

CURTISS HAWK

XP-23

By CHARLEY SMITH . . . Our "Curtiss Man" ('Shrike', July '74 and 'Sparrow Hawk', March '75) comes up with the last of the great biplane series. The "Y" model was even smoother, without supercharger.

Over the past few years I have scratch-built several Curtiss planes. Most of the better known planes, such as the Shrike, Sparrow Hawk and the Falcons were classics of their time. The Hawk series, from the P1 to the XP-23 were especially intriguing to me, mainly because of the wings. All of this series, both Army and Navy, had the same wing plan. I felt that if I could establish an easy way to make the ribs, all of these planes could be modeled and flown.

The little-known XP-23 Hawk, of which only one was built, was one of Curtiss's most elegant creations, a final desperate effort to keep the "Hawk" series going. This biplane of the early 1930's was the last pursuit biplane that the Army would take a hard look at. Changes in airplane design were well under way. The XP-23 was faster than anything else in the Army's stable. The G.E. turbo-supercharger geared GIV-1570-C engine increased the top speed to 223 mph and vaulted it to over 30,000 feet. The new features of a heated cockpit, machine guns mounted either side of the pilot for easy access, a retracting gunsight chin rest for better accuracy, the all metal flush riveted fuselage and empennage, were all ideas with a future.

The monocoque fuselage construction was to become the aircraft industry's main method of building air frames until the advent of the sonic jet age. The XP-23's front end was quite cluttered as you can see, and the Army reworked it to a "Y" (service test) status to evaluate drag reduction. These results were never released but the "Y" sure was a sleek bird, and in profile you can see the P-40 of the future. However, without the supercharger its speed and ceiling dropped, and the Army dropped the XP-23. Young companies like Lockheed, Chance Vought, Northrop, Martin, Grumman and Boeing were working on planes that would out-strip anything flying. Martin's B-10 at 207 mph, and Boeing's P-26 at 235 mph, were already flying and setting the new pace in aviation. The Curtiss "Hawks" were to become a large part of the Golden Age of Aviation.

This model is 2 inch scale and really not hard to build. The aluminum landing gear and strut detail seems to work very well and is strong. The method I use in producing the wing ribs makes that process a little easier. Most of the materials used can be purchased at your local hobby shop. The .010 aluminum can be obtained from a newspaper printing plant, and the .080 aluminum sheets from companies that manufacture storm doors and window. The No. 9 "Oly" beer cans for the supercharger are now getting hard to find, as they have changed the shape. My model, at 9 pounds, is powered by a Webra 60 R/C speed engine with pump, and it will do good vertical maneuvers.

FUSELAGE

Complete fuselage construction requires intermediate construction of tail surfaces and lower wing. Read all the way through, and then decide on your construction schedule.

Cut out the bulkheads from the materials noted. Assemble bulkheads A to H on the engine mounts. Cut out 2 hardwood blocks to be positioned between E and G. Epoxy this assembly and install engine, using 6-32 screws. Drill mounting holes, install blind nuts. Then add side 1/4 sq. stringers and glue remaining bulkheads in place. Glue two 3/8 x 1/2 balsa stringers from A to H. Make up aluminum landing gear and cabane strut details, drill all holes shown. Epoxy the 1/8 inch plywood sheet between F and H. Add 1/2 inch triangle balsa pieces.

Plank fuselage with 3/32 balsa sheet, one inch either side of center line, to gain some stiffness. Bolt landing gear and strut details in place. Make up the 1/8 music wire spreader axle and install, using clips, and bolt in place. Make up the tail wheel assembly, wire, collars, nylon block, filler block, and bolt these to bulkhead N as shown. Install 1/4 sq. balsa stringers between F-K and J-M. Finish planking the top half of the fuselage. Install 1/4 sq. balsa stringer from K to N and finish planking the bottom. Finish planking the front end of the fuselage, add nose blocks and Prestone cooler tunnel.

Install the cardboard oil cooler on the right hand side of the fuselage between B and C. Carve the nose block between A and B to achieve a straight line to the oil cooler. Carve the back block between C and D to achieve a smooth exit.

