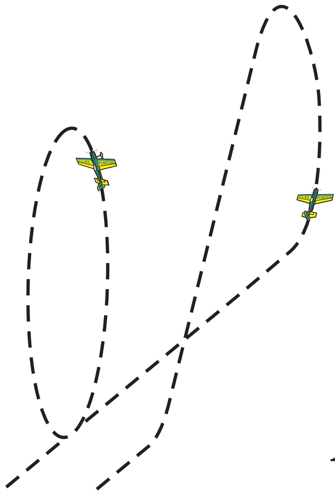
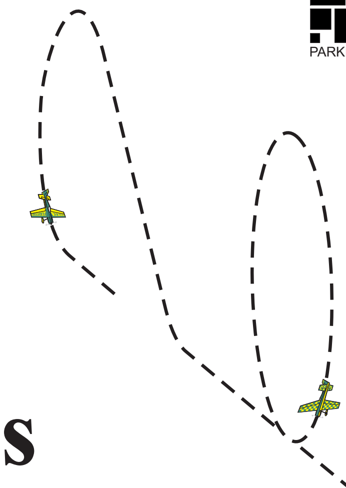


Section 2: Basic Aerobatics



Airplane Considerations and Control Setup

Primary to Aerobatic Airplane Transition

Parallel Positioning

Basic Aerobatics Introduction

Aerobatics is unarguably the most engaging and rewarding forms of flying available to the R/C pilot, not to mention a prerequisite for 3D flying success.

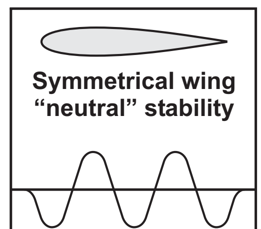
While individual opinions vary regarding the "best" methods for learning aerobatics, there's no question which methods work best when up against the School's 4-day aerobatics course deadlines! The timeless crawl-walk-run approach presented here has proved to be the most effective method for learning aerobatics in the shortest amount of time. Once you master basic aerobatics, you'll have the foundation to begin rapidly building a more successful and satisfying R/C flying experience for years to come.

Of course, an essential component in this process is choosing an airplane well suited to basic aerobatic training. That means a "neutral" plane with a symmetrical wing and ailerons that neither resists nor exaggerates what it is told to do. While a high wing primary trainer with ailerons is capable of some aerobatics, one ends up forcing it to do what it wasn't meant to do. Ultimately, aerobatics are easier to learn flying an airplane with a wing designed for aerobatics.

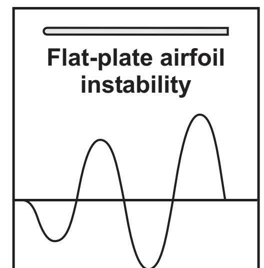
Note: Landings, wind, and symmetrical wing planes tend to expose poor fundamentals and bad habits that flyers can otherwise get away with. If you are comfortable landing a trainer—proving good fundamentals—you'll enjoy stepping up to the "flying on rails" feel, precise control, and increased capabilities of a symmetrical wing plane. On the other hand, those who can not comfortably land a slower trainer will find stepping up to a faster symmetrical wing plane extremely difficult (and will often end up looking for something other than becoming a better pilot to keep their interest).

Assuming good fundamentals, the main difference transitioning into a "neutral" symmetrical wing plane from a primary trainer is that the plane will not correct itself, but stays where you put it. You will, therefore, need to deliberately return the wings to level and correct unwanted climbs and descents with the elevator.

Since flat-plate airfoil "foamies" tend to be unstable and therefore require more effort to fly in general, foamies are not recommended for basic aerobatic training. P.S. When you watch a pro fly a foamie smoothly, it is the pilot's skill that makes the difference!



The plane predictably stays in the attitude you place it in until you effect a change, and then it stays in that attitude until you effect another change.



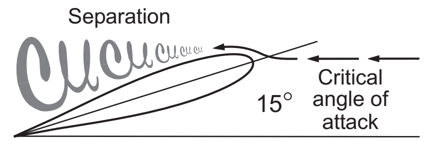
The plane won't stay in one position very long and the results of control inputs tend to be varied and/or magnified.

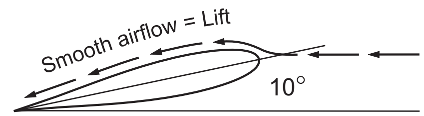
KPTR: Consistent landings with a basic trainer are the prerequisite to symmetrical wing aerobatic success.

