STICKIT IV

THE ULTIMATE COMPETITION FUN FLY MACHINE!

By Dan Stevens

Introduction

Green is not one of my favorite colors. I found this out the hard way. I covered the wings of an early model Stickit II with transparent yellow on one wing and transparent blue on the other. It rolled so fast that the airplane turned green. I was so enthralled that I allowed it to fly into the ground and destroy itself. Okay — I won't lie anymore — but it's almost true.

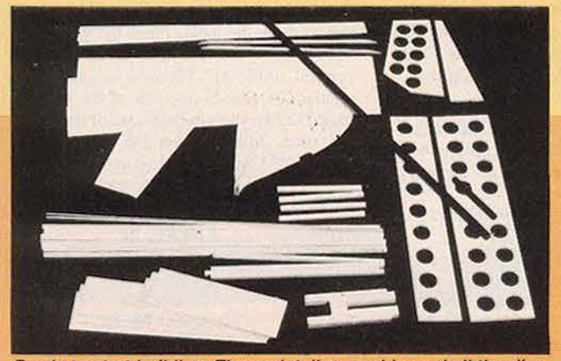
Competition Fun-Fly is **big** here in the Southeast. For the past three years the fun-fly season has been highlighted by the Competition Fun-Fly Nationals. This premier annual event was dreamed up and continues to be sparkplugged by Gordon Banks and his R/C Report magazine. For those of you not familiar with competition fun-fly let me just say that the events we fly have no luck factor involved and no subjective judgements. It's all time and task. You move, the clock starts. Then you do whatever the particular event requires, and then land. The clock stops at first touch. The type of plane required to do these types of events have evolved over the years to the point that they are beginning to look alike — just like pattern, Quickie 500, Formula 1, etc. The old truism that form follows function still holds. Another truism comes to mind — beauty is in the eye of the beholder. These types of aircraft are ugly, but they sure do the job.

The Stickit IV, as the name implies, is an evolutionary airplane that was conceived and continuously modified to remain a competitive force in the fun-fly wars. It features a number of things that are not usually found on model airplanes and it requires a programmable radio such as the Futaba 7UAF, or similar, to activate these features. These features include individual aileron servos. This kind of power is required for the large ailerons that give a roll rate that must be seen to be believed. The various mixes also allow us to use coupled flaps and elevator; 4' diameter loops for this airplane is "normal". Last but not least of the flying functions are spoilers. These are coupled to low throttle and will get you back to terra firma posthaste. Another unusual feature is the single, large wheel landing gear. We are always in a hurry to get back to earth so conventional landing gear and attachment methods will not stand up. The landing gear as shown will allow "arrival" angles as great as 30 degrees at half speed and will not only survive but put you back in the air with the engine still running! As an aside, tip skids are shown on the plans as an option. I only use them on hard surfaces. They are not necessary on grass. Everything else on the Stickit IV is almost the minimum the law allows to keep it going in the right direction. A case in point is the fiberglass tail boom. It weighs 1 oz. per foot and I've only seen one broken in two years of my friends and my experience. This was in a full power crash due to radio failure.

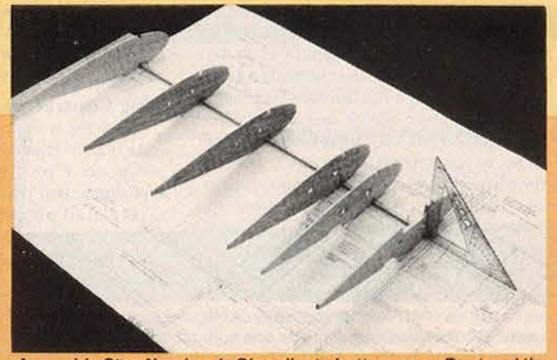
With the sport version modifications shown on the plans, the Stickit IV becomes a docile, well-mannered Sunday flier that will keep on flying at a much lower airspeed to most and survive many a less than perfect landing. Build it as light as you can. Use no balsa heavier than medium. Make good joints and use a quality CA such as Satellite City's Hot Stuff. UFO is great if you are CA sensitive. Avoid epoxy and, lastly, build it straight. You will be positively amazed at the kind of flying you are capable of with this airplane.

