



# Ford Flivver

**W**hat on earth — is a British modeller doing with a scale replica of a small but significant slice of the "Golden Era" of American aviation? Yes, a good question, so now we're awake I'll explain.

March 1987 and a business trip to Jacksonville, Florida (well, someone has to do them) and, like any other modeller, the first spell of free time was down to finding the local model scene.

To trim a tale of new friendships made, sights seen, and things done, to essentials — one of my acquisitions was a Williams Brothers kit of a tiny monoplane I'd never ever heard of. However, when I saw that box sitting on Hobby World's shelf I had to have a flying version. When I opened that kit — well, if all plastic kit manufacturers did what Williams did, the world would be a better place for us Sport Scale buffs. The kit included not only a high quality three-view, by Bill Hannan himself, but also photos of the real aircraft.

Back home in England it took little time for that three-view to grow into a 50" span model weighing 56 oz., pulled along by my O.S. 20 4-stroke. A quick look will show you that W-I-D-E track gear, no landing problems here, with a steerable tailwheel. Catch that bulbous fuselage — no radio fitting problems here — with lots of wing area to give light loading.

**Dereck does a beautiful scale replica of Henry Ford's early aviation efforts. It's a real winner.**

**By Dereck Woodward**

Well, she flew ... and how! Flight one was a scale competition and we took home third place. All day I had to explain what a "Flivver" was, but at the end of the day I didn't have to try to remember which was my model! Hooked? Good. Read on.

#### **Weight Warning**

The Medical Profession has determined that excess weight will seriously impair your scale model's flying abilities!

Flivver's structure may look flimsy — it isn't! I've even crash-tested it for you and it just bounces instead of breaking up. Start "beefing up" and the C.G. will migrate aft fast! The amount of lead needed to correct will be awesome and the result won't get high enough for a decent crash. Her 56 ounces was achieved with standard servos and a 500 mA battery so that weight can be reproduced; if you have a micro radio, even better.

Don't own an O.S. 20FS? Never mind, an O.S. 20 or 25 FP series will fit or just check your favourite 20/25 and adjust the bearer spacing. The

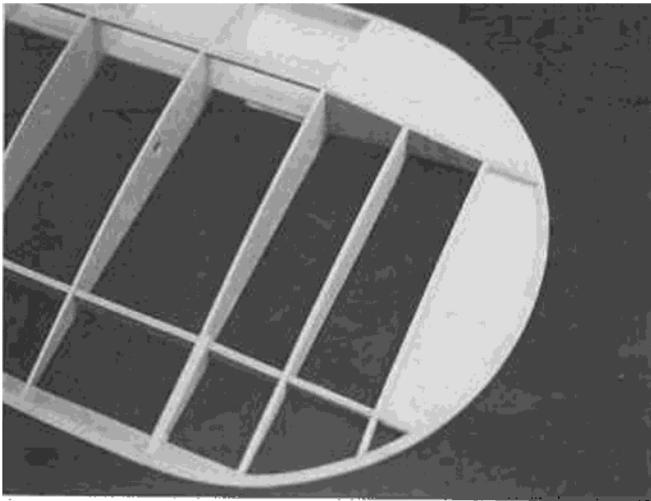
silencer? Let it hang out in the breeze no one will notice once she's flying.