Aerobatic Airplane Stall Characteristics

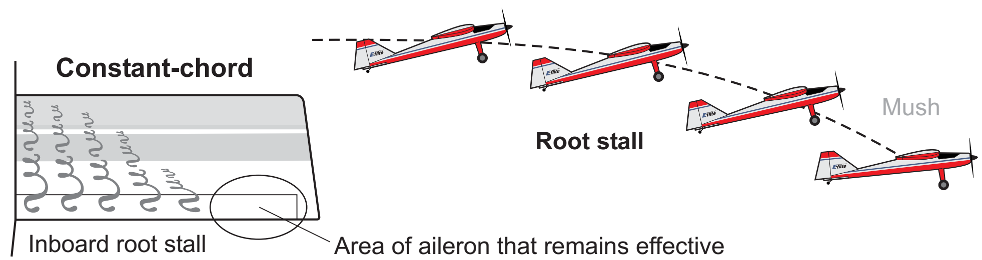
Nearly all airplanes with symmetrical wings, little dihedral, and ample power are suitable for aerobatics. Yet, as you trade the forgiving qualities of basic trainers for higher performance, you need to be aware of the different stall characteristics of aerobatic planes when over-controlled or flown too slow.

A stall or loss of lift occurs when the wing's angle of attack is too steep relative to the flight path and the airflow can no longer remain smooth over the wing.

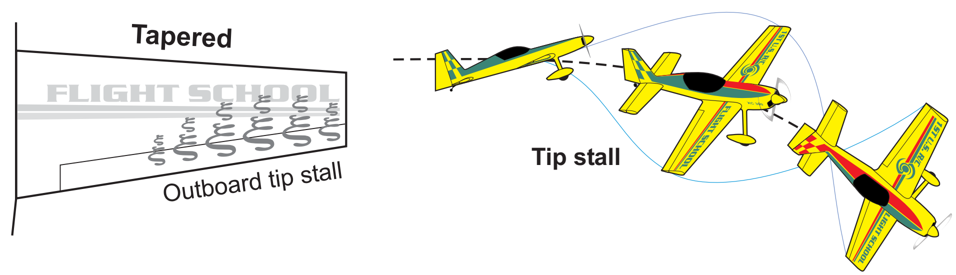




A constant-chord wing inherently stalls at the center root first, while the tips continue to provide lift. The first sign of a stall with this wing type would be a higher sink rate and/or a sluggish elevator response, but the plane would remain somewhat controllable.



A tapered wing inherently stalls out toward the tips first. Stalling this wing will result in a wing dropping, followed by a snap roll into a spin if the elevator is not lessened and/or the airspeed increased. While this wing makes it possible for experienced flyers to perform snappier maneuvers, it can prove unforgiving for the less experienced flyer.



Consequently, an ideal basic aerobatic airplane would feature a more forgiving constant-chord wing.

The exception to the tapered wing tip stall tendency described above is when an airplane is very light. As a rule, the heavier a plane is in proportion to its size, the more important its aerodynamics and the skills of the pilot are. The lighter a plane is, the less critical its aerodynamics and the pilot's skills are. Indeed, an exceptionally light tapered wing airplane may have such mild stall characteristics that it exhibits almost no tendency to tip stall. Experience will tell.

KPTR: A constant-chord symmetrical wing affords aerobatic performance with forgiving slow speed characteristics.

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Setup for Success

Logic dictates that the "best" airplane setup is the one that best compliments the type of flying a person does most often. Seldom can you go wrong by initially setting up your plane's control surface *travels* according to the manufacturer's *low rate* recommendations. Then, as you develop a feel for your plane, you can fine tune the travels more to your liking and skill level.

"Balanced Controls" describes the ideal condition in which all the controls are equally sensitive. Possibly nothing inhibits aerobatic progress more than when one of the controls is noticeably more or less sensitive than the others, forcing the pilot to remember to use two different control pressures depending on the input.

You will be best served to increase or decrease your control surface travels to achieve balanced controls that match your immediate comfort level. Even low time pilots can sense when the aileron is touchier than the elevator, for example. Why needlessly force yourself to get used to an overly sensitive or sluggish elevator or aileron response? Or, introduce large amounts of radio *exponential* and lose the 1 to 1 correlation between your intentions, control inputs and flight responses, when a simple travel adjustment may be all that is needed to make the airplane more agreeable to you?

All too often, perfectly good airplanes are faulted or retired simply because the pilots, who upon experiencing a dislike with the way their planes handle, put it upon themselves to learn to deal with it, and then go looking for another airplane when the one they're flying isn't much fun to fly. On the other hand, changing the travels to your immediate comfort level will boost your confidence and allow you to concentrate on aerobatics, instead of trying to get used to the plane.

