Silent Wings Soaring Association

April-June 2015

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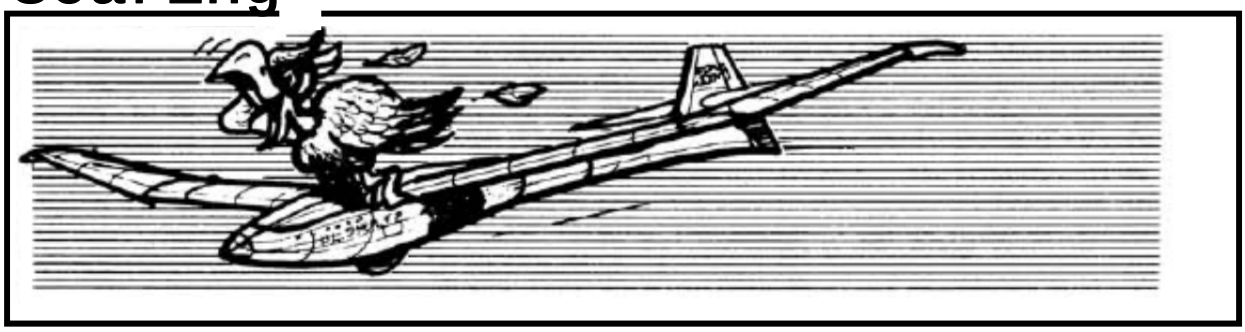
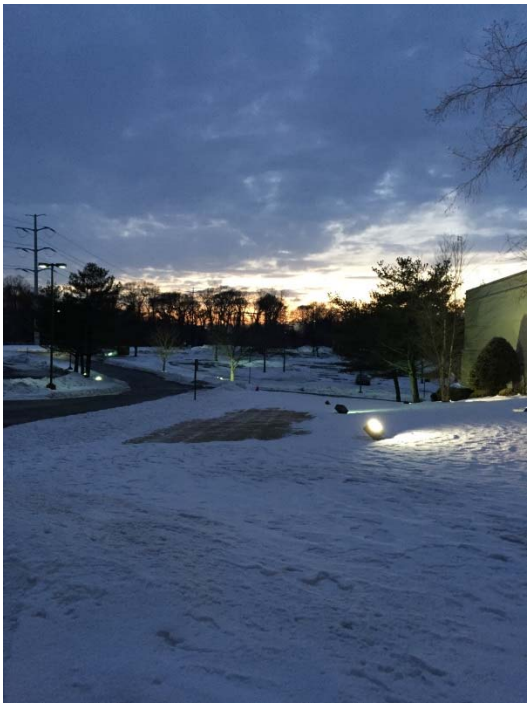
Soaring



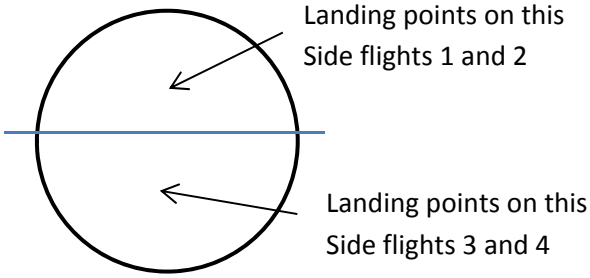
Keith **Kindrick** **April - June** 2015



(*I started this in March and due to a complicated work assignment taking me to Long Island New York through the late winter and spring it's a little out of date but you all will recall some of this*.)

Having just completed our March contest with amazing weather and a great format of 3, 5, 7, and 9 with John Barr as CD what is not love about our flying site in Southern California. I spent a week on the East coast for business and with a daytime high of 19 degrees on Long Island New York I am convinced SWSA is the place to be in the winter!

John Barr took the landings to a new level having us fly the ole half circle arrangement. You were able to get the points on half of the circle if you landed in the correct half. Otherwise you would not have any points. This worked pretty easy since we have a seam in the carpet where the light and dark Green sections join together.



We had a return visit from Mike Robertson with his lovely timer Lea. Mike has been a

long time member of SWSA and it was great to see him back with us.

The Club 2 meter is starting to be a hot class once again. Harvey has made 4 of these jewels this year. Will Frank finish his before I start mine??

Harvey Jenkins does it again!

Eber reports, “Finally something new from the field, a Modified Bird of Time built by Club President Harvey Jenkins. It features a three piece wing with solid center panel and standard wing span. Wing rests on a Pylon mount. Fuselage nose is extended one inch and the tail four inches. The tail was changed to a V configuration. No flying report yet as the tail suffered a structural problem during hand launch tests. Craftsmanship as is typical for Harvey is extraordinary”.

I’m not sure why Harvey is not all smiles in the next picture. Maybe the camera guy said something off character!

There’s a new ‘Silicon Valley of drones’ and it isn’t in California

Published: June 22, 2015 6:00 a.m. ET
By Sally French, CBS MarketWatch

North Dakota appropriated $5 million to help bring infrastructure to the site as part of its 2015-2017 executive budget and another $7.5 million in grant funding for runway improvements. With the project expected to cost about $25 million in total, the balance will be covered by private investment, said Swoyer.