CONSTRUCTION

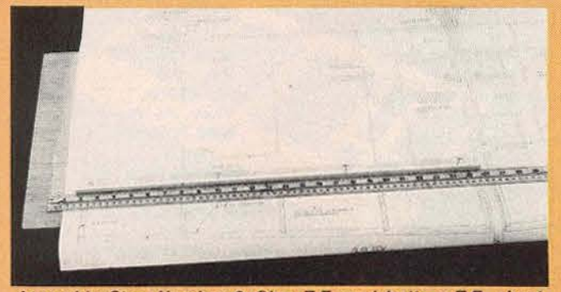
This will not be an absolute step-by-step guide. You should not be building this airplane if you are a beginner. It is much



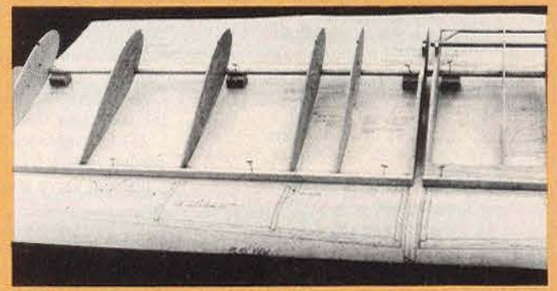
Ready to start building. The pod, tail assembly, and all the ribs cut out. All sheeting cut to appropriate length.



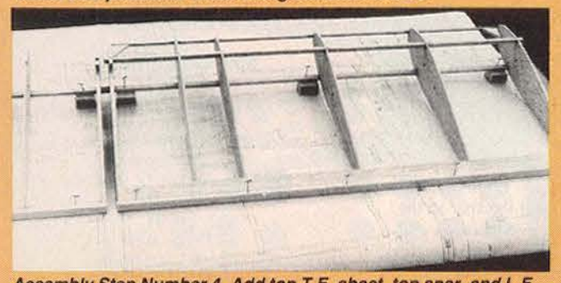
Assembly Step Number 1. Glue ribs to bottom spar. Root and tip ribs must be square both vertically and horizontally.



Assembly Step Number 2. Glue T.E. and bottom T.E. sheet together over plan. Note use of straightedge. Bowed hinge lines cause real problems when using extreme throws.



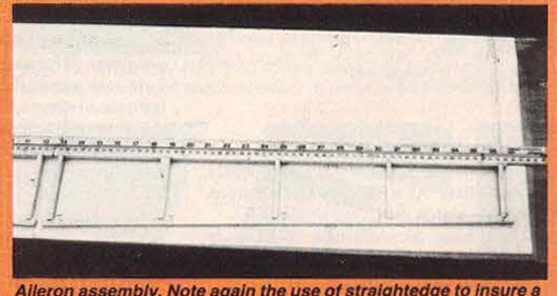
Assembly Step Number 3. Add rib/spar sub-assembly to T.E. sub-assembly. Note use of spar jack-up blocks to allow T.E. to remain flat on building surface.



Assembly Step Number 4. Add top T.E. sheet, top spar, and L.E.

Assembly Step Number 5. Add L.E. sheeting.

Assembly Step Number 6. Add capstrips, servo mount rails, reinforcements, and tip cap. Wing half is now complete.



Aileron assembly. Note again the use of straightedge to insure a straight hinge line. Rough cut "ribs" to approximate taper.

quicker in response than anything that most modelers have ever seen. You must be always aware that full throttle is to be avoided unless you are climbing or maneuvering. Even full throttle level flight will likely cause flutter and subsequent disintegration in a very short time. In order to be so responsive, very large control throws must be used which, in turn, makes for "springy" surfaces that are prone to flutter. You pay for your thrills. The sport version modifications shown on the plans along with "normal" surface throws will cause the flutter problem to go away. You will still have a very responsive, well mannered, easy handling airplane that will fly and land at walking speed. The sport version will probably fly better than most planes you have had — it will also probably be the ugliest. As a full blown competition model — **watch out!**

Bill of Materials
(all balsa unless specified)

Wing
4 — 3/32" x 3" x 36" — Ribs & Tip Cap
1 — 1/16" x 6" x 48" — L.E. Sheet (or 2"-3" x 48")
1 — 1/16" x 3" x 48" — T.E. Sheet
2 — 1/16" x 3" x 36" — Center Section Covering
2 — 1/4 sq. x 48" — Main Spars
3 — 1/4" x 3/8" x 48" — T.E. & Aileron
1 — 1/4" x 3/8" x 36" — Aileron Ribs
4 — 1/16" x 1/4" x 36" — Capstrips (can be stripped from T.E. sheet)
1 — 1/4 sq. x 36" spruce — Spar Doubler
1 — 1/4" x 3/8" x 36" spruce — Servo Mounts
1 — 1/8" sq. x 48" spruce — L.E. Spar
2 — 1/4" x 36" Triangle — Aileron L.E.

