This underside shot shows race number and simulated wheel wells. Note navigation lights.

C/L STAGGERWING BEECH

Control Line scale machine that can win most any Scale contest and of course is a fun bird!

BY WALTER MUSCIANO

• For decades modelers throughout the world have selected the beautiful Beechcraft Staggerwing as a most attractive subject. In fact, over a span of thirty years this is the sixth Beechcraft biplane to be built by the author with wingspans ranging from eighteen inches to forty-eight inches, in both control line and R.C.

The Beechcraft Biplane model presented here is a ¾ inch to the foot scale control line standoff scale replica that can be powered with engines from .15 to .25 cu.in. displacement. We tried .15, .19 and .29 engines and found the .29 a bit too powerful and that a .19 engine was ideal. This scale gives us a wingspan of about two feet which is a very handy size for display at home as well as transportation to the flying site and is still large enough to provide some good flying fun.

The full size plane that we duplicated in model form is the plane flown by Louise Thaden and Blanche Noyes when they won the 1936 Bendix Transcontinental Speed Dash from New York to Los Angeles. This was the first time a woman won the race and the first time the event was won in a stock commercial production airplane. The complete story of Walter H. Beech, the Beechcraft Staggerwing, and the 1936 Bendix Race was covered in Part One of this article which appeared in last month's Model Airplane News. Order your full size plans now and we can begin our model.

INTERIOR DETAIL was installed on our model including a complete cockpit with seats, instruments and control wheel plus a door that opens. All of this is, of course, optional but we found it hard to resist.

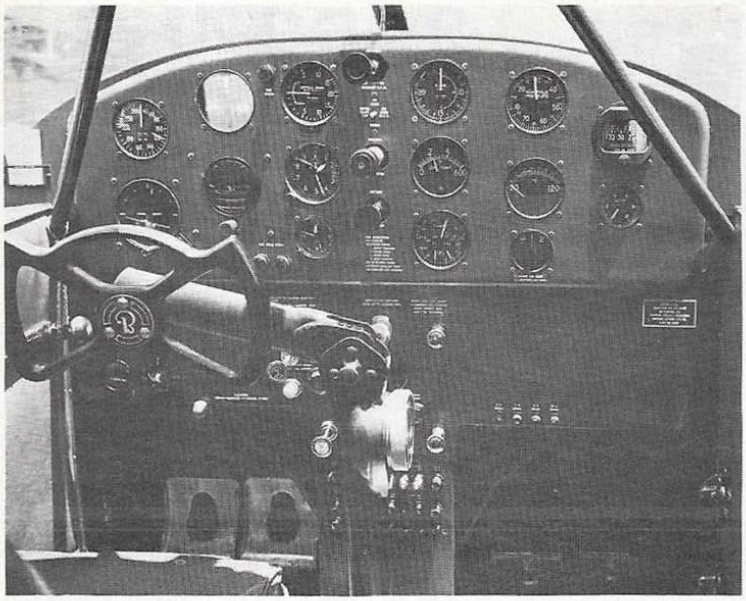
VERTICAL KEEL and bulkheads are traced and cut to shape and are then firmly cemented to the keel. Cement one 1/16" x ¼" planking strip to each side to hold the bulkheads steady.

STABILIZER AND ELEVATOR are cut to shape from sheet balsa. Cement the elevator joiner in place and sandpaper to a streamline shape. Cement the control horn to the joiner and hinge the elevator and stablilizer to each other. Cement the stabilizer into the slot in the keel.

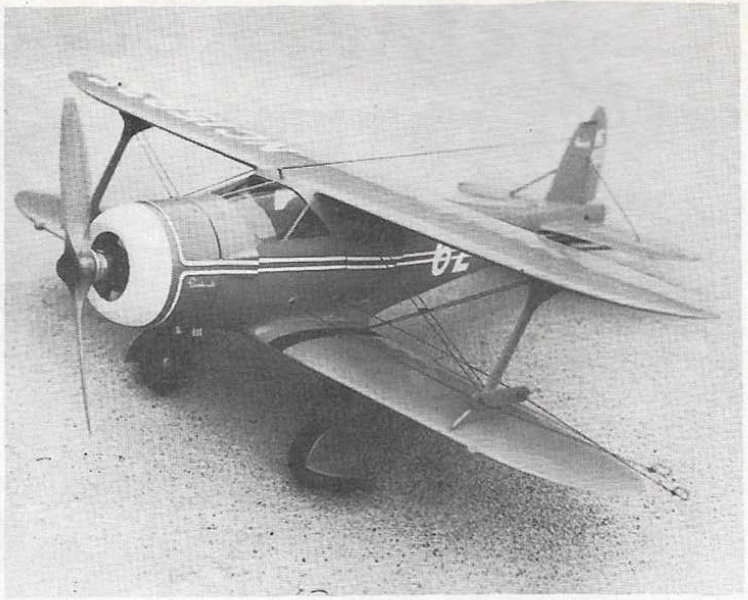
BELLCRANK MOUNT is ¼" x ¾" hardwood and is very firmly cemented to the keel and bulkhead. Attach the music wire lead out lines to the bellcrank and bolt the bellcrank loosely to the mount. Bend the control rod to shape and pass through the bulkheads to attach one end to the bellcrank and the other end to the control horn. Check the controls and then tighten the bellcrank to the mount.

