Taming the Taildragger

Toil, tears, and sweat — but worth the trouble

by DON DOWNIE / AOPA 188441

■■ Since it's comparatively easy to handle a tri-gear "nosedragger" on the ground, is it worth the time and perspiration to master a "taildragger"? Will you be a better all-around pilot from this taildragger experience? Can you really fly a taildragger rather than have it fly you?

Answer a qualified "yes" to all these questions. No matter how long you fly them, taildraggers will always have a few surprises up their landing gear. But you'll certainly be a more precise, perceptive pilot with tailwheel experience, so it's worth the effort to learn to fly one.

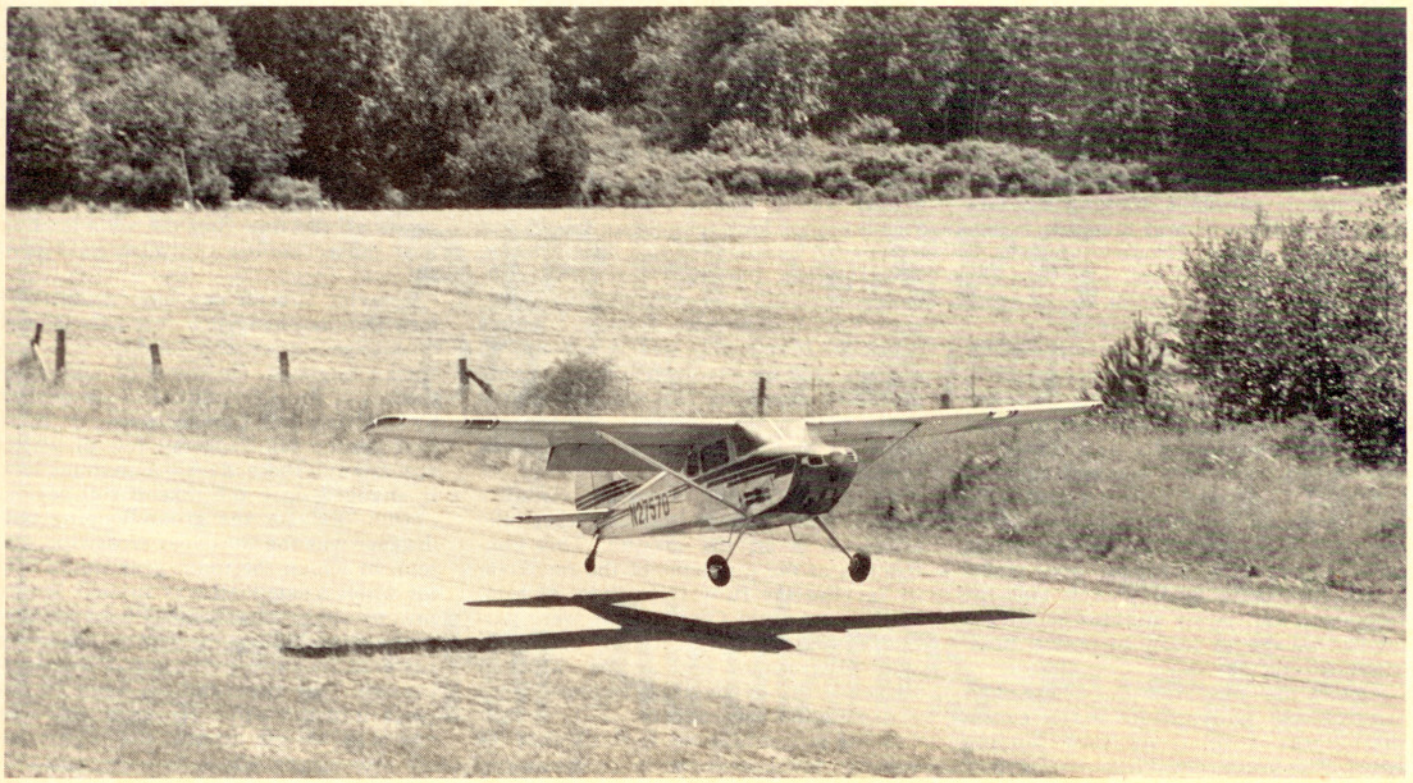
Approximately 10% of today's licensed airplanes are taildraggers. The list includes present production Bellanca Citabrias, Cessna's 180 and 185 bush airplanes, the Maule, the Piper Super Cub, the Taylorcraft, and several agricultural types. In addition, a large percentage of homebuilts have the training wheel in the back, as do most production aircraft built prior to 1955.