#### **Balsa Dust Production**

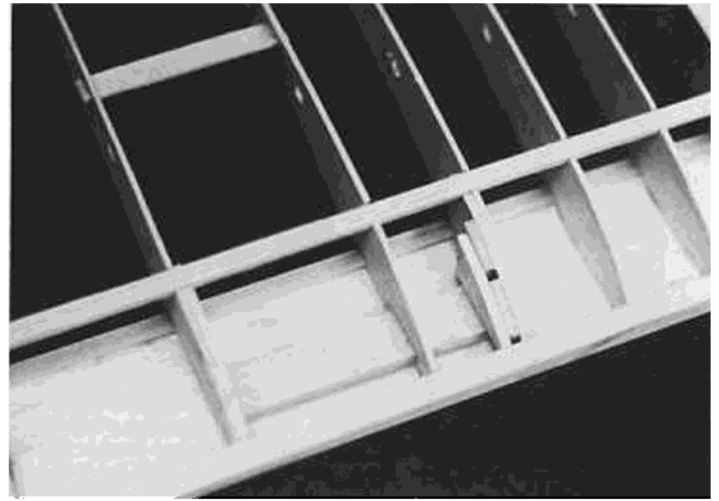
Uncle Henry Ford did us a favour with the wing — no dihedral, parallel chord, and a semi-circular tip outline. I make a ply template of the rib, cut the lot out and make cutouts as needed. If your spruce comes in 36" lengths, you'll have to splice up the spars and the balsa LE. Make good joints and stagger them on opposite panels. When that leading edge "D" box is complete, the wing will be very rigid and light. There are the ply ribs and beams built in for the gear mounts; again — don't swap for huge chunks of block hardwood.

Does the TE look different? Well, beat this for speed. The ribs are slotted as they're cut out. When the wing is framed-up, that ply strip is glued in, for now ignore the ailerons and use a continuous strip. Add the top and bottom capstrips, with Cyano, it all takes as long as cooling time for a coffee. A light wipe with sandpaper to section the caps and it's done. Now the rather minimal section, (a) looks better when covered than a wide solid balsa TE; (b) is quicker to achieve; (c) much cheaper — less "Ecuador Gold" hits the carpet; and (d) it's far more ding-proof thanks to a ply rather than a balsa edge.

Ailerons — try this way. Build the wing as though they're not there; then make up the sub-spar and aileron LE



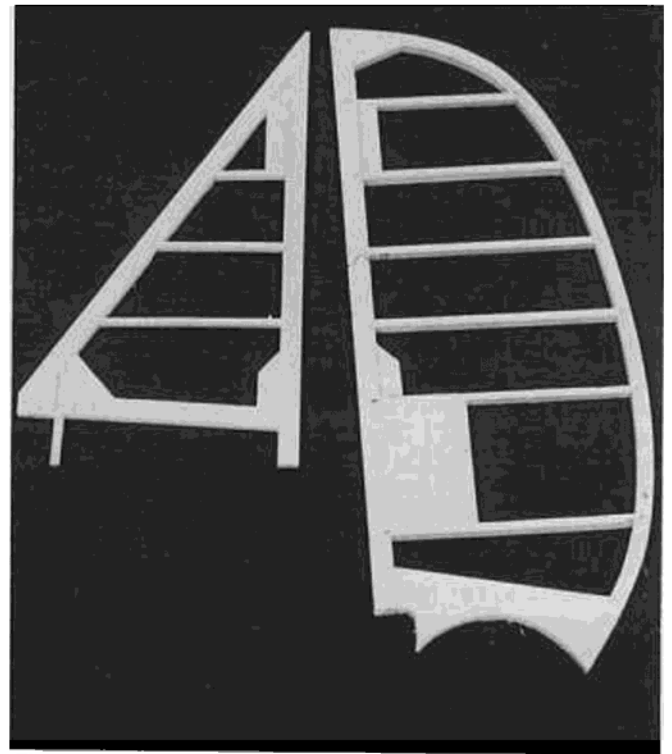
Nearly complete wing and tip structure. Laminated tip is light and very strong.



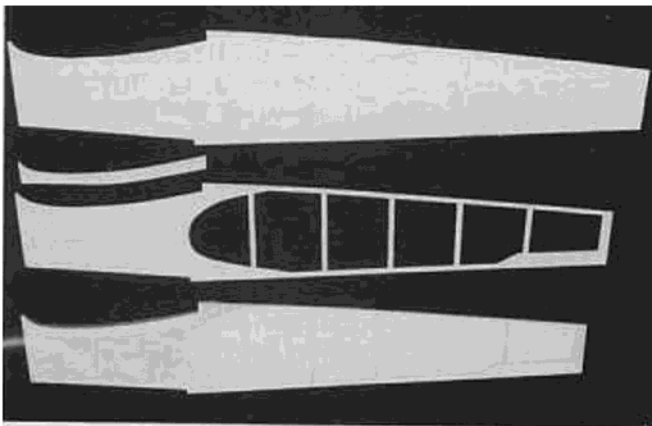
Wing structure around u/c mount before top sheet is applied. Bell crank platform is already fitted. Scale rib spacing is used.



