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The Pilot's Lounge #52: Tailwheels, Part II — The Checkout

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In a previous column, AVweb's Rick Durden asked the question,

By [Rick Durden](#) | September 12, 2002



Ordinarily, as summer winds down here at the virtual airport, the Pilot's Lounge regulars are engrossed in planning their hundred-dollar-hamburger trips in directions that will give them the best scenery as the fall colors start to show. But this

year, discussion of the continued high level of incompetence at the Transportation Security Administration (TSA), and its scapegoating of general aviation, is the dominant activity. I was frustrated recently on a trip in which I'd talked with FSS twice before departure, asked about TFRs anywhere along the route, was told there were none, then decided to file IFR anyway because of some nagging discomfort and the fact I was flying over unfamiliar territory. Halfway to my destination, ATC rerouted us because the planned route would have taken us right through a TFR. Hey, TSA — one of the biggest assemblages of patriots in this country is GA pilots. We're trying hard to keep up as you continually fumble with the rules of the game, but it's no fair if you hide the information from the very people who brief us.

On a more positive note, tailwheel operations have

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ABOUT THE AUTHOR ...



Rick Durden is a practicing aviation attorney who holds an ATP Certificate, with a type rating in the Cessna Citation, and Commercial privileges for gliders, free balloons and single-engine seaplanes. He is also an instrument and multi-engine flight instructor. Rick started flying when he was fifteen and became a flight instructor during his freshman year of college.

He did a little of everything in aviation to help pay for college and law school including flight instruction, aerial application, and hauling freight. In the process of trying to fly every old and interesting airplane he could, Rick has accumulated over 5,400 hours of flying

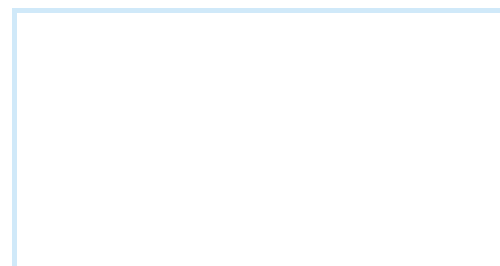
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By Paul Bertorelli | August 18, 2015

David McCullough's new look at the Wright brothers is an engaging read, but doesn't plow much new ground. [More](#)

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played a major role in non-TSA conversations. Mike Felske of East Troy, Wis., contacted me with an interesting question, and I headed to the Lounge to run it by the folks who are way more knowledgeable than I. Mike was looking for a syllabus for a tailwheel checkout, one that would be as thorough as possible, targeting the pilot transitioning from a fair amount of nosewheel flying, and including whatever the FAA needed for an endorsement under [61.31\(i\)](#). Mike is no slouch in the tailwheel-airplane flying business: He's an experienced flight instructor with over 500 hours of tailwheel time, but he hadn't located a syllabus for a tailwheel checkout. When he asked, I realized I hadn't seen one either; so, being curious, I started looking around, and wasn't able to find one. (I know they're out there; I suspect more than one reader will have a reference.) I did, however, find that raising the subject triggered a huge amount of conversation, particularly on AVSIG, the aviation special-interest group on CompuServe. That forum has a number of members with extensive tailwheel time in all types of airplanes, from the smallest up through the C-46, B-17, and Avro Lancaster. During the course of discussions and a lot of listening on my part, I put together a working syllabus for a tailwheel checkout. I also wrote down a number of points to consider on the issue of whether a full-stall or wheel landing is better from an operational safety standpoint (and I'll explore those next month, as *Tailwheels, Part III*). I've written about flying tailwheel airplanes in the past, which I guess we can call "[Tailwheel, Part I: Why Not Fly Tailwheel?](#)" so I won't rehash a lot of technique here, just the things that I feel are important for an instructor to consider. What follows might best be considered a cross between a syllabus and lesson plans. I'm going to refer to the pilot being checked out as the "student," simply as a verbal shorthand, and in reflection that, no matter how experienced that pilot is, she or he is a student in a learning situation.

