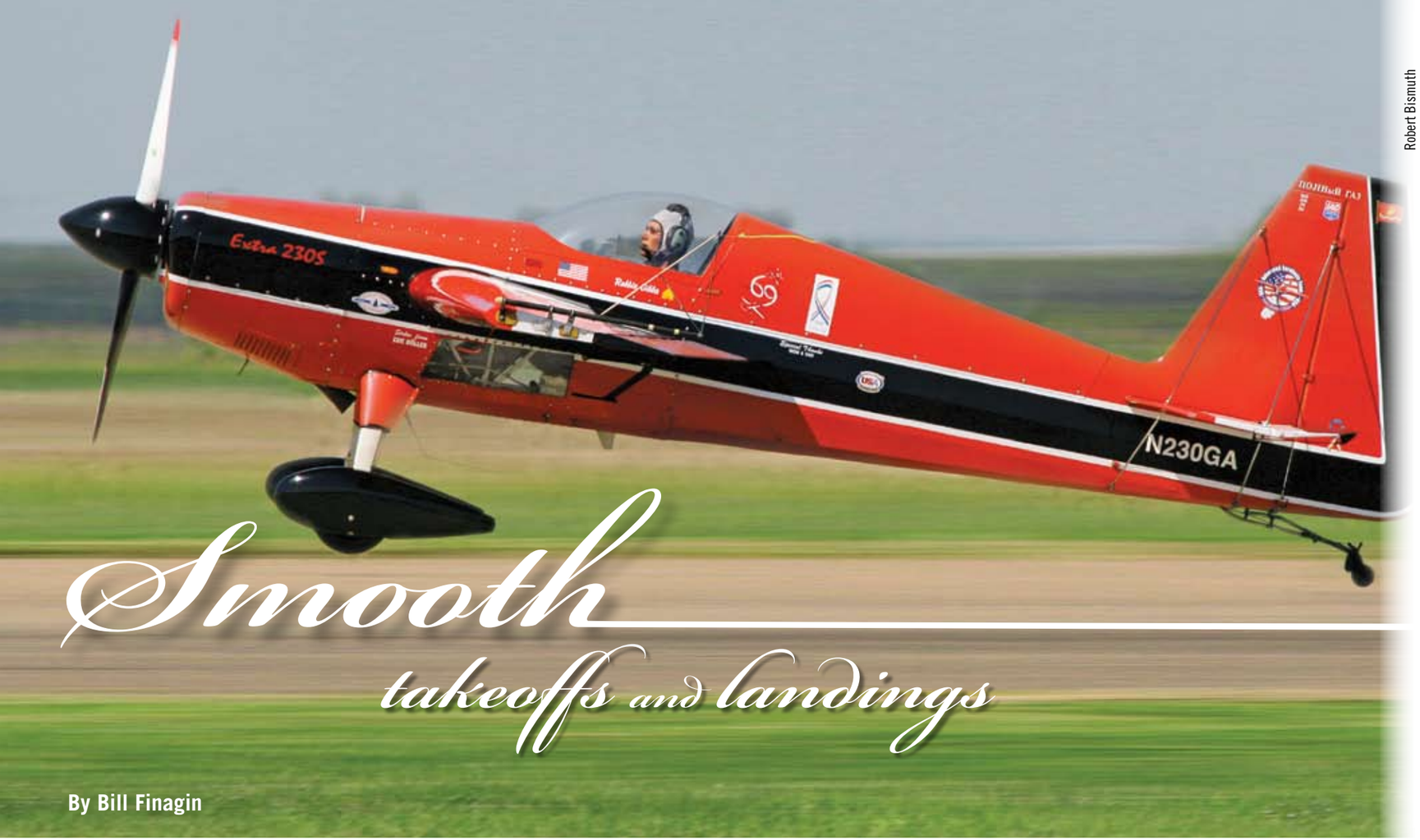


Robert Bismuth

Smooth takeoffs and landings

By Bill Finagin

Wow! Recently *Sport Aerobatics* contacted me and explained that several readers had asked for advice on landings. Sure enough, over the past year there have been technique articles on everything from stalls and spin recovery to rolls and hammerheads. All of these maneuvers are optional. However, every time we take off, a landing is in our future. It makes sense that this topic should get some attention.

