



**COMMERCIAL PILOT
MANEUVER GUIDE
ASEL
JUNE 2008**

FORWARD

The Scott Aero Club Commercial Pilot Maneuver guide describes the manner in which commercial pilot maneuvers will be taught, conducted, and evaluated. The guide is applicable to both Part 61 and Part 141 programs and is a supplement to the approved training syllabi.

For indicated airspeed and power settings, refer to the matrix on page 1 for specific aircraft. This maneuver guide is consistent with the FAA or and commercial Practice Test Standards, the FAA Flight Training Handbook, and Pilot Information Manuals and POHs. Comments and recommended changes to this maneuver guide should be submitted to the Chief Pilot, Scott Aero Club. However, when any discrepancies between this guide and the Manufacturer's Operating Procedures, Checklists, Federal Aviation Regulations, Practical Test Standards, Airman's Information Manual or Advisory Circulars exist, those publications take precedence.

1. SPEEDS AND POWER SETTINGS

Speed	C-152	C-172N	C-172P	C-172R	TR182	SA160	PA28	
Speed KIAS								
Rotation Vr	50	55	55	55	55	53	55	
Best Rate of Climb Vy	67	73	76	79	88	80	75	
Best Angle of Climb Vx	55	59	60	60	72	70	63	
Cruise/Normal Climb	70-80	75-85	75-85	75-85	90-100	80	97	
Glide Flaps Up Flaps Down	60	65	65	65 60	3100-81 2600-74 2100-67	74 65(20°)	73	
Maneuvering Va Max Wt Minimum Wt	1670-104 1350-93	2300-97 1600-80	2400-99 1600-82	2450-99 1600-82	3100-112 2100-91	2150-116	2325-11 1531-88	
Flap Extension	85	0-10°-110 10-40°-85	0-10°-110 10-30°-85	0-10°-110 10-40°-85	0-10°-140 10-40°-95	90	103	
Demonstrated Cross Wind	12	15	15	15	18	20T/O 17 LDG	17	
Final Approach Speed Flaps Up Flaps Down								
Short Field Take Off Flaps Climb @ 50'	10° 54	UP 59	10° 56	10° 57	20° 59	20° 62	25° 52	
Short Field Landing Full Flaps	54	60	61	62	64	65	63	
Gear Max operation Max extended	N/A	N/A	N/A	N/A	140 140	N/A	N/A	
Recommended Entry Speeds Chandles Lazy Eights	95 95	105 105	105 105 105	105 105 105	Not Listed	Not Listed	III III	

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Steep Turns	95	105	Slow	Slow			
Spins	Slow	Slow	Deceleration	Deceleration	Prohibited	Prohibited	Prohibited
Stalls	Deceleration	Deceleration					

1. Maneuvering Speed (V_A) at Maximum Weight. V_A decreases as weight decreases, refer to specific aircraft operating handbook for airspeeds at other weights.
2. Approach speeds for approaches with full flaps. Refer to specific aircraft operating handbook for speeds at different flap settings.

2. TRANSITIONS

A. Level Flight to Best Rate or Cruise Climb

- (1) Increase pitch to Best Rate (V_y) or cruise climb attitude and simultaneously advance full throttle.
- (2) Trim for best rate or cruise climb.
- (3) Complete enroute checklist.

B. Level Flight to Enroute Descent

- (1) Reduce power and apply carburetor heat per each aircraft.
- (2) Adjust pitch to enroute descent attitude for desired airspeed.
- (3) Trim for enroute descent.
- (4) Complete "Descent Checklist."

C. Climb to Level Cruise Flight

- (1) Decrease pitch to level flight attitude.
- (2) Allow airspeed to increase to approximate cruising airspeed.
- (3) Reduce power to selected cruise power.
- (4) Trim for level flight.
- (5) Complete "Cruise Checklist."

D. Descent to Level Cruise Flight

- (1) Increase pitch to level flight attitude.
- (2) Adjust power to selected cruise power.
- (3) Trim for level flight.
- (4) Complete "Cruise Checklist."

E. Descent to Climb

- (1) Carburetor heat OFF as applicable.
- (2) Increase pitch to cruise climb attitude and fully advance throttle.
- (3) Trim for cruise climb.
- (4) Complete "Enroute Climb Checklist."

3. TAXIING (TASK II D)

- A. Check brakes immediately after airplane begins moving during initial taxi.
- B. Control safe taxi speed with throttle and without excessive use of brakes.
- C. Position controls for existing wind conditions.
- D. Complies with ATC direction, marking on taxiways.

