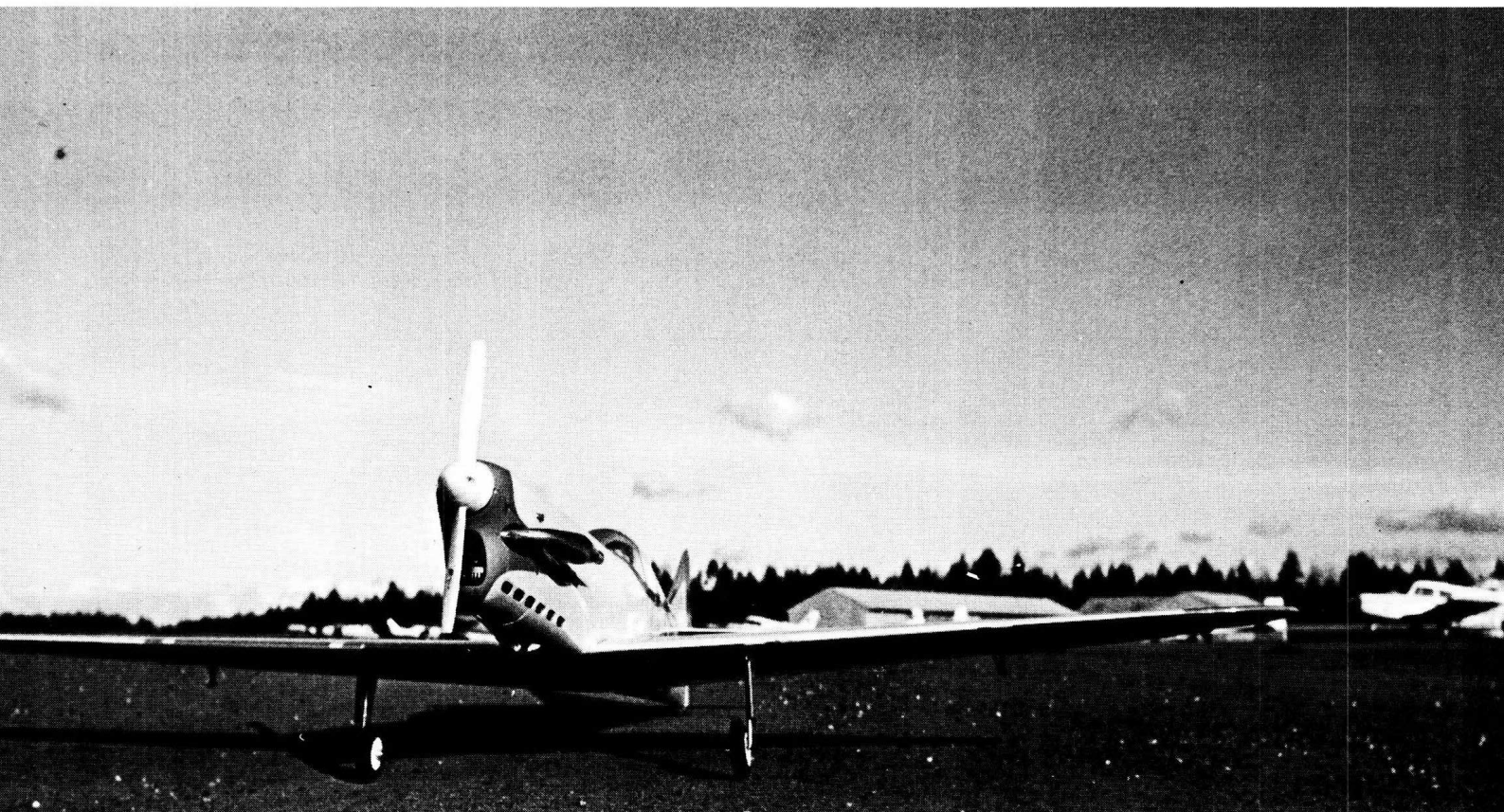


FAI RACERS GETTING POPULAR,
THIS FRESH MODEL DESIGN IS BASED ON A WELL-KNOWN
RETRACT GEARED THOMPSON TROPHY RACER OF THE 1930's

FIRECRACKER



by BOB ROOT

Upon deciding to build a formula FAI class racer different from the enlarged Formula I configurations normally used, it seemed logical to investigate the era of the thirties, since some of the most interesting racing airplanes ever designed were produced at that time. After considering the good and bad features of various racing designs of this vintage, the Keith Rider R-4 design was my choice.

