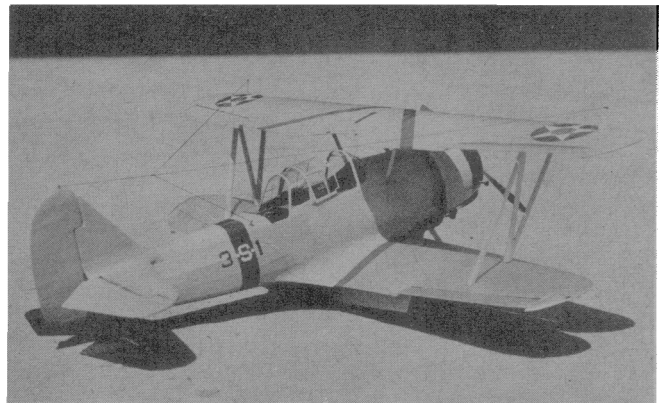




Posed on the wing of a modern jet, with its designer, model of the vintage Vought makes an interesting study in old-style design.

Vought SBU-2

by DAVID BRAZELTON



Authentic markings of the day enhance the scale placement of ribs, stringers, wires, and so on. "Green house" cockpit, noteworthy.

The last of the historic Vought biplanes makes a unique project for control-line scale fans. Performs well with your favorite .19 to .29.

► The last and probably the prettiest biplane built by Chance Vought was the SBU-2. It was used both as a scout and a dive bomber and was one of the first aircraft equipped with cowl flaps. It was powered with a Pratt and Whitney, R-1535, Twin Wasp Jr. engine, rated at 750 hp. It was of all-metal construction with fabric covering on the wings, fuselage, and tail surfaces. It cruised at 169 mph with a top speed of 205.

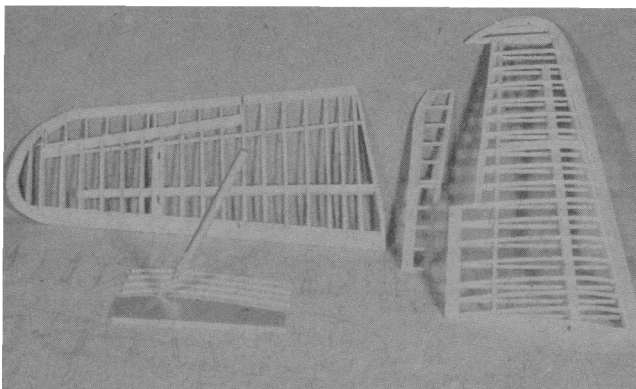
The model presented here is intended to faithfully reproduce this airplane. The fabric surfaces are authentic and with a little attention to detail, a very striking model can result.

Don't let the built-up tail surfaces or the two-piece wing ribs scare you. In the case of the wing ribs you will find that this type of construction is much faster and easier than any other method of cutting ribs for a tapered wing. The way the ribs are built in the tail surfaces is as easy as carv-

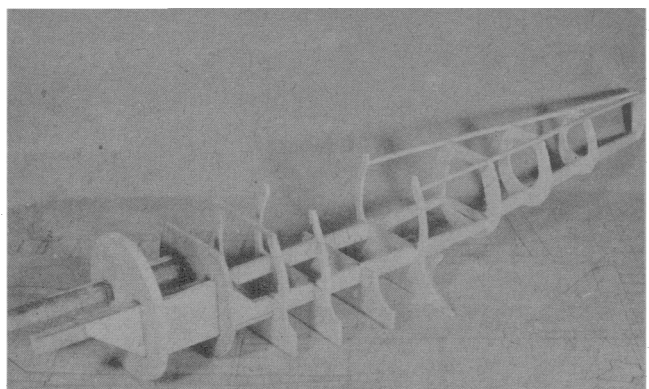
ing out of sheet balsa and much more authentic. For the contest builder there is a three view of this airplane in The Aircraft Yearbook for 1938, page 336.

