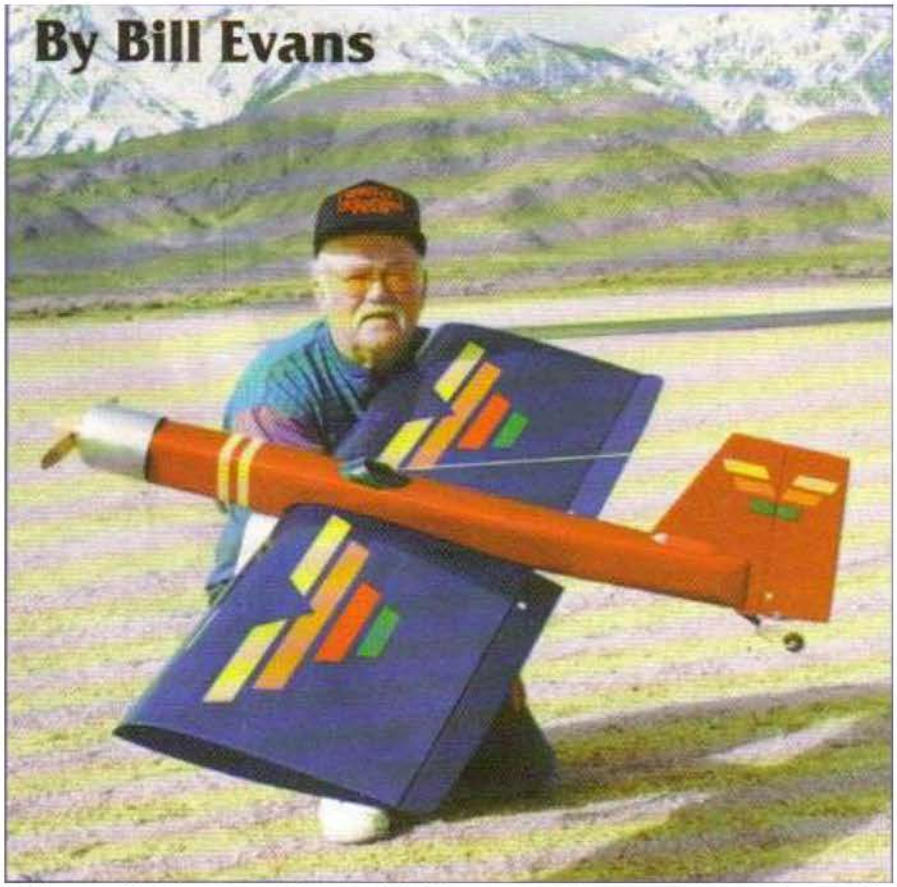
SIMITAR

Advantage cowl cheek version.

ADVANTAGE

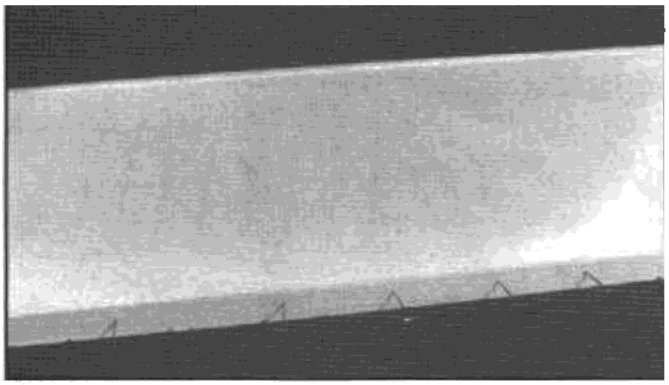


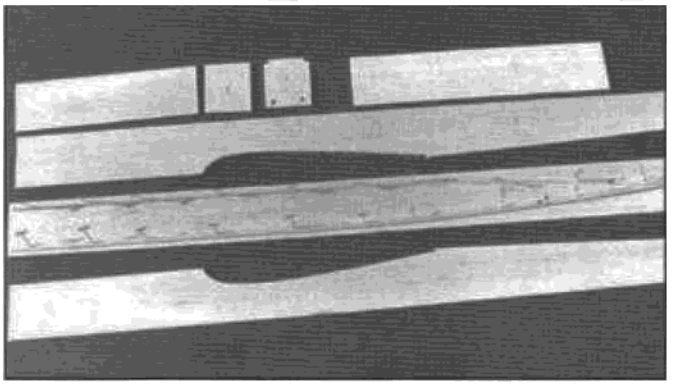
Bill Evans with Advantage, K&B new 40-60 for power, taildragger version, ready to fun fly.