4. TRAFFIC PATTERN OPERATIONS (TASK III B)

A. Entry

- (1) Complete “Before Landing Checklist” prior to turning downwind.
- (2) Enter at 45° to the downwind at a point abeam of midpoint of the runway in use unless directed otherwise by Air Traffic Control.
- (3) Use power and airspeeds per aircraft POH / desired.

B. Downwind Leg

- (1) Maintain ground track parallel to and ½ to 1 mile out from landing runway.
- (2) Maintain traffic pattern altitude ±100 feet.
- (3) Complete “Before Landing Checklist” and gear down no later than abeam midpoint of runway when entering downwind leg from crosswind leg.
- (4) Apply carburetor heat, reduce power, maintain attitude, verify speed is within the white arc, extend flaps 1st notch (10°). Decelerate to pattern speed (±5 KIAS) abeam of intended touchdown point.
- (5) Turn base when intended touchdown point is approximately 45° behind wing.

C. Base Leg

- (1) Maintain desired airspeed (±5 KIAS) during turn to base leg.
- (2) Maintain ground track perpendicular to extended centerline of runway.
- (3) Extend Flaps to 2nd notch (20-25°).
- (4) Turn final with a relatively shallow angle of bank (20°) so as to roll out on extended centerline of runway at least ¼ mile from approach end of runway.

D. Final Approach Leg

- (1) Maintain ground track over extended centerline of runway.
- (2) Extend flaps to final setting when assured of landing, considering winds.
- (3) Gump check.
- (4) Reduce airspeed as appropriate for type approach and landing.
- (5) Adjust pitch and power as necessary to maintain airspeed and descent angle.
- (6) Complete landing.
- (7) Exit runway at next taxiway or as directed, stop airplane, complete “After Landing Checklist”, and contact ground control as directed.

E. Upwind Leg

- (1) Maintain ground track over centerline or extended centerline of runway.
- (2) Climb at airspeed appropriate to type of takeoff until reaching safe maneuvering altitude.
- (3) If remaining in traffic pattern, turn crosswind at 300 feet below traffic pattern altitude (or 1200 feet MSL at KBLV) and beyond departure end of runway. If departing traffic pattern, continue straight ahead or turn 45° from the takeoff leg when within 300 feet of traffic pattern altitude or as directed by ATC.

F. Crosswind

- (1) Maintain ground track perpendicular to extended centerline of runway.
- (2) Turn downwind approximately ½ to 1 mile out from landing runway.

5. NORMAL AND CROSSWIND TAKEOFF AND CLIMB (TASK IV A)

A. Complete “Normal Takeoff Checklist”.

B. Flaps – UP or per POH / aircraft checklist.

C. Align airplane on runway centerline.

- D. Determine wind direction and speed, and hold full aileron into wind.
- E. Advance throttle smoothly to maximum power.
- F. Maintain directional control on runway centerline.
- G. Adjust ailerons as necessary for existing wind conditions to maintain wings level.
- H. Verbally verify airspeed alive, engine instruments normal.
- I. Lift off at recommended airspeed and accelerate to $V_Y \pm 5$ KIAS.
- J. Retract landing gear if appropriate and flaps after a positive rate of climb is established.
- K. Climb at $V_Y \pm 5$ KIAS with takeoff power until traffic pattern altitude or safe maneuvering altitude.
- L. Maintain ground track over extended runway centerline until a turn is required.
- M. Use noise abatement procedures as required.
- N. Complete "Enroute Climb Checklist."

6. SHORT-FIELD TAKEOFF AND MAXIMUM PERFORMANCE CLIMB (TASK IV E)

- A. Complete "Short-Field Takeoff Checklist"
- B. Flaps – Per POH / Checklist
- C. Position aircraft for maximum runway availability and align with centerline.
- D. Determine wind direction and speed and apply full aileron into wind.
- E. Apply brakes and smoothly advance throttle to maximum take off power.
- F. Check engine instruments and release brakes.
- G. Adjust pitch attitude (approximately level pitch) to attain maximum rate of acceleration.
- H. Maintain directional control on runway centerline.
- I. Adjust ailerons as necessary for existing wind conditions and maintain wings level.
- J. Lift off at recommended speed and accelerate to V_X or recommended obstacle clearance airspeed.
- K. Climb at recommended obstacle clearance airspeed or $V_X + 5$ KIAS/-0 KIAS until obstacle is cleared, or at least 50 feet above the surface, then accelerate to $V_Y \pm 5$ KIAS.
- L. Retract landing gear if appropriate after clear of any obstacles or as recommended by manufacturer.
- M. Slowly retract flaps at safe altitude (at least 200' AGL).
- N. Maintain $V_Y \pm 5$ KIAS and takeoff power until traffic pattern altitude or safe maneuvering altitude.
- O. Maintain ground track over extended runway centerline until a turn is required.
- P. Complete "Enroute Climb Checklist".