Besides being an experienced flight instructor, Mike Felske is a science teacher with 25 years in the classroom, so I listen when he talks about teaching. He reminded me that only about 25% of what a person hears is retained for any length of time, so any visual aids or hands-on work that can be used in the ground session with the student will help bump up that rate of retention. By going directly into the airplane and applying what was discussed, there is a greater chance of locking in the knowledge.

Changing A Way of Thinking

A tailwheel checkout is more than just stepping into and flying a different type of airplane. It's more than merely figuring out what hand-foot-eye coordination is involved in operating an airplane that has the wheel that steers located behind the aircraft's center of gravity, in the hope of not rolling the thing up into a ball. It is the development of a different mindset with regard to planning and judgment, and a refusal to tolerate sloppiness well beyond any level needed in the more forgiving nosewheel airplanes. In my experience and in talking with other, more experienced tailwheel instructors, that kind of learning takes time to become ingrained in one's psyche. While the syllabus below only shows three "lessons," the number of hours required to complete all three to acceptable tolerances



time. In his law practice, Rick regularly represents pilots, fixed base operators, overhaulers, and manufacturers. Prior to starting his private practice, he was an attorney for Cessna in Wichita for seven years.

He is a regular contributor to *Aviation Consumer* and *AOPA Pilot* and teaches aerobatics in a 7KCAB Citabria in his spare time. Rick makes it clear he is part owner of a corporation which owns a Piper Aztec — because, having flown virtually every type of piston-engine airplane Cessna manufactured from 1933 on, as well as all the turboprops and some of the jets, he cannot bring himself to admit to actually owning a Piper.



Video: How PT-6 Turbines Are Overhauled

PILOT'S FLIGHTBAG

← 1 of 4 →

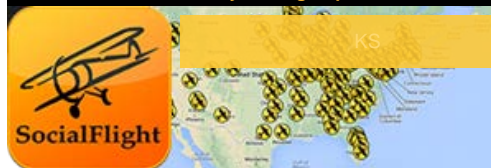
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will be different for each student and training situation. Three hours is a bare minimum — it will more likely be about seven — and 10 hours certainly wouldn't be surprising in some airplanes, especially if the training is being done at a busy, controlled field. A number of tailwheel airplanes used for transition training were built before a lot was known about stability and control, and they have primitive systems that are not intuitive, instruments in "odd" locations, and controls that may be hard to reach or use, thus adding to the length of time it takes to acquire a feel for the machine. I am of the firm opinion that, before the first flight, there has to be suitable time for the instructor and student to talk, because this is a checkout that requires the student to change his or her way of thinking about flying and allow for what may be major differences in handling and systems operation.

Please keep in mind, the following speaks in generalities and is aimed at instructors (but as a student, it helped me to read the instructor's manuals). In places, incomplete sentences are used on purpose. Of necessity, it glosses over some items that are airplane-specific. For example, in an unmodified Globe/Temco Swift, full-stall landings are not going to be taught until near the end of the checkout, if at all, as that airplane behaves very unpredictably in such a landing. Finally, after extensive discussions with instructors, I recommend teaching full-stall landings first, as they are easier to learn in most airplanes, and it was agreed by all of those instructors that students learn much better and faster when their confidence level is kept up by mastering increasingly difficult tasks, rather than being immediately frustrated by a very complex activity. Trying to introduce wheel landings too early can wreck that confidence, slowing down the entire process of the checkout significantly. (Wheel landings aren't necessarily hard, they are just "different," so it helps to have some feel for the airplane and how long the landing gear is before trying them.) I'll also be the first to admit that the following can be made better by your comments and input.

Lesson 1 — Ground Discussion

Because it is likely the aircraft type is also new to the student (unless it is a tailwheel conversion of a nosewheel airplane), the usual new-aircraft type-checkout items have to be covered in detail: airspeeds, systems (including fuel), landing gear, brakes, propeller, electrical, and hydraulics, with an emphasis on emergency procedures. A "v-speed" card that can be clipped to the yoke or a kneeboard may prove handy.