“This project evolved here in North Dakota with the right combination of political will and an economy that was growing,” Swoyer said. “It’s a state that is investing in the industry. It’s a community willing to raise their hands and say, ‘let’s try something completely different.’”

A community 'all focused on unmanned aviation'

In 2005, the Base Realignment and Closure Commission (BRAC) considered closing the Air Force base.

"Our performance and safety record in fighter aircraft was unprecedented, but despite that our aircraft were getting old and weren't going to get replaced," said Robert Becklund, then commander of the North Dakota Air National Guard.

To avoid a drastic action by BRAC, the base made a bold move — replacing its KC-135 Stratotankers with drones.

"This was a dramatic change going from a single seat manned fighter aircraft to unmanned aircraft," Becklund said. "But it was the right thing to do for the nation."

The base is now the site of the Global Hawk and MQ-1 Predator drone aircraft.

At about the same time, the University of North Dakota established the Center of Excellence for unmanned aircraft systems (UAS), offering the nation's first undergraduate degree program in unmanned aviation. Five students received degrees in 2011, the program's first graduating class. Today, more than 100 students are enrolled, and the program is one of more than 30 similar degree programs at universities throughout the country.

"We have academia, our military, the Department of Homeland Security, and industries in the region all focused on unmanned aviation," Becklund said.

In 2014, North Dakota was one of six states allowed to develop a test site for commercial drone applications: the Northern Plains UAS Test Site in Grand Forks. The site is part of a FAA program looking toward the safe integration of unmanned aircraft into airspace.

North Dakota's test site was the first to earn operational designation from the FAA, and the first to fly underneath the agreement. The site covers more than half the state, boasting 45,000 square miles of authorized airspace – the largest volume of any single state.

"If North Dakota hadn't been selected as a test site, I would have questioned our country's decision making," said Becklund, who now serves as the executive director of the test site.

The state budget allocated $4.2 million in its FY2015-17 budget for operating the test site. Of that, $1.2 million goes directly to drone companies in the form of a dollar for dollar matching program for those that opt to partner with one of North Dakota's research universities on a project. A related, but separate program — Research North Dakota — provides up to $300,000 in matching funds for qualified firms.

But there's a catch. For major companies to fly at the test site, they have to lease their unmanned aircraft to the site so that they can fly under public domain. That caveat is what may have driven companies like Amazon to explore drone delivery testing outside of the U.S.

"There is no way these companies will lease their airplanes to us," Becklund said. "It's a proprietary machine. Any company developing their own aircraft will not lease that to anyone outside their company."

That restriction has posed a major problem for test sites trying to attract corporate research.

"The FAA says they are here to support industry, but to [participate at a test site], companies have to lease their aircraft to us," Becklund said.

Companies could get around the requirement by applying for an experimental certification but that still restricts them to research — not commercial — applications.

A vibrant startup scene

Despite the challenges, other (often smaller) drone companies benefit from the test site.

Most of those companies are based in Fargo, a town entrepreneurs say bursts with energy akin to the startup scene in San Francisco. But this startup scene is dominated by drone-based industries.

"We're becoming a robust startup community," said North Dakota's Lieutenant Governor Drew Wrigley. "They are the geek squad over in Fargo. You've got technical companies and young energetic entrepreneurs."

Appareo Systems builds flight data recorders and ADS-B, a type of aircraft tracking system. Since 2001, the startup has worked on a project in partnership with NASA and the University of North Dakota to build, design and manufacture the ADS-B that equipped the airplanes.

Another company, Packet Digital, combines high speed power electronics with advancements in solar to double drone flight times. The ultimate goal is to provide drones with unlimited flight.

"Once you extend flight time, you open up the possibility of many more types of applications and uses for drones," said Terri Zimmerman, Packet Digital's CEO. Those applications could include agriculture, allowing farmers to fly over farmland to monitor crops.

And as more drones fill the airspace, there's a company working on technology that gives pilots situational awareness of other drones in the area. Botlink allows operators to control a drone from a tablet and detect other drones flying nearby.

The company was founded by Shawn Muehler. He's the guy behind DroneFocus, a meetup group in Fargo that grew to 50 members, including Becklund, local startups and public officials.

"We're bringing the government, the private sector, the commercial side together to cut through the red tape," Muehler said. "It's the only meetup where we get every industry player in one room."

The state's lieutenant governor, Drew Wrigley, has been known to attend.

Indicative of the group's attitude, the whole thing is organized through Meetup.com. That means anyone is welcome; you just have to click a button to join. When the group huddles, the gathering feels more like a neighborhood block party than a rigid policy meeting with a strict agenda, attendees say.

"We just have a different personality out here," Muehler said. "It's not about how we can beat our competitors. It's how we can help each other out to propel this industry forward."

North Dakota's drone sector has already blown away industry predictions. The Association for Unmanned Vehicle Systems International (AUVSI) released an economic report in 2013 (before North Dakota was chosen as a test site) predicting the economic impact of drone integration in the

U.S. The data was based on airspace activity at the time the report was created.