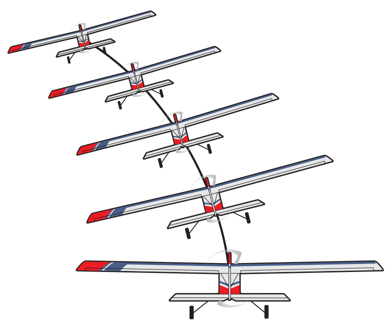
A note about radio *exponential*: Airplanes set up to achieve the extreme control surface deflections needed to perform 3D stunts also require large amounts of *"expo"* to make them controllable when not flying 3D. However, using expo also means sacrificing the correlation of control input and airplane response that is so important to developing the consistent *timing* required to fly aerobatics. Therefore, if you are not flying 3D anytime soon, it is recommended that you stay with a conventional "linear" control setup favorable to flying aerobatics, and delay involving 3D settings until your skills have evolved to where 3D flying is an option.

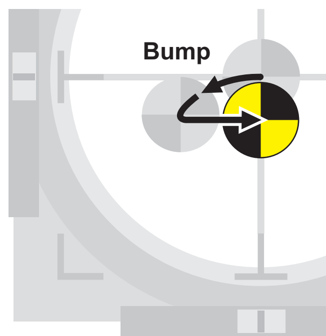
KPTR: Sometimes the best solutions are so simple that they are overlooked.
To start flying better right away, simply adjust the travels to <u>your</u> liking.

Primary to Aerobatic Airplane Transition

Taxiing: Tail-draggers are taxied with full up elevator to keep them from tipping onto the prop. Takeoff: The same takeoff procedure is used for both high and low performance airplanes: Point the plane into the wind, hold in a small amount of up elevator, full power, smoothly tap the rudder to steer, and the plane will fly off when it's ready. Relax the elevator when the plane leaves the ground, keep the wings level with the ailerons, and manage a gentle climb with the elevator. Reduce power to half once you reach a safe height to conserve battery. Turning: If you've never flown with ailerons, review pages A-10 & 11.

Course changes: Bumping the aileron to effect a course change with a symmetrical wing plane may do little more than bank the wings slightly. To execute a course change, you will also need to pull a little up elevator, and in effect, perform a mini turn.

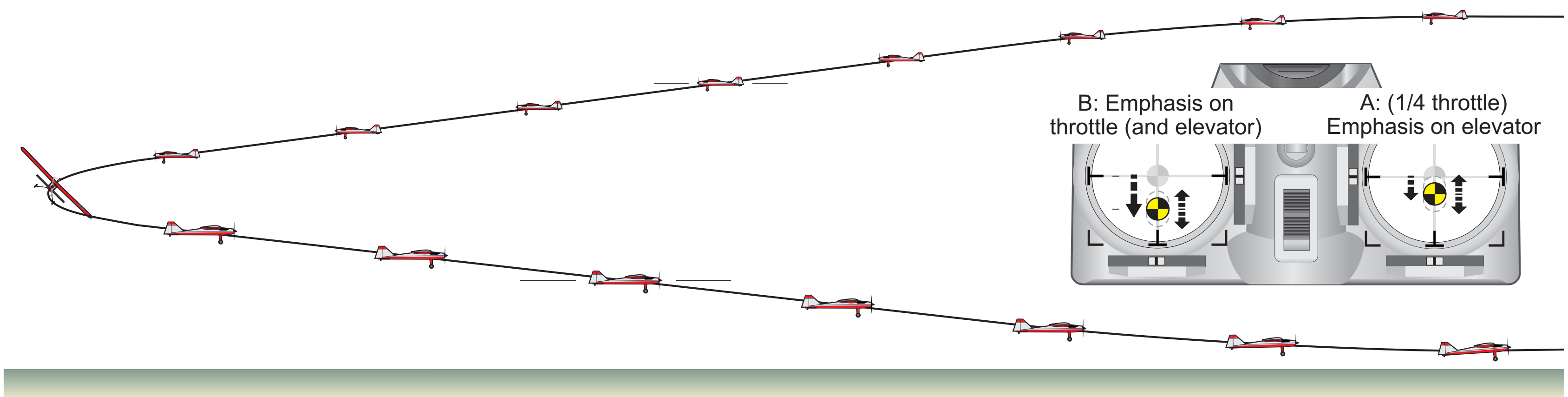




Landing: Symmetrical wing planes tend to dart toward the ground when the power is cut. Here are two ways to set up a landing with a symmetrical wing plane.

Approach A: Reduce power to start a descent, but not completely, then hold in a little up elevator to manage a gradual descent to the landing area. If you feel yourself needing more and more up elevator, the plane is getting too slow and you need to add a little more power. Cut the motor when you estimate the plane will make the runway.

