SWEPT 'WING PROGRESS

Swept 'wings have gained in popularity over the last few years, and it is our opinion that several technological advances are responsible.

These advances are:

(1) an increasing number of excellent airfoils,

(2) very simple mathematical methods for computing the washout needed to provide adequate stability,

(3) better construction materials, and

(4) new and better construction methods, most notably the vacuum bag technique.

Because of these improvements the performance of swept 'wings has increased dramatically. Swept 'wings now offer the strength to survive and take advantage of full power winch launches. They are stable, maneuverable, and capable of high speed. In short, they are now very nearly the equal of their tailed counterparts, and it may not be long before they exceed that performance. When the latter does occur their popularity will shoot up even more!

Let's take a look at each of the four factors listed above...

AIRFOILS

Radio controlled swept 'wings first started appearing in numbers during the early part of this decade. Airfoils used included the then new Eppler 174-186 series. More popular now is the Eppler 222-230 series of airfoils, especially designed for swept 'wings. Some flying wing enthusiasts have taken to modifying the airfoils of conventional sailplanes, like the Quabeck sections, for use on their wings, while others have designed their own with computer assistance.

WING TWIST & STABILITY

It seems to be a rule of thumb that the quarter chord line sweep angle should be about 20°. Larger sweeps produce large amounts of detrimental cross span flow, smaller sweeps require more twist or reflexed sections.

In an effort to obtain stability, many designers have included large amounts of wing twist, along with reflexed tip sections, in their designs. While providing the large amount of stability the designer intended, the performance of these aircraft is usually not so good as anticipated. Heavily reflexed sections create large amounts of drag (as we saw in our discussion of planks), and excessive wing twist works against a wide speed range. The individual looking for the performance needed to compete effectively in thermal duration contests and F3B tasks will likely use airfoils which are nearly symmetrical, as the combining of undercambered and reflexed sections inherently requires more twist. Maneuverability and maximum speed range come through measured decreases in stability, not increases.

CONSTRUCTION MATERIALS

Swept wings can make good use of new construction technologies. Two compatible goals are now being achieved with the use of composite technology - reduced weight and increased strength. The use of foam core wings is but a first step when constructing a swept 'wing. Diagonally oriented fiberglass skins, obechi veneers, Kevlar for high stress areas, and carbon fiber spar systems can all provide strength far in excess of conventional balsa and spruce construction. Well designed composite structures using these materials weigh substantially less than their wooden counterparts, while providing great increases in structural strength.

(Installing arrow shaft hinges can provide another quantum leap in both appearance and performance.)

CONSTRUCTION METHODS

Using a vacuum bag system saves even more weight by reducing the amount of epoxy needed, and it also integrates the structure and nearly eliminates paint and other weighty finishes. Additionally, vacuum bagging provides the builder with a straight, true, and accurately constructed aircraft. Vacuum bagging a composite aircraft can result in an incredibly strong flying machine with astounding performance.