They forecast that between 2015 and 2017, California's drone industry would have the largest economic impact in terms of dollars, and North Dakota would have the third lowest.

North Dakota's Department of Commerce revised those predictions in 2013 based on the assumption that the state would become a test site. Their data showed that North Dakota would have the greatest percentage of drone-related jobs (relative to population) of any state.

"Obviously, California has a number of aerospace companies as well as companies that develop sensors, payloads, software, and a variety of different products that fit within this industry," said Paul Lucy, a director at the North Dakota Department of Commerce. "They underestimated the potential for companies to come here and do R&D work with our test site."

Still, Becklund doesn't believe North Dakota is a complete replacement for Silicon Valley. There just aren't enough people working in engineering and technology to fill jobs in a state that already has one of the nation's lowest unemployment rates, he said. North Dakota's unemployment rate in May was 3.1% versus the national average of 5.5%.

"But if those engineers who developed the technologies in Silicon Valley are looking for a place with a low cost of living, a highly educated workforce, and a cooperative community — whether that's the government or financially — probably this is the best place to do that," he said.

But even if the jobs get filled, there's still the issue of funding.

"We can't get funding because the people in the state tend to be fiscally conservative," Botlink's Muehler said. His company received $500,000 in seed funding from local investors. But that's a paltry figure if the state is going to compete with Silicon Valley's venture-backed drone startups like Airware, which has raised over $40 million in five funding rounds, or 3D Robotics, which has more than $100 million in venture capital.

"We've been searching for Series A on a local level because we want to keep the money in the state, so we're looking for funding sources within North Dakota" said Muehler.

But where these startups lack private capital, the state is trying to foot the bill. Since 2006, North Dakota has allocated $32.5 million in grant funding for companies interested in commercial drone development through 2017. In addition, the state's Research North Dakota program offers $5 million biannually in grants from research and development to organizations and companies involved in UAS research through state universities.

Those business incentives have drawn companies from around the U.S. to the state. Florida-based drone manufacturer, Altvavian, announced in February a $3.2 million agreement to manufacture drones at a plant in North Dakota, the first official UAS manufacturing project in the state.

North Dakota's Lieutenant Governor Drew Wrigley says he sees his state as the nation's next Silicon Valley for drones.

"People look to North Dakota and say they want to emulate this," he said. "We're blessed with the natural conditions that make it easy to expand drone technology, industries that are keen to tie in UAS technology and on top of that you have

people passionate for aviation and emerging technologies. It's a part of our pioneering culture."

Let's ALL Fly!

That is it for this month.

Thermals to all ~ Keith

Take a look back in time during the golden years of sailplane design with Part 3 of a 4 Part series by the master of sailplanes Dave Thornburg.

This is CLASSIC information located at the end of this newsletter.

If you have any events let me know

2015 Contest Schedule

DATE	EVENT	CD
Sunday **July 12, 2015**	**SWSA CLUB**	TBD
Sunday **August 9, 2015**	**SWSA CLUB**	Bruce Averson
Sunday **Sept 13 , 2015**	**SWSA CLUB**	James **Smith**
Sunday **Sept TBD, 2015**	**Wilson Cup**	CVRC
Saturday & Sunday **Oct 3-4, 2015**	**VISALIA FSF**	CVRC
Sunday **Oct 11, 2015**	**SWSA CLUB**	Keith **Kindrick**
Sunday **Nov 8, 2015**	**SWSA CLUB**	TBD
TBD **December 2015**	**SWSA Year End Party**	

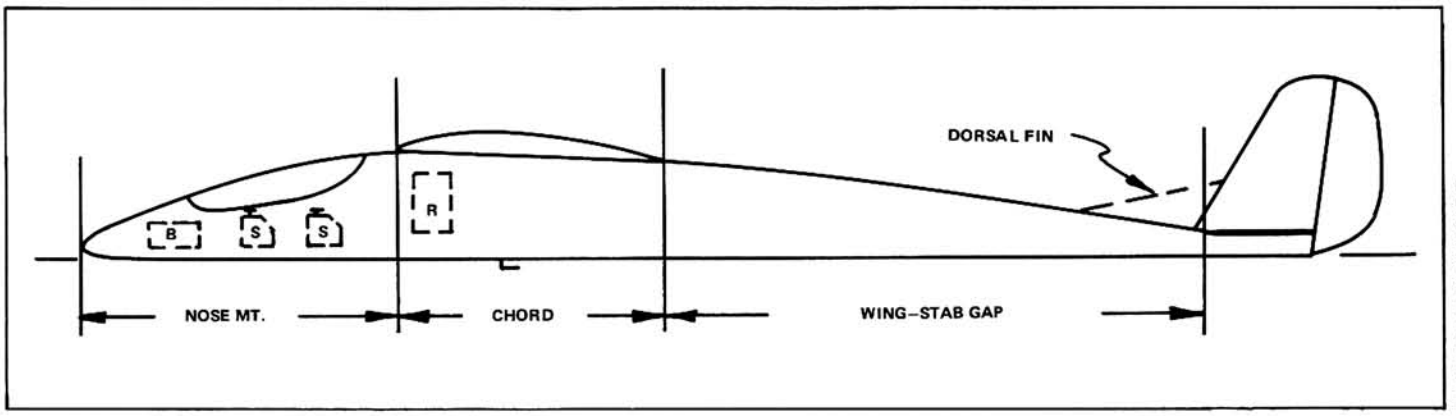
2015 SC2 Contest Schedule

Sunday June 28	Harbor Soaring	Harbor Soaring
Sunday July 19	Inland Soaring	Inland Soaring
Sunday August 23	TOSS	TOSS
Sunday September 20	Club SULA	Location Field of Dreams
Sunday October 18	TPG	TPG
Sunday November 15	Rain Date	

