



C172 RG Maneuvers Guide

N9706B

2025

Overview

The purpose of this guide is to establish a standard for specific flight maneuvers. It is to be used in conjunction with the appropriate POH and other reference materials.

Standardizing the way maneuvers are performed establishes a solid foundation of basic procedural skills and knowledge. This, coupled with experience gained over time, will enable all pilots to handle most unusual situations and emergencies in a more predictable fashion with a greater chance of a successful outcome.

Flight instructors and students should find these standards helpful in preparation for any flight evaluation. Chandelles, lazy eights, steep spirals, eights on pylons, and power-off 180° accuracy approach and landings are commercial maneuvers and will only be required for Commercial Pilots.

This guide does not replace the Airmen Certification Standards. The specific airspeeds, power settings, and flap settings used in this guide are for the C172RG.

Every maneuver begins and ends in straight and level, unaccelerated flight. Clearing turns will be accomplished before every maneuver.

Correct trim application should be used throughout every flight.

The C-GUMPSS Checklist is referenced during all Approach and Landings.

- Cowl Flaps
- Gas - Fuel: BOTH
- Undercarriage: Landing Gear Down and Locked
- Mixture: FULL RICH in case of go around (or as required)
- Prop: FULL FWD
- Seatbelts: ON
- Switches: Lights on as required

Adjusting power:

Reducing power: Throttle - Prop - Mixture

Adding power: Mixture - Prop - Throttle

Normal cruise power: 20" MP at 2300 RPM; mixture leaned

V- Speeds

V-Speed	Definition	KIAS
Vne	Never exceed speed	164
	Max window open speed	164
Vno	Max structural cruising (normal operating) speed	145
Va	Maneuvering speed @ 2650 lbs (max gross) @ 2250 lbs @ 1850 lbs	106 98 89
Vfe	Max flap extended speed 10° flaps Greater than 10°	130 100
Vlo	Max landing gear operating speed	140
Vle	Max landing gear extended speed	164
Vy	Best rate of climb speed @ Sea level @ 10,000'	84 77
Vx	Best angle of climb speed @ Sea level @ 10,000' Obstacle speed (flaps up)	67 68 63
Vr	Rotation speed	55
Vref	Final approach speed - normal landing, full flaps	60-70
Vref (no flap)	Final approach speed - normal landing, no flaps	65-75
Vref (short)	Final approach speed - Short field landing, full flaps	63
Vs	Stall speed - flaps up Rear CG Forward CG	46 51
Vso	Stall speed - flaps down Rear CG Forward CG	39 42
Vglide	Best glide @ 2650 lbs (max gross) @ 2250 lbs @ 1850 lbs	73 67 61

Maneuver Speeds

Maneuver	Recommended Entry Speed
Chandelles	105 kts
Lazy Eights	105 kts
Steep Turns	95 kts

Notes

Flaps

- Flaps up for instrument approaches at 90 knots in all models.
- Flaps limitations:
 - 130 kts for 10°
 - 100 kts for any setting greater than 10°
- Full flaps: 30°

Fuel System

- Four fuel drains
 - One each tank
 - One at fuel selector (belly, aft of access panel)
 - One for strainer (left side of cowling)
- Four position fuel selector
- Auxiliary fuel pump should be turned on any time the pressure falls below 0.5 PSI

Electrical System

- 28 volt DC system with 60 amp belt driven alternator
- 24 volt, 12.75 amp hour battery
 - Battery located aft of rear cabin wall
- Avionics switch and breakers located on left cabin wall
- Instrument lights switch controlled on dome light (above)

Landing Gear

- Use caution during ground handling - can damage gear doors with tow bar
- Gear drops down 2 feet when being retracted
- Electro-hydraulic and extension system
- Power pack located in cockpit between the left and right seat's rudder pedals
 - Normal operating pressure of 1000-1500 PSI is automatically maintained
- Gear is held up by hydraulic pressure
 - Pump will cycle when pressure switch detects a pressure drop below limits
- Positive mechanical down locks utilized on main and nose gear

- Nose gear has mechanically-actuated wheel well doors
- Gear handle is a mechanical valve that redirects the flow of the hydraulic fluid
 - When redirected, the pressure switch in the power pack detects the pressure drop and activates the pump motor
 - Pull out handle to reposition lever
- 2 gear lights - one Up (amber) and one Down (green)
 - Lights dimmed by twisting
 - Test by pushing on light
 - 3 separate switches (6 total) must close to activate the lights
- Gear warning horn - activation
 - Flaps extended beyond 20° with gear up
 - Throttle below 12" MP with gear up (bring throttle approx 25" MP to turn off)
- Squat switch
 - On nose gear
 - Prevents hydraulic power pack from actuating the pump motor when there is weight on the nose wheel
 - Not unusual for the pump motor to actuate for 1-2 seconds after liftoff to repressurize the system in the down direction
- Emergency extension hand pump available for manual gear extension (pull Gear Pump circuit breaker)
 - Pull forward and pump upwards to extend (approx 35 strokes)

