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Model design and construction by Harold Osborne.

# THE BRISTOL SCOUT BIPLANE IN SCHOOLYARD SCALE

**Super simple construction, economical operation  
and restricted flight area capabilities  
make this attractive little WWI biplane a standout.**

With the arrival on the modeling scene of the new miniature radio gear, the smaller radio scale model has become a practical reality. There are many advantages to the smaller model; low cost of materials, ease of transportation, less engine noise, less fuel consumption, smaller flying fields can be utilized, smaller workshops are required, and finally, a smaller model has less kinetic energy. If you recall your physics, Kinetic Energy is equal to one half of the mass times the velocity squared. ( $K.E. = \frac{1}{2} MV^2$ ). This means that a model that is lighter and flies slower will not "crunch" as badly as a heavy faster model. My experience with the small .049 engined aircraft is that they seem to "bounce" rather than "crunch."

Every model builder has several Cox .049 engines in his model box. Cox supplies a muffler and a throttle control for these engines. Parts are available and inexpensive.

We have dubbed this type of model

with the name "Schoolyard Scale." If this type of scale model becomes popular with builders, many other classic aircraft will be presented subsequently.

## THE BRISTOL SCOUT "D" A BRIEF INTRODUCTION

*The fastest machine which any nation could put into the air in 1914 was the Bristol Scout of the "A" type designed by Capt. F. S. Barnwell. The aircraft was termed "Baby" at this period and was powered with an 80 hp Gnome engine.*

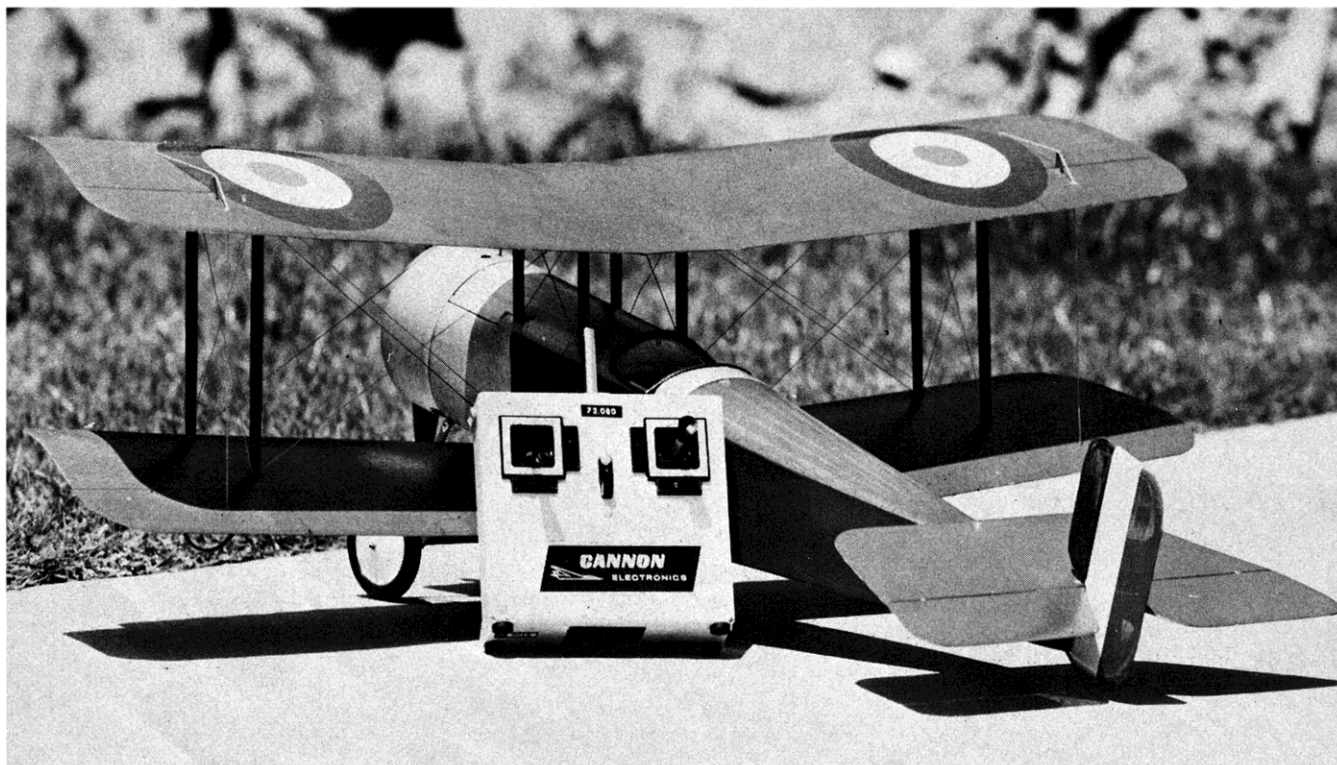
*During its pre-war sporting career, the name "Bullet" was affectionately applied. By the outbreak of war, a third or "C" type had been produced, powered by an 80 hp Le Rhone Rotary.*

*The aircraft had achieved recorded speeds of 95 to 100 mph and was regarded as little more than a fast scout, so the first aircraft in France were unarmed. Six weeks after the start of the war, a lieutenant of No.*

*3 Squadron fitted his machine with obliquely mounted Lee-Enfield rifles to fire outside the airscrew arc. No. 6 Squadron followed suit with a Lewis gun mounted on a 45-degree port bracket. No. 5 Squadron experimented with interrupter gears. Many squadrons were equipped with Bristols; Nos. 1, 4, 7 to 11 on the Western Front and to No. 111 in Palestine. The aircraft was used also for liaison duties and Lewis, Ball and McCudden all took deliveries of Scouts.*