More Information @
www.sc2soaring.com

2015 Holidays and Observances

Jul 3	**'Independence Day' observed**
Jul 4	**Independence Day**
Sep 7	**Labor Day**
Oct 12	**Columbus Day (Most regions)**
Oct 31	**Halloween**
Nov 11	**Veterans Day**
Nov 26	**Thanksgiving Day**
Dec 24	**Christmas Eve**
Dec 25	**Christmas Day**
Dec 31	**New Year's Eve**



PHOTOS BY AUTHOR

DESIGNING YOUR OWN SAILPLANE

By DAVE THORNBURG . . . In this, the third article of a series, our ace glider guider discusses fuselage and vertical stab design, and actually gets down to putting lines on paper (finally!).

• Way back in the February issue we settled most of the parameters of our "Dream Soarer": we decided to make it a floater (6.0 to 6.5 ounce wing loading) with a 90-inch span and around 800 square inches. As you may have noticed, all these figures refer to the wing, and don't tell us a thing about the fuselage and tailfeathers except how heavy they should be. (The whole plane has to weigh between 33 and 36 ounces to hit our projected wing loading figures.) What we have to tackle now is fuselage design . . . tail moment, nose moment, size and shape of the fin/rudder.

To most folks, this is the really exciting area of design. After all, the fuselage and rudder are what people notice first about a new plane; nobody looks at wings. You can spend months perfecting a new wing for your Olympic 99 . . . winch-launching every morning before sunrise and recording each flight time, hanging off the right fender of your car at 40 mph and listening to the whistle of various wingtip shapes, recording the dewline separation on the airfoil's upper surface during late evening flights, etc., etc. But when you show up at the contest field and turn ten seconds flat in the FAI speed run, what people are going to say is, "You still flying that old 99? Why don't you build something new?"

Conversely, all you have to do is saw off a cardboard mailing tube to the same length as the 99's fuselage, mount the Olympic wing and tailfeathers in their customary places at their customary angles, and half-a dozen kibitzers are going to say, "Well, Bufo, glad to see you finally built yourself something new!"

So we probably need to treat the fuselage as something more than just a long stick to hold the stab in a fixed relationship to the wing. Even if it ain't.

Here's how I begin a fuselage layout. First, I determine roughly what my overall length ought to be. In the July 1970 issue of *R/C Modeler*, Chuck Cunningham told us that the basic sailplane had a fuselage length of 50% of its wingspan. This is still a pretty good rule of thumb, although the newer designs seem to be snipping away at that figure: The Aquila and Olympic II are at 46%, while the Paragon, Bird of Time, and Viking are around 41%-42%. Some of Hi Johnson's fuselage/wing combos go down to as little as 35% (a 54-inch fuselage on a 156-inch wing).

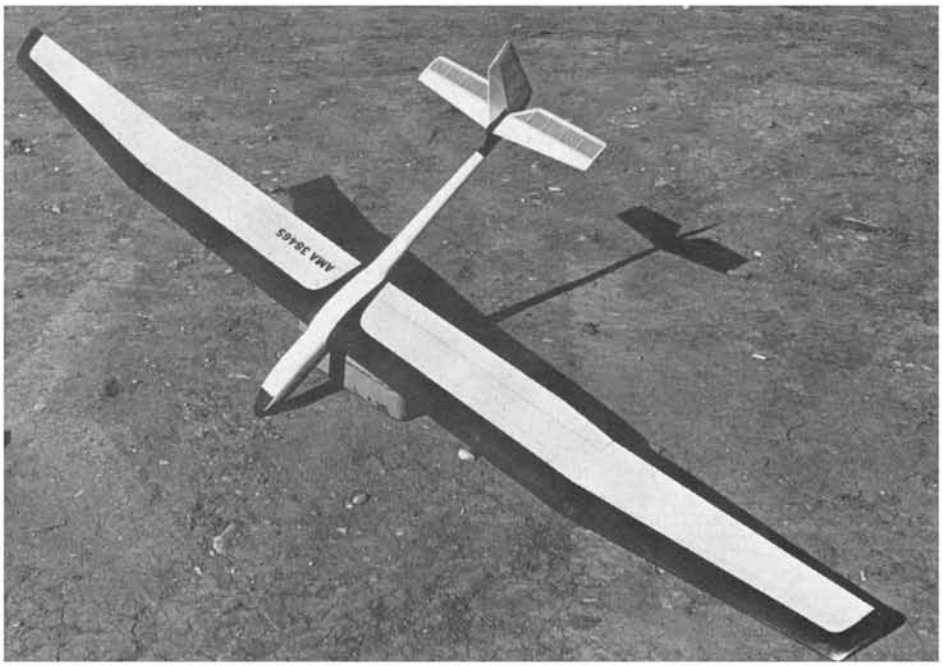
So we can tentatively place our overall fuselage length at anywhere between 40% and 50% of the wingspan without wandering out of the ballpark. Hurrah! After three months of talk, we can finally begin drawing! Get out the paper!

