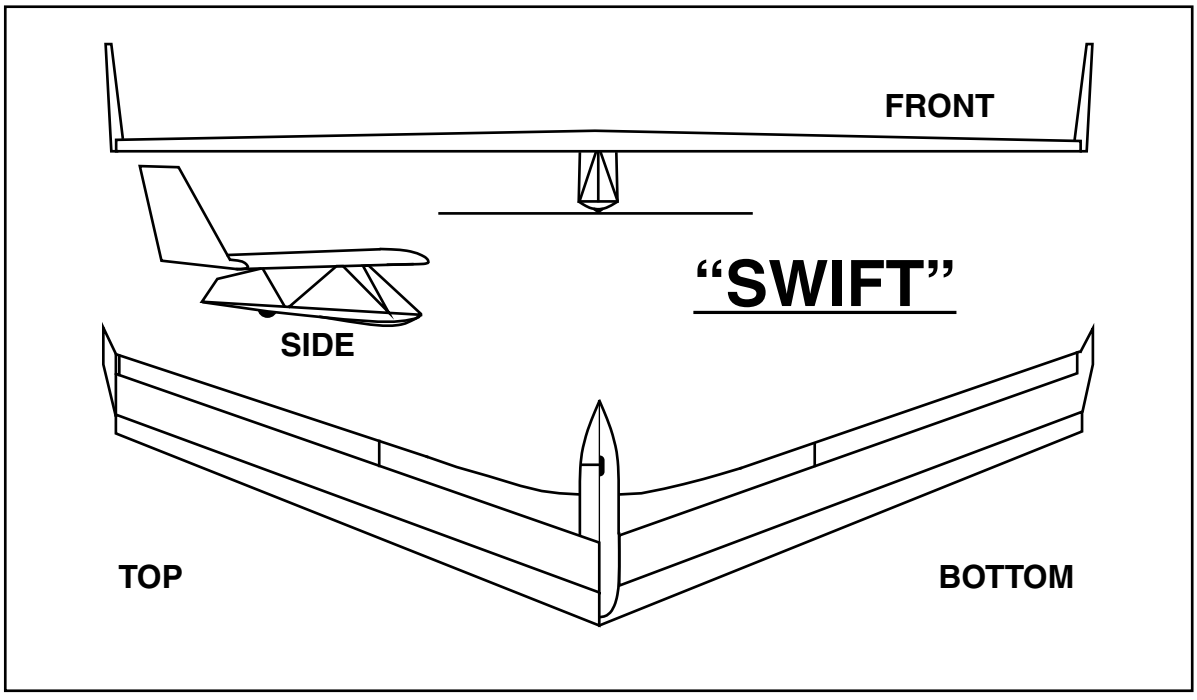
Steve Morris and the “SWIFT”

In the early 1980s we took our two Ravens to a large field north of our home for an afternoon of flying. We were just getting unpacked when another car drove up. A young fellow jumped out and said he was going to be flying his helicopter over in the far corner of the field. After checking for frequency conflicts, he set up his helicopter and we continued dragging stuff out of our car. The helicopter was soon cavorting around the sky, and we had one of our Ravens ready for the high start.

We launched the Raven and watched as she climbed out. The helicopter came to a screeching halt in the middle of a maneuver and began a plummet to the ground. Following a rapid but safe landing, the pilot ran to the ‘copter and turned everything off. Our Raven was still on the line as he turned to run to where we were standing.

Bubbling with excitement, he exclaimed, “Wow! I can’t believe it! Someone else is interested in tailless sailplanes! This is fantastic!” Over the next hour or so, the young helicopter pilot flew the Ravens, and we discussed tailless sailplanes at some length.



This was our introduction to Steve Morris. Over the next few months, we learned that Steve worked for the Boeing Company in their missile division, but that his true loves were low Reynolds number aerodynamics and unconventional planforms. He had a computer system which he portrayed as being "more computing power than man was meant to have," and had already experimented with large swept wing planforms. At the time of our meeting, Steve was working on a smaller, lighter, computer-designed swept wing planform, doing quite a bit of hang gliding, and contemplating returning to Stanford University for his doctorate degree.