Bill Evans' newest Similar for .40-.60 2-stroke engines

Many times my ideas for a particular design come from talking with my Similar flying buddies. Sometimes, comments by non Similar pilots have an influence; these are mostly related to "scale-like" airplanes. Such conversations prompted me to build a 60-size fun-scale version of a Cap 21 (with elevons instead of horizontal stab and elevator). As I expected, the ship flew great doing all the things that one with an elevator and stab can do plus the performance advantages of no tip stall, directional stability, and smoother operation over a wider speed range.

However, as a rule, I try to leave the designing of scale models of full-size airplanes to the many experts already in the hobby. Instead, my designs are intended to be reminiscent of full-scale ships while retaining the **advantage** of performance and simpler construction. This philosophy, with the help of my friends, led to the





LEFT: Cement and pin 1/4" trailing edge spar and leading edge undercap into place on core. Make sure wing core is flat, in the foam cradles (on a flat surface). RIGHT: Fuselage parts ready for assembly, note 1/4" longerons pinned and glued into place.

Simitar Advantage.

During a "hangar flying" session in my shop one day, a friend, Bob Stern, was talking about making cowlings from plastic soda bottles. This led to a discussion of shapes with the conclusion that the simplest would be a round "radial engine" cowl like the Corsair. Further brainstorming resulted in a low-wing taildragger that is not a scale of any particular plane. Instead, it reminds one of several 1930s ships like the Hughes Racer, Wedell Williams, and Brown Racers.

Within a few days, I finished the prototype using a 2-ply soda bottle cowl, painted with silver spray-can epoxy, a 60-size, constant chord, ply-sheeted wing of 50" span, a K&B 40 R/C engine, a windshield, and simulated open cockpit. The entire construction, covering, and equipment installation process took less than 12 hours excluding time out for other activities like "Honey do" chores.

Now comes the moment of truth: the test flight. Take-off was routine for a taildragger, a little down elevator at the start to let the plane gather speed, then ease back on the stick and up we go. Climb to altitude a couple of mistakes safe, then loops, rolls, split S's, Cuban eights, inverted flight, and a very gentle 3-point landing. As expected, the ship behaved well over a wide-speed range.

Within a week of completing my test flight, another friend, Bob Akin, finished his Advantage with a 64" tapered 60-size, partially-sheeted Simitar wing, a gold-painted 2-ply soda bottle cowl, a K&B 40 R/C engine, windshield, and simulated open cockpit with pilot's headrest. This version also had excellent performance with a slower, gentler roll rate because of the longer wingspan.

Within a couple more weeks, two more Advantages were completed by Bob Stern and Al Nye with the ply-sheeted, constant chord, 60-size wing of 50" span but powered by K&B 61 R/C engines. Again, performance was typical Simitar.

Many times I'm asked, "Why no horizontal stab and elevator? Why the 'flying wing' concept?" My reply is "performance!" The Space Shuttle, the Concorde, the SR-71 Blackbird, and the B-2 bomber are all flying wings and all have proven performance that makes them tops in their class.

Likewise, the Simitar series of R/C models have top-of-the-line performance; no tip stall, directional stability, wider speed range, and tighter turns. Controls are fully responsive over the entire speed range from "baby carriage crawl" to "screaming demon." If you get a little white knuckled because of some maneuver, just put your Simitar in a gentle turn, let go, and it will do 360's while you catch your breath.

By now you are saying "Enough hype! Let's get on with construction."

Configuration

For the standard, after seeing the prototypes that my friends and I built, I have settled on a 40-size, constant chord, partially balsa-sheeted wing for the final version.

Alternatives

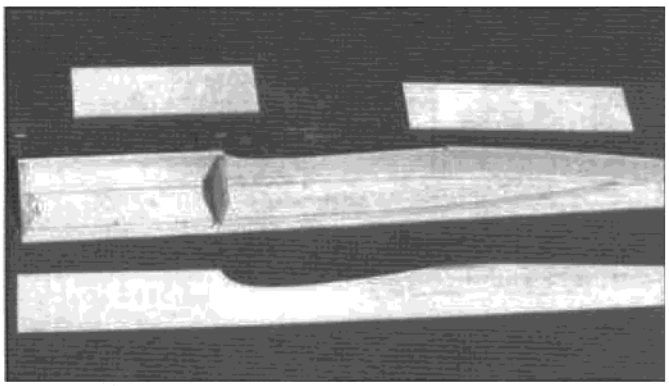
To allow each of you to customize your plane to the look you want, the plans show several alternatives. These are: tricycle gear or taildragger, radial engine cowl or cowl cheeks, and canopy or open cockpit/windshield. Also, power can be 40-61 glow 2-stroke, 15-geared electric, 25-geared or direct drive electric.

