BACKYARD FLYER

Although slightly more complicated than previous Tenderfoot models, this bird offers experience with light-weight construction for good long flights.

When he was 12 years old, the author designed this easy-to-build rubber job. It will out-perform most small kit models.

GARY HEEB

AFTER returning home from the 1966 Chicago Nationals, I decided to build a small rubber-powered model to fly around the backyard. Since my rubber-powered Wakefield "Stratowake" won second at the Nats, I scaled down, modified and simplified this basic design. The result is a small easily built rubber-powered model which Richard Anderson named the Backyard Flyer. This model was designed to be flown for fun in a small area. It is not a contest model but is a plane a beginner can learn and have fun with. And the model is not complicated with prop-carving and making a prop-hinge fold mechanism. But the main thing I had in mind when designing and building the Backyard Flyer was a model which I could fly in my backyard.

The first step is to build the wing and stab so that by the time the model is completed, any warps will be developed. Then they can be removed before first flight.

Select only choice straight-grained balsa wood; try to get the strongest wood possible. If you want a really strong model, use the next size larger wood. The extra weight will decrease the flight performance, but the model will survive many more crashes and rough landings. For the wing, I strongly recommend that you use spruce for the leading and trailing edges and the spar. Spruce has a little extra weight but will make a strong warp-free wing. Use Sig balsa and spruce for the best results.

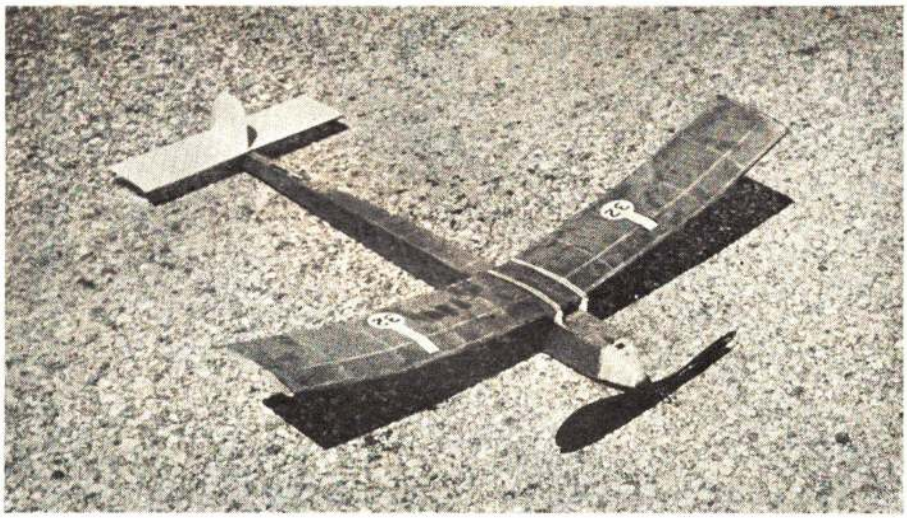
Make a hardwood or aluminum template of the wing rib including the spar notch and two pin holes. The pin holes assure that the template will stay in place when cutting out the ribs. It is very important to cut out all the ribs accurately; this will keep the same airfoil throughout the wing. Cut out ten ribs from very hard $\frac{1}{32}$ balsa sheet, using the template; make sure to notch the ribs carefully for the $\frac{3}{32}$ spar. Pin a $\frac{1}{8}$ sq. spruce leading and a $\frac{1}{16} \times \frac{3}{16}$ spruce trailing edge to the plan. Pin the wood down to the plan at the exact location. Do not stick pins through the wood but to edges, and use small weights to hold down the wood. Glue in the ribs, leaving out the ones at the dihedral joints. Glue small triangles to the tip ribs as shown in plan; add $\frac{3}{32}$ tip sheets to the outsides of the tip ribs.

