Patuxent River Navy Flying Club

Final Approach Airspeed

PRNFC

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INTRODUCTION

Final Approach Airspeed

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Importance Of Final Approach Airspeed

Stalling

- Desire to maintain enough airspeed to:
  - maneuver
  - adjust for wind gusts
  - round-out and flare

Landing

- Desire to touch-down smoothly
- Control landing in cross-winds and gusts

Stopping

- Stop in a reasonable distance; $KE = \frac{1}{2}mv^2$
  - Small changes in velocity (airspeed) can make a big difference in stopping distance!
- Reduce wear on brakes and tires
- Easier to control on wet runways

Final Approach Airspeed – Factors to Consider

Pilot Operating Handbook

- Strong recommendations – thoroughly considered by test pilots and the manufacturer.
- However, there are assumptions:
  - Flight at maximum gross weight (almost never true)
  - Usually not explained how it may or may not adjust for wind gusts.
  - Generally assumes a certain landing technique – usually regarding when power is reduced for touchdown.
- Often omits relevant material, either because:
  - Pilots “don’t need to know” or “might get confused”
  - Information could lead to lawsuits
  - Tradition, habit, or lack of effort

Final Approach Airspeed – Factors to Consider

Flap Setting

- Significantly decreases stall speed and increases drag.
- Can allow pilots to significantly reduce Final Approach Airspeed and touch-down airspeed.
- On some airplanes, it can make gusty, cross-wind landings more difficult.

Stall Speed

- For General Aviation airplanes, consider:
  - 1.3 x V_{so}
  - A good reference to understand the POH recommendation.
  - Other aircraft characteristics should be considered – wing stall characteristics, ability to view over the nose

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Flap Setting	Speed (MPH)
0 – Retracted	85
20°	80
40°	75

Final Approach Airspeed – Factors to Consider

Weight

- Weight is a big factor in every aspect of airplane performance.
- The effect of weight changes can be calculated:
  - $S_1/S_2=SQRT(W_1/W_2)$
  - S_1= Adjusted Stall Speed
  - S_2= 64 MPH (PA-28R-200, 40° flaps, 0° bank)
  - W_1= 2000 lbs. (pilot, bag, 15 gal. fuel)
  - W_2= 2650 lbs. (max. gross weight)
  - $SQRT(W_1/W_2)$ = 0.869
  - S_1= 55.6 MPH
- This example shows the largest change reasonably possible. With this example you can calculate the change for your situation.
- This technique can be applied to most of the other V speeds.

Final Approach Airspeed – Factors to Consider

Indicated vs. Calibrated Airspeed

- Most POHs give all the airspeeds in calibrated airspeed.
- Pilots read indicated airspeed on the Airspeed Indicator.
- At cruise airspeed there is usually little to no difference, however at slow airspeed, there often is a significant difference.

PA-28R-200 CAS Correction Table

Flaps 40°							
IAS - MPH	60	70	80	90	100	110	120
CAS - MPH	67	74	82	91	100	109	118

- By flying at 70 MPH indicated, the airplane is actually doing 74 MPH.

Final Approach Airspeed – Factors to Consider

Visibility over the Nose

- Dependent on the airplane. Airplanes with a “Big 6” up front, or even worse, a turbo prop, can present visibility problems.

Piper Saratoga

- You may have to “increase” final approach airspeed to see your aimpoint over the nose at higher angles of attack.

Final Approach Airspeed – Factors to Consider

Gusty Winds

- Tried & True recommendation:
  - Add ½ the gust factor
  - Example:
    - Winds: 06010G20KT
    - Gust factor is: 20 – 10 = 10
    - Add 5 knots to final approach airspeed
- This will result in greater float down the runway.

Type of Landing

- Normal Landing – slightly higher final approach airspeed, power reduced in round-out and flare.
  - Greater margin of error for less-than-optimal airspeed control on final and for gusty winds.
- Short Field Landing – slower approach speed, usually behind the power curve; harder to hold an airspeed.
  - Need to carry power in the round-out and flare.
  - Firm touch-down if power is reduced too quickly
  - Better aimpoint and touch-down control

Final Approach Airspeed – Factors to Consider

Pilot Technique

- Often airplane-dependent habit patterns:
  - C-172 background = chop power to idle approaching the threshold.
  - F-18 background = carry power through roundout with little to no flare.
  - Original CFIs can have a big impact on a pilot's technique.
- Recreational pilots should be careful emulating pilots that fly 3+ times a week. Such skill is difficult to copy without similar proficiency.
  - Timing can become critical for power reduction or initiation of the flare.
- Pilot skill will vary when faced with challenging scenarios. The pilots flying out of Clearview (1800' runway) learn to be excellent at airspeed and aimpoint control.

Final Approach Airspeed

Arrow Example

- POH airspeed = 90 MPH
- V_{so} = 61 MPH (2 x 200 lb pilots, 2 x bags, fuel to tabs, full flaps)
- 1.3 x V_{so} = 79 MPH, no gusts
- CAS Correction: 79 – 4 = 75 MPH
- Visibility at 75 MPH in the Arrow at full flaps is good.
- Those with experience in the Arrow may recognize this airspeed. It works well for me when teaching—I recommend a range of 75 – 80 MPH IAS!
- This airspeed requires carrying power through the round-out, with a slow power reduction in the flare.
- When flying alone at a light fuel weight, I use 70 - 75 MPH IAS.
- Trim and ballast can make a big difference…but that's another briefing. ☺

SUMMARY

How to integrate all of this:

- Understand the different adjustments possible.
- Talk with a CFI if you have questions.
- Practice!