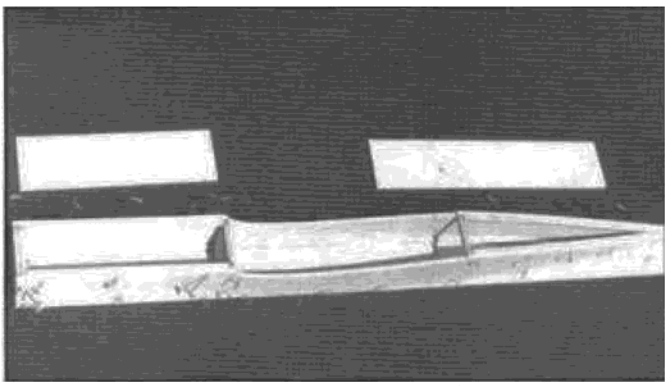
CONSTRUCTION

Wing:

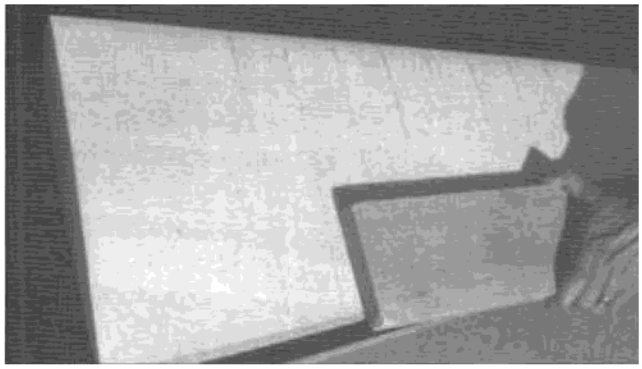
For those who do not cut foam, you may order cores for the Advantage from Soaring Research, 454 Wildrose Lane, Bishop, CA 93514, phone (619) 873-4932. Cost of wing cores is $22.00 plus $8.00 for shipping.

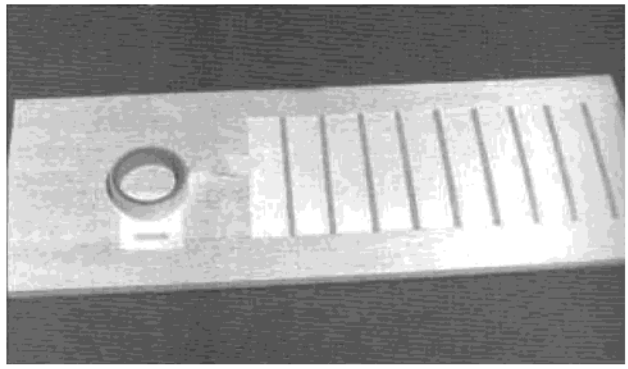
Make sure the wing panels are flat





LEFT: Left fuselage side, firewall, and former, pinned and glued into place. RIGHT: Right fuselage side and bottom 1/4" longerons glued into place, ready to sand flush and attach fuselage bottom, front, and rear.





LEFT: Trim and sand trailing edge spar and leading edge undercap flush with cores. Be careful not to sand any of the foam away RIGHT: Apply 1/16" x 2" balsa leading and trailing edge on wing top and bottom. Apply 1/16" sheet inboard sheeting and 1/16" x 1/4 capstrips on 2" centers from end of inboard sheeting to wingtip. Corefilm (two sided tape) was used to apply the sheeting.

and straight; use weights with the core on a flat surface, if necessary. Cement the 1/4" balsa leading edge undercaps to the leading edges and the 1/4" balsa trailing edge spars to the trailing edges. Use CA-UFO or carpenter's glue; do not use regular CA on foam; set these aside to dry.

Fuselage:

Cut out fuselage pieces; place and pin fuselage top piece on flat work surface. Place fuselage sides along side, mark the location of the firewall and bulkhead on the top and sides. Pin the 1/4" sq. longerons in place 1/4" in from edge (use fuselage side as guide). Curve these longerons from a 3" fuselage width at wing/elevon hinge location to centerline of fuselage at tail end. Glue these in place by applying thin CA to the inside edge of the longerons (the CA will run under the longerons).

Pin fuselage side to top; pin firewall and former in place against top and side; CA side to top, firewall, and former. Be sure to curve side to center at rear end. Pin second side into place; CA into place. Pin and CA 1/4" sq. bottom longerons into place against fuselage sides. Pin and CA 1/4" sq. strips around back side of firewall.

Sand bottom edges of fuselage sides flush with bottom longerons. Pin and CA front fuselage bottom into place. (For a taildragger, pin and CA ply gear plate into place forward of wing cutout. Also pin and CA 1/4" ply tail wheel bracket support plate into place at tail end.) Pin and CA 1/4" balsa fuselage bottom rear into place.

Fuselage construction is complete. Round corners to plan and apply sandpaper as needed.