Engine

- Lycoming O-360-F1AG 180 BHP @ 2700 RPM
- Gravity fed tanks, engine driven fuel pump with electric auxiliary pump backup
- Ram air for induction through left opening in cowling
- Cooling air comes through both openings and is vented out of the cowl flaps
 - Adjust cowl flaps to maintain temperature around 2/3 of CHT green arc in cruise flight
- Air from carb heat is unfiltered - will cause 1" MP loss at full power
- Mixture has a very short throw
 - Very easy to overlean
 - Gets better performance if leaned a little bit (1/4")
- Application of carb heat will enrich mixture

Constant Speed, Hydraulically Actuated Propeller

- Decrease in oil pressure to the piston in the prop hub will allow centrifugal force and an internal spring to twist the blades to a low pitch, high RPM setting
- Vernier control for minor adjustments
 - TWIST - do not push/pull

Other

- Manual elevator trim
- Manual rudder trim - uses a bungee system rather than aerodynamic trim
- Seats are anchored to the floor, not the seat

- Move seat forward first before fastening
- Overhead vents are “can” style
 - Overhead vents are variable controlled by twisting ring to adjust the valve.
- Sits lower than normal - technically a C175 that flies like a C172

Description	Limit
Max Gross Takeoff Weight	2650 lbs
Max Baggage	Area 1: 200 lbs; Area 2: 50 lbs (combined 200 lbs)
Fuel Capacity	66 gal
Usable Fuel	62 gal
Oil Capacity	8 qts (no ops less than 6qts)
Max Power	180 HP @ 2700 RPM
Static RPM range at full throttle (carb heat off and full rich mixture)	2200-2400 RPM

Wing Span: 36'

Length: 27' 5"

Height: 8' to 9' 6"

Slow Flight - Cruise Configuration

Objective: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in a cruise configuration.

Standards: Commercial

- Airspeed: MCA +5/-0 knots,
- Altitude: ± 50 feet of specified altitude,
- Heading: $\pm 10^\circ$ of specified heading
- Bank: $\pm 5^\circ$ of specified bank angle

Conditions: The maneuver should be accomplished in straight flight, turns, climbs, and descents with emphasis placed on smoothness, coordination, and accuracy.

Note: For the purposes of this maneuver, MCA is defined as Minimum Controllable Airspeed. In other words, “an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.”

Description:

- Select an altitude to allow recovery no lower than 1500'AGL and establish heading.
- Perform the pre-maneuver checklist.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15" MP
- Prop: FULL FWD
- Mixture: FULL RICH
- As airspeed approaches MCA, adjust throttle for level flight (approx. 18"MP). Avoid abrupt changes in pitch, bank, and power.
- Establish and maintain an airspeed at which any further increase in pitch, load factor, and/or reduction in power would result in an immediate stall.
- Stabilize the aircraft maintaining heading, altitude, and airspeed.
- Straight and level, turns, climbs, and descents should be performed, as specified, while maintaining slow flight.
- Recover to cruise flight by simultaneously applying maximum power and carburetor heat cold.
- Adjust pitch attitude to maintain altitude.

Slow Flight - Landing Configuration

Objective: To recognize changes in aircraft flight characteristics and control effectiveness at critically slow airspeeds in a landing configuration.

Standards: Commercial

- Airspeed: MCA +5/-0 knots,
- Altitude: ± 50 feet of specified altitude,
- Heading: $\pm 10^\circ$ of specified heading
- Bank: $\pm 5^\circ$ of specified bank angle

Conditions: The maneuver should be accomplished in straight flight, turns, climbs, and descents with emphasis placed on smoothness, coordination, and accuracy.

Note: For the purposes of this maneuver, MCA is defined as Minimum Controllable Airspeed. In other words, “an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.”

Description:

- Select an altitude to allow recovery no lower than 1500'AGL and establish heading.
- Perform the pre-maneuver checklist.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15" MP
- Prop: FULL FWD
- Mixture: FULL RICH
- When airspeed in flap operating range, extend flaps in 10° increments to desired setting.
 - 85 KIAS – flaps 10°
 - 75 KIAS – flaps 20°
 - 65 KIAS – flaps 30°
- Lower landing gear when below V_{lo} . Trim as necessary.
- As airspeed approaches MCA, adjust throttle for level flight (approx. 20"MP). Avoid abrupt changes in pitch, bank, and power.
- Establish and maintain an airspeed at which any further increase in pitch, load factor, and/or reduction in power would result in an immediate stall.
- Stabilize the aircraft maintaining heading, altitude, and airspeed.
- Straight and level, turns, climbs, and descents should be performed, as specified, while maintaining slow flight.
- Recover to cruise flight by simultaneously applying maximum power, carburetor heat cold, flaps 20° .
- Adjust pitch attitude to maintain altitude. Retract flaps to 10 degrees at V_x , and full up at V_y .

Power-Off Stalls - Cruise Configuration

Objective: To recognize indications of an imminent or full stall during power-off situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.

Standards: Commercial - Heading: $\pm 10^\circ$ or Bank: $\leq 20^\circ \pm 10^\circ$

- Demonstrates proper recovery procedure.
- Maintains coordinated flight.
- Avoids secondary stalls/spins.
- Recognizes and recovers promptly at the “onset” (buffeting) stall condition

Conditions: Stalls should be accomplished in straight flight and turns. Emphasis should be placed on smoothness, coordination, and accuracy.