Popularly known as the Firecracker, this airplane was selected because of its low wing, short, wide-tread landing gear, large root chord, long fuselage and inverted inline engine. The low wing gives easy access to the radio gear. The low, wide-tread landing gear results in easy takeoff and landing. The large root chord allows a thin percentage wing for low drag, and the long fuselage results in a "groovy" airplane even though the tail surfaces are scale area. The inverted engine installation allows a clean, low drag front end.

The selection of this configuration turned out to be a good one as it placed in all the 1970 FAI races in our area including second

at the Spokane Internats—in spite of its being the pilot's first year of racing. It handles and maneuvers so well that it has placed in several scale contests even though it is not, strictly speaking a scale model.

Construction

Light weight and straight, true flying surfaces are two important features to stress in the construction of this model. The original was very flyable even though it weighed six lbs. A five lb. version has just been completed and it is definitely faster. Extra weight will not cause any handling problems, but it will slow the plane down in the turns.

To insure good stall and handling characteristics with this type of wing, it is important to build it straight and true with tip wash-out as shown on the plans. When cutting the wing cores, use a foam block with at least one flat side. The core should be cut with the proper wash-out relative to the flat surfaces. The resulting block can then be used as a jig when sheeting the wing. In making the cutting templates, the tip should be made

about 1/16" oversize to compensate for the foam melting that occurs with such a highly tapered wing.

The aileron linkage, tip ribs and landing gear blocks should be installed before sheeting the wing. The wing is covered with 1/16" balsa sheets which should be glued ahead of time. The wing can be sheeted in the foam jig as shown on the plans using a water-base contact cement such as Core Grip or Sig Core Bond. When finished, the sheeting at the tip can be pulled together and glued, and the leading and trailing edges added. Use straight pieces to prevent warps. Any gaps around the edge of the tips can be filled with Sig Epoxolite.

The ailerons should be cut out at this point and edged with balsa as shown on the plans, and the leading and trailing edges sanded to shape. Add the 1/8" plywood aileron doubler (shown on the plans) for the control arm. Blind nuts will later make the installation easier.

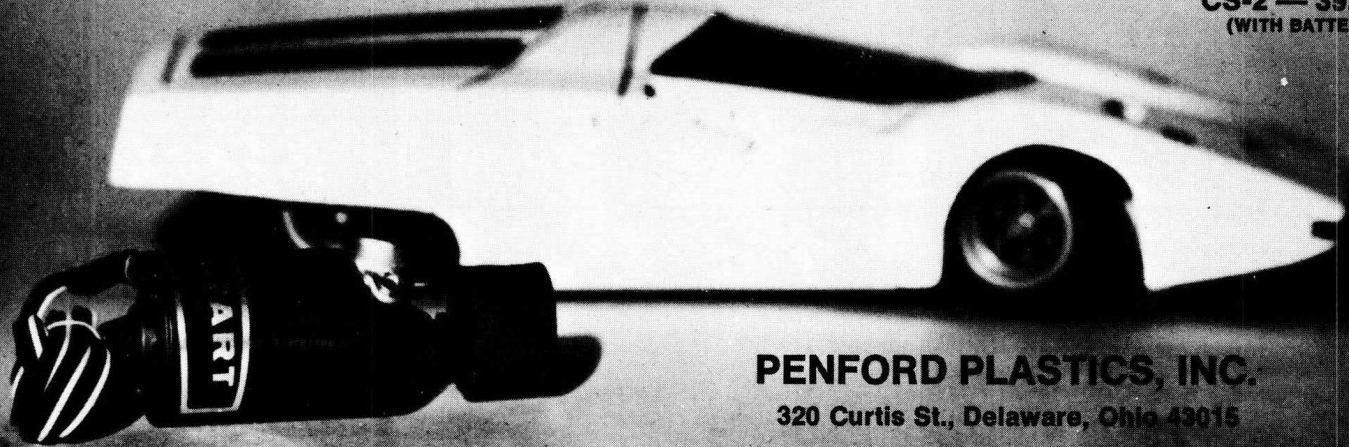
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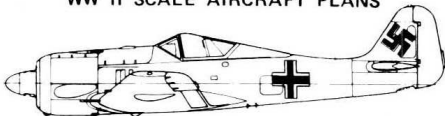
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Firecracker

