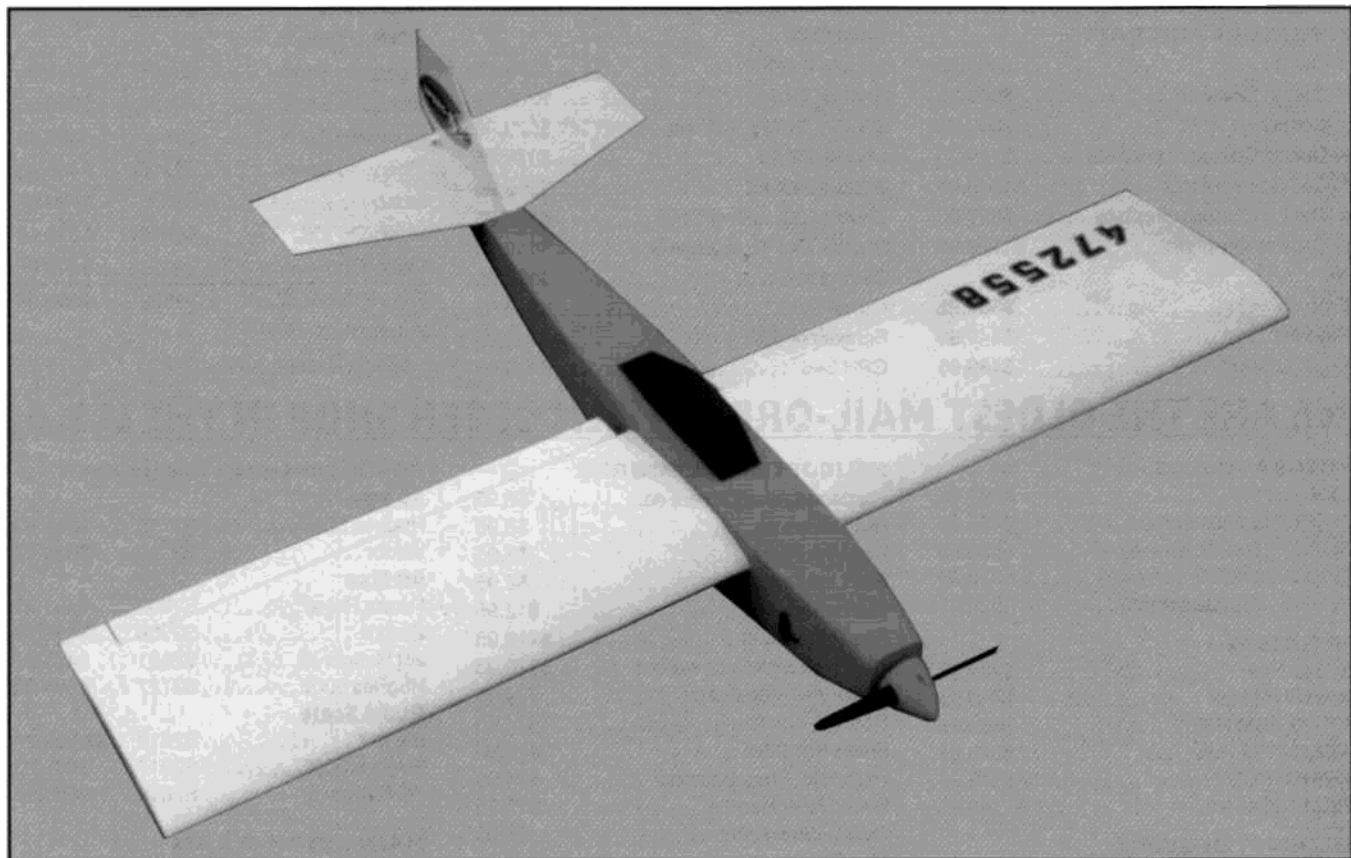


SQUERT

By Dereck Woodward



A Simple, Quick Building Electric Sport Flier For Speed 400 Motors

How about owning your own flying field? It would solve many problems, having somewhere to fly and being first! So, make millions, buy a big field, and build a Quarter Scale FBO. Next thing, your neighbors are up in arms and the wonderful wail of a piped 60 becomes the fanfare heralding the end of your dream.