*The Royal Navy also used Scouts, and one unusual experiment was conducted in the first attempt at a composite aircraft in 1916. A Scout was mounted on the top wing of a huge Porte Flying Boat in order to provide a weapon with a long patrol capability with a releasable fighter to combat the menace of Zeppelins which were bombing England.*

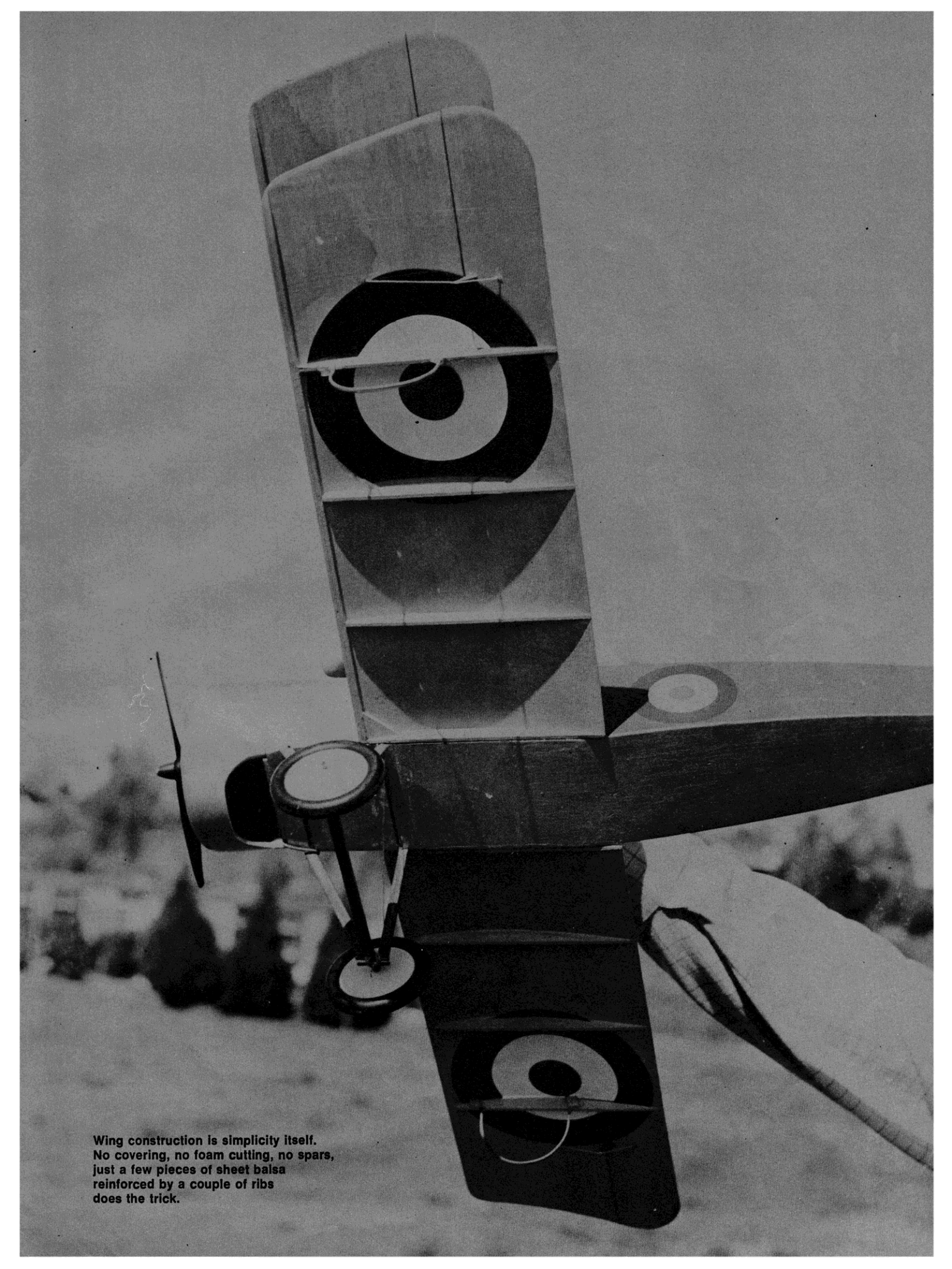
*Only one Scout survived the war as G-EAGR. This aircraft was scrapped in 1926 because it could not meet the*