As I thought about this article I asked myself a simple question: What would I write to help people understand some generic things about landings? It soon became clear that I would also need to address takeoffs. I searched my mind for those tips that have been provided to me over the years and those tidbits that I try to pass along to my students. Take a moment and ask yourself the same question. What advice that you received from your instructors over the years has stayed with you? How much has fallen by the wayside? I decided to write how I introduce concepts to my students.

I should warn you that what follows may, at first, seem like unrelated topics. Stay with me, and they will hopefully become incorporated into techniques that will bring about successful landing procedures regardless of the airplane type you are using. Admittedly they will be geared toward aerobatic aircraft as that is our forum with this publication. Remember most of the aerobatic planes we will be talking about are taildraggers. Let's get started.

As with providing direction in how to travel from New York to Dallas by car, there are different routes that will deliver you to the same destination. More than one method is possible (and several are "right"), so please don't think there is only one way of teaching landings. For example, many aerobatic pilots have learned landing using the "slipping" method. It's a good technique, but for now we will restrict the discussion to the conventional "straight-in approach" style landing, which is preferred at most airports and a must at virtually all towered airports.

First Things First—Fly the Airplane

First, and this might sound a little trivial, you have to learn how to fly the aircraft you want to take off and land. The best investment one could make is to secure some dual time with a quality instructor. Let the instructor take off and land the aircraft on the first flight. Just observe what is happening. Next, your objective will be to climb to at least 3,000 feet above any obstacle and simply fly the airplane. First fly straight and level. Pay attention to how the airplane feels. Then try some turns to both the left and right. Attempt to nail the altitudes while in the turns. Progress from shallow turns to progressively steeper ones. Note how the feel of the controls changes, and pay attention to what you are doing to control the airplane with precision. Turning right in a 60-degree bank will require more left rudder to hold the altitude compared to when you are in a left turn (assuming you are flying a clockwise-turning engine, as viewed from the cockpit). If this is news to you, consider scheduling some time to discuss gyroscopic effect with your instructor.

Next, climb up to 7,500 feet and do what is sometimes called a "rudder walk." This skill-building maneuver is designed to teach you how to use the rudder to keep the nose of the aircraft straight. The important thing to remember is that the nose *always* moves toward too much rudder. If the nose is turning toward the left, then opposite rudder is required to keep the nose straight. Look over the nose and slow the aircraft down while maintaining altitude until the stall warning (if the aircraft is so equipped) lets you know a stall is imminent. Now pull the stick full back and hold it full aft. Maintain wings-level flight and keep the nose straight by use only of the rudder. If a wing dips or "falls" toward the earth, you have simply held the rudder too long. "Dance" a little faster on the rudder! Remember, planes fly straight when rudder is neutral. After successfully mastering this skill you will have no trouble whatsoever when touching down on the runway during your landing. The fear of veering off to the right or left will disappear. You will completely understand the proper amount of rudder required due to the rudder walk maneuver at altitude.

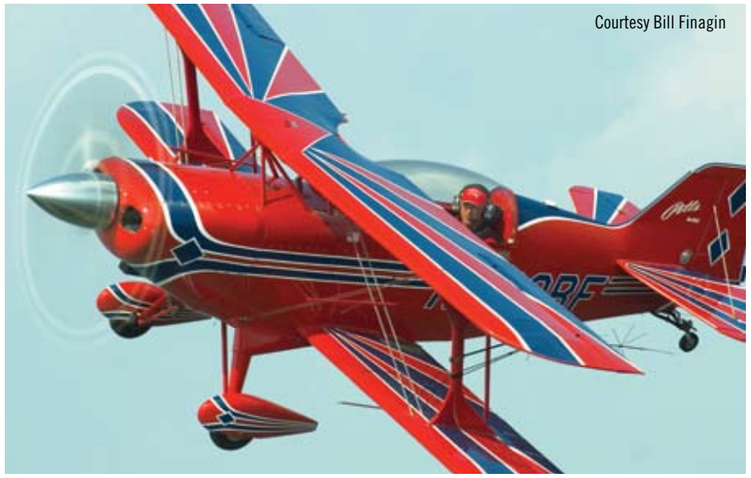
After mastering the rudder walk, fly straight and level. Gradually slow the aircraft to the speed you will use on downwind for the landing. Notice how the nose rises on the horizon as you maintain your altitude. This rise in the nose on the horizon in front of you illustrates something you already know. When you slow the airplane down and hold the same altitude the angle of attack will increase. As the angle of attack increases you will need more right rudder to compensate for the added P-factor effect. Not understanding this fundamental concept is what causes many people early on in their first landings to veer off to the left as they approach the runway after the flare. Developing skills in the fundamentals will pay dividends when it comes to greasing your landings.

