

Total Flight Solutions Cessna Maneuvers Supplement

The following guide is meant to assist you in learning the procedures required to operate the C172 during your required testing items. It is by no means exhaustive. Where differences exist, the manufacturer POH and any relevant FAA publications take precedence over this document.

Items marked with “ ” are required callouts.

Taxiing

Definition:

The Controlled movement of the airplane under its own power while on the surface. (AFH 2-18)

Procedure:

1. Complete pre-taxi checklist
2. Request/brief taxi instructions (use taxi diagram)
3. Check taxi instructions and clear the area before moving. “Clear left, clear right”
4. Perform brake check by allowing the aircraft to roll forward and briefly applying smooth pressure to one brake then the other. “Brake check complete” (the brakes should slow the aircraft without excessive pressure required, it is not necessary to fully stop the aircraft)
5. Position the yoke as appropriate for the wind (“turn into, dive away from”), taxi on the centerline at all times. Obey airport signage and markings.
6. Steer using rudder input and lead turns with sufficient room to complete the turn without brake application. When applying brakes to slow down, power should be at idle.
7. Stop the aircraft well clear of the hold short line such that it can be clearly seen over the nose.

Common errors:

Brake application with power applied

Attempting to steer the aircraft using the yoke

Relying on brakes to make acute turns rather than anticipating turn radius required by nose wheel steering

Tolerances:

Correctly read back clearances/instructions

Use an airport diagram/taxi chart and maintain situational awareness

Position flight controls for existing wind

Complete appropriate checklists

Perform a brake check immediately after the airplane begins moving

Maintain positive control without excessive use of brakes

Comply with airport markings, signals, and ATC instructions

Position the airplane properly relative to hold lines

Normal Takeoff

Definition:

A takeoff headed into the wind, on a firm surface of sufficient length to permit gradual acceleration to normal lift-off speed, and with no obstructions along the takeoff path. (AFH 6-3)

Procedure:

1. Complete pre-departure checklist
2. "Clear downwind, base, final, and opposite runway"
3. Make a departure call ("departing runway, to the")
4. Taxi to the runway centerline, "runway confirmed, windsock check, position controls for crosswind"
5. "Feet off brakes", Smoothly apply full power while adding right rudder as needed to maintain centerline
6. "Full power set, full power made, gauges green, airspeed alive, Vr, rotate"
7. "Climb at Vy"
8. Passing 500' AGL run your climb checklist (flow and confirm: "Airspeed, in, in, in, up")

Common errors:

Failure to apply right rudder during takeoff roll, resulting in loss of centerline alignment

Failure to position feet low on rudder pedals, resulting in unintentional brake application

Failure to hold crosswind correction (particularly after rotation), resulting in the aircraft drifting off track

Allowing aircraft pitch to continue to rise beyond that need for intended climb speed, resulting in rapid decay in airspeed

Failure to rotate, resulting in the aircraft flying itself uncontrolled

Tolerances:

Align with the centerline

Rotate at Vr

Maintain Vy +10/-5 (pvt.), +/- 5 (comm.)

Normal Landing

Definition:

An approach and landing directly into the wind (or with light winds otherwise), with no obstacles in the approach path, to a firm landing surface of ample length to gradually bring the aircraft to a stop, and to a landing point within the first 1/3 of the runway. (AFH 9-2)

Procedure:

1. Run your before landing checklist (Flow and confirm: "lights, carb, mixture, fuel, belts")
2. Maintain 1000' AGL and 90 KIAS (105mph) in the downwind
3. Abeam touchdown point ("1000's"), set power ~1500 rpm, hold altitude and slow to 85 KIAS (100 mph).
3. "Inside the white arc, flaps 10°", fight the balloon to pitch down for 80 KIAS (90mph) (~2.5° down), descend at 500 FPM
4. Approaching 700' AGL smoothly turn to base "....turning left/right base runway xx"
5. Set flaps 20°, pitch for 75 KIAS (85mph), maintain 500 FPM to final
6. At 500' AGL smoothly turn to final "....turning final runway xx"
7. Set flaps 30°, pitch for 65 KIAS (75mph), maintain 500 FPM to the runway aimpoint. (PAPI should indicate 2 white, 2 red)
(In a strong XW, approach with flaps 20°)
8. When crossing the runway threshold, pull power to idle and continue to descend towards the aimpoint.
9. When aimpoint passes under the nose/ground appears to rush toward you, shift your sight to the end of the runway centerline and smoothly begin to raise the nose to level flight, gradually adding back pressure as the aircraft slows. (round out and flare)
10. Touchdown on centerline, mains first, slightly nose high attitude, longitudinal axis aligned with the runway, with no side drift. Keep pressure off the nose wheel until the aircraft slows, then lower the nose and apply braking as required. (on longer runways: use aerodynamic braking and minimize use of toe brakes)

Common errors:

Failure to align the nose of the aircraft with the runway using rudder input, and failure to position the aircraft over the ground using aileron input.

Attempting to judge aircraft sink rate and landing point without use of an aimpoint

Attempting to correct altitude/sink rate errors using pitch, resulting in unintended loss/gain of airspeed

Attempting to correct airspeed errors using throttle, resulting in unintended loss/gain of altitude

Failure to establish a stabilized approach from downwind to short final, resulting in difficulty judging aimpoint and landing zone.

Overcontrolling the aircraft through excessively large control inputs. resulting in "chasing" the aircraft and an unstable approach.

Failure to shift vision down the runway after reaching aimpoint/ground effect, resulting in difficulty judging height above runway, a high round-out/flare, and a "dropped in" landing.