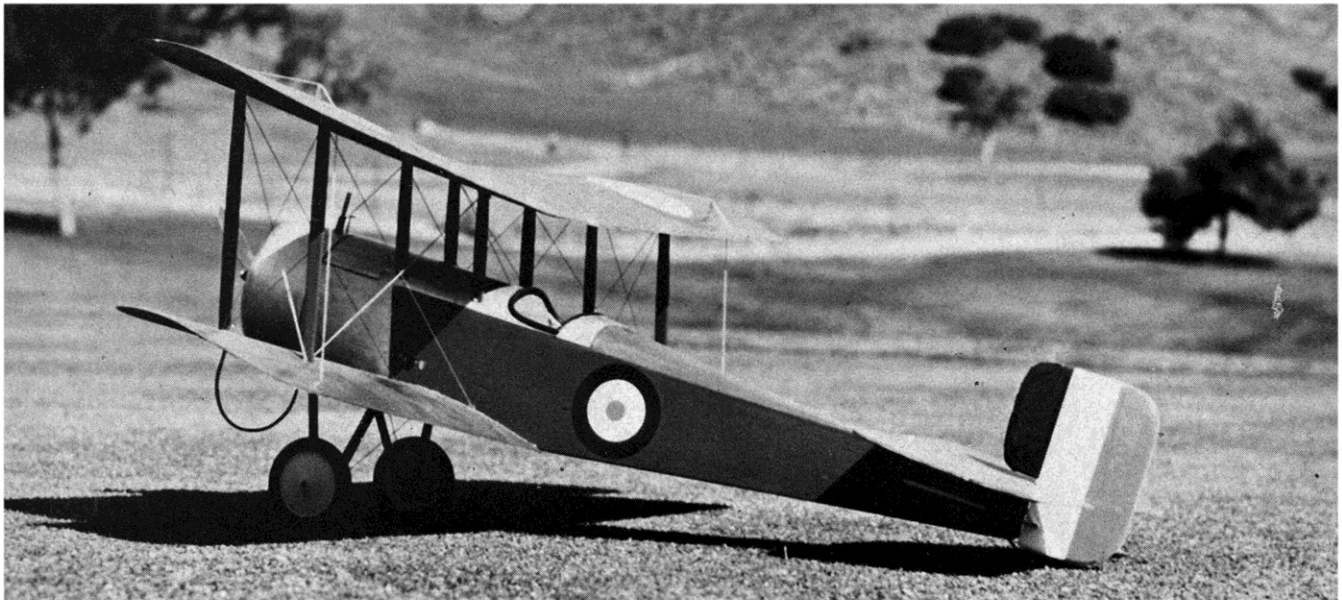
Like everything else, rigging is kept nice and simple. Although it serves no structural purpose, a few lines here and there do a lot for the scale appearance.



**BRISTOL SCOUT BIPLANE**



**Wing construction is simplicity itself. No covering, no foam cutting, no spars, just a few pieces of sheet balsa reinforced by a couple of ribs does the trick.**



safety requirements of the British government.

**Simplicity is the keynote (along with low cost) in the design of the Bristol Scout.**

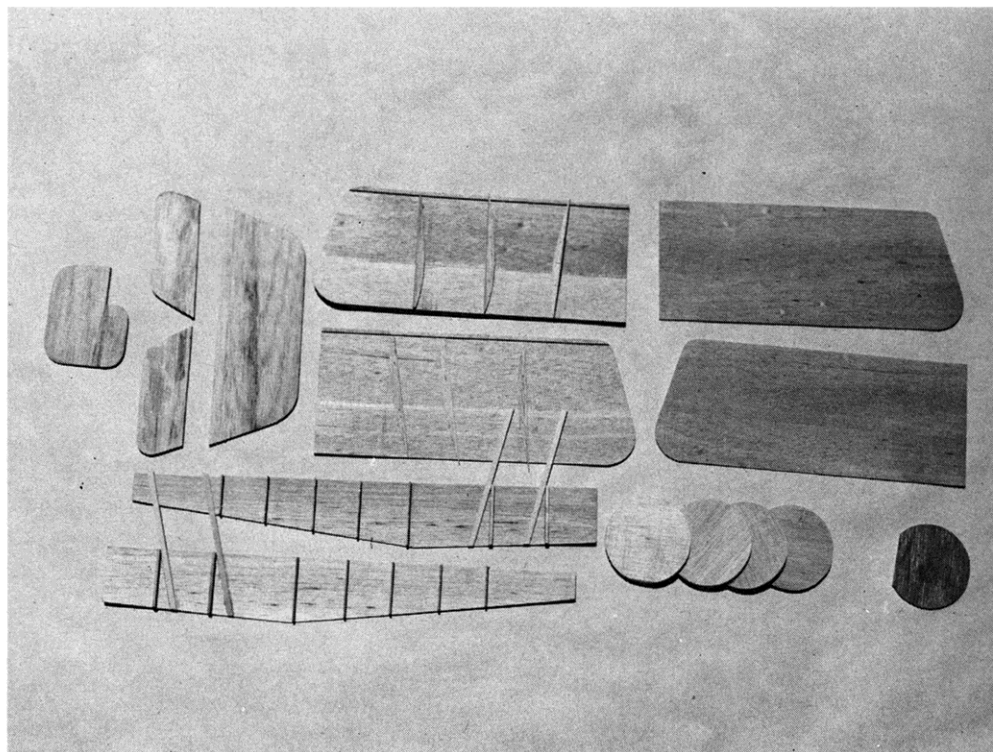
### **BUILDING THE MODEL**

Start by cutting out all the parts shown on the plans. Try the rubber cement technique for making the parts as called out on the plan. It is easy and quick.

**Slab sided fuselage construction makes for a minimum of building time.**

#### **FUSELAGE CONSTRUCTION:**

Cut out the two fuselage sides from 1/16 sheet balsa. Locate and cement in place the 1/16 x 1/4 and the 1/8 x 1/4 vertical braces and the cabane struts. Add the 1/16 x 1/4 doublers along the top of the fuselage from the firewall to the rear of the cockpit. Remember, make a left and a right side. Match the two sides together when placing the cabane struts to assure good alignment. Lay one fuselage side flat on your building table and glue former F2 in place vertically and then glue the 1/8 x 1/4 and the 1/16 x 1/4 cross braces vertically (use a small square to check) to the rear of the cockpit. This is the straight section of the fuselage. Then place and glue the other half of the fuselage to the vertical members. Pull the two extreme rear ends of the fuselage together, add the tailpost insert and glue the ends together. Then cut to proper length and glue in the cross braces aft of the cockpit to the tailpost. Epoxy the 1/16 wire tailskid to its mounting block and epoxy the skid in place. Glue the first layers of 3/32 sheet to the front bottom of the fuselage and locate the two 3/32 x 1/4 hardwood landing gear bearers in place. Glue the second layer of .3/32 sheet to the front bottom of the fuselage and locate the four 3/32 x 1/4 hardwood landing gear retainers in place with a 3/32 groove for the landing gear wire. Locate and epoxy in place the outer nyrods push rod tubes for the rudder



