



Learning Center Courses

Normal Approach and Landing





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Online Courses

Introduction

Overview



Improving your approach and landing skills in all kinds of conditions will make you a safer pilot. Based on content in the FAA's *Airplane Flying Handbook*, this course offers a basic refresher on some of the knowledge and skills needed to make consistently good landings in a normal situation (e.g., power available, light winds, long and firm runway). It covers the five phases of a normal landing: base leg, final approach, round out, touchdown, and after-landing roll.

While this course provides basic information, there is no substitute for training and practice with a well-qualified instructor. In addition, you must always follow the procedures recommended in the specific Aircraft Flight Manual (AFM).

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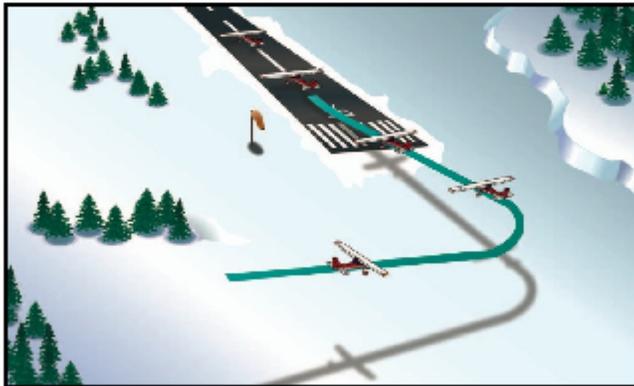
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Base Leg

Overview



A good landing begins with a good approach. Normally, you extend the landing gear and complete the before-landing check before reaching the base leg.

Placement of the base leg is especially important. It requires judgments on distance, altitude, effect of wind, and aircraft configuration. With a strong wind on final approach, for example, you need to position the base leg closer to the approach end of the runway than you would with a light wind or no flaps.

Basic Procedures

- ▶ After turning onto the base leg, reduce power and start the descent at an airspeed of approximately 1.4 VSO. (VSO—stall speed with power off, landing gear and flaps down.) For example, if VSO is 60 knots, the speed should be 1.4 times 60, or 84 knots.
- ▶ Extend flaps as required, but wait until final approach to extend full flaps.
- ▶ Establish and maintain drift correction to follow a ground track perpendicular to the extension of the centerline of the runway.
- ▶ Continue base leg to the point where a medium to shallow-banked turn will align the flight path with the centerline of the runway. Since many accidents have occurred as a result of stalling on the base-to-final turn, be sure to avoid losing airspeed and/or overbanking at this critical point. If you overshoot the proper final approach path, go around and try again.
- ▶ Be sure to complete the descending base-to-final turn at an altitude that clears terrain and obstructions.
- ▶ Make your turn to final approach at an altitude sufficiently above airport elevation to accurately estimate the point of touchdown.



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Final Approach

Overview

The objective of a good final approach is to descend at an angle and airspeed that will allow you to reach the desired touchdown point with minimum floating. When you complete the base-to-final turn, the airplane should be aligned with the runway centerline.

Basic Procedures

- ▶ On a normal approach (no wind drift), keep the longitudinal axis aligned with the runway centerline.
- ▶ Once aligned with the runway, extend flaps to final setting and adjust pitch attitude for the desired rate of descent. You may need slight adjustments in pitch and power to maintain descent attitude and desired airspeed.
- ▶ In the absence of a manufacturer's recommended airspeed, fly the final approach leg at a speed equal to 1.3 VSO. If VSO is 60 knots, the final approach speed should be 78 knots.
- ▶ With pitch attitude and airspeed stabilized, retrim to relieve control pressure.
- ▶ Adjust power and pitch as needed to control airspeed and descent angle. Control the descent angle throughout the approach so that the airplane will land on the centerline in the first third of the runway.