Construct and install stab and rudder assemblies and finish planking.

Make up the cowl block with exhaust cut-outs. Sand fuselage and balsa blocks to shape and contours.

Install the lower wing. Trim planking to wing contour. Check with a level to insure minus 2° incidence (as measured on bottom surface). Add hardwood wing block . . . drill and tap 1/4 x 20 holes for nylon bolts. Add filler blocks. Install 1/16 sheet saddle.

Add balsa fairings to landing gear . . . use celastic cement for this job. Mix up micro-balloons and form fillets at tail assembly, wing saddle, oil cooler, cabane strut fairings and landing gear fuselage joints. Install push rods or Nyrods and the servos. Hook up all fuselage controls. Install tail block and finish sanding fuselage assembly. Cover with silkspan and prime with K&B primer. All finishing instructions are later in this article.

STAB & RUDDER

These two assemblies are built in similar fashion, including the hinge set-up. Make up plywood hinge parts as shown. Stack hinge parts for the rudder and drill the 3/32 hole. Build the fin frame, glue the 1/8 inch plywood tongues in place. Assemble the 1/16 plywood hinge pieces as shown, insert the 3/32 music wire. Glue the rudder leading edge balsa pieces in place. Shim the 1/16 plywood pieces on both sides of the tongue, using .015 brass stock. When dry, remove the assembly from building board. Sheet both sides of fin with 1/16 balsa. Remove rudder from the fin. Install 3/32 music wire rudder arm. Make up 1/16 sheet covering for rudder, cut to shape. Glue one sheet to the leading edge blocks. Install ribs and filler blocks. Glue the other side now and pin to hold sheets in place until dry. When both fin and rudder are dry, sand to shape. The stab and elevators

are built the same way. Reinstall the 3/32 wire. Fill the hole with micro balloons when the fillets are being made.

WINGS

The wings are nothing special . . . just tedious. One of the problems with biplanes is the number of ribs you must make. Most everyone dreads this point of construction, and maybe my method will speed up this portion. Make up the master ribs shown on plan No. 1771-B, one set each for the top and bottom wings. Make from 1/32 aluminum sheet. You will note that the large master rib is larger than the proposed finished ribs. Don't worry, it is figured. However, use only 3/32 sheet balsa for the ribs, as any other size balsa sheet for the master ribs will not work. Stack the required number of sheets as shown and install the 1/4 inch dowels. Sand sheets to the master rib outlines. Remove the dowels and set aside the ribs. Make the opposite set of ribs. Upon inspection of the ribs, you will note that the leading edge, trailing edge and bottom are not square. This we call "flash". Trim each rib to remove this flash and now the rib is the correct size.

Cut out the required remaining ribs as shown. Make up the front and rear spars. Pin these to the building board and block as shown. Glue all ribs in place except for center section ribs. Install the leading and trailing edges. Make up the 1/4 inch balsa tips and glue in place. Make up the top wing aileron spars, right and left hand. Cut the ribs as shown on the plan and glue the spars in place. When dry, make and glue the plywood panel braces for the top and bottom wings. Top wing stays on the building board. Block the lower wing panels up to accomplish the proper dihedral. Add 1/16 plywood sheet to the top wing center section. Glue center section ribs in place, also the 3/32 sheet to the leading edge of the top and bottom wing. Plank the lower wing center section, using 3/32 balsa sheet. Note and install all blocks, splices, bellcrank plates and miscellaneous details, including the aileron bellcrank and push rods. Shape the leading edge . . . see section A-A, sand all surfaces. Make up the ailerons and install, using 3 hinges each. Cover wing frames with silk, shrink, dope until all silk pores are sealed. See finishing part of article.

SUPERCHARGER

The outer shroud was made using an aluminum cowl from a Sterling "Waco" U/C kit. The inner parts are from the bottoms of No. 9 Olympia beer cans. Make up the disc, fan, casing as shown on the plan No. 1771-B. Assemble these parts using 2-56 nut and bolt. Cut a half hole in the engine compartment as shown on the side view on Plan 1771-A. Insert the assembly. Bend over the cut casing and epoxy in place.

