

Great Landings

A primer for Radio Control (RC) pilots perfecting their landing skills compiled by Earl Aune from many of Fern Prairie Modeler's top pilots.

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It has been said, Takeoffs are optional, Landings are mandatory. Some of our landings meet the criteria of mandatory but making a great landing is one of the highlights of the day when everyone is cheering and clapping.

There are many challenges the RC pilot faces that are different than the full size pilot. We don't feel a thing as the plane gyrates around the sky. Not being in the cockpit requires good hand/eye coordination to overcome the optical illusions of altitude, heading and positions that require a lot of practice to keep the skills up. You don't use it you lose it.

The main elements of a great landing can be broken down into a few sections. Of course, there are also some tricks and tips that the experienced guys are willing to share in this paper so here we go:

Before flight

1. Hardware check
 - a. Check the landing gear for any loose or missing bolts, set screws or other hardware

Tip: Wheels should be slightly toed in to provide lateral stability during rollout
2. Wheel selection is important. They can be too hard and transmit shock into the airframe or they can be too soft and create differential drag on rollout making the plane a challenge to steer down the runway.
3. Functional struts can be too stiff causing the plane to bounce on landings and they can be too soft and bottom out transmitting the shock into the airframe.
4. Ideally, the struts begin to compress with a slight push with the plane in the takeoff attitude (tailwheel up)

Tip: Put some STP (or any thick grease or oil) up inside the tube to create a bit of a damping effect. Also shorten the springs to eliminate compressing. The problem most spring loaded struts have is they push back near 100% of the energy that was put into them on the touchdown, so they bounce back. Damping is key to smooth out porpoise type landings.
5. An airplane that is tail heavy makes the flare on landing more challenging. Balancing a plane to be a bit more nose heavy makes landings much easier.
6. Washout at the wing tips (trailing edge up about 2 or 3°) ensure the tips are the last to stall in high angles of attack while, at the same time, allows the ailerons to still control roll. This can be accomplished either by applying a twist to the wing tip and reheating the film covering with a heat gun or adjusting both ailerons up about 5° to create washout.
7. Flaps are important, especially for war birds as they eagerly love to tip stall into a spin. Flaps provide stability with the extra lift they provide which allows the plane to fly slower which makes landings less stressful on the landing gear.

Assuming the plane is ready to land:

1. Setup to land

Check the wind conditions for crosswinds and gusts. Sometimes turbulence can be created by buildings or even large motorhomes parked upwind from the runway

Tip: Set the aileron, rudder and elevator expo rates between 30 to 40% to keep things smooth around the stick center. This helps both take offs and landings.

2. Downwind leg

Slow the plane down then lower the landing gear. Then extend the flaps to about ½ way. If the plane rises up, slow it down as that's what flaps are for! Some planes like the Spitfire tend to point the nose down when flaps are extended. This is where a bit of elevator mixing can help keep it level.

3. Turn to base

Keep the turn flat (use a bit of rudder) to keep as much of the wing lifting as possible. Keep the speed up to prevent a tip stall and guide the plane into position to turn to final.

4. Turn to final

An optical illusion occurs at this point; a proper turn that aligns the plane directly to the runway centerline will look like it will be plowing right into the pilot. The optical illusion turning point can also be impacted by the plane's altitude. It takes a lot of practice to get the turning point and consistent altitude correct but it's worth it. Turning too soon puts the plane on the other side of the runway, turning too late can cause a lot of correction when it is realized the plane will come in at an angle and the rollout will be again, on the other side of the runway. If the wind is below 4 to 6 mph lower the flaps to full but keep 10 to 20% power on as the increased drag can slow the plane to below flying speed. Keep the tail high and fly it to the runway.

5. Final to touchdown

Tip: Oxygen! On final, take a deep breath and let it out slowly as oxygen is pretty important to keep the brain functioning. We tend to hold our breath when we are super concentrating and being on final approach is one of those times. I have my caller at scale contests say O2 at this point as a reminder. Try and hold your breath for 40 seconds and then multiply 5x7 or something like that, it's amazing.

Again, keep the tail high as you fly the plane in. Use a slight amount of up elevator and lock it, don't move it. This is where the mode 1 guys benefit, keeping the wings level while not moving the elevator is easy on mode 1. Some guys have a Flight Mode switch they flip on final which creates a up trim condition that you then don't have to hold up elevator position. A good idea (thanks David Buxton!)

Keep power **on**, about 10 to 20% and resist the urge to chop the throttle as the rate of descent should be controlled by throttle not elevator.

Use rudder to steer it into position and ailerons only to keep the wings level. On crosswind landings keep the wing that is into the wind lower in case of a gust. A lot of times you will actually be cross controlling rudder and aileron which is normal (bit doesn't feel normal).

When the plane is about 6" off the deck **add** a couple of clicks of power and just a bit of up elevator to create the "flare". This adds stability to the descent and allows just a bit more time to keep the wings level. As soon as the wheels touch, chop the power.

6. Rollout

Tip: Some have found that bumping the rudder during rollout, instead of holding a constant position, provides a more consistent and controlled rollout. The problem is hysteresis where a bit of input takes a bit of time for the plane to react. So, adding and holding rudder starts the plane to swing more and more so opposite rudder is applied and you end up with S-Curve rollout (or broken prop or landing gear).

As the plane slows down, begin applying more and more up elevator to bring the tailwheel into contact with the runway which is especially important during a crosswind landing. Taxi back with full up elevator for the same reason however note that if a strong wind is going with the plane, taxi with full down elevator to keep the tailwheel planted on the runway.

Summary

Successfully flying a radio control airplane around and "greasing it in" (without damage 😊) is a very rewarding experience, but it does take:

Practice, practice, practice! Do touch and goes the whole flight if possible. Each landing will become more controlled and stable with practice.

Become friends with the rudder. This control is important for not only takeoffs but landings as well.

Share your experience with friends and neighbors that may become future club members 😊

We hope you enjoyed this primer and please, if you have a trick or some tips please let us know as we will continue to update this paper.

Mind Map of Great Landings

