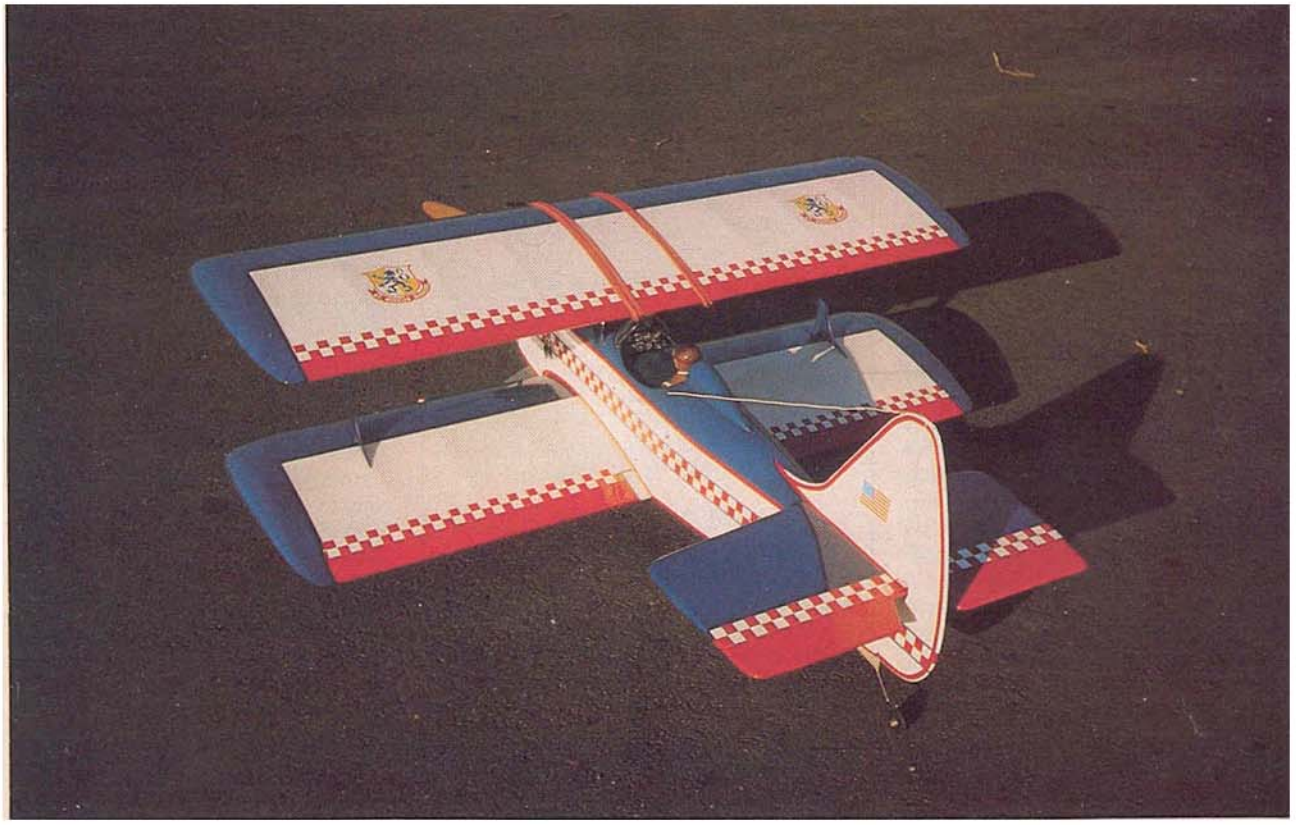
SPORTY FORTY



Do you fly R/C for sport? Are you forty years old? Over forty? Under forty?

If you meet any one of the above requirements, then RCM's "Sporty Forty" is a biplane designed just for you. Take a look at its exclusive features. Like - - - where did the name come from? Well, it's forty inches long, has a forty inch wingspan, and sports a K & B .40 up in the nose. Here's some more - - - even though they may stretch your credulity a bit. It cruises at forty (you can make it do that), takes forty hours to build (that's if you want to **really** dress it up), uses forty dollars worth of material (not including engine and radio, but including Mono-Kote, top grade wood, wheels, and preformed landing gear), and will give you forty years of great sport flying (if you don't cream it in the first forty minutes!).

