

SUNDAY FLYER

By KEN WILLARD . . . Here's the ideal project to kindle a flame from that spark of interest shown by the youngster in your life. One evening or weekend isn't much time to devote to its construction, and who knows . . . *you* might learn something!

• In the past ten years, literally hundreds of thousands of 1/2A engines have been made and used by hobbyists as power for their boats, airplanes and cars. Most of the boats, airplanes and cars have long since been wrecked, but the engines are still lying around, unused, but still usable. The hobbyist has lost interest. Most of them, to be sure, are youngsters who would like to do something with their engine, but they don't have a lot of money to buy radios and suitable kits. So what can be done with all those engines?

How about putting them into a simple sport free flight model? One that will need a minimum of building time, practically no adjustments, yet will give good flights and teach the owner quite a bit about flying simple powered models. With that in mind, the design of the "Sunday Flyer" was developed.

The secret of a good flying model is the trueness of the alignment of the structure. The most critical, in that regard, is the wing. Very few newcomers to airplane modeling can construct a wing which doesn't have any warps. With that in mind, the "Sunday Flyer" uses ready-built foam wings. That feature, combined with the solid balsa fuselage, insures an accurately built model, just what you want for your first try in building a flying model.

The foam wings used on the "Sunday Flyer" are produced and sold by Ace

R/C, Inc., Box 511D, Higginsville, MO 64037. These particular wings have the tips of the panels precut at a precise angle of three degrees (3°) so that you don't have to sand them before putting them together. They are called "Sunday Flier" wings, and the catalog number is 13L65. Yes, I know that the spelling is not the same as the name of the airplane. Don't let it bother you. Somehow, the modeling people have never agreed on whether you're a "flyer" or a "flier" so don't worry about it. Just go ahead and build the model. It will fly no matter what you call it.

What materials will you need? To make it easy for you, they are all listed in the "Bill of Materials" shown in the accompanying box. Look it over, and lay in the supply. You are now ready to start building. You'll be surprised how fast it goes together.

MATERIALS

1. Two balsa sticks, 1" x 1" x 36"
2. Two sets of Ace "Sunday Wings" (Catalog No. 13L65)
3. Some scrap pieces of balsa wood and hard wood.
4. One foot of 3/16" dowel.
5. Two 1/2" wood screws
6. Seven feet of strapping tape
7. Epoxy or "Super T" Hot Stuff instant glue.
8. "Aerofoam" paint, Pactra Formula "U"
9. Rubber bands (No. 64)

10. Wheels (2" or 2-1/2" diameter — not critical) + wheel collars - 1/8"

11. Landing gear wire, 1/8" steel, and tail skid, 1/16" x 4" wire

FUSELAGE

Study the drawing the the photos before putting anything together. It will make the job a lot easier. Note that the fuselage is made up from two pieces of balsa, each of which is 1 x 1 x 36 inches long, plus two little pieces of hardwood for mounting the motor, and some 3/16 dowels to mount the wing and tail surfaces.

One of the 1-inch square balsa sticks serves as the base structure for the fuselage. The only cut on it is the cradle at the rear which is cut to fit the shape of the lower surface of the horizontal stab. To do this, put one end of one of the wing panels in position on the tail of the balsa stick, making sure that the center line of the airfoil section is parallel to the top line of the stick. See plans. Now mark the curve on the balsa with a pencil.

Cut out the cradle. Be sure the cut is straight across.

Next cut out the "underbelly" piece which fits from the nose back to about 19 inches. I say "about" because it is not critical. Don't make it any longer, and cut it to the shape shown, because the upper "cradle" for the wing is cut from the remainder, and the slant cut at the rear of the underbelly allows you to cut

the full upper structure out of the same piece.

Cut two cradle pieces for the wing. Note that the centerline of the airfoil, in this case, is not parallel to the main body stick, but the forward end is higher. This gives the right angle for the wing to set relative to the fuselage and the tail surface. It's called the "angle of incidence."

Next, cut one of the cradle pieces lengthwise so you have two pieces, each 1/2-inch thick.

Now glue the underbelly to the main fuselage stick, with the forward ends in line.

The one-inch wing cradle piece is now glued to the top of the main stick. Be sure to locate it at the right position as shown on the plan.

Next glue the one-half inch wide cradle piece on either side of the center piece, but raise the bottom line of the side pieces about one eighth of an inch higher than the top of the main stick. This is so you can cut it to the center at a slight angle to fit the center of the wing. See detail in plan.

The 1/4 x 1/2 inch hardwood engine mounting pieces can now be glued to the sides of the forward end of the fuselage. Take note that they slant down slightly.

This provides the required "down-thrust" for the engine.

The fuselage is now complete, except for wing mounting dowels and final shaping. We'll come back to that under "Assembly."

WING

Putting the wing together is a snap. The dihedral angle for the panels is precut by the manufacturer. All you have to do is make sure the ends line up with each other. With this method, you get the "polyhedral" effect on the wing which makes it so stable in flight.