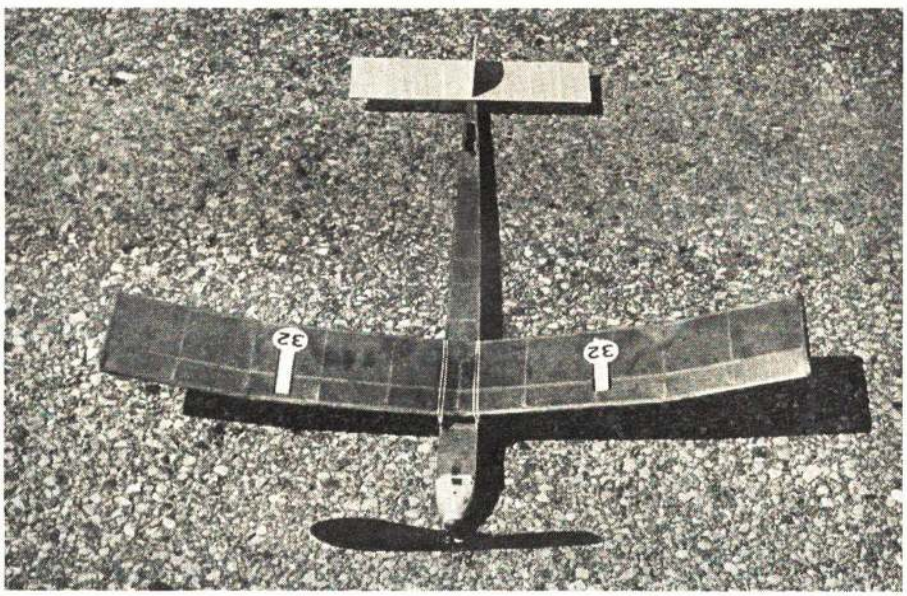
Cut the wing at the dihedral joints, bevel the leading and trailing edges to the proper dihedral angle. Prop the wing up to the correct dihedral measurement and cement; it is best to double cement before gluing the wing together. After the wing is throughly dry, glue in the remaining ribs. Next, cement a $\frac{3}{32}$ spruce spar in place, making sure that you have a good fitting glue joint at the dihedral break. Glue large gussets to the ribs at the dihedral joints. These gussets will greatly increase the strength of the wing and could be added to every rib if desired. Sand the leading edge to the proper airfoil shape; next sand the tips to the correct contour. Finish sanding the wing, making sure to smooth out any bumps or rough spots. Reglue all joints!

Use the wing rib template to make the stab ribs. Take the wing rib template and lay it on top of the stab rib shown on the drawing. After finding the same contour, mark the leading and trailing edge location on the template. Cut a sheet of $\frac{1}{16}$ balsa (with the grain running chordwise) to the exact length of the stab rib. Use the marked template and cut around the top edge, slide the template down the required distance and again slice around the top edge. After cutting out the ten required stab ribs, pin down the leading and trailing edges to the plan and glue the ribs in place. Go over the wing and stab frameworks lightly with sandpaper, smoothing out all the bumps and rough spots.

Predope the wing and stab outline surfaces. After the precoat is dry, dope the outlines of the wing and stab and cover, making sure the grain is running lengthwise. Let the dope dry thoroughly and lightly spray the wing with water. Thin down covering dope and add a few drops of castor oil. The castor oil will help prevent warping. Dope the wing with one very light coat. Do not water spray or dope the stab. If any warps appear, twist

Don't Forget: Tenderfoot Funtique Contest entry deadline is May 15th.





Plans show a built-up wing and tail with stronger, simpler all-wood fuselage. A Kaysun plastic 8″ dia. prop is powered by four strands of ¼″-wide flat rubber. Author tells how to get the most turns into the motor and adjust the plane for greater duration.

the wing over steam or a heat lamp in the opposite direction of the warp and hold for a few seconds and cool.

Make a paper template of the rudder, pin it down to a sheet of 1/16 balsa, and draw around it. Cut along the line and remove the rudder from the sheet. Sand and glue the rudder into the slot provided in the stab, making sure it is perfectly square with the stab.

