

Maneuvers Guide

All maneuvers should be executed at an appropriate location and altitude, specifically:

1. Altitudes allowing the completion of the maneuver no lower than 3,000 feet AGL.
2. No airborne engine failures lower than 400 feet AGL or slower than V_{sse} (84 knots).
3. No ground based engine failures at airspeeds greater than half the value of V_{mc} and runway width less than 75 feet.
4. Zero thrust settings in this aircraft is 11" MP and RPM fully retarded (but not feathered).

Source: https://www.faa.gov/training_testing/testing/acs/commercial_airplane_acs_7.pdf

Normal Takeoff

1. Hold the brakes.
2. Advance the throttle to 1,700 RPM and check the engine instruments.
3. Release the brakes and advance throttle full forward.
4. Rotate at 84 knots.
5. Confirm a positive rate of climb and level out about 50 feet AGL to accelerate to blue line (V_{yse} , 100 knots). When out of runway, or at blue line, retract landing gear.
6. Climb at blue line to pattern altitude and then accelerate to V_y (107 knots).
7. Reduce the throttle to 25" MP and the propeller to 2,500 RPM.
8. Accelerate to 120 knots for cruise climb.

Normal Landing

1. Enter traffic pattern with throttle set at approximately 17" MP.
2. At midfield downwind, extend landing gear after confirming below V_{le} (154 knots).
3. Extend flaps to approach setting (4-5 seconds)
4. Trim for blue line (V_{yse} , 100 knots).
5. On base, confirm GUMPS (fuel on main tanks, undercarriage is down and locked, mixture full forward, propeller control full forward, seatbelts fastened).
6. Extend flaps to full setting.
7. Maintain 100 knots until short final then slow to 85-90 knots.
8. When landing is assured, reduce throttles to idle.
9. Touch down with minimal float, full elevator back pressure, and apply light, smooth braking.

Short Field Takeoff

1. Indicate "Using max available runway."
2. Hold the brakes.
3. Advance the throttle to 1,700 RPM and check the engine instruments.
4. Advance the throttle to full power and release the brakes.
5. Rotate at 84 knots.
6. Confirm positive rate of climb and retract the landing gear.

7. Pitch to climb at 90 knots (V_x) until clear of obstacle (50 feet). *Tip: This is only for 2-3 seconds and don't apply back pressure too quickly or you'll get a stall indication.*
8. Accelerate to blue line (V_{yse} , 100 knots) until pattern altitude.
9. Reduce the throttle to 25" MP and the propeller to 2,500 RPM.
10. Accelerate to 120 knots for cruise climb.

Short Field Landing

1. Enter traffic pattern with throttle set at approximately 17" MP.
2. At midfield downwind, extend landing gear after confirming below V_{le} (154 knots).
3. Extend flaps to approach setting (4-5 seconds)
4. Trim for blue line (V_{yse} , 100 knots).
5. On base, confirm GUMPS (fuel on main tanks, undercarriage is down and locked, mixture full forward, propeller control full forward, seatbelts fastened).
6. Extend flaps to full setting.
7. Maintain 90 knots until final then slow to 80-85 knots, depending on weight (higher weight should use higher speed).
8. When landing is assured, reduce throttles to idle.
9. Touch down with minimal float, full elevator back pressure, and apply light, smooth braking.
10. Retract the flaps.

Steep Turns

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Set the throttles to approximately 18" MP, the propeller to approximately 2,500 RPM and mixture appropriate to the density altitude.
4. Confirm the landing gear and flaps are up.
5. Roll into a bank (45° for private, 50° for commercial) and increase pitch to maintain altitude within ± 100 feet.
6. Adjust throttles to help maintain altitude and trim off excess control pressures. *Tip: You may need as much as 20-21" of MP.*
7. Begin your roll out at half your bank angle (approximately 25°) and roll out on desired heading within 10° .
8. Immediately begin a steep turn in the opposite direction using the same procedure.

