

DR. WALTER PANKNIN
AT THE MARCS SYMPOSIUM

The first part of November, 1989, saw us in Madison, Wisconsin, for the Madison Area Radio Control Society's National Sailplane Symposium. MARCS '89 enjoyed a very large number of attendees, and all of the speakers were superb. Of particular interest to flying wing enthusiasts was the presentation given by Dr. Walter Panknin, the originator of the "Flying Rainbow" series of flying wing sailplanes. This month's column will be devoted to a synopsis of Walter's presentation, "Flying Rainbows; Basics, Building and Beauty of Flying Wings."

Walter began his talk with some slides - a short history of the origins of the Flying Rainbows, followed by photos of his 'wings in the air. "Magnificent" is the only word to describe them. Other photos showed some of the experimental configurations Walter has tried, plus some good closeups of present design features. One outstanding characteristic of Walter's 'wings is the pattern of their brilliant colors - truly "Flying Rainbows"!

The more technical portion of Walter's talk began with an explanation of the similarity between conventional tailed aircraft and flying wings: that is, the flying wing does have a horizontal stabilizer - it is at the wing tips! The same stabilizing loads produced by the tail of a conventional aircraft are also produced by the ends of the wings for a tailless aircraft. Once this idea becomes a part of your thinking, everything to be known about flying wing pitch stability becomes quite obvious.

Walter gave the "magic formula" for wing twist. This computation involves such things as the aspect ratio, moment coefficients of the airfoils used, taper ratio, and stability factor. The end result is the geometric twist needed for stability. He then led the symposium participants through an example which made everything clear.

As a general recommendation, use the Eppler 222 at the root and the Eppler 230 at the tip. A wing root chord of 14 inches should give enough room for the receiver and a large battery pack (1200mah). A span of 110 to 140 inches and a tip chord of 9 inches gives a lot of wing area. The geometric twist used is determined by the "magic formula." Control of pitch and roll is by elevons which extend over the outer one third of the semispan, while speed range is expanded by use of spoilers or flaps. Servos must be put into the wings themselves so they are directly linked to the control surfaces. Construction should be of foam with balsa skins to provide a strong, stiff structure which will have excellent performance. This excellent performance was demonstrated by both mathematical modeling and results of actual flight testing against conventional tailed aircraft.

Of special interest to us were Walter's ideas concerning winglets. While not needed for flight, they are recommended as aids to visibility. As Walter so aptly said, "Out of sight, still in mind, comes the crash!"

The harmonic oscillations which can occur during high wing load maneuvers were also mentioned. Walter's solution involves maintaining a relatively large root chord.

Walter's presentation concluded with the five steps to success: (1) understand what you do; (2) build it stiff, not only strong; (3) no play in the linkages; (4) precise location of the CG; and (5) have confidence it will fly. He then issued a challenge to the symposium attendees: "Would you try it?"

A complete transcript of Dr. Panknin's presentation, along with all of the pertinent drawings, are available within the Proceedings of the 1989 MARCS Symposium.

If you have access to a Commodore 64 computer and Simon's BASIC, you may be interested in obtaining a copy of Walter's Flying Rainbow computer program which can assist you in designing your own flying wings. Contact Lee Murray, LJM Associates, for more information.