TAIL: I always start on the tail surfaces because I like to build them the least. Cut the vertical fin from $\frac{3}{8}$ " sheet balsa and sand the leading edge to streamline shape. The rudder is built by assembling the $\frac{3}{8}$ " balsa leading edge and the trailing edge outline as shown in the plans. Then place in position strips of $\frac{1}{16}$ " balsa, $\frac{3}{8}$ " wide, at the intervals shown on the plan for ribs. When the cement is dry, the ribs can be cut to shape as if you were carving from balsa. Round the leading edge and cement to the fin with the rudder trimmed about 5° to the right.

Construction of the horizontal stabilizer looks a little tricky because of the scale hinging. I found that it built the easiest right in my hand. Start the construction by cutting the horizontal stabilizer (Continued on page 54)



Using a template, rib pieces are sliced out, trimmed to length to suit tapering panels. Much easier than making many different ribs.



Clever use of keel pieces lines up fuselage assembly. Doubler effect reinforces motor mounts. Interior details before planking.

Vought SBU-2

(Continued from page 22)

and leading edge of the elevator in one piece. Mark off the elevator separation line and cut the leading edge away from the horizontal stabilizer. Shape the leading edge and spot cement back into position making sure that there is a spot of cement between each hinge.

With a single edge razor blade carefully cut $\frac{1}{8}$ " section out of the leading edge at each hinge and slot the horizontal stabilizer to fit the $3/16$ " ply hinges snugly. Cut six hinges from $3/16$ " plywood and drill a $3/32$ " hole. Into each hole insert a piece of $1/16$ " I.D. brass tubing $3/16$ " long. Bend one end of the $1/16$ " wire hinge pin and slide on three hinges. Make a brass control horn and solder it into the center of the hinge pin. Then slide the last three hinges and finally bend the remaining end of the wire.

Drill $1/16$ " holes into the end of the leading edge for the ends of the hinge pin. Apply cement to the hinges and fit them into their respective spots, pulling the hinge pin snugly against the elevator leading edge. Cut a small staple from shim brass and insert it into the leading edge over the pin as shown in the plans. Put a drop of solder on each staple. Then securely cement the hinge pin to the leading edge, being careful to avoid the area around the hinge.

Cut the $\frac{3}{8}$ " sheet inner trailing edges, notching each end as shown in the plan, and slot the top of the leading edge for the $1/16$ " sheet tip. Pin your leading edge and elevator assembly to the board over the drawing and finish the assembly. The ribs can be made the same as in the rudder. Carve a balsa block to fillet the fin to the horizontal stabilizer and assem-

ble these three parts together. Sand to a streamline surface, cover with Silkspan, and apply one coat of dope.

WINGS: Build a leading edge of $\frac{1}{4}$ " x $\frac{3}{4}$ " balsa sandwiched between two pieces $\frac{3}{8}$ " x $\frac{1}{2}$ " balsa. Carve the leading edge to the shape shown in the rib detail.

Cut out the tops and trailing edge and pin the wing outline to the board. Install $\frac{1}{8}$ " x $1/16$ " lower rib surfaces in their positions, fitting them underneath the tongue of the leading edge. Cement the main and secondary spar directly on the lower rib surfaces. Make a sheet metal template of the under camber of the wing rib and mark the position of the main spar. Slice 73 camber members, marking the spar position on each. Since this is a double taper wing, both leading and trailing edge of your camber strip will have to be trimmed, using the spar as a reference point. Fit each camber strip into position, cementing to the leading edge, both spars, and the trailing edge. The camber strip must fit beside the lower surface strip at the trailing edge. Make a solid $\frac{1}{8}$ " sheet rib for the end of each panel. This can be made using the rib template. Cut out the $1/16$ " plywood strut plates and cement them into the wing, as shown, with those on the upper wing below the spar and those on the bottom wing above the spars.

Cut four wire fittings from shim brass and bend as shown in the drawing with a small hole in the ends for the flying wires. Hook these over the strut plates at each of the lower forward strut points and the upper aft strut points. The ends of the fittings should extend outside of the surface of the wing.

If you intend to build the flaps, add the $1/16$ " x $\frac{1}{8}$ " false spar, shown in the plans, and terminate the strips forming the bottom surface of the lower wing at this spar.

