LARGE-SPAN FLAPS FOR SAILPLANE APPROACHES AND LANDINGS

by STEPHEN DU PONT

I have been asked many times recently about the use of large-span flaps in place of spoilers on sailplanes. One of the most important recent advancements in sailplane technology is the large-span flap. There is an unfounded fear in the minds of many sailplane pilots that a sailplane without spoilers would be difficult to fly.

I am reminded of the old Department of Commerce attitude when Hawley Bowlus and the late Richard duPont first equipped the Albatross II with flaps in the late 1930's. The Department held that it was necessary to actuate the flaps with a crank of many turns to prevent someone from letting them off too suddenly. This is a little like requiring a multi-turn crank to control spoilers to prevent putting them on too suddenly. I once tried pulling spoilers on a popular sailplane just prior to touching down. I still have imprints in my nether side of the rivet heads in the seat as they pushed up through five inches of foam rubber, and it is a tribute to the Schweizer brothers' excellent product that I didn't bend it. Of course, the answer is simply that sailplanes are flown in landing approach, right onto the ground at a safe speed margin above stalling speed.

Let us consider some flight characteristics of a sailplane with large-span flaps and no spoilers. See table for *suggested* flight use of flaps. Dick Schreder designed HP-10 without spoilers because he didn't want to spoil the smooth surface of the laminar-flow wing for soaring by cutting slots in it which could never be smooth in flight.

HP-8 had both spoilers and flaps. The flaps on HP-10 reach from one aileron to the other, having a span of 34 feet out of a 48-foot wing. They come down about 50° on the HP-10 Schreder prototype, 75° on the Helisoar HP-10's and 90° on Dick's HP-11. With 50° flaps the HP-10 at 55 mph flies at an angle of about 25 degrees nose down and it's coming down fast. There is nothing to prevent you from flying it all over the sky this way, and the thing to remember is that at 55 mph the flaps can be released immediately. At such a nose-down attitude if flaps are released suddenly, you accelerate downhill fast in a sure enough dive, but the ship doesn't stop flying. Instead, you can keep the speed from increasing by leveling out as you let flaps off. All that happens is the ship is suddenly gliding 55 mph at a 35-to-1 glide. Yank on full flaps again, keep the airspeed up by dropping the nose, still at 55, and you are coming down as steep as you could possibly desire, with strong drag to make it easy to hold that speed. If you apply flaps in an extreme fashion and at higher speed as just described you go through an instant of high lift which would be expected to, and does, "balloon" the sailplane. This couldn't matter less, as it is only momentary. But, consider the terrific advantage before or even after touch-down of being able to let air brakes off part way and *increase* the lift over the dive-brake as well as the no-brake condition. You can jump last-minute fences, ditches, rocks, etc., by dint of the fact that around landing speed, putting flaps from high-drag position into the high-lift position, say 25°, literally picks you up over the obstruction. The best approach

SUGGESTED FLAP USE TABLE FOR LARGE-SPAN FLAPS AND NO SPOILERS BASED ON HP-10 EXPERIENCE

–5°	Best L/D speed up into high speed, low drag between thermals, speed triangles, etc.
0°	Best L/D — normal between thermals — circling field in pattern.
12°	Thermalling, weak ridge lift — best climb, lowest sinking speed. Aero tow take off — use in aero tow when too low.
25°	Landing Approach — very slow touch-down — normal airport landing. To stre — e — etch glide before touch-down — to jump that last ditch, fence, rock.
35°	Normal approach — ease off flap to flatten glide, add on flap to steepen glide — normal landing.
45°	Normal landing in rough field, approach air brake — lose altitude fast. For quick stop, slow landing.
50° and up	Strong airbrake — steep approach — lose altitude fast — "and up" for terminal velocity where approved. To hold down speed in inadvertent instrument or intentional aerobatic maneuver such as spin recovery, check spiral dive on instruments. To get out of bad cloud updrafts.