Tiger Moth basic handling notes

by David Phillips

To move the aeroplane, lift the tail by the tailplane strut, gripping as close as possible to the fuselage. The aeroplane will be neutrally balanced when the skid is at head height (approx). Lift it any higher and let go and it will tip onto its nose.

The easiest way to move it is with ONE person lifting the tail (approx shoulder height supporting little weight) with someone else pushing on the rear (or front) of one of the wing walks. Because the balance changes quickly as the tail is raised, if two people lift the tail they nearly always end up in opposition to each other — one lifting up and the other pulling down.

While you have the tail up in the air, have a good look at and play with rudder/tailskid interconnect.

Preflight inspection
Check fuel on, then clockwise around the aeroplane from the cockpit. Switches off (rear and front), flying wire tension (left wing), note aileron differential, oil quantity 2/3 full or more, engine left side — magneto wiring, propeller not loose, spinner tight, engine right side — magneto wiring, exhaust manifold nuts/gaskets, prime carburettor, exhaust pipe security, climb up on cowl for fuel contents and wing top surface inspection, flying wire tension (right wing), rear locker contents, tailplane secure, tail fin main spar not cracked. General — no wrinkles in fabric (suggesting deformation or breakage underneath).

Starting
Chocks in position, throttle closed, switches off, stick hard back. Pull prop through 4 times (after priming, and **always** treating the prop as live!), then: throttle wide open, pull prop through 8 compressions backwards; then: throttle fully closed; then: throttle set 3/16 inch, magneto switches on, start engine, monitor oil pressure rise.

Warm up — 4 minutes minimum summer, 8 minutes winter — at 800–1000 rpm to ensure smooth running.

Check mags and dead cut at idle, then 1600 rpm — mags, then briefly full throttle — 1950–2100 rpm static. Check idle with throttle closed — 600–700 rpm.

Taxying
In theory with stick hard back to avoid nose over. Neutral is probably better — less pressure on skid = less turf damage. Full forward stick and blast of power will lift the tail. Once moving, the only “brake” you have is the tailskid. With soft ground it works well, but with hard ground it slides. Taxying downwind in more than (about) 10 kts wind velocity will be difficult directionally and it will be difficult to stop — maybe impossible on hard smooth ground and an engine that won’t idle below 600 rpm.

Up elevator digs the skid in for better stopping — effective during landing roll whilst there is some airflow over the tailplane.

Weave for forward visibility. The rudder has more travel than the steerable tailskid. At low speed and low power settings the skid will turn you rather like a steerable tail wheel, but with wide turn radius.

You can turn much more tightly (especially to the right) with a blast of power against full rudder. The problem is this increases speed. If you were trying to tighten the turn due to confined space, and you find the turn is still not tight enough, you may now be going too fast to stop.

The solution is more power (ie more slipstream, to make the rudder bite), but this means more speed … and a potentially more violent collision. So — decide early whether or not you can do it. If not, get out and lift the tail around. Collision imminent? Switches off. It will slow a little better with no thrust at all.

When using a liberal blast of power from low speed to achieve a tight corner, you can easily get into a situation where the momentum of the back end swinging around will tighten the turn still further, like a mild ground loop. This can be used to your advantage for a very tight turn, as long as it doesn't get out of hand.

The Tiger is steered on the ground by a combination of tailskid steering and slipstream against rudder. If you are taxying downwind, you may get away with skid steering alone. If this is inadequate, you will need more slipstream, which means more power and more speed, in a situation where it is already not so easy to stop. With between 10 and 15 knots (or so) of tailwind you will need wingtip assistance to taxi downwind. If you start losing directional control downwind your choices are:

1. Stop. When stopped, a large blast of power plus full rudder to get pointed the right way again … hopefully without gaining too much speed.

2. More power. OK if space is unlimited, but remember you now have a lot of slowing down to do which requires a closed throttle and no slipstream over the rudder.

3. Shut down and roll to a stop.

Takeoff

TMPFFIH … whatever bits of it you can use, anyway. Trim 2/3 forward normally. Look down the strip centreline before lining up (whereupon the centreline vanishes). Find a directional reference — runway edge perhaps — that you can keep in view out to the side (left normally) peripherally to maintain the aircraft parallel to. Then look ahead for a reference in the distance against the side/cowl of the aircraft. Open the throttle smoothly and hold light forward pressure on the stick until the tail comes up. Check rpmM 1950 or more, oil pressure 40–50, and let the aircraft fly off.

Climb at 60 mph. Find a reference point where the horizon cuts the side of the fuselage for climbing and level attitudes; this will involve putting at least part of your face in the breeze. The view directly ahead (unless diving) is poor to negligible.

When safely clear of the ground, pull the throttle back until you hear a change of engine note, and continue climb at 60 mph. Weave gently to clear the area ahead.