Tolerances:

Maintain 65 kts (75mph) +10/-5 (plus any applicable gust factor) (pvt.), +/-5 (Comm.)

Touchdown within +400 ft./-0 ft (Pvt.) of desired landing point, +200/-0 ft. (Comm.)

No side drift, longitudinal axis aligned, and on centerline

Soft Field Takeoff

Definition:

Takeoff from soft or rough fields where it is necessary to get the aircraft airborne as quickly as possible to eliminate drag or avoid damaging the landing gear. (AFH 6-13)

Procedure:

1. Complete pre-departure checklist: flaps 10°
2. "Clear downwind, base, final, and opposite runway"
3. Make a departure call ("....departing runway, to the")
4. Apply full back elevator and taxi to the runway centerline without the use of brakes. (anticipate a wider turning radius)
5. Without stopping: "runway confirmed, windsock check, position controls for crosswind" and smoothly apply full power while adding right rudder as needed to maintain centerline "Full power set, full power made, gauges green, airspeed alive"
6. Allow the nose wheel to lift off the runway, but relax elevator as needed to prevent a tail strike (you should be riding a wheelie)
7. Allow the aircraft to lift off of runway as soon as possible, and reduce pitch to maintain level flight just above runway
8. Accelerate to V_y , then pitch up and trim to hold a V_y climb out (~10° nose up)
9. Once clear of the tree line: "clear of obstacles, V_y , positive rate, flaps up"
10. Passing 500' AGL run your climb checklist (flow and confirm: "Airspeed, in, in, in, up")

Common errors:

Failure to reduce elevator pressure after aerodynamic authority is achieved, resulting in a tail strike

Failure to anticipate the increase in left turning tendencies that occur as the nose lifts off, resulting in a noticeable yaw and loss of centerline

Failure to prevent the aircraft from climbing out of ground effect before accelerating to V_y

Failure to hold crosswind correction (particularly after rotation), resulting in the aircraft drifting off track

Allowing aircraft pitch to continue to rise beyond that need for intended climb speed, resulting in rapid decay in airspeed

Tolerances:

Lift off at lowest possible airspeed

Maintain V_y climb +10/-5 (pvt.), +/- 5 (comm.)

Soft Field Landing

Definition:

A landing in which the aircraft touches down as smoothly as possible and at the slowest possible speed, such that the wings support the weight of the airplane as long as practical to minimize stresses imposed on the landing gear or to prevent sinking into a soft surface. (AFH 9-23)

Procedure:

1. Run your before landing checklist (Flow and confirm: "lights, carb, mixture, fuel, belts")
2. Maintain 1000' AGL and 90 KIAS (105mph) in the downwind
3. Abeam touchdown point ("1000's"), set power ~1500 rpm, hold altitude and slow to 85 KIAS (100mph).
3. "Inside the white arc, flaps 10°", fight the balloon to pitch down for 80 KIAS (~2.5° down), descend at 500 FPM
4. At 700' AGL smoothly turn to base "....turning left/right base runway xx"
5. Set flaps 20°, pitch for 75 KIAS (85mph), maintain 500 FPM to final
6. At 500' AGL smoothly turn to final "....turning final runway xx"
7. Set flaps 30°, pitch for 61 KIAS, maintain 500 FPM to the runway aimpoint. (In a strong XW, approach with flaps 20°)
8. When crossing the runway threshold, lower the aircraft into ground effect earlier by gradually reducing throttle and flying level just above the runway.
9. Smoothly reduce throttle as needed to roll the mains onto the runway while increasing elevator back pressure to hold the nose gear off. (use throttle as needed to maintain elevator authority and keep your nose off).
10. Touchdown on centerline, mains first, nose high attitude, longitudinal axis aligned with the runway, with no side drift. Keep pressure off the nose wheel until the aircraft slows, then gently pull throttle to idle and let the nose down.

Common Errors:

Rapid reduction of throttle, resulting in the aircraft "dropping in" rather than "rolling onto" the runway
Allowing the nose wheel to touch down before elevator authority is lost
Carrying excessive energy (airspeed/altitude) on final approach, resulting in floating on round-out

Tolerances:

Maintain 61 kts +10/-5 (Pvt.), +/- 5kts. (Comm.)
Keep the nose wheel off until loss of elevator effectiveness

Short Field Takeoff

Definition:

Takeoff at the maximum limit of the aircraft's performance capabilities in order to depart from shorter runways or those where the takeoff area is restricted by obstructions. (AFH 6-11)

Procedure:

1. Complete pre-departure checklist
2. "Clear downwind, base, final, and opposite runway"
3. Make a departure call ("departing runway, to the")
4. Taxi to the runway centerline using all available runway, "runway confirmed, windsock check, position controls for crosswind"
5. Hold the brakes, smoothly apply full power, "full power set, full power made, gauges in the green."
6. Release the brakes, and apply right rudder to maintain centerline, "Gauges green, airspeed alive, Vr, rotate"
7. Accelerate to Vx, pitch and trim to maintain Vx climb out (~18° nose up)
- 8.. Once clear of the tree line: reduce pitch and trim to accelerate and maintain Vy (~10° up) "clear of obstacles, Vy, positive rate, flaps up"
9. Passing 500' AGL run your climb checklist (flow and confirm: "Airspeed, in, in, in, up")

Common errors:

Failure to establish and maintain Vx before accelerating to Vy
Excessive nose up pitch, resulting in rapid airspeed decay and approach to stall.
Attempting to "pull" the aircraft off the runway before Vr is attained

Tolerances:

Maintain Vx/Vy +10/-5 (Pvt.), +/-5. (Comm.)