Tail
2 — 3/16" x 4" x 36" — Horiz. & Vert. Stabilizer & Root Ribs
1 — 3/16" sq. x 36" — Edge stiffeners

Fuselage
1 — 6" x 6¼" — 1/4" Plywood — Engine Mount (cut into 2 pcs.)
1 — 27¼" .505 Fiberglass Tube
1 — 5½" .414 Fiberglass Tube

Miscellaneous
Nuts, Bolts, 1/16" & 1/8" Music Wire
Pushrods, Horns, Clevis (4-40 Pushrods Recommended for Competition Version Ailerons)
1 — 4" Big Lite Wheel, 1/8" Wheel Collars
1 — 1/4" x 1/2" x 16" Nylon — Gear Legs
Note: Landing gear and tail boom sets are available for $15.00 postpaid from: Air Flair, P.O. Box 2075, Fairborn, Ohio 45324, (513) 878-7487.

Three basic decisions have to be made before construction begins.

(1) Sport or competition version?
(2) Which engine?
(3) Which radio?

Note that these are all somewhat related. Any 4 channel radio and any 25-45 size engine can be used in the sport version. For competition — it's another story. Spoilers and flaperons dictate a computer or multi-mix radio. The current two favorite engines are the O.S. .32 and the HP .40 Goldcup — both piped. The Fox Deluxe (not std.) .40 is making a move into the circle. They are favored because they are easy handling, powerful, and light. This behind us — let's build. **Think Light.**

Wing Construction:

The wing is built in halves. This makes installing the leading edge easier and allows you to get a good glue joint on the wing root/engine pod junction.

(1) Cut all wing sheeting, wing spars and ailerons frames to 24" long.

(2) Select the most flexible wood you can find for the leading edge sheeting. Use 6" wide stock if available. If not, use two pieces 3" wide but do not join them in the center. Instead, split one 3" piece into two 1½" pieces. Edge glue these two pieces to both edges of the 3" piece. This gets the glue joint out of the bend area in the leading edge center.

(3) Cut out all ribs and drill servo rail "starter" holes.

(4) Cut servo rail holes to fit your servo in the six center ribs.

(5) Cut servo lead passage in four center section ribs.

(6) Cut servo arm clearance in two root ribs.

(7) Pin bottom main spar to plan and install all ribs. Make sure that the previously cut ribs go in the right place. Also be especially sure that the root and tip ribs are 90 degree to the spar and vertical. Remove from board when set.

(8) Pin and glue bottom T.E. sheet and T.E. to plan. Use a straightedge. Extreme throws will not tolerate a bowed hinge line.

(9) Place 5/8" tall spar jack-up blocks on plan at root, tip, and center of wing at the spar line. Use any combination of thicknesses of scrap sheet that equals 5/8" Place the rib/bottom spar assembly in place on the jack blocks and T.E. assembly. Pin the blocks to the board and the spar to the blocks, making sure that everything is still square. With thin CA glue the ribs to the T.E. assembly and, when dry, add the top spar, L.E. and top T.E. sheet.

(10) Build the other wing half and add the servo rails to both.

(11) Note the false rib shown on the left wing plan. The competition version uses a 2 oz. tank taped (with a foam cushion) to the left side of the pod. This is more than you will ever need to fly an event and, in keeping with the lightness theme, it's enough. If you desire more tank, put in this false rib. Put a 1/8" balsa spar web in front of the spars between the false rib and the root rib. Then put a 1/8" balsa tank platform on the wing centerline from this web to the L.E. spar. After you install the leading edge sheeting, you can cut the top sheeting away between the false rib and root rib to create a platform to mount up to an 8 oz. tank.

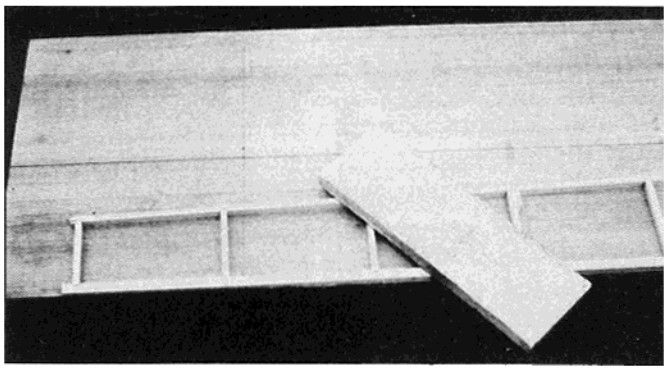
(12) Mark a span-wise centerline on the inside of the wing sheets. Dust the inside surface with baking soda to speed CA glue set. Wet a 2" or so wide strip on the outside of the sheets at the centerline to aid in bending the L.E. around the nose of the ribs. Take a wing half and put a bead of regular CA on the 1/8" spruce L.E. with the L.E. sheet flat on the table. Place the wing L.E. on the marked centerline. Hold the wing vertical until set. When it is set, apply regular CA glue to one side of the ribs and spar. Don't try to glue the nose of the ribs at this time. Just go from the spar forward about 2". Grasp the wing away from the glue side and place the L.E. flat on the work bench — wing vertical. Then carefully roll the wing back toward you forcing the glued ribs and spar onto the sheet. It's harder to write than to do. Be careful to keep the sheet pressed to the table during the "roll" and don't introduce a twist. Do both sides and then the wing half. Drip Hot Stuff between the spars to adhere the sheeting to the nose