Back To The Wing:

Plane and sand the 1/4" leading edge undercaps and trailing edge spars so that the sheeting will fit over them. Do not sand any of the core away. Sheet the wings. We used Corefilm to apply the 1/16" sheeting to the leading edges, trailing edges, and center section. Now, sand the leading edge sheeting flush to the undercap and then pin and cement the 1/4" x 1" leading edge cap to the leading edge. Apply the 1/16" x 1/4" capstrips on 2" centers from the end of the inboard sheeting to the tip of the wing.

Shape and sand the leading edge. Note: the leading edge bottom is nearly flat and the leading edge top curve is fairly steep. Do not round the leading edge, a max radius of 1/16" is desirable. Apply wingtips, carve and sand to airfoil shape, then finish sand wing panels. Join wing panels using 5-minute epoxy. When cured, reinforce the center

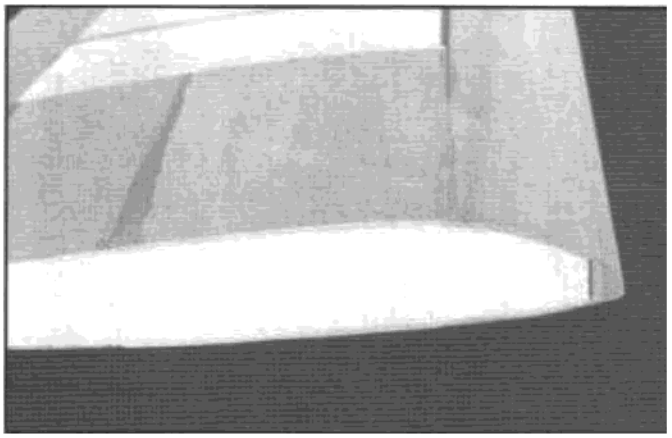
Bob Akin of Bishop, CA, and his tapered wing round cowl version of the Advantage.

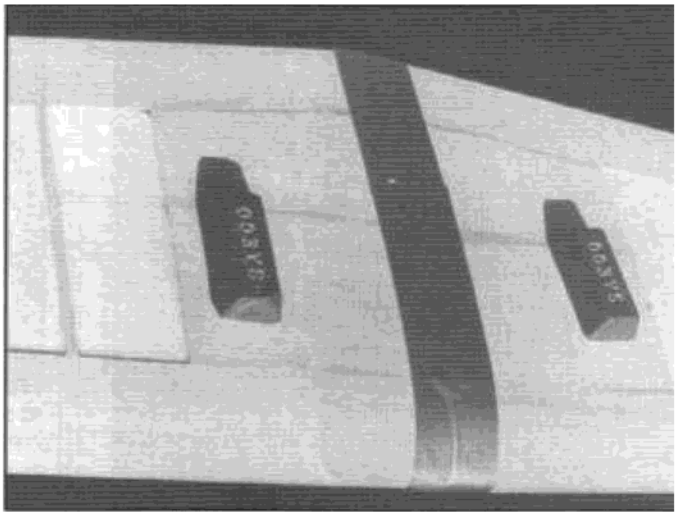
SIMITAR ADVANTAGE

Designed by:
Bill Evans
TYPE AIRCRAFT
21st Century Simitar Series
WINGSPAN
64 Inches
WING CHORD
14 Inches
TOTAL WING AREA
895 Sq. In.
WING LOCATION
Bottom of Fuselage
AIRFOIL
ESA (Evans Simitar Airfoil)
Semi-Symmetrical Reflexed
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1/2 Inch
OVERALL FUSELAGE LENGTH
44 Inches
RADIO COMPARTMENT SIZE
(L) 10" (W) 2-1/2" (H) 2-1/2"
VERTICAL FIN HEIGHT
10 Inches
VERTICAL FIN WIDTH (inc. rud.)
8 Inches (Avg.)
REC. ENGINE SIZE
.40-.60 2-Stroke
FUEL TANK SIZE
4-8 Oz.
LANDING GEAR
Tricycle or opt. Taildragger
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elevons, Nose Wheel, Rud., Throt.
C.G. (from L.E.)
1-1/2 Inches Approx. (Empty Tank)
ELEVATOR THROWS
Elevon Pitch (elevator)
3/8" Up and Down
ELEVON ROLL (Aileron)
3/8" Left and Right
RUDDER THROWS
1/2" Left and Right
SIDETHRUST
N/A
DOWNTHRUST/UPTHRUST
N/A

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, & Ply
Wing	Balsa, Ply, Foam Core
Empennage	Balsa
Wt. Ready To Fly	76 Oz. (4 Lbs. 12 Oz.)
Wing Loading	12-1/4 Oz./Sq. Ft.





