

Europa Mono Takeoff and Landing Techniques

I tell my customers “Lower your IQ to a 2 and be disciplined”. The mono in flight is a pussy cat because of excellent controls and CG position, but on the ground, the plane will bite you if you allow it to wander, controls are misapplied or if the plane is forced. New owners and especially second hand owners think it is just a taildragger, and their 10 hour tailwheel checkout is plenty of experience. Others feel that they have flown hundreds of hours in tail draggers and don’t need a checkout in a mono. The mono is not a tail dragger; it is a monocycle with a cheater wheel. Before I test a mono, I prep the aircraft with a CG near 60 inches, the controls at full Annex E deflections (rudder especially), tail springs firm with no slop, limit pin or bracket installed on the tail wheel to restrict the tailwheel to 45 degrees max. (A full swivel tail wheel will break at just the wrong moment; therefore I am not a fan.) The engine and fuel system must be tuned, reliable and the fixed prop set for climb at 90 knots at 5500 RPM and 5200 RPM static on the ground to prevent redlining on a go around or during takeoff.

Takeoff Techniques:

Before takeoff sit and pay attention to the picture over the nose. That is close to the landing attitude, but more importantly the attitude that should be maintained after liftoff. Taxi around and get a feel for the tail wheel action and the turn radius of the aircraft. For GODs sake keep the stick back.

Now on to the takeoff:

Roll on to the runway aligned with the centerline. On grass runways, pick a point or tree on the end of the runway and keep it aimed at that. (Note the many references to keeping the roll straight.)

ONCE ALIGNED WITH THE RUNWAY LOOK OVER THE NOSE AND MEMORIZE THE NOSE ATTITUDE POSITION TO THE RUNWAY AGAIN, BECAUSE IT IS YOUR INITIAL TAKEOFF AND LANDING ATTITUDE PICTURE YOU MUST MAINTAIN.

During takeoff roll, keep the plane aligned with the runway precisely. No rolling turning takeoffs to look cool. Apprehension on initial takeoffs is common, but avoid rapid power inputs and jerky control inputs.

Technique: Put a pencil in your fingers like you are ready to write in your stick hand, to prevent squeezing the stick so hard you can’t feel the controls. The pencil hurts when squeezing the life out of that stick. Keep the stick full back on the initial roll for positive tailwheel steering. On crosswind takeoffs, DO NOT APPLY FULL AILERON AND HOLD IT THROUGH THE TAKEOFF ROLL!

Note: At just above stall speed, the Europa will roll very quickly at about 60 degrees a second, so full aileron will induce a stall if over-rotated just at liftoff of the down aileron wing. That can be ugly. So is the roll into the down aileron if a stall is encountered immediately at liftoff.

Smoothly apply power so you can react with rudder to P factor swing. It takes more rudder pedal movement than you think for a Rotax or Jabiru in a Europa to keep it straight. Dance or wiggle on the rudders in small inputs left and right (a half inch or shoe sole width is common) and keep the aircraft perfectly straight down the runway centerline. This dance on the rudder allows you to

see precisely how much the nose moves with your rudder input. We know it will take right rudder initially so why take any out? Simple, to let your eyes see what happens and how much input is necessary to keep the plane dead on the centerline. No large infrequent abrupt stabs of rudder as in a Champ or Cub please, as this will induce a large movement, or on wet grass or sand may break tailwheel traction, so wiggle the rudder with ankle movement only making small adjustments as the tailwheel is quite responsive provided it is held on the runway until rudder effectiveness is achieved at 35-40 Kts.

Keep aileron inputs small and no more than a fist worth is normally necessary, even in moderate crosswinds. Use aileron only to keep the wings level. By the time you reach full power on takeoff roll (less than 5 seconds) you are near 30-35 Knots which makes all the flight controls very active.

WARNING: Allowing the stick to come forward prior to 30 Knots requires large rudder inputs if the tail wheel comes off the ground or skips along, as the rudder is not very effective at very low speed even in prop wash. I have sat through a few runway departures as new pilots allow the stick to ease off the back stop early because it felt right. What follows is an aggressive torque or P factor turn to the left. The novice applies a bit of rudder and nothing happens. The left turn starts to wrap up and the right wing begins to bend down on the outrigger as the left turn increases and then full rudder and aileron are imputed too late to reverse the turn and a runway departure is inevitable. If the plane is horsed off the runway with full right rudder and aileron still in, the down aileron may stall and the plane rolls and hits a wingtip followed normally by a firm impact, 45 degrees off runway heading and a runway departure normally occurs or a, ground loop and prop strike.