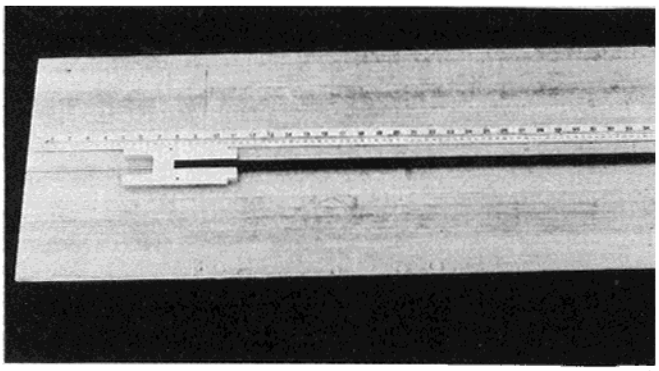
STICKIT IV

Designed By:
Dan Stevens
TYPE AIRCRAFT
Competition Fun-Fly
WINGSPAN
47¾ Inches
WING CHORD
16⅛ Inches
TOTAL WING AREA
770 Sq. In.
WING LOCATION
Mid
AIRFOIL
Sym. (15.5%)
WING PLANFORM
Tapered T.E.
DIHEDRAL EACH TIP
0"
OVERALL FUSELAGE LENGTH
37¾" Not Inc. Eng.
RADIO COMPARTMENT SIZE
6" x 8" x 2.5"
STABILIZER SPAN
18¼ Inches
STABILIZER CHORD (incl. elev.)
7½ Inches
STABILIZER AREA
137 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Slightly below C/L
VERTICAL FIN HEIGHT
8½ Inches
VERTICAL FIN WIDTH (incl. rud.)
26 Inches
REC. ENGINE SIZE
.25-.45 Sport
.32-.40 Competition
FUEL TANK SIZE
2 Oz. for Competition
6/8 Oz. for Sport
LANDING GEAR
Single-Wheel Tail Dragger
REC. NO. OF CHANNELS
4 Sport, 6 Competition
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., Coupled Flaps & Spoilers

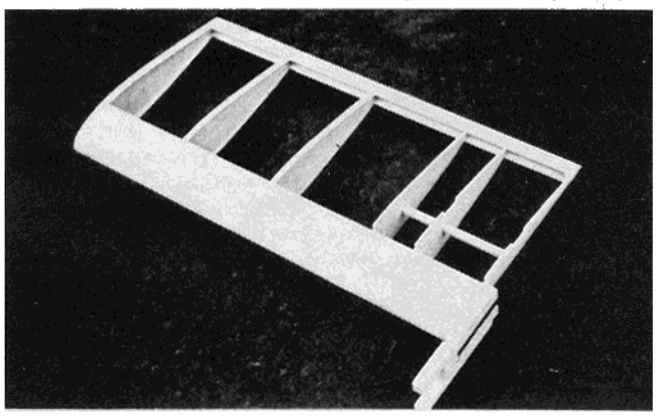
BASIC MATERIALS USED IN CONSTRUCTION

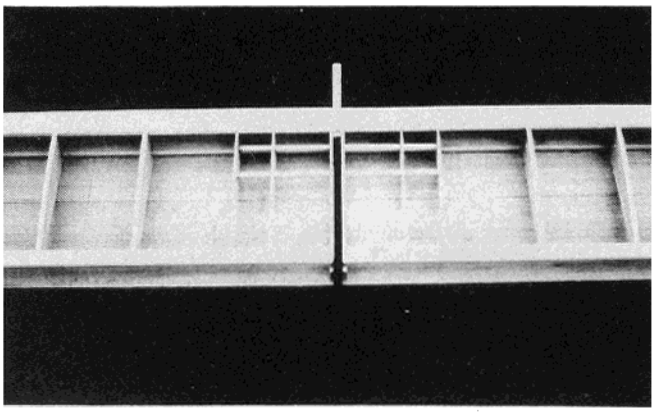
Fuselage	Plywood/Fiberglass
Wing	Balsa
Empennage	Balsa
Wt. Ready To Fly	51 Oz. (3 Lbs. 3 Ozs.)
Wing Loading	9.5 Oz./Sq. Ft.