ABOVE: After attaching leading edge cap, sand leading edge to shape. RIGHT: Join wing panels using 5-minute epoxy, use masking tape to hold in place and stop runs.

section with medium to heavy 3" wide fiberglass cloth and epoxy. Fit elevons to wing. We used X-Hinge to attach elevons to wing. (Note: If you use mechanical elevon mixing, form and install elevon control rods before you attach elevons.) Cut and cement end grain balsa into wing at bolt location to obviate crush of wing when bolting to fuselage. Fit 1/4" plywood wing plate into leading edge of wing at center section. Set wing and wing plate into place on fuselage and check for fit before gluing wing plate to wing. Now, using waxed or greased temporary 1/4" dowels, set wing and plate into place, align them, and glue plate to wing with 5-minute epoxy.

For the tricycle gear version, place hardwood gear blocks at correct location on bottom of wing; mark area, and remove sheeting and foam so that blocks are flush with sheeted bottom wing surface. Glue these in place using 5-minute epoxy. Now, sand and cover wing. (Note: If you use electronic elevon mixing, install 1/8" plywood servo plates, flush with bottom surface of wing and dig out foam for servo pocket.)

Complete and sand vertical fin (and rudder for taildragger or, if desired, for aerobatics on tricycle gear version). If you are using a rudder, attach rudder (we use X-Hinge), sand and cover; cover wing; cover fuselage; epoxy vertical fin to fuselage.

For those new to the concept of the Simitar Series, an explanation of the control surface function and component installation will be helpful.

First, a Simitar requires only pitch (elevator) and roll (aileron) functions for perfect flight. Except for pattern flying, a rudder is not required.

Simitar control surfaces are elevons which serve as ailerons and elevators. In essence, consider the control surfaces as full strip ailerons which counter actuate to provide aileron control and also actuate simultaneously to provide elevator control. This means some form of mixing is needed. Such mixing can be provided by mechanical or electronic means.

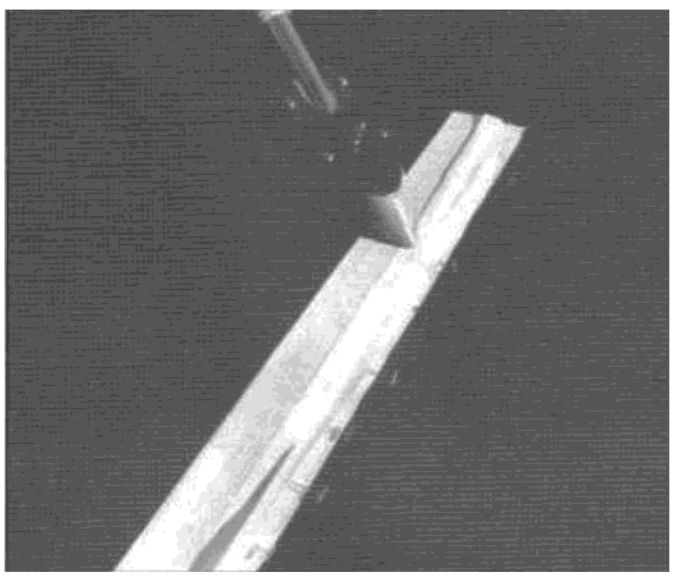
The best mechanical method is to use my sliding tray, which works as follows: One of the servos in the tray is set up as you would for strip ailerons. The second servo is for elevator and its control arm is attached to the stationary bulkhead at the front of the tray so that it will slide the tray fore and aft to give the elevator function.

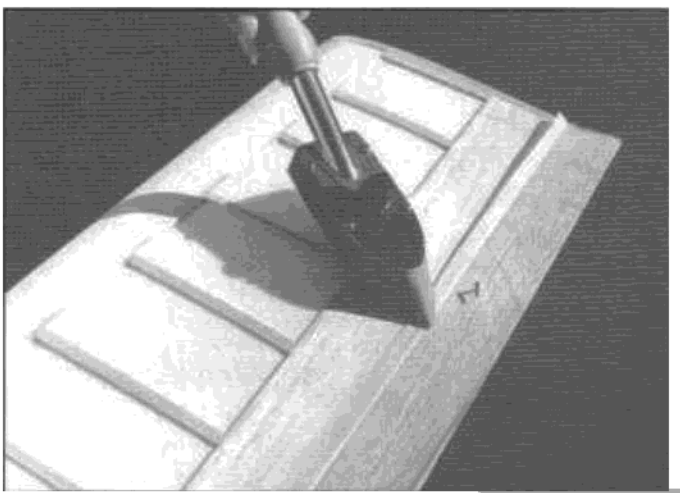
Electronic mixing can be provided by either a radio with built-in mixing or by using Ace's Christy Mixer or the Quillan Mixer which plug in between the servos and the receiver. Both mixers work very well and are in the $25.00 to $45.00 price range. Alternatively, some of the newer radio systems have built-in elevon mixing or flaperon mixing functions. I have used several of the Futabas in this line, such as the 6VA, 7NFK, 7UAF, 7UAFS, 7UAP, and 9VP.