Here's the clincher. After I had it built, test flown, and proven out, I decided it was a great subject for a cover photo. So, in keeping with RCM's well-deserved reputation for well-endowed cover models, I tried to locate the perfect model to display the Sporty Forty. What could be better than a forty year old beauty with a forty inch bust?

Try as I might, I never was able to find the right model. Oh, it wasn't too hard to find a model with the right measurements, but find one that would admit to being forty? No way! Thirty-nine, yes. Forty, Nyet.

Oh, well. So next I tried the idea of a cover shot with a guy who appreciates a beautiful woman of forty, with measurements to match. He should be forty. Or over. ('Way over!)

Take a look at the cover. You can see how I made out.

Enough of this fantasizing. Let's talk about the practical features of the Sporty Forty.

Note that there's no dihedral, and the wing section is flat bottomed. That means that the wing can be built in one piece, on a flat work bench, using standard 36" lengths of wood. No dihedral braces, no splicing - - - just put it all together.

The engine is upright, and the tank is just about level with the carburetor intake. Reason? Upright engines are the easiest to adjust and, if you nose up on landing, you don't scrape the muffler. With the tank just about level with the intake, you don't need a fuel pump.

The wide tread of the landing gear is almost one-third of the wing spread. This not only makes for good tracking, but also helps to reduce the incidence of wingtip scraping with the resultant "wing rash".

Note the relatively high tail wheel setting. It's done on purpose. Remember all those learned discussions we had about "P" factor and gyroscopic action? Well, it seems that the problem with most tail draggers comes on take-off, when the plane tends to veer to the left as you raise the tail for take-off. With the Sporty Forty, this is reduced to the minimum. Don't bother to raise the tail on take-off. Just give it the gun gradually, and it'll pick up speed and take off at the same angle that it sets on the ground, with absolutely no tendency for a wingtip stall.

How about that low aspect ratio? You don't see many biplanes like that, do you? All I can say is — try it, you'll like it! The Sporty Forty has one of the most amazing speed ranges you'll ever see. You can throttle back and float along at about 20 miles an hour, or pour the coal to it and zip along about 70. Caution — don't put too much throw in the elevators or the ailerons. The short coupling, both longitudinal and lateral, makes it very responsive to control surface actions. It's not intended to be a competition biplane — just a Sporty Forty.

So there's the design philosophy behind the model. Let's get on with the construction features. Actually, it's so

BY KEN WILLARD

What's forty inches long, has a forty inch wing span, sports a .40 up front, and is designed for sport fliers plus or minus forty years old? It's the Sporty Forty, designed by our perennial "forty year old" Chief Sunday Flyer.

simple to build that you probably can put it together just by following the plans, but there are a couple of hints and kinks that may help. Let's start with the fuselage.

Fuselage: Building the fuselage is straightforward. But I'm not going to say it's straightforward, because a lot of you have written in to complain that the designer says, "It's straightforward," and what you want to know is howinell to build it — not how straight it goes forward. So here are the easy steps:

(1) Study the plans.

(2) Look at the construction photos.

(3) Build the fuselage in accordance with the plans and photos. That's all there is to it.

Hm-m-m. Maybe that's not the whole story, so let's talk about some of the details, such as, after you have cut out the fuselage sides and glued the doublers, wing saddles, and longerons to them, join them together with the three fuselage bulkheads (some modelers call them formers) as shown in one of the construction photos. Then pinch the forward ends together to fit against the sides of the firewall and epoxy the firewall in place. Note the plans have it set at a slight down thrust angle, but no offset side thrust. In that regard, be sure that the two sides are evenly bent in so the firewall is centered on the fuselage center line, thus assuring that it will be properly aligned.

Next, do the same with the rear ends — pinch them together and epoxy. Note that the tailpost and rear ends of the longerons are sanded to a taper so they provide a good gluing area. When dry, add the cross braces, one at the rear end location of the headrest, the other at the forward edge of stab. You'll probably find that the curvature doesn't fit that shown on the plans unless you press the sides in and hold them in place until the adhesive dries.

Next, glue the 1/4" x 3/4" plywood cabane struts in place. Do this before you shape them into the streamline cross-section. Only that part of the strut from the top of the sides to the bottom of the upper wing cradle is shaped to the streamline.

The curved top of the fuselage takes a little doing — but not too much. Cut the sheet balsa to fit over the top curvature of Bulkhead Nos. 1, 2, and 3, and fit flush to the top of the sheet sides. If the balsa tends to crack when you bend it, wet the outer surface first and gradually curve it around the forms. You will also have to use some care in making the necessary cutouts for the cabane struts. If you do happen to cut away a bit too much, you can fill the gap later with some balsa putty.