Make a template of the fuselage (side-view), pin down the template to a sheet of 1/16 medium-hard balsa and mark its outline with a ball-point pen. Cut the fuselage side out, following the drawn lines; repeat the procedure making the opposite side. Take the two fuselage sides and add the 1/16 sheet rubber peg reinforcement. After letting the reinforcement peg sheets dry, drill a 3/16 hole for the rubber peg or tube. Glue the two sides together at the rear as shown in the plan.

After the rear joint is dry, place the fuselage between two parallel surfaces, such as two boards or two long aluminum angles, and glue the cross members to the body only at the parallel front part. Then glue in the remaining rear cross members. Add the top and bottom 1/32 sheets to the fuselage, trim the excess balsa off the fuselage and sand. If you want to do a good job on your fuselage, cover with tissue; this will increase the fuselage strength and will make the model look better. Pour a small amount of dope inside the fuselage, shake and pour it out. This will prevent rubber lube from soaking through the wood. Glue the stab on the fuselage, making sure it is on square. Double glue the stab joint and the fuselage seams.

Make the nose block by laminating ten pieces of 1/8 sheet balsa together. Glue the nose block hold-in piece, which fits inside the fuselage, to the rear of the laminations. Trace the body nose outline on the nose block, carve and sand to the correct shape. Drill the thrust-hole with plenty of down-thrust as shown on the plan. Glue the hardwood thrust-button in place. For extra strength, rub glue into the nose block. Purchase an 8″-diameter Kaysun plastic prop; if not available, use the next size smaller prop. Bend a piece of .045 wire to the shape shown in the plan. Be sure to bend the rubber hook, first, then put the wire through the nose block and add two washers. Finish the prop shaft by putting the prop in place and bending the winding hook.

Make up a motor of ¼″ flat rubber, four strands about 12″ long. Wash the motor, then lubricate with model rubber lubricant or a few drops of an oil base shampoo. Place the motor inside the body, hooking it to the rear peg and the prop shaft hook. Place the body on a round pencil on a flat surface, run the body back and forth over the pencil until the balance point is found; mark this spot on the body. Cut the plyons out of 1/8-sheet hard balsa, and be sure to make them with the front edge higher than the rear as shown on the plan (this will be 2 degrees positive incidence). Glue the pylons to the fuselage with their rear edges about 1″ behind the balance mark. Reinforce the pylon-body joints with extra glue and tissue paper. The Backyard Flyer is now completed and ready for its first flight.

Hold the wing on the pylons with rubber bands, but not too tight. If the bands are too tight, the wing may be damaged on hard landings; the wing must be able to shift somewhat on impact.

Hand-glide the model over tall grass. If the model tends to stall, add a shim, about 1/32 thick, under the wing at the rear of each pylon. But if the model dives, add small shims to the front of the pylons. However, don't expect a real floating glide from such a small model with a large prop. After the model hand-glides O.K., wind up the motor about 50 turns by hand, and launch with the nose slightly up and the right wing a little low.

The model should climb in a wide right turn. To make the model go right, which is the best and safest direction to climb, right-thrust or right-rudder tab may be used. To make right-thrust, add a small shim under the left side of the nose block so that the prop will pull toward the right. This will affect climb only. A tab cut in the rudder and bent right will cause both right-climb and -glide. If the model needs any of these adjustments, make them before the next flight, but only one at a time. After a good flight on 50 winds, add about 40 winds for the next test flight. My model

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Toledo R/C Expo

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19 to 29 power. Normal wood construction, but many plastic parts — machine guns, cowl etc. Metal radiator shutters. True scale except for airfoil; $21.95. Also new — 55" span profile Me109 for big engines, full multi; Pre-assembled fuselage, foam wings; $34.95.

Su-Pr-Line Products (34B Cooper Dr., Plainfield, Ill. 60544): Complete hardware for their Nyrods and other types of linkage — clevises, keepers, adapters, etc.

Tatone Products (4719 Mission St., San Francisco, Calif. 94112): Peace Pipe mufflers, steerable nose gear, engine mounts, countless other accessories for model builders and flyers.