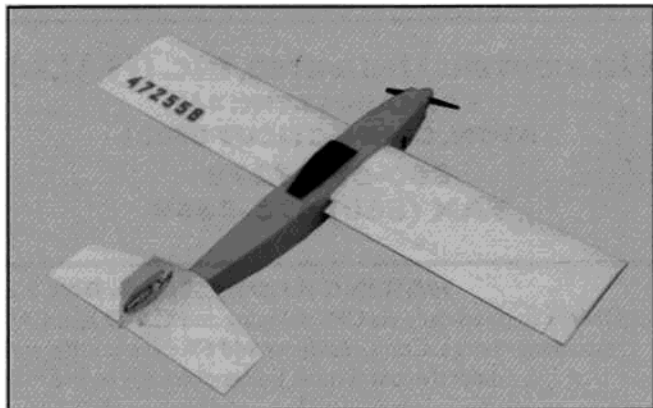
And a dream it remains for most. Mainly, we join clubs to negotiate field usage, though wilier coyotes look for alternatives! Back in

England, mid 1993, I was in "hog heaven," an all week flying field minutes from home, until the neighbors and city hall struck and we lost that site.

But, what was that "schoolyard flying" I have read of? Well, there was a schoolyard nearby. But, running gas engines in proximity to housing, soon leads to one-sided conversations with the police!

Exit gas — enter electricity. My electric soarer would do but, in a tight space, it's a big animal in a small cage. Needing tight turning, rather than a flat glide, I converted an 049 ship to electric. She flew, but let's not talk about what an extra 8 oz. did to a 16 oz. model!

There's a message! But, before she spun into a hedge, she taught



me much. Not one to stop now, I drew up something simple around the German Graupner Speed 400 motor and seven "AA" cells. In a week of drafting and building, I had an eighteen-ounce prototype ready to fly — and fly she did!

Let's Shop!

NiCds; across Europe, "Speed 400" electric models are "fueled" by yellow Sanyo 600AA's charged at one amp and discharged around six. I also tried Sanyo's "KR750AAE," bought from Tower Hobbies. Both work great! Other cells used are the "KR600AE" cells, a favorite with European "Speed 400" pylon racers, where space is at a premium. Experts may prefer "SCR" types, but the "AA" cells work fine. I've also used "Yuasa" cells with good results — some generic "cheap offers" were dismal, so watch out for false economies.

Now, the motor. The most commonly seen in England is the Graupner "Speed 400 7.2V" — a Mabuchi 380 with a metal backplate, so cheap it's almost embarrassing! A good source for Graupner motors and needed accessories is the Hobby Lobby catalog. Check their ad in this issue.

As for props — I've always ended up with a Master Airscrew 6 x 4 prop on my 400 electric models and "Squert" was no exception. However, a few 5" or 6" props will hardly take the food off the family table, so experimenting won't hurt much.

That leaves one gap — between NiCd and motor. As weight kills electric models, out with the rx NiCd and in with the BEC (Battery Elimination Circuitry) that works well all over Europe. My Futaba MC114H works well and allows longer flights by using lower power between maneuvers. There are plenty of suitable ones on the American market, but "light and BEC" are paramount, with speed control a "nice to have" third.

While you could use a small 225 mAh maximum rx NiCd, she's tight for space and the weight will rise. If going that route, I'd look at putting the rx in the rear fuselage, aft of the aileron torque rods, with the rx NiCd immediately aft of the motor battery. This looks the best from a C.G. point of view, but I am only offering this as a suggestion. Me, I'm a firm BEC fan.

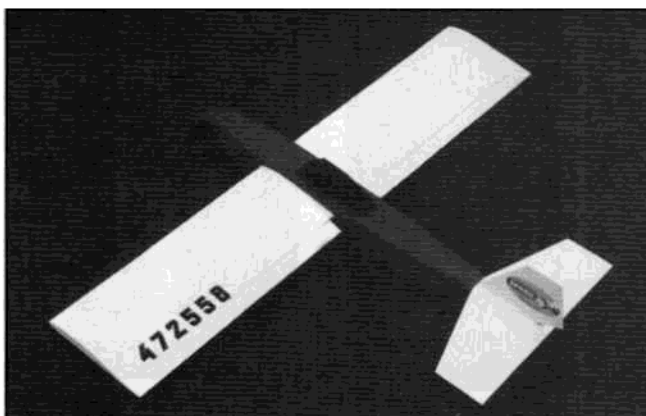
Weight Watching

Electrics has finites; powerplant saving is in fractions of an ounce. Radio weight goes in bigger fractions (as wallet weight reduces). So, it's down to a light airframe, light balsa costs the same as hard. As to foam wings, etc., feel free, but the target is 18 oz. "fueled."

Wing Ding!

Glue is the lightest fixing known, hence the one-piece structure. With a parallel chord there's only one rib, so cut a template then fourteen 1/16" ribs and 1/8" balsa for the middle two.

Noticed a lack of spars; good, we're awake. This works fine with medium grade



wood with long, straight grain, and some flexibility. True "quarter grain" wood may be too stiff to take the top curve, so be picky here.

Pin down the bottom T.E. cap and the bottom L.E. sheet by its rear edge. Line up a tip rib touching the L.E. on its front edge and "tack" with thin CA. Rock the rib back into contact along its length and glue, then glue to the T.E.

