

**PRIVATE PILOT  
MANEUVER GUIDE  
July 2003**

## FORWARD

The Scott Aero Club Private Pilot Maneuver guide describes the manner in which private 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. Indicated airspeed and power settings are general to all Scott Aero Club primary training aircraft (Cessna 152, 172, and Piper PA-28). Some variation may occur due to specific make and model. Specifically, substitute one notch of flaps in the PA-28 for 10° in the Cessnas, two notches for 20°, and three notches for 30°. This maneuver guide is consistent with the FAA Private Pilot Practice Test Standards and the FAA Flight Training Handbook. 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.

For each maneuver, a reference is made to the Area of Operation and Task of the Private Pilot Airplane Single Engine Land Practical Test Standard (FAA-S-8081-14A, August 2002) and the page number of the Airplane Flying Handbook (FAA-H-8083-3 Revised 1999) where they are described.

PTS = Practical Test Standard

AFH = Airplane Flying Handbook

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	3
1. SPEEDS AND POWER SETTINGS.....	5
2. TRANSITIONS.....	5
3. TAXIING.....	5
4. TRAFFIC PATTERN OPERATIONS .....	6
5. NORMAL AND CROSSWIND TAKEOFF AND CLIMB.....	7
6. SHORT-FIELD TAKEOFF AND CLIMB .....	7
7. SOFT-FIELD TAKEOFF AND CLIMB .....	8
8. FULL STALLS - POWER OFF .....	9
9. FULL STALLS - POWER ON.....	9
10. SLOW FLIGHT.....	10
11. STEEP TURNS .....	10
12. RECTANGULAR COURSE .....	10
13. S-TURNS .....	11
14. TURNS AROUND A POINT.....	11
15. EMERGENCY APPROACH AND LANDING (SIMULATED) .....	11
16. NORMAL AND CROSSWIND APPROACH AND LANDING .....	12
17. SOFT-FIELD APPROACH AND LANDING .....	12
18. SHORT-FIELD APPROACH AND LANDING.....	13
19. FORWARD SLIPS AND LANDING.....	13
20. GO-AROUND FROM A REJECTED LANDING .....	14
21. EMERGENCY DESCENT .....	14
22. AIRSPEEDS TABLE .....	14

*Private Pilot Maneuver Guide*

## **1. SPEEDS AND POWER SETTINGS**

Cruise Climb	80 KIAS and Full Throttle
Cruise	2300 RPM - Local Flight (~100 KIAS) Cruise Chart in POH - Cross Country Flight
Enroute Descent	100 KIAS and 2000 RPM
Slow Flight	Airspeed just above Stall and Flaps as assigned; Throttle as Required

## **2. TRANSITIONS**

### **A. Level Flight to Best Rate or Cruise Climb**

- (1) Increase pitch to  $V_Y$  or cruise climb attitude (80 KIAS) and simultaneously advance full throttle.
- (2) Trim for best rate or cruise climb.
- (3) Complete "enroute climb checklist."

### **B. Level Flight to Enroute Descent**

- (1) Carburetor heat ON. (C-152, C-172N, C-172P Only).
- (2) Reduce power to 2000 RPM.
- (3) Adjust pitch to enroute descent attitude (100 KIAS).
- (4) Trim for enroute descent.
- (5) Complete "Descent Checklist."

### **C. Climb to Level Cruise Flight**

- (1) Decrease pitch to level flight attitude.
- (2) Allow airspeed to increase to 95 KIAS.
- (3) Adjust power to cruise performance chart in POH.
- (4) Complete "Cruise Checklist."

### **D. Descent to Level Cruise Flight**

- (1) Increase pitch to level flight attitude.
- (2) Adjust power to cruise performance chart in POH.
- (3) Carburetor heat OFF.
- (4) Trim for level flight.
- (5) Complete "Cruise Checklist."

### **E. Descent to Climb**

- (1) Carburetor heat OFF. (C-152, C-172N, C-172P Only).
- (2) Increase pitch to cruise climb attitude (80 KIAS) and fully advance throttle.
- (3) Trim for cruise climb.
- (4) Complete "Enroute Climb Checklist."

## **3. TAXIING**

- 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.