I've had a love affair going with taildraggers ever since a J-3 Cub could be rented for $3 per hour, dual or solo. More than 2½ years ago, my wife and I became the proud possessors of a 1952 Cessna 170B, a delightful taildragger that we use for AOPA business trips and pleasure in the West. I continue to be amazed that so many competent pilots who fly with me just can't handle this ship on the ground. Once airborne, it's just another economy airplane, but the transition from hangar to wheels-in-the-air can be painful. The reverse landing procedure is usually even more adventuresome.

Getting down to basics, a taildragger is less forgiving to drift correction on takeoff and landing. Visibility on the ground leaves something to be desired. Taxiing, particularly in a strong crosswind, can be challenging. With almost any high-time taildragger pilot, the question isn't whether or not he's groundlooped, but when did he do it last?

"There are airplane drivers, pilots and

Under normal circumstances, the tailwheel-first landing is the method of choice when you're flying a taildragger. Here a Cessna 170 pilot shows how it's done. Photos by the author.



aviators," explains a veteran Ontario, Calif., FAA GADO pilot. "You need the feel of the taildragger, particularly in taxiing and in crosswinds. It's inattention to visual cues that gets new pilots in trouble in any airplane. There's a plain seat-of-the-pants sensibility required in a taildragger that's not really needed with the nosewheel airplane."

Taildraggers are really not all that difficult to fly; otherwise few of us pre–World War II pilots would still be around. While in contact with the ground, a taildragger is basically an unstable vehicle, while its tri-gear competitor is directionally stable and essentially self-correcting.

The taildragger is essentially a trigear in reverse, and its center of gravity must be far enough aft of the two front wheels so the prop won't be cutting nicks in the runway. Any side loads from drift on touchdown will make the taildragger swerve and eventually groundloop if corrective action isn't taken.

The farther aft the main gear of an aircraft is located, the less tendency it has to groundloop, but the greater tendency it has to nose over. The farther forward an airplane's main gear, the easier it is to groundloop. The higher the aircraft's center of gravity (high wing and long gear), the greater its tendency to tip to one side and then go around. The narrower an aircraft's main gear, the less tendency the plane has to swerve, but also the less effective are the brakes. And wide gear on an aircraft tend to increase weight and/or drag. As in any other airplane design problem, you win a few and lose a few.

There are a number of real advantages to the taildragger that counteract its ground-handling eccentricities. With an average four-place taildragger, you eliminate at least 25 pounds of nosegear weight, as well as complexity and aerodynamic drag in a high-drag area just aft of the prop. Propeller ground clearance is excellent, making the taildragger a most efficient machine in unimproved airports. Ground-handling is more versatile, since you can turn the airplane in its own length by applying one brake at very slow speeds.

Veteran designer Irv Culver (AOPA 117226), who has been in the business for well over 40 years, admits that "the most difficult thing I have had to learn about airplanes was, late in life, when I was forced to operate a nosedragger if I wanted to fly any new high-performance airplanes. I consistently taxied into positions at the gas pit, in parking areas, etc., where only pivoting one wheel would take the airplane out. It took me two years and many shutdowns with a towbar escape to learn to taxi a nosewheel aircraft."

One of the "plus" features of the older taildraggers (with certain major exceptions) was a relatively slow landing speed. The Wacos, "elephant ear" Travel Airs, Stearmans and all the inexpensive Cubs, Taylorcrafts and Aeroncas landed at a speed between 35 and 45 mph. It was usually possible to find a grass strip, runup area, or some other small section of the landing field where you could touch down directly into the wind.

