

... the Crusader

By RALPH BROOKE



Doc with his exciting multi winner. For those who are not in the know, Doc stands for DDS, Doctor of Dental Surgery, and one of Seattle's best.

LIKE ITS NAMESAKE, THE NAVY'S FAMOUS F8U, OUR R/C STUNTER IS 1964'S OUTSTANDING MULTI-STUNTER. R. BROOKE'S WINNER CONTINUES M.A.N.'S POLICY OF PRESENTING ONLY THE BEST IN R/C PLANES.

► The main objectives leading to my design of the Crusader were to have a plane with a unique appearance, preferably scale-like, and with improved flying characteristics. I always try to have a personal touch in my planes, and feel that a model based on the Navy Crusader can provide both a striking appearance and excellent maneuverability. Besides, it will never be confused with current multi designs.

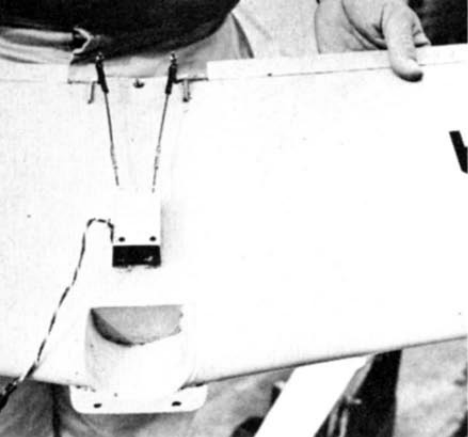
The first Crusader was designed and constructed during the winter and spring of 1964. It featured a swept leading and trailing edge, weighed 6 lbs., 2 ozs., and was powered by a Lee .45. While I considered this a very successful model, there was some problems in handling during windy or gusty conditions. This, plus my experiences at the World Championships in 1963, where wind was a definite factor in the contest, led me to redesign the plane.

The second Crusader, presented here, is heavier, 7 lbs., 2 ozs., has a longer tail moment, has only leading edge sweep and is powered by a Fox .59. Reason for the change over to the Fox .59 is its superior fuel draw at high or low tank locations. Actually, we might have eliminated the tank cut-out in the wing because of the good fuel draw but as everything was working so well, it was decided to leave well enough alone. This version flies well in calm or windy weather, and was used to take first place at the Canadian Nationals, the Oklahoma City Invitational and third place at the Nats. With luck it will accompany me to Sweden for the 1965 World Championships. The plane was designed for proportional equipment, and I feel that it would not be an outstanding "reed" plane.

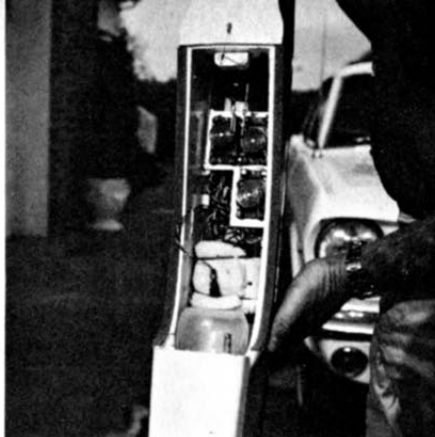
(Editor's note: A phone call to Ralph elicited his reasons for his feeling that the Crusader would not be an outstanding 'reed' plane and we quote. "It's my belief that the reed servo response is not fast enough (Continued on next page)



Doc never leaves anything to chance. Here, he is tuning his engine just prior to a Nats flight.



A look at the topside of the wing, cutout in leading edge is to allow clearance for fuel tank.



Inside the fuselage: "S" shaped dingus at rear of fuse well is Dzus fastener to attach wing.



At the front end of fuselage: bellmouthed inlet at front of cowl for good engine cooling.

to take advantage of the full span aileron. A typical proportional servo is twice as fast as a reed type and thus gives the right response necessary for full span ailerons.")

The construction of this plan should not pose any particularly difficult problems for the experienced builder, but there are some special techniques which I have found useful. Deviations from normal construction are as follows: (1) Use of a machine built or Styrofoam wing. (2) Removable tail assembly with internal control horns for ease of adjustment and packing. (3) Use of dowel and Dzus fasteners for wing and "Cam-Lock" for tail assembly. (4) Use of 1/4 in. aluminum engine mount plate to dampen vibration and increase power. (5) Special cap for fuel tank to allow tubes to come out through side.