KEEP THE STICK BACK!

CAUTION: Full aft stick must be relaxed just as the plane begins to lift or you will over-rotate and a stall may occur.

Again, hold the nose pitch attitude steady. As the nose begins to rise off the ground (about 40 Knots), relax the back stick from the stop to keep the nose attitude precisely where it was in the normal two (or three) point attitude, and the plane flies off of in a two point attitude at a constant pitch attitude and accelerates quickly.

If the pilot holds the takeoff attitude RELIGIOUSLY, the plane will rise and accelerate comfortably. Once a few feet off the runway, the nose can be lowered a bit to hasten acceleration. Accelerate to 65 and retract the gear to ½, to allow better acceleration, then full up by 75 and you can't get in trouble. Later you can retract to ½ at 60 and not get that old sinking feeling and full up by 70 and climb at 75.

Soft field operations are only slightly different.

The squishy tire pressure and soft ground makes the tail wheel act like a skid as well as the outriggers. Follow the procedures above and you are going to be OK. On soft ground, rudder inputs tend to be dampened a bit as the tail wheel slides a bit on the grass, and wet grass tends to allow a slight skid or slip condition to go unnoticed, so be disciplined and keep the plane aligned dead straight ahead.

If short field operations are desired, apply the takeoff technique above for acceptable performance. Should high GW or on a very soft field where the tail wheel is plowing a furrow, is encountered, bringing the tail up at about 40 will improve acceleration to takeoff speed. Acceleration with a larger engine from 35 to 45 knots is very quick with the tail up. Larger

quicker rudder inputs will be necessary to counteract P factor with the tail up. KEEP IT STRAIGHT! Aileron inputs are necessary for a level takeoff attitude to prevent dragging an outrigger on the roll if you are single seat or in a crosswind. Nothing is worse than strong P factor and dragging the left outrigger wheel in a left crosswind with the tail up. That is a disaster trying to happen. So, keep the wings level, with the tail up, balancing on the beach ball main tire. I normally do not use full forward stick, I tend to only ease the stick slightly forward to hold that takeoff attitude I memorized. Rotate as you would any aircraft about 50-55 Knots but do it smoothly so as not to bang the tailwheel on the runway. If you abruptly rotate and bang the tail wheel down with rudder input in at the time of tailwheel impact, it will move the tail left or right quickly and probably fly you off before you are ready to fly, in a yaw or slip and put you near the stall. If you accelerate to 55 Knots before rotating (a close to level flight attitude) you are well above the in-ground affect stall and a smooth takeoff transition can be made.

Finally, if you fly from a bumpy runway, FIND ANOTHER RUNWAY! Seriously, if you do bounce on takeoff below flying speed, the full aft stick method until ground break may get you into trouble if you are pulling back so hard you are bending the stick. Remember that pencil trick, don't choke the chicken to death. Keep a light touch on the stick. Remember at 40-45 Knots it is important to relax the back stick prior to liftoff so if the planes nose is forced up by a knoll in the runway, the stick can be eased forward to hold the takeoff attitude and rudder smartly inputted to keep the nose straight and allow the plane to recover from the bounce and keep accelerating.

Landing Technique:

Landing is the reverse of takeoff, right. Well not exactly.

Expect with a fixed pitch cruise prop, a long float distance, as the residual thrust is quite high. A 4000 foot runway is best to practice on at first, but 3000 is enough with proper technique until you are proficient.

Lower the gear (that's full flaps remember) on downwind abeam your touchdown point and trim for a 75 Knot glide. Plan for a $\frac{1}{2}$ to $\frac{3}{4}$ mile final approach until proficient. Hold 75 minimum through the first half of the final turn should you lose power. Wiggle the rudders a small amount left and right with your ankles (1/2 an inch) rapidly to get warmed up and get used to the pressure and feel of how much rudder is necessary for minute nose changes. Roll out on a slightly longer final at about 65-70 Knots. Get stabilized on airspeed, glide path, and runway alignment. A stabilized approach at consistent airspeed and glide path is essential for a good landing.