Note that the center panels are wrapped completely around at the point of maximum thickness with fiberglass strapping tape. This adds a lot of strength which is needed in the center area. Do this wrapping before attaching the outer panels.

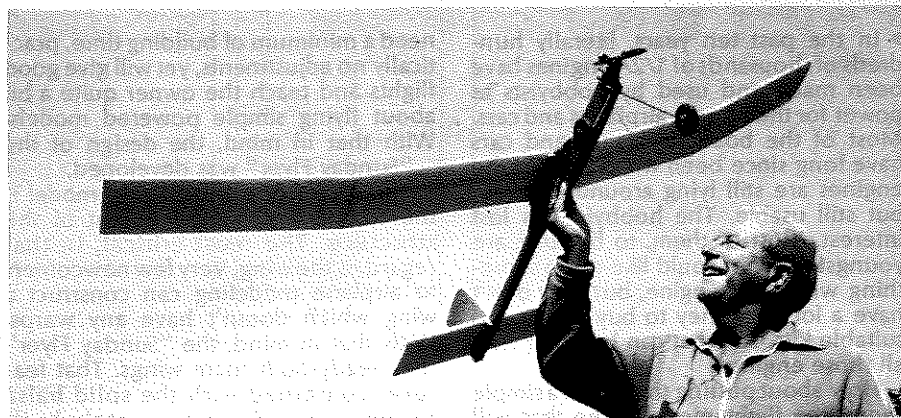
Put the panels together with "Five minute epoxy." First do the center sections, then strap them around with the strapping tape, and then attach the outer panels. You can brace the panels up until dry, but if you're the patient type, you can hold them until the epoxy sets. Also, this way, you can keep an eye on them and make sure they don't slip out of alignment. It's the best way.

After the panels are firmly dried together, make a 3/16 inch cut, 4 inches long on the trailing edge at the center joining line, extending 2 inches out on both sides. Epoxy a piece of 3/16 dowel in the cutout. Partially cut through the dowel, then crack it in the center so it will angle up and fit the trailing edges of the two center panels where they join. Mix enough epoxy to not only secure the dowel, but also smear the epoxy along the center joint forward to and

around the leading edge both on top and bottom, extending out about one inch on either side of the center line.

Before the epoxy sets, wrap a piece of strapping tape around the center joint to reinforce the center.

The wing is now finished except for some final sanding and painting.



The "Sunday Flier" admires his "Sunday Flyer".

TAIL SURFACES

The stabilizer is simply one panel from the "Sunday Flier" wing set. Only final sanding, and, if desired, painting, is required.

The vertical fin is made of 1/8 balsa sheet. Cut it out, using a very sharp knife (Uber Skiver or single-edge razor), to the shape shown on the plans. Make sure the bottom curve is cut straight across so the fin will set vertically on the stabilizer. Also cut the bottom curve as carefully as you can so that it will be flush with the top surface of the stab. The closer it fits, the better and stronger the joint will be.

Sand the forward edge and the trailing edge of the fin to a "streamline" shape. Also, while sanding the fin, sand the top curve into a pleasing rounded shape when viewed from the front.

Draw a center line on the stab with a pencil, then epoxy the vertical fin to the stab in line with and on the center-line of the stab. Sight along the center-line from the front, and make sure that the fin is vertical to the stab.

ENGINE MOUNTING

The two hardwood pieces that have been epoxied to the sides of the forward end of the fuselage serve as the engine mount. The slight downward angle gives the "downthrust" angle needed for powered flight. This angle causes the "slipstream" (air pushed back by the propeller) to flow back in such a way that the nose of the model doesn't raise so high when the engine is running and cause a stall to occur.

Mounting of the engine is simply screwing the backplate into the hardwood pieces, using two 1/2-inch wood screws. The backplate is mounted at a slight angle so the two screws go into the hardwood side mounting pieces. The angle can be either way, and if the holes get stripped in a bad landing, you can remount the engine at the other angle. See plans.

LANDING GEAR

This may be the toughest part of the construction sequence, since the 1/8 steel wire is very hard to bend. A vise is almost a must for the job.

Put the wire in the vise with the bend point flush with the top of the vise, then pull the wire and bend it by hitting it just

above the bend point with a hammer. Yes, this will tend to take the "temper" out of the steel wire, but it will still be more than strong enough.

After you have bent the wire to the shape shown on the plans, check the alignment by sighting along the left axle line. It should line up with the right axle. Small corrections can be made by hand bending the wire.

Slip the wire over the fuselage, just aft of the hardwood engine mount pieces. If you have bent it carefully, it should wedge itself against the sides.

Epoxy the wire in place, simultaneously wrapping it around with thread or fishing line. Go around the fuselage with the binding, crossing over the wire several times. This helps to prevent the wire from breaking loose on hard landings. Yes, there probably will be some hard landings.

The size of the wheels isn't critical. Two-inch wheels are shown on the plans. They seem to be about the right weight to help balance the model. Hold the wheels in place with wheel collars, or alternatively, you can use tubing which will slip over the wire snugly, then hold it on with a drop of "instant glue" such as Hot Stuff. Wheel collars do have the advantage of allowing you to change wheels more easily.