Short Field Landing

Definition:

A power-on, low-speed approach that clears any obstacles, results in little to no floating during round out, and permits the airplane to be stopped in the shortest possible distance in order to land at a field with a relatively short runway or over obstacles which limit the available landing area. (AFH 9-20)

Procedure:

1. Run your before landing checklist (Flow and confirm: "lights, carb, mixture, fuel, belts")
2. Maintain 1000' AGL and 90 KIAS (105mph) in the downwind
3. Abeam touchdown point ("1000's"), set power ~1500 rpm, hold altitude and slow to 85 KIAS (100mph).
3. "Inside the white arc, flaps 10°", fight the balloon and pitch down for 80 KIAS (90mph) (~2.5° down), descend at 500 FPM
4. At 800' AGL smoothly turn to base "....turning left/right base runway xx"
5. Set flaps 20°, pitch for 75 KIAS (85mph), maintain 500 FPM to final
6. At 600' AGL smoothly turn to final "....turning final runway xx"
7. Set flaps 30°, pitch for 60 KIAS (70mph), maintain a steep approach to the runway aimpoint. (In a strong XW, approach with flaps 20°)
8. Cross the threshold no lower than 50' AGL while maintaining a steep glide path to runway aimpoint.
9. Upon reaching the aimpoint: shift vision down the runway, round out and flare while smoothly reducing power to idle.
10. Touchdown firmly with a slightly nose high attitude, use aerodynamic braking and begin smooth application of the brakes, once the nose gear touches down: apply maximum braking without locking up the wheels, and retract flaps (for the purpose of training simply call out "simulated maximum braking" while applying normal brake force.)

Common Errors:

Attempting to fly a normal landing sight picture, resulting in difficulty controlling airspeed/altitude
Failure to select an appropriate aimpoint for the reduced approach speed
Attempting to "stretch" the float during the flare, resulting in landing short of the intended point

Tolerances:

Stabilized approach

Maintain 60 kts. (70mph) +10/-5 (Pvt.), +/-5. (Comm.)

Touchdown +200 ft./-0 ft. of intended landing point (Pvt.), +100/-0 ft. (Comm.)

Power-off 180° accuracy approach and Landing (Comm.)

Definition:

A gliding approach to touchdown at a given point, while using a specific pattern and with the engine idling. The objective is to instill in the pilot the judgment and procedures necessary for accurately flying the airplane, without power, to a safe landing. It is executed by gliding with idle power from the downwind key position to a preselected landing spot. (AFH 9-24)

Procedure:

1. Run your before landing checklist (Flow and confirm: "lights, carb, mixture, fuel, belts")
2. Abeam your touchdown point (key position), pull power idle and call "Short approach runway..."
3. Pitch to establish V_g
4. Once properly spaced from the runway (accounting for wind drift and altitude), begin a medium banked turn to the base leg, and assess glide angle by correlating altitude, aim point, and airspeed.
5. Apply partial or full flaps as needed to obtain the desired glide angle
6. Begin a turn to final and continue to assess glide angle, aimpoint, airspeed. Adjust the flaps and slip (into the wind) as necessary.
7. Establish a stabilized approach and touchdown on your intended landing point with no side load and the airplane over the centerline.

Common Errors:

1. Overly wide downwind spacing
2. Overextending the downwind leg, resulting in an inability to make the runway.
3. Excessively shortening downwind, resulting in an impossibly steep approach angle required
4. Failing to correlate airspeed/approach angle with the resulting float (or lack thereof) in ground effect on round-out.
5. Premature flap extension
6. Attempting to "stretch" a glide, resulting in airspeed decay and a rapid sink rate.

Tolerances:

1. Touchdown within +200/-0 ft. of intended landing point.

Go-Around

Definition:

A normal procedure that is used when approach/landing parameters deviate from expectations or when it is hazardous to continue. A go-around may be called for due to ATC instruction, unexpected runway hazards, overtaking another aircraft, wind shear, or an unstable approach to name a few examples. (AFH 9-10)

Procedure:

1. Apply full power, pitch to the horizon, and clean flaps to 20° [Cram, Clean]
2. Accelerate to V_x/V_y (whichever is nearest), and pitch to climb V_x/V_y (~17°/~10° up) [Climb]
3. "Clear of obstacles, V_y, positive rate, flaps up" [Cool]
4. "...going around, runway...." [Call]

Common errors:

Fully retracting flaps before establishing climb speed and positive rate.

Pitching to gain altitude without properly setting power/flaps, resulting in decay of airspeed and loss of altitude

Rushing to make a radio call before establishing a safe go around

Tolerances:

Maintain V_x/V_y +10/-5 (Pvt.), +/-5 (Comm.)

Forward Slip

Definition:

An intentionally uncoordinated (i.e. "cross-controlled") maneuver used to dissipate altitude and increase descent rate without increasing airspeed. The airplane is banked into the wind and opposite rudder is applied simultaneously, such that the direction of motion continues the same as before the slip was begun. (AFH 9-13)

Procedure:

1. Reduce throttle, bank into the wind, and apply opposite rudder
2. Control airspeed (and consequently, sink rate) using pitch. The nose should be slightly lowered when entering the slip
3. Maintain a ground track aligned with runway centerline using aileron input
4. To recover: simultaneously level the wings, smoothly relax rudder pressure while readjusting pitch to normal glide

Common errors:

Incorrect pitch adjustments that result in poor airspeed control (i.e. failure to decrease pitch, or excessive nose down)