Add the T.E. center and the vertical grain webs, then fit the top sheet. When dry, remove from the board and glue the lot to the L.E. Last comes the center sheet, capstrips, and the 1/8" tips. For the latter, hold the tip onto 1/8" balsa and draw round it!

For the torque rods, I used 1/16" music wire with brass tube for the bearings. Brass tube was flattened, drilled, and soldered to the wire for the control horns. These assemblies are epoxied to the T.E.; pay attention here, with the servo above the wing the torque rods point up, not down.

Shake A Tail Feather!

Simple, with a full-span elevator and no rudder. The cross grain pieces stiffen things up and I'd add the triangular gussets after covering. Covering with them in place is only slightly easier than filming next door's cat.

Fuselage

The 1/16" medium balsa sides have 1/32" balsa doublers to stiffen up the front, the vertical grain giving a ply effect. The motor mount is 1/16" ply and a lite ply former gives a strong point in front of the battery.

The other formers are from 1/8" x 1/4" strip, with gussets from 1/4" triangular, to free up internal space. These are light and strong though; when fitting the formers, you'll need to chamfer the edges to accommodate the fuselage taper. The battery tray rear former is from three laminations of balsa with a 1/16" wire hook built in.

Now, mark centerlines on both the under face of the top and the formers to act as a jig to get the tapers right. Assemble the sides onto F3 and F4, when dry, glue that sub-assembly onto the top sheet. Pull onto F5 at the rear, F1 and F2 up front. Check the downthrust and sidethrust on F1. Remember you're building the model inverted. While the downthrust is logical, a model with left thrust will bark!

Add part of the bottom sheet aft of F5 to

stabilize the sides, and cut out the fuselage above the wing. Add 1/4" triangular pieces inside the nose and round it off a little.

The Wing Bones Connected To The Fuselage Bone

Have a dry run to check that the bits line up, etc., before gluing together. Now, start fitting radio bits. The aileron servo points upwards in the wing — leaving more space inside the fuselage.

Use a light wood canopy to tidy up the top, or a plastic bubble hood, sprayed inside to disguise "Lt. 'Block' Head" (alias the aileron servo!). I leave the canopy off until I've

SQUERT

Designed by:

Dereck Woodcraft

TYPE AIRCRAFT

Sport Electric

WINGSPAN

36 1/4 Inches

WING CHORD

7 1/2 Inches

TOTAL WING AREA

270 Sq. In.

WING LOCATION

Shoulder Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

0

OVERALL FUSELAGE LENGTH

25 1/2 Inches

RADIO COMPARTMENT SIZE

(L) 10" x (W) 2 1/4" x 1 1/4"

STABILIZER SPAN

13 Inches

STABILIZER CHORD (inc. elev.)

4 Inches (Avg.)

STABILIZER AREA

52 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

4 1/4 Inches

VERTICAL FIN WIDTH (inc. rud.)

4 1/2 Inches (Avg.)

REC. MOTOR SIZE

Graupner Speed 400 (7.2V)

BATTERY SIZE

7 Cells, 600/750 mA NiCd

LANDING GEAR

None

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Elev., Throt., Ail. (On/Off)

C.G. (from L.E.)

