FAQ — Tailwheel Transition Training

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Many early airplanes were equipped with a simple skid mounted on the underside of the tail for landing on unimproved fields. These were taildraggers in the purest sense of the term. But as both airplane and airfield design progressed, tailskids soon gave way to tailwheels. In turn, the tailwheel yielded to the nosewheel (tricycle gear) design. Today, pilots use the terms "taildragger," "tailwheel," and "conventional gear" interchangeably to describe tailwheel-equipped airplanes. With all due respect to those still flying tailskid airplanes, I will also use these terms interchangeably in this article. Furthermore, I will assume we're sitting behind clockwise rotating propellers.

What are the requirements for a tailwheel endorsement?
You don't need a tailwheel endorsement if you've already logged pilot-in-command (PIC) time in a tailwheel airplane prior to April 15, 1991. Otherwise, you must now receive a one-time logbook endorsement to act as PIC in a tailwheel airplane. The recommended wording for this endorsement, which is to be signed and dated by your tailwheel instructor, is provided in Advisory Circular (AC) 61-65E:

"I certify that (*Pilot's Name*), (*Pilot's Certificate*), (*Pilot's Certificate Number*), has received the required training of section 61.31(i) in a (*make and model tailwheel airplane*). I have determined that he/she is proficient in the operation of a tailwheel airplane."

Federal Aviation Regulation (FAR) section 61.31(i) elaborates:
"The flight training must include at least the following maneuvers and procedures: (i) Normal and crosswind takeoffs and landings; (ii) Wheel landings (unless the manufacturer has recommended against such landings); and (iii) Go-around procedures."

Ok, but how long will all of that really take?
Pilots want their flight training boiled down to number of hours. After all, hours translate into dollars. But when transitioning to tailwheel flying, the number of landings is actually a better yardstick for measuring one's "tailwheel readiness." I've found that most pilots are competent to solo somewhere between 30 and 60 landings on paved runways. This usually translates into 7 to 12 hours of dual, most of which is spent in the traffic pattern.

If soloing a tailwheel airplane is your ultimate goal (either in a rented airplane or your own taildragger), flight school policy or aircraft insurance may specify the minimum number of hours and/or landings before solo.

That sure seems like a lot of landings. How come so many?
Because it's the landing phase that's the most challenging (and fun!) part of tailwheel flying. Managing the airspeed. Battling the wind. Judging the touchdown point. And above all,

actively working the controls to keep the airplane straight during and after landing. That means learning to use the rudder continuously to keep the tail behind you, where it belongs.
Pilots must, of course, become proficient in all of these elements to fly any airplane safely, but they are especially important in tailwheel airplanes in order to maintain directional control and to avoid an ego-deflating groundloop.

What exactly is a groundloop, anyway?
Any unwanted curving of the airplane's path when you're operating on the ground is a groundloop. The tendency to groundloop, however, is greatest while rolling out after touchdown. Groundloops can be either controlled or out-of-control maneuvers. The out-of-control kind can be rather benign--the airplane drunkenly meandering off the runway, for instance. Or they can be severe--a tight pirouette, with the airplane veering hard off the runway, poised precariously on one main wheel, wingtip dragging across the ground as everyone on the airport watches. High-speed groundloops can collapse the landing gear, can bend metal and tear fabric, and might include carving up asphalt with the propeller before the dust settles.
Pilots can and do groundloop tricycle and conventional gear airplanes alike. But the legend of the taildragger is rooted in its willingness to groundloop with minimal provocation. The relationship between the airplane's center of gravity (c.g.) and the main landing gear makes this so.

For example, in properly loaded tricycle gear airplanes, the c.g. falls ahead of the main landing gear. This configuration is directionally stable on the ground. Consequently, tricycle gear airplanes inherently track nose-first. Properly loaded conventional gear airplanes, on the other hand, wind up with the c.g. located aft of the main landing gear. As a result, tailwheel airplanes will more readily swap ends on the ground unless the pilot continuously intervenes with corrective rudder inputs.