and elevator. Cover the rear bottom of the fuselage with 1/16 sheet. Glue the 1/16 sheet stabilizer platform and the cover plate on the rear top of the fuselage. Glue former F-7 in place and place and cement the seven 1/8 square turtledeck stringers. Cover the turtledeck with silk. Epoxy the 1/8 ply firewall in place. Drill the 4 holes for the motor mount bolts and epoxy the blind nuts to F-2. Install your radio gear; battery, receiver and servos at this time.

#### **HATCH CONSTRUCTION:**

Glue the formers F-2, F-3, F-4 and F-5 in place on two 1/8 spruce longerons. Plank the top of the hatch with 1/16 sheet. Trim the hatch so that it clears the cabane struts.

#### **COWL CONSTRUCTION:**

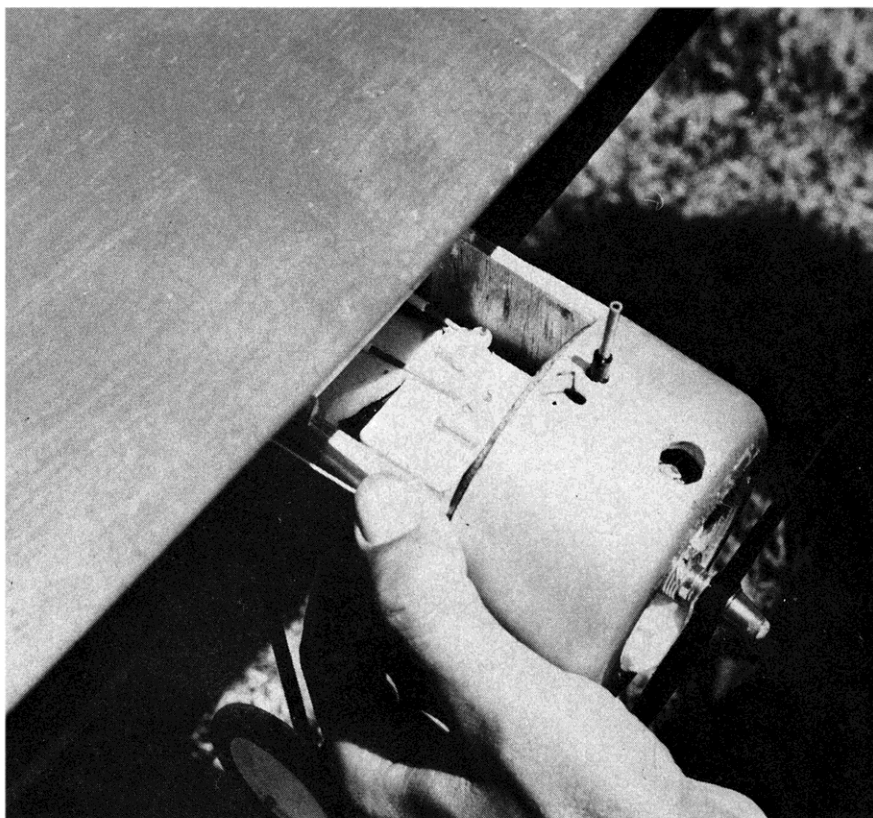
Glue C-1, C-2 and C-3 together with the grain crossed. Cut four pieces of 1/8 soft sheet 3 inches wide by 2-1/8" long with the grain along the 2-1/8" dimension. Soak these pieces in household ammonia for about 5 minutes. Wrap them around an aerosol paint spray can and hold them in place overnight with rubber bands. Ammonia will soften the cells of balsa wood so that it may be easily formed. Glue the formed pieces to the C-1, C-2 and C-3 laminate. Glue C-4 to the other end of the formed pieces with a 1/8" setback inside the cowl. This 1/8" lip overlaps the firewall, F-1. Carve the external radii on the cowl and trim away for the cutout in the bottom of the cowl. Glue a 1/8 x 1/4 hardwood cowl retaining brace across the cowl former C-4. Line cowl up with the fuselage and drill a 1/8" diameter hole through the brace and through the firewall F-1 and F-2. Epoxy a #4-40 blind nut behind F-2. Glue the soft balsa fuselage fairing blocks in place and carve to match the cowl diameter.

