

## VII.J. Soft-Field Approach and Landing

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References: FAA-H-8083-3; POH/AFM

Objectives	The student has the knowledge and ability to perform a soft field approach and landing as necessary based on the PTS with and without a crosswind.
Key Elements	<ol style="list-style-type: none"><li>1. Extend the approach in Ground Effect</li><li>2. Transfer weight from wings to wheels</li><li>3. Maintain Back Pressure</li></ol>
Elements	<ol style="list-style-type: none"><li>1. Objective</li><li>2. Determining Landing Performance and Limitations</li><li>3. Approach</li><li>4. Landing</li><li>5. After Landing Roll/Taxi</li></ol>
Schedule	<ol style="list-style-type: none"><li>1. Discuss Objectives</li><li>2. Review material</li><li>3. Development</li><li>4. Conclusion</li></ol>
Equipment	<ol style="list-style-type: none"><li>1. White board and markers</li><li>2. References</li><li>3. Model Airplane</li></ol>
IP's Actions	<ol style="list-style-type: none"><li>1. Discuss lesson objectives</li><li>2. Present Lecture</li><li>3. Ask and Answer Questions</li><li>4. Assign homework</li></ol>
SP's Actions	<ol style="list-style-type: none"><li>1. Participate in discussion</li><li>2. Take notes</li><li>3. Ask and respond to questions</li></ol>
Completion Standards	The student can demonstrate knowledge of, and has shown proficiency in Soft Field approaches and landings, without the assistance of a flight instructor. The student can judge when to begin the flare, when to add power to the flare and can correct for any misjudgments. Finally, the student understands when to go-around and demonstrates the proper use of checklists, traffic scan and pertinent safety procedures.

**Instructors Notes:**

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**Introduction:**

**Attention**

Interesting fact or attention grabbing story

How awesome would it be, once you get your private pilot license, to take a flying adventure and land in the wilderness or on a remote island, in the middle of nowhere using a dirt or sand strip?

**Overview**

Review Objectives and Elements/Key ideas

**What**

Landing on fields that are rough or have soft surfaces, such as snow, sand, mud, or tall grass

**Why**

It is important to learn to land on soft field runways in order to ensure a safe landing. A normal landing on a runway like this could result in damage to the gear or the entire plane. By learning to safely set a plane down on different surfaces the pilot has many more airport available landing fields. In the case of an emergency landing this maneuver will be very important in making a safe landing.

**How:**

**1. Objective**

- A. When making a soft-field landing, the objective is to touchdown as smoothly as possible and at the slowest possible landing speed
  - i. The pilot must control the airplane in a manner that the wings support the weight of the plane as long as practical to minimize drag and the stresses imposed on the landing gear by the rough or soft surface

**2. Determining Landing Performance and Limitations**

- A. Chapter 5 of the POH
  - i. Landing distance
  - ii. Crosswind components
- B. **CE** - Improper use of landing performance data and limitations
  - i. Make proper use of landing performance data and limitations
- C. Effect of wind and Landing Surface
  - i. A headwind is going to decrease the landing distance
  - ii. A tailwind is going to increase the landing distance
  - iii. Take into account whether you will be landing on hard packed turf, or wet, high grass turf
    - a. **CE** - Failure to consider the effect of wind and landing surface
      - Know the condition of the landing surface and its effects
        - a. If a surface is soft or wet, consider the effect that will have, especially in the case of a crosswind landing, when one wheel touches before the other

**3. Approach**

- i. Similar to a normal approach, except that the airplane is held 1 to 2' off the surface as long as possible to allow the wheels to gently touch down at minimum speed
- ii. Often times soft field runways are short fields
  - a. Approach speed is 55 knots (short field )
    - Otherwise, use the normal approach speed