cutting the dihedral angle carefully on a power saw and gluing the two halves together with Titebond or white glue. Remember to pre-glue the balsa edges. Masking tape stretched under tension can be used to hold the halves together until dry.

Before covering the center section with fiberglass, plywood plates should be countersunk in the area where the hold-down bolts will be located. Don't drill these holes until the fuselage is finished. One layer of 8 oz. fiberglass cloth in the center section and a second layer in the area of the bolt holes is sufficient.

The tail surfaces can be built up as shown or shaped from light 1/4" sheet balsa. It is important to keep them light. The stabilizer and elevator should be finished, except for the color, and hinged together before the fuselage is started. I have had good luck with the nylon hinges which use wire pins. A strong connection is attained by drilling holes in the hinges and gluing with epoxy. The wire areas of the hinges should be liberally coated with petroleum jelly before gluing to insure their being free when finished.

After cutting out and assembling the required parts of the fuselage, mark the

locations of the formers on crutch F12 (3 parts). Check carefully that the crutch and former widths match correctly, sanding to size where necessary. The crutch is 1/16" wider than formers F1 through F7 because of the 1/32" plywood doublers. Formers F8 and F9 should be the same width as the crutch. Former F11 should be cut out to accept the fuel tank to be used.

The fuselage is started by pinning the completed horizontal tail and the 1/16" fuselage crutch parts to a flat surface. The elevator pushrod should now be connected. The wing hold-down blocks should be glued and fastened to their respective formers with wood screws for added strength. All of the flat-topped formers can then be glued to the crutch, and the fuselage sides (with doublers) and bottom pieces added, as shown in the exploded view on the plans.

When dry, the fuselage can be lifted from the work bench and the remaining parts added, including the vertical tail. Make sure the tail surfaces are at right angles to each other. Formers F1 and F4 and the engine mount doublers F13 should be adjusted to fit the engine used before mounting in the fuselage. The foam fuselage top blocks should be formed and sheeted before being contact-cemented to the main fuselage. Former F2 and the foam block shouldn't be cut out for the motor mounts until after the foam is sheeted.

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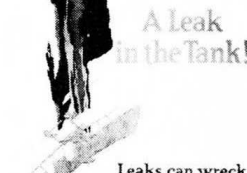
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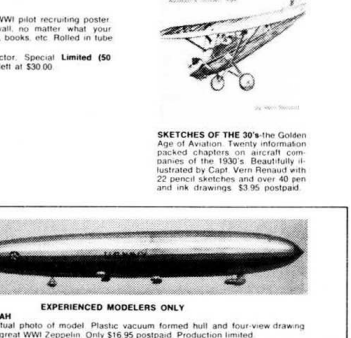


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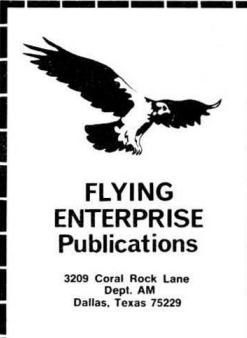


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The next step is to glue enough foam blocks to the front end to finish filling it out. Mark the location of the spinner using the engine mounts as a reference, and you are ready for the fun part. Get some No. 60 grit sandpaper and rough shape the entire airplane, being careful not to overdo the foam front end. When you are satisfied with the shape, sand the wood portions with finer sandpaper (about 180). The foam shouldn't need much additional fine sanding. If you get a dent or hole in the foam, just glue in a foam patch and resand. Low spots in the foam can be filled with vinyl spackling compound since it sands easily.