Description:

- Select an altitude to allow recovery no lower than 1500’AGL and establish heading.
- Perform the pre-maneuver checklist.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15” MP
- Prop: FULL FWD
- Mixture: FULL RICH
- When airspeed reaches an approach speed of 60 - 65 kts, establish a descent.
- Reduce throttle to idle.
- Transition smoothly from the approach to a pitch attitude that will induce a stall, continuing to maintain heading, with any directions (if applicable) to turn.
- Initiate recovery when:
 - Imminent stall - The first buffet or rapid decay of control effectiveness is experienced.
 - Full stall - A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full-up elevator is experienced.
- Recover by simultaneously adding full throttle and carb heat off, decreasing the angle of attack, and leveling the wings.
- Establish a positive rate of climb at an approximate V_x pitch attitude
- With a positive rate of climb, establish a V_y pitch attitude
- Resume normal cruise, or as specified.

Power-Off Stalls - Landing Configuration

Objective: To recognize indications of an imminent or full stall during power-off situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.

Standards: Commercial - Heading: $\pm 10^\circ$ or Bank: $\leq 20^\circ \pm 10^\circ$

- Demonstrates proper recovery procedure.
- Maintains coordinated flight.
- Avoids secondary stalls/spins.
- Recognizes and recovers promptly at the “onset” (buffeting) stall condition

Conditions: Stalls should be accomplished in straight flight and turns. Emphasis should be placed on smoothness, coordination, and accuracy.

Description:

- Select an altitude to allow recovery no lower than 1500’AGL and establish heading.
- Perform the pre-maneuver checklist.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15” MP
- Prop: FULL FWD
- Mixture: FULL RICH
- When airspeed in flap operating range, extend flaps in 10° increments to desired setting.
 - 85 KIAS – flaps 10°
 - 75 KIAS – flaps 20°
 - 65 KIAS – flaps 30°
- Lower landing gear when below V(LO). Trim as necessary.
- When airspeed reaches an approach speed of 60 - 65 kts, establish a descent.
- Reduce throttle to idle.
- Transition smoothly from the approach to a pitch attitude that will induce a stall, continuing to maintain heading, with any directions (if applicable) to turn.
- Initiate recovery when:
 - Imminent stall - The first buffet or rapid decay of control effectiveness is experienced.
 - Full stall - A sudden loss of control effectiveness occurs, excessive sink rate, or sudden nose pitch down with full up elevator is experienced.
- Recover by simultaneously adding full throttle and carb heat off, decreasing the angle of attack, and leveling the wings, flaps 20°
- Establish a positive rate of climb at an approximate V_x pitch attitude
- Retract flaps to 10 degrees at V_x
- With a positive rate of climb, establish a V_y pitch attitude; Flaps up by V_y
- Resume normal cruise, or as specified.

Power-On Stalls - Cruise Configuration

Objective: To recognize indications of an imminent or full stall during power-on situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.

Standards: Commercial - Heading: $\pm 10^\circ$ or Bank: $\leq 20^\circ \pm 10^\circ$

- Demonstrates proper recovery procedure.
- Maintains coordinated flight.
- Avoids secondary stalls/spins.
- Recognizes and recovers promptly at the “onset” (buffeting) stall condition

Conditions: Stalls should be accomplished in straight flight and turns simulating departure with emphasis placed on smoothness, coordination, and accuracy.

Description:

- Select an altitude to allow recovery above 1500’AGL.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15” MP
- Prop: FULL FWD
- Mixture: FULL RICH
- Slow to lift-off speed (approx 55 kts)
- Simultaneously apply full throttle, carb heat off, and establish a takeoff attitude.
- If turning, establish the desired bank angle (as directed by instructor). If a turn is used, 20° max bank angle.
- Transition smoothly from the takeoff attitude to the pitch attitude that will induce a stall. (Max allowable pitch is 30°).
- Recognize and announce the first aerodynamic indications of the oncoming stall (e.g., stall warning horn, mushy aileron control, buffeting).
- Announce the stall (at the buffet); then promptly recover by simultaneously:
 - Decreasing angle of attack.
 - Maintaining wings level using primarily rudder inputs.
- Maintain present altitude and accelerate to V_y .
- Return to cruise flight by setting cruise power and maintaining altitude, heading, and airspeed.

Power-On Stalls - Specified Configuration

Objective: To recognize indications of an imminent or full stall during power-on situations and to make prompt, positive recoveries, with minimum loss of altitude while maintaining coordinated flight.

Standards: Commercial - Heading: $\pm 10^\circ$ or Bank: $\leq 20^\circ \pm 10^\circ$

- Demonstrates proper recovery procedure.
- Maintains coordinated flight.
- Avoids secondary stalls/spins.
- Recognizes and recovers promptly at the “onset” (buffeting) stall condition

Conditions: Stalls should be accomplished in straight flight and turns simulating departure with emphasis placed on smoothness, coordination, and accuracy.

