Flight Advisor Corner by Hobie Tomlinson

July 2005 **Tailwheel Transition, PART II**

This month we are going to continue our series on tailwheel transition. Last article we talked about some of the history and characteristics of tailwheel aircraft, now we want to resume by discussing the actual transition training.

The first item in transition training is a thorough familiarization preflight of our aircraft with the emphasis on its exact configuration. Tailwheel aircraft come with many different "variations on the theme" as we discussed last article, so we want to pay particular attention to which one we are working with!

First is the type of tailwheel assembly. Do we have a steerable or a free castering tailwheel? Does it have a "full swivel" function? Does the aircraft have a "tailwheel lock" What type of tire does the tailwheel have, the older, small "hard rubber" type, or the newer, larger "air type". How about the leaf spring and steering springs? The old style springs were "softer" and absorbed the bumps better, but the tail sat low to the ground, giving a high angle of attack to the wing and more fuselage blanking of the rudder. Newer tailwheel springs are stiffer, allowing the tail to sit higher and providing a slightly lower angle of attack for the wing. Carefully inspect the fuselage area where the tailwheel spring attaches. Sometimes the newer springs prove to be "too stiff" and fatigue cracking to the aft fuselage structure occurs, especially if subjected to a lot of rough field operations. Observe the steering springs for condition and proper tension on both sides. Lastly, check the tailwheel tire for proper inflation, sidewall condition and tread wear.

Second is the type of brake assembly. Do we have heel or toe brakes? Are the brakes powered mechanically or hydraulically and what type of brake assemblies are used, shoe or disk? This will give us an idea of the brake effectiveness to expect. Mechanical shoe type brakes will be the least effective, while the hydraulic disk type brakes will be the most effective. Also hydraulic shoe type brakes can have a tendency to "grab" if the pads become contaminated. (A major problem with old style brakes on Stearmans.) When dealing with older foreign aircraft, some quite unconventional (to us) systems may be encountered.

Lastly is the type of main gear assembly. Does the aircraft have a crosswind gear installed (C195, Helio Currier) and if so, does it have a "lockout" function which will prevent its activating when not intended. Does the aircraft have "wheel extensions" installed, or are they available for this type? (C140s are light in the tail and easy to "nose over. Most have had wheel extensions installed, moving the main wheels forward and correcting the problem.) Does the aircraft have a "walking gear" (older Beech 18's)? This type gear has a compression spring in the drag brace, allowing limited fore and aft movement of the wheel. The term "walking" refers to the apparent stepping motion observed when the springs compress at different times during the run-up. This ability of "fore/aft" wheel movement is also present in Cessna aircraft with vanadium tube gear. When converted to tailwheel configuration, this particular trait increases control difficulties on landing (a trait known as "squirrelly") and is not viewed by me as desirable. Finally, what types of shock absorbers are installed? The progression has been from bungee cords (giant rubber bands) on J3 Cub's, to Oleo struts on Aeronca's and finally spring steel gear on Cessna's. The oleo strut configuration provides for the easiest landings, because when compressed by a landing load it does not immediately want to "snap back" to its uncompressed state.

Before leaving this topic, I must say that the individual type clubs are a wealth of information on their particular aircraft and are well worth contacting before flying or purchasing a given type aircraft. They can all be accessed through the EAA's website.

The next step in our transition process is spending a few minutes just sitting in the seat. Seat height and adjustment are very important in any aircraft, but even more so in tailwheel types. Can you easily move each rudder pedal full travel and work the brake pedals from all rudder positions? How do the brake pedals feel when actuated, solid or spongy? If spongy, maintenance is probably required prior to flight. What is the view "over the nose"? Older "round engine" types (such as the Cessna 195) have very limited forward visibility and must be operated by looking off to the side of the nose. Also note the nose position relative to the horizon, as this will be the correct landing attitude for normal "3 point" landings. A "3 point" landing is a term used in tailwheel aircraft to describe a landing in which the main gear and tailwheel contact the ground simultaneously. This is the normal landing method in light wind conditions.

Once we have completed the familiarization process, *we are ready to go Fly*. If we are flying an older aircraft without an electrical system, "hand propping" will be required. This is another "lost art" and probably deserves its own article. Suffice to say that propellers are lethal, so do not attempt this without proper instruction from someone with "hands on" experience! It can be done safely, but complacency here is a proven killer. *(See companion article on hand propping.)*

Taxiing is going to be quite different in a tailwheel aircraft. Immediately test the brakes at start of taxi by retarding the throttle and smoothly applying pressure to both brakes. Both brakes should feel "solid" with good braking capability and no "grabbing". If the brakes do not test satisfactorily, shut down and obtain corrective maintenance!

It is important that we always use the brakes smoothly in a tailwheel aircraft, because more than one aircraft has been tipped up on its nose by a sudden brake application while it was rolling forward. This is especially critical if the airplane starts to roll forward during a high power run-up!

