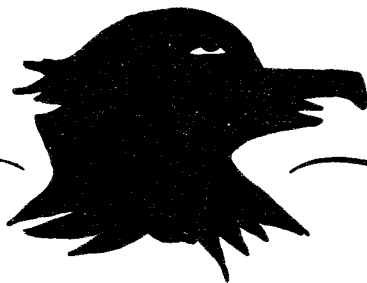


Scanning By Hlsat



BLACKHAWK

Two can be better than one, as shown by the Blackhawk, a 1/2A stunter that doubles your pleasure! It's a little bird with big ideas.

BLACKHAWK

TYPE: 1/2A Control Line Stunt
WINGSPAN: 36 3/8 inches
WING AREA: 230 square inches
LENGTH: 21 inches
AIRFOIL: Fully symmetrical
ENGINE: Two .049-.051

• It's been a pleasure to write this article about a beautiful airplane and its designer, both top-notch additions to this hobby. For those of us who are old enough to remember the old "Blackhawk" comics, the model described here is a return trip to adventureland. It is whimsically patterned after the twin-engined, twin-finned airplanes that the Blackhawk squadron (a dashing bunch, always ready for excitement and action) flew from one episode to another. The Blackhawks were special, and this model has those same distinctive lines. It is not a scale ship—it isn't even a semi-scale ship—but it is a flying machine that sure does make one think of taking to

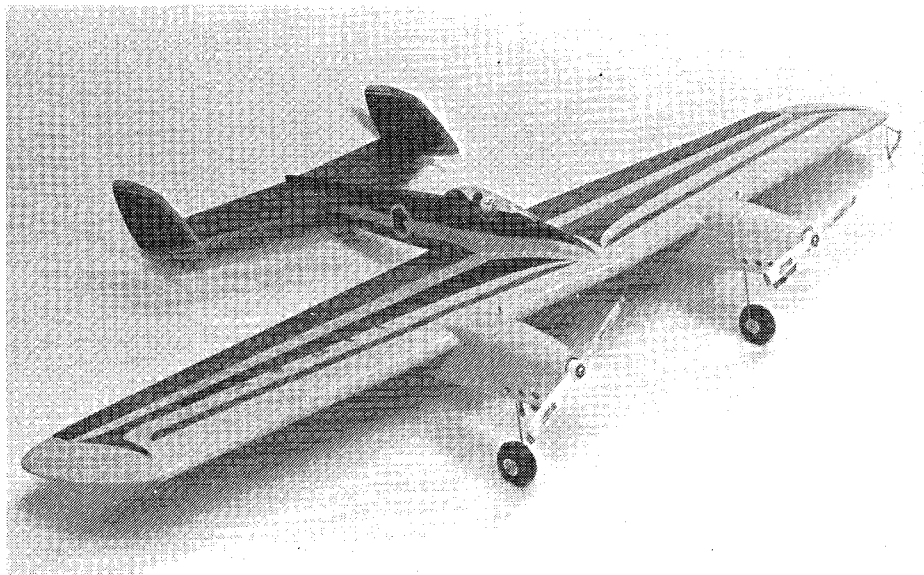
the skies, with the familiar yell—"Blackhawk-k-k!"

Considering the current interest in 1/2A Stunt planes, this model has appeal for all, including the younger set. It has a symmetrical airfoil and flaps, and is a full-stunt type model with scale appearance. It even has the Blackhawk insignia! This is not a beginner's model, however, but is well worth the time and effort expended by any modeler with average building skills.

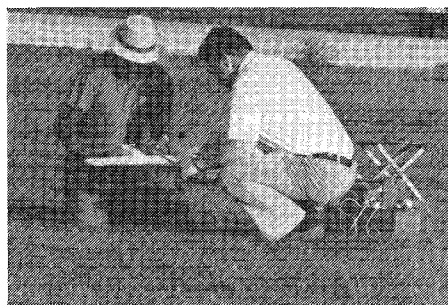
Some time ago, Harry Higley mentioned to me that *M.A.N.*'s Editor was looking for some unique and interesting twin-engined CL models to present. I immediately thought of Cal Shumate's line of models. Over the years, Cal has designed and built twins in all sizes from 1/2A to .35 cubic inch displacement. Cal's .15-size ship had just bit the dust a short time earlier (that was the one I had in mind, at first). Cal then told me of a new model he had under construction, and I saw it shortly thereafter at our Chicago Model Masters club meeting during a "show and tell" session. He graciously consented to supply me with photos of some of his twins, past and present, which I forwarded to *M.A.N.* I thought they would want a larger displacement model, but they picked the Blackhawk! Surprise, surprise! Now what do I do? "Forget the theory, and get the thing built, Jim!" said Cal. He doesn't waste much time on extraneous matters—he saves his energy for the models themselves, where his building reflects much care, patience, and attention to detail.