Reacting to erroneous airspeed indications

Using excess power while trying to lose altitude

Poor ground track control

Late recovery from the slip, resulting in touchdown with the longitudinal axis misaligned

Tolerances:

Slip into the wind

Transition to sideslip before touchdown

Touchdown +400'/-0' of intended landing point

Pre-maneuver Checklist

Before performing maneuvers, be sure to perform your CRAACC checklist

Clearing the area

Reference point selected

Airspeed (at or below V_a)

Altitude

Configuration (lights, mixture, flaps)

Call ("N...x miles, N/S/E/W, maneuvering at x feet")

Steep Turns

Definition:

Steep Turns consist of a set of constant bank 360 degree level turns, one in each direction. The maneuver is designed to teach students about the reduction in vertical lift and overbanking tendency that occurs when an airplane enters a bank. (AFH 10-1)

Procedure:

1. Perform clearing turn(s)
2. Select a reference and bug your heading
3. Trim for an airspeed of 95 KIAS (110mph) (~2200 rpm)
4. Verify that the aircraft is in the clean configuration
5. Add 100 rpm of throttle. Begin to roll left into a 45 degree bank (PVT), 50 degree(Comm.). As the aircraft passes 30 degrees of bank start adding back pressure and Add one full swipe of nose up trim and relax your yoke grip
6. Begin rolling out from the turn 20 degrees prior to the initial/target heading.
7. Immediately begin rolling right into a 45 degree bank (PVT), 50 degree (comm.) and repeat the above steps.
8. At the conclusion of the maneuver complete the cruise checklist.

Common Errors:

Remember that this is a visual maneuver. Your eyes should mainly be outside of the cockpit, **not** fixated on your instruments. Strive for a 90% outside 10% inside split. Large altitude deviations will be avoided if you keep your eyes outside of the cockpit

Keep an eye on altitude and coordination

Don't let the aircraft climb through tolerance as you take your bank out and the vertical lift is restored (This is often referred to as ballooning).

Tolerances:

Entry altitude +/- 100ft. (Pvt. & Comm.)

Airspeed +/- 10 (Pvt. & Comm.)

Bank +/- 5° (Pvt. & Comm.)

Entry heading +/- 10° (Pvt. & Comm.)

Steep Spirals (Comm.)

Definition:

A gliding maneuver consisting of at least three 360° turns conducted to lose altitude while maintaining a constant radius around a surface-based reference point. (AFH 10-3)

Procedure:

1. Clear the area
2. Position the aircraft to enter from the downwind, spaced with your reference point just outside of your landing gear $\sim \frac{1}{8}$ - $\frac{1}{4}$ mi)
3. Note your heading
4. Pull power idle and establish V_g
5. Bank into a constant radius turn while pitching to maintain V_g . (As bank changes are made to correct radius, pitch changes will be needed to maintain V_g)
6. Complete 3 turns no lower than 1500' AGL and roll out on your entry heading

Tolerances:

Bank angle $+60^\circ/-0^\circ$

Airspeed ± 10

Heading $\pm 10^\circ$

Complete no lower than 1500' AGL

Common errors:

Inadequate pitch control

Failure to correct bank angle for the effects of wind

Failure to use trim

Disorientation or loss of reference heading/number of turns

Chandelles (Comm.)

Definition:

A maximum performance, 180° climbing turn that begins from straight-and-level and concludes with the airplane in a wings-level attitude just above stall speed. (AFH 10-4)

Procedure:

1. Clear the area
2. Establish 105kts, Note your entry heading and select a 90° reference.
3. Smoothly roll into a 30° bank turn while applying full power, and gradually increasing pitch.
4. Upon reaching your 90° reference the nose should be at maximum pitch up (~20° up)
5. While maintaining constant pitch, gradually decrease the bank angle to slow the rate of turn such that you complete your turn just above stall speed. (remember elevator and rudder pressure required will increase as you slow)
6. Gradually decrease the pitch while allowing the airplane to accelerate back to Va without losing altitude.

Tolerances:

Rollout 180° from entry heading +/- 10°
Complete turn just above stall speed

Common errors:

Failure to establish/maintain maximum pitch up, resulting in excess airspeed on turn completion
Failure to reduce the angle of bank during the second half of the turn, resulting in excess airspeed on turn completion
Reducing bank too rapidly, resulting in stall indication before turn completion
Reaching maximum pitch up before the 90° reference, resulting in stall indication before turn completion
Fixation on instruments causing loss of S.A. (remember this is a visual maneuver)
Failure to maintain coordination

Lazy Eights (Comm.)

Definition:

A series of climbing and descending 180 degree turns in which the first 90° is a climb and the second 90° is a descent. It is the only standard flight training maneuver in which flight control pressures are constantly changing, and requires substantial skill in coordinating the aileron and rudder. (AFH 10-6)

Procedure:

1. Clear the area
2. Enter no lower than 1500' AGL, and establish V_a or recommended entry speed (105kts)
2. Select prominent reference points at your 45°, 90°, and 135°
3. Slowly roll and, gradually increase pitch to reach max pitch up (~20° up) and ~15° bank at the 45° point
4. Continue to slowly roll and gradually decrease pitch such that aircraft is at minimum energy and the nose "slices" through the horizon at ~30° bank
5. Continue to slowly decrease pitch and bank such that max pitch down (~10° down) and ~15° bank is reached at the 135° point
6. Gradually increase pitch while slowly removing the remaining bank such that the airplane completes the turn on entry airspeed and altitude.
7. Immediately begin to roll and pitch in the opposite direction to complete the second half of the maneuver just as you did the first.
8. Continue this process the number of times specified by the examiner

Tolerances:

Maintain coordination throughout

~30° bank at the steepest

Constant change of pitch, roll rate, and airspeed

Altitude +/- 100'

Airspeed +/- 10 kts.