Slow Flight

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Set the throttles to approximately 18" MP, the propeller to approximately 2,500 RPM and mixture appropriate to the density altitude.
4. Extend the landing gear once below V_{le} (154 knots).
5. Extend flaps to the full setting once below V_{fe} . *Tip: You may need approximately 14-15" of MP to do this. Don't let the aircraft climb as you extend flaps. You may wish to extend the flaps in segments to help stabilize your altitude.*
6. Adjust throttles setting and trim to maintain 80 knots, ± 5 knots. *Tip: You may need as much as 20-21" of MP as you're operating in the region of reverse command.*

7. To recover, advance the throttles to 25" MP.
8. Retract the landing gear
9. Retract the flaps. *Tip: Similarly to extension, you may wish to do this in segments, so you don't descend.*
10. Return to entry settings (18" MP, 2,500 RPM).

Power Off Stalls

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Set the throttles to approximately 18" MP, the propeller to approximately 2,500 RPM and mixture appropriate to the density altitude.
4. Extend the landing gear once below V_{le} (154 knots).
5. Extend flaps to the full setting once below V_{fe} . *Tip: You may need approximately 14-15" of MP to do this. Don't let the aircraft balloon as you extend flaps. You may wish to extend the flaps in segments to help stabilize your altitude.*
6. Reduce throttles to 10" MP and maintain altitude while allowing airspeed to slow. *Tip: Trim as necessary to maintain altitude.*
7. **Maintain coordinated flight.**
8. Maintain attitude until the first indication of a stall (stall warning horn, airframe buffeting, etc).
9. To recover, reduce the angle of attack and lower the nose approximately 5°, while smoothly advancing the throttles to full power.
10. Retract the landing gear
11. Retract the flaps. *Tip: Similarly to extension, you may wish to do this in segments, so you don't descend.*
12. Accelerate to blue line (V_{yse} , 100 knots) and then pitch up to climb.
13. Return to entry settings (18" MP, 2,500 RPM) once recovered.

Power On Stalls

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Set the throttles to approximately 18" MP, the propeller to approximately 2,500 RPM and mixture appropriate to the density altitude.
4. Verify the landing gear and flaps are retracted.
5. Retard the throttles to 10" MP and allow the airspeed to slow to 90 knots. *Tip: This may mean the throttle warning horn sounds.*
6. Advance the throttles to 18" MP and raise the nose of the aircraft to induce a stall. *Tip: Trim as necessary to reduce control pressure. The pitch angle may become quite extreme.*
7. **Maintain coordinated flight.**
8. Maintain attitude until the first indication of a stall (stall warning horn, airframe buffeting, etc).
9. To recover, reduce the angle of attack and lower the nose approximately 5°, while smoothly advancing the throttles to full power.
10. Accelerate to blue line (V_{yse} , 100 knots) and then pitch up to climb.
11. Return to entry settings (18" MP, 2,500 RPM) once recovered.

VMC Demonstration

***Special care should be taken for this maneuver. Do not attempt on high density altitude days or very high altitudes (greater than 6,500 MSL). The instructor or examiner may artificially limit your rudder travel to increase safety margins.**

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Close the cowl flap on the left engine and open the cowl flap on the right engine.
4. Set the throttles to approximately 18" MP, the propeller to the full forward and mixture appropriate to the density altitude.
5. Verify the landing gear and flaps are retracted.
6. Reduce the throttle on the critical engine (left) to idle to simulate engine failure.
7. Configure the airplane for zero side-slip by running "The Drill." The right throttle should be configured for maximum power.
8. Using only 5° of bank and rudder, maintain heading.
9. Slowly, at approximately 1 knot per second, raise the nose of the aircraft, to reduce airspeed **until first indication of a loss of directional control**.
10. To recover, smoothly reduce the throttle on the operating engine and lower the nose.
11. Re-establish and maintain the bugged heading and accelerate to blue line (V_{yse} , 100 knots).
12. To recover, smoothly retard the throttles on the operating engine while advancing the throttle in the simulated failed engine.
13. Return to entry settings (18" MP, 2,500 RPM) once recovered.