But this groundlooping tendency isn't necessarily a negative. The fact that the taildragger doesn't cut the pilot any slack during the landing phase is what makes the tailwheel transition so rewarding. Every good landing in a tailwheel airplane is due solely to piloting skill. Neither luck nor airplane stability can take any credit for it. The objective of tailwheel training, of course, is to learn to make more good landings than bad!

What do the terms "three-pointer" and "wheel landing" mean?
Takeoffs and landings directly into the wind in conventional gear airplanes come in two basic flavors: three-point and two-point. These terms refer not only to the airplane's attitude, but also to the number of wheels in contact with the ground as the airplane rotates on takeoff or as it touches down on landing.

The three-point attitude is identical to the attitude the airplane has when it's parked on the ramp. All other things being equal, the three-point attitude allows the pilot to operate at slower airspeeds: on takeoff, the airplane levitates into ground effect sooner; on landing, the airplane touches down slower, resulting in a shorter ground roll. Soft field operations usually call for a three-point or tail-low attitude during takeoff and landing. Three-pointers may be prescribed for short field landings, too. (Three-point landings are sometimes referred to as full stall landings, yet the airplane might not actually be stalled when the wheels contact the ground.)
The three-point attitude does have potential disadvantages, though. One is reduced forward visibility during takeoff and landing in some taildraggers. Another may be a false sense during takeoff that an under powered airplane (or one that is operating at high density altitude) is capable of climbing out of ground effect while still in the nose-high, low speed, high drag,

three-point attitude. Some airplanes may only be able to wallow along in ground effect in this configuration.

The true two-point attitude, by comparison, corresponds to the attitude the airplane assumes in level cruise flight. Pilots transitioning to tailwheel airplanes might initially fear that the two-point attitude would bring the propeller precariously close to striking the ground. This apprehension can be alleviated, however, with a simple demonstration: With the prop of a parked taildragger positioned vertically (be extremely cautious when moving any propeller!), have your instructor pick up the tail of the airplane until it's in a level, two-point attitude. Check out the clearance between the ground and the prop.

All other things being equal, two-point takeoffs generally allow the airplane to accelerate quicker and offer improved forward visibility. They also permit the pilot to gain more speed--and hence, have better control authority--prior to becoming airborne in gusty wind conditions. A short field may command the use of a two-point attitude during takeoff.

Two-point landings are commonly referred to as wheel landings. In fact, any landing during which the tailwheel is held off the ground--even if it's only an inch or two--qualifies as a wheel landing. Wheel landings in certain airplanes may offer better forward visibility during the landing roll. Some pilots also argue that a wheel landing is preferable to a three-pointer when encountering gusty crosswinds. Others claim that quirks in a particular taildragger's design may necessitate the use of wheel landings for better controllability. Pilots of Stardusters and Swifts, for instance, swear by the wheel landing.

But the two-point attitude has its disadvantages, too. Forcibly raising the tail on takeoff, for example, adds a sometimes-significant gyroscopic component to the left-turning effects of torque, P-factor, and spiral slipstream. The pilot must anticipate the need for additional right rudder as the tail rises. On the other end of the pattern, the wheel landing occurs at a higher ground speed than a three-point landing. Consequently, wheel landings tend to use up more of the available runway. It's also easier to instigate a pilot-induced-oscillation (PIO) during a wheel landing. If not checked quickly, this can culminate in a prop strike, a groundloop, or a little bit of both. Eventually, the wheel landing is transitioned into a three-point attitude. The possibility of a brief lapse in control authority is greater during this transition.

Keep in mind we're not necessarily restricted to the two- and three-point attitudes described above, either. We can set intermediate attitudes during takeoff and landing, too. And during takeoff and landing in crosswind conditions, we might choose a three-point attitude modified with the downwind main wheel raised off the ground (i.e.: aileron into the wind) as part of our crosswind correction. Similarly, we might choose a two-point attitude, but again with the downwind wheel raised off the ground.