## **4. TRAFFIC PATTERN OPERATIONS**

### **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.

### **B. Downwind Leg**

- (1) Maintain ground track parallel to and approximately ¼ to ½ mile out from landing runway.
- (2) Maintain traffic pattern altitude ± 100 feet.
- (3) Complete “Before Landing Checklist” no later than abeam midpoint of runway when entering downwind leg from crosswind leg.
- (4) Abeam touchdown point, apply carburetor heat, reduce power to approximately 1500 RPM. Maintain attitude with pitch control. Verify speed is within the white arc, extend flaps 10° (PA-28: One Notch). Decelerate to 70 KIAS abeam of intended touchdown point.
- (5) Turn base when intended touchdown point is approximately 45° behind wing.

### **C. Base Leg**

- (1) Maintain 70 KIAS during turn to base leg.
- (2) Maintain ground track perpendicular to extended centerline of runway, flaps 20°, (2nd Notch).
- (3) Turn final with a maximum 20° angle of bank so as to roll out on extended centerline of runway at least ¼ mile from approach end of runway.

### **D. Final Approach**

- (1) Maintain ground track over extended centerline of runway.
- (2) Extend flaps to 30° (C-172N: 40°; PA-28: 3rd Notch) when assured of landing, unless winds preclude full flaps.
- (3) Reduce airspeed as appropriate for type approach and landing.
- (4) Adjust pitch and power as necessary to maintain airspeed and descent angle.
- (5) Complete landing.
- (6) Exit runway at next taxiway or as directed, if full stop, clear runway, stop airplane, complete “After Landing Checklist”, and contact ground.

### **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 traffic pattern 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 from the takeoff leg when within 300 feet of traffic pattern altitude. Avoid flying over the housing area.

### **F. Crosswind**

- (1) Maintain ground track perpendicular to extended centerline of runway.
- (2) Climb at airspeed appropriate to type takeoff until reaching traffic pattern altitude.

## **5. NORMAL AND CROSSWIND TAKEOFF AND CLIMB**

- A. Complete “Normal Takeoff Checklist”.
- B. Flaps -- UP.
- 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.
- H. Verbally verify airspeed alive, engine instruments normal.
- I. Lift nose wheel at recommended airspeed and accelerate to  $V_Y$ .
- J. Climb at  $V_Y$  with takeoff power until traffic pattern altitude or safe maneuvering altitude.
- K. Maintain ground track over extended runway centerline until a turn is required.
- L. Comply with Local Noise Abatement Procedures.
- M. Complete “Enroute Climb Checklist.”

## **6. SHORT-FIELD TAKEOFF AND CLIMB**

- A. Complete “Short-Field Takeoff Checklist” appropriate for aircraft.
- B. Position aircraft at beginning of runway aligned on centerline.
- C. Determine wind direction and speed; hold full aileron into wind.
- D. Apply brakes and smoothly advance throttle to maximum power.
- E. Check engine instruments and release brakes.
- F. Adjust pitch attitude (approximately level pitch) to attain maximum rate of acceleration.
- G. Verbally verify airspeed alive, engine instruments normal.
- H. Maintain directional control on runway centerline.
- I. Adjust ailerons as necessary for existing wind conditions.
- J. Rotate at recommended airspeed and accelerate to  $V_X$ .
- K. Climb at  $V_X$  until obstacle is cleared, or at least 50 feet above the surface, then accelerate to
- L. Slowly retract flaps at safe altitude and airspeed (greater than 200 feet). Last flap retraction at  $V_Y$ .
- M. Maintain  $V_Y$  and takeoff power until traffic pattern altitude or safe maneuvering altitude.
- N. Maintain ground track over extended runway centerline until a turn is required.
- O. Complete “Enroute Climb Checklist”.

## **7. SOFT-FIELD TAKEOFF AND CLIMB**

- A. Complete “Soft-Field Take Off Checklist” appropriate for aircraft.
- B. Taxi with full nose up elevator.
- C. Set Flaps as specified in the aircraft POH.
- D. Align aircraft on takeoff path without stopping.
- E. Determine wind direction and speed; hold full aileron into wind.
- F. Advance throttle smoothly, maintain maximum power.
- G. Verbally verify airspeed alive, engine instruments normal.
- H. Adjust and maintain pitch attitude that transfers weight from wheels to wings as rapidly as possible.
- I. Maintain directional control on center of takeoff path.
- J. Adjust ailerons as necessary for existing wind conditions.
- K. Liftoff at slowest possible airspeed and remain in ground effect while accelerating.
- L. Accelerate to and maintain  $V_X$  or  $V_Y$  as appropriate.
- M. Slowly retract flaps at safe altitude and airspeed (greater than 200 feet AGL). Last flap retraction at  $V_Y$ .
- N. Maintain  $V_X$  or  $V_Y$  and takeoff power until traffic pattern altitude or safe maneuvering altitude.
- O. Maintain ground track over extended centerline of runway until a turn is required.
- P. Complete “Enroute Climb Checklist”.

