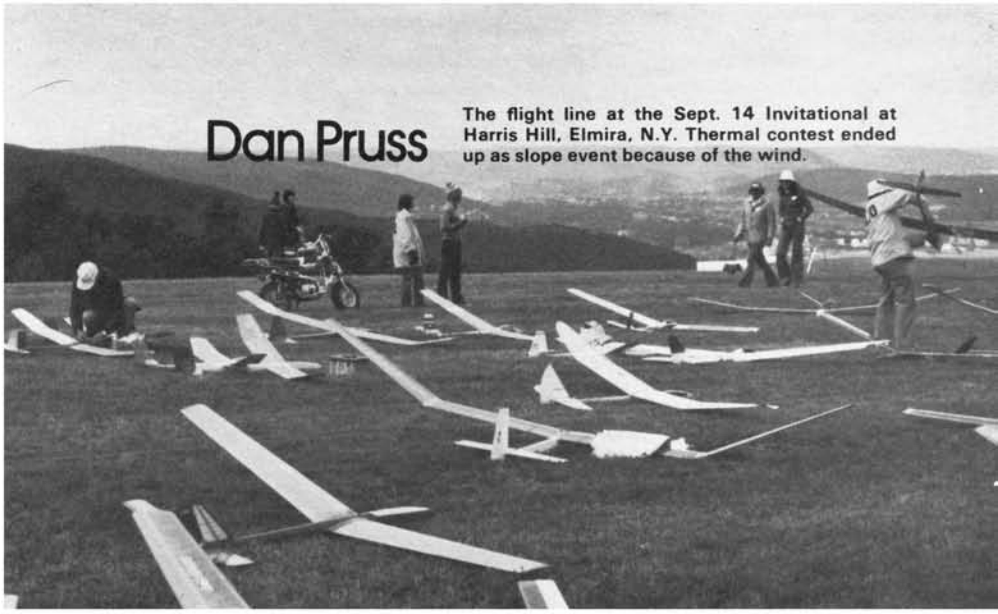
Soaring

Dan Pruss



The flight line at the Sept. 14 Invitational at Harris Hill, Elmira, N.Y. Thermal contest ended up as slope event because of the wind.

HOW MANY OF US, through the course of our model flying, have had the occasion to help the new flier in our group with his, or her, first flight? We probably each have our own "talking through" techniques for the neophyte—and most of these procedures, no doubt, have been successful. Yet, how many of these new fliers really learned anything from those first flights?

It has been this scribe's observation that the normal "talk through" conversations, which range from "a little right"—"push the nose over"—"a little up"—to "Harvey, I think we better run for cover!" have left the new flier with not necessarily the same confidence it takes to run a sailplane on a slalom course through a string of telephone poles.

If, for the next few minutes, we can forget about aerodynamics, principles of flight, and the basic laws of physics, a simple point will be emphasized that I have found to work most successfully in getting the model of the new flier from off of the tow to safely on the ground. Nothing wrong in having any knowledge or background in the above studies, except to most new fliers these sciences usually are more useful in analyzing a wreckage than in making a successful first flight.

For the new flier that simple point is to know and recognize what the sailplane's fuselage profile—and angle with respect to the horizon—are in flight.

This can be readily determined by observing a particular trimmed out sailplane during some hand-launched tests or while a more experienced flier is testing the new ship. A Hobie-Hawk, for example, has a very low nose profile in a normal gliding attitude—somewhat deceiving when one realizes how efficient this sailplane is. Other models' profiles vary, and when compared with the horizon, their fuselage angles are from the pronounced nose-low appearance to that which is about parallel with the horizon. In no case have I seen any presently kitted models that would have a *normal* flight profile with a nose-above-the-horizon attitude.

In the present discussion concerning "fuselage angle," let us restrict the flying talk to the "off the tow—to safely on the ground" aspect of flying—omitting best L/D concepts, how to fly for distance, spot landing techniques, or why transparent yellow Monokote is easier to see than orange against a blue sky.

For the sake of using round numbers, let us assume that you, as a flier, have a sailplane that glides at 10 mph. Now, on a day when the air is absolutely calm and you test glide this plane it flies at 10 mph over the ground (its airspeed is also 10 mph). On the day when the wind is, say, 7 mph and you test glide (into the wind), this same sailplane appears to fly much slower. Over the ground it is slower—the *groundspeed* is only 3 mph but the *airspeed* is still 10 mph.

