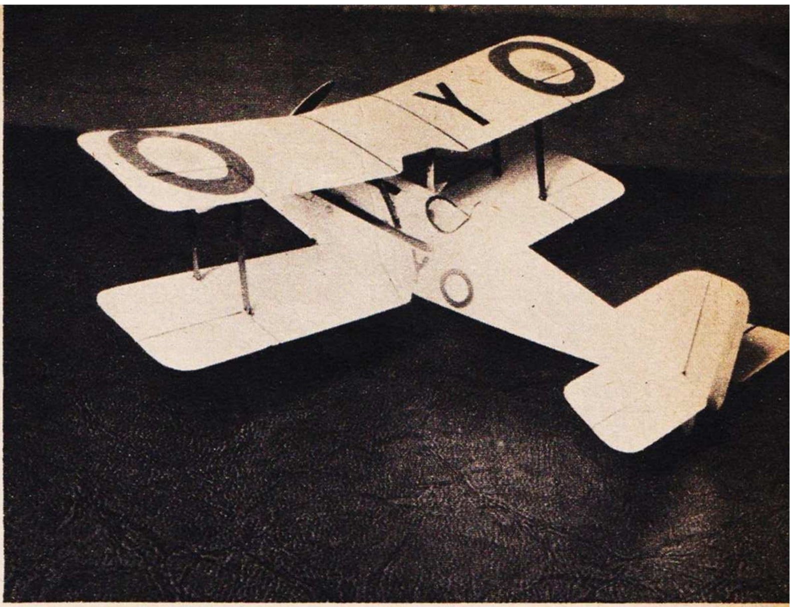
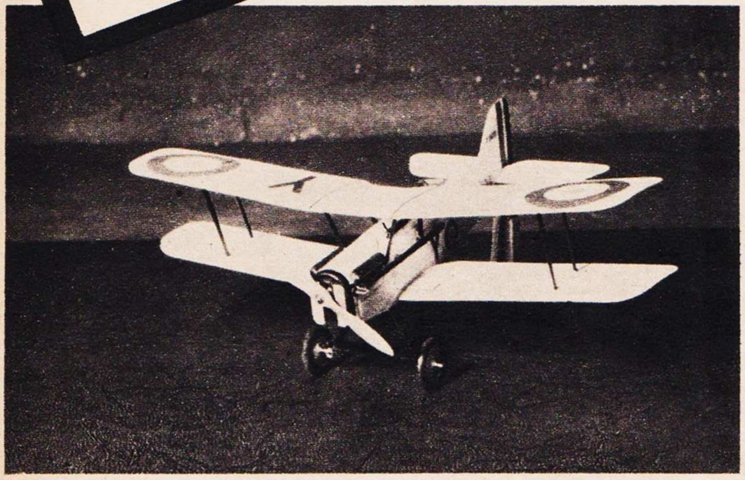
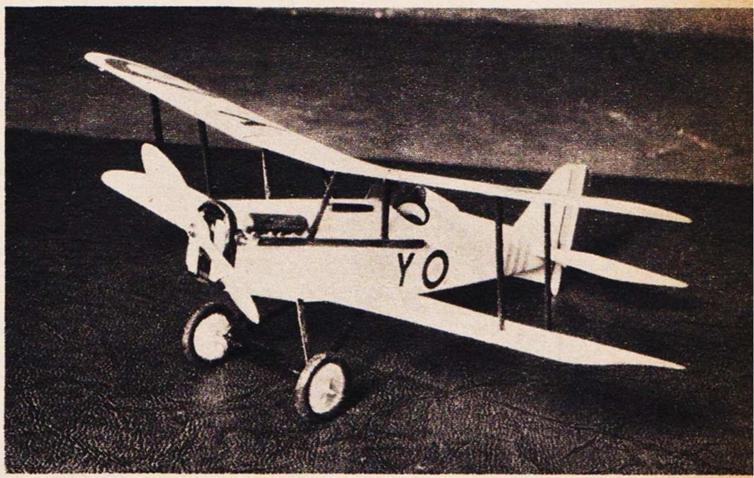
BABY SE5







The venerable SE5 flies again — this time as a midget CO-2 powered fighter

by HOWARD G. McENTEE

AFTER a great deal of experiment and many hours of flying the little pusher described in Dec. 1947 M.A.N., and a second model of the same design but carrying tricycle gear, the urge was felt to build something a bit more complex for the tiny *Campus* engine to pull around. As the old World War I SE5 has always been our particular favorite, this biplane was a logical choice. Experienced scale modelers do not need to be told of the advantages the SE5 offers as a free flight scale job, be it powered by rubber, gas or CO-2. For those not so well versed we will briefly enumerate its points of superiority.

First and probably most important, the original ship incorporated considerable dihedral in both wings, and the wings are large enough to afford plenty of area even though the span is small. Second, the tail is quite long, allowing a good tail moment arm with only a slight increase in area over that used in the big ship. Add to these the fairly high thrust line, and the general "right" look of the design as a whole, and it is quickly apparent why this particular biplane has always been such a popular model subject. In a search for authentic plans we remembered Bill Wylam's scale drawings of the original which appeared in December 1944 issue of this magazine. The plans were to a scale of ¼″ equals 1′; exactly double size gave a wingspan of 13¼″, just right for the A-100 powerplant.