- iii. Procedures
    - a. Configure
      - Perform the before landing checklist and configure on downwind
        - a. Flaps
          - 1. Flaps will aid in touching down at minimum speed and are recommended whenever practical
          - 2. In low-wing airplanes (like the DA20) the flaps may suffer damage from mud, stones, slush, etc.
        - **CE** - Failure to establish approach and landing configuration at proper time or in proper sequence
    - b. Maintain a Stabilized Approach
      - Final approach speed
        - a. Maintain 65 knots
          - 1. Unless short field landing (then 55 knots)
          - 2. Higher approach speeds may result in excessive floating in ground effect
            - a. Floating can make a smooth, controlled touchdown even more difficult
            - b. **CE** - Avoid excessive airspeeds on final approach
      - Trim the plane out for the decent
        - a. Adjust pitch and power as necessary to stay stabilized
      - There is however, no reason for a steep angle of descent
        - a. Unless obstacles are present in the approach path
      - **CE** - Improper procedure in use of power, wing flaps, or trim
        - a. Make pitch and power adjustments together to maintain decent
        - b. Set flaps in accordance with the POH
        - c. Trim often to relieve control pressures
    - c. **CE** - Failure to establish and maintain a stabilized approach
    - d. **CE** - Inappropriate removal of hand from throttle
      - Throughout the landing, do not remove your hand from the throttle
        - a. Of course, some duties require your hand to be moved (configuring, etc.); if your hand is removed, return to the throttles as soon as possible
        - b. A go around or increased power may be needed immediately
- B. Touchdown Area
  - i. The landing area should be free of obstructions, as smooth and flat as possible, and provide enough distance to safely roll to a stop
  - ii. Plan for a considerable glide in the landing
    - a. Therefore aim your approach at a point in-front of your intended landing area
      - Farther in front than a normal/short field landing
- C. Keep Flight Controls Coordinated
  - i. Use rudder to maintain coordination
    - a. Especially when turning base to final
  - ii. No more than 30° of bank
  - iii. A sideslip in the case of a crosswind is the exception to the rule
- D. Maintain a Precise Ground Track
  - i. Consider the effect of wind
    - a. Use current wind correction knowledge in order to maintain a precise ground track to your intended landing point
    - b. Sideslip into the wind to maintain the extended centerline

E. Checklists

- i. Still use appropriate approach and landing checklists

4. Landing

A. Overview

- i. The major difference between the soft-field and normal landing is that the approach is extended 1 to 2' above the ground, in ground effect as long as possible
  - a. Use the same technique as a normal landing, but use partial power during the roundout and touchdown to extend the approach and allow for a gentle touchdown
  - b. The airplane should be flown onto the ground with the weight fully supported by the wings
    - This permits a more gradual dissipation of forward speed to allow the wheels to touch down gently at minimum speed
    - This also minimizes the nose-over forces that affect the airplane at the moment of touchdown

B. Touchdown

- i. Should be made at the lowest possible airspeed with the airplane in a nose-high pitch attitude
  - a. Increase back pressure in order to touchdown as gently as possible
  - b. A firm touchdown is not desired
- ii. Increase the power slightly just prior to touchdown in order to cushion the landing and assist in slowly transferring the weight from the wings to wheels
  - a. The addition of power will vary based on aircraft and the terrain your landing on
    - EX: tall thick grass (more drag, therefore more power) vs dirt (less drag, less power)
- iii. When the main wheels touch the ground maintain sufficient back-elevator pressure to keep the nose wheel off the surface
  - a. Site Picture: Hold the cowling on the horizon to keep the nose wheel off the ground
  - b. As the aircraft slows, increase elevator back pressure to keep the nose wheel off the ground
    - Using back elevator pressure and engine power can control the rate at which the weight of the airplane is transferred from the wings to the wheels
  - c. **CE** - Closing the throttle too soon after touchdown
    - Closing the throttle too soon will result in the nose wheel touching down early and the weight transferring to the wheels (at higher speeds than desired)
      - a. This can damage the nosewheel or the aircraft
- iv. Directional control is maintained diligently through the use of the rudders
  - a. **CE** - Poor directional control after touchdown
- v. **CE** - Failure to hold back elevator pressure after touchdown
  - a. Maintain back pressure in order to keep as much weight as possible on the wings, rather than the wheels
- vi. At anytime during the transition phase, before the weight is being supported by the wheels, the pilot should be able to apply full power and perform a safe takeoff (obstacle and field length permitting)
- vii. Once slowed, safe and under control, pilot should gently lower the nose wheel to the surface
  - a. A slight addition of power usually will aid in easing the nose wheel down
- viii. **CE** - Improper procedure during roundout and touchdown