Install the shroud with 2-56 nuts and bolts. Make up the exhaust assemblies as shown on 1771-B. Glue and install the right hand exhaust assembly using 1/8 inch dowels. Before installing the left hand exhaust assembly, trial-fit the supercharger intake assembly shown on 1771-A. Trim the rear of the exhaust assembly as required to achieve a smooth transition. Glue and install left hand exhaust assembly using 1/8 inch dowel. Glue the supercharger intake in place. Cut out the .010 aluminum shroud from 1771-B and install as shown on the exhaust detail.

WHEEL PANTS

These are separate assemblies. Shape the balsa blocks to the contours shown. install the plywood pieces to the inner pant assembly, and mount this assembly on the landing gear. Make up the other pant assembly. Install plywood pieces with 4-40 blind nuts installed. Assemble the pant assemblies and sand to finished shape. Mask the area covered by the micro-balloon fairing. Carve and sand to shape.

STRUTS

Make up right and left-hand strut assemblies as shown. The view shown is true size. Cut the spruce as shown and shape to streamline cross section. Assemble with epoxy. Make up the clips of .010 aluminum and install with 2-56 screws. With wings assembled to the fuselage, slip struts in place. Fasten the top clips of each strut assembly to the upper wing with No. 2 x 1/8 sheet metal screws. Make the lower wing strut fairings with micro-balloons.

FLYING WIRES

Make up the required number of flying wire clips. Install as shown on plans, using No. 2 x 1/8 sheet metal screws. The flying wires are made of silver elastic thread. Cut twelve 3/32 x 1/16 pieces of brass tubing. Make up four spreader dowels and 2 long spreader dowels as shown on plan. The loop at the end of the flying wires are made up, as shown. After the left and right flying wires are made up, epoxy the crimped brass tube points twelve places. Note: When making up the front pair of wires and the rear 2 pair of wires, do not overstretch the elastic thread.

SPINNER

The spinner is made from a Williams Bros.'s 3-1/2 inch dia. P-40 spinner.

Remove the cone and fill the inside with polyester resin to 3/8 inch of the top of the cavity. Let set overnight. Drill out the back piece to fit your prop shaft. Install an arbor and reassemble the spinner. Mount this in a hand drill and with the drill running, file to the shape. Note: the polyester will probably come loose. If this happens use "Zap" or "Hot Stuff" to bond it back in place. When the proper contour is achieved, polish the spinner, using 220 sand paper. Prime, using K&B primer and polish with 400

wet paper. Make up the scale propeller as shown.

FINISHING

When all sanding and shaping is completed, dope the assemblies. Apply 2 or 3 coats of clear dope, sanding with 220 "open coat" paper, wing frames and all. Apply the silk span to the fuselage and tail assemblies and add 2 more coats of clear dope, sanding lightly between coats with 220 paper.

Cover the wings with silk, doping only at the leading and trailing edges and tips. Make sure that the weave is parallel to the leading edge and to the ribs. Pull tight to remove any wrinkles. Add two more coats of dope to the edges and sand lightly with 220 paper. The silk will shrink, but very little, so try to have it pulled tight. Now sprinkle the silk lightly with very hot water and let dry. Dope the wings using 50-50 dope and thinner. Again, use very light "skip" brushed coats, only 25% of the silk will be doped at each coat. First coat should be diagonally right, second coat diagonally left, next coat parallel to the ribs and the next parallel to the leading edge. Let the dope dry between each coat. Normally about one-half hour. Repeat this process until the silk is completely covered and all the pores are sealed. Usually 5 coats will do it. Let the dope dry overnight. Then add 2 more coats, 100% coverage, using straight clear dope. Let this dry, overnight and sand very lightly using used 220 paper. Prime the wings using K&B primer . . . 2 coats should do it . . . sand lightly with 400 wet paper.

