



Suggested Extended Envelope Maneuvers. This sequence is designed as a single flight for efficiency, but each maneuver may be applied as a remedy for a specific pilot needs; initial or recurrent training with a SAFE CFI-PRO™ instructor.

All maneuvers are aggressively “eyes outside” with sight reference straight forward. Clear left or right but then eyes forward for the execution of each maneuver.

First “Yaw Canceling Maneuvers” The objective of these maneuvers is **anticipating** yaw (developing muscle memory for normal inputs) The common advice “step on the ball” is wrong only because it means we are **already uncoordinated** and are likely now overcorrecting. This can result in slewing the plane back into coordination. Safe pilots anticipate yaw rather than react after the fact. (“playing soccer?”)

Taxi in calm wind with hands off controls and perform S-turn with rudders only (sit on hands). The intention here is to **break the “driving habit.”** Later, after this is solidly implanted, hold controls for wind but handle the yoke in some manner different from driving (does not surface these deeply embedded habits).

“Wheelie” on mains down the centerline with half power steer gently R/L to emphasize rudder control with the nosewheel off the runway.

Extended Normal Take-Off on a longer runway; apply full power but reduce several times while on the ground to **demonstrate the yaw effect of power.** [reference] The idea is to build rudder response (and counteract “driving” impulse)

During straight-ahead climbout, demonstrate the increased climb performance achieved with proper coordination; fly first without right rudder – note VSI, then point out increased VSI with proper coordination. Demonstrate that right rudder sometimes requires some left aileron to maintain the wings level (permission to cross-coordinate – as in a chandelle).

During climb at safe altitude, (full power) positively **vary pitch from level to Vx** maintaining straight vertical line outside perpendicular to horizon. **This illustrates the yaw effect of pitching up.**

Climbing S turns to maneuvering altitude, vary shallow alternating bank left and right (no level) emphasizing rudder to “cancel adverse yaw” of ailerons. [\[reference\]](#)

Climb Vx and alternate left and right turns emphasizing coordination (and in right turn “cross-coordination” Chandelles are also a good practice of this same skill.

Level >3000agl Pitch/accelerate/power reduction/trim (eyes outside: remove pressure- **trimming could be a whole lesson for beginners**)

Positively vary power in level flight to illustrate yaw caused by power application. [\[reference\]](#)

Execute 30 degree bank turns 90 degree duration back and forth (no level flight). Emphasize roll with eyes outside directly over the nose to sense yaw. (Be vigilant to correct “driving habit” of looking in direction of turn to clear then rolling with eyes still on the wing) Also emphasize appropriate back pressure to “lift” through the turn.

“**Dutch Rolls**” left and right with eyes outside directly over the nose to cancel adverse yaw. (If necessary, demonstrate positive aileron only to show adverse yaw) This should be performed at progressively slower airspeeds with more adverse yaw. This can also be performed nose high on a cloud or low. [\[reference\]](#)

“Yaw inducing maneuvers: pointing the nose of the aircraft and holding a point”

1. **Horizon slide left and right with rudder**; slow to approach cruise (top of white arc) and while maintaining wings level slide the aircraft nose L/R with rudder maintaining wings level with aileron (yes- skidding). [\[reference\]](#)
2. **Rudder boxing**: after “horizon sliding” left or right, raise the nose to Vx on a straight line, maintain this pitch and slide in the opposite direction then lower the nose; drawing a full, perfectly square box in the sky. [\[reference\]](#)
3. “**Inverse Dutch Roll**” Level flight approach cruise (top of white arc! Tracking a road, add full rudder with opposite aileron to maintain the track, reversing smoothly right and left. Try this maneuver at progressively slower airspeeds. (Done correctly, the wings pass through level at the same time the rudder passes through neutral with the nose on track as you swing from side to side.)

Normal power on and power off stalls with slow deceleration; attempt to achieve stall with ***lowest*** pitch attitude possible. Recover with pitch only (reduction of AOA)

“**Applied physics lesson**” #1; Secondary stall (nose low “surprise” stall – how they really happen) On recovery positively load the wings sufficiently to restall with nose

below the horizon. [\[reference\]](#) Emphasize the difference between AOA and flight attitude.

“Applied physics lesson” #2; “what will happen in turning stall?” (spin?) Not if coordinated because **lift is equal on the wings**; the nose falls away from lift vector toward the pilot’s feet.

Repeat the above in 30- and 60-degree banks and alternate left and right turns.

Secondary stall: illustrates the “nose low” (below horizon) stall and builds the “unload” habit.

“Applied physics lesson” #3 “when will the plane spin? Yes – uncoordinated.”
Defining slip and skid: CRITICAL! Put plane in power off stall with full SLIP (step on the high wing) For most docile trainers: NO SPIN! (most aerobatic capable planes can take you over the top”) Why stable?? Forces in opposition balance.
[See Cross-coordinated article.](#) [\[blog reference\]](#)

Steep Turn Reversals: start with 720s then 360, then and finally 60 degrees bank reverse after 90 degrees turn. 60/90s require aggressive roll in and out.

Chandelle left and right. Point out how controls will be “crossed” to maintain proper coordination. Lazy Eights across a road reference; emphasize proper configuration at all eight points.

Descend to pattern from altitude with either with alternating R/L full slips, ***or* descend to pattern altitude** w/ Three turn spirals (commercial standard) to a **power off 180** pattern into landing at a non-towered airport. Please be careful to clear for traffic and announce your intentions on CTAF. (Also apply power occasionally to avoid carb icing)

Pattern exercises:

Fly the full length of the runway; **slow flight centerline** at 1 foot with crosswind crab if necessary. Alternate crab and slip with a 10K crosswind. Emphasize go-around as normal (expected) outcome.

Do this repeatedly until comfortable in ground effect and precision is achieved.

As above but apply slip and land just upwind wheel...fly centerline with one wheel down and go-around. [\[reference\]](#)

Fly centerline again but this time progressively reduce power until wheels touch in nose-high attitude (no lateral drift) and transition to a go-around

Fly the centerline again to a normal landing.

Just about every flight maneuver requires elements of the above basic fundamental skills. Much of this coordination **is not intuitive** but must be trained and practiced continually to imprint (over-learning: [reference](#)).

Some skills we have (driving: [reference](#)) must be unlearned to operate an airplane correctly.

“Deconstruct!” Very seldom (if ever) is a maneuver taught in its final form but is assembled from fundamental skills that must first be mastered. Difficulties with complex maneuvers usually indicates weakness in one of the fundamentals so deconstruct, analyze, practice, and reassemble (rather than practicing complex maneuvers badly reinforcing errors).

All CFIs are prone to “flight training fallacies!” ([reference](#))