

Everything you need to know about your tail-wheel

Lots of people never use them, and that's OK. Many who have them fly fine, but don't understand what is going on, and that might be OK too. But we should know a bit more about what it takes, how they work, and how to keep them happy;

If you have one, keep it maintained;

Tail-wheel tire pressure is usually 45 psi, or more. Don't let it get below this.

The main springs eventually get bent from repeated weight or pounding. When this happens the pivot bolt ends up pointed too far aft. That makes the wheel geometry very "stable" if you want to go straight! But, try to turn and it is difficult. AND..... this is the most frequent cause of "Shimmy". Shimmy is a vibration on landing or at higher speeds where the tail wheel shakes back and forth (like a shopping cart with a damaged wheel). The solution is to just buy new springs and change them, or, if your AME agrees, take them off, trace them on paper for record, and get them all re-arched at an actual spring shop. Be prepared to buy new (since this doesn't always work). Try to get them bent evenly (there are usually 3 or even 4 leaves) and you want them to lie together bent 1 to 2 inches more than they did on the paper before this.

Don't just lubricate your tail wheel every annual, actually disassemble it, clean it, look for broken parts, and put in new bearings, races and seals every few years (they are cheap!).

Some aircraft have true "Locking" tailwheels, like Beavers etc where the pilot can actually engage a lever to lock the tail-wheel straight. The idea here is that on take-off or landing, by locking the tailwheel you add some directional stability, at least until the speed climbs and the weight comes off the tail wheel.

Most common small aircraft have a Scott (3200 or 3400) or Maule type tailwheel. These allow the tail-wheel to turn only a limited amount in each direction, until direct force "kicks it out", and then it rotates 360 degrees. This is so there is some positive steering action while on the ground delivered through the chains and springs, from the rudder (which is connected by cables to the rudder pedals).

Inside the Scott tail-wheels there are some pressure disks, 3 (or 5) small springs and the bent flat-spring sear that catches on the central casting lip to provide the 'Locking' action. The casting holding this sear takes a lot of abuse and failure of the attachment is common. The Maule uses a system of simple levers in the hinge point to release the wheel. These are a bit simpler, but perhaps not as robust. These should be disassembled and cleaned occasionally too.

Tail wheel arms are connected to the bottom of the rudder with springs and chains. They should be just barely tight with no weight on them. (ideally they should come just slack when the tail is lifted.)

Flying a tailwheel aircraft .

Flying isn't really an issue, if anything you probably just go a little faster. Landing and occasionally taking off is a little different.

Usually (but not always) take-offs go fairly well for the uninitiated. When I check people out on the tail-wheel aircraft I have them;

- taxi slowly and make enough turns to know what is ahead (sometimes forward visibility sucks).

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- for run-up, or for line up to take off, let the aircraft move ahead a couple of meters to make sure we start with the tail-wheel lined up pointed directly ahead.
- as we apply power the aircraft will try to turn to one side. As you apply power use the pedals to keep the aircraft lined up on the centreline of the runway, road, clearing, or between the haystacks. CONCENTRATE.....correct every little swing completely and quickly, but smoothly.
- the tail will start to come up at some point, but if you're concentrating on keeping it straight you won't even notice.
- you can use neutral elevator, or once you are experienced, even a little down elevator to help the tail get up. If you use elevator in most airplanes you can reduce the down-elevator as you accelerate.
- Note: In a Cub, maintaining too much forward stick can result in sticking your prop in the dirt (especially a long prop). In a Citabria once you are rolling you can't stick the prop in the dirt even with full forward stick....unless you also touch the brakes or hit deep grass etc.....then it gets expensive too.
- Now that you are at flying speed climb away but keep your attention outside until your well on your way (thats just good sense).

Landing a Tail-wheel aircraft:

Now we come to the trickier bit.....but it is still not magic.

I tell the people I check out on tail-wheels; “...**every time you see the landing surface in the windscreen ...your feet must be constantly moving...putting in slight track corrections... until the aircraft is tied down!**” Most landing failures are from lazy feet.