Related Media for this Section



Use of Flaps

[Use of Flaps.pdf](#) (303.36 KB)



Estimating Height and Movement

[Estimating Height and Movement.pdf](#) (112.91 KB)



Descent Angle

[Descent Angle.pdf](#) (147.78 KB)



Stabilized Approach Concept

[Stabilized Approach Concept.pdf](#) (302.87 KB)



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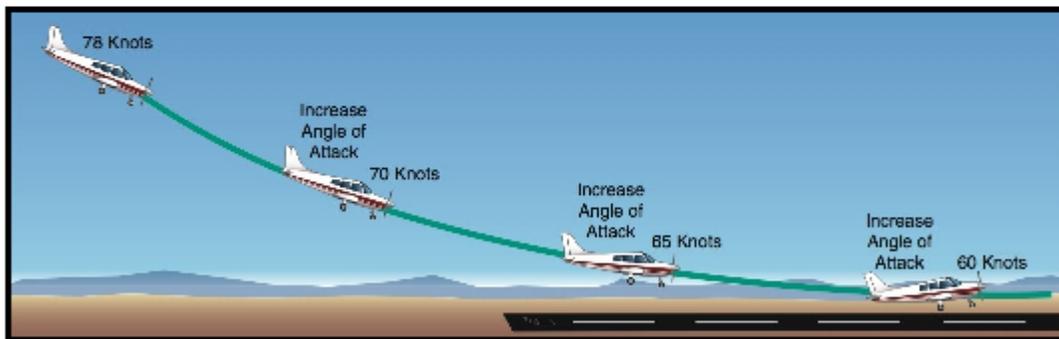
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Roundout (Flare)

Overview

The roundout is a slow, smooth transition from a normal approach attitude to a landing attitude. This phase begins when the airplane is within 10 to 20 feet above the ground, and continues until it touches down. During the roundout, the goal is to decrease airspeed to touchdown speed, while controlling lift so the airplane will settle gently onto the runway.

Basic Procedures



To accomplish the roundout, gradually increase pitch attitude and angle of attack (AoA) as the airplane reaches a height of 10-20 feet AGL. The AoA should increase at a rate that allows the airplane to settle slowly as forward speed decreases. The roundout rate must also be proportionate to rate of closure with the ground. For example, when the airplane appears to be descending very slowly, increase pitch attitude at a correspondingly slow rate.

Important: Once you start the roundout, do not push the elevator control forward. If you have used too much back pressure on the elevator, relax it slightly or just hold constant pressure. Since you may need power to prevent an excessive rate of sink or a stall, keep one hand on the throttle throughout the approach and landing.



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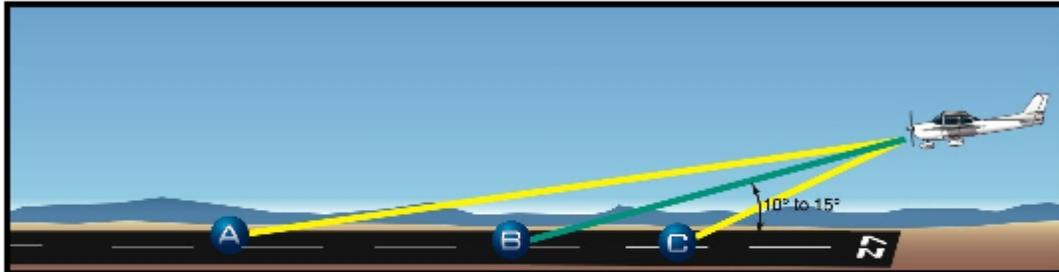
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Roundout (Flare)

Visual Cues



Visual cues, including depth perception, are important in flaring at the proper altitude and maintaining the wheels a few inches above the runway until touchdown.

The visual cues used most are those related to changes in runway or terrain perspective, and to changes in the size of objects near the landing area (e.g., fences, bushes, trees, hangars). If you direct and maintain your vision at a shallow downward angle (10° to 15° toward the runway) as you start the roundout, the point of visual interception with the runway appears to move toward you as the airplane loses altitude.



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Touchdown

Overview

Ideally, you perform the round out and touchdown with the engine at idle and the airplane at minimum controllable airspeed. The goal is to touch down on the main gear at or near stalling speed.

If the airplane is settling too fast for gentle touchdown when the wheels are within 2-3 feet off the ground, slow the descent with additional back pressure on the elevator control. The added back elevator pressure will slow the settling process, and allow the airplane to touch down in the proper landing attitude (main wheels first, with little or no weight is on the nose wheel).