Description:

- Select an altitude to allow recovery above 1500' AGL.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15" MP
- Prop: FULL FWD
- Mixture: FULL RICH
- Slow to lift-off speed (approx 55 kts)
- Flaps: 10° (simulating short-field takeoff - when airspeed is within flap operating range)
- Landing gear: DOWN (below V_{lo} - 140 kts)
- Simultaneously apply full throttle, carb heat off, and establish a takeoff attitude.
- If turning, establish the desired bank angle (as directed by instructor). If a turn is used, 20° max bank angle.
- Transition smoothly from the takeoff attitude to the pitch attitude that will induce a stall. (Max allowable pitch is 30°).
- Recognize and announce the first aerodynamic indications of the oncoming stall (e.g., stall warning horn, mushy aileron control, buffeting).
- Announce the stall (at the buffet); then promptly recover by simultaneously:
 - Decreasing angle of attack.
 - Maintaining wings level using primarily rudder inputs.
- Maintain present altitude and accelerate to V_y.
- Raise the gear after establishing a positive rate of climb (VSI reversal).
- Return to cruise flight by setting cruise power and maintaining altitude, heading, and airspeed.

Accelerated Stalls

Objective: To recognize indications of an imminent or full stall occurring at a higher than normal airspeed due to an increased load factor.

Standards:

- Maintains coordinated turning flight, increasing elevator back pressure steadily and firmly to induce the stall
- Recognizes and recovers promptly at the “onset” (buffeting) stall condition
- Returns to the altitude, heading, and airspeed specified by the examiner

Conditions: N/A

Description:

- Select an altitude to allow recovery above 3000’AGL.
- Clear the area using clearing turns.
- Fuel: BOTH
- Carb Heat: ON
- Reduce throttle: approx. 15” MP
- Prop: FULL FWD
- Mixture: FULL RICH
- Slow to V_a (106 kts @ max gross)
- Enter a coordinated, level flight, 45° banked turn
- Smoothly, yet firmly, increase the angle of attack through back pressure until the onset of a stall occurs
- Recover by promptly decreasing the angle of attack and leveling the wings, while simultaneously applying full throttle and carb heat off
- Resume normal cruise.

Steep Turns

Objective: To develop smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

Standards: Commercial

- Airspeed: ± 10 kts
- Altitude: ± 100 feet of specified altitude,
- Heading: $\pm 10^\circ$ of specified heading
- Bank: $50^\circ \pm 5^\circ$ of specified bank angle

Conditions: The maneuver should be performed at the manufacturer's recommended airspeed or, if one is not stated, a safe airspeed not to exceed V_a .

Description:

- Select an altitude to allow recovery above 1500' AGL.
- Stabilize the aircraft in level cruise flight at the appropriate airspeed (POH = 95 kts)
 - Fuel: BOTH
 - Carb heat: COLD
 - Throttle: approx. 20" MP
 - Prop: approx. 2300 RPM
 - Mixture: leaned for cruise
- Clear the area using clearing turns.
- Establish and announce altitude and heading.
- Determine a visual reference point.
- Smoothly roll into a 50° banked turn using coordinated ailerons and rudder.
- As the bank becomes steeper, adjust back pressure so as to maintain constant altitude and apply power, as necessary, to maintain airspeed.
- Maintain a constant bank angle, altitude, and airspeed during the turn.
- Maintain constant vigilance for traffic so as to clear the area for the second turn.
- Approaching the visual reference point (within approximately $5-10^\circ$ of initial heading), transition smoothly back to straight and level flight using coordinated ailerons and rudder. Reduce back pressure to maintain altitude and power to maintain airspeed.
- Smoothly transition into a steep turn in the opposite direction.
- After completion of the second 360° turn, return to cruise flight by setting cruise power and maintaining altitude, heading, and airspeed.

Chandelles

Objective: To develop positive control techniques at varying airspeed and attitudes while remaining orientated and coordinated.

Standards: Commercial

- Airspeed: Just above a stall speed at completion
- Altitude: Minimum altitude loss during recovery
- Heading: 180° heading change $\pm 10^\circ$
- Bank: Not to exceed 30°

Conditions: N/A

Description:

- Select an altitude to allow recovery above 1500'AGL.
- Stabilize the aircraft in level cruise flight at the appropriate airspeed (POH = 105 kts)
 - Fuel: BOTH
 - Carb heat: COLD
 - Throttle: approx. 20" MP
 - Prop: approx. 2300 RPM
 - Mixture: leaned for cruise
- Clear the area using clearing turns.
- Establish and announce altitude and heading. Determine visual reference points.
- PROP – FULL.
- Smoothly roll into and establish a 30° bank.
- Apply full throttle while increasing back pressure to increase pitch to approximately 5-10° nose high.
- Maintain coordination and a 30° bank and continue to increase pitch until the 90° point (constant bank, changing pitch).
- Gradually start rolling out the bank at the 90° point while maintaining pitch (constant pitch, changing bank).
- Complete the rollout to wings level at the 180° point. Momentarily hold airspeed without stalling.
- Resume straight and level flight while letting airspeed increase to cruise.
- Reduce power to cruise setting and maintain altitude, heading, and airspeed.