If you were able to compare the two distances that the model covered in calm air vs. the 7-mph wind, you would note that the distance over the ground was much less in the 7-mph wind (assuming the release height was the same in both cases) than in the calm air (see Fig. 1).

During both of these tests, the same "fuselage angle" should have been maintained.

Now if you were again to test glide that same plane from the same height and with the same

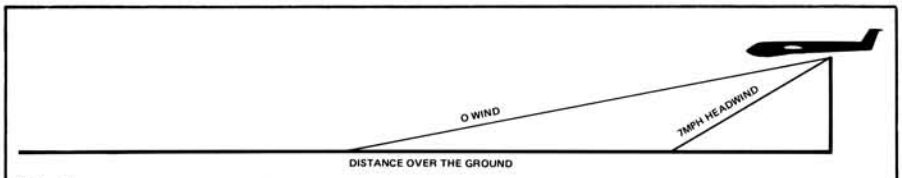


FIG. 1

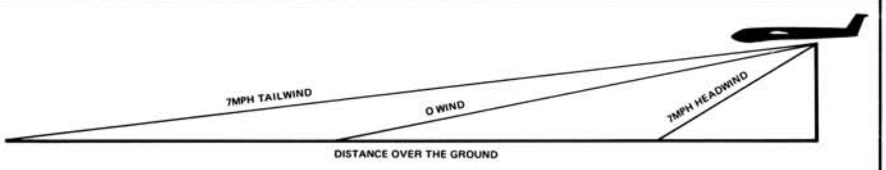


FIG. 2

"fuselage angle" but with that same 7-mph wind now at your back (tailwind), a greater distance would be covered over the ground (see Fig. 2). The *airspeed* would still be 10 mph but the ground speed would now be 17 mph.

Now, for the moment, let us refer to "fuselage angle" as something else. Technically speaking, when the wing is changing its angle with respect to the *relative* wind, the angle of attack is changing (see Fig. 3).

But since wings are attached to fuselages and the angular changes in fuselages are easier to see at a distance, we will continue to refer to fuselage angle at time with respect to angle of attack.

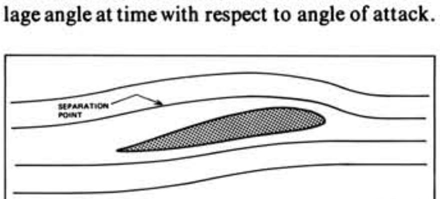


FIG. 3

As this angle of attack increases so does drag, and as drag increases airspeed decreases. The angle of attack can be increased to a point where the air separates from the wing and the wing can no longer produce enough lift (see Fig. 4). When

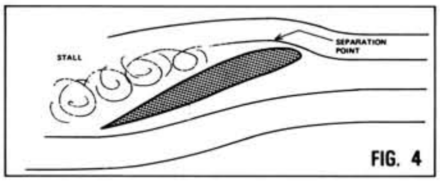


FIG. 4

this critical angle is reached, the wing stalls and it, and whatever is attached to it, tends to fall out of the sky.

Now, let us present some examples:

1. Let us say your model stalls at 6 mph. In the glide test where the air was calm, if you slowly increased the angle of attack—fuselage angle—you would see the plane slowly decrease its airspeed and drop, that is stall, from its normal glide path. It would, however, still be moving at 4 mph over the ground at the time of the stall.

2. In the test where you flew into the 7-mph wind, as the plane approached the stall, it would slow to a point where it would be motionless over the ground—airspeed would still be 7 mph—then move "backwards" until it stalled at, again, 6 mph but minus 1 mph groundspeed.

3. Now let us suppose we test the same plane again with the 7-mph tailwind. As it glides now at 17 mph over the ground and we increase the angle of attack at what *appears* to be a safe flying speed—13 mph—the plane drops out of the sky! Right, the groundspeed was 13 mph but the airspeed was again 6 mph. To the seasoned flyer this is "old hat", but to the novice, this latest condition just mentioned is the most misunderstood and least recognized "plane cruncher" in our sport.

