VII.G. Short-Field Approach and Landing

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

Objectives
The student should develop knowledge of the elements related to a short-field approach and landing. The student will understand the procedures involved and will have the ability to properly execute them as prescribed in the necessary PTS.

Key Elements
1. 4° Stabilized Approach
2. Region of Reverse Command
3. Minimal Float/Max Effective Braking

Elements
1. Landing Performance and Limitations
2. Obstructions and Other Hazards
3. Configuration and Trim
4. Downwind Leg
5. Base Leg
6. Final Approach
7. Roundout/Flare
8. Touchdown

Schedule
1. Discuss Objectives
2. Review material
3. Development
4. Conclusion

Equipment
1. White board and markers
2. References

IP’s Actions
1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

SP’s Actions
1. Participate in discussion
2. Take notes
3. Ask and respond to questions

Completion Standards
The student has the ability to perform a well coordinated and stabilized short-field approach and landing as required in the student’s PTS.
Instructors Notes:

Introduction:

Attention
The short-field landing requires the airplane to be flown at one of its critical performance capabilities while close to the ground in order to safely land in a confined area.

Overview
Review Objectives and Elements/Key ideas

What
Short-field approaches and landings require the use of procedures for approaches and landings at fields with a relatively short landing area or where an approach is made over obstacles that limit the available landing area. This low-speed type of power-on approach is closely related to the performance of flight at minimum controllable airspeeds.

Why
As in short-field takeoffs, it is one of the most critical of the maximum performance operations. It requires that the pilot fly the airplane at one of its crucial performance capabilities while close to the ground in order to safely land within confined areas. To land within a short-field, the pilot must have precise, positive control of the rate of descent and airspeed.

How:
1. Landing Performance and Limitations
   A. Performance Section of the POH (Section 5)
      i. Keep in mind that the runway surface will affect the landing roll distance
      ii. Do not attempt to land if the landing performance is not adequate
      iii. Plan Ahead – Do not attempt to land on a short-field from which a T/O cannot be made
         a. The distance necessary to land is often less than the distance necessary to T/O
   B. Limitations Section of the POH (Section 2) describes landing limitations
      i. Check crosswind limitations if necessary

2. Obstructions and Other Hazards
   A. Know the type of obstructions or hazards that will need to be cleared on the approach
      i. Trees – How many (1 or a row of trees?) and what is the height of the trees?
      ii. Power lines, towers, or other manmade structures – How high and where are they?
      iii. Mountain, Cliff, Hill – What is the height?
   B. The height of the obstructions will indicate how steep the approach will have to be

3. Configuration and Trim
   A. The airplane should be configured for a normal landing (Landing Flaps)
   B. Final Approach should be steeper than normal to clear any obstacles
      i. 4° Glide Path at 80 knots
         a. A slower speed will provide an increased sink rate allowing for the steeper glide path
            • Region of Reverse Command
            • As we get further below L/D_{MAX} the increase in drag increases our descent
   C. A wider than normal pattern should be used so that the plane can be properly configured and trimmed
   D. Coordinated Flight Controls
      i. When turning in the pattern, use no more than 30° of bank and keep the turn coordinated
a. Go around and set up again if overshooting final rather than cross controlling the airplane
ii. Keep the airplane coordinated throughout the approach and landing

4. **Downwind Leg**
   A. At the midpoint complete the landing checklist
   B. Select a Touchdown and Aiming Point
      a. Touchdown Point (1,000’ markers)
         • Select a point that will allow obstacle clearance and the most runway available for landing
      b. Aiming Point (The beginning of the 2nd runway stripe prior to the 1,000’ markers)
         • Choose a point which will allow the airplane to settle relatively quickly on the touchdown point based on the current conditions and reduced approach speed
         • The aiming point will be short of the touchdown point (approx 400’ - 450’ prior)
   C. Go Around Point
      i. Select points along the approach at which the decision will be made to continue or go-around
         a. A go around may be necessary if too low, high, slow, fast or the approach is not stabilized
   D. Abeam the landing point or slightly beyond, reduce power to 50%, extend the takeoff flaps, and pitch for 90 knots
      i. The downwind leg can be extended to allow time to properly configure and trim the airplane

5. **Base Leg**
   A. Configure the airplane for the landing configuration
      i. Extend the landing flaps and trim the airplane for 80 knots before turning final
         a. Ensure a shallow, coordinated turn to final to avoid an unsafe situation
      ii. By the time you turn final the airplane should be in the landing configuration