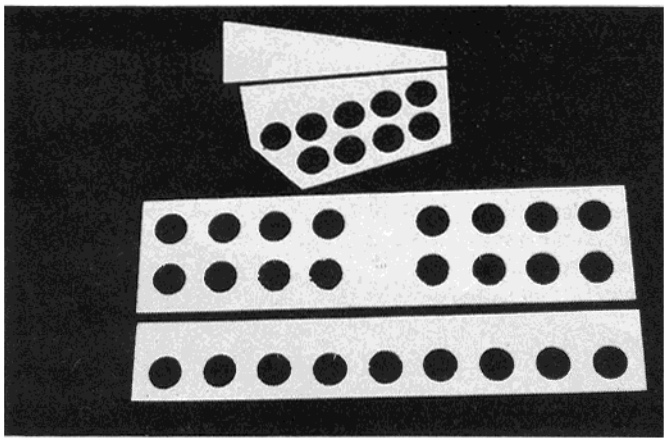


LEFT: Finish sanding of aileron to tapered cross section. Use a sanding block and coarse paper. Sand diagonally. RIGHT: Glue 1/4" ply together and saw out pod to fit your engine. Be sure to drill for landing gear. Glue boom in place with "Super-T" or similar. Use a straightedge to check that the boom is parallel to the pod top and bottom.

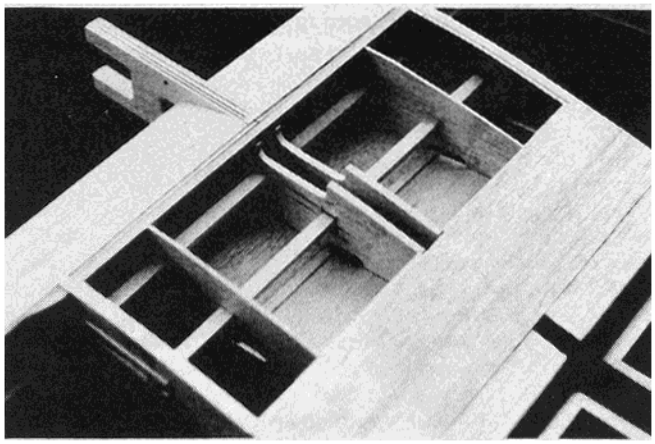




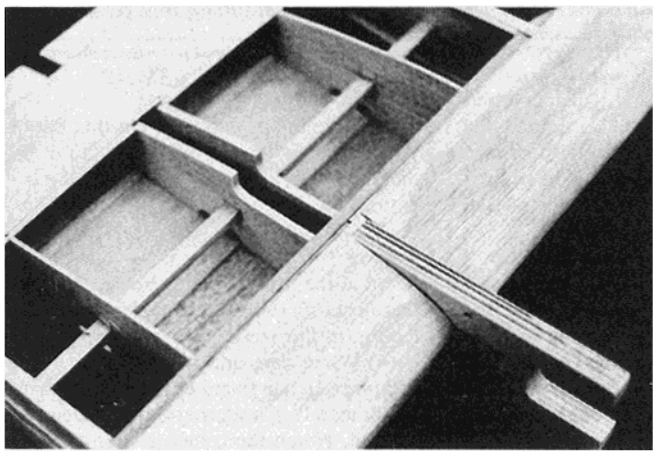
LEFT: Add one wing half to pod/boom. Use "Super-T". RIGHT: Add other wing half after first half is set. Lay on board to insure wing is flat. Be sure trailing edges are aligned. Add spar joiner.

