


PRIVATE PILOT FLIGHT MANEUVERS

STEP BY STEP PROCEDURES PLUS PROFILES

BY BRAD DEINES

THIRD EDITION

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ABOUT THE AUTHOR

Brad Deines. As a boy, Brad first discovered his love for flying accompanying his father on charter flights in a small four seater single engine Cessna. Being only in the fourth grade, Brad was to short to see over the glare shield. So, with a briefcase beneath him to see out the windshield, the charter pilot gave him his first flying lesson. Takeoffs, climbs, cruise, descents, and landings, Brad did it all. You could not pry the smile off his face for weeks afterwards. It was shortly thereafter, he knew aviation would play a major role in his life.

Using his own money saved from working odd jobs, he began taking flying lessons when he was 16 years old at a local flight school in Casper, Wyoming. As with most pilots, he recalls vividly the first time he soloed. Not really knowing he was going to solo that day, his instructor told him to park the aircraft at the base of the control tower. After Brad shut the engine down, he wondered why his instructor had him park here. With a quick signature in Brad's logbook, the instructor jumped out and Brad was off on his own to do three takeoff and landings. To this day he still remembers shouting at the top of his lungs "YAHOOO!" as he flew his first downwind leg by himself.

He finished getting his Private Pilot's Certificate at the fixed base operator in Casper with just minimum flight time. As a matter of fact, the morning of his checkride, he had to fly a cross country as part of his minimum requirements. Even after he did that, he had to stay in the practice area doing maneuvers until he had the minimum 40 hours required by the Federal Aviation Administration.

To continue his flying education, he then applied and was accepted to attend Embry-Riddle Aeronautical University in Prescott, Arizona. A University known as the "Harvard of the Sky", where every subject Brad took had some connection to aviation. After four years, he left with a Bachelor of Science Degree in Aeronautical Science and a Commercial Multiengine Certificate with Instrument Privileges.

He then acquired his flight instructor ratings at a flight school located at Sky Harbor airport in Phoenix, Arizona. With a CFI and CFII in his hands now, he began giving instruction. He spent several years as a flight instructor and ground instructor. He then returned to his almamater to become a flight manager for Embry-Riddle teaching all levels of flight training. This included basic levels to the Boeing 737 simulator training program. Brad was also a certified check airman for Embry-Riddle Aeronautical University where he administered check rides for students testing for their Private Pilot Certificate, Commercial Pilot Certificate, Instrument Pilot Rating and Multi-engine license.

It was during this entire time as a flight instructor that he spent two years researching and writing this manual for his students. He wanted to give his students a comprehensive, professional manual covering all the flight maneuvers required to fly an airplane safely and efficiently.

Today, Brad is a captain for a major airline where he applies the procedures described in this manual on almost a daily basis.

Brad is the owner of Aero Tech Publications, a company which has specialized in aviation publications for over 10 years. He is also the author of:

Commercial Pilot Flight Maneuvers — Step by Step Procedures Plus Profiles.

Instrument Pilot Flight Maneuvers — Step by Step Procedures Plus Profiles.

Multi-Engine Pilot Flight Maneuvers — Step by Step Procedures Plus Profiles.

PREFACE

The purpose of this manual is to help in the explanation, visualization and execution of the flight maneuvers required for Private Pilot Practical Flight Test. Students preparing for their Private Pilot Certificate will find this manual helpful. Any pilot preparing for a Biennial Flight Review (BFR), can use this manual as a refresher on maneuvers that you may not have executed in quite some time. Flight Instructor applicants and Flight Instructors will find this manual a beneficial teaching aid. Instructors and flight schools can use this manual to develop thorough and standardized lesson plans.

Each maneuver is broken into six sections.