Lazy Eights

Objective: To develop the feel for varying control forces and the ability to accurately maneuver the airplane while demonstrating good planning and orientation.

Standards: Commercial

- Airspeed: ± 10 kts at 180° points
- Altitude: ± 100 at 180° points
- Heading: $\pm 10^\circ$ at 180° points
- Bank: Approx. 30° at steepest point

Conditions: N/A

Description:

- Select an altitude to allow recovery above 1500' AGL.
- Stabilize the aircraft in level cruise flight at the appropriate airspeed (POH = 105 kts)
 - Fuel: BOTH
 - Carb heat: COLD
 - Throttle: approx. 20" MP
 - Prop: approx. 2300 RPM
 - Mixture: leaned for cruise
- Clear the area using clearing turns.
- Establish and announce altitude and heading. Determine visual reference points.
- Begin a gradual coordinated climbing turn in the direction of the 90° reference point.
 - When at the 45° reference point, the aircraft should be at its maximum pitch attitude and an approximately 15° bank angle.
 - The bank angle should continue to increase until the 90° reference point is off the nose, while the pitch attitude should slowly decrease to level flight.
- As the nose of the airplane passes through the 90° reference point, the pitch attitude passes through level flight. The bank angle should be at 30° . The airspeed should be at its minimum.
- Both the pitch attitude and the bank angle should continue to decrease so that when the 135° reference point is reached, the pitch attitude reaches its lowest point and an approximately 15° bank angle.
- The pitch attitude is slowly increased, bank angle is slowly decreased, so that the aircraft returns to straight and level flight at the entry altitude and airspeed.
- Smoothly roll bank in the opposite direction and re-accomplish the maneuver.
- Complete the rollout to wings level at the 180° point. Airspeed, altitude, and heading should be the same as at entry.
- Resume cruise flight after completing the maneuver.

Eights-on-Pylons

Objective: To develop the ability to maneuver the airplane accurately and in a coordinated manner while dividing attention between the flight path and the selected points on the ground.

Standards: Commercial

- Select suitable pylons that will permit straight and level flight between the pylons
- Enter the maneuver in the correct direction and position using an appropriate altitude and airspeed.
- Establish the correct bank angle, not to exceed 40°
- Apply smooth and continuous corrections so that the line-of-sight reference line remains on the pylons
- Divide attention between inaccurate, coordinated airplane control and outside visual references.
- Maintain pylon position using appropriate pivotal altitude, avoiding slips and skids.

Conditions: N/A

Description:

- Select two, small but prominent reference points for pylons that are close to a suitable place to land in case of an emergency.
- Stabilize the aircraft in level cruise flight on a downwind entry at 1000' AGL (airspeed below Va)
 - Fuel: BOTH
 - Carb heat: COLD
 - Throttle: approx. 20" MP
 - Prop: approx. 2300 RPM
 - Mixture: leaned for cruise
- Clear the area using clearing turns.
- Calculate pivotal altitude (ground speed in knots squared, divided by 11.3).
- Turn 45° to the downwind
- Just past the intended pylon, roll into a turn around that pylon (approximately 30 to 40° of bank) and place the wingtip on that pylon.
- As the turn is continued, hold the line of sight reference on the pylon by adjusting bank and altitude. (Lower altitude upwind and higher altitude downwind).
- Crossing the midpoint between the pylons, roll back to wings level.
- Just past the opposite pylon, perform the next turn exactly as the first, but in the opposite direction.
- Complete the maneuver by crossing the midpoint between the pylons wings level, at the same altitude and airspeed at which the maneuver was entered.

Steep Spiral

Objective: To improve pilot techniques for power-off turns, wind drift control, planning, orientation, and division of attention.

Standards: Commercial

- Airspeed: ± 10 kts
- Altitude: Sufficient to complete maneuver above 1,500' AGL
- Heading: 360° heading change; Rollout $\pm 10^\circ$
- Bank: Not to exceed 60°

Conditions: Determine a target gliding speed for the aircraft during this maneuver.

- One method is to adjust the wings level glide speed for the load factor at the maximum anticipated bank angle. Multiply the wings level glide speed by the square root of the load factor at that bank angle. Round this value to the nearest 5 kts for ease of reading on the airspeed indicator.
- Best glide @ max = 73kts; 45° load factor = 1.41, square root of 1.41 = 1.19
 - $73 * 1.19 = 86.87 \sim \mathbf{87kts}$

Description:

- Select an altitude to allow recovery above 1500' AGL.
- Stabilize the aircraft in level cruise flight
 - Fuel: BOTH
 - Carb heat: COLD
 - Throttle: approx. 20" MP
 - Prop: approx. 2300 RPM
 - Mixture: leaned for cruise
- Clear the area using clearing turns.
- Establish and announce altitude and heading. Determine visual reference points.
- Select a prominent reference point that is close to a suitable place to land in case of an emergency.
- Carb heat: ON
- Throttle: IDLE
- Prop: FULL FWD
- Mixture: FULL RICH
- Establish target speed (87 kts) and trim as necessary
- Begin gliding spiral
- Adjust bank angle and Wind Correction Angle, as necessary, to correct for the the effects of wind and to maintain a constant radius turn around the reference point
- Increase power momentarily during each turn to clear engine (easiest to do on upwind leg)
- Plan to depart on entry heading after three turns unless otherwise instructed

Normal / Crosswind Takeoff and Climb

Objective: To develop proficiency in conducting normal takeoff and climb profiles.