Basic Procedures



After the main wheels make initial contact with the ground, hold back elevator pressure to maintain a positive angle of attack and to hold the nose wheel off the ground until the airplane decelerates.

Important: Be sure to touch down with the airplane exactly parallel to the direction of movement along the runway. Landing "sideways" (e.g., while turned into the wind or drifting) imposes side loads on the landing gear.



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After Landing Roll

Overview

The landing process is not complete until the airplane decelerates to normal taxi speed during the landing roll.

Basic aircraft control should be your only focus during this phase of a normal approach and landing. Unless you need short field landing techniques, do not attempt to retract flaps while still on the runway. Perform this action and any other after landing cleanup items on the checklist only after you have turned onto the taxiway and stopped the aircraft.

There are two specific aircraft control tasks to manage in this phase: directional control and deceleration.

Basic Procedures - Directional Control

Be alert for directional control difficulties immediately upon and after touchdown due to the ground friction on the wheels. To manage directional control:

Rudder: Whether in the air or on the ground, the rudder controls yaw. Its effectiveness depends on the speed of the airplane (higher speed = greater effectiveness).

Nose wheel steering: After it has touched the ground, the steerable nose provides more positive directional control.

Brakes: Differential brakes on the main gear can also assist with directional control.

Ailerons: In the air and on the ground, ailerons change the wing's lift and drag components. During the after landing roll, use ailerons as needed to keep the wings level. If a wing starts to rise, apply aileron control toward that wing.

Basic Procedures - Deceleration

For optimum braking performance, put maximum weight on the wheels after touchdown. Apply brakes after the nose wheel is on the ground and directional control is assured. Maximum brake effectiveness occurs just short of the point where skidding occurs. If skidding occurs, braking becomes ineffective.

Related Media for this Section



Common Errors

[Common Errors.pdf](#) (18.99 KB)



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Chapter 1 - Base Leg

A good approach and landing begins with placement of the base leg. Judge the altitude, distance, speed, and airplane configuration required for the conditions to start an effective approach. Take into account such conditions as wind speed and direction, terrain and obstacles, runway surface condition, and aircraft performance. Complete the pre-landing checklist and lower the landing gear prior to entering the base leg. The base to final turn is critical: there no room to recover from an unintentional stall, which could have disastrous results. If you overshoot this turn, go around.

Chapter 2 - Final Approach

Fly the final approach leg at a speed low enough to allow for an effective descent angle, but stay high enough to provide a margin of error and allow for wind gusts that could diminish airspeed.

Proper use of flaps is critical to a safe and successful approach. Extending flaps affects pitch behavior, which in turn has effects on airspeed, descent angle, and stall speed. Any change in flap settings must be accompanied by power or pitch changes to maintain desired approach angle and descent speed.

Effectively estimating height and movement requires proper head positioning and visual focus techniques. Focus at a point that enables you to roundout (flare) at the correct height and speed.

Whenever feasible, use a stabilized approach with constant glidepath to the runway aiming point. The runway shape will appear to remain the same throughout a stabilized approach.

Chapter 3 - Roundout

The roundout (flare) should be a slow, smooth transition from a normal approach attitude to a landing attitude. It should be executed at a rate that gets you to the proper landing attitude and the proper touchdown airspeed just as the wheels contact the landing surface.

Visual cues are important. Direct your central vision at a shallow downward angle of from 10° to 15° toward the runway as you initiate the roundout.



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Chapter 4 - Touchdown

Make your touchdown minimum controllable airspeed with the engine at idle. The goal is to touch down on the main gear at or near stall speed.

After the main wheels make initial contact with the ground, hold back elevator pressure to maintain a positive angle of attack for aerodynamic braking, and to hold the nose wheel off the ground until the airplane decelerates. Touch down with the airplane exactly parallel to the direction of movement.

Chapter 5 - After Landing Roll

The two main tasks for the after landing roll are directional control and deceleration.

Differential braking can help maintain directional control, but avoid overcontrolling. Use the rudder for steering until the nose wheel becomes fully effective.

Putting maximum weight on the wheels after touchdown helps obtain optimum braking performance.