Repeat the procedure to cover the top of the fuselage aft of the cockpit. Then cut out the cockpit. Then add the lower sheeting from the trailing edge of the bottom wing back to the tail.

The nose structure, forward of the firewall, is built up by inserting balsa block filler stock at the bottom, top and sides. Sand the bottom flat across to begin with, then add the 3/32" plywood bottom from the forward edge of the bottom wing up to about 1" forward of the firewall. Cut a 1/4" hole up through the center of the balsa block filler and insert a drain tube for all the gook that collects there after an engine run. Incidentally, when you finish flying and clean off the plane, you won't be able to get all that residue, so to prevent it from dripping on your floor, you either have to put a rag under the drain hole, or plug it up until you want to fly again. Don't forget to take it out when you go flying, or you'll get quite a puddle in there.

The tank compartment hatch cover takes a bit of time but is well worth it. Note the slot in the firewall so the tank can be lifted straight up along with the hatch when you want to remove it and clean the compartment. The sheet bot-

tom for the tank compartment is slanted as shown so the fuel pick-up will be right at the bottom. When you get it in place, seal it and fuelproof the whole area so fuel won't drip down into the battery and receiver compartment.

The plans show a Sullivan MM-1 motor mount, and I recommend it. I've used one both on the Sporty Forty and also on my RPV practice plane for about a year now, and have never had the engine come loose. Yet, if you want to, just loosen the two mounting bolts, releasing the lugs, and the engine comes right out. Great for servicing.

The landing gear mounting block is epoxied to the plywood bottom and the side doublers, and the landing gear bolted to it. Some guys use screws, but I prefer bolts, with blind nuts epoxied to the top of the block.

Add the plywood plate to the bottom rear of Former No. 1, with holes drilled to receive the wing mount dowels. Then install the rear mounting block for the nylon bolt that holds the trailing edge in place.

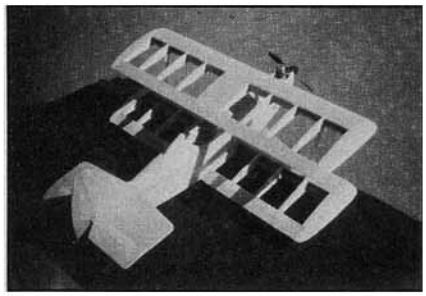
I don't think it's necessary to go into detail about the windshield, do you? The plans show it quite clearly. The slit fuel line tubing edging the windshield is just a little "touch of class" that adds to the appearance. Mounting the windshield is done with Hot Stuff, after carefully trimming the bottom edge to fit flush with the balsa.

The last item is the mounting of the wing cradle, which must be carefully aligned so the incidence of the top wing is correct. You have a good gluing surface at each joint so, after getting one properly aligned, glue it in place. Then line up the other, making sure they are parallel, and glue it. When dry, drill a hole through the center of the glue joints and run a 3/4" 3-48 bolt through the hole and tighten it down with a washer and nut. Yes, I suppose the glue joint would hold even without the bolt, but the little extra strength adds a lot of protection.

Probably a lot of you will prefer to make a fitting for a nylon bolt attachment set-up for the top wing. Fine — go ahead. I was in such a hurry to see the plane fly that I decided to use the rubber band method as shown. By cutting off lengths of heavy paper clip wire and bending them to the shape shown on the plans, then epoxying the wire firmly in place, it took a little less time. To keep the wire from chafing the rubber bands, I slipped a short length of small diameter fuel tubing over the ends. The whole set-up works so well that I've decided to leave it that way. Got some colored rubber bands and they matched the color scheme.

See? Building the fuselage is "straightforward".