Incidentally, a good source of large drafting paper is a weekly or small daily newspaper plant . . . the smaller the better. They will usually sell you a remnant roll of newsprint for next to nothing. Otherwise, use the back side of whatever kit plan you have handy. For example, I've drawn some reasonably good-looking sailplanes on the back of old Ugly Stik plans . . . "aesthetic bleed-through" doesn't seem to be much of a problem.

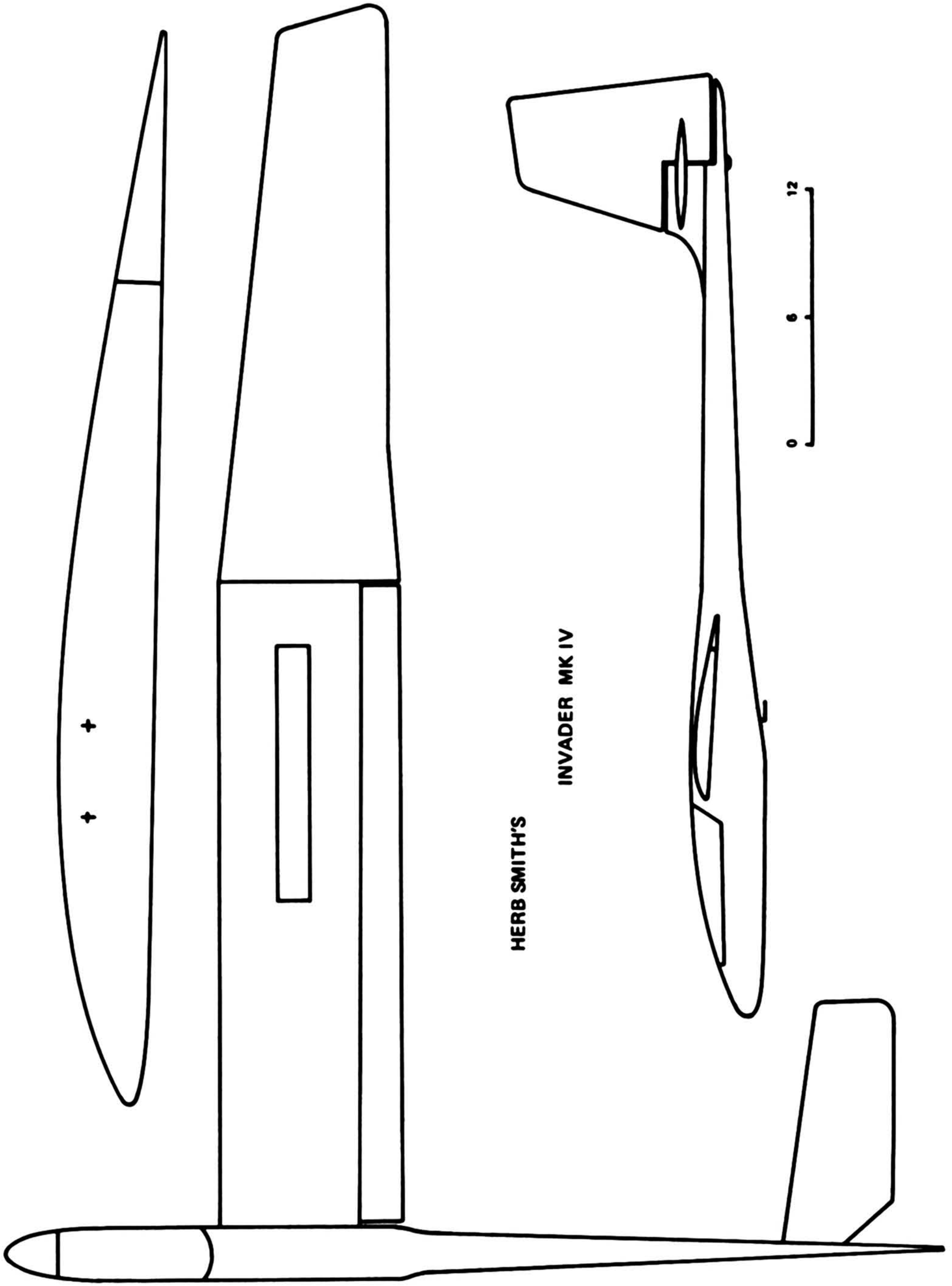
Begin by drawing a fuselage reference

DESIGN COMPARISON OF SIX CONTEMPORARY SAILPLANES

	SPAN	FUSE. LENGTH	% OF SPAN	ROOT CHORD	NOSE MOMENT (CHORDS)	WING STAB GAP (CHORDS)
AQUILA	99	46.2	46%	9	1.16	2.1
BIRD OF TIME	118	49	42%	10	1.1	1.8
GULF COASTER	108	53	49%	9	1.57	2.94
OLYMPIC II	99	46	46%	10	1.1	1.8
PARAGON	118	50	42%	10	1.2	2.0
VIKING	118	48	41%	11.5	.94	1.8



Herb Smith's latest (and best) FAI ship is the Invader Mk. IV, which placed 8th at the FAI Finals at Pensacola. Has a 114-inch span, 836 sq. in., 8.5 oz. wing loading.