SLIDING TRAY MIXER

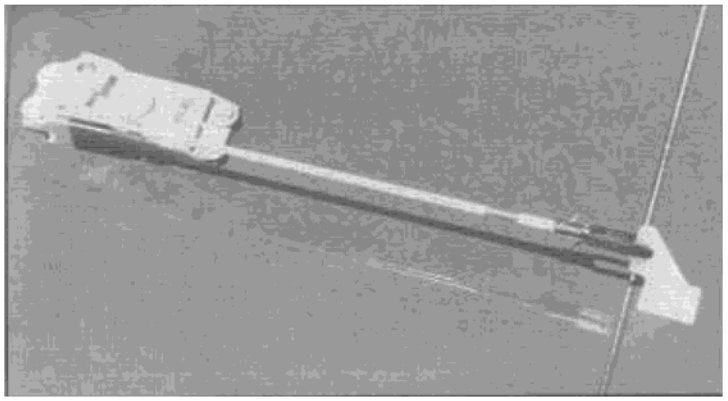
Control Set-Up:

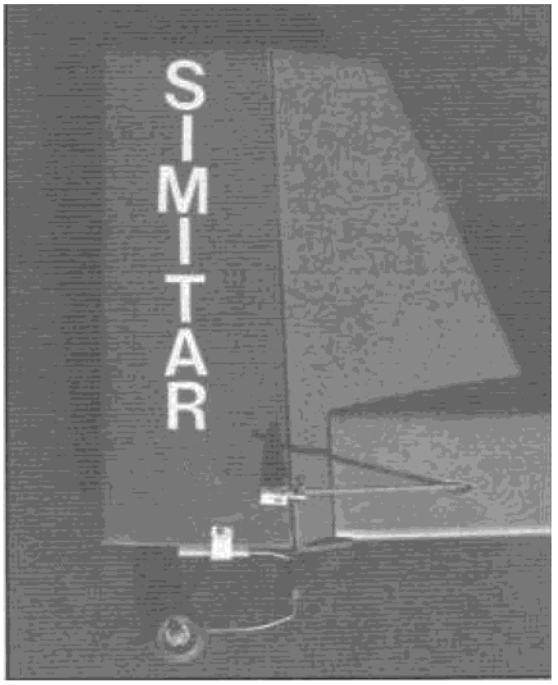
The sliding tray fore and aft





LEFT: Pin X-Hinge to leading edge of elevon and iron down. RIGHT: After ironing down X-Hinge to control surface, pin surface into place on wing and iron down, hinging complete.





LEFT: Servo set-up using electronic mixing, use 4-40 rod from servo to elevon horn. RIGHT: Shown is detail for the rudder and tail wheel connecting links.

formers are of 1/4" ply. Drill the 1/8" holes for the dowel through both formers at the same time; this will make the holes parallel. Cut the 1/8" ply tray to fit both aileron and elevator servos. Push the dowels into one of the formers, then slide the red outer NyRod over each dowel; then, push the other former onto the dowels. Cement the tray in place onto the NyRods (be careful not to get cement inside the NyRods) then install the servos as shown.

ELECTRONIC MIXER

Control Set-Up:

Use 1/8" ply trays to mount servos into wing; epoxy the trays flush on bottom of wing after sheeting. Grind a hole in the top center of the wing and use a piece of piano wire with a hook bent on one end to tunnel out for each servo lead. The lead is then easily fished through with a piece of string.

Radial Cowl Or Cowl Cheeks:

For radial cowl, we used 2-liter soda bottles, shrunk with a heat gun over a 4" dia. x 6" long mandrel. Use the top end of the bottle, as it is smooth and round. A 1/8" taper on the mandrel will help in removal of the cowl blank. Also, coat the mandrel with powdered graphite to allow the cowl to slip off the mandrel. We used two bottles (shrinking the second right over the first) to gain a little stiffness. To attach cowl to fuselage, use four hardwood blocks 3/4" x 3/4" x 3/8" glued to fuselage with CA on top, bottom, and sides. Outer surfaces of blocks are rounded to curve of cowl and cowl is attached with small screws (we used servo mounting screws).

For cowl cheeks, make from balsa per plan and CA into place ahead of firewall.

