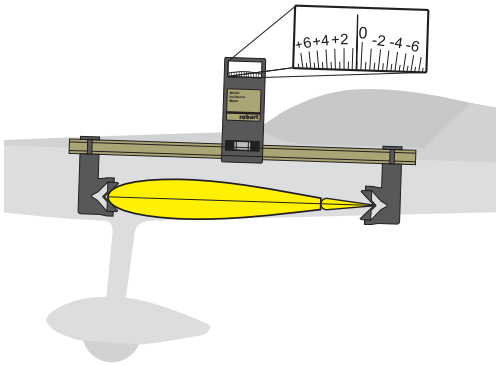
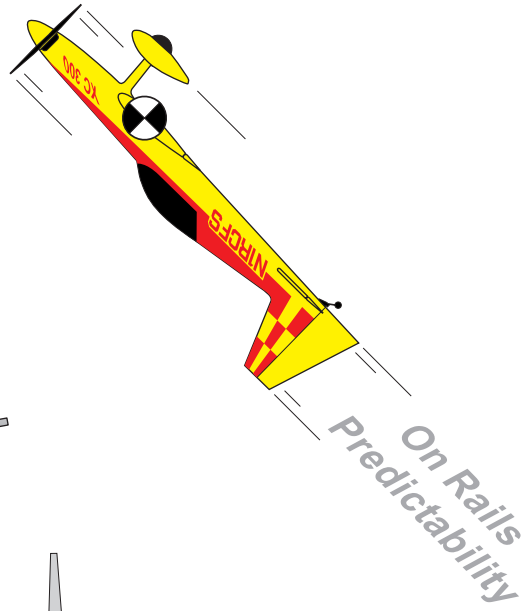
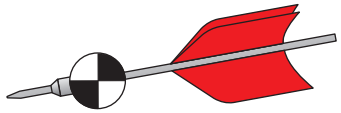
Airplane Setup Optimization



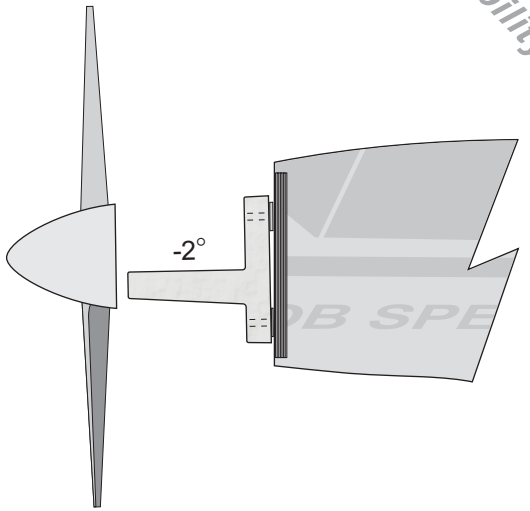
Wing Incidence



C.G.