#### **WING CONSTRUCTION:**

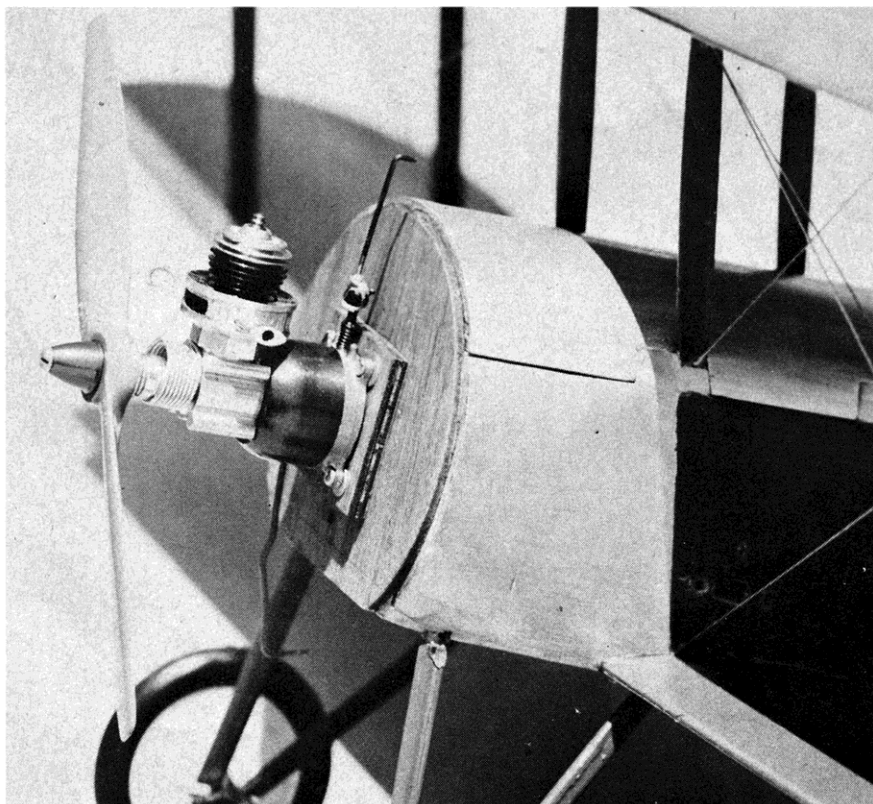
Glue the 1/10 x 1/8 leading edge brace to all four panels and the center section. Glue about 1/4 inch of the leading edge of each rib to the wing panel. After the glue has set, curve the balsa wing panel around each rib and glue the rest of the rib. Use the same procedure on all four panels and the center section. Assemble the top wing by gluing the outer panels to the center section with 1/2 dihedral under each outer rib.

#### **EMPENNAGE CONSTRUCTION:**

Join the elevators with a 2" length of 1/8 diameter hardwood dowel. Install the control horns on the rudder and elevators. Locate the Robart Mini-hinge hole locations. Epoxy the hinges in place after painting.



**Radio installation in the Scout calls for the gear to be mounted as far forward as possible. As with most WWI vintage biplanes, pilots will have to be aware of the type's propensity to flip up on its nose.**



**Although it was not a feature of this airplane, adding a throttling capability to the engine along with the third servo would not be a difficult task. This is a subject we will cover in subsequent Schoolyard Scale model articles.**

**Installation of the QR/C Cox .049 requires a total of about ten minutes . . . time enough to drill four engine mounting holes in the firewall.**

## LANDING GEAR:

Bend the front and rear struts from 3/32 diameter music wire to the size shown on the plan. Cut the axle to the size shown. With the front and rear struts held to the fuselage by tape, solder the ends together and solder the 1/16 diameter wire shock cord shafts in place. Fair the struts by epoxying 3/32 x 3/16 hardwood fairings to the wire. The axle is held in place by wrapping elastic thread around the axle and shock cord shafts. This gives a nice scale touch.

## PAINTING AND FINISHING:

An all balsa model must be kept as light as possible. A model railroad paint called "Floquil" is sensational for the type of model. This paint brushes easily without streaking. One coat will cover adequately, but if you put one coat on and let it dry thoroughly, then sand smooth, and apply another coat, you will have a neat job with very little grain showing. Use RR 44 Depot Olive on the fuselage sides and top, top of wings and stabilizer, elevators and all struts. Use RR 87 Depot Buff on the bottom of the fuselage, wings, stabilizer and elevators. Use RR 101 Bright Silver on the cowl, cockpit hatch and cowl fairings. For fuel proofing, apply a coat of Francis Resin to the inside of the cowl. Fuel proof all the other parts of the model before assembly with Aero Gloss fuel proofer PS-4. The red, white and blue roundels and rudder marking may be painted on or cut from Trim Mono Kote and applied.

## FINAL ASSEMBLY AND DETAILS:

Glue the lower wings to the fuselage with 1/8" dihedral at each outer rib. Glue the stabilizer in place and attach the elevators and rudder, using Robart Mini-hinges. Note: Only after the radio gear is installed, should the upper wing be glued to the cabane struts and the interplane struts. Flying and landing wires may be installed using elastic thread by threading through small holes drilled in the cabane and interplane struts. Epoxy the landing gear in the bearer slots. The windscreen is cut from clear butyrate sheet and cemented in place. The cockpit coaming may be made from a length of 3/16 diameter black neoprene tubing, split in half and cemented in place with contact cement. Instrument panel details and wing aileron horns and wires are shown on the plan if you wish to add these details.

## PILOT REPORT: BRISTOL SCOUT

As a test pilot, I just don't trust unflown and unproven biplanes. The original WW I Bristol Scout got rave pilot reviews for its maneuverability



(read instability), and one look at the stubby-nosed, short coupled *Scale R/C Modeler* prototype gave me the same sweaty palms that countless airmen must have gotten at first sight of the full-size biplane.

On flight test day, I hemmed and hawed, shuffled my feet, tinkered and pattered . . . all to avoid what I expected would be a foregone inevitability, i.e., one short, disastrous launch into a roundel-trimmed splatter. The Cannon Super-Mini was performing flawlessly (drats!), but I took another range check anyway. If the wind would only blow a little harder. . . .

Even though the new Cox QR/C was singing like a demonic banshee, I told Frank (Editors are so gullible) that another tank for break-in would be prudent. That only postponed the inevitable by ten minutes. If it would only rain or something. After all, why even try to fly a plane you know is a prime candidate for the toothpick farm?