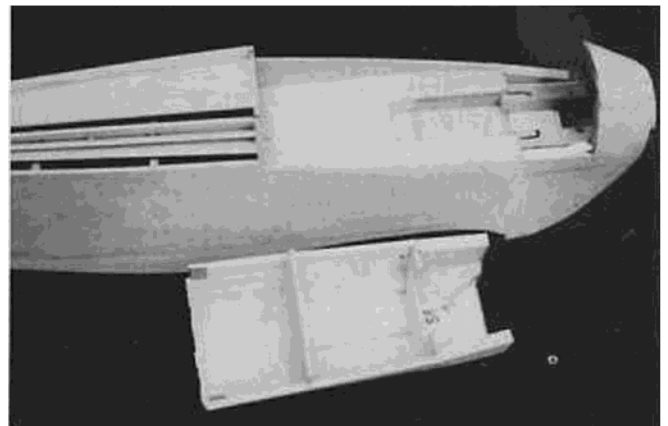
Aileron servo sits on foam pad and is restrained by scrap balsa box — works!



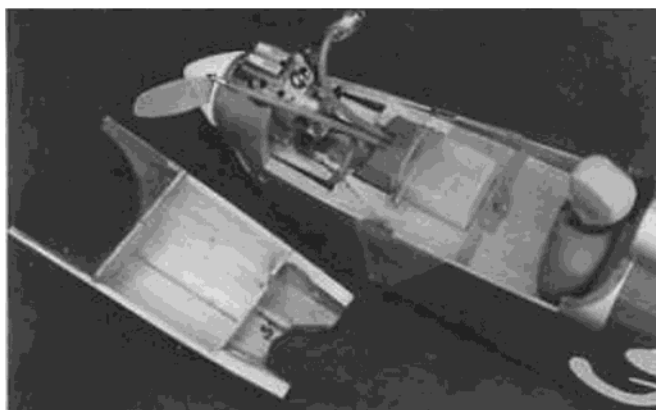
Fin and rudder structure, formers to be skinned in 1/32" sheet. Light but strong.



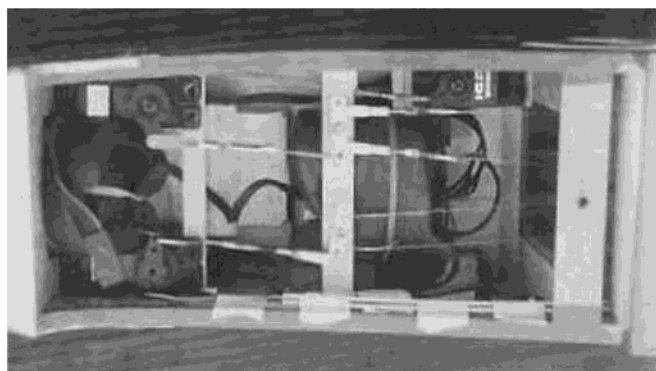
Parts of fuselage side plus completed side. DON'T fit that doubler over the wing aperture until sides are joined by formers and at sternpost — I found that out the hard way!



Here the planked-up hatch has been cut away from the cowl. Planking goes to front former — rear of block cowl goes with hatch, matches scale panel lines and is ply faced. Simulated rear deck "stringers" are more damage resistant than thin sticks.



