just prior to round out. In other words, leave the spoilers where they were (freeze the left arm), and leave the sideslip inputs alone (lateral stick and rudder input). "Chair fly" this action/inaction combination sometime to visualize it. By focusing on changing only one parameter (pitch change), we have now reduced our workload in the round out by minimizing

other flight control inputs that needlessly complicate the stabilized approach.

But what if our round out was a tad too little and/or too late? (Will leave out of this discussion the very fast touch down/PIO threat). Well now we have touched down faster than desired, but still hopefully tracking straight. But this faster than desired touchdown can harbor problems - a very sensitive rudder ready to steer the glider left or right with small rudder input. So, the moral here is round out for a normal, minimum energy touchdown and you will have a less sensitive, but still very controllable rudder for now primary use in directional control on rollout.

Having just the right amount of bank into any cross wind is critical as well. Undesired bank at touchdown can also result in directional control issues, just as a shallow bank while flying will turn the glider. So, use slight bank at touchdown ONLY as need to kill lateral drift. Otherwise the wings should be level. Practice using canopy/glare shield references so that wings level references are obvious.

So now let's backup and say you've done everything right and have touched down nicely at some point past the aim point, at the proper speed, and on centerline. tracking straight on the centerline since our fuselage remained aligned with it throughout the round out with just the bank needed for any cross wind. Now what? Well, my very first objective after touchdown is to do nothing for the first few seconds other than observe directional changes, if any. (Along with checking for directional issues I generally deploy full spoilers to kill any remaining lift after touchdown.) Our eyes during the round out, of course, shifted from our aim point to some point down the runway. I now use that far focus point to watch for directional changes.

And as I watch for undesired nose movement left or right, I'm already "thinking feet" as the required control input if needed. Let's pause for a second and think about the early stages of a takeoff in terms of directional control. Early in the roll larger rudder inputs are needed for effective steering. As speed increases, the rudder becomes more effective and hence progressively smaller inputs are need to track straight. And so it is in reverse on landing rollout as we decelerate. Initially I make small rudder inputs to correct left and right, and as I slow I can expect to need larger inputs. The bottom line, however, if we have landed properly on centerline, only small rudder inputs should be needed initially.

Finally as we slow to nearly a stop, the rudder loses all effectiveness. Ideally, we remained on the centerline and eventually the ailerons lose effectiveness as well and we stop, then tilt wing low. If stopping at midfield at Monroe, there are yellow taxiway turnoff lines that initially parallel the dashed center white line. Your goal should be to stop your glider between those parallel yellow lines before they diverge to the taxiways. By doing so, your 17 meter K-21 wing tips will remain on the runway and not impact runway edge lights.

All this is the ideal, but if, for whatever reason directional control is lost on rollout, remember your last line of defense - full wheel brakes. This is not a gentle maneuver, but rather needs to be applied aggressively to prevent a possible runway excursion.

Hopefully this article has helped provide useful techniques. The K-21 is an excellent trainer with many docile characteristics. But she does demand a competent touch after touch down with a definite plan to fly her all the way to a stop. Never quit flying after touchdown! The key is awareness of the issue and practice.

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