Frank grows impatient. I feebly look for further delays. I finally settle down to sitting on my flightbox, to await Frank's decree for destruction. He checks the camera once more then, as if it were just that simple, he says "Fly it."

By the time I'm ready to launch, I've become the Prudential rock. I trot a few steps, and the Bristol lifts gently out of my hand . . . lo and behold, it's actually flying!

Not knowing what the cruise speed will be, I apply a judicious amount of down elevator, and the Scout scoots ahead quickly. A little rudder now, to feel things out . . . it's got too much throw to be smooth. But everything is all signals go, and I begin a steady climb to maneuvering altitude.

At a respectable height, I make progressively tighter right and left turns. The large, air-balanced rudder requires very little throw. The elevator had been preset for small amount of travel, so

it's very comfortable. I pull a few loops, which come off clean and stable. A few zingy rolls convince me that those WW I aces were very capable of flying any Pitts Special class ships.

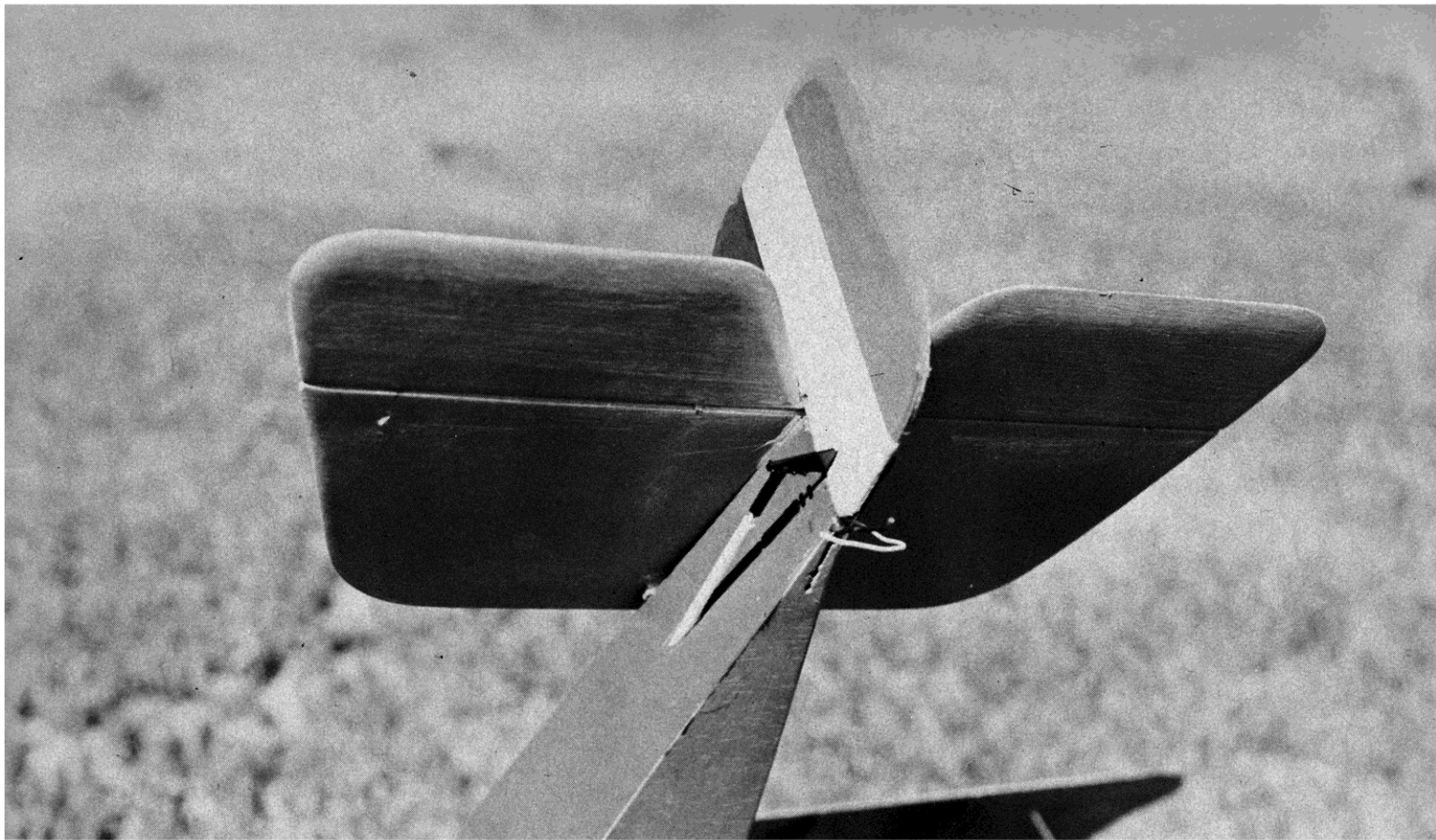
The snap rolls, which always look staggering with any biplane, get Frank a little nervous—he hasn't gotten his flight shots yet. The muffled Cox engine is so quiet, especially inside that cowl, that I'm watching the prop to see if there is still power. Since we're without throttle, it takes lots of passes at Frank (BANZAI!) before he can track the biplane properly with the camera.

Just as we get the rhythm down, the engine gives a burp and I quickly grab some altitude in preparation for landing. At fifty feet, the Cox turns the final rpm's, and the Scout transitions into one of the flattest and longest glides I've ever seen. It must have taken over a minute to get down . . . if there had been a thermal around, it would probably have gone up!

