

# Crosswind Landing Technique

By Don Chapton

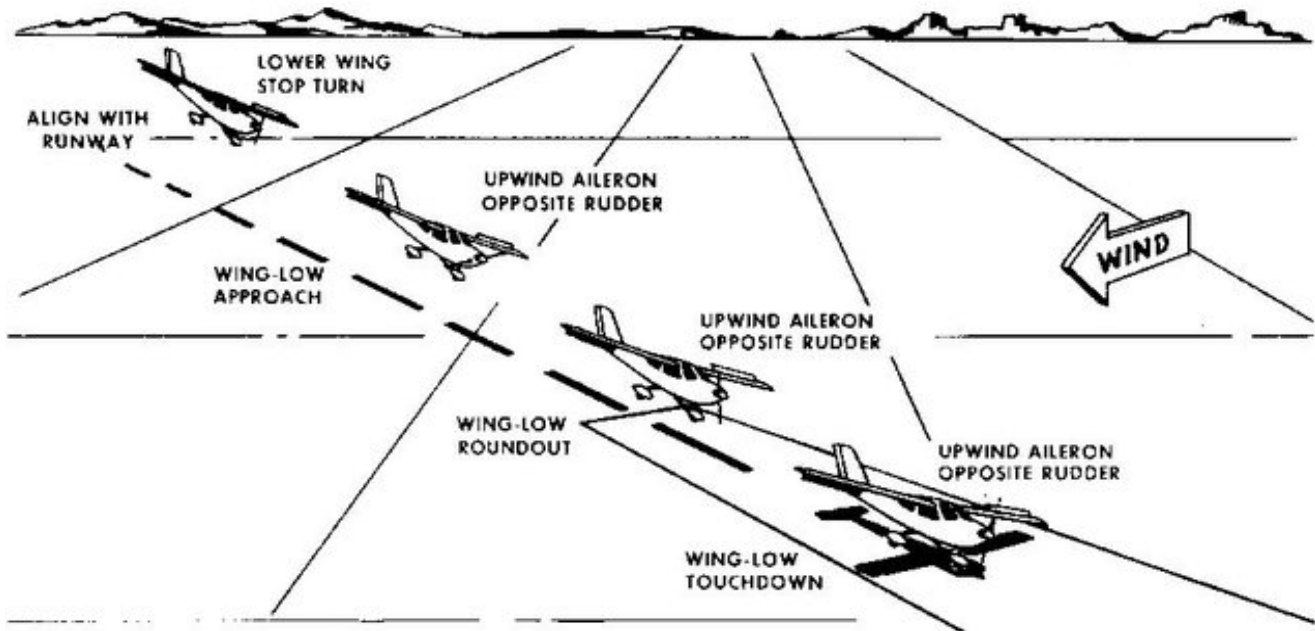
Had a conversation about crosswind landings and I would venture to say that very few RC pilots have much of an idea of the control inputs to successfully land in a crosswind. For that matter, most of the full-scale pilots have huge problems with cross-winds. I have been building flying models since I was 5 and got into R/C in 1971. I have always built scale models even when I was flying free flight. Learned on a Goldberg Skylane and built a Top Flite Mustang for my second model. I have also flown full scale for over 40 years and most of my time is in warbirds, aerobatic and sport airplanes so this gives me a unique perspective on how to fly both.

As I thought about how to go about this it occurred to me that most R/C pilots don't use the rudder much except landing and take off. This works OK for most sport models and trainers but flying scale models especially multi-engine and fighters require rudder for almost all the flight regimes. Since cross-wind landings require proper rudder control maybe we need to go back to learning good stick and rudder control skills.

Let's start with the basics. If you can get ahold of a cub type trainer plane with some dihedral and a 48" wingspan or larger it would be a big bonus. These planes will usually fly quite nicely with just rudder and elevator inputs. So to start fly figure 8s using only the rudder for turns. Once that is mastered do some pattern work and touch and goes using only the rudder for turns. This gets you used to using your left hand through the entire flight. Now practice figure 8s using rudder and ailerons at the same time. Fly straight and level and give it some hard right aileron. Notice how the nose yaws to the left initially when you do this. Try it again only this time apply right rudder as you hit the ailerons. No yaw to the left and the airplane flies a nice smooth arc. Now do some 180 degree turns with just aileron. Notice that after the yaw it will settle down but as it goes around the turn it will still have a left nose up attitude. The airplane is flying uncoordinated and by adding a bit of right rudder the fuselage will be aligned with the flight path. In full-scale airplanes we have the turn and bank indicator that has a ball in a curved tube something like a level. You want to keep the ball centered in the middle to keep the airplane coordinated. Flying uncoordinated causes bad things to happen and we will cover that later. Now let's do some stalls. The trainer type airplane is pretty stable but we can get the idea of what happens when we are not in coordinated flight. Pull the throttle to idle and pull back the stick for a gentle stall. If trimmed properly it should just break straight ahead. Do it again but now as it gets ready to break add right aileron. As it breaks it will drop the left wing and if you give it more right aileron it will snap over faster to the left. It might not be very pronounced on a trainer type airplane but as you get into heavier wing loaded scale planes believe me it will happen quick. How many times have you seen someone get too slow on final and it rolls over and crashes? Meanwhile, the guy is saying "I had full opposite aileron and it still kept rolling". This is where the good old rudder comes into play. Try it again and as the right wing drops neutralize the ailerons and give it left rudder to pick up the wing. If the right wing drops and you give it left aileron it will actually make it roll faster to the right. There is an aerodynamic explanation of how this happens but just keep in mind and slow airspeeds and a wing starts to drop pick it up with the rudder. Try this at higher power settings until it is natural to pick up the wing with the rudder. If you have a low wing airplane with a semi-symmetrical airfoil all of these exercises will require an increase in skill. Again after you are comfortable with this it is time to do forward slips. In full scale, we use the forward slip to control glideslope on final approach. To do a right forward slip you apply right aileron and left rudder. So get established on final a little higher than normal and engine at idle and put the right wing down and apply left rudder. Keeping the same airspeed you would on a normal landing. The higher the bank angle will require more left rudder and you will see a marked difference in descent rate. You will use the rudder to keep the airplane aligned with the runway. But Don, you say you