*Under the cowl — plenty of room. That's an English made tank you probably can't buy, but there's no space problems in fitting your favourite brand. Don't forget — a 2-cycle has its throttle arm on the other side to the O.S. 20 FS. Radio switch is other side of pilot figure.*



*Plenty of room for gear. NiCd at front fits into box under bearers with a servo either side of front bay. Ply plate in centre mounts closed-loop bell cranks, and restrains Rx in foam wrap. Bell crank system allows removal of rudder/elevator servos without too much disturbance of control runs. At rear of bay is throttle servo and switch (in cockpit floor). Note drinking straw tube for antenna.*



*Final u/c set up as per plan with rigid rear link.*



*Detailing levels are up to individual choice. Overall areas are probably better than every nut, bolt, rivet, and wrinkle.*

with dry fitted hinges. Cut the appropriate ribs to length and glue in that spar/LE assembly, adding the aileron part ribs as required. When dry, sand to section before cutting the



*Detail of tailwheel bracketry and closed-loop rudder controls. Hardware is from brass and 1/16" music wire, soft soldered together. Wheel is the old favourite — ply and balsa. Pull-pull wires are old u-control 3-strand — cheap!*

ailerons free. There's no way now the ailerons can't match up.

A straight pushrod goes from one aileron bellcrank to the other via the servo bay. As the make of hardware I used won't be available, I've just drawn it as a guide. The horns were cut from 1/16" paxolin (circuit board material), or aluminum, but you could reach into that box of bits we all keep and adapt a commercial bit to suit. I built a servo retaining box out of balsa directly into the center section, but a plastic unit could be utilized here as well.

And, now for those wingtips. Laminations are light, strong and easy to do, so here's my route. With that semi-circular shape, just draw an arc to the inside radius of the tip onto a scrap of paper taped to your board. Cover in some clear plastic sheet; now knock pins into the board about 1/2" apart. Select some bendy 1/16" x 1/4" strip balsa, allow an inch or so extra at each end of the "jig" and cover them well in white glue. Place the laminates for one tip together, squeezing well to ensure they are in really close contact before pinning down at one end of the jig. Then work around the jig, pinning as you go. Let it dry overnight before repeating for the other tip.

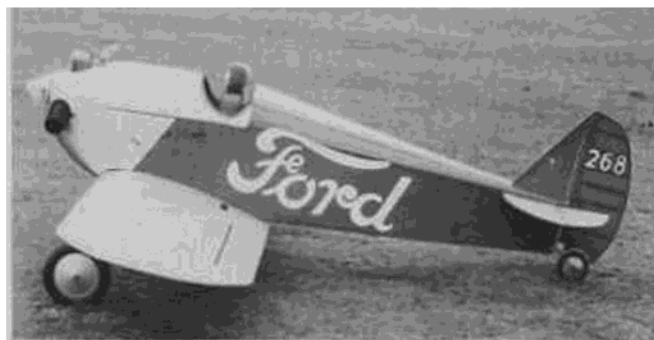
### Tail Feathers

The curved outlines are done the same way as the wingtips using the plan or a tracing. I did the tailplane and elevators as one outline with the spars and ribs added on the board. When dry, part them off and they'll match. If you go for the internal horn/joiner, it's best to silver solder or braze the joint for peace of mind. The absence of an external horn/pushrod adds greatly to the "air" of realism even at this size of model.

You've noticed the small 1/64" ply patches on the tailplane and fin — these are for the attachment bolts for the tail surface rigging wires. As they are so obvious, I decided that as well as fitting them, they would also help hold up the fin. Figured that's as light as beefing-up the fin attachment then adding simulated rigging.

The rudder is built up as per the tailplane but I'll go into the tailwheel later. It's strange that a humble tailwheel can contribute so much to the charm of a subject, but that was one of the areas that caught my eye when I first saw that plastic kit.

The fin is built up from strip and sheet covering — much lighter than sheet and as stiff. As a conscientious designer, I tested this out by



"Ford" logo was hand painted — great fun. Spinner is commercial item, cut skirt off rear part, mount behind prop, cut front portion to clear prop and screw to back plate. Closely resembles real thing — trick is to select one that looks just right after "surgery."

arranging for Flivver to flip over on landing. The fin stood this maltreatment with ease. (Okay — so I was flying in the sort of wind when little scale models should have been safely in the hangar and low level gusts did the flipping for me. Sense is not always acquired with the passage of time!)