Final Assembly:

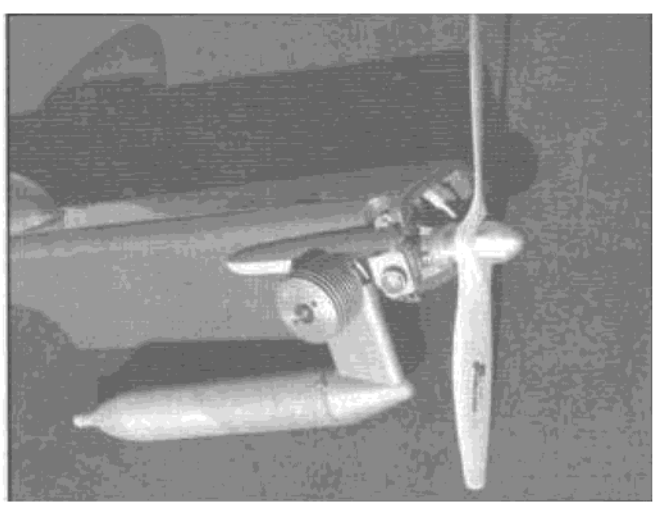
Install the landing gear, engine, fuel tank, and all the radio components. Hook up all the controls and check to make sure there is no binding. Check to make sure your aircraft balances (level to slightly nose down) at C.G. location indicated on the plans (approximately 1-1/2" behind the leading edge of the wing, with no fuel in the tank).

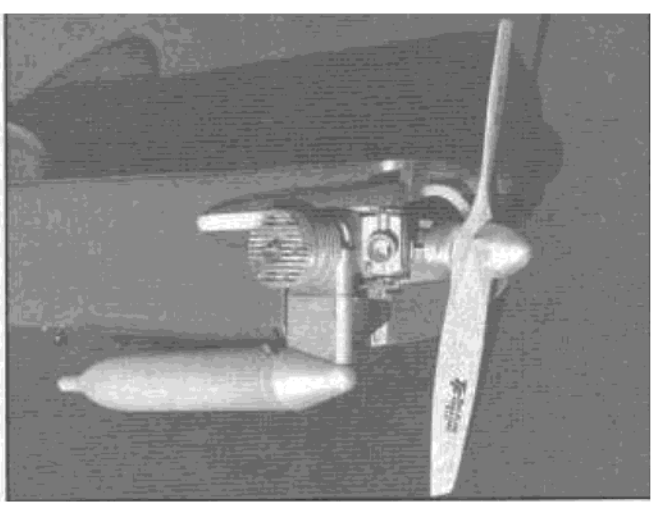
Control Throws?

I put in as much as I can get, then use what I need. (3/8" to 1/2" of up, down, left, and right is fine.) Remember, control is not like a light switch (on or off), it's like a dimmer switch; use only as much pressure on the stick as you need to make it do what you want!

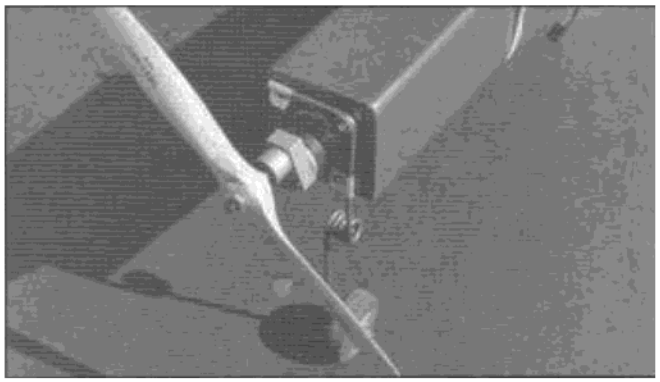
Set the nose wheel height so that, while setting on a flat surface, the leading edge of the wing is 1/4" higher than the trailing edge (measured at the hinge line). Also, the trailing edge of the elevons are set 1/8" up with the transmitter trim at neutral.

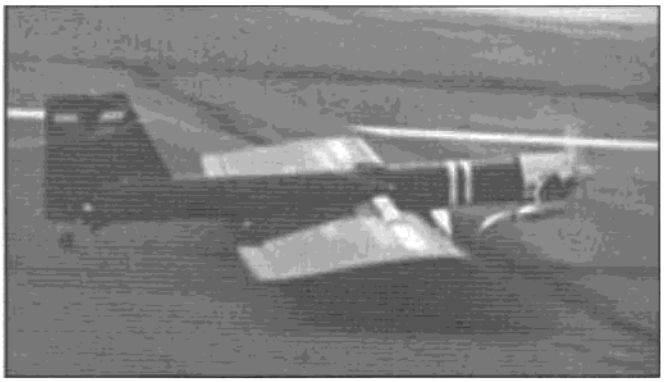
Check all surfaces for proper motion. (Remember left aileron command results in the left elevon going up and the right going down; and the up elevator command results in both elevons going **up**!)





LEFT: New K&B 61-50 mounted in the cowl cheek version. RIGHT: New K&B 40-50 shown in the Advantage, again note tuned muffler.