## **8. FULL STALLS - POWER OFF**

- 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. (C-152, C-172N, C-172P Only).
- D. Reduce power to 1500 RPM.
- E. Maintain assigned altitude and heading as aircraft slows to normal approach speed.
- F. Extend full flaps (in steps) once aircraft is at or below  $V_{FE}$ .
- G. Establish a stabilized glide at 65 KIAS on a constant heading or with up to  $20^\circ$  angle of bank.
- H. Reduce power to IDLE and increase pitch to landing attitude.
- I. Maintain a specific heading  $\pm 10^\circ$ , and angle of bank not to exceed  $20^\circ$  if in turning flight, while inducing a stall.
- J. Maintain landing attitude by steadily increasing back elevator deflection until a full stall occurs.
- K. Recognize and announce indications of the stall and promptly recover by simultaneously adding full power, decreasing angle of attack, leveling wings using rudder, and placing carburetor heat OFF to regain normal flight attitude.
- L. Retract flaps  $20^\circ$ , (PA-28: Retract One Notch) accelerate to  $V_X$ , establish a positive rate of climb, and maintain a constant heading.
- M. Accelerate to  $V_Y$  and slowly retract remaining flaps while maintaining positive rate of climb, avoiding secondary stalls, excessive airspeed or altitude loss, spins and flight below 1500 AGL. Last flap retraction at  $V_Y$ .

## **9. FULL STALLS - POWER ON**

- A. Complete clearing turns.
- B. Select entry altitude that will allow recovery to be completed no lower than 1500 AGL.
- C. Carburetor heat ON. (C-152, C-172N, C-172P Only).
- D. Reduce power to 1500 RPM.
- E. Maintain assigned altitude and heading as aircraft slows to normal rotation speed.
- F. Maintain constant heading or, if stall is to be done in a turn, establish maximum  $20^\circ$  angle of bank.
- G. At 60 KIAS, apply full power, carburetor heat OFF (If Applicable), and induce a pitch attitude that will produce a full stall.
- H. Recognize and announce indications of the stall and promptly recover by decreasing angle of attack, leveling the wings, and regaining a normal flight attitude.
- I. Avoid secondary stalls, excessive airspeed, or altitude loss, spins, and flight below 1500 AGL.
- J. Accelerate to  $V_X$ , establish a positive rate of climb and maintain a constant heading.
- K. Accelerate to  $V_Y$  and continue positive rate of climb.

## **10. SLOW FLIGHT**

- A. Complete clearing turns.
- B. Select altitude lower than 1500 feet.
- C. Carburetor heat ON. (C-152, C-172N, C-172P Only).
- D. Reduce power to 1500 RPM.
- E. Maintain assigned altitude and heading at an airspeed which any further increase in angle of attack, increase in load factor, or reduction in power will cause an immediate stall.
- F. Maintain coordinated straight, turning flight at assigned bank angle, climbs, and landing approach descents in various configurations and bank angles.
- G. Maintain the specified altitude  $\pm 100$  feet, the specified heading  $\pm 10^\circ$  and airspeed  $+10/-0$  KIAS.
- H. Maintain specified heading  $\pm 10^\circ$  and level off from climbs and descents within 100 feet.
- I. Maintain specified angle of bank ( $\pm 10^\circ$  if in turning flight).

## **11. STEEP TURNS**

- 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  $V_A$  or the recommended entry for the airplane.
- D. Roll into a coordinated  $360^\circ$  turn while maintaining a  $45^\circ$  bank angle  $\pm 5^\circ$  and roll out on the entry heading  $\pm 10^\circ$ .
- E. Maintain the entry altitude  $\pm 100$  feet and airspeed  $+ 10$  KIAS.