Right & Down Thrust



Wing Incidence (a.k.a., Decalage) Primer

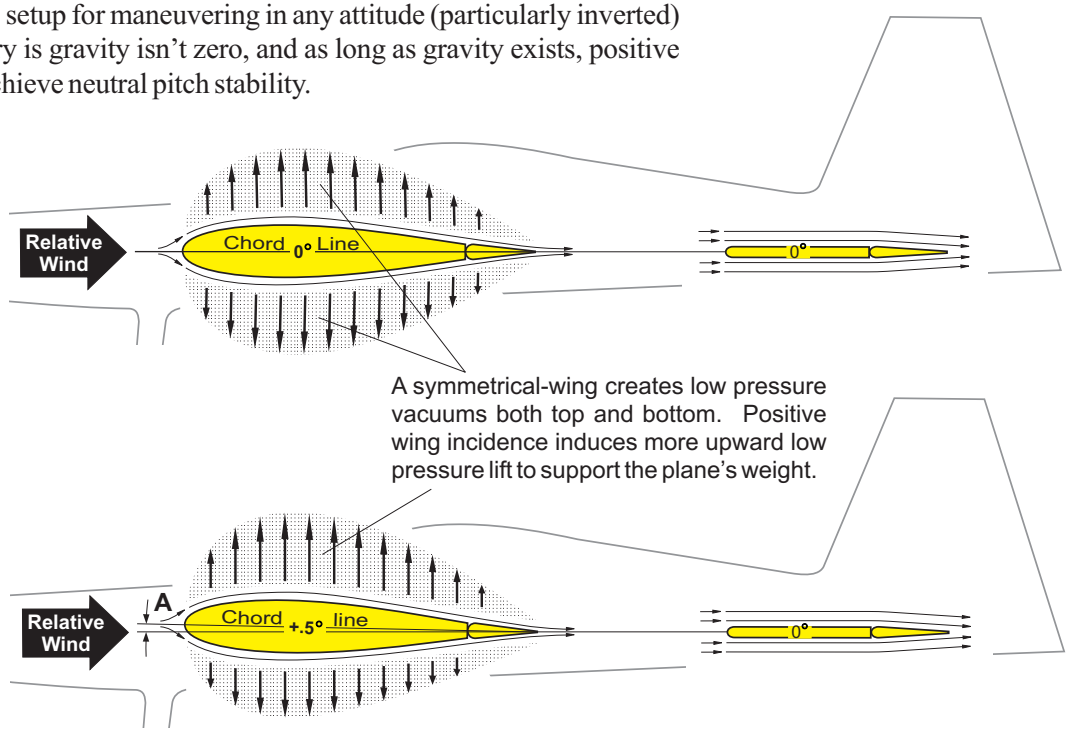
SETUP

Achieving a high degree of "neutral" pitch stability, that is, the ideal tendency of an aerobatic airplane to stay in the attitude it is placed in until changed by the pilot, is largely determined by whether or not the airplane incorporates positive wing incidence. The omission of positive wing incidence on many models designed since the 1990's has made it necessary to cover this crucial subject which had been a fundamental design feature for most of the sport's history. With a few exceptions, such as Hanger 9 & Carden Aircraft, the steady disappearance of positive wing incidence in radio control aviation is rooted in the persistent theory that the ideal airplane setup for maneuvering in any attitude (particularly inverted) is to have everything set at zero! The problem with that theory is gravity isn't zero, and as long as gravity exists, positive wing incidence will be necessary to generate upward lift and achieve neutral pitch stability.

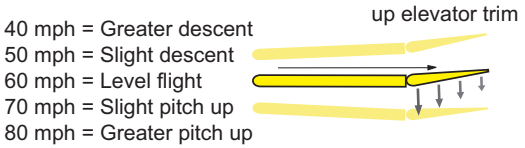
Explained: Air flowing over the curved surface of the wing generates a low pressure vacuum (suck). A symmetrical airfoil wing will produce an equal amount of low pressure on both the top and bottom at zero angle of attack to the relative wind (direction of flight).

The "chord line" is the line running from the trailing edge of the wing through the center of the leading edge. "Angle of attack" is the angle of the chord line to the relative wind.

As a rule, the horizontal stabilizer will fair (align) with the relative wind, thus, a symmetrical wing set at the same angle as the stab produces no upward lift to support an airplane's weight. Positioning the wing at a slightly positive angle of "incidence" (**A**) or "decalage" relative to the horizontal stabilizer results in greater low pressure on top of the wing and thus the lift needed to support the weight of the plane.



When positive wing incidence is absent, pilots must alternatively trim the nose UP to establish a positive angle of attack to maintain level flight. However, using elevator trim this way only works in theory if the plane's airspeed remains constant. Since the airspeed is constantly changing during flight, the force exerted by the elevator trim on the tail will be constantly changing as well. I.e., as airspeed increases, the increased effectiveness of the trim will cause the airplane to pitch up. As the airspeed slows and the effect of the trim becomes less, the plane will pitch down. Consequently, airplanes with the wing set at the same angle as the stab display subtle but erratic pitch tendencies because they constantly go in and out of trim.



KPTR (Key Point To Remember): To fly your best, you must correct any setup deficiency that would cause you to fight the plane.