HERB SMITH'S
INVADER MK IV
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line down the center of your paper. Some sort of straightedge is a good thing; Bill Northrop once accused me of using a piece of wet 1/16 square balsa for a straightedge on some drawings I sent him, but it was a vicious slander . . . I never use less than 1/4-inch square for anything. I admit it had been broken a couple of times, swatting flies. And it probably *was* wet, because we had a lot of flies in those days. Until we finally got the roof on.

Whether this "fuselage reference line" turns out to be down the middle of the fuselage or not matters very little: what we want it for is mostly to determine our nose and tail moments. On the drawing that heads this month's column, the reference line became the bottom line of the fuselage itself . . . how's that for design simplicity?

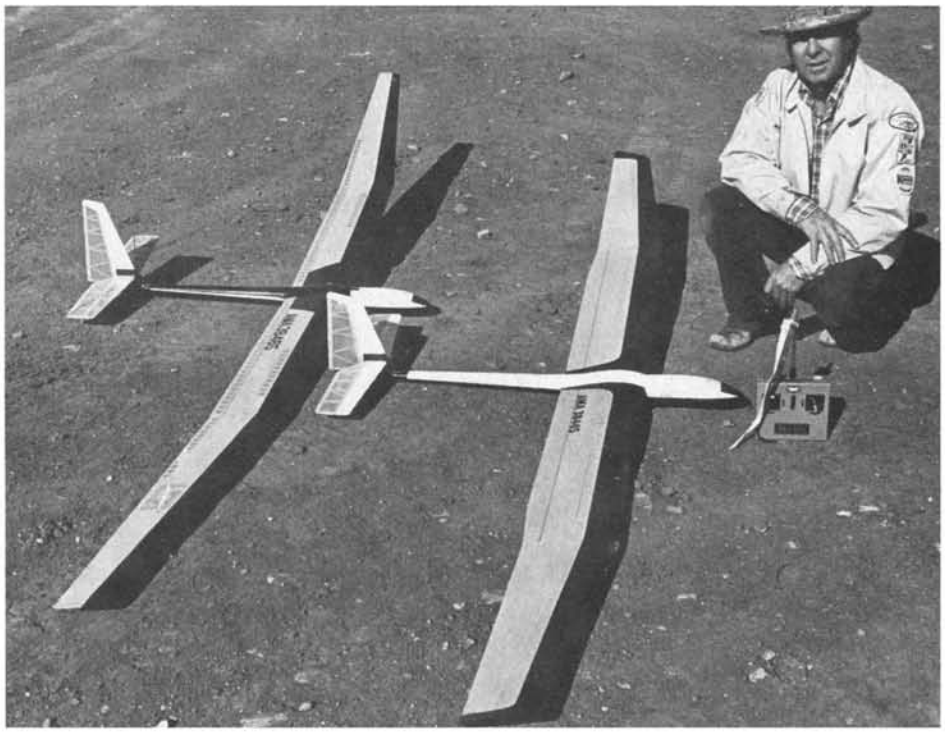
Now, how do we go about dividing this line up into nose and tail? Back in the old days, in Albuquerque, when everyone in the club was obligated to come up with four or five new designs a year just to appease the gods of the rocky and turbulent New Mexico slopes, we used a very simple system for roughing out fuselages, and I find that it still works pretty well. In this system, all the fuselage measurements are functions of the root chord of the wing. The nose length, from wing leading edge to tip of noseblock, was decreed to be 1.0 to 1.25 times the wing root. The distance between the trailing edge of the wing and the leading edge of the stab was to be 1.8 to 2.5 times the root. And that was about all there was to it . . . lay out those two measurements and your fuselage was ready to rough in!

I can hear the engineers and assorted mystics screaming already: "Hey, what about Tail Volume Coefficients? What about the Center of Lateral Area?" Well, everyone needs a hobby. If your hobby happens to be plugging numbers into formulas, then I refer you to an excellent article by Le Gray in the December 1973 issue of **Model Builder,** or the long series of articles by Tony Estep that ran throughout that same year in RCM. If, on the other hand, you'd rather draw airplanes and then build them, let's get on with it.

Since we settled on a 9-inch chord, that's now our basic unit of measurement. Multiply it by 1.0 (that's easy) and again by 1.25 (fetch the calculator, Maude!) and our nose length comes out approximately 9 to 11 inches. Mark the wing leading edge point 11 inches from the left end of the reference line, then put another mark (for the trailing edge) 9 inches past this. Now our wing location is fixed, and we can rough in our wing-stab gap: in this case, it will be between 16 and 22.5 inches in length.