7. SOFT-FIELD TAKEOFF AND CLIMB (TASK IV C)

- A. Complete “Soft-Field Take Off Checklist”.
- B. Flaps – Per POH / Checklist.
- C. Align aircraft on takeoff path without stopping.
- D. Determine wind direction and speed, and apply full aileron into wind.
- E. Advance throttle smoothly and positively to maintain maximum power.
- F. Check engine instruments.
- G. Adjust and maintain pitch attitude which transfers weight from wheels to wings as rapidly as possible.
- H. Maintain directional control on center of takeoff path.
- I. Adjust ailerons as necessary for existing wind conditions to maintain wings level.
- J. Liftoff at slowest possible airspeed and remain in ground effect while accelerating.
- K. Accelerate to and maintain V_X or $V_Y \pm 5$ KIAS as appropriate to a safe maneuvering altitude.
- L. Slowly retract flaps at safe altitude (at least 200’ AGL).
- M. Retreat gear after positive rate of climb per Checklist / POH.
- N. Maintain $V_Y \pm 5$ KIAS and takeoff power until traffic pattern altitude or safe maneuvering altitude.
- O. Complete “Enroute Climb Checklist”.

8. NORMAL AND CROSSWIND APPROACH AND LANDING (TASK IV B)

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete “before landing checklist” and gear down no later than abeam mid point.
- C. Apply carburetor heat as applicable and reduce power per aircraft procedures, lower the flaps One Notch (10°), maintain altitude, and decelerate to downward approach speed abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Extend flaps second Notch ($20-25^\circ$).
- F. Turn final and maintain proper ground track.
- G. Extend final flaps to desired setting considering wind.
- H. Gumps check.
- I. Reduce airspeed to final approach speed.
- J. Adjust pitch and power as necessary to maintain stabilized airspeed and descent angle.
- K. Smoothly reduce power to idle over aim point.
- L. Transition from approach to level altitude approximately 10 to 15 feet above runway by applying back elevator pressure and crosswind correction as necessary.

- M. Touch down smoothly at approximate stalling speed, at or within (beyond) 200 feet of intended touchdown point, with no appreciable drift, and airplane's longitudinal axis aligned with and over runway center landing path.
- N. Maintain directional control during ground roll by increasing aileron deflection into the wind as necessary.
- O. Complete appropriate checklist after a full stop or after clearing runway.

9. SOFT-FIELD APPROACH AND LANDING (TASK IV D)

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete "Before Landing Checklist" and gear down no later than a beam midpoint of runway.
- C. Apply carburetor heat as applicable and reduce power to pattern power, lower flaps one notch (10°), maintain altitude, and decelerate to downward speed abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Extend flaps to second notch (20-25°).
- F. Turn final and maintain proper ground track.
- G. Extend flaps to final setting considering wind.
- H. Gump check.
- I. Reduce airspeed to recommended soft-field approach airspeed.
- J. Adjust pitch and power as necessary to maintain a stabilized approach and recommended airspeed ± 5 Knots considering wind gust factor and descent angle.
- K. Reduce airspeed to recommended speed including gust factor as necessary on short final.
- L. Maintain enough power during landing to make a soft touch down.
- M. Transition from approach to landing attitude approximately 10-15 feet above runway by using elevator pressure and apply crosswind correction as necessary.
- N. Touch down smoothly at minimum descent rate and ground speed with no appreciable drift and airplane's longitudinal axis aligned with and over runway centerline.
- O. Hold nose wheel off landing surface as long as possible by applying back elevator pressure.
- P. Maintain directional control during after-landing roll.
- Q. Maintain sufficient power and apply full back elevator pressure while taxiing on soft surface.
- R. Complete appropriate check list after a full stop or clearing runway.

10. SHORT-FIELD APPROACH AND LANDING (TASK IV F)

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete "Before Landing Checklist and gear down no later than a beam midpoint of runway.
- C. Apply carburetor heat as appropriate and reduce power to recommended setting, lower flaps one notch (10°), maintain altitude, and decelerate to downward pattern speed abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.