Wings: To build the wings of the Sporty Forty, you start by building two identical wings. The 36" spars, leading edges, trailing edges and sheet stock



SPORTY FORTY
Designed By: Ken Willard

TYPE AIRCRAFT
Sport Biplane
WINGSPAN
40" (Top & Bottom)
WING CHORD
12" (Top & Bottom)
TOTAL WING AREA
936 Square Inches
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
None
O.A. FUSELAGE LENGTH
40 Inches
RADIO COMPARTMENT AREA
(L) 9" X (W) 3¼" X (H) 3" (Avg.)
STABILIZER SPAN
17½ Inches
STABILIZER CHORD (incl. elev.)
5½" (Avg.)
STABILIZER AREA
138 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
6" (Avg.)
REC. ENGINE SIZE
.40
FUEL TANK SIZE
12 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., & Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa
Weight Ready-To-Fly	104 Ozs.
Wing Loading	16 Oz./Sq. Ft.

are all standard sizes available in any good hobby shop. The leading edge might be an exception. It's symmetrically shaped, mostly intended for U-Control planes or R/C jobs with symmetrical airfoils. To adapt them to a flat bottomed airfoil was easy; just glue the bottom to the bottom sheeting with the rear edge of the stock slanted, as shown in the plans. Then the top sheeting comes down tangent to the top of the leading edge stock.

The wing section is what we used to call "modified Clark Y" because that's what every flat bottomed airfoil was called. But I just call it the "super zip-zip" section, with the maximum curvature 4" back so you can use 4" sheeting from the leading edge to the spar. Very scientific — and works great.

The piece of trailing edge stock sandwiched in between the trailing edge sheeting gives added strength, but probably isn't really needed; the added strength is well worth the slight increase in weight.

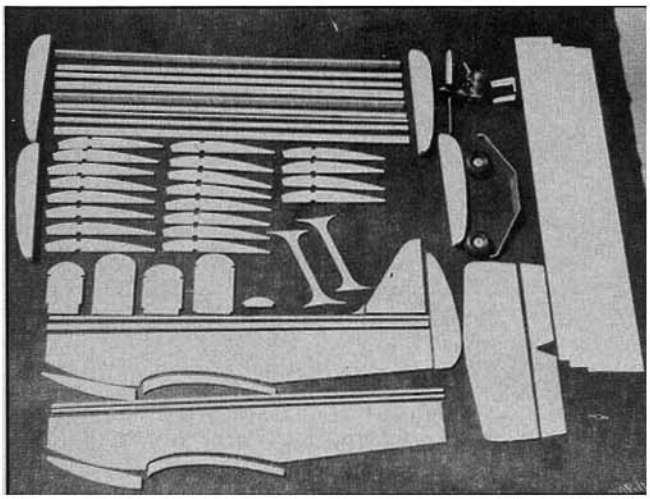
Everyone has their favorite way to attach sheeting. Personally, I use contact cement. You just have to be careful that it's lined up before you lay it on, because if it isn't, you just start over.

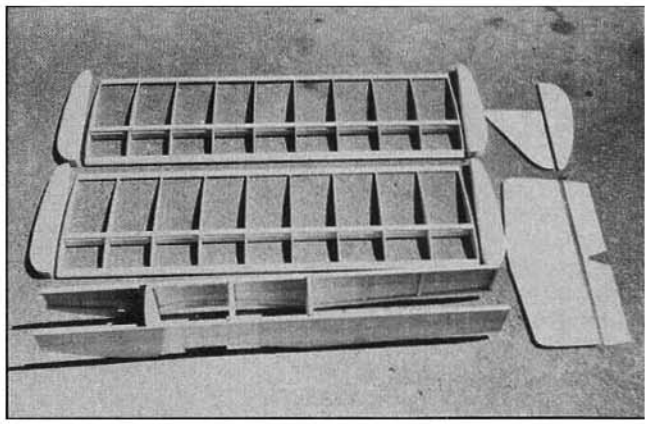
The wingtips are carved from balsa blocks. A little expensive (helps to build up to the forty buck tab for materials) but they look nice when finished. If you worry about the cost, you could make the tips out of 1/4" sheet stock and have a little open frame covering from the end rib to the outside edge of the tip. But heck — go ahead, live a little. Carve up some block tips. You'll be glad you did — they really do look sharp.

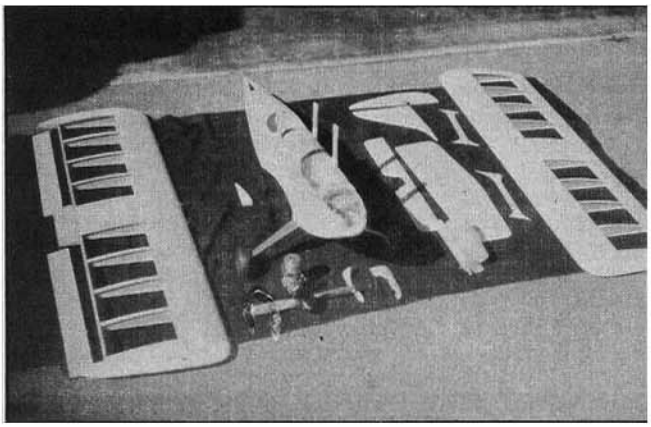
The shear webs in the center bays also add strength which may not be needed for such a short span wing. But I got into the habit with my 10' sailplane wings, and put the webs in before I thought too much about it. Again, they add a lot of strength for very little weight, so put them in.