The aircraft is taxied at minimum power without "dragging the brakes" (continuous brake application with excessive power to prevent a speed increase). The aircraft should be taxied with the heels of the feet on the cockpit floor and the balls of the feet on the bottom of the rudder pedals. The feet are slid to the brake pedals whenever braking is needed. The aircraft will taxi easier if it is kept in motion at a safe, constant taxi speed.

To turn the airplane while taxiing, rudder is first applied in the direction of the turn, with whatever power and brake is required to turn the aircraft while controlling taxi speed. Once the aircraft is turning it will want to continue turning and it is necessary to anticipate the stopping point and lead it with opposite rudder and brake. If the aircraft is one in which restricted forward visibility prevents seeing obstacles directly in front of the aircraft, taxiing is done with a series of zigzag (or S) turns so that the area directly in front of the aircraft can be continuously monitored by looking off to the side of the nose.

The control positions during taxi are the same as used for tricycle gear aircraft, but are much more important in tailwheel aircraft. The old gouge is **"Climb into the wind, Dive away from the wind."** That is, when taxiing into a quartering headwind, the yoke (or stick) should be turned (pushed) to the upwind side and positioned full aft. This will prevent the wind from lifting the upwind wing or raising the tail. (The elevator can be neutral here in a tricycle gear, but not a tailwheel.) When taxiing with a quartering tailwind, the yoke (stick) is turned (pushed) to the downwind side and positioned full forward. This is because the wind is flowing over the aircraft backward (as it does in an aerobatic "tail slide") and reversing the control inputs. Thus down aileron keeps the wind from lifting the upwind wind and down elevator keeps it from lifting the tail. This is also important in tricycle gear aircraft as they can nose over "kitty-corner" in strong tailwinds. It is very important to taxi slowly in strong winds (especially when taxiing downwind), as extra taxi energy just compounds the control problems! Because of the strong tendency of a tailwheel aircraft to weathervane, taxiing directly crosswind (or downwind) is difficult and will usually require large rudder inputs and some brake usage to maintain directional control.

Run-up of a tailwheel aircraft is always done after turning the aircraft directly into the wind. This minimizes the tendency of a crosswind to lift a wing while operating at a high power setting. It is also very important that the elevators be held in the full up position and the aircraft prevented from creeping forward by continuous, firm brake application. As a general rule, do not trust light aircraft parking brakes and never trust them on tailwheel aircraft! Letting the aircraft creep forward at a high power setting, then suddenly applying the brakes (especially if not facing into the wind or holding full up elevator) is a real easy way to "stand it on its nose"!

Takeoff in a tailwheel aircraft is started by carefully aligning the aircraft with the runway. The aircraft should be allowed to roll forward enough to "center" the tailwheel and if a locking mechanism is provided, the tailwheel should be locked. Brakes are then released and the throttle smoothly advanced to full power as both feet are slid off the brake pedals. Directional control during takeoff will be affected by changing rudder effectiveness (with increasing power & airspeed), torque, "p" factor, gyroscopic precession from the propeller (as the tail is raised), adverse aileron yaw (in crosswinds) and wind effects.

The takeoff roll is started with some up elevator to improve tailwheel steering effectiveness. As soon as increasing airspeed has given adequate rudder authority, the elevator position is changed to slightly forward and the tail allowed to rise to the liftoff attitude. This attitude is then maintained with elevator until the aircraft flies off the runway. It is very important in tailwheel aircraft to make a gradual advancement of power and to lift the tail smoothly. Doing either abruptly will dramatically increase control difficulties. (The first due to torque and the latter due to gyroscopic precession.) If the aircraft has been correctly trimmed for takeoff, the elevator will be mostly neutral during the latter portion of the takeoff roll and the aircraft will "fly itself off" the runway. Directional control should be maintained by applying whatever rudder pressure is needed to keep the airplane tracking straight. This is best done by picking an object at the far end of the runway and keeping it in a constant position relative to a place in the windshield or on the nose of the aircraft. Do not "walk" or "jab" the rudder pedals, but maintain a constant pressure on the correct pedal to keep the aircraft tracking straight. As control effectiveness increases with increasing airspeed, less and less control deflection (or control pressure) will be required to achieve the same result.

Once airborne, there is no significant difference between a tailwheel and a tricycle gear aircraft. A tailwheel aircraft will be faster and have a greater useful load than a tricycle gear aircraft of the same type. Tailwheel aircraft have more powerful rudders than tricycle gear aircraft and do not have the "rudder-aileron" interconnect springs that have become so popular on tricycle gear aircraft. That plus the fact that the older type tailwheel aircraft had significant adverse aileron yaw characteristics means that initially flying coordinated turns may take some practice. Other than that, all is the same.

Next month we will look at the different types of takeoffs and delve into *landings, where the real fun begins*. The thought for this month is: **Fools rush in where angels fear to tread!** So until next month, be sure to **Think Right to FliRite!**

Trainer for my first 200 Hrs. – Cessna 140 @ KBTV – Winter of 1962

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