The only deviation from true scale was a slight increase in tail area. However, the model has proven such a stable flier that we feel sure strictly scale size tail surfaces would work adequately. No change in landing gear was needed as a gear of scale height gives comfortable prop clearance. Of course, placed as it is, the undercarriage doesn't afford much prop protection, and furthermore it is so far back that the model almost always noses over, even when landing from a smooth glide, unless the landing surface is very smooth. It was decided to take these risks, however, rather than spoil scale appearance by moving the gear forward.

Now a few words about construction and model weight. We have always been enthusiastic about all-balsa construction. While this method has many advantages, to be successful it is imperative that you choose your wood with care. Not only must thickness and weight be carefully checked, but on those parts that have to be curved—such as the cowling and to a lesser degree the wings—you must use a cut of wood that is amenable to bending. Such wood is variously termed "A cut," slash cut, tangent cut, and so on. The model shown was made throughout of "A cut" wood which proved quite satisfactory.

By choosing grades of wood carefully, the weight was held to .82 oz.; this is light enough to allow very good performance. When selecting your wood be careful to pick only the lightest grades—they will be plenty strong and it is astonishing how the weight goes up if you don't watch this. Aside from the wing and landing gear struts which are of rather hard stock, all other parts are of soft wood.

FUSELAGE—Cut out the two fuselage sides, which run from radiator to tail, These pieces are of 1/32″ thick material and should be matched together to be sure both are alike in shape. Moisten both pieces at the rear so they can be bent inward as seen on the top view.

Cut bulkheads 1 (radiator), 2, 3, 4 from soft 1/8″, and No. 5 from 1/16″ stock; after cutting out the centers for lightness, assemble these five bulkheads and the two sides. (Do not pull the sides together at the rear yet).

At this point let us digress a bit to discuss cement. Though some modelers are not aware of it, certain grades of model cement are very fast drying while others dry rather slowly; for such purposes as assembling the fuselage parts the latter is the only kind to use. As they are put in place, the bulkheads must be shifted a bit to line them up; fast drying glue will set almost as soon as it is out of the tube and hence give you no time for careful lineup of the various parts. Also, we find when working with thin balsa parts that the slow drying cement seems to warp them less when it is hardening.

There are many places where use of quick drying cement will speed up work however; this grade is especially desirable for field repairs, since even major damage can be mended and the ship will be ready for flight again in a short time.

By the time the glue on the front four bulkheads is well set, the moistened rear of the side pieces should be dry. Cut out the final two bulkheads, cement them in place, and close the side pieces at the tail. Next, cut a piece of 1/32″ stock to cover the fuselage bottom from tail forward to bulkhead 4. This piece may be a bit wider all around than needed—it can easily be trimmed to size after the glue dries.

Incidentally, glue in tubes is ideal for this work; by properly regulating pressure on the tube as you draw the nozzle over the edge of the wood, a perfect bead of cement can be put on even the thinnest edge. Of course, when you bring the bottom piece up against the lower edges of the sides to which you have thus applied glue, the latter will be squeezed both inside and outside the joint. That which goes inside serves as a fillet to strengthen the joint, but any that comes outside should be scraped off before it sets because it simply smears up the surface and makes difficult the simple job of trimming off excess material on the bottom piece.

The remainder of the fuselage bottom is left open for the time being, so the rounded cowling comes next. This is installed in two pieces; one from nose to bulkhead 5, the other from there on back. These pieces should be well soaked in water, then bent to approximate shape. Don't cut them to exact size as they will shrink a bit upon drying out. Rather wait till they are thoroughly dry, then trim to fit. Put the forward piece on first. The rear piece is a bit trickier to fit properly, particularly the sternmost portion—here you can leave it wider than necessary, and smooth the joint off with sandpaper after the cement has set. Sand the entire fuselage with very fine paper, smoothing joints and rounding the edges slightly. Then cut the cockpit with a sharp bit of razor blade.

TAIL SURFACES—Since motor weight is concentrated at the nose there is no need to skimp on tail material, so 1/16" soft stock may be used. Cut the horizontal and vertical surfaces to outline shown. Round them on the forward edges and taper them a bit towards the rear. The stabilizer fits into a slot cut in both sides of the fuselage as far forward as bulkhead 7. After this surface has been glued in place, fasten the rudder atop the cowl.

Needless to say, great care must be exercised to line these pieces up properly both with the fuselage and with each other. The rudder should be carefully aligned along the fuselage center; the stabilizer should be parallel with the fuselage reference line (top edge of the side pieces).

At this point it is wise to give the assembly a coat of half glider polish and half thinner—it is much easier now than after the wings and landing gear are attached. Glider polish is simply dope with materials added that allow it to remain more flexible when it dries than is the case with plain dope. It is especially suited to thin balsa work since it has less tendency to warp the surfaces. If you can't obtain this liquid at your hobby store it is possible to make your own by adding a small amount of castor oil to the dope. The percentage varies according to the thickness of the dope used, but a basic proportion is a teaspoonful of oil to a pint; too much oil will produce a mixture that remains sticky after drying.