Heading +/- 10°

Common errors:

Failure to select reference points / instrument fixation

Poor Coordination

Control roughness (rushing the bank / pitch)

Altitude gain on turn completion

Slow Flight

Definition:

Slow flight is a maneuver in which the pilot operates the aircraft at an airspeed just above the stall. This maneuver is meant to show the student how an aircraft performs while in the region of reverse command (a.k.a. back side of the power required curve). (AFH 5-9)

Procedure:

1. Perform two 90 degree clearing turns
2. Select a reference and bug your heading
3. Reduce throttle to ~1800 RPM and slow below Vfe. Set flaps for landing and pitch for 46 KIAS. As you start reducing airspeed and introducing flaps, make sure to increase power so that you don't lose altitude.
4. Maintain an airspeed of 46 KIAS (55mph) or an airspeed just above the stall horn if the stall horn sounds above 46 KIAS (55mph)
5. Use power to maintain altitude and pitch to maintain airspeed
6. To recover, apply full power and clean the flaps up while maintaining altitude, and perform the cruise checklist.

Common Errors:

Be sure to increase angle of attack as you start bleeding off your airspeed. If you let the nose fall, you will be low and you will be fast.

Be sure to maintain heading and do not ride the stall horn

Remember that you are operating in the region of reverse command while in slow flight. You use power (throttle) to correct for altitude deviations and pitch to correct for airspeed fluctuations.

Remember that this is a visual maneuver. Your eyes should mainly be outside of the cockpit, **not** fixated on your instruments. Strive for a 90% outside 10% inside split. Large altitude deviations will be avoided if you keep your eyes outside of the cockpit

Tolerances:

Completed no lower than 1500 ft. AGL

Altitude +/- 100 ft. (Pvt.), +/- 50 ft. (comm.)

Heading +/- 10° (Pvt. & comm.)

Airspeed +10/-0 kts (Pvt.), +5/-0 (Comm.)

Specified bank +/- 10° (Pvt.), +/-5 degree (comm.)

Power-on Stall

Definition:

The power-on stall is a maneuver that simulates a stall during takeoff/climb out. The pilot will establish a climb out speed, apply power and hold an excessively high pitch until a stall is induced. (AFH 5-18)

Procedure:

1. Perform two 90 degree clearing turns
2. Select a reference and bug your heading
3. Verify that the aircraft is in the clean configuration
4. Reduce airspeed to V_r .
5. Once the aircraft is stable at V_r ., apply ~2500 RPM power and increase pitch to 20°
6. Neutralize ailerons, hold increasing back pressure to maintain pitch, and add increasing right rudder to maintain coordination until the stall is induced
7. To recover, reduce angle of attack, full power, and pitch to V_x fly climb ($\sim 10^\circ$ up).
8. Level at the nearest 100 ft., and perform the cruise checklist.

Common Errors:

Be sure to maintain coordination. The combination of full power and a high angle of attack will cause a sizable yaw to the left. This yaw must be counteracted with right rudder.

You must resist the urge to lift a drooping wing with ailerons. Instead, hold heading (and thereby roll) using rudder.

Tolerances:

Completed no lower than 1500 ft. AGL

Heading: $\pm 10^\circ$ (Pvt. & comm.)

Specified angle of bank ($\leq 20^\circ$): $\pm 10^\circ$ (Pvt. & comm.)

Power-off Stall

Definition:

The power-off stall is a maneuver that simulates a stall during an approach to landing. The pilot will establish a stabilized descent, pull power to idle, and attempt to maintain altitude until a stall is induced. (AFH 5-17)

Procedure:

1. Perform a clearing turn
2. Select a reference and bug your heading
3. Verify the aircraft is in the clean configuration
4. Set 1500 RPM and slow below V_{fe}
5. Set 10° flaps and fight the balloon
6. Set full flaps and pitch for approach speed and ~500 FPM descent
7. Once stabilized at approach speed and ~500 FPM, set power idle, neutralize ailerons, and pitch to maintain altitude
8. Acknowledge the stall horn, buffet, and full stall
9. To recover: reduce angle of attack, full power, flaps 20° , pitch to V_x , "positive rate", flaps up.
10. Level at the nearest 100 ft., and perform the cruise checklist.

Common Errors:

Do not rush to stall the aircraft, first establish a stabilized approach to landing.

Remember that this is a visual maneuver. Your eyes should mainly be outside of the cockpit, **not** fixated on your instruments. Strive for a 90% outside 10% inside split. Large heading deviations will be avoided if you keep your eyes outside of the cockpit

you must resist the urge to lift a drooping wing with ailerons. Instead, hold heading (and thereby roll) using rudder.

Tolerances:

Completed no lower than 1500 ft. AGL

Heading: $\pm 10^\circ$

Specified angle of bank ($\leq 20^\circ$): $\pm 10^\circ$ (Pvt.), $\pm 5^\circ$ (comm.)

Accelerated Stalls

Definition:

A +1G stall performed at or below V_a in a 45° bank turn, meant to demonstrate the relationship between load factor and stall speed. (AFH 5-19)

Procedure:

1. Enter no lower than 3000' AGL.
2. Clear the area
3. Set at or below V_a power (~2200 RPM)
4. Roll into a coordinated 45° bank, and pull power idle
5. Smoothly and firmly pull the yoke back to induce a stall while maintaining coordination. "There's the buffet/stall horn"
6. At the first indication of stall: recover by unloading the wing, reducing AoA, and applying full power to accelerate to V_x/V_y .