1. **Objective** — the Federal Aviation Administration's goal for a pilot as stated in the practical test standards.
2. **Completion Standards** — are taken from the Private Pilot Practical Test Standards. This details exactly what the Federal Aviation Administration requests of a pilot executing a maneuver. The limitations listed are the tolerances allowed on a Federal Aviation Administration's check ride. If these standards are not met, you will not pass your check ride.
3. **Description** — a brief explanation of the maneuver.
4. **Procedure** — a detailed step by step explanation of how to execute a maneuver as recommended by the Federal Aviation Administration. Each maneuver may vary slightly due to airplane type, manufacturer's recommendations, training environment and level. A Certified Flight Instructor will provide guidance on how the maneuver should vary for your particular situation.
5. **Reference** — contains the Federal Aviation Administration's Advisory Circulars (AC's) on which the previous sections are based. Page numbers are listed for location of additional information and easy reference on each flight maneuver. Since the FAA, or their designee, is the one testing you, it only makes sense to use the references they have based the test on and not other authors/publishers books. The FAA books can be downloaded for free at the FAA Standards web site http://av-info.faa.gov.
6. **Profiles** — most maneuvers also contain a graphic representation(s) of each maneuver. This graphic assists in visualizing the maneuver while summarizing the procedures and

completion standards. On most profile pages you will have a table where you can fill in your particular aircraft airspeeds, pitch attitudes, bank angles, power settings and configurations.

All airspeeds, pitch attitudes, bank angles, power settings and configurations are referenced from the 1984 Cessna 172P Pilot's Operating Handbook based on sea level, maximum gross weight, and standard atmospheric conditions. Airspeeds, pitch attitudes, bank angles and power settings may vary due to altitude, temperature, humidity, winds, aircraft weight and configurations. Consult your airplane Pilot's Operating Handbook and/or your flight instructor for the proper airspeeds, pitch attitudes, bank angles, power settings and configurations.