#### Fuselage

The fuselage is mostly air, with enough wood to keep engine, radio, wings, and tail in order, plus maintaining the covering in shape. Adequate strength is maintained by having correct amounts of wood in the places where needed — not by vast amounts of heavy sheet and block. The nose is fairly hefty, being based on the 1/2" square beech engine bearers that anchors the engine solidly, but from there back it gets lighter all the way.

All the cowl and hatch lines are based on the full size with the middle cylinder of the Anzani being replaced by the model engine. I used card mailing tube for the dummy pots, 1" dia. is about right here. I'm none too hot on this point — you could have a ball here and, as the dummy engine is forward of the CG, it won't bother the balance either.

Yes, I did use 1/32" sheet for the

fuselage sides. With care in joining the skins it's fine, but very light. Well sanded 1/16" would also be suitable. Don't glue in the 1/8" balsa wing seat treblers until after the fuselage sides are joined and pulled in at the sternpost. Ignore this and you'll find it goes into a funny shape. (How do I know why to pass this little gem on to you?)

The rear top stringers are easier done as shown than by using thin strips of timber supported by formers and also resist handling damage far better. Fitting is easier if those long triangles are cut a tad oversize, then trimmed to fit. Make that long, prominent headrest from soft balsa hollowed for lightness. It's covered, sprayed silver, and fitted after the model is covered.

Leave off the fuselage bottom sheeting until you've trial fitted the elevator and rudder drives, that'll allow you to check for snags. Incidentally, it is just possible to slip the tailplane into place, then ease the elevators plus horn/joiner into place and slip home the hinges. As they can be removed by the reverse, you can do a trial fit of the elevator drive, then remove for covering.

Up at the front I built the hatch by

"tacking" the hatch formers into place, then planking the hatch using strips of soft 1/4" sheet 3/8" wide. Build the hatch in conjunction with the cowl — part of the latter is cut away to form the front of the removable hatch. Now for the obligatory "carve and sand" session — there had to be one somewhere!

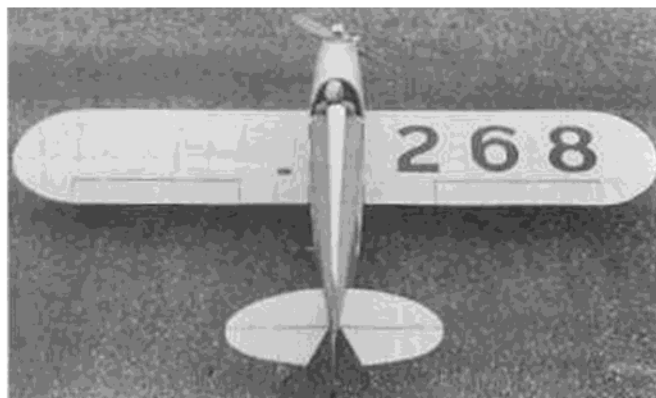
Those with the requisite skills could have a ball on fibreglass cowlings or, even better, beaten aluminum for the cowls and top decking. No need to imitate a metal finish that way.

#### The Landing Gear

Mains first — what a track! If you've put off building a scale model due to its silly tippy-toes gear — you've just lost your excuse. The set-up drawn is the result of some development and gives good handling. The main wheels are "Williams" 3/4" Golden Age; they are high quality and so close to scale that no one will argue over them.

Now the tailwheel. Unless you know something I don't, you'll have to make one. It took me a while to pluck up courage to do it, but it worked. The snag is that taxiing on tarmac wears the balsa tyre, but it is fun!

The music wire legs from the rudder horn and the torque rod top are best cut a little oversize and trimmed as the



Top view — yes the numbers are that odd shape. Rib tapes add a touch of "depth" to finish.



Not an easily mistaken shape! Generous wing and tail areas plus long moment arm gives good flying manners, too.



