Ex. 16, 18 – Short-field Take-offs & Landings

What you will learn:

- ✓ How to take-off from and land on short runways (with and without obstacles).

Why learn this:

- ✓ Many small aerodromes have short runways

- ✓ In an emergency situation (e.g., precautionary landing) you are likely to be landing on shorter-than-normal landing surface.

Links:

- ✓ You already know how to perform normal take-offs and landings
- ✓ You know about different climb speeds and when they are used
- ✓ You know about effect of air density on take-off and climb performance.

Let's see how much you already know:

- What is the procedure for normal take-off?
- Normal approach (starting from downwind)?
- Normal landing?
- What is ground effect and why does it occur?
- What is the difference between best rate and best angle of climb, and when are they used?
- What are some of the factors that affect take-off and climb performance?
- What is the difference between "take-off run" and "take-off distance"?

Theories and Definitions:

- ✓ Short Field Take-Off Considerations
  - no obstacle
  - with obstacle
- ✓ Short Field Landing Considerations:
  - no obstacle
  - with obstacle.

Short Field: Take-off Considerations

- ✓ If no obstacles exist, minimizing ground roll is critical; subsequent climb performance is less important
  - Use 10° of flaps to lower safe lift-off airspeed
  - Accelerate in ground effect to safe climb airspeed
- ✓ If obstacles are present, minimizing total take-off distance is crucial
  - Flap setting depends on the airplane
  - Climb out at V_x or recommended POH speed
- ✓ In both cases:
  - use all available runway
  - hold brakes until static rpm is achieved
  - take off into the wind.

Short Field: Landing Considerations

- ✓ If no obstacles exist, use normal or slightly shallow approach
- ✓ If obstacles are present, use steeper approach angle for obstacle clearance
- ✓ In both cases:
  - land into the wind
  - use full flap on approach
  - use lowest safe approach airspeed
  - use power to ensure controlled approach before and after clearing the obstacle (no chop-n-drop)
  - apply brakes, pull back on control column fully and retract flaps after all wheels touch down.

Procedures

- Short-Field Take-off
  - no obstacle
  - with obstacle
- Short-Field Landing
  - no obstacle
  - with obstacle.

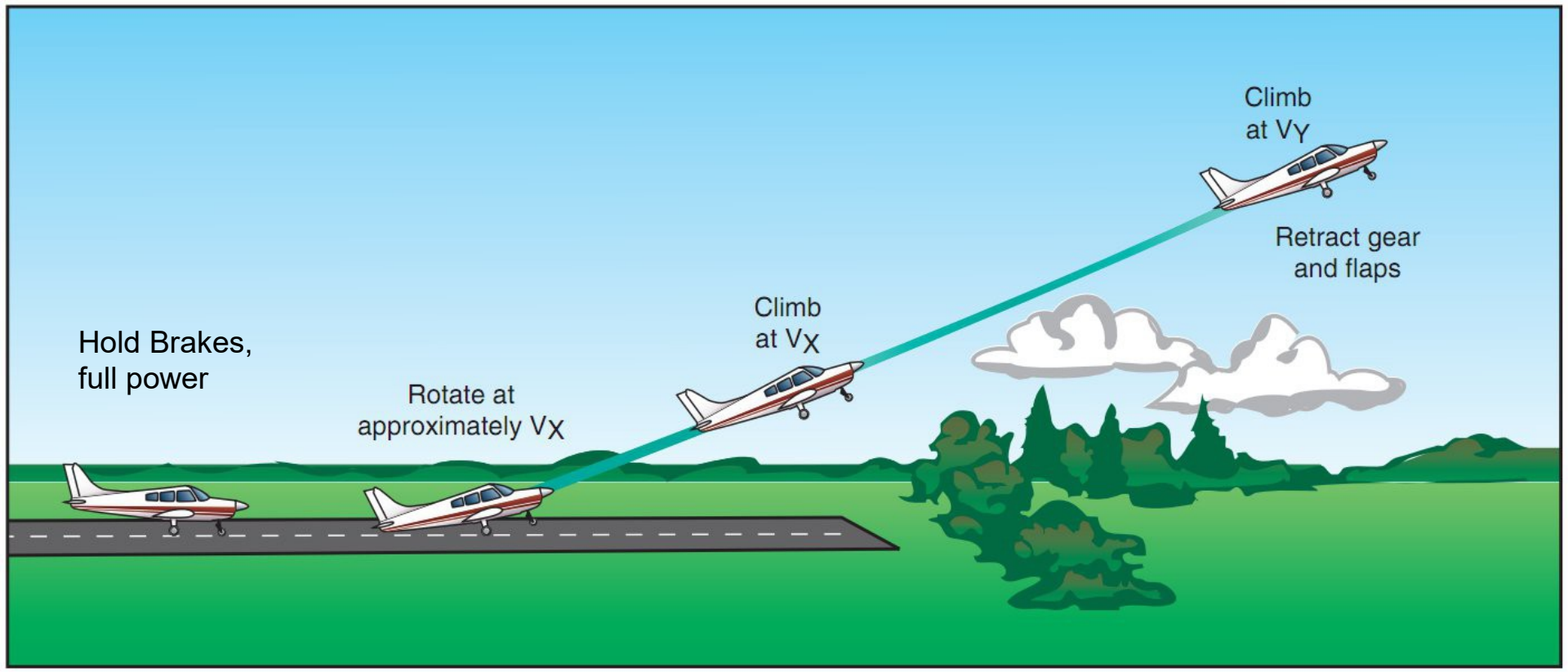
Short-Field Take-off (no obstacle)