*Note: If the approach is high and the nose is lowered, airspeed will build rapidly. If on speed and high, and the nose is lowered, the power must be reduced significantly (we're talking idle is not uncommon) as the Europa is very clean, even with full flaps it will build speed nose down. Side slips at 70 KIAS are safe even with full rudder however the nose cannot be lowered significantly even in the slip, as speed increases rapidly. Slip so as to hold speed. The tried and true technique of pulling the nose up and slowing down (55 knots) and letting the plane sink does work, but the sink rate builds quickly requiring a large power application (full power on an 80 HP engine is not unrealistic) to arrest this behind the power curve, nose high, low power, high sink condition. Great care must be taken using this later technique. **Fly a stabilized approach. If it isn't right, go around, fly a longer final and get the feel of the pitch, power and glide path picture.***

Set a 2.5 to 3 degree approach glide path at 70 Kts on first flights until the airspeed calibration and the stall and handling characteristics are well known. Then later about 60 Kts is comfortable

for me flying dual. Slowing to 55 Kts in a lightly loaded plane on short final and clear of obstacles is comfortable for most when the stall is consistent at 45 Kts dirty.

Dance on the rudders to get the feel of minute changes when stabilized on final. This will pay dividends when confronted with crosswinds or those pesky gusts. Keep it aligned with the runway centerline and on speed. Any extra speed will result in excessive float.

Technique:

Do not flare out high and drop in or use the "falling leaf approach". This falling leaf approach is taught in Cessna's by accident. The student rounds out high, the plane slows and then sinks, he pulls more to stop the descent, then slows and sinks again and repeats until finally the horn goes off and or an impact occurs, one way or the other. We were taught in the military to fly the plane into ground effect as control of the descent and ground effect can be easily felt. Fly the plane in a smooth motion and transition from your glide path to cut your descent and plan to fly to a point level at a foot or two off the runway then smoothly establish a slow flight attitude. Slowly allow the plane to settle or lower to just above the runway at the landing attitude. If within a couple of feet of the runway, you can actually feel the nose begin to drop due to diminishing downwash and it is very easy to anticipate the increase in back pressure to fly level down the runway until you establish that slow flight attitude or "takeoff attitude" you memorized prior to takeoff, which now is your landing attitude.. Your landing attitude is actually a bit higher as the rubber block will be completely unloaded. So figure about two more fingers of pitch attitude increase for your proper landing attitude.

I can't emphasize enough, that if you practice low power low approaches slow flighting just inches off the runway at the normal slow flight speeds, you get an excellent feel and picture of the landing attitude and control feel in the flare. The P factor effect in the round out becomes noticeable for the aware pilot, as it induces a slight yaw as the nose rises and by dancing lightly on the rudder as mentioned earlier, the amount of rudder necessary to correct this yaw is easily recognized and the yaw can be corrected precisely. Precise runway alignment can be mastered in only a few approaches using this technique. Windscreen parallax error varies from plane to plane and can be easily compensated for especially when dual using this technique. Remember, your feet are inboard in the Europa and your feet and butt are not precisely aligned with the fuselage centerline. Get used to it. In cross wind practice, the wings level crab is used. With the flight path, precisely aligned with the runway, a kick out transition using rudder and aileron becomes second nature to achieve precise runway alignment at touchdown. Many of us still fly a wing low approach and transition to a level rudder crab right at round out but the crab technique is the easiest to master. The low approach technique saved much wear and tear on our military aircraft and pilot landing techniques improved dramatically. So will yours.

The slow flight technique is fairly simple, but most folks have trouble because they have never flown on purpose very low to the runway except to hit it. Being that close to the ground can be disconcerting so here is the technique:

Practice slow flight at altitude until the pitch power and control feel are second nature. Now go in and fly the pattern. Begin your flare and get right down into the ground effect. Allow the plane to slow in ground effect while doing nothing more than establishing a slow flight attitude down the runway with only enough power to maintain flight in about 6-12 inches off the runway. Continue to hold it off in ground effect until the plane wants to settle (typically 50 Knots but who looks) and just add or hold enough power for flight (about a knob worth) and fly level for about 1000 feet down the runway, then go around. After a few practice rounds, should you roll the tail wheel on the runway with the main still airborne, you have got the landing attitude nailed which

is outstanding, if you two point the tail then main, you are doing excellent. Bouncing off the main first is unsatisfactory. By using this technique you save wear and tear on the aircraft, tires, and your nerves and develop better pilot skills and precision near the runway. This will be a huge benefit when confronted with crosswinds, or during a go around.