Tolerances:

Maintain coordination and acknowledge the signs of impending stall

Common errors:

Failure to maintain coordination

Failure to maintain constant bank during stall entry

Failure to firmly apply back pressure, resulting in a 1G banked stall at published stall speed

Emergency Descent

Definition:

The emergency descent is used to lose altitude as rapidly as possible to get to a lower altitude (in case of hypoxia or icing), or for landing (in case of an uncontrollable fire or structural damage). The procedure varies depending on the reason for descent, but can be generally broken down into 3 methods (AFH 18-8)

Standard procedure:

1. Clear the area (pay special attention to the area below)
2. Select a reference and bug your bottom altitude
3. Verify the aircraft is on maneuvering speed and in the clean configuration
4. power idle, bank 30°-45°, and pitch for Vfe while setting full flaps. (do not exceed Vfe!!)
5. Maintain coordination with rudder
6. Note descent rate, and select a landing site if needed
7. To recover: begin a gradual roll out 10% of VS above your bottom altitude (~200' above), let the aircraft settle onto your bottom altitude while adding power and retracting flaps to maintain level flight.
8. Run your cruise checklist

High energy descent (in case of engine fire):

Steps 1-3 are identical

4. Power idle, bank 30°-45° away from the flames (in the case of wing fire: sideslip away from flames) and pitch for max allowable speed (for the purpose of the maneuver use 120 KIAS)
5. Maintain coordination or sideslip as specified

Steps 6-8 are identical

Low energy descent (structural damage)

Steps 1-3 are identical

4. Power idle, bank 30°-45° toward the damaged wing, pitch for Vg
5. Maintain coordination with rudder
6. Note descent rate, and select a landing site

Steps 7-8 are identical

Common Errors:

Forgetting to use trim to hold airspeed
Exceeding Vfe when flaps are used
Descending below the bottom altitude
Attempting to climb at completion of maneuver
Failure to reconfigure for cruise flight (Add power and retract flaps!)

Tolerances:

Bank angle: 30°- 45°
Appropriate airspeed +0/-10
Level off altitude +/-100 ft.

S-Turns:

Definition:

S-Turns are a ground reference maneuver in which the airplane's track resembles two opposite but equal half-circles on each side of a selected straight line reference. It is intended to teach pilots how to correct for wind during a turn.

Procedure:

1. Clear the area
2. Select a suitable straight line ground reference perpendicular to the wind
3. Enter maneuver at 95 KIAS (110mph) 600'-1000' AGL. Note/bug heading, and cross the reference in the downwind perpendicular to the line.
4. Immediately roll into the turn and note the maximum bank required
5. Gradually decrease bank angle as you turn into the wind such that you complete a semi-circle, wings level, over the reference.
6. Immediately begin a gentle bank in the opposite direction, as you turn downwind, and gradually increase bank angle to complete a semi-circle of equal size to the first over the reference. You will need to roll out firmly to end with the wings level over your reference.
7. Run your cruise checklist

Common Errors:

Rushing into the initial turn, resulting in overcontrolling the airplane

Failure to gradually reduce bank during the first turn, resulting in early completion of the turn

Rushing to establish maximum bank in the second half of the turn, resulting in unequal turning radius

Failure to gradually increase bank during the second turn, resulting in late completion of the turn

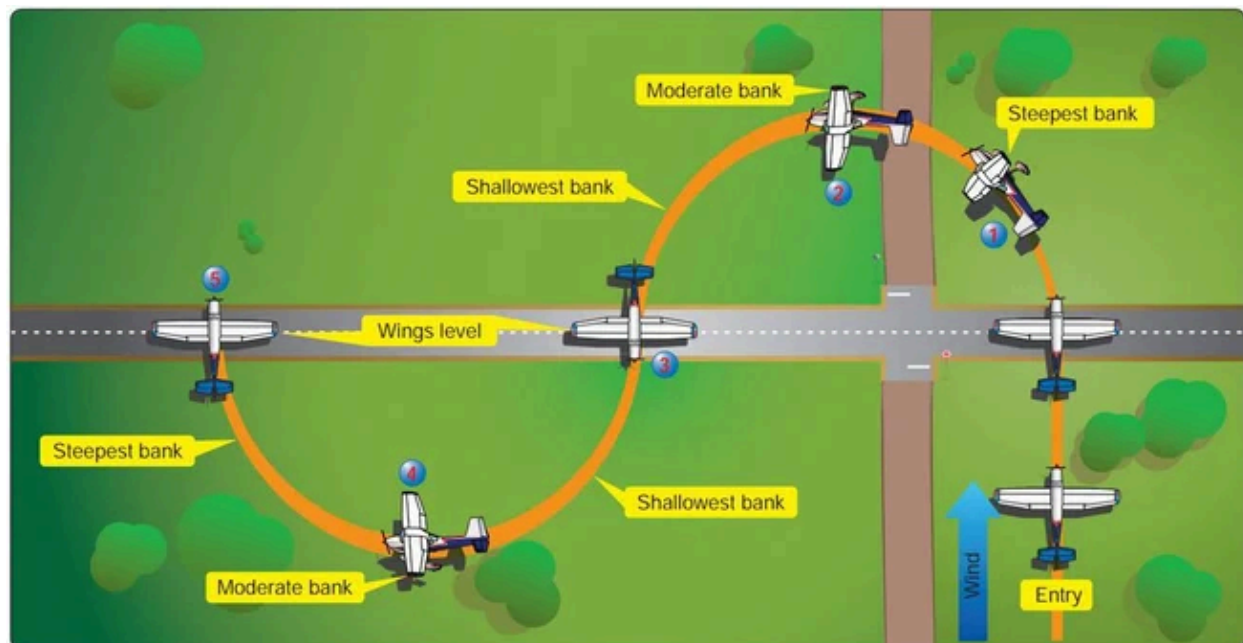
Failure to account for the winds' effect on ground track/turning radius

Tolerances:

Reverse direction directly over the selected reference line

Altitude: +/-100 ft.