The taildragger's ground-handling eccentricities can be far outweighed by its virtues when it comes to operating into unimproved airstrips. This Cessna 185 has just put down at a river-bottom airport near Northway, Alaska.

Not all older taildraggers, however, had these slow takeoff and landing speeds. Exceptions were the sleek, temperamental Cessna 195s, Staggerwing Beeches, Spartan Executives, and others. For example, one of the first lightplanes I flew after manhandling C-46s during World War II was a sleek Cessna 195. Fortunately a long-time flying friend and excellent instructor, the late Jimmy Most, was in the right seat as I confidently started a takeoff from the long-gone East Los Angeles Airport. I hadn't rolled 50 feet before torque had me 90 degrees to the runway, and Jimmy promptly closed the throttle. We tried it again with a slow-and-easy throttle application and stayed inside the runway confines.

In a taildragger, forward visibility ranges from fair to terrible when the tailwheel is on the ground. This contributes to the problems of the neophyte in keeping the runway in front of him. Monocoupes and Cessna 195s were particularly blind, and nearly all the World War II trainers had to be S-turned while taxiing so the pilot could see what was going on up front.

Some students seem to think that it's "sporty" to sit low in an open cockpit and thereby make this situation even worse. While the slipstream can be uncomfortable on a cold day or night, you'll find that most taildragger pilots sit just as high as possible, at least during takeoff and landing.

Basic tailwheel design calls for a spring connection between rudder pedal and tailwheel that gives some directional control. The stiffer the spring, the better the control. Most tailwheels are steerable through about 30 degrees each side of center and then castor into full-swivel. A few tailwheel installations, particularly on some models of the Swift, castor all the time, but the wide landing gear makes ground control a good gamble.

Heavier aircraft can have a tailwheel lock that is engaged before takeoff and disengaged after the landing roll has been completed. On the P-51 and some models of the AT-6, this is accomplished by applying full forward stick. On most twin-engine taildraggers—few of which are around these days—a manual lock is engaged once the takeoff roll begins.

One "fix" for the groundlooping taildragger was the Goodyear crosswind system, in which the main gear would castor when a side load was applied. It was my personal impression that the airplane was flying me when the gear castored in a crosswind and I was taxiing with the nose canted about 30 degrees into the wind. However, this was one way to see around the high nose of taildraggers like the Cessna 195.

Judging from the quantity of crosswind gear available for sale in the swap section of various taildragger-club newsletters, this approach is becoming increasingly unpopular.

The best design formula for a taildragger that handles well, according to Irv Culver, includes wide main gear, not too far forward; a ground angle considerably less than the stall angle, so that tailwheel-first landings can be made easily; and a good-sized tailwheel with either stiff steering springs or no springs at all. In Culver's estimation, the one totally tame taildragger was the Funk, since it could be landed with the tailwheel safely planted on the ground while the main gear was still three feet in the air.

You can land a taildragger on its two main wheels if you're both good and lucky. Wheel landings improve forward visibility at touchdown but do not eliminate the problem of directional control as the ship slows up and the tail starts to drop. At this point, the rudder is less than effective, and the battle begins.

With the main gear necessarily forward of the center of gravity, the taildragger will tend to bounce back into the air if the wheel landing is not a complete "grease job." Usually each bounce is higher because of pilot-induced oscillation, where too much control is applied a split second too late. The best remedy for a bad wheel landing is either to go around or to hold the ship in the air until it stalls and the tailwheel touches first.

Except in very unusual cases—extreme winds or restricted forward visibility—there's no reason for wheel landings with a taildragger, since you're landing at a speed higher than stall, with resulting tire wear and a longer landing roll.

Some of the mystique regarding the terrors of the taildragger resulted from early engineering, particularly in brake actuators. Most older taildraggers have small heel pads to actuate the brakes. Many a dragged wingtip can be traced to a pilot's letting his heel slip off this pad.