The tail skid is made from 1/16 wire, 4 inches long. Force the wire through the center of the fuselage stick at the angle shown on the plans. Bend the top 1 inch flush with the top of the fuselage and glue in place. Make a slight bend at the bottom end to skid along on the ground.

PAINTING

If you want to paint your model, be sure to use a polyurethane base paint, such as Pactra Formula "U" or a similar type. Other types of paint will more than likely dissolve the foam wing material.

You can use one of the plastic mylar coverings in lieu of painting, but be sure it is one which needs only mild heat,

such as Top Flite Models' "Ekonokote." Otherwise you will melt the foam on the wings.

Although the wings do not have to be painted or covered, since the styrofoam is fuel resistant, the fuselage must be protected. It can take any type of paint, since it is wood. Just be sure the paint is fuel proof. Epoxy resins or butyrate dope meet that requirement.

ASSEMBLY

Drill 3/16 holes in the fuselage at the points shown on the plans and insert the lengths of dowel. Glue them in.

Attach the wing with rubber bands. Check the cradle to be sure the wing fits it. Sand any high spots off until the wing is resting securely on the cradle without wobbling.

Attach the tail assembly with rubber bands going from the front dowel back over the stab and looping the dowel which sticks out the rear. Be sure the vertical fin is lined up with the fuselage. Also, sight down the fuselage from the front and check the alignment of the stab with the wing. See Fig. 1.

FLYING

The Sunday Flyer is not a "hot rock" performer. It isn't intended to be. It flies in a steady, gentle turn at a fairly slow speed. However, when properly adjusted, it will climb several hundred feet, and, if there is a wind blowing, it will fly with the wind and you'll have a long chase. So, my advice to you is, "Don't fly the Sunday Flyer if the wind is over five miles an hour. Even then, limit the engine run to about a half-a-minute."

Before flying, check for balance by holding the model up at the balance point. The model should hang horizontally. If it hangs with the nose down, add small weights to the tail until the model is level, then tape or glue the weights in place. Similarly, if the tail hangs down, add weights to the nose. This is the most common condition.

Now test glide the model. Launch the model straight ahead . . . not up . . . at

about the same speed as you would toss a softball to a friend some twenty feet away.

The model should go straight ahead and gradually nose down into a gentle glide. If it noses up, then drops sharply to the ground, add more weight to the nose until the nosing up tendency disappears. If, on the other hand, the model leaves your hand and makes a shallow dive towards the ground, remove some weight from the nose until the model glides gently forward. See Fig. 2.

When the model seems to be gliding properly, it's time for the first powered flight. There are two ways to keep the power down for the first test flights. One is to run the engine "rich." The other is to reverse the propeller on the prop shaft so the curved face faces aft instead of the normal mounting. This allows the prop to run faster but it doesn't make as much wind, or thrust, because the blades are inefficient when running backwards.

Limit the fuel to about twenty seconds of running time. And, be smart. Wait for a quiet day.

Launch the model just as you did in the glide tests. It should move out in a gentle circle to the left, climbing very slowly, then when the engine stops, it should glide either straight ahead or maybe in a gentle turn either to right or left. That part isn't critical; actually, a slight turn is best, so it won't glide too far away.

If, when you launch the model, it goes into a swooping type of flight, winding up in a mild crash to the ground, then go get it, and if it isn't damaged, realign it the way that you had it, and then carefully shift the stab in the cradle, moving the left side of the stab forward, and the right side aft, and snug it down at the new setting. Not too much. See Fig. 3. Note the setting.

Shifting the stab will change the

setting of the vertical fin to give a slight left rudder action.

Launch the model again at low power. This time it should leave your hand and climb gently to the left as it is supposed to.

If you have shifted the stab too much, the model will circle to the left and spiral back to the ground. If it does that, retrieve it, and reset the stab at about half the offset you had in the spiral. The third time should be the charm, as they say.

You are now ready for full power. Limit the engine run to fifteen seconds for the first few flights. After you have observed the rate of climb, you can make longer flights, but watch out! If the model should get too high, it might enter a rising current of air, known as a thermal, and you'll have a long chase. Oh yes; don't forget to put your name and address on the model, just in case it should fly away. It could, you know. It loves to fly.

REPAIRS

One of the features of the Sunday Flyer is that it is easy to repair. The wood parts can be glued back to their original shape using epoxy or, if you are careful, the instant glue types.

If any of the foam surfaces break, they can be carefully joined back to fit as they did before breaking, then separate them, smear epoxy in the break put back together, and let it dry. You can also strengthen the repair by laying a piece of cloth over the break before the epoxy dries, and smear the cloth with epoxy. It may not look as good as it did, but it will be strong.

SUMMARY

The Sunday Flyer is easy to build, easy to fly, and easy to repair. Yes, you probably will have some crashes, but you'll get a lot of good flights, and you'll learn a lot about adjusting for best performance. You'll learn a lot, while having a lot of fun.

ENJOY!