The Tiger is lively and pleasant in pitch, neutrally stable in yaw, and the ailerons are there for show only — although they work quite well with the rudder.

Try using full rudder left and right (skidding) whilst in level flight to get a feel for it. Then try full aileron with rudder locked to see adverse yaw.

Then do a long series of steep turns with violent reversals trying to keep the "ball" (top needle on turn indicator) in the middle to get a feel for the rudder. Follow this with wingovers, then do the same using only the seat of your pants for balance instead of the slip needle. It is important to establish a "feel" for balanced flight as early as possible; the aircraft will not stay in balance with just feet off, let alone hands and feet off, as it is neutrally stable in yaw.

Then try prolonged sideslips (standard approach technique) with throttle closed at 65, 60, 55 and 50 mph. Use full aileron, and rudder to maintain straight track. Getting a GOOD feel for the rudder — airborne and on the ground — is the key to handling a Tiger Moth.

Stalls, spins, aerobatics are straightforward, except aileron rolls which require the nose to be 30– 40 degrees above the horizon to start.

Propeller stopped in flight? Check mags and fuel on, throttle 1/3 open, dive vertically to 110 mph minimum to restart.

Approach and landing

60 mph with a little bit of power. Slight sideslip now and again to view/track centreline, or just stick your head out into the breeze to see where you're going and stay in balance. If high, sideslip to correct. Wheel on (ie land on main wheels only) to begin with — the undercarriage is forgiving and gives a low frequency rebound, so it's easy to catch any bounce. Touch-and-go is straightforward, but you may need liberal amounts of aileron to keep the aircraft nice and level whilst the wheels are on the ground.

Three-point landing is OK if wind is calm, OR straight down the runway, OR if crosswind is light at 5–7 knots max. Flare until the venturi is sitting on the horizon (good reference for a three-point attitude).

Keeping straight on the ground by looking out the side (takeoff and landing) takes a little getting used to, since you can't see DIRECTLY ahead. However, if you pick a point in the distance adjacent to the side/cowl it will do fine even though it is displaced from the centreline.

Crosswind
Takeoff: full into wind aileron. You may do better keeping the stick hard back for a couple of seconds to benefit from the tailskid's help to keep you straight, but once you have 10–15 kts airspeed the limiting factor will become keeping the wings level — not directional control — if the wind is strong. With two lightly loaded and dihedralled upwind wings in a three-point attitude, plus a lot of sail area up high, plus a narrow track undercarriage … as soon as you start moving in a crosswind it wants to tip. This can be countered somewhat by getting the tail up high early which reduces the angle of attack (lift).

Landing: can be done two-point (ie upwind wheel and tailskid), but if you touch down with any rate of descent (ie drop it on from a couple of feet) the impact will make the aircraft rock onto the downwind wheel, and probably further — so now you are low speed, virtually no aileron control, with the downwind wing dropping. You also have the momentum of quite a high C of G (with the top wing, tank, etc) also pulling you over the wrong way, which can be quite uncomfortable. For crosswind landings, and in fact all landings, you have a lot more control when you wheel the aircraft on (plus less turf damage). The only benefit of a three-pointer is a shorter landing.

Once the tailskid has "landed", pull the stick fully aft to prevent bunny hopping and to maximise "braking".

Lateral stability on the ground
Because of the high C of G and the narrow undercarriage, between airspeeds of 0 and about 20 knots the use of rudder in one direction will tend to make the aircraft roll in the other. Above this (approx) speed the outside wings (going faster) develop enough lift to counter this.

If you are compelled (!?) to take off in a strong crosswind, there may be some advantage in pointing the aircraft say, 45 deg across the runway and more into wind at the start of the roll. Get the tail up really high ASAP to minimise the lift and maximise aileron effectiveness. As soon as the tail lifts, apply full downwind rudder to try and align with the runway. You have the disadvantage now of the faster (upwind) wing wanting to lift. However, it is now at a low or maybe negative angle of attack, and as you turn towards the runway centreline the high C of G should lean you outwards to help counter the effect of the outside wing lifting. Full into wind aileron throughout, of course.

If the crosswind was so strong that it would have tipped you onto a wingtip before reaching flying speed (eg. 15–20 kts) with a conventional takeoff, then it is probably strong enough to have you airborne (by taking off at 45 deg off the centreline and utilising some of it as HWC) before you exit the runway edge if you are unable to completely align with the runway once you get going.

Shutting down

Bring the aircraft to a stop, and (last flight of day) switch fuel off and allow the engine to idle for 2–3 minutes. Carry out dead cut check (important), then mags off and open throttle smoothly and fully to prevent running on. Full throttle should coincide with engine stop.

More flights to do? As above but don't turn fuel off.

Post flight
Find a large rag …