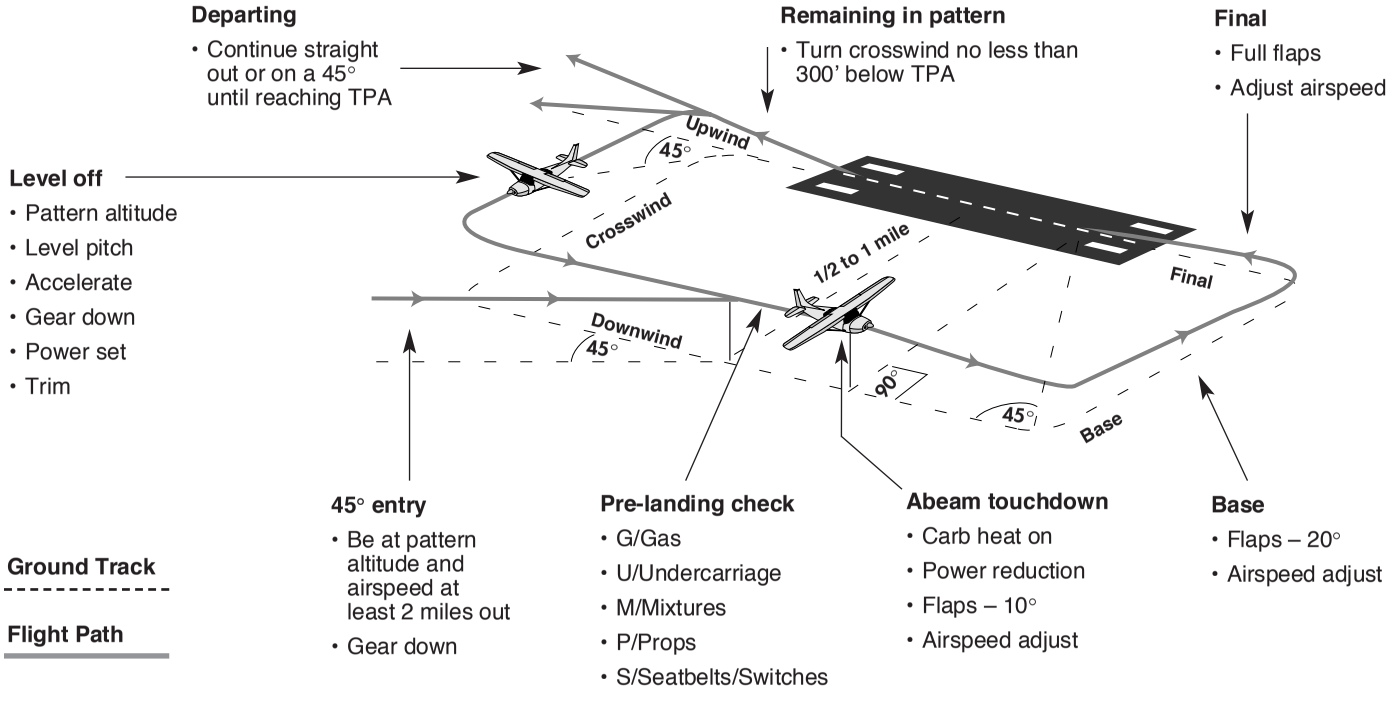
HOW TO USE THIS MANUAL

Before every flight lesson, know exactly what flight maneuvers will be practiced. Reference your flight syllabus for the maneuvers to study. Divide the list into two sections: **New Maneuvers** for the maneuvers your instructor is going to introduce or teach for the first time; and **Review Maneuvers,** for maneuvers you are familiar with but will be practicing on your next flight lesson.

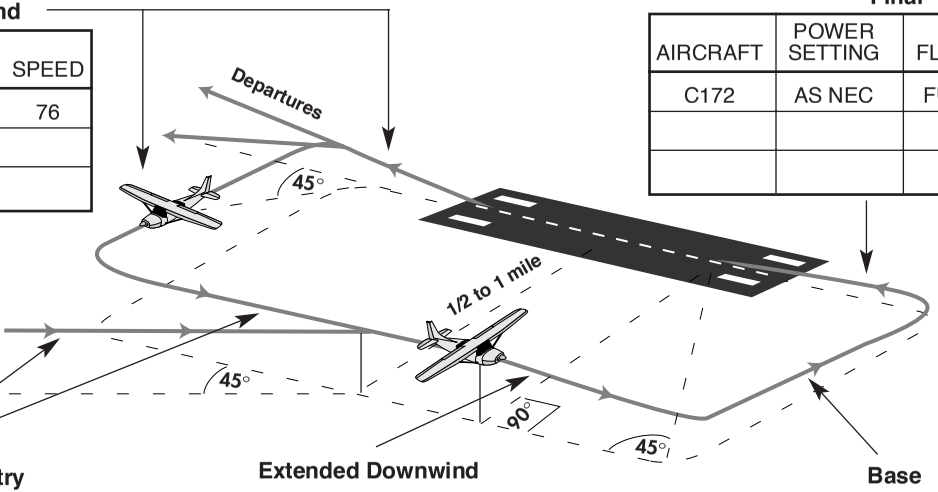
New Maneuvers — Start by reading the maneuver's six sections. If there are questions on a particular step in the maneuver, reference the appropriate Federal Aviation Administration Advisory Circular or other references listed for each maneuver. If an answer cannot be found, write it down and ask your instructor during the pre-flight briefing. Go over the procedure section several times until you every step memorized. Practice the maneuver by "chair flying" the step by step procedure. (Chair Flying - visually flying the maneuver in your comfortable chair at home). By doing all this preparation, you will impress your flight instructor with your knowledge and understanding of the maneuver before you even step into an airplane. Not to mention the money you will save in less dual flying time.

Review Maneuvers — The profile section in most cases will continue to refresh your memory on the steps required to complete the maneuver. If it has been several weeks since practicing this maneuver, it may be best to follow the steps listed for a new maneuver. Continue to "chair fly" the maneuver on your off days to maintain your proficiency.

TRAFFIC PATTERN OPERATIONS — 1



TRAFFIC PATTERN OPERATIONS — 2



Upwind/Crosswind

AIRCRAFT	POWER SETTING	SPEED
C172	FULL	76

Final

AIRCRAFT	POWER SETTING	FLAPS	SPEED
C172	AS NEC	FULL	65

Downwind/45° Entry

AIRCRAFT	POWER SETTING	SPEED
C172	2300	95

Extended Downwind

AIRCRAFT	POWER SETTING	FLAPS	SPEED
C172	1500	10°	80

Base

AIRCRAFT	POWER SETTING	FLAPS	SPEED
C172	1500	20°	70

Limitations — Altitude ±100 feet • Airspeed ±10 knots

NORMAL APPROACH AND LANDING

OBJECTIVE

To teach the private student the knowledge of the elements related to a normal approach and landing.