ENGINE MOUNTS are passed through the holes in the bulkheads and held in place with several applications of cement. Drill a hole in each mount just behind bulkhead "B" and cement a ½" length of dowel into the hole so that half of the dowel protrudes.

Author fuels his Staggerwing before a flight. ¾ scale produces a very convenient size.



Full size Beechcraft panel to help you layout your scale duplicate.



Note eyelets in fuselage side where leads emerge, protect lines.

C/L STAGGERWING BEECH

This part is then cemented to the rear of bulkhead "B". The dowel relieves the engine force that tries to pull the mounts out of the bulkhead holes.

TAIL WHEEL STRUT is bent to shape and then sewn and cemented onto a piece of plywood. Cement this to the side of the keel very firmly.

FUEL TANK installation is next. Select a tank that will fit between bulkheads "B" and "C" if a complete cockpit is contemplated. We found a tank that fit beautifully and was slipped between the engine mounts. Attach plastic tubing for fuel supply, filling and vent lines to the tank and securely install the tank between the engine mounts. Use scrap balsa, cement to wedge and brace the tank firmly to the structure. Be sure to pass the fuel supply line through the hole in bulkhead "B".

PLANKING starts by cementing a strip to each side of the side strip that is already in place. Also cement a strip to the top and the bottom of the fuselage on the keel. Now cement a strip to each side of the top and bottom strips and continue in this manner until the fuselage is covered. It is important to cement each strip to the bulkheads and to its adjoining strip using plenty of cement. It will be necessary to taper and bevel the last several strips to insure a good fit. Hold strips in place, as they are cemented, with straight pins driven through the strip and into the bulkhead. Plank right over the windows and door. These are cut out later. Do not plank over the areas covered by the wings. Cut the tail block from two pieces of ½ inch balsa and hollow to clear the control horn. Cement in place and check the elevator movement. Trim and sandpaper to fair into the fuselage. When complete, wipe cement into any spaces between strips with the fingers. When dry press Plastic Balsa into any remaining cracks or spaces. Bend the air outlet fairings from aluminum or tin can metal and cement in place. Then, sandpaper thoroughly and brush on several applications of balsa filler coat. This must include the engine mounts and the front of bulkhead "B". Sandpaper lightly after each coat is thoroughly dry. Be sure the lead out wires emerge from the fuselage in the proper location.

COWL is made from rings cut from ¼ and ½ inch balsa. Cement the rings together with the grain of each layer running at right angles to the adjoining layer. Use plenty of cement and let dry overnight. Round off the front edges and sand smooth with a sandpaper block. Apply balsa filler coat on the inside and outside of the cowl.

WINGS are identical except that the lower wing has a bit of dihedral and contains the landing gear. The number of ribs used on our model is one half the number of ribs actually fitted on the full size Beechcraft.

Note thin aluminum sheet latch to hold cabin door when it's closed.

Beech C 17R in flight—note smooth level flight of this fine bird.

C/L Staggerwing Beech

Notice that the center sections of both wings are sheet balsa covered and the wing tips are ½ inch balsa. Trace and cut the ribs to shape and notch the leading and trailing edges to receive them. The upper wing leading and trailing edges are in one piece from tip to tip while the lower wing leading and trailing edges cut into three pieces for the center section and the outer panels. Also, at this time cut the lower wing joiners and the landing gear mount from plywood.

UPPER WING is assembled by cementing the ribs into the notches in the leading and trailing edges flat on the work table. Cement the tips between the leading and trailing edges and set the assembly aside to dry. Cover the center section area with 1/16 inch sheet balsa on top and bottom using plenty of cement. Hold in place with pins until cement is dry. When the entire wing is dry, carefully carve the wing tip and leading and trailing edges to the shape shown on the plans using an X-acto No. 26 blade or equal. Sandpaper the entire wing smooth using a block wrapped with sandpaper. Recement all joints.