2 3/8 Inches

ELEVATOR THROWS

3/16" Up — 3/16" Down

AILERON THROWS

1/4" Up — 1/4" Down

RUDDER THROWS

NA — NA

SIDETHRUST

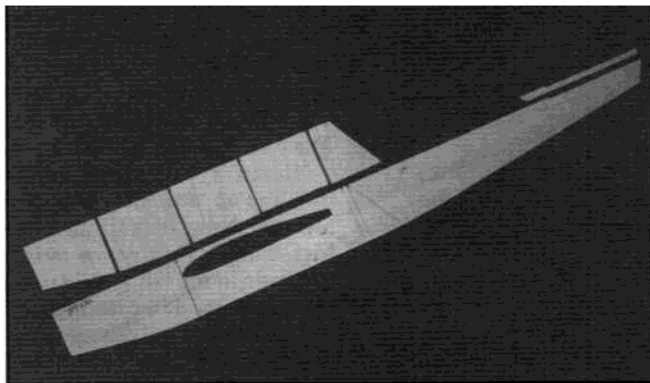
1 1/2" Right

DOWNTHRUST

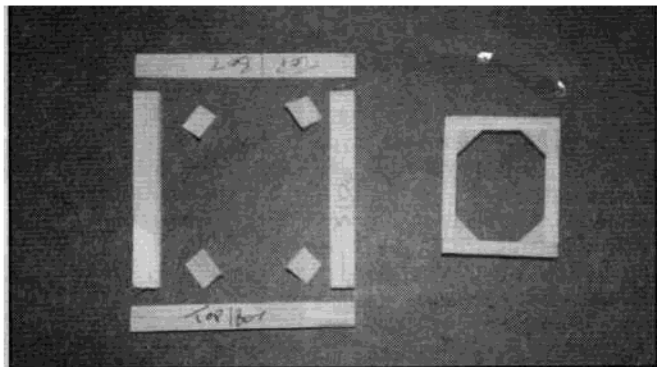
1°

BASIC MATERIALS USED IN CONSTRUCTION

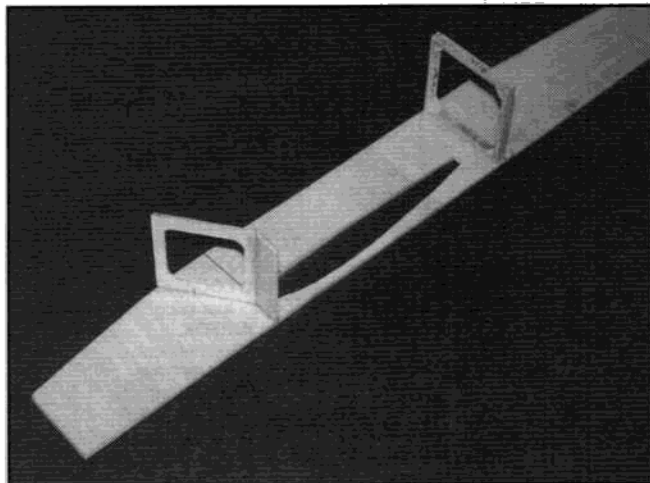
Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa
Wt. Ready To Fly	18 Oz. (1 Lb. 2 Oz.)
Wing Loading	9.6 Oz./Sq. Ft.



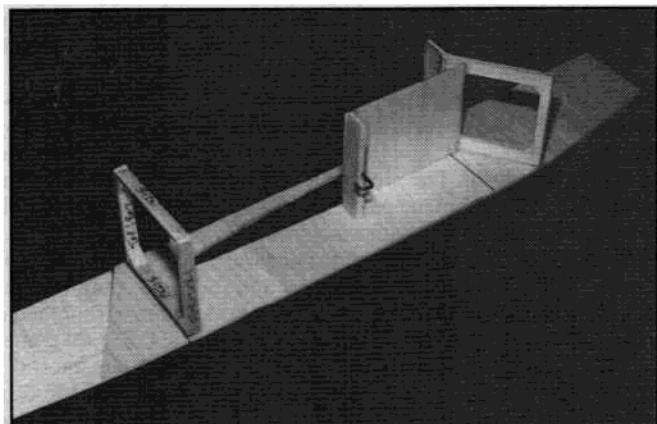
These balsa pieces are soon CA'ed together to make a fuselage side — I cut out the wing opening in the doubler after assembly.



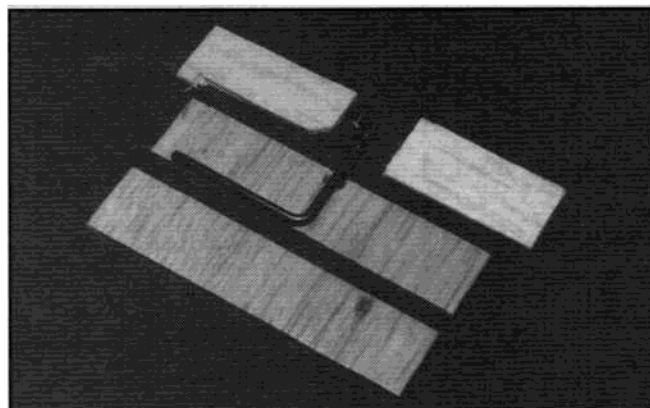
Here's how to assemble a strong, light former that takes up little internal space in a small fuselage.



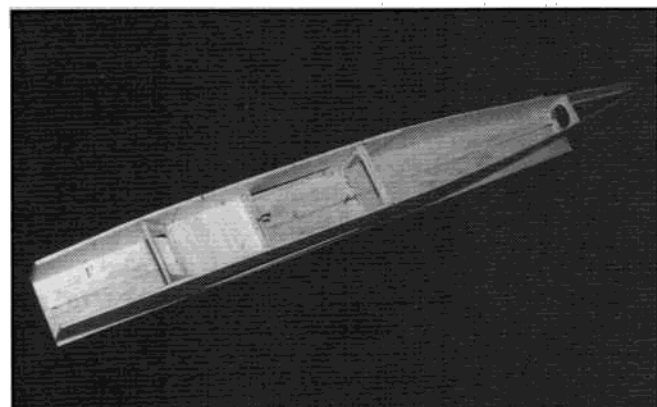
We're on our way now — the bend in F3 gives better access to the NiCd flight pack.