COMPLETION STANDARDS

1. Considers the wind conditions, landing surface, obstructions, and selects a suitable touchdown point.
2. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
3. Maintains a stabilized approach and the recommended airspeed, or in its absence, not more than 1.3 V_{S0}, +10/-5 knots, with gust factor applied.
4. Makes smooth, timely, and correct control application during the roundout and touchdown.
5. Remains aware of the possibility of wind shear and/or wake turbulence.
6. Touches down at or within 400 feet (120 meters) beyond a specified point.with no drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
7. Maintains crosswind correction and directional control throughout the approach and landing sequence.
8. Completes the appropriate checklist.

DESCRIPTION

The airplane is aligned and stabilized on final approach with final flap setting. Pitch and power are coordinated to remain stabilized on the desired glide path. At an appropriate altitude a transition to the landing attitude is made to allow a power off touchdown on the main gear. After touchdown, the airplane will be slowed to normal taxi speed on the runway centerline.

PROCEDURE

1. Prior to 300 feet AGL on final approach, stabilize the airplane with the final flap settings and recommended airspeed.
2. With the airplane stabilized, trim off control pressures.

3. During gusty conditions increase final approach speed by one-half the gust factor. So, if the wind is gusting to 12 knots, add 6 knots to your final approach speed.
4. Coordinate pitch and power to maintain the glide path that permits touchdown near stalling speed beyond and within 400 feet of a specified point.
5. At the appropriate flare altitude (10 to 20 feet AGL), slow the airplane descent rate by raising the pitch attitude and gradually reducing power to idle. The airplane will then settle onto the runway on the main gear in the landing attitude.
6. Maintain back pressure on the yoke throughout the landing roll.
7. Slow the airplane to taxi speed before leaving the runway centerline.

Note: FAR 91.103 requires takeoff and landing performance data to be computed prior to all flights.

References

Private Pilot Practical Test Standards FAA-S-8081-14A, pg. 1-11.
Airplane Flying Handbook FAA-H-8083-3, pg. 8-1 ⇒ 8-17.

CROSSWIND APPROACH AND LANDING

OBJECTIVE

To teach the private student the knowledge of the elements related to a crosswind approach and landing.

COMPLETION STANDARDS

1. Considers the wind conditions, landing surface, obstructions, and selects a suitable touchdown point.
2. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
3. Maintains a stabilized approach and the recommended airspeed, or in its absence, not more than 1.3 V_{S0}, +10/-5 knots, with gust factor applied.
4. Makes smooth, timely, and correct control application during the roundout and touchdown.
5. Remains aware of the possibility of wind shear and/or wake turbulence.
6. Touches down at or within 400 feet (120 meters) beyond a specified point.with no drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
7. Maintains crosswind correction and directional control throughout the approach and landing sequence.
8. Completes the appropriate checklist.

DESCRIPTION

The airplane is aligned on final approach with final flap setting as dictated by wind conditions. Pitch and power are coordinated to remain stabilized on the desired glide path. At a point prior to round out, a crosswind correction is established using the side-slip method. At an appropriate altitude, a round out is made to the landing attitude. A power off touchdown on the upwind main gear first occurs, followed by normal deceleration and slow application of full aileron into the wind.