Discipline in the Pattern

Now that we are armed with strong fundamentals, let's go fly in the pattern. First off we must approach the pattern in a disciplined way. Normal entry is on a 45-degree approach to the downwind or a crosswind to downwind entry. Whichever entry you choose, the important thing is to set up your speed and altitude *before* you get to the downwind leg. Having to fuss about changing altitude and speed simply complicates the approach, so get your altitude and airspeed right before starting downwind. Now you have to worry only about keeping the altitude and the airspeed stable. Of the two, the primary one is to hold altitude. Do this with the stick (or yoke). Small changes are all that are necessary. Keep your hand away from the throttle.

Kate DeBaun

Holding the nose slightly higher than what you see when taxiing and being extra patient help to smooth the landing.


Courtesy Bill Finagin

Learning how your airplane handles at altitude and understanding control inputs will take the guesswork out of landings.

Practice a few patterns at altitude. If the airspeed changes by a few knots, this is no big deal. Concentrate on holding the altitude with minimum pitch changes. Once you have nailed how to hold altitude, then modest throttle changes can be made to maintain proper airspeed. However, these changes should be minor. If you find yourself working the throttle to reduce power and then adding power shortly thereafter, you made too much of a power change in the first place. Next time make fewer and more minor power changes.

The next key to a successful setup for landing is to figure out how far out from the runway you want to fly the downwind. In a Pitts it is easy: Just fly downwind so you are looking at the runway off the lower wingtip.

Having to fuss about changing altitude and speed simply complicates the approach, so get your altitude and airspeed right before starting downwind.

This ensures the same distance out each time. In other aircraft you may have to resort to tracking over the same objects on the ground below you each time. The important thing is to know where you want to be every time you are on the downwind.

It's as Easy as 1, 2, 3...

As we get opposite the approach end of the runway, we will do three things spaced one second apart. First, we will reduce the power (we will soon learn how much!). One second later we will pitch down. Once again, in the Pitts gauging the pitch is easy. Just reference the horizon about two-thirds of the way up the cabanes. The pitch angle is about 5 to 7 degrees down. At the third second you begin your turn to base. This is not a meandering cross-country turn, but one with a fair amount of gusto! As you bank, remember you will have less lift. Therefore you must be lightly adding a little back-pressure to maintain a constant pitch on this downward path. Keeping the pitch constant is the key. If the power is reduced the right amount, you won't have to touch the throttle. If you begin to build airspeed, reduce power a bit. Likewise, if you are slowing down, you need to add a touch of power to maintain the correct airspeed for your aircraft.

The next step is to turn final. You should always have in mind the altitude above the ground at the turn from base to final. We use 450 feet AGL in the Pitts so the profile on final looks the same every time. The altitudes of other aircraft may be lower, but the point is to establish an altitude that you use as a minimum every time you are turning final. If you find yourself setting up to be too low at that point, there is an easy correction on base. Simply level off at 450 feet (or whatever you have chosen for your minimum altitude) and hold that altitude until turning final. Then continue your descent.

On final approach, aim at a spot on the runway that is just beyond the "numbers" or the displaced threshold. This method forces you to track the centerline of the runway. In a crosswind this technique will require you to "crab" into the wind. Maintain the track to fly the centerline of the runway. Thus when you flare and lose the runway view under the nose, you will know you are still tracking the centerline of the runway. Once you know you are over the end of the runway and have it "made," smoothly reduce all remaining power. Immediately begin your flare (sometimes called the "round-out").

Be patient. Do not be in a rush to touch down. With reduced power or no power continue the flare and keep the aircraft from touching the runway. Refuse the runway! This means you will be continually, albeit slowly, pulling the stick back and watching the nose rise slightly as you slow the plane. Take care not to lift the nose too high! Only about 10 degrees above the angle you see when you are taxiing the aircraft will be enough. Now is when your patience is tested. Simply wait until the airspeed diminishes. Then the aircraft will touch down tail wheel first and the mains will drop about 3 to 5 inches and "stick."