- ✓ 10° of flaps-off ground faster, climb slower
- ✓ Taxi to the threshold (use all available runway)
- ✓ Hold brakes, smoothly apply full power
- ✓ Confirm static rpm
- ✓ Release brakes
- ✓ Slight back pressure on control column
- ✓ Rotate at recommended POH speed
- ✓ Accelerate in ground effect to safe climb airspeed
- ✓ Climb out, retract flaps at safe altitude and airspeed

Short-Field Take-off (with obstacle)

- ✓ Flap setting depends on the airplane
- ✓ Taxi to the threshold (use all available runway)
- ✓ Hold brakes, smoothly apply full power
- ✓ Confirm static rpm
- ✓ Release brakes
- ✓ Slight back pressure on control column
- ✓ Rotate at recommended POH speed
- ✓ Climb out at V_x or recommended POH speed until clear of the obstacle
- ✓ Climb out at V_y after obstacle has been cleared.

Short-Field Take-off (with obstacle)



Short-Field Landing (no obstacle)

APPROACH

- ✓ Full flaps
- ✓ Normal or slightly shallow approach slope
- ✓ Lowest safe approach speed

TOUCHDOWN & GROUND ROLL

- ✓ Full brakes (do not skid)
- ✓ Control column all the way back
- ✓ Flaps up ASAP after touch-down.

Short-Field Landing (with obstacle)

APPROACH

- ✓ Steeper than normal approach slope
- ✓ Controlled power-on descent throughout the approach
- ✓ Full flaps
- ✓ Lowest safe approach speed

TOUCHDOWN & GROUND ROLL

- ✓ Full brakes (do not skid)
- ✓ Control column all the way back
- ✓ Flaps up ASAP after touch-down.

Short-Field Landing (with obstacle)

- Correct

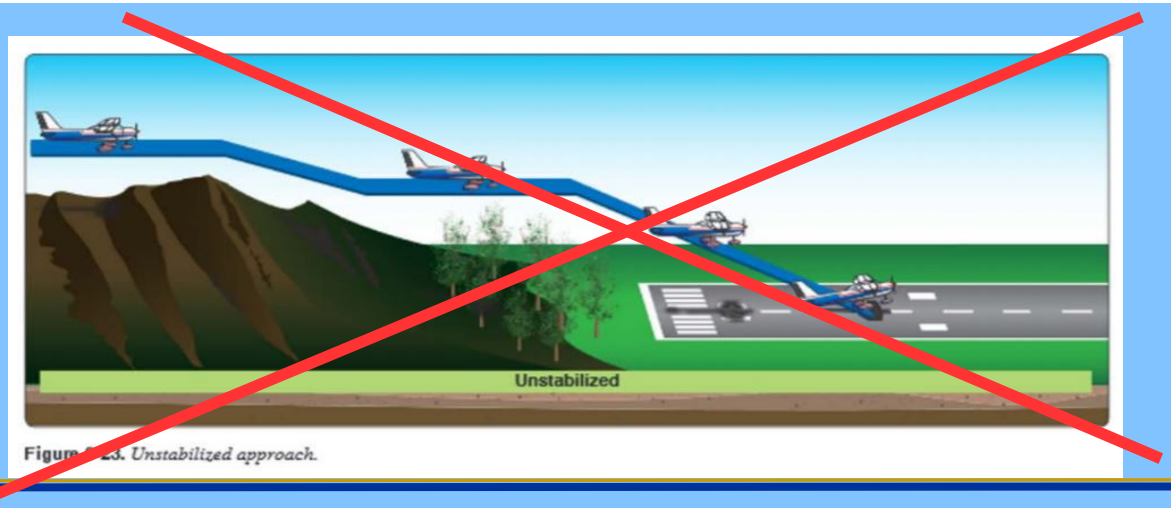


Figure 6-23. *Unstabilized approach.*

WRONG-UNSTABLE

SAFETY

Standard take-off and landing safety considerations continue to apply: can you think of some?

Compare take-off and landing distances for the same conditions: what do you notice?

- It is possible to land in a field that's too short to take off from: plan ahead!
- Allow generous safety margins when calculating take-off performance
  - The planes are old
  - Your technique might be slightly less than perfect…
- Avoid excessive pitching up on take-off: maintain V_x
- Accelerate in ground effect before attempting to climb out of it
- Maintain safe clearance when passing over obstacles
- Avoid operating out of short fields when visibility is poor, air density is low or other unfavorable conditions exist.

Review

- What is the procedure for short-field take-off without obstacle?
- With obstacle?
- Short-field landing with no obstacle?
- With obstacles?
- What technique would you use to take-off from a short AND soft field (no obstacle)?
- What technique would you use to take-off from a short AND soft field (with an obstacle)?
- How would you land on a short, soft field with an obstacle?

Conclusion

- ✓ Now you know how to land on short fields (including going over obstacles)
- ✓ This drastically expands the number of destinations available to you
- ✓ You are better equipped to handle an emergency off-airport landing

QUESTIONS?