Prime the spinner, wheel pants, struts, fuselage, scale propeller and exhaust assemblies, using the above primer. Sand with 400 wet paper. Spray the fuselage, pants, struts and spinner using Pactra 34-4 O.D. The wings are sprayed using Hobbyoxy No. H-40 Cub Yellow. Mask out the fuselage and rudder and spray the fin and stab assembly, using Hobbyoxy Cub Yellow. The exhaust and supercharger details are painted with Pactra 50-4 Silver. The rudder is sprayed with Pactra Swift White. Mask out 6 white strips and add the red strips using Pactra Stearman Red. When this is dry, mask out the red and white strips and spray the blue bar using Pactra Bonanza Blue.

The Wright insignia is made from yellow stick-um Monocote cut to shape, masked and sprayed with brown enamel. The letters are 1/4 inch "Super Stick" vinyl letters, black. Make up a right and left hand detail and position on the model as shown.

Add the legend, type, sn., and specs. to the left side of the model just forward of the cockpit, as follows:

"U.S. ARMY XP23
Air Corps sr. 32-278"
(1/4 inch white, Gothic
Super-Stik vinyl letters)

"Crew weight 200 lbs.
 Fuel
 main 60 gals.
 reserve 20 gals.
 auxiliary 50 gals.
 Oil
 main 6 gals.
 auxiliary 2 gals.
 Gross weight 4754 lbs."
 (1/8 inch white-Gothic,
 Quik-Stik rub on letters)

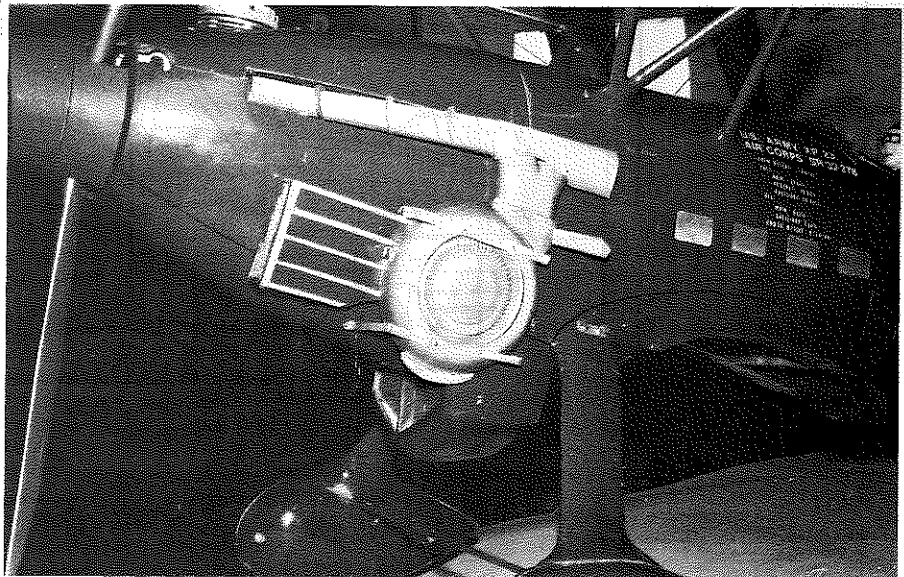
The panel lines were added next . . . refer to Peter Westburg's plans shown in Model Builder May and June 1976. Use a "Sharpie" No. 42 black pen.

All the assemblies and surfaces that were sprayed with Pactra were then over-sprayed with one coat of Hobby Poxy No. H-08 clear, to achieve a shiny finish.