Then the fun begins! The drill is to keep the nose going down the runway in a straight line. Look only over the nose! Rely on your peripheral vision to check that you are over the runway and to confirm that portions of the runway are both on your right and your left side. If you bring your primary focus away from the front of the aircraft, you will lose your perspective immediately. If there is a crosswind, you will have been crabbing with the nose into the wind. Consider a crosswind coming from the right. You have been maintaining the centerline and crabbing with the nose toward the right. As you touch down with the tail wheel first, the plane will instantly realign to the track you have been following. However, a tail-wheel aircraft will want to "weathervane" into the wind. You correct for this by using "downwind" rudder, which in this example would be the left rudder. Once again, a good instructor will help you with this phase of the landing.

Finally, never turn off a runway without first coming to a complete stop. After experiencing several landings you should entertain the idea of making the turn-off at no faster than a brisk walking pace. Faster turns make you a candidate for the ground loop award.

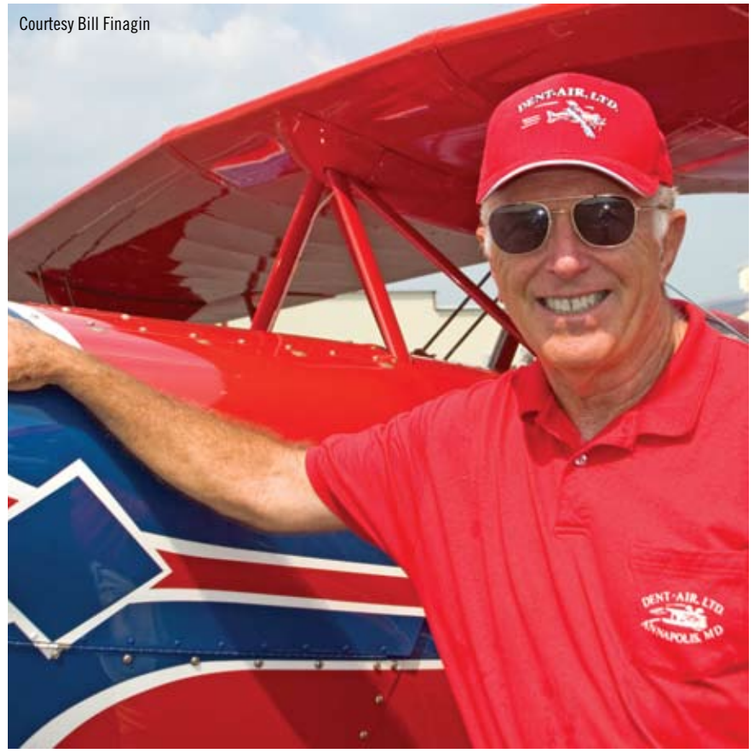
Cleared for Takeoff

Now that we have mastered the landing, let's get ready to take off. For the sake of discussing the takeoff we will begin after the preflight and after the run-up that took place just short of the "do not cross" line.

We add sufficient throttle to taxi onto the runway and align the nose with the runway heading. Determine where the wind is coming from—right, left, or straight ahead. Advance the throttle as fast as you can while still being able to control the forward direction of the aircraft and hold the centerline of the runway. Glance in at the airspeed indicator only briefly. Keep your eyes out over the nose of the aircraft. Keep the nose straight with only the rudder. Never try to steer with the stick or the yoke.

Glance quickly at the airspeed indicator, like a digital camera snapping a photograph. With taildraggers I like to push the stick forward and get the tail up and off the ground early. This minimizes the P-factor and provides a good visual picture over the nose. Again, be patient! The airplane will accelerate and fly when it is ready. When it feels light on its feet, smartly lift off with a gentle yet positive movement of the stick rearward. A constant rate of climb is what we are looking for. Full power until obstructions are cleared or 500 feet AGL is a good rule of thumb. Monitor airspeed and keep it constant. If you are finding that you are accelerating, then increase your pitch upward so your climb speed stays constant. If you find yourself slower than the advertised optimal airspeed for the airplane you are flying, get the nose down before you stall. This is why it is important to monitor the airspeed. About 100 feet below your target pattern altitude begin to level the aircraft. This will require a slight but measured power reduction. If power is reduced too much, then you will not be able to maintain your pattern altitude on crosswind and downwind.

As you can see, smooth takeoffs and landings result from developing a disciplined routine and reducing the number of variables you need to manage. Armed with this new information, go flying and see what tidbits work for you. Enjoy yourself, be safe, and gain skills by flying with an instructor. Knowledge trumps blindly experimenting, and good instruction uses less gasoline to get to the point of flying aerobatic maneuvers—which definitely includes takeoffs and landings—safely.


Courtesy Bill Finagin

Bill Finagin's instructing style attracts students from all over the world.