'Three Point' (tail low), or Main 'Wheel' landings are your choice, but decide early in the landing which you want. There are many who tell you they can land just as short by landing on wheels. These guys must agree heavy braking is usually required and until you are proficient you often pull a balancing act between heavy braking and flipping onto the nose. Develop this skill later.

Unless you have a stiff cross-wind, use the Three-Point landing. Get flaps out early on final so you can stabilize the whole landing early. Approximately 1.3 x stall speed on approach. Once your sure you're going to make the landing spot begin slowing it down with increased attitude until about 1.1 Stall Speed, hold that attitude and use power to set exactly on the spot. Eventually you will be good enough to time your arrival without changing your tail-low attitude. I flare a slight bit as I arrive to stall the wing and cushion the impact at the last moment . When you arrive with only the minimum SAFE airspeed the energy is so low braking is barely required. I use little bursts of power on the final to pinpoint the touch down and to keep the engine running happily.

One more thing.....when the mains touch and I am tail-low I put full back stick (up elevator) in instantly and hold it there. My feet are wiggling the rudder and I am looking outside.

People usually get into trouble when they arrive at touch down with the tail higher than it needs to be and too much energy. The main wheels hit, the tail drops, the angle of attack increases, and the plane rebounds into the air....barely flying and in poor control. This is decision time! Make it...and stick with it.

If you can power up and go around do it, quickly!

IF YOU HAVE TO LAND (AND YOU ARE NOT MORE THAN 10 FEET IN THE AIR) PULL THE STICK BACK TO THE STOP - DOUBLE YOUR FOOT INPUTS - AND CUT THE POWER ! If you are higher than that, you may have time to use a short burst power to cushion the next

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landing? That burst will extend your landing distance, but will also give you increased rudder authority for a short moment.

IF you choose to salvage a bad wheel landing, and you have speed, forward stick (down elevator) will arrest the porpoising that can develop, but it takes courage and commitment. Allow the aircraft to slow and the tail will come down. This also takes up runway. In severe cross-winds (when I can't angle across the landing surface into the wind) I do a wheel landing. A little extra speed (5 mph), a little less flap (1/2 or less), and a prolonged touch down make a smooth transition. Then forward pressure on the stick to 'pin' the airplane onto the surface. When I am happy I reduce power and let the tail drop. When it does it is important to reverse to use full 'up elevator' to keep it secure. As you taxi in high wind use elevators and ailerons to reduce flying tendency. (IE if the wind is from behind and from the left, keep the left aileron DOWN.....if the wind is from ahead and from the left, keep the left aileron UP.....think about it....it is obvious). In extreme cross-winds use every technique available to reduce the angleI have used taxi-ways and infields frequently.....with tower notification.

The dreaded "Ground-loop" is when directional control is lost, most commonly on landing. A slow airplane, heavy, with a rear CofG and poorly maintained landing gear or brakes is the surest way to get one. Any poorly coordinated situation can start the ground-loop. Once the heavy tail starts coming around to pass the pilot it is nearly impossible to prevent, you need to have instant reactions.

Extra airflow over the rudder adds control but adding power may just add to 'P Factor' torque and accelerate the rotation if you are not experienced a bit. Your feet will be very active on the rudders, and also on the brakes (if you have them and they are working correctly) . Aileron inputs can be important, you want coordinated control as quickly as possible. Don't give up! Not all ground-loops cause damage, if you are lucky the tail might just become the front and you will skid to a stop, shaken but wiser.

Using power and elevator can make ground handling easier, especially if you are without brakes (IE big tires or on skis?) In mud or deep snow, the aircraft may be reluctant to steer. A little forward stick and some power will lighten the tail and allow you to swing around easily.....but stay alert. Before you get the knack it will tend to over-steer.

There is always more to learn. Generally Tail-draggers are more suited to rough strips, gravel (the prop can be farther from dirt), debris, snow or deep grass. But plant any airplane in real deep grass (more than a foot high ?) and you might stop shorter than you planned. Work up maximum performance gently.