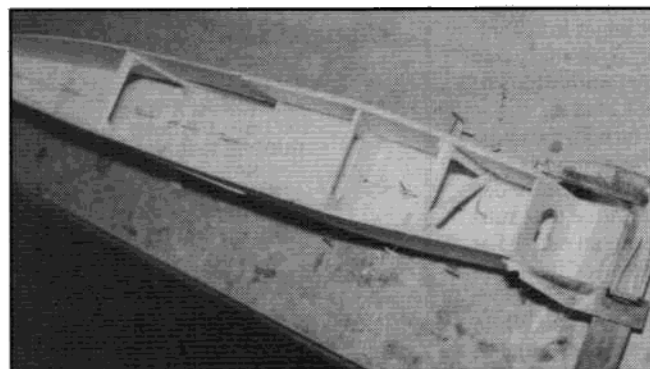
The NiCd tray has been added to the basic side and former assembly. The hook at the tray's rear is for the battery's second retainer, a rubber band.



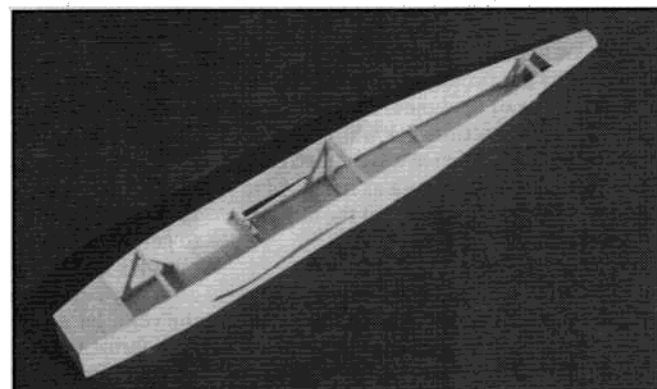
The parts involved in the hold-down hook at the rear of the battery tray.



Using the top sheet as a building jig ensures a straight fuselage. Trim the excess sheeting off when the glue has fully set up.



Pulling the sides in at the front end to mate with F1 requires a few pins, clamps, weights, and CA glue.



The fuselage is as far as it will go before adding the wing, tail feathers, and trial fitting the R/C gear. This is the bottom view of the assembly.

established the aileron trim, then fix the canopy on with clear tape. It works and is light, that's what's needed on light, simple models.

The elevator servo is fixed in place with double-sided foam tape. (Viable with a vibration free lifestyle.) The elevator is driven by a lightweight flex cable anchored at F5, F6, and mid-way between. I fixed the rx in place with Velcro. The fuselage swallows microserves, even the standard rx was used on my first "SquErt."

The battery location method has served well. Velcro is contact-glued to F3, with matching strips on the packs. I put the loops in the fuselage, the stiffer hooks on the pack where they'll pick up less grass, dirt, etc. A rubber band from a dowel across F2 to the hook on F4 gives added peace of mind here.

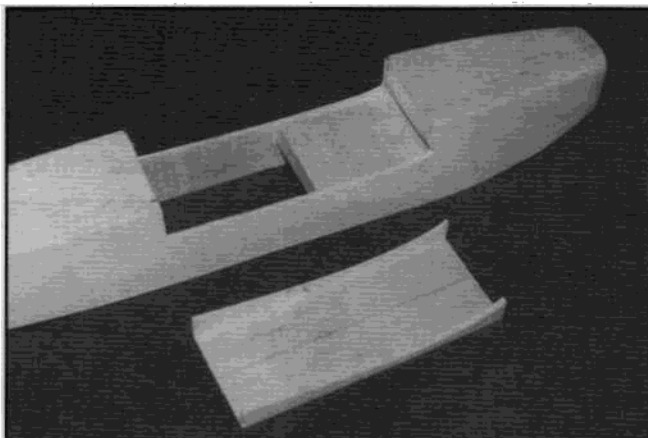
A bottom hatch finishes the project off. 1/16" cross-grain balsa with a tab at each end and a screw into a lite ply crosspiece does fine, as it's only keeping the airflow straight. That leaves the motor control,

fitted high inside the front bay to keep power leads short.

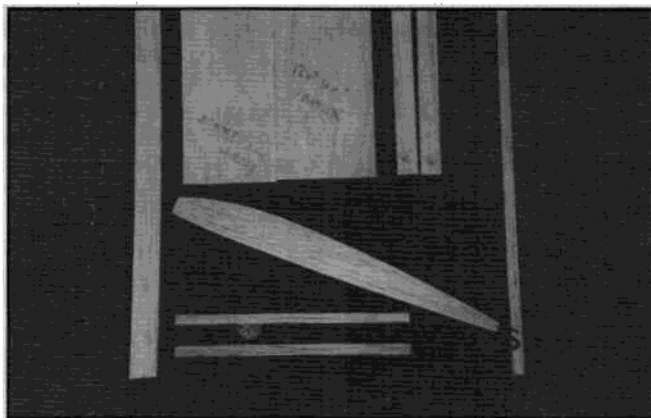
I mount the radio and arming switches on the left side of the fuselage, just behind the motor bay. As I launch her with my left hand, I can see that my hand is clear of the switches.