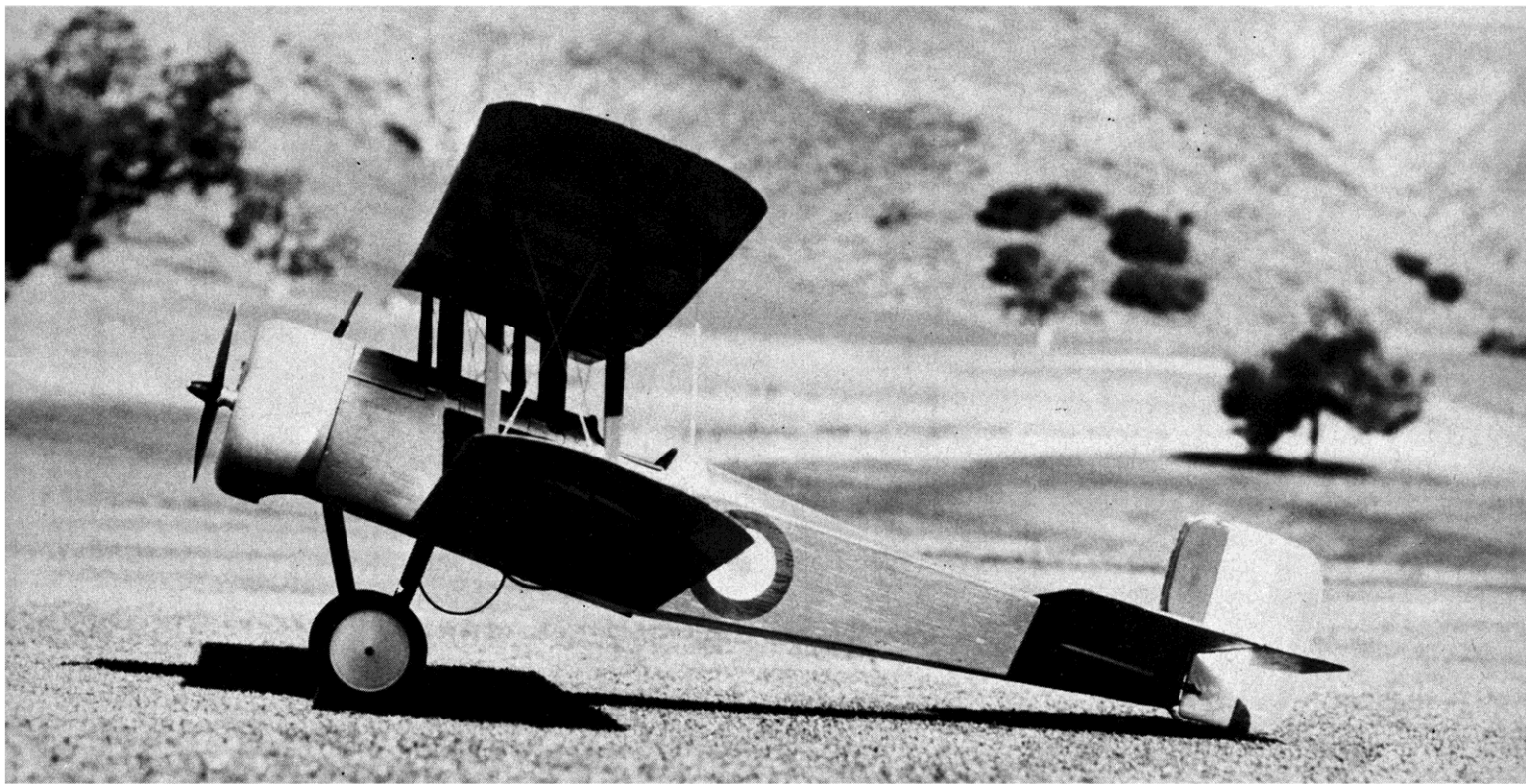
Subsequent flights (after going to MINIMUM rudder throw), were relaxed, and I had plenty of time to enjoy the fine equipment we were using. The Cannon Super-Mini has to be one of the neatest things going in the R/C field today. It's amazing not only that the total airborne weight is a scant 3.1 ozs., but that the performance actually exceeds larger units. The servos are noticeably faster than most, and the resolution (which can be so critical in smaller aircraft) is right on. The Super-Mini has established a new standard in engineering that will be hard to equal for some time.

Especially if Schoolyard Scale is your bag, this radio is a must for these small airframes. The installation of our brick was a snap—it actually fit *sideways* behind the firewall. We used servo tape to hold it all in place. One simple mod slated for the near future is a separate charging plug accessible without removing the hatch (probably through the cockpit) so that we can easily fast charge at the field. The next time you're in the hobby emporium, try one of these ultra-smalls on for size and be pleasantly surprised at what good things come in such tiny packages.