5. After Landing Roll/Taxi

- A. Continue to maintain full aft back pressure as well as wind correction
- B. The use of brakes on a soft-field landing are not needed and should be avoided
  - i. This imposes a heavy load on the nose gear due to premature or hard contact with the landing surface, causing the nose wheel to dig in
  - ii. Braking is normally accomplished through surface friction with the ground

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- a. The soft or rough surface will provide sufficient reduction in the airplane's forward speed
- b. The pilot will often need to increase power to keep the airplane moving and becoming stuck
- iii. **CE** - Improper use of brakes
- C. Maintain enough speed to prevent becoming bogged down
  - i. An increase in power may be necessary to keep the plane moving
  - ii. Too fast could cause problems too
- D. Retract the flaps after the landing roll
  - i. This is less important than concentrating on maintaining full control of the airplane
  - ii. This also puts more weight onto the wheels
- E. Perform the After Landing Checklist after parked

### Common Errors:

- Improper use of landing performance data and limitations
- Failure to establish approach and landing configuration at proper time or in proper sequence
- Failure to establish and maintain a stabilized approach
- Failure to consider the effect of wind and landing surface
- Improper procedure in use of power, wing flaps, or trim
- Inappropriate removal of hand from throttle
- Improper procedure during roundout and touchdown
- Failure to hold back elevator pressure after touchdown
- Closing the throttle too soon after touchdown
- Poor directional control after touchdown
- Improper use of brakes

### Conclusion:

Brief review of the main points

A soft field landing is very similar to a normal landing except that our main goal is to transfer the weight from the wings to wheels as gently as possible. When doing this it is also important to hold the nose wheel off the ground, slowly and gently bringing it to the surface.

### PTS Requirements:

To determine that the applicant:

1. Exhibits instructional knowledge of the elements of a soft-field approach and landing by describing:
  - a. How to determine landing performance and limitations.
  - b. Configuration and trim.
  - c. Obstructions and other hazards which should be considered.
  - d. Effect of wind and landing surface.
  - e. Selection of a touchdown area.
  - f. A stabilized approach at the recommended airspeed to the selected touchdown point.
  - g. Coordination of flight controls.
  - h. A precise ground track.
  - i. Timing, judgment, and control procedure during roundout and touchdown.
  - j. Touchdown in a nose-high pitch attitude at minimum safe airspeed.
  - k. Proper use of power.
  - l. Directional control after touchdown.
  - m. Use of checklist.
  - n. After landing runway incursion avoidance procedures.

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2. Exhibits instructional knowledge of common errors related to a soft-field approach and landing by describing:
  - a. Improper use of landing performance data and limitations.
  - b. Failure to establish approach and landing configuration at appropriate time or in proper sequence.
  - c. Failure to establish and maintain a stabilized approach.
  - d. Failure to consider the effect of wind and landing surface.
  - e. Improper procedure in use of power, wing flaps, and trim.
  - f. Inappropriate removal of hand from throttle.
  - g. Improper procedure during roundout and touchdown.
  - h. Failure to hold back elevator pressure after touchdown.
  - i. Closing the throttle too soon after touchdown.
  - j. Poor directional control after touchdown.
  - k. Improper use of brakes.
3. Demonstrates and simultaneously explains a soft-field approach and landing from an instructional standpoint.
4. Analyzes and corrects simulated common errors related to a soft-field approach and landing.