Operational discussion: You should include an in-depth conversation, with visual aids as available, on what occurs when the steering takes place behind the center of gravity; how that means that the airplane tends to stay in a turn or swerve rather than straightening out, and that the student must not only start, but stop each turn or correction. It should also include some very basic information on the use of rudder pedals, including not "pushing" on them, but applying pressure as needed to get the airplane to go where the student desires. Students who trained in airplanes that do not require much rudder in flight or on the ground, such as Cherokees, will need a great deal of work in this area, and patience on the part of the instructor.

Emphasize the use of ailerons on the ground and the constant awareness of the wind direction relative to the airplane.

Visibility: Discuss the expected visibility over the nose, where to look for visual cues, and the considerations for taxiing, takeoff, and landing. For some airplanes, this means a curving approach, with virtually no wings-level time on final. Discussion of visibility (or lack of it) in flight, and what to do about it, is appropriate for a number of types of airplanes.

Taxi: Introduce the concept of absolute intolerance for heading deviation and excursion during taxi; the student should not allow drift from the direction the student desires the airplane to go. On a very basic level, the student must always have a firm idea of where he or she wants the airplane to go (a huge proportion do not), not some foggy



QUESTION OF THE WEEK

Will solar aircraft fly?

They're the future of aviation.

They'll have uses, but gasoline and Jet A will continue to power most aircraft.

There are too many variables to make solar energy a reliable power source.

It's a gimmick that has no legs.

OTHER. My opinion doesn't appear as a choice — but maybe I'll [send you an e-mail](#). (200 words or less, please.)

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PICTURE OF THE WEEK



Picture of the Week »

Allen Macbean of American Fork, Utah serves up our latest "Picture of the Week." Click through for a better look and for more breath-taking reader-submitted photos.

notion that this taxi exercise will terminate with the airplane on the runway pad; the student must decide the precise route to be taken and where the airplane will be pointed all of the time, including during S-turns for visibility. If the nose moves so much as one degree off of the desired heading when taxiing, taking off, or landing, such deviation should be more than enough to trigger immediate action on the student's part to bring the nose back to the desired heading.

Discuss the stick position when taxiing. Generally, it is all the way aft with appropriate aileron deflection. If taxiing downwind with a wind of over about 15 knots, the stick may be pushed forward to the neutral position, as, no matter which way the wind is flowing over the elevators, it is not going to cause the tail to come up. (This may be airplane specific.)

Encourage minimal use of brakes due to a number of considerations, including the difficulty applying them when needed (heel brakes), lack of reliability (older airplanes), and concern with nosing over.

Takeoff-roll discussion: Pinning the tailwheel down helps directional control, and directional control will become more challenging as the tail comes up. Also remind the student of the effect of p-factor; and how the expected gyroscopic effect of the tail coming up (turning the airplane left) will magnify the need for rudder to overcome the loss of directional control that had been provided by the rolling tailwheel.

Full-stall landing discussion: Advise the student to pull the stick/yoke all the way aft prior to touchdown (on most aircraft), with the ailerons positioned as needed for a crosswind, and with the student poised to go to full-aileron deflection almost immediately after touchdown. If the airplane starts to hop or bound, make sure the stick is full aft to stop it. (This may be airplane specific.)

If the airplane has flaps, all should be used, as the desire is to touch down with minimum energy. Even in a stiff crosswind, there should be more than enough control authority to keep it straight during flare and touchdown with full flaps. Because directional control is more challenging once on the ground than it was in the air, minimum speed at touchdown will help keep things under control during the rollout.

Crosswind-control discussion: Emphasize that the elevator and aileron controls *will* be moved to their limits in any crosswind landing (something few nosewheel pilots have done or are comfortable with); the elevator gets to that position prior to touchdown (if full stall), and ailerons get to their limit at or shortly after touchdown. Then, both controls are held at those travel limits through rollout: The stick will stay fully aft, with the ailerons either neutral or at travel limit for wind correction, while taxiing.