LOWER WING construction begins by cementing the plywood joiner to the leading edge which

C/L Staggerwing Beech

automatically forms the proper dihedral. Make the center section first. Bend the landing gear struts to shape and solder the wheel cover mounting wire to them. Sew the struts to the landing gear mounts with strong carpet thread and plenty of cement. As an alternate, several "J bolts" can be used. The landing gear mount is built into the center section. A small notch must be cut into the bottom of the leading edge for the landing gear wire. Cement the L.G. mount into the openings in the joiners and complete the assembly by adding the ribs to the mount and the trailing edge to the ribs. Use plenty of cement on all center section joints, especially around the landing gear installation. Now, assemble each outer panel separately. Cement the ribs into the notches in the leading and trailing edges with the structure flat on the table. Add the wing tip and cover the center section with sheet balsa. Carve the leading and trailing edges and tip, and sandpaper smooth. Sandpaper the entire wing with sandpaper on a block of wood. Recement all joints.

WING COVERING should be any medium weight covering from silk to Coverite. We used the new Aristo-Craft Wing Skin wing covering with success. Be certain that the covering adheres to the two ribs that form the cavity for the wing struts. The covering over this space must be cut away on the top of the lower wing and the bottom of the upper wing in order to accommodate the wing strut at a later time.

CABIN WINDOWS AND DOOR outlines are carefully marked on the fuselage and cut out with a sharp single edge razor blade after the fuselage has received several coats of balsa filler coat with light sandpapering and is smooth. When cutting the door, care must be taken because of the fuselage bulkhead that is located at the door. An X-acto No. 27 saw blade will help accomplish this operation. Cement a layer of 1/16 inch balsa to the inside of the door to give it added body and strength. When dry, gently remove the piece of bulkhead that is attached to the door and fill-in the groove with some Plastic Balsa. Carefully sand the fuselage openings to remove any irregularities. Check the fuselage and add more balsa filler coat, thinned 10 percent, if it is needed. Add the cabin floor and then paint the cabin interior gray, tan or buff. Instruments can be commercial types such as Tatone or they can be home-made with thin brass washers as frames. Instruments should be assembled on 1/16 inch sheet balsa cut to the shape shown on the plans and painted black. When complete, cement in place after the control wheel has been added. Seats are cut from ½ inch balsa and painted brown. Cement ⅛ inch dowel to the seat bottoms, paint black, and cement the seats to the floor. Hinge the door to the fuselage using fabric or wire and sheet aluminum. A not-to-scale door spring latch was used to keep the door from flapping when the model is in the air. The side windows are covered with .020 to .032 sheet plastic. Cut the plastic and fit it into the openings and then apply cement along the edges.

FINAL ASSEMBLY begins by cutting the fin and rudder to shape, sandpaper to a streamline section, seal and install atop the fuselage. Be sure to offset the rudder as shown. Cut the strut openings in the wing covering and cut the two interplane struts from plywood. Sandpaper the struts to a streamline section and check the fit in the slots in the wings. Cut, sand and drill the control line guide. Seal the struts and guide. Check the fit of each wing to the fuselage and trim the fuselage as required. Cement the lower wing in place using plenty of the adhesive. When dry, cement the struts into the lower wing slots, very firmly, to the ribs and leading and trailing edges. The upper wing is now cemented to the fuselage top and to the wing struts. It is most important that the wing struts fit into the slots exactly as shown on the plans because they govern the

alignment of the wings; provided the struts were cut to shape accurately. When the cement is dry, several additional applications of cement must be added to the wing/fuselage and wing/strut joints. Each application must be absolutely dry before the next is applied. The meticulous modeler will care to paint the bottom of the upper wing center section in the color of the cabin interior before the wing is cemented in place. In fact, more cement can be applied to the upper wing/fuselage joint through the cabin door and windshield openings. Cement the control line guide to the wing strut as shown.

CABIN FAIRING PIECE is cut from ½ inch balsa and fitted in place over the wing and cabin. Cut and fit until it is perfect. Cement in place and sand smooth, then seal. The cabin fairing piece will require some filleting as described below.

FILLETS are very important on this model because generous fillets are one of the characteristics of the Beechcraft Staggerwing. The easiest method is to cut a pattern to the shape of the fillet from 1/16 inch balsa and cement in place to the wing and fuselage. This shape should include only that portion forward of the leading edge and to the rear of the trailing edge. When cement is dry begin applying Plastic Balsa, with the fingers, on the 1/16 inch balsa pattern. Gently press and wipe the Plastic Balsa along the wings and fuselage in gradual layers. Wait until each layer is dry before applying the next. Continue, molding with the fingers, until you have formed reasonably accurate fillets that are a bit oversize to allow for sandpapering. When the last application is thoroughly dry, the fillets are sandpapered. This is best done with fine sandpaper that is cut into small sheets of about 2 x 3 inches. Sandpapering can be done using the finger and ¼ to ½ inch dowels wrapped with the sandpaper. As sandpapering progresses it may be necessary to add a bit more Plastic Balsa here and there to attain the proper contours. The fin and stabilizer are also filleted in this manner.