Older aircraft had brake actuators in the most unusual places; the Ford Tri-Motor, for example, had a "Johnson bar" that activated either brake with rudder action. Some models of the great old Waco F-2 had the brakes activated by a combination of rudder pressure and pulling the throttle handle out toward the center of the cockpit. It is only within the past two years that the Citabria line has gone to conventional toe brakes, and the Super Cub has yet to make that change.

A directional control in addition to the rudder—and one that is usually overlooked by newer taildragger pilots—is the aileron. Ailerons that move down (wing up) produce more drag than those that move up (wing down). The higher the angle of attack, the greater this drag. Since taildraggers start each takeoff and complete each

landing in a fully stalled attitude, the use of aileron is additionally beneficial. In fact, ailerons on taildraggers can produce up to half as much yaw control as does the rudder.

In my 170B, for example, I can take off in a fairly brisk crosswind without use of downwind brake or excessive rudder, merely by starting my roll with full aileron deflection into the crosswind. With a wind from the right, I'll start with full right deflection and only as much left rudder and brake as is required to keep the ship from weathervaning to the right. As speed increases, this full aileron must be reduced or else you'll wind up dragging the right wingtip on liftoff.

The same basics apply during landing, when aileron should be added into the wind after touchdown to increase the drag of the downwind wing.

When is a groundloop inevitable? Engineers like John Thorp (AOPA 22461) point out that there are too many variables to come up with any clear-cut formula. The surface of the runway (wet, dry, grass, gravel, ice or mud), slope or angle of the runway, crosswind component—all are important. Configuration and loading of the aircraft are always factors. Condition of brakes and tires is another variable.

One of the several problems in learning to fly a taildragger is finding a qualified flight instructor and an FBO who will actually let you solo the bird. There are a number of good schools specializing in taildragger training, usually combined with aerobatic courses, but you can expect the time involved in mastering a taildragger to be greater than for mastering a tri-gear.

As in any other type of flight instruction, it takes constant practice to stay sharp. You must let the student go far enough into a groundloop to have him or her get the feel of what's going on, yet not "prang" the aircraft. If the instructor takes over too soon, the student never really learns what might happen. If the CFI is too late, it's both expensive and embarrassing.

A sharp CFI may let a student get somewhere between 30 and 40 degrees off the centerline before taking over with appropriate brake and aileron, plus full throttle, to make the rudder effective and get the airplane back into the air again. Of course, you're going to take off out across the runway (hopefully, between the lights), but once you're off the ground you can go around and try it again. Thus it is both safer and easier to teach new taildragger students on a broad grass field without obstruction lights. There should, however, be some sort of centerline marking as a reference for drift correction.

What if you've never flown a taildragger and don't have a qualified instructor readily available? The best answer is not to try it. If you must go this route, however, Eric Shilling, of Riverside, Calif., recommends lots of taxiing at very slow speeds, not more than 2 or 3 mph.

Shilling, who estimates that 17,000 of his 23,000 hours have been logged in taildraggers, was a Chennault AVG pilot and is now doing all the flight testing on the single-seat aerobatic Acroduster, developed by Stolp Starduster. He recommends that homebuilders and others who have never before flown a taildragger practice taxiing at very slow speeds, at which one can turn sharply without dragging a wing.

"The tailwheel will 'kick out,' and you learn what a groundloop looks like without banging up the machinery," he explains. "At these slow speeds, you can also apply strong braking action without the hazard of a nose-up. With this do-it-yourself training, you can slowly build up the speed to perhaps 25 or 30 mph with a high-performance ship. There's no need to go any faster than this to learn how to handle the brakes and tailwheel."

With time and training, practice and perspiration, it is possible to tame the taildragger. However, the longer you fly the type, the more you respect it. A great many taildragger pilots share my personal belief that a taildragger really isn't through flying until it's been shut down, parked, chocked, and securely tied down, or until it's been pushed lovingly into a hangar, chocked, and the hangar door shut—and locked! □