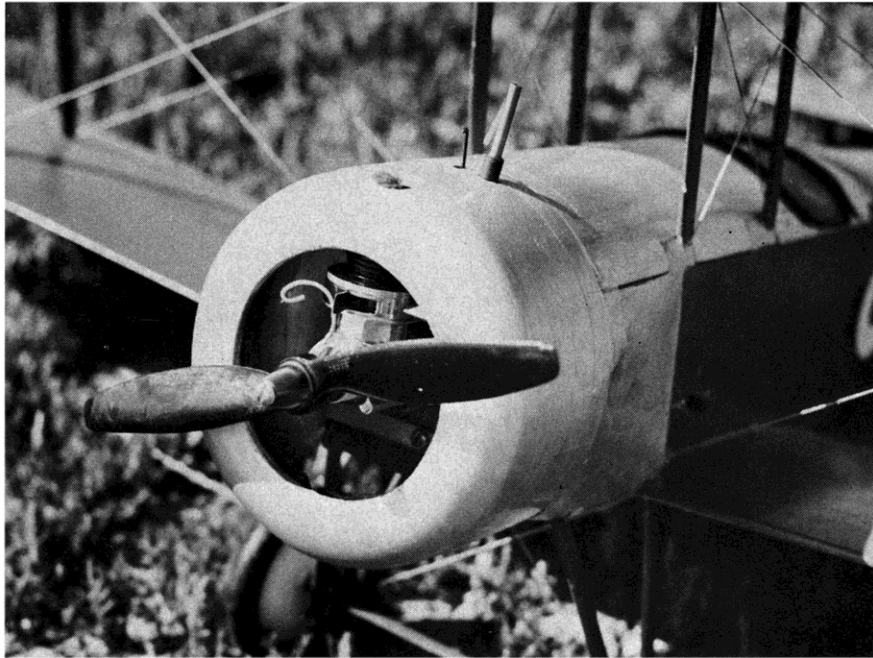
The Cox QR/C engine is a refinement of their QZ controlline engine of several years ago. The expansion area of the unique exhaust ring is large enough so that there is virtually no loss in power when the muffler band is fully closed. All that happens is that the engine gets a lot quieter. This product is one of the major breakthroughs in making *practical* schoolyard flying a true reality, since it completely eliminates the stigma of



**Be sure to choose the sheet stock for the tail very carefully. You'll want to keep it light to avoid tail heavy problems. Area is more than ample.**



**Wheels for the Scout are right off the shelf from the Williams Brothers. Elastic cord wrapped around the axle where it joins with either landing gear support provides the shock absorbing capability.**



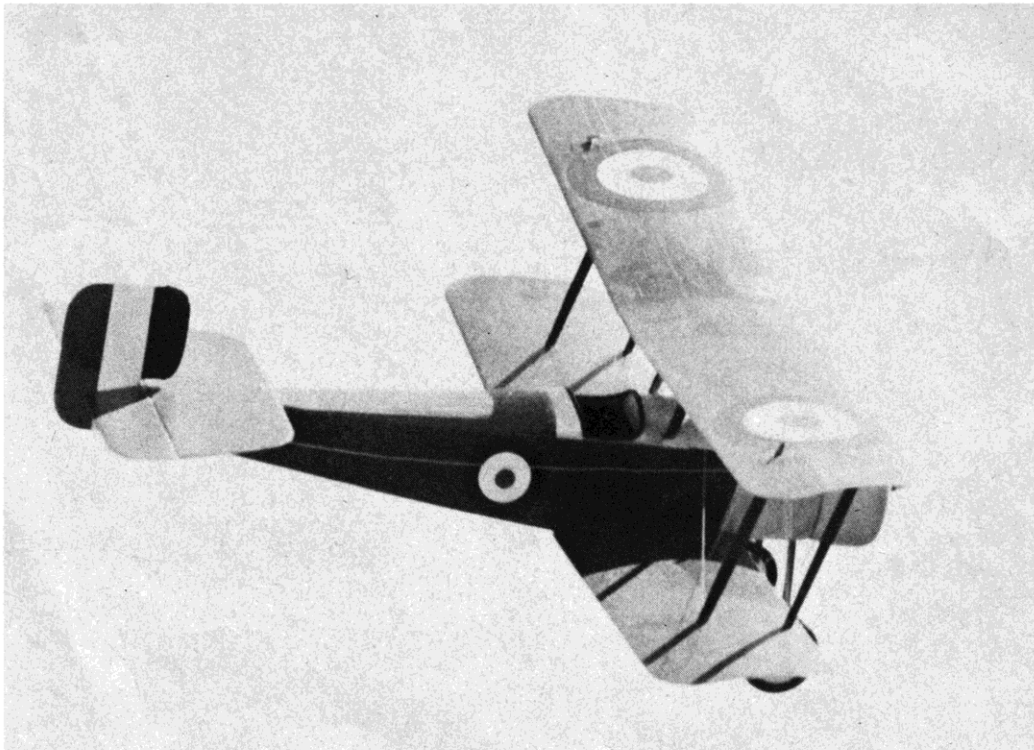
The Scout is a good little performer with brisk flight characteristics that should keep even the experienced flier interested. Walking over to the schoolyard sure beats driving 25 miles to the flying field.

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Although the cowling for the prototype model was made from balsa, lightweight vacuum formed plastic cowlings will be available to builders through Harold Osborne's plans service. See the plans on page 60 for further information. Five ounces of lead were added to the lower inside lip of the fuselage to balance the airplane prior to flight. Removable forward hatch is made from built up balsa strips over a light frame. Try to achieve a snug fit so that no other means of attachment will be necessary.

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There is something about the appeal of an early type biplane in the air as it trundles past that is most rewarding—especially if it is your airplane.



noise pollution from the operation of models in residential areas. With the QR/C, you can fly in a schoolyard, and passersby walking below the aircraft won't even know it's there!

All in all, the Cannon/Cox combination in the Scout has to be one of the most enjoyable flight packages I've flown in a long while. The plane just doesn't fly like a biplane—it's a slow and easy machine that any average pilot can really relax with. I've actually flown it from a very restricted front yard without any problems. I'm sure that you'll agree that scale looks really add a whole new dimension to

small field flying. After test flying the first in *Scale R/C Modeler's* new series of schoolyard scale planes, I'm convinced that this concept will be the Sunday flyers' wave of the future. □