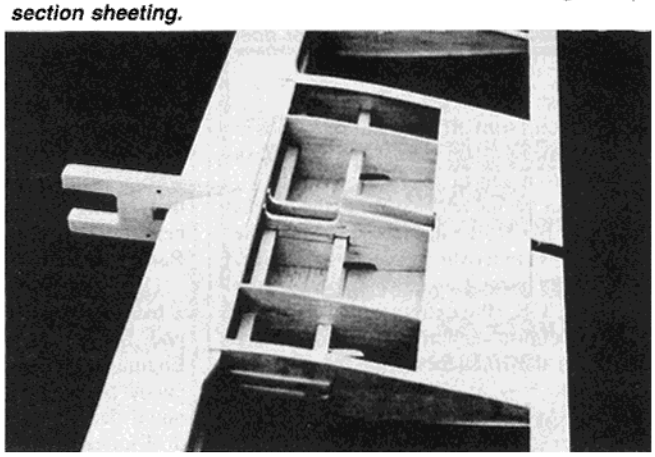


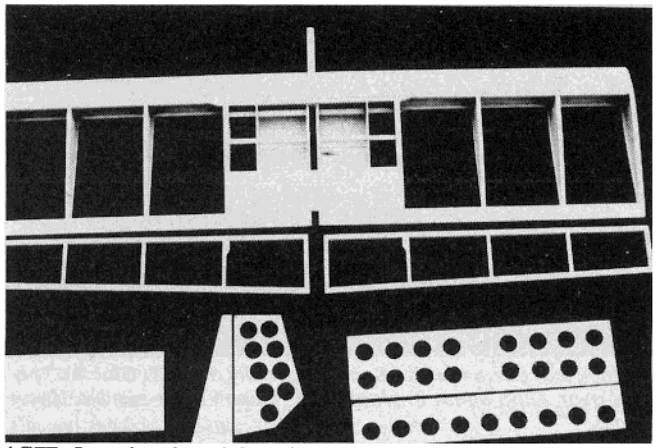
Tail assembly ready to cover.

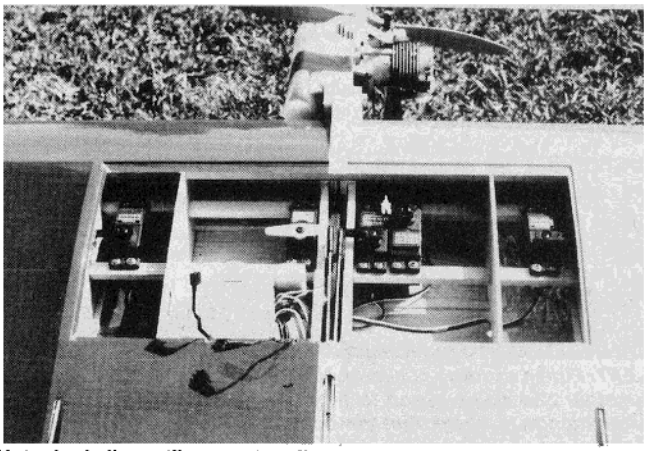


ABOVE RIGHT & BELOW: Views showing complete center section. Be sure to add rear boom mounts before adding center section sheeting.