Standards: Commercial

- Airspeed: $V_y \pm 5$ kts on climb out

Conditions: Awareness of obstacles during all takeoffs.

Description:

- Accomplish the Before Takeoff checklist.
- Accomplish the Line-Up checklist.
- Visually check for traffic on Downwind, Base, and Final, as well as on the runway.
- Communicate, as appropriate (non-towered/towered)
- Taxi onto the runway, as appropriate.
- Align aircraft with runway centerline. If crosswind is present, deflect ailerons fully into the wind.
- Smoothly apply full throttle with heels on the floor, so as to not hold brakes.
- Check the engine instruments (CHT, MP, tachometer, oil temp, oil pressure, etc) for correct indications.
 - 2700 RPM
- As the aircraft accelerates, reduce aileron deflection as necessary. Maintain centerline with rudder.
- Rotate at V_r (55 kts) and adjust back pressure to establish a V_y (84 kts) climb.
 - NOTE: If a significant crosswind exists, increase the rotation speed by one half the gust factor, not to exceed 10 knots. This holds the aircraft on the ground a little longer so that a smooth and definite liftoff can be made.
- Ensure positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the plane.
- Complete Climb checklist at 500'AGL.

Normal / Crosswind Approach and Landing

Objective: To develop proficiency in conducting approaches and landings under normal conditions.

Standards: Commercial

- Airspeed: Approach speed ± 5 kts
- Landing within 200' beyond specified point

Conditions: Awareness of obstacles.

Description:

- Accomplish the Before Landing checklist. (C-GUMPSS)
- While flying the appropriate traffic pattern, assess the wind by the required wind correction angles and surface wind indicators. (Consider the use of reduced flap settings for landing, depending on the crosswind conditions.)
 - On each leg of pattern, confirm Landing Gear (1 seen; 1 green)
- Abeam the touchdown point, reduce throttle to 15-17" MP. Flaps: 10°
- Continue to adjust flaps, as required.
- On final, maintain final approach airspeed of 60-70 kts.
 - NOTE: If gusty conditions are present, increase final approach speed by one half the gust factor, not to exceed 10 knots.
- Establish slip, as needed.
 - Side slip: Nose to maintain centerline, aileron to control wind drift
 - Forward slip: Nose into the wind, aileron to maintain centerline
 - NOTE: When to transition to the side slip depends on pilot proficiency. Establishing the side slip earlier on final (for low time pilots) allows for a more stabilized approach with maximum exposure to the control inputs needed for the touchdown.
- When the runway is made, reduce throttle to 11-12" MP and slow the descent by increasing pitch attitude.
 - Crosswind: As the aircraft decelerates, increase aileron and rudder deflection to maintain the necessary sideslip. Allow the aircraft to touch down on the upwind main wheel first, followed by the downwind main wheel, then the nose wheel.
- Throttle: IDLE after touchdown.
- Maintain back pressure on the yoke throughout the landing roll and continue to increase aileron deflection fully into the wind as the aircraft slows to taxi speed.

Soft Field Takeoff and Climb

Objective: To develop proficiency in conducting soft field takeoffs and climbs.

Standards: Commercial

- Airspeed: $V_y \pm 5$ kts on climb out

Conditions: Awareness of obstacles during all takeoffs.

Description:

- Accomplish the Before Takeoff checklist.
- Accomplish the Line-Up checklist.
- Set flaps to 10° .
- Visually check for traffic on Downwind, Base, and Final, as well as on the runway.
- Communicate, as appropriate (non-towered/towered)
- Taxi onto the runway, applying full back pressure on the yoke. Keep the aircraft moving at a brisk pace while taxiing onto the runway centerline - avoid braking and/or stopping. If crosswind is present, deflect ailerons fully into the wind.
- Smoothly apply full throttle with heels on the floor, so as to not hold brakes.
- Adjust back pressure to maintain the nosewheel clear of the runway and to avoid striking the tail.
- Check the engine instruments (CHT, MP, tachometer, oil temp, oil pressure, etc) for correct indications.
 - 2700 RPM
- As the aircraft accelerates, reduce aileron deflection as necessary. Maintain centerline with rudder.
- Allow the aircraft to lift off when its ready. Establish a wind correction angle to maintain centerline, as required.
- Adjust pitch to accelerate in ground effect to V_y (84kts) or V_x (67kts) if an obstacle is present.
- If no obstacle is present:
 - Establish V_y pitch attitude
 - Retract flaps at safe altitude and airspeed.
 - Climb out at V_y
- To clear obstacle:
 - Establish V_x pitch attitude
 - Continue climb at V_x or manufacturer's recommended airspeed (see performance charts)
 - Once the obstacle is cleared, establish a V_y attitude.
 - Retract flaps at safe altitude and airspeed.
 - Climb out at V_y .
- Ensure positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the plane.
- Complete Climb checklist at 500'AGL.