Airspeed: +/-10



Turns Around a Point

Definition:

Turns around a point consist of at least one 360° constant radius turn around a single ground-based reference point. They are intended to teach pilots about the relationship between ground speed and turn radius, as well as develop smoothness and coordination on the controls. (AFH 7-7)

Procedure:

1. Clear the area
2. Select a suitable ground reference that can be seen from all sides, and enter the maneuver 600'-1000' AGL and from the downwind (Be alert for obstacles in the maneuvering area)
3. Note/bug heading, set power ~2200 rpm to maintain V_a .
4. Firmly roll into the turn and note the maximum bank required to hold your reference centered. (Lead your roll onto the reference point such that you do not overshoot)
5. Gradually decrease bank angle as you turn into the headwind for the first half of the circle. Do not allow your reference to move in your view
6. Gradually increase bank angle back to the maximum noted as you turn into the downwind for the second half of the circle. Do not allow your reference point to move in your view
7. Complete the maneuver wings level on your entry heading/altitude/airspeed.
8. Run your cruise checklist

Common Errors:

Failure to note entry heading

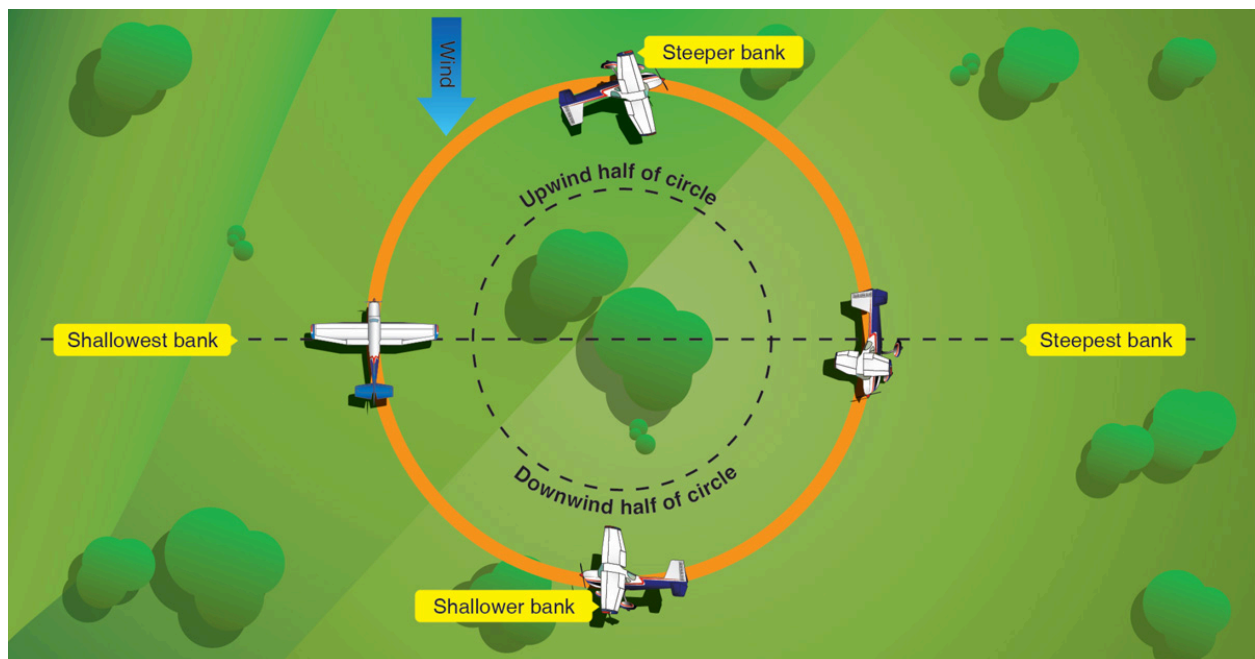
Making power changes during the turn, resulting in overcontrolling the airplane

Failure to account for the winds' effect on ground track/turning radius

Tolerances:

Altitude +/-100 ft.

Airspeed +/-10



Eights on Pylons (Comm.)

Definition:

A ground reference maneuver in which the pilot keeps an imaginary line from the pilot's eyes to the pylon parallel to the airplane's lateral axis while turning around the pylon. When performed correctly, the airplane appears to "pivot" around the pylon. After completion of one 180° turn around the pylon, the airplane is rolled out on a track that proceeds diagonally to a point tangent on the downwind side of the second pylon and then "pivots" around the second pylon. This process is then repeated the specified number of times to result in a series of symmetrical figure 8s being traced around the pylons.