What we have at this point is not a fuselage, but merely some fuselage parameters. Without exceeding these parameters, we can still design a ship with a long nose and a long tail, a short nose and a short tail, or any combination thereof.

Ah, decisions!



Herb Smith with his Mk. III and Mk. IV Invaders. Both ships have glass fuselages and rudder, elevator, flap, and spoiler controls. Plans and kits are available from Herb . . . see text.

Since time immemorial, I've had in my box of drawing equipment three blocks of scrap balsa. One of them is shaped like a Futaba battery pack, one like a receiver, and one like a servo. Now is the time to drag them out . . . they can take some of the decisions about nose and tail moments right out of our hands. You probably don't have such a set of blocks, and you certainly can't afford to cut them at today's balsa prices; it would be cheaper to have them milled from titanium. That's assuming your radio itself isn't available. If it is, you can lay the pieces out directly on the drawing paper and start getting an idea of what we're up against.

Since God has decreed that radios must go in the very front of a sailplane, in order to protect the wing and towhook from excessive damage in the event of a crash, we can use the shape of our radio components to help us pin down an exact nose length. Batteries, because of their weight, go as far forward as possible. For sailplane use, I always strip my pencell packs of their plastic case and wrap them in a single layer of electrical tape. I realize this makes the cells more vulnerable to shock damage, but it saves weight (the cases weigh around 20 grams) and more importantly, it reduces all three dimensions by 1/8 to 3/16 of an inch. These dimensions may seem minor, but they can make quite a difference to the crowded business end of a sailplane.

Brrrrr! Herb must really like to fly. The rest of the field is empty, and no wonder!

Traditionally, the receiver follows the batteries, with the servos last in line. This order isn't inviolable, however; on small, light ships I like to push the servos forward against the batteries and put the receiver behind them. This way, you can shorten your nose moment while still keeping most of your weight forward. With conventional pushrods, the aft receiver location isn't always practical, but I'm a great fan of cablerods (nyrods with wire cores). For two-meter ships, the .030 wire cables are usually enough; anything larger gets the .058 cables.

By now you've probably noticed that the servos in the drawing at the beginning of this article are mounted in tandem, rather than side-by-side. This is simply one of my prejudices, born of long years of flying free flight and small sailplanes. I rarely design a plane two servos wide, unless I'm more interested in looks than performance. The rule seems to be "the smaller the plane, the more important it is to have a minimum cross-section". If you're one of those folk who sincerely believe that full-scale fineness ratios (ratios of width to length) apply to models, then you ought to start seeking converts among the free-flight-

Continued on page 94

Sailplane . . . . ***Continued from page 36***

ers, especially the hand-launch glider men; they've been making their fuselages 1/8-inch wide or less for over forty years, no doubt out of sheer ignorance. (And if they could only narrow them to 1/32 of an inch without losing either strength or lightness, I'd be willing to bet . . . I admit I can't prove this . . . that their times would go up. It seems that the more air a fuselage has to displace . . . *wedge apart,* if you will . . . the worse its drag will be. At least at our sizes and speeds.)

Well, at this point we're faced with the actual task of doodling some tentative nose shapes around our radio; starting to commit our Dream to paper (which often shatters it, incidentally!). Here's where most folk fall back on the shape of their favorite airplane, either consciously or unconsciously. Canopy or no canopy? (In other words, are you an Aquila fan or a Windrifter fan?) Pod-and-boom or conventional fuselage? High wing, mid wing, or low wing? Cut yourself out a wing root silhouette and lay it on the drafting paper, for ideas. High wings are still in vogue with the full-scale designers because they currently believe them to have slightly less fuselage-wing interference drag than midwings, but don't let that limit you. And remember that the only good reason for not building a low-wing sailplane is that you're likely to hash the Monokote every time you land. But suppose you had a *wheel* down there. . .

The sky is truly the limit when it comes to fuselage shapes, especially if all-out performance isn't your biggest consideration. Don't forget that you have to *like* a plane well to fly it well, so keep doodling until you hit on a shape that really lights your afterburners.

One of my own all-time favorites was a little six-footer I tossed together for the First Annual Espanola (New Mexico) Soar-In. I called it "The Espanola Espaniel," and its nose was a kind of comic profile of a dog's head, complete with rolling plastic eyes and a pair of brown corduroy ears glued down the sides. It didn't fly particularly well, but it was great for chasing cars!

You'll notice that, in the drawing, I completely copped out on originality . . . the fuselage shown is a kind of modified version of the airfoil section from Herb Smith's "design of the month". Actually, I've built two or three fuselages very close to this outline (we used to roll them out of a single sheet of 1/32 plywood, in a manner similar to that used on the J.P. "Darts" and "Javelins". Took about nine hands to do the rolling, but they sure came out light and tough!).

