Solo

Approach to Landing
Part 3 of 4

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In part three, we will examine how to reduce and prevent the errors in airspeed, flight path and descent rate that make the approach unstable.

Airspeed errors

Airspeed errors may be greatly reduced by controlling the pitch attitude of the aircraft. The simplest and most effective way to control pitch attitude is through the use of elevator trim. This gives the pilot the of not having to hold a pitch attitude with the elevator stick while maneuvering the aircraft through the approach course.

As you start your power reduction on the downwind leg of the approach, trim the aircraft to maintain best forward glide speed and glide angle without manipulation of the elevator control stick. Best glide angle and speed will vary between aircraft types, i.e. trainers compared to acrobatic airframes. Typically an effective glide angle would be in the 3-6 degree range. Airspeeds should be 1 ½ times the estimated stall speed.

In practice, I have found that 1-3 bumps or clicks of elevator trim will work assuming that the aircraft has been trimmed for hands off level flight.

Pitch and power equals performance. The power setting that the aircraft has been trimmed for will have a significant role in the glide angle and aircraft speed. Likewise, distance to the runway threshold, where the pilot starts his approach, and wind conditions will also interact. We will expand on this in part 4.

Flight path error

Preventing the most common flight path error, failure to align the aircraft to the runway, is fairly easy and it may be accomplished in two steps.

Step one - select a set of visual queues that bracket the final approach course with respect to the runway edges. The bracketing being no wider than the width of the runway.

Step two - use the visual queues to anticipate when to turn to final as well as an alignment aid during the final approach.

As the aircraft passes across the first visual queue, the pilot should be rolling out of the base to final turn to a wing level profile. If the aircraft is in a wing level profile before the first visual queue, the pilot has turned early and will be lined up with the outside portion of the runway. In the case of our field, that means the

barbed wire fence. Similarly, if the turn to final is just being initiated when the aircraft passes across the first visual queue, the aircraft will be lined up with the inside of the runway, closest to the pilot, pit area and so on. In either case, the pilot must make the corrections required to center the aircraft in the visual queue

Reducing the pilot induced oscillations (PIO) may also be achieved in two steps.

First - Constantly evaluate the aircraft position in relation to the visual queues. When the aircraft appears to be drifting out of position, make the correction immediately.

Second – Make corrections using both the rudder and aileron (coordinate flight) with a light or gentle touch. A light coordinated touch reduces the rate at which the aircraft is wandering on the approach course and potentially reduces high bank angles. High bank angles cause significant changes in lift, which in turn is directly related to the rate of descent.

Descent rate errors

Power or throttle management is the key to controlling descent rate. Gradual changes in the power settings will result in predictable changes in rate of descent.

If the aircraft is observed sinking faster than desired, add a small amount of power to stop the sinking trend and then hold that setting until the aircraft arrives at the desired point on the approach path. Similarity, if the aircraft is high, reduce power in gradual steps to revise the descent rate.

To accomplish this, I suggest the rule of halves.

When the aircraft is abeam the pilot station on the downwind leg, reduce the throttle setting to half of whatever is currently in use. As the aircraft is turned from downwind to base, reduce the throttle setting by half. As the aircraft is turned from base to final, reduce the throttle setting one more time by half.

If you are full throttle, during level flight entering the downwind leg, the new throttle setting will be a ¼ throttle setting as you roll wings level on final. Likewise, if you were to enter at the same point at a ½ throttle setting, you would end up at a 1/8 throttle setting,

Same technique may be used to add power to slow a descent. Add half, of what is currently being used.

In part four, we will put this all together along with some techniques which wil ensure the approach is stable.