For the wing, no construction data is given since the original wing was machine-made and is not commercially

available. My suggestion is that a wing be built of Styrofoam as outlined in recent articles by my good friend Ed Izzo, using the rib templates given on the plans. There are, however, some special features in the Crusader wing which should be incorporated into whatever wing is constructed by the builder of the model. For those who prefer the built-up type wings note that the plans offer an alternative method of construction. The small half size drawing is used only to show the correct wood sizes required and the rib locations. Build the wing structure directly over the plans using the full size wing outline as a guide. Any special construction notes will be indicated on the plan.

The first of the features is the recess in the leading edge of the wing to allow installing the fuel tank as low as possible. The cutout is made, and a piece of Celastic is soaked in thinner and pressed into place (Continued on page 48)

The Crusader

(Continued from page 12)

with the fuel tank to be used.

The rear edge of the wing is left flat (not rounded), and the ailerons are beveled 20 degrees on the L.E. to allow free movement with the nylon hinges shown. The pins through the hinges are installed about 1/4" in from the edge of the surface.

The aileron servo is protected by a light aluminum can with tabs bent under, with the servo mounting screws holding the can and servo in place.

To construct the fuselage, lay out sides on 3/32"x4"x51" balsa sheets, trimming the top edge with a straight edge. I have found it easiest to place the two sides one above the other, but mirror image to each other. Place a full length 1/8thx1/4" longeron along the top. A 1/8th in. sheet doubler with grain at 45 degrees extends from the nose ring to the wing trailing edge. Glue 6mm plywood over this doubler, and place a 1/8x1/4" truss aft of the trailing edge area. The wing and cowl cutouts are made with both sides pinned together after the balsa and plywood doublers are glued in place. This prevents any wing-fuselage misalignment, and assures a good cowl fit.

Mark cowl cutout, airfoil cutout, and exact line from trailing edge of wing to the end of the tail cone. Cut carefully, so both sides will be identical. Separate sides and glue engine mount bearers. Bearers should be pre-drilled and blind nuts inserted prior to gluing.

Join fuselage sides to 1/4 in. firewall and 3/4 in. bottom block.

Prepare full length top block by splicing for length and adding 3/4 in. sheet to top. Draw straight line down centerline of under side of top block to assure a straight fuselage. (If you are not confused by now, read on!). Mark off width of fuselage at several stations, draw connecting line, and cut block with band saw keeping cut line 1/8 in. outside of all outlines. Sideview is then drawn and cut to shape.

Spot cement fuselage sides to top block using temporary 1/4 in. bulkhead at rear of wing and several 1/8x1/2 in. temporary spacers down fuselage sides.

Carve and sand top block to shape. Remove from fuselage and hollow, referring to cross sections shown. Make cockpit cut out at this time. Cut off removable tail block, and permanently join top block to fuselage.

The Fox. 59 is bolted to the 3/16 in. aluminum spacer with 6/32 machine bolts and this spacer is bolted to the 1/4 in. aluminum mounting plate with 440 bolts. Mount the plate in the fuselage using 5/8 in. Veco extension shaft on the engine. The 1/4 in. plywood ring is glued and held in place by the back plate of the spinner tightened down with the prop nut. Finish nose section to shape.

Remove engine to construct cowling. Put small shim of balsa on rear of plywood ring to allow removal of cowling. Carve balsa block to shape. A 5/8 in. diameter drill in a drill press can be used to rough hollow intake section of cowling,

punching through from front to back. Complete hollowing of cowling. Top and aft edges of cowling are reduced 3/32 in. and faced with 3/32 in. plywood.

The plywood former at stabilizer leading edge may be installed, and the bottom of fuselage sheeted.

Construction of empennage is conventional, and should not present any problems. The rear stab hold-down is a commercially available Cam-Loc obtained from an aircraft supply house.

To reduce finish weight, the model is covered with Jap tissue applied over several coats of clear dope. Brush four coats of clear, over the tissue, wet sand, then spray sufficient pigmented dope to cover. Model is trimmed, decals applied, and several coats of clear dope are sprayed on, being careful not to dissolve the decals. The inside of the cowl is finished with Hobbyoxy.

The nose wheel brake is a simple device which engages shallow notches cut into rubber tire. When I'm asked how this brake works, I simply quote its designer, Milt Boone, and say, "Every time!" (NOTE: Do not use pessary type wheel, as notches are difficult to cut in this type).

This second version of the Crusader almost flew "off the drawing board," and completed a full AMA pattern on the second flight. No major trim problems were encountered, and the only adjustments were to the length of the elevator control horn. At time of writing this article, (November 15, 1964), sixteen gallons of fuel have been run through the model, with no serious structural or equipment damage.

While this model was not intended to be a scale or nearly scale-craft, it does combine realistic appearance with excellent aerobatic and ground handling. It is hoped that the Crusader will lead a movement toward more realistic competition aircraft.