There are at least two design flaws apparent in the drawing as shown. With a perfectly flat fuselage bottom, and no nose-skid, the poor towhook is going to become the landing gear, and as such it won't last long, especially over tarmac. Three possible cures: a thick nose skid, a small sub-rudder, or a nice bow in the bottom of the fuselage. The second design flaw is more subtle. Note that when the model is at rest on the ground, the wing will be sitting at a positive angle of attack. "That's normal," you say, "all full-scale planes are built that way." Full-scale, yes; models, not-so-yes. Picture the plane in the drawing coming in for a landing. When the fuselage touches down and begins its landing slide, the wing is thrown into a positive angle of attack, and hence will begin lifting again. Presto! Ze plane is once more airborne, and ze pilot is jamming full down stick to try to get ze nose back on the ground! After two or three bounces, the beast may lose enough airspeed to stay glued down, but by then the center of the circle is about fifty to seventy-five points behind you, and fading fast.

The moral is, when designing your own fuselage, try to work out some configuration whereby the wing is at least at zero degrees to the good earth while the plane is skidding to a stop. At the same time, of course, you want your fuselage to *fly* at two to four degrees negative angle to the wing, for minimum drag. The combination of those two requirements can give you gray hair! I solved it on the Bird of Time by using a generous subfin. Anybody got a better idea?

Awright, I know I promised to talk about rudders and fins, but frankly, the subject is embarrassing to me. People tell me that the rudder on my old Honker 1/2A is stolen from a Cessna 140; the Doodler and Honker Bipe rudders, they claim, come from the Curtiss Jenny; and the Bird of Time is clearly cribbed from Frank Zaic's Thermic 100. None of these charges are particularly true, but then none are particularly false, either. The fact is, I've got a head full of other people's rudders, and no room left for any ideas of my own. So the best advice I can give you is to comb your memory and steal a nice shape from somebody you think well of. There aren't many really pleasing rudder shapes around these days, unless you're a fan of the old F-100 Super Sabre. Lee Renaud hit on a beauty for the Aquila, and then there's . . . uh, well, maybe we ought to think about building a nice vee-tail. . .

So you're on your own as to rudder shape. What I can suggest is some design parameters. In the English book, *Radio Control Soaring,* which is still the best current volume on our sport, Dallimer and Dyer suggest that the vertical ought to be 12%-15% of the wing area, for thermal soarers. If you take this figure seriously, you're going to need a larger sheet of drawing paper, as this is the figure most people today are using for the stabilizer! Fortunately, the planes they show in the 3-views all figure out to about 4%-7% verticals, and those are the figures I'd recommend as average (the Aquila, for example, has 6%).

If you're a real "eyeball designer", one who hates math the way Dracula hates clerical collars, you can think of the rudder size as "just under half of the stabilizer". Too large a rudder is said to cause spiral stability problems among free flights; this isn't an easy characteristic to detect with R/C, unless you're given to freezing at the controls, or hooking up your rudder servo backwards. Too small a rudder, however, may cause wandering, as if you or your ship had occasional attacks of senility. Since tail moment is obviously a factor in rudder effectiveness, you probably ought to push for the 7% figure if your wing-stab gap is short; if your tail moment is long, 4% may be plenty. There's nothing magic here . . . try a size, and if it doesn't suit you, try again. (Ever notice all those dorsal fins on full-scale aircraft? They're usually added at the urgent and sweaty request of the test pilot, immediately after the first flight!)

MODEL OF THE MONTH

This month's three-view comes from Denver, Colorado, a high-country design called the Invader. Designer Herb Smith flew it to eighth place in the 1978 FAI Finals down in Pensacola. The ship has rudder, elevator, flaps and spoilers, with everything tucked neatly into a clean fiberglass fuselage. The first thing you'll notice on the full-size plans is that the towhook is a full 1/4 inch *behind* the center of gravity . . . this tells you that Herb is out to WIN! Here's what he says of the design:

"The Mark IV was developed through a series, as the name implies. I observed that lift was almost always available if one could move about in search of it without hitting the ground first. So the first requirement became *a fast moving plane with a low sink rate.*

"For this, one must pay a price. I designed my own low-drag section, which produces less low-speed lift for launch and thermaling, so large flaps were my answer, to change the wing camber for various conditions.

"The high speeds generated in FAI demand a lot of strength and high-speed stability. Much attention was given to the strength of the sailplane; it will withstand dork after dork without damage. It has been stalled and dropped on a wingtip with only scuff damage. It can be brought down from altitude in high speed dives without fear of flutter. It can be brought down in a moderate dive at low speed with the use of full flaps and spoilers. Getting down is never a problem with the Mk IV.

"With all this, the Mk IV is a super light-air floater. When proper flap and stab trim is applied, it will float in light air with the best floater-type sailplanes, and beat them at their own game.

"The Mk IV is *not* a free flight and must be flown all the time except in super calm air, mainly because it reacts to the slightest disturbance in the air. It is still very stable, and very responsive to control commands. Flown with a gentle touch it is a very docile sailplane, easily flown by the intermediate pilot."

Herb says the ship is very maneuverable, and can be snap-rolled out of the bottom of a loop! It can also be made to spin, "and anything else you can think of." This is hardly Herb's first design series; he's been modeling since 1940, with ten years off to design and fly two full-size aircraft. Plans and a limited number of kits are available from him at 3031 S. Valentia, Denver, CO 80231. •