Cal could only provide a penciled outline of the wing and a couple of sketches of the engine nacelle construction. I then "borrowed" his model and hung it up next to my drawing board.

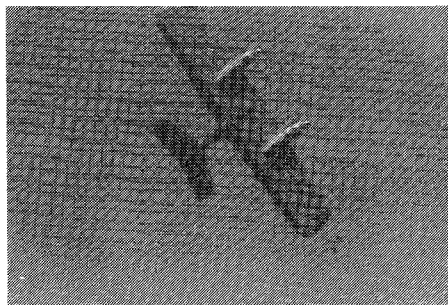
During the development of the engineering drawing, I kept scratching my head over something I noticed that was unusual. The fuselage narrowed down nicely at the tail; the elevators were swept back, which implies the use of split-horns—but there was no room for split-horns! Yet when you pulled the leadouts, the elevators moved. Impossible! I asked for permission to use a razor blade, and after peeking, lo and behold, I found that it does work! (The explanation can be found



Blackhawk in all its finished glory. Plane has a trim and competent appearance.



Cal Shumate and Harry Morrill get their act together at Model Masters' field.



Wingover gives Blackhawk an opportunity to show off its twin 1/2A engines.

BLACKHAWK

in the construction portion of this article.)

Cal Shumate (or Calvin, as I know him) was, years ago (I'll get into trouble if I tell you how many), one of Klin's Fly-Boys. Millie Klin had a hobby store in her husband Ed's sporting goods store and she "adopted" all the neighborhood kids. We flew in Jackson Park, across from the lake, on the south side of Chicago. Cal went to work for Monogram Models while in his teens, displaying innate abilities for careful and precise work. He began to provide master models for their plastic airplane kits. Cal is still with Monogram today, and throughout his distinguished career has contributed his skills to many of their plastic kits.

Klin's Fly-Boys became the Chicago Model Masters Flying Club, and Cal held office many times over the years, serving as contest director, executive director, scale judge, activities coordinator, and instructor—teaching youngsters in schools and park district programs how to build airplanes. He was one of the earliest members of the Scale Masters Club and is still

active with them. Cal is an all-around "good guy"!

We'd better get to the construction of the model. There's something about building the wing first that drives one to complete the model and get it into the air, so that's where we'll begin.

WING. Start by cutting out wing ribs from $\frac{1}{32}$ " sheet medium balsa. Make two of each rib. There are two favored methods of transferring rib templates to balsa: the stack method and the template method. If you use the stack method, cut out a $\frac{1}{16}$ " plywood template of the root rib and the tip rib. Stack balsa blanks, one for each rib, and sandwich between the templates. Be sure that the templates are parallel. Now carve the ribs, using the templates as guides. Sand to finished shape and cut out notches with a razor saw. Do this for each wing panel. (Note: If ribs for both panels were carved at once, there would be a slight difference in panels. This may or may not be objectionable, depending on your point of view.)

For the template method, rubber-cement the rib drawings to $\frac{1}{32}$ " to $\frac{1}{16}$ " plywood. Carefully cut out each one to use as a template. Sand the edges smooth. Now each can be used to cut out ribs individually. Use a new blade when cutting

ribs, and be careful not to nick your template. Holes for LE wires may be punched out with a paper punch or cut out with the knife.