6. **Final Approach**
   A. Usually started at least 500’ AGL
   B. Establish and maintain a 4° glide path
      i. Higher and steeper approach
      ii. VASIs/PAPIs will indicate a high glide path
         a. VASIs – Both bars White
         b. PAPIs – 4 White lights (Indicates above a 3.5° glide slope)
      iii. When practicing the approach/landing, an obstacle will be simulated at the approach end
         a. The airplane should be approximately 100’ AGL at this point to ensure clearance
   C. If you haven’t already, extend the landing flaps and trim the airplane for approach speed
      i. Double check the landing checklist
   D. Maintain a Stabilized Approach
      i. The landing is in reality an accuracy approach to a spot landing
      ii. Pitch for Airspeed, Power for Altitude
         a. Below L/D\textsubscript{MAX} – In the Region of Reverse Command
            • Maintain 80 knots and adjust power for a safe descent
         b. Make small adjustments to keep the Aiming Point in the same place on the windscreen
            • Large adjustments result in a roller coaster approach
         c. DO NOT only pitch to gain altitude/avoid an obstacle; this will result in an very slow AS and stall
            • CE - Adjust Pitch AND Power together to make adjustments
            • CE – Always keep a hand on the throttle in case a go around/immediate power is needed
      iii. Aiming Point Adjustments
         a. If the obstacle clearance is excessive, reduce power and adjust pitch to maintain 80 knots
         b. If the obstacle clearance is insufficient, increase power and adjust pitch to maintain 80 knots
VII.G. Short-Field Approach and Landing

E. Wind Correction
   i. Headwind – will result in a steeper descent angle to the runway due to the decreased GS
      a. To correct for this, use more power and a lower rate of descent
   ii. Tailwind – will result in a higher GS which will increase landing distance/ground roll
      a. Use less power and increase the rate of descent
   iii. Ground Track
      a. Use the crosswind landing techniques to maintain a ground track in line with the landing area

7. Roundout/Flare
   A. The roundout/flare must be judged accurately to avoid flying into the ground or stalling too high
   B. Minimum floating should occur; the airplane should settle relatively quickly onto the aiming point
      i. CE - Do not try to hold the airplane off the ground

8. Touchdown
   A. Touchdown should occur at the minimum controllable AS with the airplane in approx the pitch attitude
      that will result in a power off stall upon closing the throttle
   B. Closing the throttle
      i. Closing before ready for touchdown may increase the descent and result in a hard touchdown
   C. Directional Control
      i. CE - Maintain the centerline and directional control with rudder pressure
      ii. CE - Increase aileron deflection into the wind as AS decreases
   D. The airplane should be stopped in the shortest within the shortest possible distance
      i. Upon touchdown, hold the positive pitch attitude to provide aerodynamic braking
      ii. Immediately retract the flaps to the ‘Cruise’ setting and apply max effective braking
         a. Max Effective Braking – Braking to the point just prior to skidding the tires

Common Errors:
- Improper use of landing performance data and limitations
- Failure to establish approach and landing configuration at appropriate time or in proper sequence
- Failure to establish and maintain a stabilized approach
- Improper procedure in use of power, wing flaps, and trim
- Inappropriate removal of hand from throttle
- Improper procedure during roundout and touchdown
- Poor directional control after touchdown
- Improper use of brakes

Conclusion:
Brief review of the main points
A short-field approach and landing requires the airplane be flown at one of its critical performance capabilities
while close to the ground in order to land safely in a confined area. You must have precise positive control of the
airplane’s rate of descent and as to produce an approach that will clear any obstacles, result in little or no
floating during the roundout, and permit your airplane to be stopped in the shortest possible distance.

PTS Requirements:
To determine that the applicant:
   1. Exhibits instructional knowledge of the elements of a short-field approach and landing by describing:
      a. how to determine landing performance and limitations.
      b. configuration and trim.
      c. proper use of pitch and power to maintain desired approach angle.
d. barriers and other hazards which should be considered.

2. Exhibits instructional knowledge of common errors related to a short-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. improper technique in use of power, wing flaps, and trim.
   e. inappropriate removal of hand from throttles.
   f. improper procedure during roundout and touchdown.
   g. poor directional control after touchdown.
   h. improper use of brakes (landplane).

3. Demonstrates and simultaneously explains a short-field approach and landing from an instructional standpoint.

4. Analyzes and corrects simulated common errors related to a short-field approach and landing.