To The Cells!

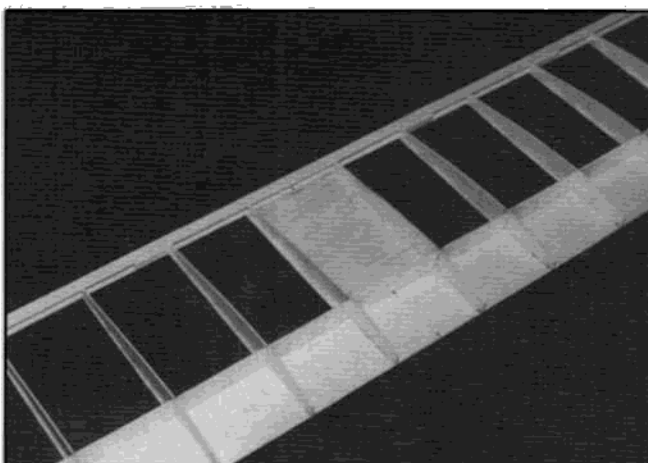
There's one teeny weeny snag to little electrics. You can go to the local hobby shop and buy ready-built packs of 1400 and 1700 mAh cells, but "AA" 7-cell packs we have



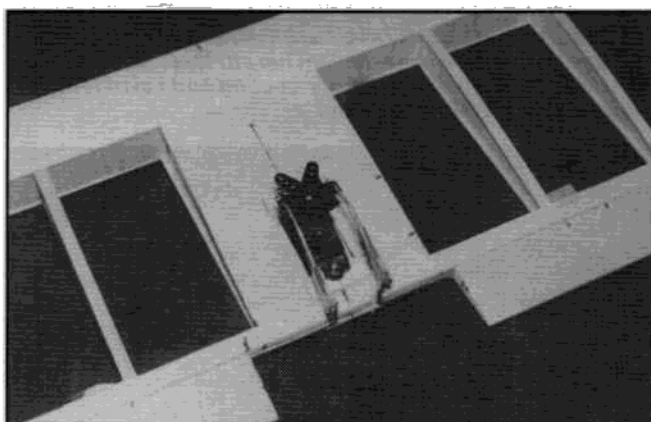
Now, cut away the fuselage above the wing opening. Save the cut away piece, it goes right back in!



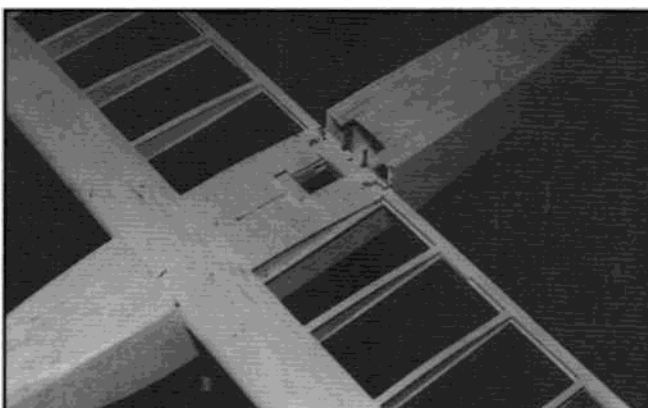
Now for the wing, these are the basic parts. Yes, there are more ribs, and the strips and planks are a little longer, but I thought this a much more informative photo!



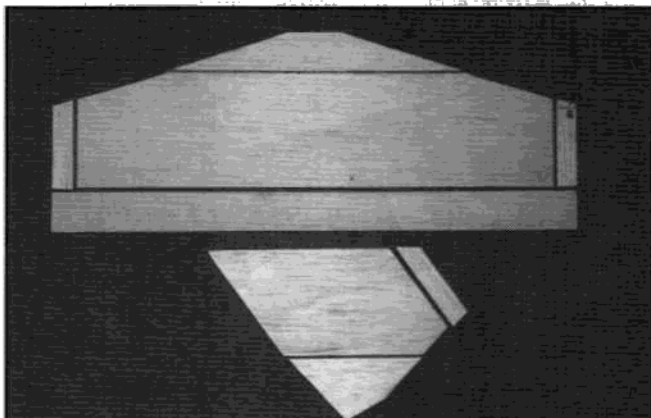
Moving along with the wing now, the ribs are onto the lower L.E. sheet, the center section sheet is in place, and the T.E. "U" channel is built up.