In the Europa, initial practice on non-crosswind days, saves your tires from side loads and reduces the potential of ground loops, by doing low approaches until the technique to kill drift is mastered.

Note: If you chose to reduce your tire pressure to 16 pounds, your tire will cushion the landing impact, but it will also increase the chance for tube failure due to tire rotation on the rim if numerous touch and go landings are attempted. 21 pounds of air will keep the tire from slipping on the rim but the plane is noticeably bouncier on asphalt. It gets down right hoppy.

For a full stop, use the same technique but on round out don't add power to hold it off and it will land. You cannot force a mono to land or try to stick it on. It will revolt and bounce or begin a porpoise down the runway. Never push the stick forward on initial contact trying to hold the main on. Usually the plane bounces on the main and directional control becomes difficult. If you bounce, GO AROUND! Going around does not question your manhood, it means the runway is not quite in the right place. Strive for a tailwheel landing first. (With a new rubber block, a two point is not uncommon.)

Use those small wiggle rudder inputs to keep the plane aligned with the runway in level flight, just above the runway, and it will want to settle on its tail wheel first. Just hold it off as long as it is flying. Once it feels like it wants to sink, simply look over the nose and increase back pressure a bit looking for that landing attitude and continue to hold it off until the tailwheel hits. *(Again, slow flight practice at altitude does give you a better feel of this attitude and control feel, but very low approaches, so low you are skipping tires off the runway; really give you an excellent feel for landing.)*

For short field landings I use the same technique but a slower approach speed such as roll out on final at 60 Kts. I prefer to drag a short field, or fly down the runway looking for obstacles and for a go around point so that if I am not firmly down I will swallow my pride and go around comfortably rather than run off the end. If there is an obstruction on the end of a runway such as a fence or trees, I displace the threshold or flare point farther down to prevent hitting the fence or trees at the either end. When satisfied with my approach plan, I slow to 55 Kts on final and hold 55 Kts until clear of obstacles and adjust my aim point to just prior to the desired threshold or flare point. Then as I approach ground effect, I round out a bit, hold power until I slow the rate of descent and reduce power slowly while slowly descending and setting the nose to my landing attitude. Let it settle and keep it straight. Roll out is supposed to be 600 feet and is on turf, but I find 1000 feet is a nice deceleration to taxi distance on asphalt without significant braking. Practice, practice, and more practice for short field landings.

THE MONO IS NOT A WHEEL LANDING AIRCRAFT. The low to mid wing, low stance, large flaps and forward positioned gear work against an ideal wheel landing aircraft. The gear is positioned about 5 inches forward of the Leading edge of the Mean Aerodynamic Chord (normal taildraggers the axle is on the leading edge of the MAC) so the CG is farther aft of the wheels than standard which means at touchdown, the plane's tail drops immediately. This increases the angle of attack and surprise, you are flying again or the tail wheel hits and the momentum of the

impact deflects the spring and a porpoise results and at just the right speed, a pilot induced oscillation occurs. None of which is good.

Can a wheel landing be done, yes I have seen it done by a very good pilot named Lee Ohlmernik, landing very fast and he greased it on. However, trying to get to a three point he was clearly in distress and applied power to go around. Second attempt was slower, again just at touchdown he missed the nose rise just a bit but kept the main on and he was able to use rudder and only a deft touch of forward pressure, aileron and rudder allowed him to fly until the speed bleed off then the transition to three point occurred with some noticeable oscillations. That was the last time he did it as it took nearly 3000 feet to get it under control...

On crosswind landings, if you are well practiced with the rudder movement, the kick out of the crab is very easy to control. Aileron use on crosswind is small, so just concentrate on keeping the wings level and you will be fine.

Your runway alignment is critical just prior to touchdown. The goal is zero drift and perfect alignment with your flight path and fuselage going straight down the runway. Just as the plane feels it is firmly in ground affect, and about to settle, smoothly apply the rudder necessary to keep the fuselage aligned with the centerline. Use only enough aileron to keep the wings level. Once the tail wheel makes contact, the main comes down immediately. Smoothly apply full aft stick. In a crosswind as rudder control diminishes rapidly, add about a fist full of aileron into the wind without diminishing aft stick. Slowly apply more aileron to pin the downwind wing on its outrigger as you slow.