Soft Field Approach and Landing

Objective: To develop proficiency in conducting approaches and landings to soft runways, with and without obstacles.

Standards: Commercial

- Airspeed: Approach speed ± 5 kts

Conditions: Awareness of obstacles.

Description:

- Accomplish the Before Landing checklist. (C-GUMPSS)
- While flying the appropriate traffic pattern, assess the wind by the required wind correction angles and surface wind indicators. (Consider the use of reduced flap settings for landing, depending on the crosswind conditions.)
 - On each leg of pattern, confirm Landing Gear (1 seen; 1 green)
- Abeam the touchdown point, reduce throttle to 15-17" MP. Flaps: 10°
- Continue to adjust flaps, as required.
- On final, maintain final approach airspeed of 60-70 kts.
 - NOTE: If gusty conditions are present, increase final approach speed by one half the gust factor, not to exceed 10 knots.
- Establish slip, as needed.
 - Side slip: Nose to maintain centerline, aileron to control wind drift
 - Forward slip: Nose into the wind, aileron to maintain centerline
 - NOTE: When to transition to the side slip depends on pilot proficiency. Establishing the side slip earlier on final (for low time pilots) allows for a more stabilized approach with maximum exposure to the control inputs needed for the touchdown.
- When the runway is made, reduce power to 11-12" MP and slow the descent by increasing pitch attitude.
- Touchdown at minimum airspeed with the aircraft in a nose-high pitch attitude. As the main wheels touch, hold back pressure to prevent the nose wheel from touching. Once the aircraft is stabilized with the main wheels on the ground, smoothly reduce power as required while maintaining sufficient back pressure to hold the nose off the runway as long as possible. Adjust power according to the surface conditions.
- When the nose wheel settles to the runway, maintain full elevator back pressure to minimize the weight on the nose wheel.
 - Crosswind: As the aircraft decelerates, increase aileron and rudder deflection to maintain the necessary sideslip. Allow the aircraft to touch down on the upwind main wheel first, followed by the downwind main wheel, then the nose wheel.
- Remain full back elevator pressure until slowed to taxi speed. If on actual soft field, continue to taxi with full back elevator pressure and minimum braking.

Short Field Takeoff and Climb

Objective: To develop proficiency in conducting short field takeoffs and climbs.

Standards: Commercial

- Airspeed: $V_x \pm 5/-0$ kts until obstacle is cleared (or until 50' above the surface), then $V_y \pm 5$ kts

Conditions: Awareness of obstacles during all takeoffs.

Description:

- Accomplish the Before Takeoff checklist.
- Accomplish the Line-Up checklist. (No flaps)
- Visually check for traffic on Downwind, Base, and Final, as well as on the runway.
- Communicate, as appropriate (non-towered/towered)
- Taxi onto the runway, as appropriate, as close to the approach end as possible. If crosswind is present, deflect ailerons fully into the wind.
- Hold the brakes, preventing any movement of the aircraft.
- Smoothly apply full throttle.
- Check the engine instruments (CHT, MP, tachometer, oil temp, oil pressure, etc) for correct indications.
- Immediately release the brakes and apply slight forward pressure on the yoke, allowing the aircraft to accelerate as quickly as possible.
- As the aircraft accelerates, reduce any aileron deflection as necessary. Maintain centerline with rudder.
- Rotate at V_r (55 kts or as determined by the POH) and adjust back pressure to establish a V_x (67 kts) climb.
- Once the aircraft lifts off, establish a Wind Correction Angle to maintain the runway centerline with level wings.
- Maintain V_x or as determined by the POH until clear of obstacles and at least 50' above the surface.
- After clearing obstacles, establish V_y pitch attitude. Maintain a ground track along the runway and extended centerline with coordinated aileron and rudder use.
- Ensure positive rate of climb, tap the brakes, and retract the gear when insufficient runway remains to land the plane.
- Complete Climb checklist at 500'AGL.

Short Field Approach and Landing

Objective: To develop proficiency in conducting approaches and landings to short runways, with and without obstacles.

Standards: Commercial

- Airspeed: Approach speed ± 5 kts
- Landing within 100' beyond specified point

Conditions: Awareness of obstacles.

Description:

- Accomplish the Before Landing checklist. (C-GUMPSS)
- While flying the appropriate traffic pattern, assess the wind by the required wind correction angles and surface wind indicators. (Consider the use of reduced flap settings for landing, depending on the crosswind conditions.)
 - On each leg of pattern, confirm Landing Gear (1 seen; 1 green)
- Abeam the touchdown point, reduce throttle to 15-17" MP. Flaps: 10°
- Continue to adjust flaps, as required.
- On final, maintain final approach airspeed of 60-70 kts.
 - NOTE: If gusty conditions are present, increase final approach speed by one half the gust factor, not to exceed 10 knots.
- Establish slip, as needed.
 - Side slip: Nose to maintain centerline, aileron to control wind drift
 - Forward slip: Nose into the wind, aileron to maintain centerline
 - NOTE: When to transition to the side slip depends on pilot proficiency. Establishing the side slip earlier on final (for low time pilots) allows for a more stabilized approach with maximum exposure to the control inputs needed for the touchdown.
- After clearing the obstacle, reduce power to idle and slow the descent by increasing pitch attitude.
 - Crosswind: As the aircraft decelerates, increase aileron and rudder deflection to maintain the necessary sideslip. Allow the aircraft to touch down on the upwind main wheel first, followed by the downwind main wheel, then the nose wheel.
- Immediately after touchdown, the aerodynamic braking should be applied to minimize the after-landing roll. Apply brakes once determined that they won't get locked up or cause damage to the tires.
- Continue to increase aileron deflection fully into the wind as the aircraft slows to taxi speed.