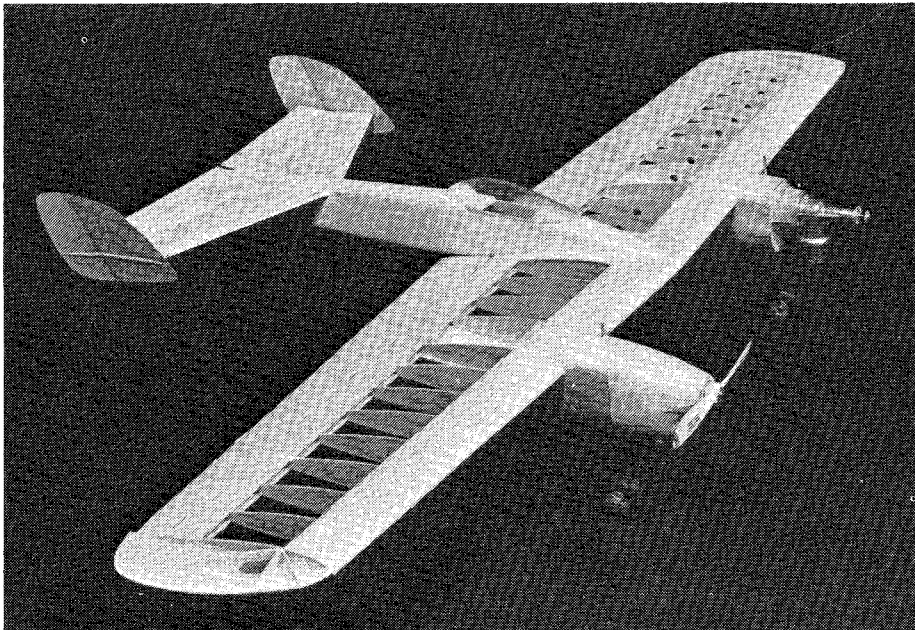
Cut the full-span TE sheets from soft or medium balsa, $\frac{1}{16}$ " x 1" x $32\frac{3}{4}$ ". Spars and LE strips are cut slightly longer than the half-span length on the plan; they'll be trimmed to length after assembly. Wing tips, tip gussets, and flaps can all be cut out but placed aside for now. Pin the TE sheet down to the board, and begin cementing the ribs in place. Pin the bottom spars down to use as a guide in locating the ribs and then glue the ribs to them, but do not glue the spars together at the center just yet. Now add the top spars, top TE and LE strips, using straight pins and rubber bands, or masking tape. When this is dry, prop up the wing tips with $\frac{1}{16}$ " scrap balsa. Now glue the spars and LE strips together at the center, let dry, and remove the wing from the board. The bellcrank will be installed before adding the leading edge sheeting. Glue the $\frac{3}{32}$ " plywood bellcrank mounting pad between the center ribs and even with the top surface of the bottom spars. The rear of the mount should be flush with the bottom of the ribs. Glue a $\frac{1}{16}$ " scrap piece at front, also flush.

Attach the leadout wires or cables to the bellcrank. Thread the wires through the holes in the inboard ribs until the bellcrank is in place. Mount the bellcrank with machine screw, washers and nut. Now place the wing back down on the building board with shims in place, and cement the top surface sheeting. When dry, flip the wing over and cement the bottom surface sheeting in place. Trim off any excess balsa, and trim the leading edges and spars flush with the tip ribs. Glue the $\frac{3}{32}$ " sheet wing tips in place. The leadout wires should pass under the inboard wing tip.

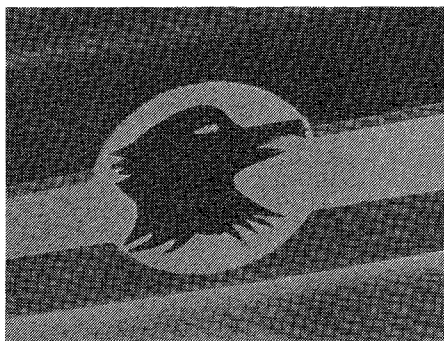
Add the $\frac{1}{16}$ " tip gussets, top and bottom, and the lead weight at the outboard tip. Install the flap pushrod at this point. Now add $\frac{1}{16}$ " sheeting to the bottom of the wing at each nacelle location. Complete the sheeting with $\frac{1}{16}$ " sheet on the center ribs, top and bottom. Cut a slot for clearance of the flap pushrod. Next assemble the flaps and flap control horn. Drill a $\frac{1}{16}$ " diameter hole at the location shown on the plan. Insert the horn temporarily in both to check the fit between the rear of the wing tips; also check the distance at the center for clearance of the fuselage. Now cut a groove in each flap, so that the horn fits flush with the edges. Reassemble with glue in the holes and slots. Cover with gauze or cloth tape and fill with a skin of glue.