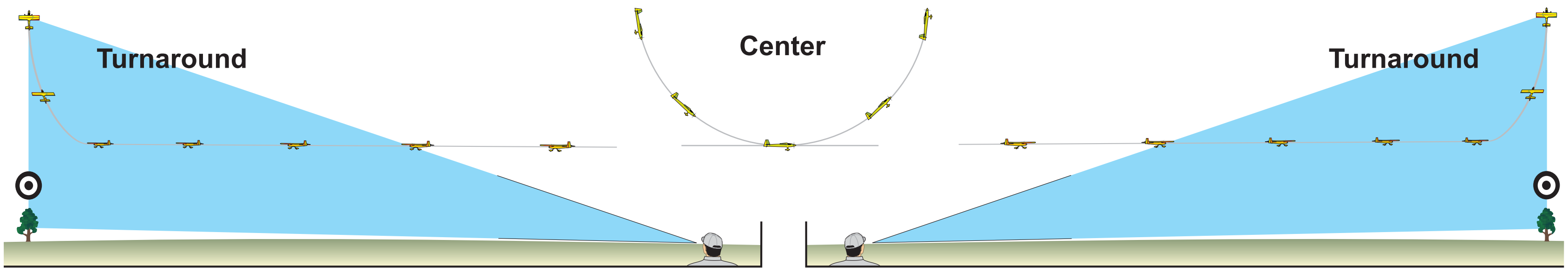
Approach B: Reduce power to start a descent. Use the elevator to keep the fuselage attitude level, and manage the rate of descent with the throttle.



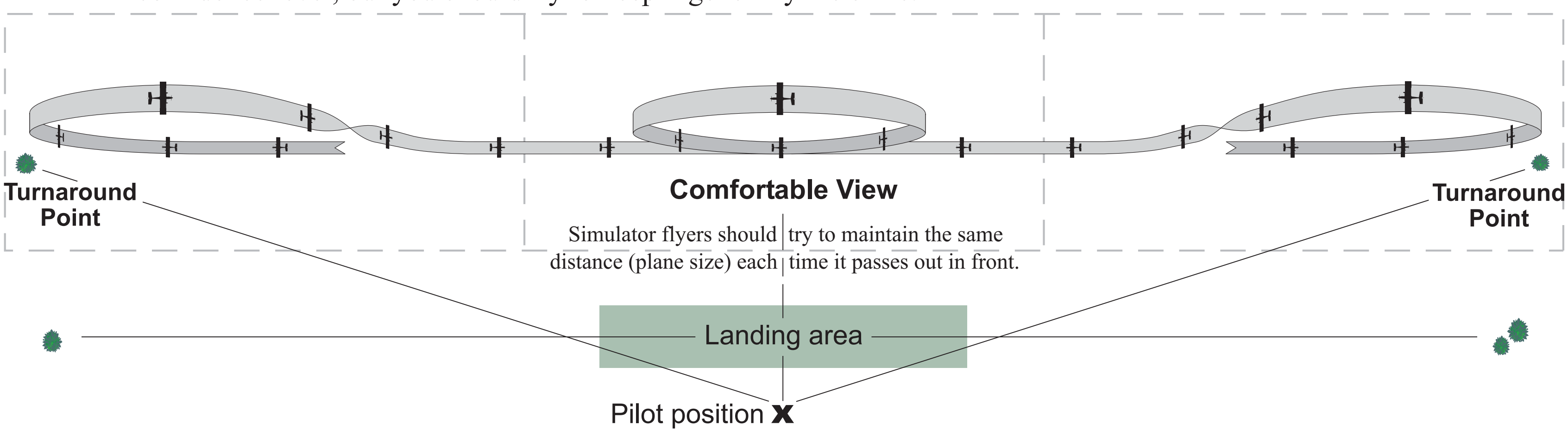
KPTR: One knows when a plane is getting too slow by "feel", i.e., needing more and more elevator, not speed.

Parallel Positioning Foundation for Aerobatics

All basic aerobatic maneuvers are intended to be flown from the pilot's left to right and right to left, usually parallel with your runway layout. They can all be classified as either turnaround (end) maneuvers or center maneuvers in front of you. Note: The tendency of most flyers is to start a maneuver and then try to make corrections to end the maneuver heading in the right direction. Good pilots, on the other hand, understand that starting a maneuver from a consistent parallel line is the most influential factor in finishing it parallel, and thus reducing or eliminating the need for corrections altogether!



To improve your positioning and ease of flying, picture the distance out in front of you where you can comfortably perform your center maneuvers. Project that distance out to your left and right parallel to your runway or field layout, then pick some ground references to help you maintain consistent positioning and parallel entries into your turnaround maneuvers. The altitude you choose to fly at will depend on your confidence level, but you should try to keep it generally the same.



 KPTR: Consistent positioning promotes the familiarity that leads to confidence and opportunities to try new things.