The fully framed-up wing with the aileron servo and drive in place. Homemade torque rods are cheap, light, and fit better than commercials. Remember — this is the top of the wing, the servo points up, not down!



The wing drops into the fuselage opening and is glued in place, the lightest fixing known to aeromodeling! Transporting a one piece 36" span model weighing 18 ounces is no sweat. Remember, this one never gets oily either.



This is a fine way to clear out those odd pieces of good, light 1/8" balsa that have accumulated in your scrap box. Piece them together to form the stabilizer and vertical fin; the glue lines stiffen them up just fine.

to build. I use electric race car wiring and a big soldering iron; an 80-watt iron does a great job.

I join the cells with 1/4" brass strip (K&S Metal Center strip) cut to length and presoldered. Insulation tape holds cells together in a 3 or 4-cell arrangement with the leads fed to the center front of the pack. The photos probably explain that far better than I just did!

At present prices, one Sub C pack = about three or four 700 AA packs. As with most aspects of small modeling, we win the \$/fun stakes hands down — the best kept secret in modeling!

Covering

Or insulation? Whatever, "light is might," so the lightest you can find scores highest. Fabrics and paints are right out of

the race. I used English Solarfilm, which is very light. Litespan is available from Hobby Lobby and really "adds lightness."

Preflight

A stand makes changing batteries and servicing far easier, I've used both a Robart foam stand and a converted small foam cooler. Before flying, I'll run her tethered in my yard (try that with a glow engine!), looking for radio glitching as well as a range check.

Let's Fly (Quietly)!

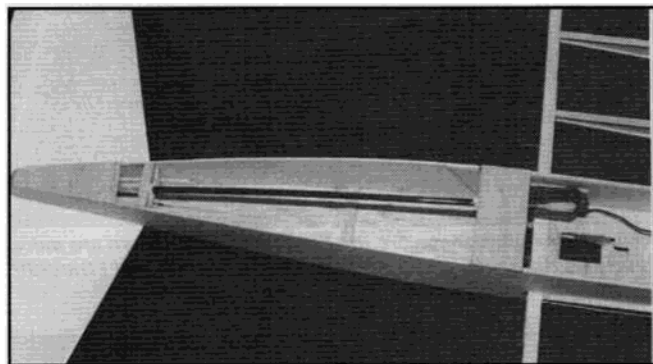
The nervous could sign up a clubmate for the first launch, but it's easy enough single handed. I load a charged NiCd, check both radio and motor (from behind the prop, even a tiny 400 can give you a nasty cut). Turn it off and fit the hatch.

On the strip, switch on and arm the

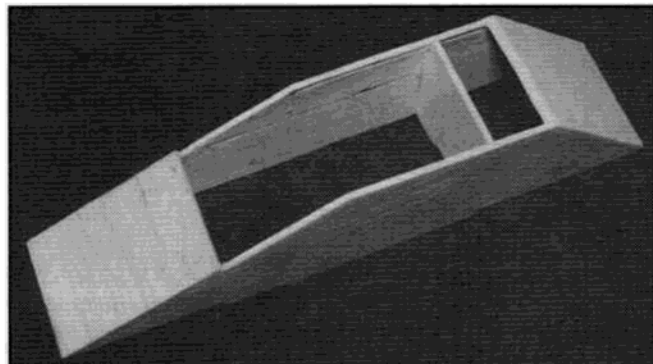
motor. I hold the tx in my right hand and launch the model with my left. She flies away easily, but no hauling into a steep climb. If you fly slope soarers, you'll feel at home, as "Electrobatics" demand energy management and smooth flying. Let her fly straight and level before maneuvers to build speed; electrics don't accelerate as fast as glow models.

"SquErt" will fly three consecutive inside loops, though a Cuban Eight may cause a little height loss. The roll rate is "relaxed" unless you really crank up the throws. Too much roll throw and you tend to throw her into tight, speed killing turns, so I'd go for less for once.

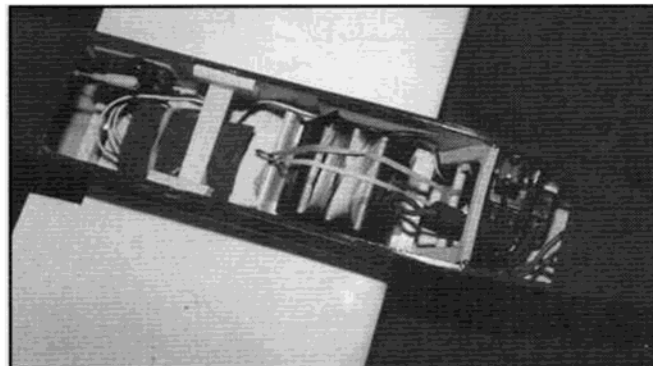
Inverted — well, the Eppler 205 section tolerates it, but you need to push down elevator to stay level. Still, "SquErt" will fly a