Bottom view of lettering and that great u/c track — no scuffed tips here!

assembly is made "in hand." Here you'll see an asset in babyscale — if a length is too short, throw it in the bin, it won't break the bank. The rudder horn is from brass strip, soft soldered into place — mine has held okay.

#### **Covering and Finishing**

She was designed for tissue and dope, but I obtained some heatshrink fabric in a realistic silver, so that's what was used. The aim is to keep it light, no ten coat jobs with lead filled paint — that's for the quarter scale bunch.

I suppose the major problem with a one-off is a lack of colour schemes — in this case it's any colour you like as long as it's blue and silver. The hard part was the aluminum cowlings. I tackled this by a traditional tissue and sealer job. When smooth, I used auto primer spray tins to build a smooth grey finish then sprayed with silver. Don't use a metallic silver and it'll look good. The flat panels are simulated with printer's lithoplate stuck on with contact adhesive to give depth to the finish.

As the markings are pretty obvious I've put them on the plan to save you

the chore of scaling them up. Yes, some of the letters are odd shaped — Ford's paintshop must have done a little freehanding here. I made a tracing of the letters and logo, taped it to the model and transferred them with typist's carbon paper. Painting was done by hand using hobby enamels and was a lot easier than I expected.

Now, please don't leave out the pilot, she'd look pretty stupid flying without anyone in the office. Williams to the rescue again with a "head and shoulders" job sitting on a block of balsa to give the right height. It'll win no art or sculpture prize, but it looks good as she clatters past at twenty feet up.

#### **Guidance and Go**

Plan ahead here. If you can build scale I reckon you can fit a radio so I offer my solution as a possible one. Basically, why have weight aft of the C.G. if you can get it forward. So a square battery pack goes under the engine bay area with a servo on a mount up against each fuselage side and as far forward as they'll go. The receiver is in the middle of the bay

with another servo at the rear to allow a gently curved snake drive from servo to throttle. Don't forget, if you use a 2-stroke engine, the throttle arm is on the opposite side as a 4-stroke.

There's room aplenty for a four ounce tank in there, I get around twenty minutes flying on four ounces of 10% nitro. At the cost of nitro in England, that's good news!

One last detail. Instead of leaving the Rx antennae outside, try this. Tape some drinking straws together and fix into the fuselage rear. Then instead of hanging that orange wire outside, hide it inside. It works fine and it's another aid to realism.

#### Up, Up and Away

Right, everything works correctly, range check okay, and here's a fine day. On grass, start the run with a lot of "up" (not as much on good tarmac). She tracks straight and accelerates smartly, so ease off the "up" when the tail is up. Let her run before easing her into a shallow climb — with an O.S. 20FS she's no Curare, so no hauled off efforts. We're simulating a 35 hp aircraft — not an F16!

Climb to "three mistakes high" and see what she'll do. As shown, the ailerons and elevators are smooth and powerful. The rudder is powerful and neutral, which gives great stall turns.

Stalls are not dramatic, despite brutal provocation mine just flops about with wings level and full "up" held in. This means that Flivver won't spin. I spent a whole session trying to provoke a spin and failed. I even tried an ounce of lead under the tail to provoke a spin, she went very twitchy in pitch but still no spin. As many a scale model has been totalled from undemanded spinning, I don't consider that a problem at all.

I suppose on that 35 hp the real Flivver was a right-way-up cruising aircraft. So for scale effect I do just that and she looks great just pattering past on low power before I open up and slowly climb away in a lazy turn. However, being a conscientious designer, I checked out the full flight envelope for nasty tricks so you can build, fly and enjoy, by taking her into realms of flight the full size wouldn't even dream of.

Didn't fool you guys, did I? Flivver got wrung out like any sports model, her low power providing more challenge by needing anticipation and a hand from gravity for the more adventurous tricks. So when the judges are watching, you make her look the low powered sportster — but for sheer fun — go for it!