The original model used Klett type plastic hinges for the flaps and cloth tape hinges for the elevator—your choice here. If you choose plastic hinges, 5-minute epoxy or an aliphatic resin may be used. Epoxy sets fast and extreme care must be exercised to assure proper alignment; an aliphatic resin may not be as strong, but

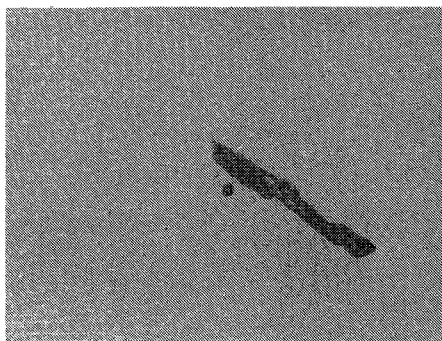
(Continued on page 108)



Framework neat and not too difficult to construct; no excess fat on bird's bones.



Close-up of hand-cut insignia; excellent finishing workmanship shows here.



Each viewing angle of this twin-engined beauty has a different look.

BLACKHAWK

(Continued from page 46)

gives more time for realignment. Cut slits in the trailing edge and flaps at the proper locations. Make a trial assembly without using glue. Check for freedom of control movement, and make any necessary adjustments before pulling it apart and gluing it back together. Before the glue has dried, check for freedom of movement again. When dry, hook up the flap pushrod and horn. Use either a 1/2A retainer or a small washer soldered in place.

STABILIZERS. Cut out the two parts of the horizontal stabilizer and the two elevator halves. Glue the main stabilizer to the front piece; sand to shape.

Now comes the part I mentioned in the introduction: making the "elevator horns." Start with 1/32" music wire. It's necessary to make two 1/32" i.d. loops in the wire. If you have a pair of needle-nose pliers with a 1/32" diameter rounded end, no sweat. If not, follow this procedure: Drive two small diameter steel brads into a piece of scrap hardwood block, about 1" apart and with about 1/8" sticking up. Cut off about a 6" length of music wire and wrap a loop 1 1/2 times around one pin, using the other as an anchor. Remove the wire. Notice that it has expanded a bit. Snip off the end and put a short length of wire through the loop, and with pliers now squeeze the loop tighter all around. Take your time doing this and get a smooth, snug fit. (No slop!) Make two of these loops and then bend each to the size and shape on the plan. Make one left-hand and one right-hand. Cut off excess length. Now mark the locations of the 1/32" dia. holes to be drilled into each elevator. Drill the holes, cut the grooves, and place each hole into an elevator. Check your accuracy against the plan before gluing these in place. When completed, cover each with glue and cloth hinge material. Rub on a glue skin covering. When dry, lay each elevator upside down on board and check to see if they are aligned vertically. If not, bend slightly to match. Now attach them to the horizontal stabilizer with cloth hinges.

FUSELAGE. First cut out two fuselage sides and formers F-3 through F-6. F-6 is 1/32" plywood, the others are 1/16" balsa. Glue formers F-3, 4, and 5 to one side piece and let dry. While waiting, bend the 1/32" music wire tail skid, drill small holes in former F-6, and mount the skid with either copper wire or strong thread and glue. Cement the other fuselage side to the assembly and pin upright to the board. Glue the fuselage ends together and check alignment. While all this is drying, bend the elevator pushrod. Don't forget the zigzag bend—it is necessary for final adjustment of the elevators. Before binding and soldering the open end, slip the loops of the elevator horns over the wire and slip around into position. The two loops should be approximately 1/8" apart with the eleva-

tors flat. In operation the loops will close together on full-up and spread apart to about 1/4" on full-down. Now bind the end of the pushrod with copper wire and solder.

Glue the fuselage to the center-section top sheeting. Check alignment carefully. The fuselage is a bit flimsy at this point, but don't fret. Cut out a block for the nose deck from 3/8" soft balsa. Start with a 4" long piece a little wider than the fuselage. Carve the front of it to match the surface of the wing. When it matches, hold it in place and mark the underside of it along the fuselage top. Trim the sides slightly oversize and then carve the top of the block to rough outline and shape. Now glue the top nose block in place.

Next install the pushrod by first sliding it through the holes in formers F-4 and F-5, then insert the end into the top hole of the flap horn, and add a retainer to the end or solder on a small washer. Now glue the horizontal stabilizer in the long notch at top rear of fuselage. Again check alignment of both the fuselage to the wing and the stabilizer to the fuselage. The three components should be square when viewed from the top, and the wing and stabilizer should be parallel when viewed from the rear. Make any adjustments required before the glue dries. Check alignment of the flaps and elevators. Hold the elevators in neutral position and see if the flaps are also at neutral; if they're not, adjust the angle of the zigzag bend in the pushrod to compensate. The total control travel is fixed, and is not affected by the zigzag bend.