PROCEDURE

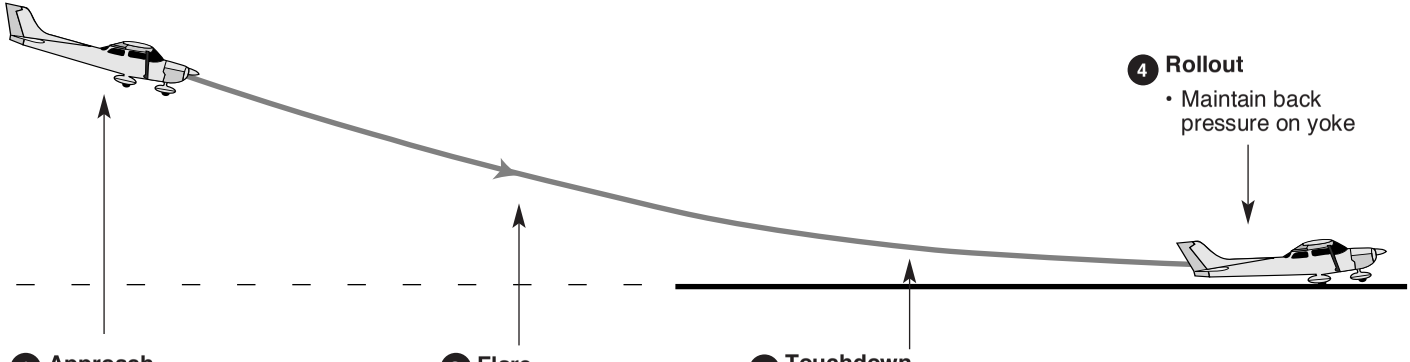
1. Once established on final approach, maintain runway alignment by use of an appropriate crab angle or side slip and extend the flaps to the final setting. The degree of flap setting will be determined by the existing conditions.
2. Use a final approach airspeed as recommended by the manufacturer. During gusty conditions increase final approach speed by one-half the gust factor. So, if the wind is gusting to 12 knots, add 6 knots to your final approach speed.
3. At a point prior to round out, drift correction will be maintained by establishing a side slip (wing-low) method of drift correction. (Apply aileron to control drift and opposite rudder to keep the airplane's longitudinal axis aligned with and over the runway centerline.)
4. Proper technique will result in a touchdown at approximate stall speed on the upwind main wheel first, followed by the downwind main wheel, then finally the nose wheel. Aileron deflection into the wind is increased to full during the landing roll out to prevent drift while rudder is used to maintain directional control.

Note: FAR 91.103 requires takeoff and landing performance data to be computed prior to all flights.

References

Private Pilot Practical Test Standards FAA-S-8081-14A, pg. 1-11.
Airplane Flying Handbook FAA-H-8083-3, pg. 8-1 ⇒ 8-17.

NORMAL/CROSSWIND APPROACH AND LANDING



1 Approach
- Maintain final approach speed
- Full flaps
- Maintain centerline

2 Flare
- 10 to 20 feet above ground begin flare
- Reduce power

3 Touchdown
- Power idle
- Landing attitude
- Main wheels first
- Let nose wheel down gently

4 Rollout
- Maintain back pressure on yoke

AIRCRAFT	APPROACH SPEED
C172	65

Limitations — Maintain approach speed +10/-5 Knots • Land within 400 feet of specified point

SHORT-FIELD APPROACH AND LANDING

OBJECTIVE

To teach the private student the knowledge of the elements related to a short-field approach and landing.

COMPLETION STANDARDS

1. Considers the wind conditions, landing surface, obstructions, and selects the most suitable touchdown point.
2. Establishes the recommended approach and landing configuration and airspeed; adjusts pitch attitude and power as required.
3. Maintains a stabilized approach and recommended approach airspeed, or in its absence, not more than 1.3 V_{S0}, +10/-5 knots, with gust factor applied.
4. Makes smooth, timely, and correct control application during the roundout and touchdown.
5. Touches down smoothly at minimum control speed
6. Touches down at or within 200 feet (60 meters) beyond a specified point, with no side drift, minimum float, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
7. Maintains crosswind correction and directional control throughout the approach and landing.
8. Applies brakes, as necessary, to stop in the shortest distance consistent with safety.
9. Completes the appropriate checklist.

DESCRIPTION

A maximum performance maneuver requiring the use of procedures and techniques for approach and landing at fields with a relatively short landing lengths. Also, where an approach must be made over obstacles limiting the available landing length.

PROCEDURE

1. Set full flaps.
2. Coordinate pitch and power to obtain approach speed and the desired descent angle.

3. Ensure the approach is stabilized prior to 300 feet AGL.
4. Coordinate pitch and power to maintain the descent rate and airspeed.
5. Start the round out and power reductions so as to arrive at the power off stall attitude, near stall speed and with the throttle reaching idle at touchdown.
6. Lower the nose-wheel to the runway.
7. Retract the flaps.
8. Bring yoke full aft.
9. As weight is transferred from the wings to the main gear, increase braking to stop in the shortest distance consistent with safety.

Note: FAR 91.103 requires takeoff and landing performance data to be computed prior to all flights.

References

Private Pilot Practical Test Standards FAA-S-8081-14A, pg. 1-15.
Airplane Flying Handbook FAA- H-8083-3, pg. 8-17 ⇒ 8-19.
Pilot Operating Handbook/Approved Flight Manual