Then cut your upper camber strips so they fit into the notches in the trailing edge and add the $1/16$ " gussets. The flap is made of $1/16$ " sheet sanded to a razor edge with $1/16$ " x $\frac{1}{8}$ " strips cemented to the upper sides midway between the rib positions. Fasten the flaps with a cloth hinge to the $1/16$ " x $\frac{1}{8}$ " spar.

Cut four $\frac{1}{4}$ " square strut fittings and notch one side to fit the $3/32$ " cabane struts. Then cement these into position on the inboard sides of the $\frac{1}{8}$ " balsa ribs of the center panel. Sand your wing carefully so that all ribs are even. Assemble the upper wing outer panels using the $1/16$ " ply strengtheners. There is just enough dihedral in the top wing to make the top surface flat. Cover the wing panels with Silkspan and give it a coat of dope. Build your ailerons and cover separately.

FUSELAGE: Begin the fuselage construction by cutting out all formers as shown on the plans. The crutch is made up of $\frac{3}{8}$ " ply cut to the shape of the heavy lines in the side view. The motor mounts are cemented directly to this crutch, being sure that you make a left and right. Formers F-1 and F-2 are cemented in position making sure that they are square with the crutch sides and that the sides are parallel. Formers F-3 through F-6 are cemented into position in order and the cockpit floor, the right half of which is shown in the top view of the crutch is added.

A $\frac{1}{4}$ " x $\frac{3}{8}$ " keel is cemented into the slot in F-5 and F-6. You will notice that about $1/16$ " of the keel extends outside the former. Cement F-7, F-8, and F-9 to the keel and when dry, fasten the $\frac{3}{8}$ " square longeron into the top notch on each side. Mount the bellcrank on the bellcrank platform with a $1/16$ " pushrod long enough

(Continued on page 56)

the leading edge of the top wing 3" in from the tip. I would suggest the tooth from a large comb. A small mast goes on the top of the rudder and one on the right side of the fuselage just ahead of the red band. The antenna is made by fastening the ends of a piece of black thread, 40" long, to the masts on the top wing. In the center of that, tie a 12" piece of black thread with a simple overhanded knot in the middle and pull one end back to the mast on the rudder and cement. The other end drops down to the mast on the fuselage.

The wing walks are made from $\frac{1}{2}$ " wide strips of wet or dry sandpaper and cemented to the wing surface along the joint with the fillet. Make a line guide from wire and fasten to the left hand strut. Put loops in the leadouts, connect up the lines, crank up the engine and you are ready to fly.

FLYING: The first flight should be made from a fairly smooth surface, on a calm day, with the flying wires set as close together as you can get them on your handle. A biplane can be pretty tricky if your incidence angles are off. Try to fly as much as possible from a smooth surface because a simple turnover can certainly erase a lot of scale detail.

to reach nearly to the center of the 1/16" I.D. brass tube shown in the side view. Cut and solder that tube to the end of the pushrod. Drill holes in the left side of the crutch for lead outs. Fasten lead-outs to the bellcrank and cement the bellcrank platform on the crutch. Shape the stub spar from hardwood (I used a piece of yardstick) and fix it in position on former F-4. Cut out the fillet rib and cement it to the ends of the stubs on F-3, F-4, F-4a, and F-5. The fillet rib is cut part way through at F-3 and bent so that the front part is parallel with the fuselage center line.

Make a fuel tank to fit in the space between the motor mounts and between F-1 and F-2. Fill in below the crutch between F-2 and F-3 with scrap balsa and shape to form a smooth fillet with the wing.

Bend the landing gear and fasten the main to the 1/2" ply landing gear mount. Cement the mount in place between F-1 and F-2. The rear strut and spreader bar are bent in one piece with the joint at the top of the rear strut. These are bent and soldered to the main landing gear. Fasten the rear landing gear strut to a piece of 1/2" square balsa with cement and thread or fine wire. Cut a slot 1/2" wide and 3/16" deep in the wing fillet and cement the rear strut in place.