Power-Off 180° Accuracy Approach and Landing

Objective: To develop proficiency in conducting an approach and landing proceeding power-off from a specified point to a preselected landing spot.

Standards: Commercial

- Considers the wind conditions, landing surface, obstructions, and selects an appropriate touchdown point.
- Positions airplane on downwind leg, parallel to landing runway, and not more than 1,000' AGL
- Completes final airplane configuration
- Touches down in a normal landing attitude, at or within 200' beyond the specified touchdown point

Conditions: Awareness of obstacles. Altitude from which the maneuver should be started will vary with the type of airplane.

Description:

- Accomplish the Before Landing checklist. (C-GUMPSS)
- Determine projected ground track for a continuous turn to final (based on wind).
- Reduce the throttle to idle on the downwind leg abeam a preselected touchdown point not more than 1000' AGL with the landing gear extended.
- Establish best glide (73 kts @ max gross)
- Turn base and final, adjusting bank depending on wind and glide angle.
- Use flaps as necessary. (Consider delaying the last 10° of flaps until landing is assured).
- Evaluate aircraft performance based on determined ground track and reference altitudes.
- Touchdown at or within 200' beyond the intended touchdown point, on centerline, with the aircraft aligned parallel to the runway.

Emergency Descent

Objective: To recognize situations that require an emergency descent and obtain proficiency in the execution of emergency descent.

Standards: Commercial

- Appropriate Airspeed: +0/-10 kts
- Level Off Altitude: $\pm 100'$ of specified altitude
- Recognizes situations, such as depressurization, flight deck smoke, and/or fire that require an emergency descent
- Establishes the appropriate airspeed and configuration
- Exhibits orientation, division of attention, and proper planning
- Maintains positive load factors during the descent

Conditions: This maneuver should be performed at an altitude to allow sufficient time for the maneuver to be accomplished and recover at a safe altitude.

Description:

- Select an altitude to allow recovery no lower than 1500' AGL and establish heading.
- Perform the pre-maneuver checklist.
- Clear the area using clearing turns.
- Landing gear: DOWN below V_{lo}
- Fuel: BOTH
- Carb Heat: ON
- Throttle: IDLE
- Prop: FULL FWD
- Mixture: FULL RICH
- Upon reaching V_a (106 kts @ max gross), initiate a bank to maintain a positive load factor.
- Adjust pitch during turn to maintain V_a (106 kts) in turbulent air or V_{ne} (164 kts) in smooth air
- Hold bank until desired landing site is found
- Recovery:
 - Level wings
 - Gently pull up (careful to not over G the airframe) and make adjustments to the rate of pitch up
 - Return to normal cruise configuration and power settings

Emergency Approach and Landing

Objective: To develop proficiency in conducting landings under emergency conditions.

Standards:

- Establish and maintain the recommended best glide airspeed (± 10 kts) and configuration during simulated emergencies
- Select a suitable landing area within gliding distance.
- Plan and follow a flight pattern to the selected landing area, considering altitude, wind, terrain, obstructions, and other factors.
- Follow the appropriate emergency checklist.
- Attempt to determine the reason for the simulated malfunction.

Conditions: Any shutdown/securing related items should be simulated.

Description:

- To simulate (only with instructor aboard)
 - Carb Heat: ON
 - Throttle: IDLE
 - Prop: FULL FWD
 - Mixture: FULL RICH
- Establish best glide attitude and airspeed (73 kts @ max gross), maintaining altitude if airspeed is above best glide speed.
- Proceed directly to the closest, most suitable landing site (considering altitude, winds, terrain, etc).
- If sufficient altitude:
 - Complete the Engine Failure During Flight checklist
 - If no restart, complete the Emergency Landing Without Engine Power checklist.

Go-Around (Balked Landing)

Objective: To develop proficiency in conducting landings under normal and abnormal conditions.

Standards: Commercial

- Airspeed: $V_y \pm 5$ kts on climb out

Conditions: Awareness of obstacles.

Description:

- Upon a go around decision, simultaneously apply takeoff power
 - Carb Heat: COLD
 - Throttle: FULL
 - Prop: FULL FWD
 - Mixture: FULL RICH
- Establish a pitch up attitude to maintain V_x or V_y as appropriate.
- Retract wing flaps to the second setting.
- Retract wing flaps to the first setting after reaching V_x .
- Retract wing flaps up at V_y .
- Ensure positive rate of climb, tap the brakes, and retract the gear when a positive rate of climb has been established.
- Complete Climb checklist at 500'AGL