When you are satisfied with the shape, mix up some Hobbypoxy or Sig Epoxy and cover the front end with fiberglass over the wood, foam, etc. The best method is to spread on a

thin coat of glue, lay on the cloth, and then rub down to force the glue into the weave. Fingers can be cleaned with acetone to keep them from sticking to the cloth. Try not to add too much additional glue on top of the cloth as it will make the cloth float and fill up unevenly.

Try to achieve a cloth texture all over and avoid shiny areas, since these are hard to sand and unnecessarily heavy. Work a small area at a time until you get a feel for the working time of the epoxy. Let the first layer set a little, and then add additional layers over the foam parts, overlapping the balsa slightly. One layer of 8 oz. cloth on the balsa and three layers on the foam should be sufficient. When hard, the cowl can be cut out and the foam removed. The foam is easily melted out using lacquer thinner or acetone. The fiberglass

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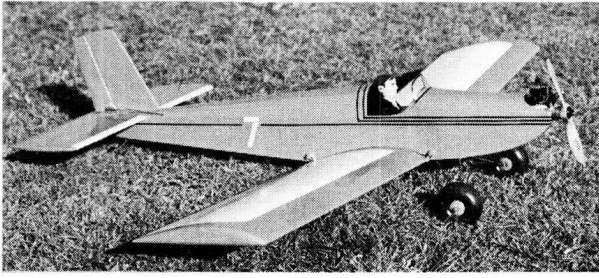
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cloth edges can be faired to the fuselage using Epoxolite.

The wing should be carefully positioned on the fuselage with holes drilled through the wing and hold-down blocks. The blocks can then be tapped for the hold-down bolts. Having completed this, the 1/32" plywood wing fillets can be glued, bolting the wing in place to hold them. A 1/32" balsa spacer should be used between the wing and the plywood fillet on the inside, and the plywood taped to the wing on the outside. This will leave space for a wing seal inside the fuselage, while still achieving a thin fillet at the wing surface. Before dry, make sure the wing is parallel to the tail.

Epoxolite can be added to finish the fillets when dry. An Epoxolite fillet should also be added around the tail surfaces. If care is used when forming the Epoxolite with a wet finger, little sanding will be required.

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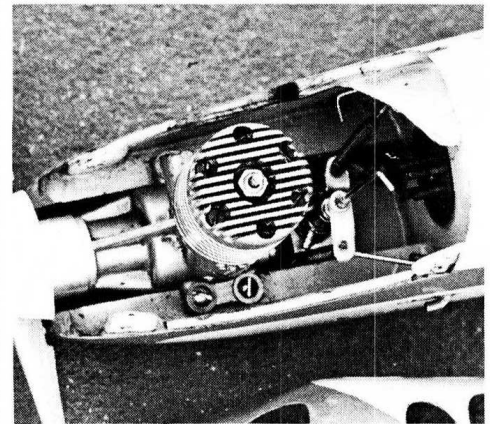
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Flying

Mount the RC gear where required to balance within the range shown on the plans (tank empty). It is important to use long control arms on the aileron—at least one in.

When everything is working properly, go fly it. Just hold lots of right rudder and up elevator and it should take off with no sweat. With the short landing gear it won't lift off until it's ready. Oh yes, get off the elevator when it gets in the air.

NOTE: For those who are interested in high quality three views of this racer and many others, contact R.S. Hirsch at 8439 Dale St., Buena Park, Calif. 90620. Also, if you can't find anyone in your area to cut the wing cores, the author will supply a set for \$15. Write Bob Root, 1318 144th S.E., Bellevue, Washington 98007.

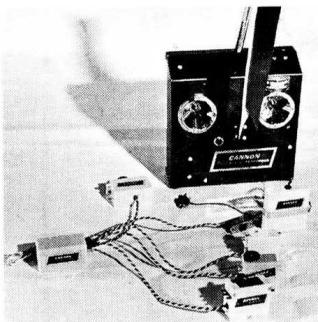
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