

Tail Dragger Transition

Or: So *That's* what the rudder is for!

Background

Back in the "good old days" (pre 1950) most pilots learned on tail-dragger aircraft. With the introduction of the nose-wheel on the standard C-150 trainer, there began a new crop of pilots who had never flown and tamed the wily tail dragger. At present time, the majority of aircraft are tricycle gear and the average Sunday pilot has never flown a tail dragger. However, there are plenty of old tail-draggers out there, and the majority of experimental (home built) aircraft are also tail-draggers. There are also a goodly number of accidents involving experienced pilots (in tricycle gear) but with low time in tail draggers. In 1991, the FAA added "tail dragger" to the list of endorsements so that operating as PIC in a tail dragger aircraft now requires a specific endorsement from a CFI. (Those of us who have been flying tail draggers since before April 15, 1991 are grandfathered).

In the air of course the landing gear makes no difference in how an airplane flies. However, tail draggers tend to have a larger rudder to ensure directional control authority. Also, if the tail dragger in question is an older aircraft (J-3, C-120, Aeronca, etc.) then the ailerons tend to be less differentially compensated which requires more use of the rudder to maintain coordinated flight. The real difference is in landing; a tricycle gear aircraft is statically and dynamically stable rolling down the runway. A tail wheel aircraft is *statically and dynamically unstable*. In other words; the pilot must make constant control inputs to keep the aircraft simply rolling in a straight line, and *any* deviation from rolling in a straight line can very quickly increase until it becomes a full ground loop. This results in (at very least) scraping a wing tip, and more likely, collapsing the gear, prop strike, and other very expensive noises. Learn your stick & rudder technique well and this should never happen!

Areas of Instruction

1. Ground Maneuvers; taxiing the aircraft
2. Flight Maneuvers: slow flight, use of rudder for coordinated flight, and uncoordinated flight including "dutch rolls", and "box the point".
3. Spins (if desired and the aircraft is capable)
4. Take Offs - long take off roll practice
5. Landings
6. Cross wind take offs and landings

The transition can take anywhere from 2-3 hours to 10 hours depending on the student's level of experience. Glider experience helps!

Lesson 1: Taxi, Take off And Air work

Dual, ½ Hour Ground, 1 Hour Air

Objective: Student understands the 4 forces on the aircraft requiring the use of right rudder during take off. Student understands that tail draggers don't have brakes. Taxi practice with tail wheel "locked" and in "caster" mode, switching between modes, slow and fast taxi. Student understands the importance and usage of rudder during slow flight.

Elements: Taxi, Take off, slow flight

Equipment: Aircraft with tail wheel

Instructor's Actions:

- Quiz student on 4 forces which require the use of right rudder on take off
- Explain the use of the rudder during taxi. Demonstrate taxiing with tail wheel steerable with small rudder movements, and the transition to a castering tailwheel. Note that the tail swings very fast, watch for obstacles in the path of the tail!
- Quiz the student on the proper position for the flight controls when taxiing with wind
- Explain that, as far as the student is concerned, *tail draggers don't have brakes.*
- Demonstrate high-speed taxi with tail up on a take off roll
- Ask student to fly out to a practice area and do clearing turns
- Demonstrate "boxing a point with the nose" and "dutch rolls"
- Demonstrate the effects of adverse yaw and use of rudder to control turns and lift the wing in slow flight. Demonstrate why aileron will not work well in this flight condition.
- After student practice, perform the landing while explaining technique
- Additional student take offs if time; Instructor will land unless student is judged sufficiently advanced to land

Student's Actions:

- Review with the instructor taxi techniques including control positions
- Review the 4 forces requiring right rudder
- Taxi the aircraft without using brakes whenever possible. Practice locking the tailwheel in and out of caster.
- Observe instructor demonstrations on take off
- Fly to a practice area and execute clearing turns
- Perform dutch rolls, boxing a point with the nose, slow flight, turns in slow flight, recovery with aileron (attempted) and recovery with rudder.
- Practice slips at altitude
- Observe landing demonstration
- Practice take offs

Completion Standards: Student understands when and why use of rudder is required on taxi, take off and in slow flight, as well as normal coordinated flight. Student can taxi the tail wheel aircraft and remain in control. Student can smoothly accelerate for take off without significant changes in aircraft heading.

Post-Flight Review: Discuss differences in ground handling between the tail wheel and nose wheel aircraft and estimate how much work the student will need to do the full transition. Discuss the ground-loop phenomenon and how to avoid it. Stress the importance of zero side slip tolerance on landings in crosswind.

Student Assignment: Read "Stick & Rudder" by Wolfgang Langewiesche.

Lesson 2: Taxi, Take offs, Landings

Dual, 1-1.5 Hours Air

- Objective:** Student becomes comfortable taxiing a tail wheel airplane. Student learns to perform an extended take off roll by bringing the tail up and maintaining directional control while taxiing at near take off speed for the length of the runway. Student learns to land in 3-point attitude. Student reviews and is comfortable with slips to landing.
- Elements:** Taxiing, take offs, extended take off rolls, normal 3-point landings
- Equipment:** Aircraft with tail wheel
- Instructor's Actions:**
- Demonstrate use of rudder when bringing the tail up and taxiing at high speed.
 - Demonstrate use of slips to landing and a normal 3-point landing
 - Talk student through take offs and landings
- Student's Actions:**
- Perform standard taxiing maneuvers
 - Perform extended take off rolls while maintaining good directional control bringing the tail up and tracking runway centerline with crosswind if necessary
 - Standard landing pattern and use of slips on the landing approach
 - 3-point landings
- Completion Standards:** Student shows proper use and non-use of brakes for taxi work. Student maintains directional control while bringing the tail up at the start of the take off roll, and then can continue to track the runway centerline with tail up at speeds below V_{lo}
- Post-Flight Review:** Instructor critique
- Student Assignment:** Read "Stick & Rudder" by Wolfgang Langewiesche.

Lessons 3-n: Take offs, Landings, crosswind Landings

Dual, 1-1.5 Hours Air

Objective: Gain confidence and experience with tail wheel take offs and landings (wheel landings and 3 points) with and without crosswind when possible

Elements: Traffic pattern work, slips to landing, wheel landings and 3-point landings

Equipment: Aircraft with tail wheel

Instructor's Actions:

- Demonstrate wheel landings for the student
- Assist the student with all aspects of tail wheel operations until the student is ready for solo flight

Student's Actions:

- Practice take offs (tail up)
- Landing approaches including slips to landing
- 3-Point Landings
- Wheel landings

Completion Standards: Student is judged safe and competent for solo tail wheel operations and is so endorsed in the log book

Post-Flight Review: Final discussion of being careful with crosswinds and avoiding the groundloop.

Student Assignment: Read "Stick & Rudder" by Wolfgang Langewiesche.