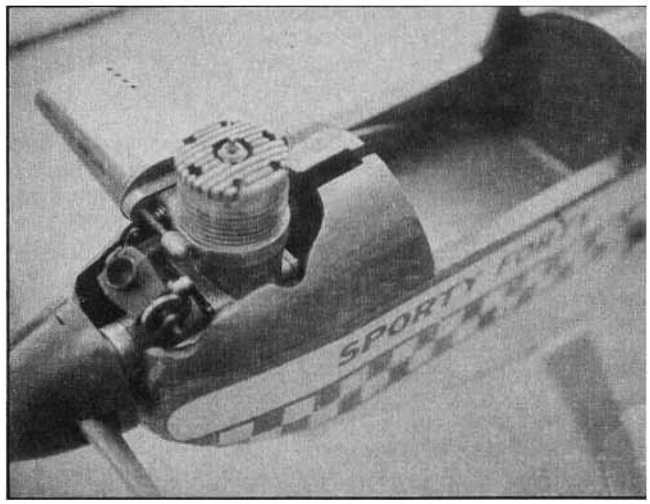
Capstrips top and bottom with full chord sheeting in the center, make a very good surface to attach the covering, which in my case was MonoKote. I'm kinda' hooked on the stuff. It's easy to put on, gives a high gloss finish with little work involved, and repairs are easy to make.

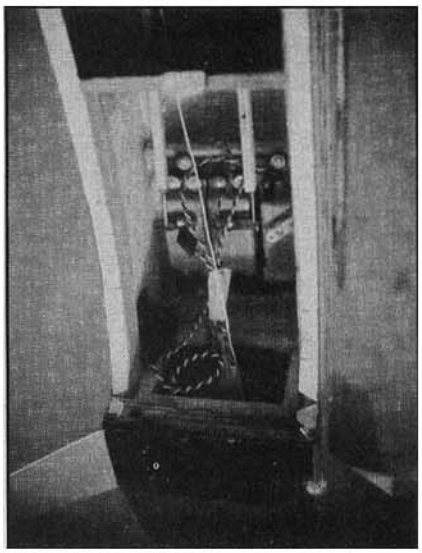
But, wait. Before you cover, remember you've got to modify the lower wing to add ailerons. Really not much to it. Start by slicing off the ribs with a very sharp razor or X-Acto knife, 1/4" ahead of the 2" sheeting on the top and 3/8" ahead on the bottom. Then butt glue a full depth 1/4" spar from tip to tip at the angle shown in the profile view of the lower wing. Next, cut away the sheeting on the aileron section 1/4" back on the top, and 3/8" back on the bottom, and butt glue a 1/4" strip on the front as shown on the profile view. Since the aileron is hinged on the top line, the gap allows room for down travel. Add some



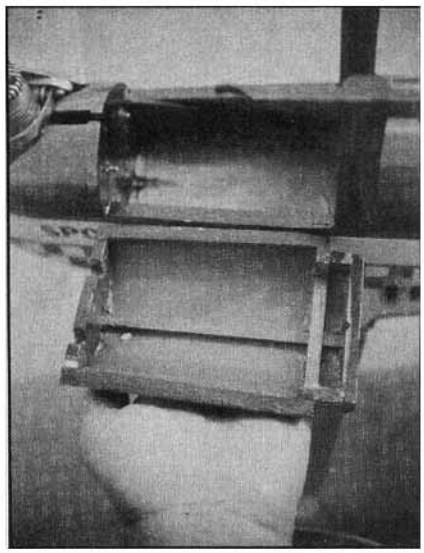




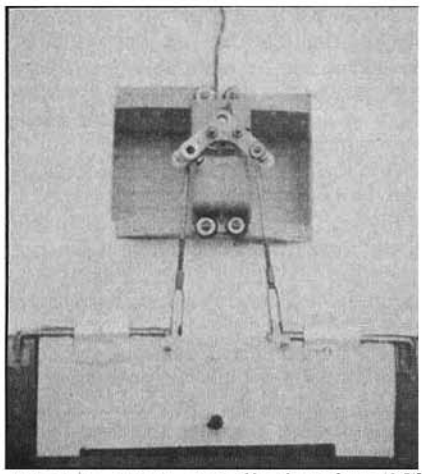




Servo tray set-up.