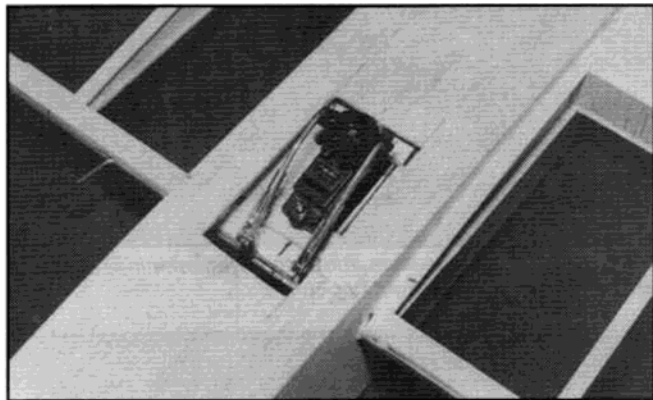
The elevator pushrod has a straight run aft. This fuselage allows an airway for motor and battery cooling and I also feed the receiver antenna out the rear end.



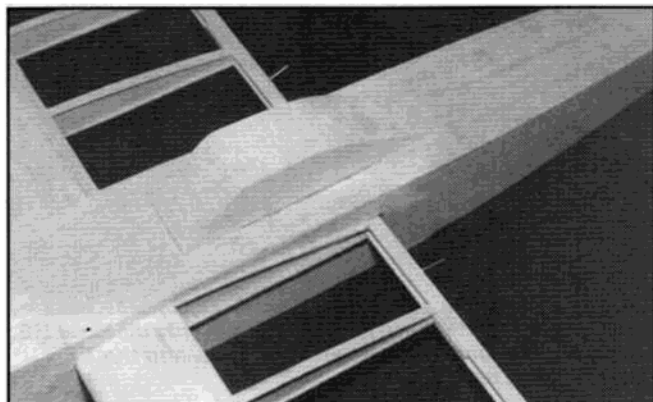
This is one way to cover the servo up — a simple 1/16" balsa sheet cover that is taped in place after establishing the aileron trim.



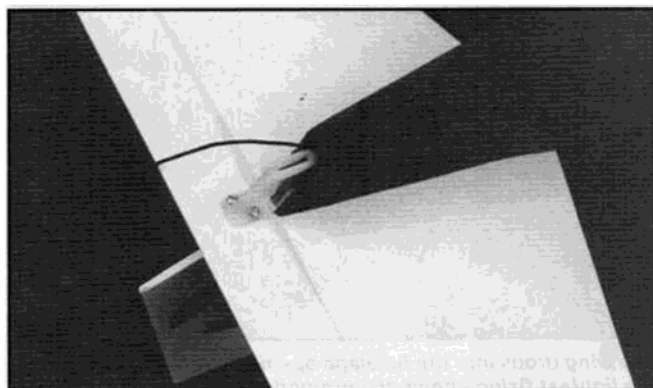
The radio area — with "fuel tank" installed. Elevator servo at rear is servo-taped to side, foam wrapped rx is secured in center. NiCd, secured by Velcro and rubber band is to front. Speed controller is servo-taped inside front, above radio and battery arming switches.



I fly my SquErt with the servo "open" until happy with the trim, then fix the "canopy" with clear tape.



Balsa "cockpit canopy" — sits over servo opening, secured by clear tape after trim is established.



The receiver antenna is led out through the open rear end — looks a little tidier and works fine.

360° turn and roll out afterwards without much height loss.

You can do a tolerable four-point roll. A goodly push of down is needed when inverted, but the maneuver is recognizable and fun to practice. Another "con job" is a sham stall turn. Just before pulling up, you drop the left wing a tad into the vertical and power back as speed drops. The slight roll yaws the nose left and gravity helps her the rest of the way. Practice hard in private — it goes wrong a lot initially (or even subsequently).

As The Battery Runs Down

I remember my first electric



The author, and his first "SquErt," in England. Expanse of grass is Old Warden aerodrome, home of the Shuttleworth Collection.

— it barely flew, with one loop per two or three minute flight seen as a great effort. "SquErt" flies 5-6 minutes with plenty of aerobatics on a 600 mAh NiCd. A further bonus is that she's quiet, even by electric standards.

I charge up five packs, then it's off to the local schoolyard after dinner, and I've got nearly an hour of airtime with aerobatics to keep me happy. Not a bad deal! Give it a try, "SquErt" may not be a 40 powered hot ship, but you'll be flying long after they're gagged.