Procedure:

1. Clear the area
2. Establish V_a , estimated pivotal altitude(P.A.), fly downwind, and select a suitable pylon left of course
3. Establish a course to enter the maneuver 45° from the downwind ~.5mi from the pylon, bug your entry heading
4. Lead your roll onto the pylon slightly, to establish a steady turn as it reaches the reference line.
5. Once the turn is established, and the pylon does not appear to move, note your actual pivotal altitude.
6. During the first half of turn as you turn into the wind, continuous minute reductions in pitch will be required to maintain P.A.
7. During the second half, as you turn downwind, continuous minute increases in pitch will be required to maintain P.A.
8. Roll out at P.A., on a heading which crosses the downwind at 45° to the other side.
9. Hold level flight for 3-5 sec., then roll into a steady turn around your second pylon. Fly the second turn as you did the first.
10. Roll out at P.A., on your entry heading, and continue the maneuver the specified number of times

Tolerances:

Determine approximate pivotal altitude

Select pylons that permit straight-and-level flight between

Bank $\leq 40^\circ$

Smooth and continuous correction to maintain reference line on pylon

Avoid slips and skids

Common errors:

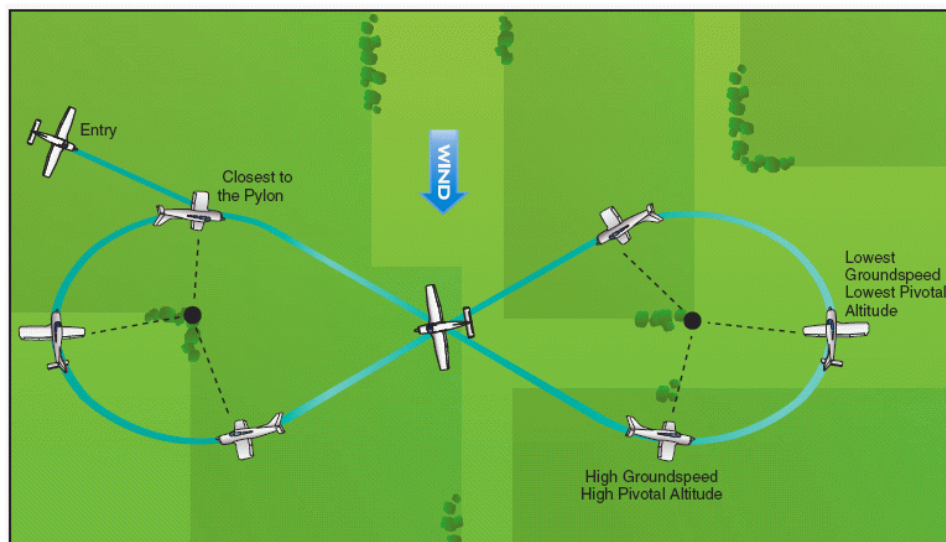
Uncoordinated flight, often the result of attempting to hold the reference line using rudder input

Excessive gain/loss of altitude

Improper timing of roll onto pylon reference, resulting in "hunting" for pivotal altitude

Disorientation, often resulting in lopsided eights

Failure to determine pivotal altitude



Recovery from unusual attitudes

Definition:

Unusual attitudes are unintended or unexpected attitudes that exceed pitch up of 25°, down of 10°, bank greater than 45°, or any of the above at speeds inappropriate for the conditions. (AFH 5-1)

Procedure:

1. Note pitch and bank attitude (e.g. "Nose high, left bank")
2. Nose high: full power, reduce pitch to the horizon, and level the wings.
Nose low: reduce power, level wings, and raise pitch to the horizon.
3. Maintain coordination and respect speed limitations throughout the maneuver

Common errors:

Abrupt control usage
Rushing to react before properly identifying the unusual attitude
Attempting to increase AoA before "unloading" the wing (i.e. leveling the wing)
Incorrect throttle usage

Tolerances:

perform the correct, coordinated, and smooth flight control application to resolve unusual pitch and bank attitudes while staying within the airplane's limitations and flight parameters.

Emergency Approach and landing (forced landing)

Definition:

The forced landing occurs when the airplane can no longer maintain level flight (typically due to partial/complete engine failure). The pilot must select a suitable landing site and maneuver the airplane to touch down at minimum speed and sink rate so as to avoid injury. (AFH 18-2)

Procedure:

1. Run your ABCDs:
 - Airspeed** - pitch for best glide (Vg)
 - Best place to land** - Select a suitable landing site. Airports are best if within range, otherwise a very large field with little to no obstructions should be selected. Immediately maneuver the airplane toward your selected landing site. (In the event landing must be made in rough terrain, "fly through the crash" and sacrifice expendable plane components.)
 - Checklist** - run checklists above a safe altitude only. Engine restart and securing should be conducted from memory (and confirmed with the checklists if time permits)
 - Declare** - squawk "7700" and declare "Mayday, Mayday, Mayday" on 121.5
2. If sufficient altitude exists: maneuver the aircraft to a downwind key position, and fly a pattern to the field.
3. Make use of slips, flaps, S-turns, and spirals as needed to place the airplane in the key landing position (short final) no lower than the bottom altitude specified by the instructor/examiner.

Common Errors:

Failure to trim after establishing Vg
Failure to consider the effects of wind on landing distance
Over commitment to an unsuitable field
Failure to change heading when no suitable fields are found ahead
Lining up to land against the grain of a plowed field
Failure to configure for landing and prepare the aircraft for crash before maneuver completion

Tolerances:

Airspeed: +/-10kt
Prepare for landing as specified

Systems and Equipment Malfunction

Definition:

Any abnormal flight condition, instrument indication or performance scenario which calls into question the safety of flight.

Procedure:

1. First, do nothing. Utilize your decision making tools (3Ps, DECIDE, etc.) to evaluate the situation
2. Determine the severity of the situation (i.e. **is immediate action required?**)
3. **IF YES: Execute memory items**, and (time permitting) confirm with checklists. **IF NO:** Troubleshoot the issue using an appropriate checklist if available.