If you intend to put in the interior detail, most of it should be put in now before the fuselage is planked. The front seat is made of card and the rear seat is made of balsa and wire. A shoestring makes a good safety belt with fittings cut from aluminum foil. Throttle quadrant is made of 1/2" balsa with round headed pins for control levers. These are cemented in place on the left after the fuselage is planked. The front instrument panel is cut from card, painted black, and cemented to F-3. The rear instrument panel is cemented to F-5A. There are two F-5A required and they are cemented in after the fuselage is planked. The stick is carved from wood and the flap handle bent from wire. There is no flap handle in the rear seat and the stick is normally stowed on the left side. The interior is painted a willow green.

The 1/16 ply tail bellcrank mounts are cut and cemented in place on each side of the keel. The bellcrank is cut from aluminum, drilled and mounted with a 2-56 machine screw. A 1/16" wire pushrod, long enough to reach from the vertical arm of the bellcrank to a short ways into the brass tube on the pushrod from the control bellcrank, is bent and installed. A short pushrod is bent to the length shown on the drawing to go between the horizontal arm and the elevator horn. The tail assembly now is installed on the fuselage and the pushrod secured to the horn. Set your control bellcrank at neutral and adjust the setting of the elevator by unsoldering the pushrod at the brass tube and lengthening or shortening as the case may be. Be sure, when you have finished your adjustment, that both halves of the pushrod are securely soldered to the tube.

Install the stringers between F-5 and F-9. Note that the stringers below the cockpit floor start at F-6.

Cut the 3/32" ply cabane strut mount and cement between F-1A and F-3, making sure it is securely cemented to F-2. Bend the cabane struts and fasten them in place with grooved pieces of 1/4" square hard balsa. Make two wire fittings and fasten them at the rear cabane strut with cement and two small pins, so that the fitting ends extend about 3/16" outside of the fuselage. Cut out F-5B and install in place between F-5 and F-6. Now plank the forward portion of the fuselage with

1/16" balsa. The area around the wing fillet is most easily planked with 1/16" x 1/4" strips. Cement a 1/2" x 2" balsa block on top of the 1/2" square longerons and carve to shape. If you desire, this block can be hollowed as shown by the dotted lines.

The large fairing under the fuselage is cut from 1/2" sheet, shaped to a streamline section, and cemented in place. It will have to be notched for the spreader bar and the notch filled with balsa. Make the landing gear and cabane strut fairings and cement them in place.

Bend a tail wheel strut from 1/16" wire and cement it to a piece of 1/2" plywood cut the same shape as those portions of the rear bellcrank mount that extend below the fuselage. Drill a 1/16" hole in the keel to take the end of the strut and cement firmly in place. Fill in between the stringers with 1/16" balsa from former F-9 forward to the line shown.

Cover the entire fuselage with Silkspan and give a coat of dope. The lower wing now is installed by cementing the fillet ribs together and cementing the stub spar to the main spar of the wing. There should be 1/2" dihedral in each lower wing. If you are installing the flaps, the planking in the bottom of the wing fillet must be cut out to take that portion of the flap that extends inboard from the wing.

The Vought used a plain disk wheel with a high pressure tire. The closest I could find in a ready made wheel was a 2" Veco with spokes. Fasten them on the axle with the spoke side inboard. Use a 1/2" rubber tire wheel for a tail wheel and hold on the axle with a drop of solder. These 1/2" wheels are generally sold in pairs but don't throw the other one away.

COWLING: To start the cowling cut four pieces of balsa 1/16" x 1/4" x 3" long. Spot cement these together in pairs and pin each pair to a board 2" apart and parallel with each other. Cement the upper part of C-3 and C-4 in place across these pieces and set a piece of 1/2" x 1/2" balsa in the top notch. Note that C-4 is cracked at the line and bent forward. When the cement is dry, pick up the assembly, and install C-2. Now turn the cowl over and put the bottom half of C-3 and C-4 in place with a piece of 1/2" balsa in the notches.