Emphasize and explain why the cliché "The airplane isn't done flying until it is tied down" is absolutely true.

"If you don't like something, go around." Discuss why, unlike a nosewheel airplane, it is not unusual to perform a go-around *after* touchdown (during the rollout itself) if directional control becomes an issue. One way to recover from a swerve is to apply full power to get the maximum rudder effectiveness and simply take off, rather than risk further loss of control during the rollout. Point out that this is a judgment call, because if there is any risk of collision, it's better to be going slowly, and a go-around attempt under those conditions is inappropriate.

Lesson 1 — Flight

Preflight — Items to Consider

Fuel system: Discuss the fuel drains and the effect of the nose-up attitude (while parked) on the fuel system, and on the ability to identify and remove contamination from the system. On some specific types, there are fuel tanks that will drain fuel into other fuel tanks while in three-point attitude, so it may be necessary to shut off some fuel selectors on the ground (e.g., Aeronca Chief). Fuel selectors and gauging systems on older airplanes may be unconventional, there may be multiple tanks, the selector "pointer" may be counterintuitive, and it may be necessary to take

some action to read the fuel quantity of a given tank.

Demonstrate inspection of the tailwheel, its springs and cables, and the connection to the rudder (if any).

Show how the three-point attitude allows the "down" aileron to generate a great deal of drag, and again discuss the benefits of the ailerons for steering control while on the ground.

Taxiing

Remind the student to always be thinking of the the stick/yoke position.

Have the student experiment with the steering, making wide-radius turns and tight turns, to determine what can be done without the brakes and what requires them. Let the student sort out the position of the brakes, especially heel brakes, and let the student see what is involved with starting and stopping turns and dealing with increasingly dramatic swerves.

Show the effect of ailerons when taxiing: On a light-wind day, have the student steer the airplane on the ground with "opposite" aileron, and discuss how the drag of the down aileron helps with directional control in a crosswind.

In Flight

Expected flight time: one to three hours.

If possible, do the first few takeoffs and landings on grass, for greater directional control.

Takeoff: Directional control — teach the student to use all available visual cues; if there is good visibility over the nose, select a point well beyond the far end of the runway for a directional reference. Require the student to allow no nose deviation from desired direction; notice effectiveness of tailwheel and rudder during acceleration, the effect of raising the tail, balancing the aircraft on the mains for optimum acceleration, and breaking ground and establishing climb at the appropriate airspeed plus or minus 5 knots.



Turns: to explore coordination.

Steep turns and turns with rapid roll-in and roll-out are used to get the feel for the responsiveness of the controls and appropriate rudder coordination at differing speeds and roll rates.

Slow flight: The student needs to become as comfortable as possible flying the airplane precisely at not more than 5 knots above stall speed for the particular configuration; use gentle turns and coordinated rudder. Push for altitude plus or minus 100 feet and airspeed plus or minus 5 knots.

Power-off and power-on stalls: These are performed through the break or full aft movement of the stick/yoke, whichever comes first, to explore effectiveness of ailerons and rudder at stall speed and to detect any signs of aileron reversal. Some older airplanes may exhibit aileron reversal near stall speed, which necessitates that roll and yaw corrections be performed with the rudders. Many low-powered airplanes require a greater amount of nose-down pitch-change to recover from the stall than the student is used to in higher-powered airplanes, due to the difficulty of accelerating away from the high-drag condition of the stall.

Full-stall landings to a full stop (if appropriate for the airplane): The goal is to fly the approach speed plus or minus 5 knots, aircraft aligned with the runway at touchdown (unless the aircraft has crosswind gear), and no drift; roll out with the student using available visual cues for directional control and assertively taking corrective action any time the airplane is not headed in the desired direction; encourage minimal braking initially, so the student can experience the changes in control authority during deceleration. Then teach heavy brake use, as appropriate for the airplane, so the student knows where to draw the line if there is a risk of nosing over.