## **12. RECTANGULAR COURSE**

- A. Determine winds and select a suitable rectangular course, boundaries of which are approximately one mile in length and one of which is parallel to the wind.
- B. Enter from upwind side parallel to course boundary, approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  mile from boundary.
- C. Plan the maneuver to enter at 600 feet to 1000 feet AGL.
- D. Maintain 95 KIAS ( $\pm 10$  KIAS).
- E. Maintain uniform distance outside course.
- F. Start and complete turns using appropriate bank angle abeam course boundaries.
- G. Reverse course as directed.

### **13. S-TURNS**

- A. Determine winds and select a suitable reference line perpendicular to the wind.
- B. Plan the maneuver to enter at 600 feet to 1000 feet AGL.
- C. Enter from upwind side, perpendicular to reference line.
- D. Maintain 95 KIAS ( $\pm 10$  KIAS).
- E. Maintain constant radius turns of appropriate bank angle on each side of reference line, and plan rollout to be straight and level directly over and perpendicular to reference line.

### **14. TURNS AROUND A POINT**

- A. Determine winds and select a suitable reference point.
- B. Enter left turn from upwind side at distance equal to desired radius.
- C. Plan the maneuver to enter at 600 feet to 1000 feet AGL.
- D. Maintain 95 KIAS ( $\pm 10$  KIAS).
- E. Maintain two complete radius turns using appropriate bank angle.
- F. Apply adequate wind drift correction to track a constant radius turn around the selected reference point.
- G. Reverse course as directed.

### **15. EMERGENCY APPROACH AND LANDING (SIMULATED)**

**NOTE: THIS MANEUVER IS NOT APPROVED FOR SOLO STUDENT FLIGHTS**

- A. Carburetor heat ON (C-152, C-172N, C-172P Only) and throttle closed to simulate emergency approach and landing.
- B. Establish and maintain best glide airspeed.
- C. Select and fly to suitable landing area.
- D. Determine reason for malfunction: Use specific aircraft checklist if time and altitude permit.
- E. Simulate initiating MAYDAY on Frequency in use or 121.5.
- F. Simulate entering code 7700 on transponder.
- G. Continue descent and plan flight pattern to selected area considering altitude, wind, obstacles, size of field, and other factors.
- H. Simulate securing failed engine. Complete "Emergency Landing With/Without engine Power Checklist" (As appropriate).
- I. After assured of making selected area, extend full flaps.
- J. On short final, simulate master switch OFF, fuel selector OFF, Mixture IDLE CUT OFF, throttle CLOSED, and door UNLATCHED.
- K. Do not descend below 500 feet AGL except to approved runways.

## **16. NORMAL AND CROSSWIND APPROACH AND LANDING**

- A. Enter and fly traffic pattern according to standard procedures.
- B. Complete before landing checklist.
- C. Apply carburetor heat (C-152, C-172N, C-172P Only) and reduce power to 1500 RPM, lower the flaps to 10° (PA-28: One Notch) maintain altitude, and decelerate to 70 KIAS abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Extend flaps 20° (PA-28: Second Notch).
- F. Turn final and maintain proper ground track.
- G. Extend flaps to 30° (PA-28: Third Notch).
- H. Reduce airspeed to 65 KIAS.
- I. Adjust pitch and power as necessary to maintain airspeed and descent angle.
- J. Smoothly reduce power to idle over threshold.
- 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 smoothly at approximate stalling speed, beyond and within 400 feet of intended touchdown point, with no appreciable drift, and airplane's longitudinal axis aligned with and over runway centerline.
- M. Maintain directional control during ground roll by increasing aileron deflection into the wind as necessary.

## **17. SOFT-FIELD APPROACH AND LANDING**

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete "Before Landing Checklist."
- C. Apply carburetor heat and reduce power to 1500 RPM, lower flaps to 10° (One notch in the Piper Warrior), maintain altitude, and decelerate to 70 KIAS abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Extend flaps to 20° (Second notch in Piper Warrior).
- F. Turn final and maintain proper ground track.
- G. Extend flaps 30° (Third notch in Piper Warrior).
- H. Reduce airspeed to recommended soft-field approach airspeed.
- I. Adjust pitch and power as necessary to maintain airspeed and descent angle.
- J. Reduce airspeed to 60 KIAS +10/-5 KIAS (include gust factor as necessary) on short final.
- K. Maintain approximately 1200 RPM during landing.
- L. Transition from approach to landing attitude approximately 10 feet above runway by using elevator pressure and apply crosswind correction as necessary.
- M. 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.