PAINTING should not be started until all wood surfaces are grain-free, and covered framework is wrinkle-free. The entire model is painted medium blue after the cabin windows have been carefully covered with masking tape. First paint the front half of the cowl white in several applications. When dry, tape off the front and the remainder of the cowl is painted blue, inside and outside. When painting the model be sure to paint the front of bulkhead "B" and the engine mounts. After the first few coats are dry the windshield should be fitted, cut to shape, and cemented in place by overlapping the cabin post and cabin fairing piece. Hold in place with straight pins until cement is thoroughly dry. Very carefully apply some Plastic Balsa along the edges of the windshield where it overlaps the fuselage; side and top. Don't get any on the windshield. Place masking tape on the windshield and gently sandpaper the Plastic Balsa. Seal carefully, replace the tape, and paint the area. Paint the model a few more times. Thin the dope about ten percent for the last few coats or use a spray can if you have spraying experience. Rub the model gently with rubbing compound for a rich lustre.

DETAILS AND TRIM are added now. Add the wheels. Bend the wheel cover support wire to shape and solder or epoxy it to the main landing gear strut after it has been bound to the strut with fine soft wire for soldering or strong thread for the "5 minute" epoxy attachment. The lower end of the wire is wrapped around the end of the axle to retain the wheel and is held in place with epoxy or solder. Cut the landing gear covers to shape, sandpaper, seal, paint and cement to the support wire. Once in place it should receive several more coats of cement over the wire. Install the engine as close to the bulkhead as possible and spot cement the cowl in place after an opening has been cut for the engine cylinder. The wood should not be closer than ⅛ inch to the engine. We kept our cowl openings to the barest minimum for the sake of appearance. Add the tailwheel and check the balance. If tail is heavy add some lead weight to

C/L Staggerwing Beech

the bottom interior of the cowl; and if nose heavy add lead weight into the very rear of the fuselage by gently slicing off the tail fairing block to provide access to the fuselage rear. Replace the block when the weights are cemented in place. The radio aerial mast is cemented into the cabin fairing piece and painted blue. The tail struts are cut from 1/16 inch dowel and sandpapered on two sides to flatten them slightly, then complete the sandpapering to a streamline shape. Cut to length and trim the ends to an angle so they lay flat on the fin and stabilizer. Paint the struts. Trial fit in place and then cement to the fin, fuselage and stabilizer. When the cement is dry paint the struts again. The fuselage stripes are white with a very thin black outline. Use automobile pin striping available at any good auto accessory shop. This is made of Mylar and adheres tenaciously and is thin enough to be

stretched into curves. Buy ⅛ inch black and 1/16 inch white striping and cut the black to about 3/32 inch plus width. Lay the black in place first and then apply the white over it; centered carefully. This will automatically appear as a white stripe with a thin black outline. Solid color decal sheet can also be used; cut into strips. The aileron, trim tab and landing flap outlines are made with 1/32 inch wide stripes that are made by cutting the 1/16 inch stripe in half. Note that the aileron is on both surfaces of the lower wing and the flap appears only on the bottom of the upper wing. Wing walks are cut from black finishing paper and cemented in place on the lower wing. License and race numbers are purchased in decal form or cut from solid white decal sheet. The wheel wells on the bottom of the lower wings are cut from solid black decal sheet. Add all decals now. Wing wires are simulated with light weight black fish line or very heavy carpet thread. Press ½ inch pins or lils half-way into the wire attachment locations and tie lengths of the line to the head of the pins. Apply cement to the pin and push all the way into the wood with a needle-nose pliers. Do this carefully so you don't slip. A very tight installation should result. Cut the streamline spreader from 1/16 inch dowel and cement to the junction of the gear struts. Tail wheel doors are cut from sheet aluminum or from a tin can and the sharp ends forced into the fuselage with cement. Paint blue. The tail light can be a white round head pin. Wing light tips are painted red and green to complete the model.

FLYING should be from a paved surface such as a supermarket parking lot when it is closed; schoolyard; etc. The first flights should be conducted on thirty-five foot lines and progressively lengthened to sixty feet as you become familiar with the model. Braided stainless steel lines of .010 inch diameter are recommended as minimum. The rather low position of the bellcrank will make this Beechcraft tend to fly level, even at high altitudes, rather than bank toward the flier so taut lines will be pleasantly experienced. The model is faster than the average biplane, but then, so was the full size beauty.

Happy Flying.

ACKNOWLEDGEMENT

The Author extends his thanks to Frank Pedroja, J. H. Coffman and the Beech Aircraft Corporation for their generous and kind cooperation in the preparation of this article.