How do all of these "tests" apply to a regular flight? If you are new to the hobby, remember that no matter how fast or slow your sailplane appears to be flying, try to keep the fuselage angle with respect to the horizon at that angle relative to the horizon that you know is safe for

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your particular model—that is, nose low to parallel with the horizon. This is especially true in making a turn from into the wind, upwind to downwind. Remember in example 2, where the groundspeed was relatively slow? O.K. As you make a turn to go downwind, you are coming into a condition similar to example 3. Suddenly the groundspeed increases (normal), and *usually* the new flier instinctively pulls the nose up to slow down, trying to fly the model at the speed he was accustomed to seeing while flying into the wind. A stall is most likely to occur, and if this is close to the ground, it might be too late to effect a recovery. This, it has been said, tends to make kit manufacturers smile.

If the fuselage angle was maintained throughout the turn, it would be *normal* to see the sailplane increase its groundspeed as it proceeded downwind. This takes a bit of discipline; but, realizing what that safe angle or attitude is develops confidence that is so necessary in assuring those first successful flights. Now if you began a turn back into the wind, the groundspeed would diminish and it would appear that the sailplane has slowed down. If the "fuselage angle" was still maintained throughout the turn, the "slowing down" of the plane would be expected, and by knowing the fuselage angle, complete confidence could be maintained.

It should also be realized that winds are not necessarily steady in velocity or direction and that gusts or wind shifts, when they occur, can upset a model from its intended flight attitude. When this happens, the flier might suddenly find the model in an attitude in which he is sure he didn't put it. Again, fuselage angle; you, as a flier, must command the model and be concerned about that fuselage angle that you know will give you a safe performance.

Sometime during the course of your flying you will probably hear of "the perils of a downwind turn" (never did know why these should be "hairier" than those upwind). If they are perilous, it is because the flier—while flying his plane downwind—tries to slow the model down (with that fuselage angle) before he commences the turn. This is poor procedure. By the time the model has slowed down to what he *thinks* is a safe speed, the model stalls (as in example 3.) and, if too close to the ground, its back to the drawing board.

Again, the foregoing is not directed at the seasoned flier, who instinctively reacts to the other than normal conditions but to the new flier. Neither does this guarantee 10-minute maxes or landing the model at one's feet. It is intended to help the new flier to get through some of the earlier growing pains and to develop confidence quickly in a sport where relaxing is what it is all about.

Getting the novice flier to recognize a sailplane's flight performance by emphasizing fuselage angle has further proven to be a most successful method of teaching and in getting a new modeler to solo successfully.

An Observation or Two: If we, in RC Soaring, can label our sport successful with regards to the contest program, then perhaps we should further realize why to date it has been so successful.

First of all, many newcomers—those with less than one year's experience—have been seen enjoying the contest circuit this past summer. Most of those fliers have experienced that perfect 10-minute max and have also made respectable spot landings. Two-minute precision flights have been made and creditable 15 cumulative scores reached.

That the novice can reach these achievements as a week-end flier gives him confidence in attending his first contest. The flier realizes he, or she, has to get it "all together" for a contest but, knowing he, or she, was able to do it before, has to stimulate the individuals into "giving it a go" against a local, state, or national champion.

Secondly, the flexibility of particular tasks, i.e., duration 6-10 minutes, precision 2-3 minutes, the landing zones—speed/distance has allowed contest managers to select tasks best suited for their own conditions. This same flexibility has further kept contests from becoming routine.

It is the opinion of many that if the current flavor of tasks—speed/distance, duration, and precision flying can be maintained, and with the existing and accepted flexibility, it would be in the best interests of the sport.

This past contest season attests to that way of thinking. Witness the LSF Tournament with its speed/distance task as designed by Donelson/Hahn. The Michigan State Championships had a 24-minute cumulative—3 round task—"no flight over 10 minutes or be penalized" feature. C.D. Gordon Pearson claimed it was widely accepted.

The point of all this is, as modifications to tasks are introduced, they are presented because they serve a new need and purpose. Although most are "variations on a theme" most often they have also been refinements. While C.D.'s and contest planners have taken a few liberties with the rule book, these same people have added new dimensions to competition, the modifications have seldom caused an unpleasant air and above all they have encouraged, not discouraged, the newcomer to "climb into the ring."

LSF—Shortlines: Membership as of October is past 1,600 . . . newest country to join is Czechoslovakia . . . new in soaring? . . . looking for an added challenge? . . . join the L.S.F. Send for letter of intent form to: League of Silent Flight, Dept. M., P.O. Box 39068, Chicago, IL. 60639. Include a stamped self-addressed envelope.

(My address is Rt. 2, Box 490, Plainfield, Ill. 60544.)