Cruise Engine Failure and Full Shutdown/Secure

1. Stop the yaw and roll of the aircraft using rudder and aileron.
2. Establish a pitch attitude to achieve blue line (V_{yse} , 100 knots).
3. Mixtures full forward.
4. Propellers full forward.
5. Throttles full forward.
6. Retract landing gear.
7. Retract flaps.
8. Turn on fuel boosts to high setting (simulated).
9. Identify inoperative engine. *Tip: "Dead leg, dead engine".*
10. Verify inoperative engine by slowly retarding the throttle of the suspected inoperative engine.
11. Verify fuel selectors and magnetos for the inoperative engine.
12. Feather the inoperative engine.
11. Secure the inoperative engine by retarding the mixture to cut-off.
12. Turn the fuel pump off for the inoperative engine.
13. Turn the fuel selector off for the inoperative engine.
14. Turn the magnetos off for the inoperative engine.
15. Turn the alternator off for the inoperative engine.
16. Close the cowl flap on the inoperative engine.

Engine Restart In-Flight

1. Set the fuel selector to the main tank.
2. Advance the throttle 1/5 forward.
3. Advance the mixture to full rich (or appropriate for density altitude).
4. Turn the fuel pump on low.
5. Set magneto to "Both."
6. Set the propeller to mid-range.
7. Set the magneto to "Start." *Tip: As the unfeathering accumulator pushes the props to a low pitch, it may take a few seconds to restart the engine, keep cranking.*
8. Turn the fuel pump off.
9. Turn the alternator on.
10. Maintain less than 15" MP and 2,000 RPM until CHTs reach 200° F.
11. Open the cowl flap.
12. Return to entry settings (18" MP, 2,500 RPM) once recovered.

Single Engine Landing

1. Enter traffic pattern with throttle set at an appropriate setting to maintain blue line and zero side-slip.
2. On final, extend the landing gear.
3. On short final, extend the flaps to the approach setting (approximately 5 seconds).
4. Confirm GUMPS (fuel on main tanks, undercarriage is down and locked, mixture full forward, propeller control full forward, seatbelts fastened).
5. Maintain blue line until landing is assured.
6. When landing is assured, reduce throttles to idle.
7. Touch down with minimal float, full elevator back pressure, and apply light, smooth braking.
8. Maintain directional control.

Engine Failure Prior to Rotation

1. Close both throttles and maintain directional control using rudder and smooth braking.

Engine Failure After Takeoff (EFATO)

1. Execute "The Drill."
2. Execute a single engine landing.

Instrument Maneuvers

Single Engine Instrument Approach

1. Execute "The Drill."
2. Execute a single engine landing.

Commercial Maneuvers

Accelerated Stalls

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Set the throttles to approximately 18" MP, the propeller to approximately 2,500 RPM and mixture appropriate to the density altitude. *Tip: An entry speed of 130 knots should work well.*
4. Roll into 30° - 45° bank in the direction of your choosing.
5. **Maintain coordinated flight.**
6. Maintain attitude until the first indication of a stall (stall warning horn, airframe buffeting, etc).
7. To recover, reduce the angle of attack and lower the nose approximately 5°, roll wings level, while smoothly advancing the throttles to full power.
8. Accelerate to blue line (V_{yse} , 100 knots) and then pitch up to climb.
9. Return to entry settings (18" MP, 2,500 RPM) once recovered.

CFI Maneuvers

Drag Demo

1. Execute clearing turns.
2. Heading bug the entry heading and note the entry altitude.
3. Simulate an engine failure on the critical engine without feathering the propeller and establish zero-side slip at blue line (V_{yse} , 100 knots).
4. Note the vertical speed.
5. Extend the landing gear.
6. Note the vertical speed.
7. Extend the flaps.
8. Note the vertical speed.
9. Retract the flaps.
10. Note the vertical speed.
11. Retract the landing gear.
12. Note the vertical speed.
13. Recover from the engine failure.
14. Return to entry settings (18" MP, 2,500 RPM) once recovered.