The surfaces should be sanded lightly with very fine paper before doping and again after. Use a single coat all over, including both sides of the tail surfaces. This doping adds only .05 oz. weight to the ship and produces a smoother, more efficient finish.

LANDING GEAR—The struts are cut from 1/16" thick hard balsa sanded to streamline shape; the spreader bar is of the same material. The struts are cemented firmly against the bulkheads for strength. Wheels are held by axles of 1/32" music wire; two loops of wire between the wheels and the portion of wire that is bound to the spreader provides considerable shock absorbing action.

Wheels from 1-1/16" to 1-3/16" diameter will do, but they must be *light*. The neat little rubber and aluminum wheels now on the market are far too heavy. If necessary you can make your own from two pieces of 1/8" balsa glued together with grains at right angles. Washers should be fastened to each side of the wheels, or a short length of small brass or aluminum tube will do as a hub.

WINGS—These are made of 1/20" balsa, cut and sanded to shape as was the stabilizer. The upper wing should be cut in one piece and, after sanding, moistened *lightly* with water on both sides. Curve to a slightly exaggerated airfoil shape and allow to dry. When thoroughly dry, cement the four ribs in place. The two innermost ribs are placed right at the point where the dihedral break comes. Carefully split the wing into three sections at these ribs, sand the edges so they butt smoothly together at the required dihedral angle, and cement firmly.

The lower wings are made in the same manner, except they are individual panels with no centersection. All wings are given the glider polish treatment after thev are finished and before fastening to the fuselage.

Wing struts are of 1/16" thick hard balsa. Install the centersection struts first, cutting small holes in the cowling for them to pass through. Next cement the upper wing in place. Needless to say, this must be checked with extreme care to make sure it is at right angles to the fuselage and at the proper angle of incidence.

The lower wings are now cemented against the fuselage sides, temporarily held in place with pins and blocked up at the tips at the correct dihedral. The outer wing struts are installed last; note that all struts are glued against the wing ribs, holes being cut in the surface of the lower wings to allow this.

Don't omit the two bamboo strips which run through the fuselage and are cemented to the undersides of the lower wings. These strips help prevent the wings from tearing away from the fuselage if an obstruction is hit. After the wings are installed the covering on the bottom of the fuselage from bulkhead 4 to the nose is added.

MOTOR INSTALLATION—The powerplant is held in holes cut in bulkheads 2 and 3. These holes, and the others shown in the bulkheads, may be cut with the metal ferrule on a lead pencil from which the eraser has been removed. Note that the powerplant is mounted so that there is a small amount of downthrust (relative to the fuselage reference line).

Since bulkhead 2 takes most of the blow if the model hits an obstruction head-on, another piece of 1/8" sheet is glued to the near surface where the tank passes through, as a strengthening measure. The bulkhead grain is vertical, so the added piece is glued on with grain horizontal.

In our model the fuselage sides, cowl and bulkheads were assembled complete as detailed above. Then the nose was cut off with a razor blade, the powerplant fitted in place, and the inner nose pieces of 1/8" balsa cut to fit and glued to bulkhead 2. The nose piece is held in place

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with a pin. The powerplant is held only by friction in the two bulkheads; this proved entirely adequate, as it can't turn because the cylinder is notched into the side of the fuselage. A hole is cut in the bottom of the nose to allow access for the tank filling pipe.

The propeller is cut from a blank as shown; it should be of a fairly heavy wood because balsa is too light. Pine, spruce, or wood of such weight is adequate.

FINISHING—All decorations are of colored tissue doped on. Struts, landing gear, cockpit edge and dummy motor are doped black. The motor and exhaust pipes are of very soft balsa. If you want to use authentic decorations, they may be obtained from Wylam's drawings in June 1947 issue of M.A.N.

For real flying results, don't overdo the decorating! We found that our decorations and added details increased the weight of the model .1 oz.; this doesn't seem like much until you realize that these details, which do nothing to aid performance, total up to about 1/7 of the total model weight, a really sizable proportion.

FLYING—As usual, the glide test comes first, after you have sighted carefully over wings and tail to make sure no parts are unduly twisted or bent. The stabilizer trailing edge can be bent slightly up or down to get a good glide; however, if more than this slight bend is needed, add weight to nose or tail to achieve balance.

For the first power flights, charge the tank with the cartridge holder nozzle uppermost—this will give only a short flight. When you are satisfied with adjustments, charge with the nozzle straight down (airplane upside down) and get ready for a chase.

Changes in motor speed are obtained by rotating the motor cylinder *slightly* in the crankcase—it is not necessary to loosen the locknut to do this because you can rotate the cylinder with your fingers. You can adjust for best duration or for high speed stunt flights, but the total range of adjustment is only about 1/8 of a turn so try it a bit at a time.

The original model was completed in northern New Jersey in mid-December when the weather was anything but helpful for outdoor testing. Still we have had many flights over a minute, and all indications point to much better results in better weather.