- E. Extend flaps second notch (20-25°).
- F. Turn final and maintain proper ground track.
- G. Extend flaps to final setting (30-40°).
- H. Gump check.
- I. Reduce airspeed to final approach speed.
- J. Adjust pitch and power as necessary to maintain a stabilized approach and recommended airspeed ± 5 Knots with wind gust factor applied and descent angle that will ensure safe obstacle clearance.
- K. Transition from approach to landing altitude approximately 10 to 15 feet above runway by applying back elevator pressure and crosswind correction as necessary.
- L. Touch down at and within 100 feet beyond intended touchdown point at minimum control airspeed, with minimum float and no appreciable drift, and airplane's longitudinal axis aligned with and over runway centerline.
- M. Maintain crosswind correction and directional control throughout the approach and after landing by increasing aileron deflection into the wind as necessary.
- N. Retract flaps and apply brakes to stop in shortest distance consistent with safety.
- O. Complete appropriate checklist after a full stop or clearing runway.

11. POWER-OFF 180 ACCURACY APPROACH AND LANDING (TASK IV K)

- A. Position aircraft on downwind leg, parallel to runway at pattern altitude.(not more than 1000' AGL)
- B. Abeam selected/specified touchdown point, close throttle and establish glide speed.
- C. Configure aircraft for landing with gear and flaps.
- D. Touch down at or within 200 of the selected/specified touch down point.
- E. Complete appropriate checklist after a full stop or clearing runway.

12. GO-AROUND FROM A REJECTED LANDING AS APPLICABLE (TASK IV L)

- A. Make a timely decision to discontinue the approach to landing.
- B. Apply take off power immediately to climb pitch attitude for V_y and maintain $V_y \pm 5$ Kts.
- C. Retract flaps as appropriate to recommended setting.
- D. Retract landing gear (if appropriate) after a positive rate of climb is established.
- E. Retract remaining flaps
- F. Maneuver to side of runway to clear/avoid conflicting traffic.
- G. Maintain take off power and $V_y \pm 5$ Knots to a safe maneuvering altitude.
- H. Complete appropriate checklist.

13. STEEP TURNS (TASK V A)

- A. Complete clearing turns.
- B. Select and maintain altitude that will allow maneuver to be performed no lower than 1500 feet AGL.
- C. Enter at manufacturer's recommended airspeed, or a safe airspeed not to exceed V_a .
- D. Roll into coordinated 360 degree turn while maintaining bank angle of at least 50 degrees ± 5 degrees and roll out on the entry heading ± 10 degrees and reverse the turn for 360 degree turn in opposite direction. Maintain the entry altitude ± 100 feet and airspeed ± 10 KIAS.

14. STEEP SPIRAL (TASK V B)

- A. Select altitude to allow completion of at least three 360 degree turns ending at least 1500 AGL.
- B. Select a suitable ground reference point.
- C. Start descent downwind and adjacent to the ground reference point at idle power and recommended airspeed (not less than best glide speed).
- D. Maintain a constant radius circle around the reference point with bank not exceeding 60 degrees \pm degrees at the steepest point.
- E. Clear engine after each 360 degrees of turn.
- F. Maintain selected airspeed ± 10 knots and roll out toward object or specified heading ± 10 degrees in a position to execute a practice emergency landing.

15. TURNS AROUND A POINT (TASK V B RELATED)

- A. Determine winds and select a suitable reference point.
- B. Enter downwind from upwind side at distance from the reference point equal to desired radius.
- C. Plan the maneuver so as to enter at 600 feet to 1000 feet AGL.
- D. Maintain V_a or less or manufacturer's recommended speed.
- E. Maintain two complete radius turns (760 degrees) using appropriate bank angles.
- F. Reverse course as directed.

16. CHANDELLES (AREA V TASK C)

- A. Complete clearing turns.
- B. Select an altitude to allow the maneuver to be performed no lower than 1500 feet AGL.
- C. Enter on a heading which will permit the maneuver to be initiated into the wind.
- D. Enter maneuver at V_a or manufacturer's recommended speed, straight and level.
- E. Establish and maintain an approximate 30 degree angle of bank to the 90 degree point of turn.
- F. Simultaneously apply / pitch and power to maintain a smooth coordinated climbing turn to the 90 degree point with a constant bank.
- G. Use maximum climb power for fixed pitch props and recommended climb power for constant speed props.

- H. Begin a coordinated constant rate roll out from the 90 degree point to the 180 degree reference point while maintaining power and constant pitch.
- I. Complete roll out at 180 degree point +- 10 degrees just above stall speed and maintaining that airspeed momentarily avoiding a stall.
- J. Resume straight and level flight with minimum loss of altitude.