Dr. Stephen Morris' name is now "in the news" following release of the "SWIFT," an FAI Class II hang glider which he designed with Prof. Ilan Kroo of Stanford University. There are several characteristics which make the "SWIFT" unique. It is a tailless rigid wing glider with excellent performance. It is easily carried on the top of a car, can be assembled in a matter of minutes by a single person, and is capable of flying hundreds of miles with a high degree of comfort for the pilot.

The "SWIFT" (Swept Wing with Inboard Flap for Trim) provides sailplane performance with hang glider convenience. It is usually foot launched from the slope, but can also be towed to altitude. True aerodynamic control surfaces, elevons and flaps, provide positive control at all flight speeds. Elevons are operated by a single side mounted control stick — just like modern jet fighters. The flaps, which provide a speed range of from below 20 to over 70 m.p.h., are controlled by a mechanism on the opposite side of the cockpit. With a glide ratio of 25:1, the "SWIFT" has a tremendous potential range. Foot landings are not at all traumatic, due to the low stall speed of the "SWIFT," and a small fuselage mounted wheel makes for effortless landings on smooth surfaces.

The "SWIFT" has a number of positive attributes which make it a good scale subject. The relatively short wing span is conducive to both 1/4 or 1/3 scale; just under 3 meters and just under 4 meters, respectively. The root airfoil seems to have a cusp on the upper rear surface — something like a Liebeck section. This could be easily duplicated with one of the reflexed airfoils designed for model use. The wing is deep enough for all electronics to be

totally enclosed, although batteries and receiver could be placed in a hollow “pilot.”

The simplicity of hang glider instrumentation, typically just an air speed indicator and variometer, is a bonus for those who appreciate details but dislike spending inordinate amounts of time with extensive detailing. The pilot is enclosed in a transparent fairing, and this provides some additional challenges to the modeler.

The “SWIFT” has been featured on several television programs and in a number of magazine articles, and a videotape is available from the manufacturer, Bright Star Gliders. The Bright Star Gliders tape includes information on fabrication techniques and car top transportation, in addition to some beautiful in-flight footage.

The “SWIFT” is constructed of Kevlar™ fabric and carbon fiber over a solid foam core, just as our modern models. Building a large scale model of the “SWIFT” would therefore not pose many problems, but would certainly amount to an impressive accomplishment.

The “SWIFT” videotape is available in VHS NTSC format (U.S.) for US$24, and in VHS PAL format (Europe, Australia, etc.) for US$29. Contact: Bright Star Gliders, 48 Barham Avenue, Santa Rosa CA 95407, (707) 576-7627

Photographs used in this article came from the Hang Gliding WWW Server Home Page: <http://cougar.stanford.edu:7878/HGMPSHomePage.html>.

Classification	FAI Class II hang glider
Wingspan	39 ft. (11.89 m)
Tip chord	3.03 ft.
Taper ratio	0.75
Wing area	135 $ft.^2$ (12.54 m^2)
Aspect ratio	11.5:1
Weight	115 lbs. (50 kg) without 'chute* 135 lbs. (62 kg) with 'chute*
Rated load	+6 g to -4 g
Flap span	8.58 ft.
Flap chord	25%
c/4 sweep angle	20 degrees
Wing twist	8 degrees
CG location	4 ft. back from apex of leading edge
L/D	24:1 maximum, with pilot fairing 15:1 at 60 m.p.h. (97 kph) 20:1 maximum without pilot fairing
Vne	75 m.p.h. (120 kph)
Aerodynamic concepts by Prof. Ilan Kroo and Dr. Stephen Morris	
Design, structure, and development by Brian Robbins, Eric Beckman, and team pilot Brian Porter	

* Second Chantz, Inc. "Pocket Rocket" HG-350 ballistic parachute system