In all landings, once the tail wheel makes contact and the main comes down, do not relax.

IF YOU DO AN INCOMPLETE FLARE AND THE MAIN WHEEL HITS FIRST AND A BOUNCE BEGINS, GO AROUND, AS IT WON'T GET BETTER FASTER THAN WORSE. IF YOU SLAM THE TAIL WHEEL DOWN, A PORPOISE WILL MOST LIKELY OCCUR, KEEP FLYING AND GO AROUND. IF YOU FAILED TO BE STRAIGHT ON INITIAL CONTACT, OR ARE LEANING AND DRIFTING ON CONTACT AND THE PLANE DARTS OFF, ADD POWER AND GO AROUND EARLY TO AVOID THE RUSH.

Once on the ground:

Hold full aft stick and firm tail wheel contact.

Keep working or dancing on the rudder in small increments to keep it straight down the centerline. Do not allow any drift or a sweeping turn to begin, as it normally leads to overcorrection and only gets worse. Keep it straight down the centerline! Keep the stick back and only enough aileron to keep the outriggers even, and wings level. A burst of power can actually improve your directional control and in a slight skip or hop on uneven terrain can catch your bounce in ground effect.

WHEN FIRMLY ON THE RUNWAY KEEP THE STICK FULL BACK ON ROLL OUT AND KEEP IT DEAD STRAIGHT DOWN THE CENTER OF THE RUNWAY!

Apply an extra fist worth of aileron for a stiff cross wind on touchdown when firmly on the ground and counteract with rudder as required.

Do not use the brake unless the tail wheel is firmly planted and you are going straight down the runway. Heavy braking will raise the tail, and between 30-35 that is a directional control problem about to happen.

The plane is flying until about 30 Kts (even with full aft stick) so use your lateral flight controls as well as rudder for alignment and keeping the wings level. (This failure to keep flying the airplane until stopped is the leading cause of loss of control accidents on landing roll out. Remember, it is a flying airplane until at walking speed, and an unstable unicycle until chocked.)

DO NOT ATTEMPT A TURN UNTIL AT A SLOW WALKING SPEED!

Caution: Turning off the runway at high speed while opening the canopy and throwing your scarf back may sound cool but, in reality, it will make you look stupid when you ground loop.

Applying firm brake pressure when turning quickly to exit the runway will reduce tail wheel pressure on the tarmac and the outside wing will dig in and the outrigger being aft of the CG will reduce tail wheel pressure even more. Should the tailwheel break traction on gravel, sand or a paint stripe, loss of control will result. (Most of the ground loops on roll out occur when turning off the runway, not on touchdown, believe it or not. You just don't hear of them because they don't report them.)

KEEP THE STICK BACK AT ALL TIMES WHILE TAXIING TO PLANT THE TAIL WHEEL FOR POSITIVE STEERING CONTROL.

Taxi with care at all times. In strong tail wind conditions, the stick should be placed forward only once you have slowly aligned with the downwind taxiway. Do not taxi fast with a tail wind as once the aircraft taxi speed plus prop blast hits the equivalent tailwind speed, there is no down force at this relative tail plane airspeed for the tail wheel, and the rudder can become a reversing force with a tailwind making for some control confusion. So in this tailwind instance, the tail wheel now is just bouncing along with no hold down force from the stabilator, only the weight of the aircraft is holding down the tail. Do not apply a lot of power with the stick forward as propwash can lift the tail unexpectedly. There may not be enough downforce to keep proper control when turning from downwind taxi to crosswind taxi in a rapid turn. Taxi slowly with a tailwind. Feel the wind from behind and allow it to push you.

I enjoy the mono as it is different, and challenges me to stay on my toes. I must fly by the numbers and stick to my tried and true techniques. I just don't get to fly a mono often, and it is always on asphalt so strict adherence to the book keeps me honest, and out of trouble. The Mono is light weight, has less drag; and lower drag makes for a better performing airplane. Enjoy your mono wheel. Keep it light, as light airplanes bounce and heavy ones crash. It takes practice and discipline to learn the mono's quirks, but it is not difficult and it is a rewarding feeling to be proficient in the mono. Just never relax until the parking brake is set, the engine is off and wheels are chocked and you will be fine!