- N. Hold nose wheel off landing surface as long as possible by applying back elevator pressure.
- O. Maintain directional control during after-landing roll.
- P. Maintain sufficient power and apply full back elevator pressure while taxiing on soft surface.

## **18. SHORT-FIELD APPROACH AND LANDING**

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete “Before Landing Checklist.”
- C. Apply carburetor heat (C-152, C-172N, C-172P Only) and reduce power to 1500 RPM, lower flaps to 10° (PA-28: One Notch), maintain altitude, and decelerate to 70 KIAS abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Extend flaps to 20° (PA-28: Second Notch).
- F. Turn final and maintain proper ground track.
- G. Extend flaps 30° (PA-28: Third Notch).
- H. Reduce airspeed to 65 KIAS.
- I. Adjust pitch and power as necessary to maintain airspeed and descent angle that will ensure safe obstacle clearance.
- J. Reduce airspeed to recommended airspeed +10/-5 KIAS on short final.
- 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 beyond and within 200 feet of intended touchdown point, with minimum float and no appreciable drift, and airplane’s longitudinal axis aligned with and over runway centerline.
- M. Maintain directional control after landing on ground roll by increasing aileron deflection into the wind as necessary.
- N. Retract flaps, apply brakes and “up” elevator to stop in shortest distance consistent with safety.

## **19. FORWARD SLIPS AND LANDING**

- A. Enter and fly traffic pattern per standard procedures.
- B. Complete “Before Landing Checklist.”
- C. Apply carburetor heat and reduce power to 1500 RPM, maintain altitude, and decelerate to 70 KIAS abeam intended point of touchdown.
- D. Turn base when intended point of touchdown is approximately 45° behind wing.
- E. Turn final and maintain proper ground track.
- F. Reduce throttle to IDLE.
- G. Reduce airspeed to flaps UP approach speed.
- H. Establish forward slip by simultaneously lowering a wing into wind and applying opposite rudder.

## Private Pilot Maneuver Guide

- I. Adjust pitch and amount of slip as necessary to maintain airspeed, descent angle, and directional control.
- J. Transition from slip to normal approach approximately 50 feet above the runway.
- K. Transition from approach to landing attitude approximately 10 to 15 feet above runway by applying back elevator pressure and crosswind correction as necessary.
- L. Touch down smoothly at approximate stalling speed, beyond and within 400 feet of intended touchdown point, with no appreciable drift, and airplane' longitudinal axis is aligned with and over runway centerline.
- M. Maintain directional control during after landing roll by increasing aileron deflection into the wind as necessary.

### 20. GO-AROUND FROM A REJECTED LANDING

- A. Apply full power, Carburetor heat OFF, pitch to  $V_X$ , attitude, and retract or maintain flaps to 20° (PA-28: Second Notch).
- B. Establish a positive rate of climb and accelerate to  $V_Y$ .
- C. Retract flaps at a safe altitude and airspeed (greater than 200 feet AGL).
- D. Maneuver to the side of the runway to clear and avoid conflicting traffic.

### 21. EMERGENCY DESCENT

- A. Apply Carburetor heat ON. (C-152, C-172N, C-172P Only).
- B. Set power to IDLE.
- C. Flaps UP.
- D. Pitch for maximum airspeed ( $V_A$  in turbulent air,  $V_{NO}$  in smooth air).
- E. Complete appropriate emergency checklists.

### 22. AIRSPEEDS TABLE

KIAS	$V_{S1}$	1.2 x $V_{S1}$	$V_{S0}$	1.2 x $V_{S0}$	1.3 x $V_{S0}$	$V_Y$	$V_X$	$V_{FE}$	$V_{NO}$	$V_{NE}$	$V_A$ <sup>1</sup>	Best Glide	Approach <sup>2</sup>	
													Normal	Short
<b>C-152</b>	40	48	35	42	46	67	55	85	111	149	104	60	65	54
<b>C-172N</b>	47	56	41	49	53	73	59	85	128	160	97	65	65	60
<b>C-172P</b>	44	53	33	40	43	76	60	85	127	158	99	65	70	61
<b>PA-28</b>	50	60	44	53	57	75	63	103	126	160	111	73	70	63

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.