Tank complete with hatch.



Aileron servo detail showing 90° bellcrank attached to servo for differential throw. Horns are epoxied to top of ailerons.

end plate balsa blocks to the ailerons between the top and bottom sheeting, and the ailerons are ready for finishing, covering and mounting.

The center bay of the lower wing, at the trailing edge, where you cut away for the ailerons and added the full span spar, is rebuilt from the spar back to the trailing edge by shaping a piece of hard block balsa to butt up against the spar and taper back to the trailing edge in conformance with the wing sections. Then a hole is cut through it to accommodate the nylon bolt mounting system. Up at the leading edge, two 1/4" dowels are inserted into holes drilled into the leading edge to match the holes in the plywood plate at the back of Former No. 1

The lower wing is now finished except for making the mounting for the aileron servo. The plans show the mount arrangement for KPS-14 type; you can easily make whatever changes are needed for your preference. But I strongly urge you to provide the offset servo arm, which gives differential aileron travel. The set-up which I have shown on the plan gives three times as much up-aileron as it does down-travel, and this totally eliminates any adverse yawing tendency.

And that, I think, adequately covers the wing structure.

Empennage (high class name for tail surfaces): These are cut from sheet balsa, of the sizes stated in the plans. The elevator, in particular, is cut from medium hard balsa stock, so the narrow

section at the center has plenty of strength. Round off the edges of all the surfaces — no need to taper and streamline them since your objective is a sport model, not a racer.

The 1/8" dowels inserted into the fin, and fitting down into the stab, give that little added strength that makes you feel secure. So do it.

Let's see. We've got the fuselage done, the landing gear mounted, the wings built, and the tail surfaces done. Not much left except mounting the servos, installing the control rods, and adding the "cosmetic" features like the interplane struts and the wheel pants. The interplane struts are cut out of 1/16" plywood to the shape shown in the profile view. They are held in place using landing gear strap fittings which have been bent through 90° so one mounting hole can be screwed to the spar, and the other can have a 2-56 bolt inserted into a hole through the strut and connected to the strap fitting which has been bent up at 90° to fit against the side of the interplane strut.

Mounting the servos is a matter of individual choice. I used a Kraft mounting tray, attached to rails, which mounted the rudder, elevator, and engine servos. The aileron servo mounting has already been discussed.

The receiver and battery pack are stuffed up forward through the hole in Bulkhead No. 1, and held there by filling up the empty space with foam.

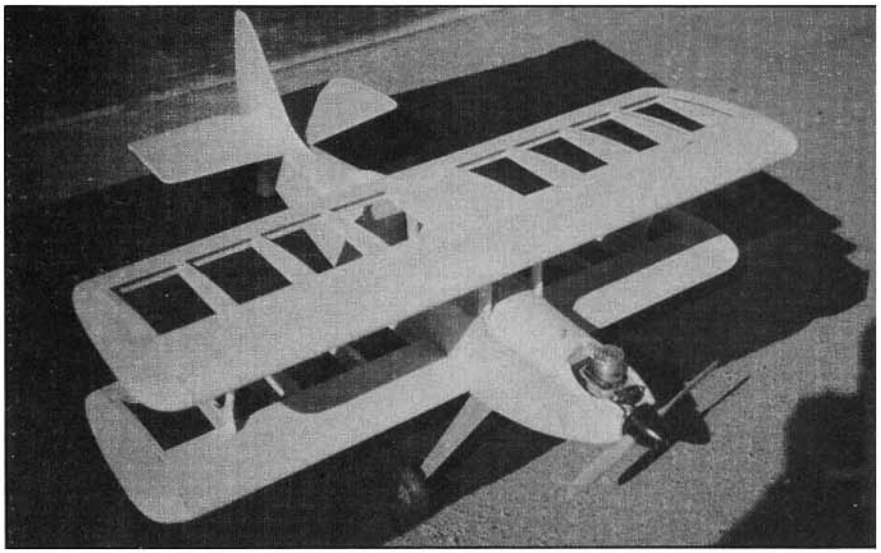
Wheel pants are optional — just like the interplane struts. But they certainly do add to the appearance. That's why I've shown the detail on how to make them. It's worth it just to hear the comments at the field.