LEFT: Astro Flight Cobalt geared 15 shown. Using a 12 x 6 prop, the electric powered Advantage performs like a U-control. RIGHT: Advantage at full-power, on take-off roll.

Flying:

Ah, yes, flight performance of the Advantage is very smooth and graceful; gives the feeling that it's an extension of yourself in the air; seems to always do the right thing, often, before you command it. Are the thumbs quicker than the eye? Bill Winter said to me, "Why does my Simitar do what I want it to before I tell it to? Does it read my mind?"

List Of Advantages Inherent To All Simitars

There are several flight characteristics in the Simitar series that make it much more superior in flight performance to a conventional aircraft with the aft-mounted horizontal stab!

First, a Simitar will not stall! As you reduce power and pull back on the elevator, when it reaches the point where a stab ship would stall, the Simitar will merely drop its nose and continue to fly straight ahead with the nose down a bit. So, with the Simitar, the tail will never drop, tip-stall, and crash. How many times have we all either tried to force a stab ship into the air or stretch the glide and have it tip-stall and crash! Never will it happen with a Simitar.

Second, a Simitar has a wider speed range. It will fly slower and faster than a conventional ship! Given the same weight, same power, same wing area, the Simitar, since it will not stall, will fly slower and, since it has less drag, will fly faster!

Next, a Simitar is aerodynamically stable! Hands-off at quarter throttle, tap a bit of left aileron to get the right wingtip up a bit, let go and a Simitar will do left 360's until you say quit! Anyone of any age who can tap left stick and right stick can fly a Simitar until the tank runs out and never have to touch up or down on the stick; since it will not stall, pitch control is not required for slow flying! Take-off and landing for first-time fliers should be done by the instructor.

Now wind is not a factor with a Simitar! Simitars have been easily flown in winds up to 70 mph! It will hover inverted and back up in 40 to 50 mph winds! Vertical take-offs and landings are no problem!

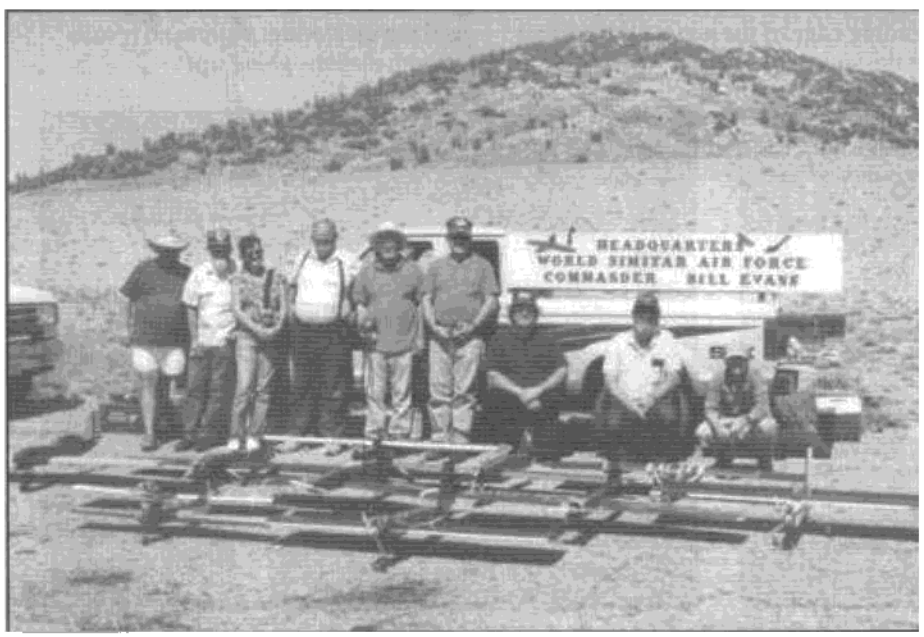
Aerobatics? A Simitar will do all maneuvers a conventional pattern ship will do, better and more easily: Plus it will tumble fore and aft as well as tumble tip to tip — and tight turns!

Just think about it! The fastest ship in the world (the SR-71) is a flying wing! The fastest passenger ship in the world (the Concorde) is a flying wing! The Shuttle, which has the world's distance record, goes into space and re-enters at 18,000 mph over the Indian Ocean to land at Edwards, is a flying wing. None of these ships have aft-mounted horizontal stabs! Ever wonder why?

Performance!

Paul Harvey recently made the statement, "Before too much longer, no aircraft will be built with horizontal tails."

Remember, be safe, be courteous to other fliers, have fun! and Tight Turns!



LEFT: Pilots and their ships at 10,000 feet; Simitars fly easily in the super thin air. ABOVE: Flying up at 10,000 feet. Coyote, making a low pass with the Advantage.