Crosswinds: Introduce crosswind landings after several successful landings into the wind, in which the student demonstrates touchdown at minimum speed and good directional control on rollout.

Bounced and main-gear-first landings: Recover by smoothly bringing the stick all the way aft.

Go-arounds: Initiate when well into the flare, and also during rollout.

Satisfactory completion of Lesson 1 occurs when the student holds selected altitudes within plus or minus 100 feet, headings within 10 degrees, and airspeed within 5 knots of target. On takeoff and landing, the main gear remain straddling the runway centerline, which is, of course, a judgment call on grass. Depending on the type of airplane, touchdown occurs when the yoke/stick is at full-aft travel. Full aileron-deflection into the wind is smoothly and appropriately applied at or shortly after the upwind main landing gear touches the ground. Again, depending on the type of airplane, the tailwheel may touch down first, or the tailwheel and one main (or both if no crosswind) will touch down simultaneously. The main gear does not touch down prior to the tailwheel. The student must also demonstrate appropriate aileron use any time the airplane is on the ground; until that is consistently demonstrated to the point it becomes second nature, the lesson is not complete. The student recovers from a bounced landing smoothly and uses appropriate judgment as to when to go around, either prior to or after touchdown.

Lesson 2 — Ground Discussion

Review full-stall landings, and go-arounds; introduce aborted takeoffs and wheel landings.

Aborted takeoffs: An abort should be considered any time the student is distracted or directional control is questionable for reasons that don't make sense. Because force of impact increases with the square of the speed, if there is some difficulty with directional control during the takeoff roll, aborting the takeoff is probably the better procedure: If you're going to hit something, the slower the better. Further, a distraction, such as a door opening, can lead to a swerve on takeoff that cannot be corrected, so resolve to either abort or go, and don't try to "fix" something during the takeoff roll. While this may sound inconsistent with a go-around during the landing rollout, it is because the matter is a judgment call and should, therefore, be discussed prior to flight.

Discussion of wheel landings: The approach is flown at the same speed as a full stall landing, no faster. An increase of just 10% in approach speed increases the landing distance over 20%; do not tack on any extra speed for a wheel landing. While there are advanced techniques for wheel landings that are airplane-specific (such as holding a constant pitch-attitude and using power to regulate the entire landing, including flare, and then using brakes immediately on touchdown), the general approach is fly a normal approach with a little extra nose down trim, close the throttle prior to or during flare; then flare to a slightly tail-low touchdown. As the mains touch, the back-pressure is relaxed and the trim lowers the nose about a half a degree, which is all that is necessary to get the airplane to stay firmly on the ground. Directional control is critical: Brakes are not used for the initial training, and the tail is held up with forward pressure until the student makes the decision to lower it.

Full flaps are normally used for all wheel landings, to take advantage of the reduced stall speed and drag; the idea is to touch down without excess energy. Most tailwheel airplanes have such effective aerodynamic controls that a high-energy touchdown is simply not needed and adds to the risk during the rollout. In a crosswind, the upwind main touches down well before the downwind main, and full aileron travel is reached, and held, prior to touchdown of the downwind main. The tail is lowered at the student's discretion.

If the airplane bounces, the student should *not* try to drive it back on or "pin" it to the runway, but should flare again and make a tail-low touchdown on the mains, then relax the back pressure to keep the tail up. If the airplane bounces a second time, the landing should be converted to a full-stall landing or a go-around, depending on the student's judgment. If there is any question of directional control or if there are any pitch oscillations after a bounce, a go-around should be performed.

Lesson 2 — Flight

Expected flight time: One to four hours.

Review recovery from swerves while taxiing, full-stall landings, and go-arounds; introduce aborted takeoffs and wheel landings.

With warning to the student the first few times, close the throttle during the takeoff roll or initial climb, with sufficient runway remaining to land and stop.

Directional control, maintenance of adequate glide speed, and aileron usage for crosswind are the essential items.