Let's go a step beyond, looping on full power from level flight. Into wind and start a shallow dive with a touch extra power for speed, then pull up into the loop. Just over the top, simulate a non-inverted fuel system

by pulling the power off and recover at the bottom into level before reapplying power. So, it's not round and we've dropped a little height — this is a 1925 aircraft, not a Pitts Special.

Now the roll. Start well upwind and enter the same sort of dive for speed. Now pull up the nose around 10°,

down, try reducing the rudder input — remember it's a very powerful control on a light model with low inertia.

She'll get round a Cuban Eight — just! A good head of speed is called for and lots of height. Once you're in there, the speed goes, the height goes, but it's a good test of skill. The moral is start high! Same goes for inverted — yes, she really will roll into inverted, fly around easily and even climb gently or turn without losing height. She will roll out nose low though, so no playing in the weeds here. All these were done on my 4-stroke version, a 2-stroker would have a greater margin of urge for these tricks, but it soon starts to lose authenticity around here . . .

#### What Went Up

So, it's landing time. Use a touch of "up" trim to slow her down and cruise around the pattern. Power off to descend. Remember the drag of that fat fuselage and don't let the speed decay too low until you're skimming the grass. Flivver will do a three pointer, the mark of a real "taildragger" pilot I reckon and a good way to impress, so go practice.

#### Closing the Hangar Doors

There's no denying that Henry Ford gave us a great shape to model; O.S.'s 20 FS is a great little engine; and credit is due to Williams for putting the drawings and photos in their plastic kits. I hope you'll have as much fun as I've had so don't just sit there reading magazines — go build a Flivver, I'd be honoured to receive a photo of one from your great country, so good luck and fly safe! □

<b>FORD FLIVVER</b>	
Designed By: Dereck Woodward	
<b>TYPE AIRCRAFT</b>	
Scale	
<b>WINGSPAN</b>	
50 Inches	
<b>WING CHORD</b>	
10 Inches	
<b>TOTAL WING AREA</b>	
478 Sq. In.	
<b>WING LOCATION</b>	
Low Wing	
<b>AIRFOIL</b>	
Flat Bottom	
<b>WING PLANFORM</b>	
Constant Chord	
<b>DIHEDRAL EACH TIP</b>	
None	
<b>O.A. FUSELAGE LENGTH</b>	
35 1/2 Inches	
<b>RADIO COMPARTMENT SIZE</b>	
(L) 9" x (W) 3 1/4" x (H) 2 1/4"	
<b>STABILIZER SPAN</b>	
14 Inches	
<b>STABILIZER CHORD (incl. elev.)</b>	
5 1/2 Inches (Avg.)	
<b>STABILIZER AREA</b>	
72 Sq. In.	
<b>STAB AIRFOIL SECTION</b>	
Flat	
<b>STABILIZER LOCATION</b>	
Top of Fuselage	
<b>VERTICAL FIN HEIGHT</b>	
5 1/2 Inches	
<b>VERTICAL FIN WIDTH (incl. rud.)</b>	
5 1/2 Inches (Avg.)	
<b>REC. ENGINE SIZE</b>	
20-26 4-stroke	
20-28 2-stroke	
<b>FUEL TANK SIZE</b>	
4 Oz.	
<b>LANDING GEAR</b>	
Conventional	
<b>REC. NO. OF CHANNELS</b>	
4	
<b>CONTROL FUNCTIONS</b>	
Rud., Elev., Throt., Ail.	
<b>BASIC MATERIALS USED IN CONSTRUCTION</b>	
Fuselage	Balsa & Ply
Wing	Balsa, Spruce & Ply
Empennage	Balsa & Ply
Wt. Ready To Fly	58 Oz. (3 Lbs. 10 Oz.)
Wing Loading	17.5 Oz./Sq. Ft.

elevator to neutral and roll over. Power off when inverted and if you raised the nose correctly she'll come out at the same height. A touch of "up" makes the roll more "barrelly", which looks good too.

Stall turns are great fun and a cinch with that rudder but don't try and go straight up forever. If she goes over the top too quick and fishtails on the way