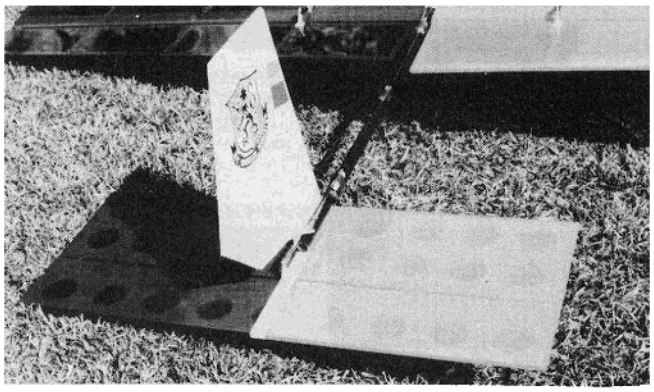


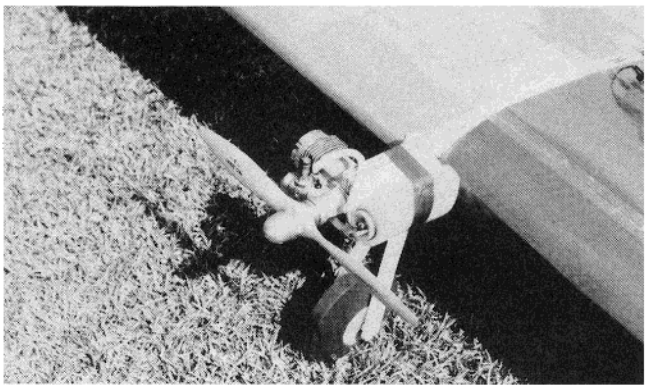




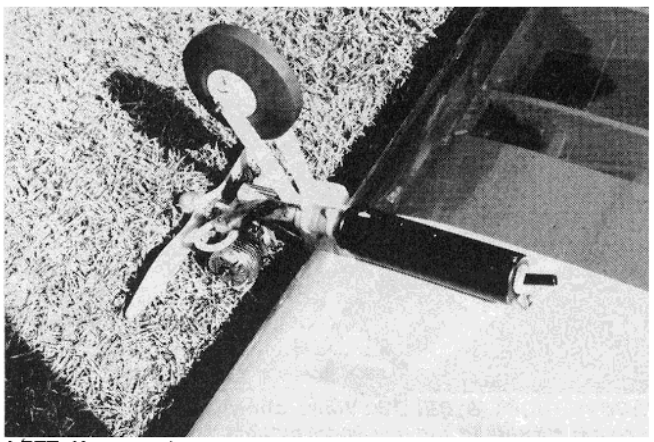


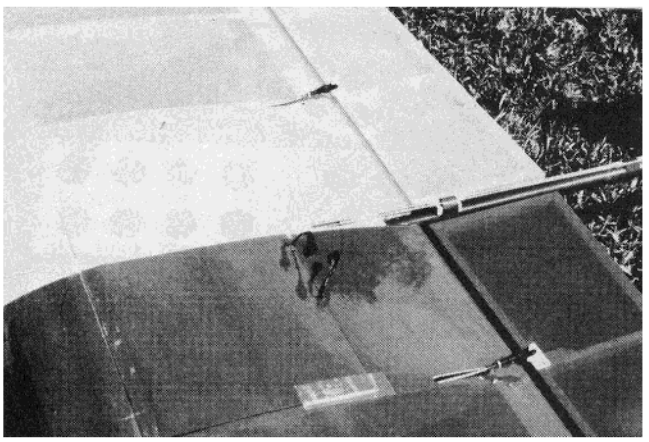
LEFT: Completed model ready to cover. RIGHT: Hatch area exposed. Note dual aileron/flaperon/spoileron servos. Receiver and battery on left behind servos. Antenna exits out left tip.





LEFT: Rear quarter view showing completed tail assembly. Also 1/16" M.W. pushrods and plastic guides taped to boom. RIGHT: Front quarter view showing tank taped to pod with foam rubber cushion.





LEFT: Homemade aerosol can "pipe". Any 3 to 5 ounce can will do. Also coat hanger wire and silicone fuel tubing rear pipe mount. RIGHT: Hatch taped in place. Author doesn't use switch to save weight and increase reliability.

of the ribs.

(13) Don't trim off the main spar stubs at the root but do trim everything else flush with the root and tip ribs.

(14) Put the halves back on to the blocks and pin the T.E. in place. Install the capstrips. Turn it over and do the other side. Cut out and install tip caps (3/32"). Slightly bevel the T.E. (the extreme throws used in the competition version require more swing area than the usual bevel on the movable surfaces).

(15) After notching the L.E. and T.E. of the ailerons, pin the leading edge to the plan again using a straightedge. Cut the "ribs" to proper length and rough cut to finish shape. Finish assembly and, when dry, add 1/4" triangle stock to the L.E. and the 1/16" end caps. Finish and sand to shape with a coarse sanding block. Don't round the trailing edge. Stop wing construction here until pod and boom are ready.

Pod and Boom Construction:

(1) Glue two pieces of approximately 3" x 6½" — 1/4" plywood together for the pod. Mark and saw out according to plan. Engine cut-out shown fits the O.S. .32 — cut out pod to fit your engine. Also make the notch deeper for a heavier engine. Don't drill for engine yet, you can shift it fore or aft to aid in final balance. Do, however, drill for the landing gear. It's too late after pod is joined to the wing.

(2) Glue boom into pod. Do this flat on your board and use a straightedge to insure that the boom is parallel to the pod top and bottom line.

(3) Glue the pod/boom assembly to one wing half. Be sure wing is centered on the boom at the trailing edge. Be sure that the rearmost L.G. hole on the pod is oriented to the top of the wing.

(4) When dry, add the other wing half and place flat on board to insure a flat wing (no dihedral). Check that trailing edges are aligned. Notch the center section ribs and install the 1/4" square spruce spar joiners.

(5) Sheet the bottom between the ribs

indicated on the plans. Sheet the top rear 3'' where indicated. Add 1/16'' x 1/4'' hatch lips. Construct hatch from 1/16'' balsa with 1/16'' x 1/4'' cross grain stiffeners.

Tail Construction:

(1) Construct as shown. Don't cut lightning holes for sport version or if you are going to use a heavy engine. Don't round the trailing edges.

Final Assembly:

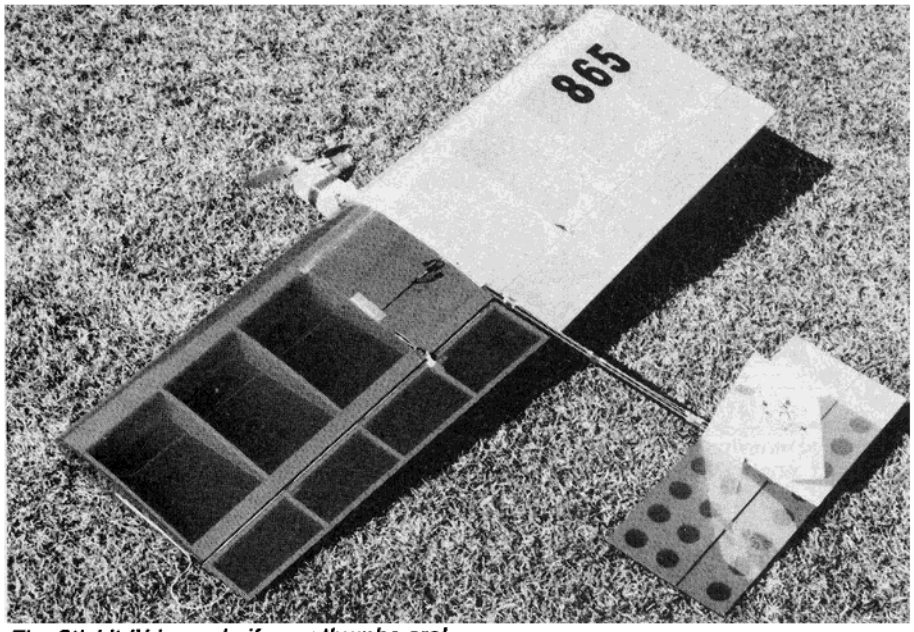
(1) Cover, hinge and horn the vertical and horizontal tail surfaces. Cut away covering where needed and glue the sub-boom to the center of the horizontal stab. Check that it is square to the leading edge. I use Satellite City's Special T. Bend the top two bends of the tail skid and drill the boom and stab to fit. Push the tail skid in from the top and bend the rearward sweep in with your fingers. Secure with Super T. Special T the vertical stab. to the horizontal stabilizer next to the boom and at 90°.

(2) Cover the wing, ailerons, and hatch. I use transparent covering because I think it's lighter and so that I can check for damage on those sometimes ''less than perfect'' fun-fly landings. It works better for me to cover tips first. Also, you must put pin holes in the aileron covering to allow the covering to shrink. I put one in each bay's inside corner, top and bottom. Horn and hinge the ailerons. Seal the aileron hinge line. I use Black Baron Presto.

(3) Install radio as shown — use 4/40 hardware for ailerons. I use solid 1/16'' M.W. for rudder and elevator pushrods with plastic guides taped to boom.

(4) Install landing gear legs. Put a #6 bolt through the wheel axle hole. Freeze overnight. Chuck the wheel in a hand drill and attack with a coarse sanding block. Fast but messy. You can wrap a turn of plastic tape around the wheel to improve its life expectancy. Install between gear legs with 1/8'' M.W. axle and collars.

(5) Mount the servos in the plane. Mount the tail. Secure with a #2 sheet metal screw. At this point, everything should be on or in the plane except the engine and tank. Move the engine and muffler/pipe where necessary to achieve the desired balance. Drill mount holes; remove the gear legs and fuelproof the mount. I use Hot Stuff, however, Polyurethane varnish or brushing (not spray) Rustoleum will also work. When dry, bolt on the landing gear and engine. Use socket head bolts and elastic lock nuts.



The Stickit IV is ready if your thumbs are!

Final Set-Up:

(1) I use Goldberg short horns and Futaba extra long arms on all but throttle. The elevator pushrod is hooked to the top hole. Rudder and ailerons are attached one hole from the top hole (see photos). This set-up requires strong servos such as Futaba 9201s for ailerons. Install 4/40 pushrods for aileron hookup. Install 1/16'' M.W. pushrods with plastic tube guides to elevator and rudder. A long 2/56 pushrod will do for throttle. Set aileron throws at 45 degrees up and down. I use 60% exponential to make this amount of throw controllable. Use the flap/elevator mix to get about 20 degrees down flap on the ailerons at full up elevator. Use the programmable mixes to slave the two aileron channels to throttle and dial in about 10 degrees up ailerons at low throttle. Set elevator throw at about 45 degrees up and about 30 degrees down. I don't use exponential on elevator and I don't mix in up ailerons on down elevator. (Set flaperons at 0 degrees in down elevator.) 45 degrees is okay for rudder too. Until you get use to what this type of aircraft will do, I would suggest that minimum low rates be used for initial flights. Dial them up gradually as you get more confident. For the sport version, set throws that more or less look like the planes you have — say 30 degrees on everything. Test fly and adjust to suit. The hatch is taped in place. I use UFO Thick to secure the receiver and battery foam rubber wrapping to the floor of the radio bay.

Flying:

Remember not to fly at full throttle except to climb or maneuver. Loops, rolls, and spins can all be done safely at full throttle.

In Fun-Fly competition, you must plan what you are going to do and then execute the plan. Getting down quickly is just as important as getting up quickly, so don't get any higher than necessary. Since this type of plane is fully controllable at ridiculously low air speeds, we are able to do most events within the vertical confines of a 40' x 100' box. Competition experience has shown over the years that slow and tight is much quicker than fast and wide. It takes some getting used to after flying airplanes that will perform only at decent flying speed, but you will get used to it. You won't want to go back to that type after experiencing this.

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From RCModeler June 1991