Wheel landings to a full stop: Show that the airplane does not have to be driven onto the ground, and that such action is counter-productive in many types. Show how and when to lower the tail, keeping aileron control in for crosswinds.

Go-arounds: Incorporate from wheel landings, including bounced landings.

Convert bounced-wheel landings into full-stall landings.

Satisfactory completion of Lesson 2 occurs when the student consistently performs an aborted takeoff, makes wheel landings demonstrating directional control in crosswinds with the main gear straddling the runway centerline at all times, and responds appropriately to a bounced landing.

Lesson 3 — Ground Discussion

Review wheel landings; introduce all emergency procedures not previously covered; introduce short- and soft-field takeoffs and landings.

Review emergency procedures per the POH/Owner's Manual for the airplane.

Soft-field takeoffs: These are made with the tail low, just barely clear of the ground to avoid nose-over (may be airplane specific — some are made with the tailwheel in contact with the ground throughout the takeoff roll).

Soft-field landings: These are full stall at a minimum descent rate, with some power while the student evaluates the surface and is prepared to go to full power and take off if it is too soft.

Short-field takeoffs: These are made with the minimum drag, which means raising the tail so as to achieve maximum acceleration, and are airplane specific. If the POH calls for use of flaps, deployment may be delayed until just prior to unstick speed to aid acceleration.

Short-field landings: These landings are airplane specific. Initially, an approach at something less than 1.3 V_{so} is flown, using power as needed to break the descent/flare, then the throttle is closed and a full-stall landing is made with maximum braking, while the flaps are raised to put weight on the mains. More advanced techniques are airplane- and pilot-specific, and involve a wheel landing with maximum braking, with the tail up to put maximum weight on the main wheels, while being aware that it can lead to a nose-over if done improperly. This short-field wheel landing and maximum-braking technique may not a part of a normal checkout for most airplanes unless it is specifically discussed in the POH; otherwise, it is a very advanced procedure for a pilot who knows the airplane extremely well and is going to be landing on extremely short strips.

Lesson 3 — Flight

Estimated flight time: one to two hours.

Review aborted takeoffs, emergencies, wheel landings, crosswinds, and go-arounds; introduce short- and soft-field takeoffs and landings.



Emergency procedures: Practice these, including simulated engine failure (with the throttle to idle) at an altitude of at least 3000 AGL, with a glide to touchdown on a suitable runway.

Soft- and short-field takeoffs and landings: Show how speed control within 5 knots of target and power control for desired touchdown gives the optimal landing technique.

Satisfactory completion of Lesson 3 and the tailwheel checkout occurs when the instructor is satisfied the student can hold airspeed tolerances within 5 knots of target, consistently straddles the centerline (or other selected reference) on takeoff and landing, performs emergency procedures as specified, demonstrates retention of memory items, shows appropriate use of checklist follow-up items, invariably holds appropriate aileron deflection while on the ground, and demonstrates suitable judgment in handling swerves, go-arounds, bounces on landing, and unexpected or abnormal developments.

I don't pretend that this syllabus is perfect; it's only a guideline, and I expect that there will be a lot of suggestions to modify and improve it. One of the things I like best about writing this column is that the readers provide tremendously insightful comments, so I learn a great deal that benefits my flying.

Next time, we'll explore which is better and safer: wheel landings or full stall. I'm most certainly still collecting comments on the subject.

See you next month.

An advertisement banner for the DC Pro-X ANR Headset. On the left is the DC logo, a stylized 'd' and 'c' with a registered trademark symbol. To its right is the text 'DC PRO-X ANR Headset' in bold. Below that, it says 'FREE DC Aviator Ball Cap • FREE Shipping • 30-Day Money Back Guarantee'. To the right of the text is a tan aviator ball cap with the DC logo on it. Further right is a blue oval button with the text 'Order >>' and an image of the DC Pro-X ANR headset. The background of the banner is a light blue sky with white clouds.