17. LAZY EIGHTS (AREA V TASK D)

- A. Complete clearing turns.
- B. Select an altitude that will allow maneuver to be performed no lower than 1500' AGL.
- C. Select reference points.
- D. Enter maneuver at V_a or manufacturer's recommended speed, straight and level from a heading which will allow entry into the wind.
- E. Enter climbing turn toward the 45 degree reference point, attaining the maximum pitch-up attitude at approximately 10 knots above stall speed and 15 degree angle of bank passing through that point.
- F. Continue turn toward the 90 degree reference point, decreasing to level pitch attitude and increasing to 30 degree bank angle passing through that point.
- G. Continue descending turn toward the 135 degree reference point, decreasing pitch attitude to the lowest point and decreasing the bank angle to 15 degrees passing through that point.
- H. Continue turn to 180 degree reference point, increasing pitch to level attitude and rolling wings level at that point.
- I. Enter climbing turn in the opposite direction toward the selected reference points to complete the second half of the symmetrical loop.
- J. Continue maneuver through the number of specified symmetrical loops and resume straight-and-level flight.
- K. Achieve the following throughout the maneuver:
 - (1) Constant change of pitch and roll rate with approximately 30 degree bank at the steepest point.
 - (2) Altitude tolerance of +- 100' at 180 degree point from entry altitude.
 - (3) Airspeed tolerance of +- 10 kt at 180 degree point from entry airspeed.
 - (4) Heading tolerance of +- 10 degree at 180 degree point.

18. EIGHTS-ON-PYLONS (AREA VI)

- A. Complete clearing turn.
- B. Select suitable ground reference points (pylons) that will permit approximately 3 to 5 seconds of straight-and-level flight between pylons.
- C. Enter maneuver at pivotal altitude AGL based on ground speed ($GS \text{ in knots} \div 11.3$).
- D. Enter maneuver at V_a or less.
- E. Maintain line-of-sight reference line on pylon with bank angle of approximately 30 to 40 degrees at the steepest point.

- F. Hold pylon using appropriate pivotal altitude avoiding slip's and skids.

19. MANUVERING DURING SLOW FLIGHT (TASK VIII A)

- A. Complete clearing turns.
- B. Select altitude to complete no lower than 1500 degree feet AGL.
- C. Carburetor heat ON as applicable.
- D. Reduce power per aircraft checklist.
- E. Establish and maintain an air speed which any further increase in angle of attack, increase in load factor or reduction in power will result in an immediate stall (stall horn barely on).
- F. Maintain coordinated straight, turning flight specified bank angle +5 degrees, climbs, and descents in various configurations and bank angles as specified by instructor / examiner
- G. Maintain specified altitude +-50 feet and heading +-10 degree, airspeed +5/-0 knots, and specified angle of bank; +-5 degrees.

20. STALLS – POWER – ON/OFF (TASK VIII B+C)

- A. Complete clearing turns.
- B. Select entry altitude that will allow recovery to be completed no lower than 1500 feet AGL.
- C. Carburetor heat ON per checklist.
- D. Reduce power appropriate to aircraft.
- E. Maintain assigned altitude and heading as aircraft slows to desired airspeed to initiate a stall.
- F. Establish either a takeoff, climb, or approach configuration with appropriate power settings.
- G. Establish a pitch attitude on a constant heading +-10 degree, or a specified angle of bank not to exceed 20 degrees +-5 degrees in turning flight that will induce a stall.
- H. Recognize and promptly recover as the stall occurs by simultaneously reducing the angle of attack, increasing power to the maximum allowable, leveling wings, and placing carburetor heat OFF as appropriate to regain normal flight with minimum loss of altitude.
- I. Retract flaps to recommended settings, retracts landing gear after a positive rate of climb is established as appropriate.
- J. Establish V_x or V_y before final flaps retraction.
- K. Accelerate and continue positive rate of climb to altitude, heading, and airspeed as specified.

21. EMERGENCY APPROACH AND LANDING (SIMULATED) (TASK IX A)

- A. Complete clearing turns.
- B. Carburetor heat ON as required and throttle closed to simulate emergency approach and landing.
- C. Establish and maintain the recommended best-glide airspeed +-10 kt.
- D. Select and fly directly to suitable landing area.

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- E. Determine reason for malfunction: check fuel selector ON, mixture RICH, carburetor heat ON as appropriate, magnetos BOTH, and primer IN and LOCKED. Use checklist if time and altitude permit.
- F. Initiate MAYDAY on frequency in use or 121.5.
- G. Enter code 7700 on transponder.
- H. Continue descent and plan flight pattern to selected area considering altitude, wind, obstacles, size of field, and other factors.
- I. Secure failed engine. Complete emergency landing with/without engine power checklist, as appropriate.
- J. After assured of making selected area, gear up extend full flaps.
- K. On short final, master OFF and doors UNLatched.
- L. Touch down with nose high attitude.