And that, I think, covers the construction. How about the set-up for flying?

Flying: The Sporty Forty is definitely not a "run of the mill" biplane. It was not intended to be. It's short coupled, stubby, with a very low aspect ratio and a very high response rate. But, once you get the surface travel set up at the right amount, it's one of the easiest flying biplanes you'll ever have in your stable. You can drag it across the field at 20 miles an hour, or you can zip it around at 60 or 70. Take-offs are "a piece of cake", as the English say, and landings can be made at full stall, or with a little excess speed and then flare it for a real "tail dragger" job where the tail wheel touches down first, and then the main gear hits. It's up to you.

Just so you won't blow it, here are some suggested travel angles for the ailerons and elevator. Elevator — 10° up and down. Ailerons — 18° up and 6° down. With the C.G. at the center position shown on the plans, you'll need about 2° of down elevator for a "neutral" position. If you want a wilder performance, be my guest and be ready for instant response.

Rudder travel isn't critical, except that the tail wheel is attached. Also, believe it or not, the Sporty Forty will make rudder turns, even though it has no dihedral. So, set it up to suit your taste.



CONCLUSION

For some time now, I have refrained from designing what most of you would call a "standard size" sport R/C model. I've preferred to stick with the special purpose sizes, like ultra small designs, or slope racers, or amphibians. But you all wanted a sport R/C that used standard type R/C equipment, so I tried to come up with a good sport design that was just different enough from the usual designs to whet your desire for building.

I think the Sporty Forty meets the requirement. It's different, it's easy to build, and easy to fly. Yet it still looks like a model of a good sport biplane that a full scale pilot would like to fly. And so would a sport R/C flyer.

Am I right?

Let me know. □

BILL OF MATERIALS

Fuselage:
Sides — 1/8 x 5 x 36 (2)
Longerons and Vert. Braces — 1/4 x 1/4 x 36 (4)
Bottom — 3/32 x 4 x 8 plywood (1); 1/8 x 4 x 15½ balsa (1)
Doublers — 1/4 x 1¼ x 12 (2)
Hatch — 1/8 x 5 x 8 sheet balsa (1); 1/8 x 1/4 x 8 strips (3); 1/4 x 4 x 1¼ (3)
Turtledeck — 1/8 x 5 x 10 (1); 1/4 x 1/8 x 10 (3); 1/4 x 4 x 1¼ (2)
Headrest — 1¼ x 1¼ x 5½ (1)
Wings:
Leading Edge — 3/4 x 3/4 x 36 (2)
Spars — 1/2 x 1/4 x 36 (4)
Rear Spar for Bottom Wing — 5/8 x 1/4 x 36 (1)
Front Spar for Ailerons — 5/8 x 1/4 x 36 (1)
Ribs — 1/8 x 1¼ x 12 (20)
Wingtip Blocks — 12 x 2 x 1½ (4)
Leading Edge Sheet — 1/16 x 4 x 36 (4)
Trailing Edge Sheet — 1/16 x 2 x 36 (4)
Trailing Edge Stock — 1/4 x 3/4 x 36 (tapered) (4)
Stabilizer: 1/4 x 6 x 18 (1)
Elevator: 3/16 x 2½ x 18 (1)
Fin: 1/4 x 7½ x 6 (1)
Rudder: 1/4 x 2¾ x 11½ (1)
Cabane Structure:
Struts — 3/4 x 1/4 x 8 plywood (4)
Wing Cradle — 1/4 x 1/2 x 12 hardwood (2)
Interplane Struts:
Strut Material — 1/16 plywood sheet 9 x 4 (2)
Fittings — Landing Gear Straps bent 90° (4)
Landing Gear:
Main — Tempered aluminum or Hallco preformed
Tail — Goldberg tail wheel fitting and 1/16 wire
Main Wheels — 3"
Tail Wheel — 1¼" or 1⅛"
Wheel Pants — 1 x 6 x 2⅝ balsa block (2); 1/16 x 4 x 2½ plywood (4);
.040 aluminum attach plates - cut to shape shown (2)
Covering:
This is builder's choice. I chose MonoKote. Also, you'll note that I use MonoKote Trimstrip for aileron hinges. The detail shows how to make them, if you want to do it. Some modelers don't trust that type of hinge, but it seems to work OK for me.

From RCModeler Mar. 1978