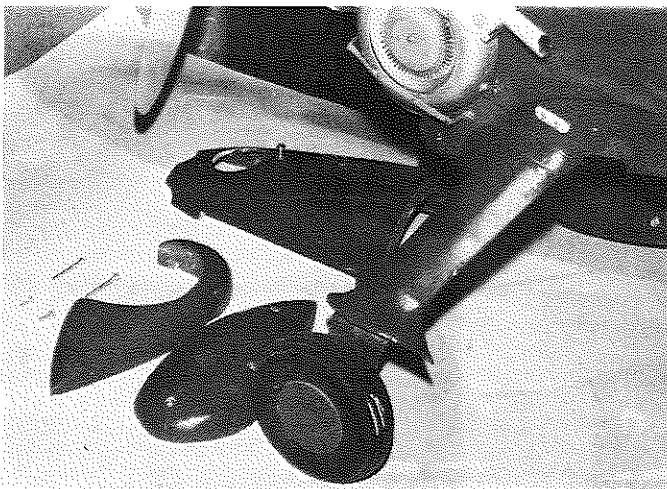
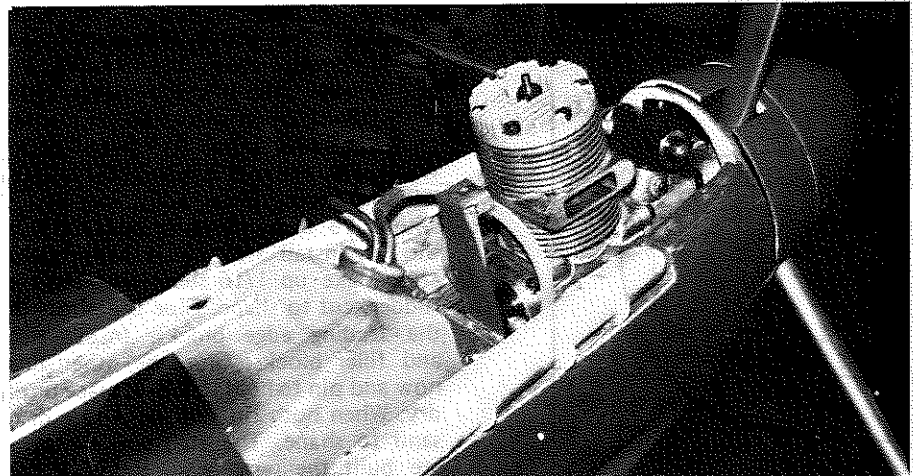
Add the final details . . . cockpit rubber coaming; wind screen, cabane flying wires, and a pilot. Let's fly!

FLYING

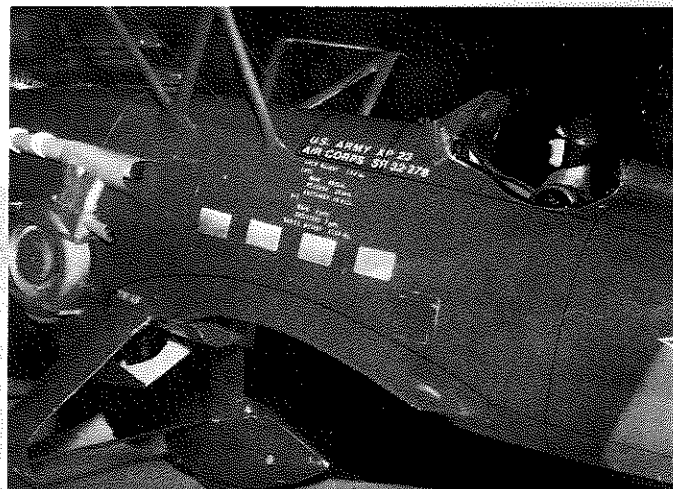
Balance the model 1/4 inch ahead of the C/G indicated on the drawing for the first few flights. Taxi the plane around to get the feel of it. You will notice a tendency to track left as the power is increased. Correct this with a little right rudder. Also a must . . . the tail should come up in a high speed taxi. If not: 1) check the balance, 2) the elevator might be up a little, or 3) you have a heavy elevator thumb. But seriously, tail-draggers are hard to handle at take off, so a little right rudder, and off we go for a biplane thrill that only a biplane flyer can experience. Once you get the feel of the plane, shift the balance to the spot indicated. Good flying!



Supercharger is made from 9 oz. "Oly" beer can and Sterling C/L Waco cowling. Landing gear is flat aluminum with streamlining added. Spreader also serves as wheel axle.



Wheel pants come apart for easy assembly and maintenance. note mounting hooks for flying wires.



Cabane struts are cut from a single sheet of aluminum, bent to shape, and then faired with micro-balloons. Entire fuselage is balsa planked.