Are taildraggers trickier to handle in windy conditions?
Trickier, no. Less tolerant of pilot inattentiveness, yes. The pilot must be acutely aware of wind direction and strength. Make it a habit to look at the wind indicators on the airport before taxiing, just before takeoff, and on short final. If the windsock is straight out, it's blowing at least 15 knots.

Taxiing into the wind? Think "climb into" the headwind: elevator control full aft, with left aileron into a left quartering headwind, right aileron into a right quartering headwind. Taxiing downwind? Think "dive away from" the tailwind: elevator control full forward if the wind speed is faster than your taxi speed, and right aileron with a left quartering tailwind, left aileron with a right quartering tailwind.

And don't forget about the wind generated by the propeller, either. Be sure to hold the elevator control fully aft before adding run-up power; otherwise, the prop blast may be sufficient to raise the tail, possibly driving the propeller into the ground.

Be sure to adhere to the crosswind limitations of your taildragger as well. If the Pilot's Operating Handbook (POH) fails to list a maximum demonstrated crosswind, use 20 percent of the airplane's calibrated stall speed in the landing configuration (Vso calibrated). Certification requirements specify that light airplanes shall have no uncontrollable groundlooping tendency in a 90 degree crosswind up to 0.2Vso in strength.

Can taildragger techniques be used in tricycle gear airplanes?
Not only can they be used, but they should be used. You should fly tricycle gear airplanes in the pattern as though they were taildraggers. You'll be pleasantly surprised how tailwheel techniques thus applied will improve your tricycle gear takeoffs and landings. Tailwheel techniques directly carry over to floatplane flying, too.

What are some of the common problems pilots have transitioning to taildraggers?
The biggest problem can be summed up in three words: rudder, rudder, rudder. Too many pilots have grown accustomed to being reactive with their rudder inputs--waiting for the airplane to do something, then responding--or worse, actually bracing their legs against the rudder pedals, especially during landing. The key in a taildragger is to be proactive with the rudder. To be light, loose, but active on the rudder pedals all the way through the takeoff and all the way through the landing.

The second problem concerns the elevator. Pilots flying tricycle gear airplanes tend to relax back elevator pressure instinctively during the landing roll out. In a taildragger landing in the three-point attitude, relaxing back elevator pressure reduces directional control, thus making it more difficult to keep the airplane straight during the roll out. The key in a three-point landing is to hold the elevator control fully aft during the entire landing roll while actively using the rudder to keep the airplane aligned with the runway.

The third problem appears during wheel landings. The key difference between the three-point landing and the wheel landing is sink rate. Successful wheel landings require minimum sink rate. If the airplane at all settles, falls, or sinks toward the runway in the last few feet, a wheel landing will be difficult or impossible. And if the pilot flinches and applies back elevator as the main wheels touch down, the airplane will rebound into the air. At this point, the pilot needs to react quickly and efficiently--either convert the landing to a three-pointer or add power and execute a go-around.

Can you recommend any books on the subject?
My favorite is "The Compleat Taildragger Pilot" by Harvey S. Plourde. But don't forget about the FAA's "Airplane Flying Handbook," which devotes an entire chapter to tailwheel flying. Combining the information from these publications with structured ground and flight instruction will make for an enjoyable tailwheel transition experience.

Even if you don't plan to fly a taildragger regularly, a few hours of tailwheel training will markedly improve not only your rudder awareness, but also the quality of your landings in nosewheel airplanes. This alone should be incentive enough to add a tailwheel sign-off to your "To Do" list. Find a school that has something fun like a Citabria, Champ, or J-3 Cub and give it a try!

Master Instructor Rich Stowell has logged more than 7,600 hours in tailwheel aircraft ranging from the Vultee BT-13, Stearman, and Waco; to the Cub, Champ, and Husky; to the Starduster, Skybolt, and Great Lakes; to the Pitts, Eagle, Extra 300, and Yak-54; to the Decathlon, Citabria, and Scout; to the Micco, Vans RV, and Maule.