Top Flite Models Inc. (2635 Wabash, Chicago, Ill. 60616): Two-inch exact scale SE5a; 53" span, for 40-60 engines; full-size plans, formed metal cowls. Special adjustable strut fittings. Fuel-proof matte decals; $45.

Trans-Stand Inc. (Box 144, Wyckoff, N. J. 07481): Light folding stand to hold transmitter (any type or size) out of dirt, prevent tipping in wind. Holds case at 45-degree angle. Has carrying handle — $6.95 pp.

Vic's Custom Models (618 Cowpath Rd., Montgomeryville, Pa. 18936): Very smart "Son-O-Jet" F.G. fuselage has "Crusader-style" nose contours. Has 60" span pre-covered foam wing and stab, canopy, trike LG components. Split rudder acts as drag brake. In ARF kit form.

VK Model Aircraft Co. (12072 Main St., Akron, N. Y. 14001): Newest kit is Cherokee Babe for pulse propo, small digital — 53" span, 470 sq. in. wing. For 19 to 35 power. Formed cowl and windshield, steerable nose gear, full-span ailerons. Flying weight is 3-4 lbs.; $25.95.

Warner Industries, Inc. (259 Hosack St., Columbus, Ohio 43207): Wide line of precision foam wing cores; also custom foam cutting. "Jig-It" is fuselage assembly jig on heavy 10 x 45" base, fully adjustable for many shapes and sizes; $15.95.

Wenzel Engineering Co. (16 Newbridge Rd., Hicksville, N. Y. 11801): Four-feet-long rocket kits from polyfoam, fully pre-fabbed for fast assembly; $9.95.

Williams Bros. (6719 Salt Lake, Bell, Calif. 90201): Extensive line of molded plastic items. Engine cylinders, wheels, pants, spinners, linkage parts. Sportsman pilot is new, in three scale sizes. Exact scale WW I machine guns. Nats-winning "La Jollita" Formula I pylon racer; $32.95 kit.

Wing Mfg. (Box 44, Morton Grove, Ill. 60053): Kits for scale WW II planes. Posi-tract landing gear. New midwing 63" span 630 sq. in. competition stunter; FG fuselage, foam wing cores, Inverted engine, very attractive; $89.95 less balsa parts.

World Engines Inc. (8960 Rossash, Cincinnati, Ohio 45236): Controlaire brick-unit plane installation package; het receiver, four-control digital decoder, three servos, in case $3\frac{1}{4}$ x $2\frac{5}{16}$ x $2\frac{1}{8}$" high, including all lugs, servo arms. With S-4a aileron servo and 500-maH pack, weighs $11\frac{1}{2}$ oz. Brick alone is $165. Several new ARF kits, for stunt, scale, pylon.

Backyard Flyer

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needed no adjustments and went right because of slight natural warps in the wing. Don't wind the model up too tightly until you feel that it is flying O.K.

You can make a winder with a piece of $\frac{1}{16}$ dia. music wire and an old hand drill. Bend a winding hook about $\frac{1}{2}$" dia. in one end, and at the other end, bend a 90-degree angle about $\frac{1}{4}$" from the end. Put the end with the bend in the drill and tighten up the chuck; the bend will lock behind the chuck jaws and prevent the wire from pulling out. With the winder you will be able to stretch the motor and put in a lot more winds. Of course a helper is needed to hold the model; this is done by using a piece of heavy wire held through a piece of metal tubing which is the rear motor mount. Lubricate the motor before each flying session. Make up several motors at a time, and break them in by stretching outside of the model. Stretch at least three times their length and hold for a couple of minutes. My motor failed at 450 winds.

If you desire longer flights, increase the length of the motor and make sure the nose block fits tightly and won't fall out during the glide. The model really moves out with six strands, and more down-thrust (shims behind the top of the nose block) will be needed to prevent looping.

This model is a trainer and can be used for flight experiments. For example, if you want a better glide, use a smaller prop.

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