just taught us to fly coordinated and now we are very uncoordinated and very close to the ground aren't we setting ourselves up for a stall/spin? No, and if you take it up to altitude you will find that it won't snap but you do have to neutralize the aileron and rudder as it breaks. As you get to short final and you are at the point where you usually level off and flare straighten it out and land.

Now on to the dreaded crosswind where we will use everything we just learned all at once. Say we have a crosswind from the right. As you get established on final you will add right aileron until the airplane stops drifting to the left. Now you are flying down final with the right wing down but with the nose also pointing to the right. Now add left rudder until the fuselage is aligned with the runway. So now we are in the forward slip just like we practiced before. You will fly down final at about the same speed you normally would and as you come over the threshold you will level off and flare. Now as you level off you will keep the wing down into the wind and touchdown on the upwind main wheel and the tailwheel. As the wheel touches down you will increase the right aileron until you have full aileron in it as you slow down and keeping everything straight down the runway with the rudder. As you slow down you will have full right aileron and you will have a full up elevator as you slow and come to a stop if it is a tailwheel airplane. With tricycle gear, you will touch down on the upwind main with the nosewheel slightly off the ground and gently lower it as you slow down.



We can talk about the merits of wheel landings vs. three-point landings at a later time for tailwheel airplanes. Most full-scale pilots botch this because they are uncomfortable touching down with the wing down on one wheel and they tend to neutralize the aileron letting the wind under the right wing and taking them for a ride. The toughest thing is that you will be constantly adjusting the controls all the way down final especially if it is a bit gusty. If you will have the discipline to go out and practice this you will have a much better chance of successfully flying your scale airplane.

As a full-scale pilot I had to learn all of these steps starting in a Cessna 150 and advancing to a 172 then I went to a Great Lakes biplane and it opened a whole new world of flying. A lot of RC pilots I have trained didn't want to take the time to practice these basic flight maneuvers so never got really great at flying models. They were just satisfied being able to get it up and down and do a loop and a roll every once in a while.

## Setting Up your airplane

After flying and attending scale contests I have noticed several things that contribute to a good or bad flying airplane. First of all, make sure you build everything absolutely straight. Close is not good enough. Make sure all the incidence, washout and alignment are perfect. Setting the proper CG is also critical. For the first flight, I always balance my plane in the forward 1/3 of the CG range. This will make the airplane easier to handle and it will respond a little slower to elevator input. More often than not I see airplanes set up with way too much control throws. This is a scale airplane, not a 3D machine. Most of the full-scale airplanes have a lot slower roll rates than you would think so if the plans show control throws start out with the minimum. On tailwheel airplanes, I set up my tailwheel steering at around 10-15 degrees either way. It results in a large turning radius but a lot less sensitive on take-offs and landing. I just got a new 18 channel radio and I would like to find a way to put the tailwheel on dual rates independent of the rudder. Full-scale airplanes have a steerable tailwheel that will break out to full swiveling with full rudder deflection or a full swiveling wheel with a lock that will lock it straight with very little movement. Most warbirds have a locking tailwheel.

First the rudder. Almost every airplane I see has about twice the rudder throw it needs along with a tailwheel with too much throw. On initial set up use the designers throw as a starting point and set your dual rate to about half of that and go fly. Test that it has enough throw to keep it straight on take off without being overly sensitive. Again this is not a 3D model and does not need to knife edge the length of the runway. When I set up my tailwheel I set the rudder slightly right when the tailwheel is neutral. This almost eliminates the tendency to swing left as the tail comes off the ground. So try this and I think you will find take off and landing will be much easier.

Elevator I like to set up so it allows any maneuver but doesn't let you overcontrol. How many of you have seen an airplane snap at the bottom of a loop because it had too much elevator throw causing a high-speed stall? Also if you balance the airplane in the middle of the CG range the less elevator throw is needed and it gets more sensitive as the CG moves back until the airplane becomes uncontrollable.

Ailerons. What can I say, most airplanes have two or three times the throw needed to fly scalelike. Also if possible you want to have more up throw than down. So with the application of right aileron the right aileron goes up and the left goes down. You want about twice as much up as down as this will almost eliminate adverse yaw requiring less rudder in a turn.

These are my thoughts and observations and I hope it can help. I would also try and answer any questions and it would be fun to get a good discussion going on some of these topics. If you have any specific questions about what I wrote or don't understand some part of it you can contact me on RCSB via private messenger. My username is Yakdriver.