Cut two pieces of 1/2" ply 1 1/2" wide and 2" long with a notch 1/2" long at C-3 and slide into the notches on the sides of the cowling for mounting platforms. Set the cowling in place on your motor mounts so that the 1/2" ply platforms lie directly on top of the mounts and the lower part of C-4 fits against F-1. Mark the position of the motor mount holes on the platforms, remove the platforms, and drill the holes. Replace the platforms and cement securely to C-3 and C-4. The nuts for the motor mounting bolts should be fastened to the platforms by your favorite method of fixing a blind nut. Frankly, I just put lots of cement on them.

With a knife and sandpaper shape the 1/2" balsa members in the upper and lower notches. Now the entire cowl can be planked with 1/16" balsa working each way from the pairs of 1/16" you used for a crutch. After the planking is completed sand the crutch to conform with the contour. Cut the cowl flaps at the lines and open them about 20 degrees.

C-1 can be cut roughly to shape, and cemented to C-2 and shaped with the rest of the cowling. Make the scoop as shown and cement to the lower half of the cowling (do not cement to C-1 or C-2).

With a sharp knife or razor blade remove the lower cowling and cut holes to fit your engine. The nose piece shown can

be turned from balsa and hollowed to fit your engine and cemented directly to the end of your engine mount after your engine has been installed. Cover the entire cowling with Silkspan and dope.

FINISH: Before further assembly can be made, the finish must be put on the model. Give each sub-assembly several coats of dope, sanding lightly between each coat. A good under finish of sealer should be applied. I apply three coats of sealer and sand out the imperfections. It usually takes three such applications for a halfway decent finish. Be careful in sanding your fabric covered areas or you will find you have very neatly sliced the paper at a rib. When your under finish has reached a perfectly smooth surface, seal it with one coat of clear and sand lightly.

Give the entire airplane three coats of aluminum, sanding lightly between each coat. Mask around your planked area on the fuselage and give two coats of a very light grey (this you will have to mix yourself). The upper surface of the top wing is painted yellow.

The canopy is built now. Start from the rear section and work forward. For a good scale effect build the canopy structure from a fairly stiff shim brass with the celluloid fit inside. The front section of the hatch can be made to slide by soldering the frame to a 1/32" I.D. tube on a piece of 1/32" wire. The last portion to be built is the windshield.

FINAL ASSEMBLY: Build the wing struts and finish as indicated above. Cut a small section of the fabric from the wings to let the strut through at the strut plate. Coat securely with cement and set the top wing in position on all the struts. It would be wise to have someone standing by, because attempting this two handed can be nervewracking. Set the engine in place inverted, connect your fuel line, set the upper part of your cowling in place, and install motor mounting bolts. Hold the lower cowling to the upper cowling with dress snaps.

RIGGING: The rigging on this model is simple, consisting of a set of double flying wires and a set of double landing wires. I use small diameter stranded flying wire and swage the ends with 1/32" I.D. brass tubing. Merely slide a 3/16" long piece of tubing onto the wire, thread the end of the wire through the wire fitting and back through the tubing. Slide the tubing down close to the fitting and squeeze it tightly in at least two places with your dulllest pair of dikes. Repeat the process at the other end and cut off your left over wire. Now you have a landing wire that from a few feet looks as if it is equipped with turnbuckles. On the flying wires, I swaged one end of the wire to the upper wire fitting, then threaded through the lower wing root with a needle and back up again to the other ear of the wire fitting. I would suggest a piece of celluloid above and below to keep the wire from cutting the balsa.

DECORATION: My model was decorated as the squadron leader aircraft of Squadron VS-3, on board the Lexington. A 1/2" red chevron goes on the top wing with the No. 1 in black centered inside it. A red band goes around the fuselage 1" aft of the cockpit. The numbers 3-S-1 are 1/2" high with the S painted white, centered in the band. The 3 and 1 are black. A black U S Navy goes under the tail in 1/2" letters. There is a 1 1/2" red band around the leading edge of the cowling. The entire tail is painted yellow. A 2 1/2" star and dot insignia goes on the top of each upper wing and the bottom of each lower wing.

An antenna post, 1" tall, sets through