Now it's time to add the bottom block and sheeting. From 1/4" soft sheet, cut out a blank longer than needed, then carve the front end of it to fit and match the bottom rear surface of the wing while lying against the bottom of the fuselage. When it does, hold it in place and mark the outline of the fuselage bottom. Trim slightly oversize. Before gluing it in place, cement the tail skid and pad (F-6) to former F-5. Cut a slit in the end of the bottom piece to allow clearance of the tail skid. Now glue the bottom in place. Cut two pieces of 3/32" medium balsa so that the grain runs across the fuselage. Wrap around the end and glue in place. Cut out the cockpit deck from a short piece of 1/4" soft balsa, and glue in place. When everything is dry, trim off all excess, carve both top and bottom of fuselage to rough shape, and sand smooth. Take the canopy you've chosen and try it on for size. This is a fighter-type bubble canopy, placed backwards. A canopy back stop may be carved of scrap balsa and glued in place, or the canopy may be fitted completely down to the fuselage at the rear, and the back stop painted on.

A procedure that is faster, but requires more care and skill, would be to build the fuselage separately, adding the pushrod and stabilizer assembly as you go. If you choose this method, make a trial assembly of the controls and check vertical align-

ment of the flaps and elevators before gluing on the 1/4" bottom deck. Also, the bottom should be only tack-glued in place, temporarily, while shaping and sanding the fuselage. Follow all the preceding steps for constructing the fuselage, but omit the ones joining it to the wing. After it is assembled and shaped, carefully carve the front end to match the rear surfaces of the wing. (This is the part that requires precision, and should only be attempted if you have good carving skill.) The use of a spare wing rib or airfoil template helps a bit in establishing guidelines for carving. After assembly, snap the pushrod in place and check surfaces.

NACELLES. First note that the nacelles are not identical, but are opposites—one left-hand and one right-hand. This is because the wing spars are swept back slightly, and the nacelles are anchored to the spars. Construction is very simple, consisting of a firewall, one former, two hardwood beams (hard balsa may be substituted), a 1/64" plywood bottom cover sheet, and soft balsa blocks.

Start by cutting out the firewall from 3/32" plywood, and the former from 1/16" balsa. Place the engine assembly of your choice on the firewall and mark the location of the mounting holes. Install 2-56 blind mounting nuts in the back. Bend two landing gears from 1/16" music wire. Mark the locations on the firewall and drill holes. Bind the landing gear to the rear face of the firewall with copper wire. Now make two of each length of the beams. Lay 3/16" sq strip on the plan to get the correct angle at the rear. Now cut out four tank platforms, even if you don't plan to install tanks—they are used for alignment in assembly, and for rigidity. Assemble one left-hand crutch and one right-hand. Include 1/2A stunt tanks if you planned to use them. Solder extensions to the tank as shown in the exploded view on the plan, before installation. While drying, cut out the nacelle bottom covers from 1/64" plywood. When the crutch assemblies are dry, wrap the bottom covers around them and mark the location of the hole for the overflow extension tube. Drill the holes and glue the covers in place. Use masking tape to hold in place.

Cut away the bottom wing LE sheeting at the nacelle locations. Cut between the ribs but not past them. Do not cut the spars or the leading edges. Cut to be flush with the spars, leading edges, and ribs. Now make a trial assembly of the nacelles to the wing. The rear face of former F-2 will be cemented to the front faces of the top and bottom spars. The beams will butt up against and be cemented to the bottom edge of the leading edges. When you're satisfied with fit and alignment, glue them in place.

While the nacelles are drying, cut out soft balsa blocks for the rear nacelle sections, the nacelle tops, and the nose cowls. Carve each one to fit the nacelles before carving to rough shape. Cut out the nose rings from $\frac{1}{16}$ " plywood and glue to the cowl blocks. (The length of the cowl depends on the engine assembly you've chosen; see alternatives on the plan.) After the outer shapes have been carved and sanded, begin to hollow out the rear section and the cowling. Remember, lightness counts, so carve to approximately $\frac{1}{8}$ " wall thickness on the sides. In addition, carve the cowl to fit your engine (with the needle removed). Holes must be made to clear the air intake, cylinder head, and needle valve, and also for the exhaust. Decide, for your engine, whether you want a removable cowl; if so, make the necessary provisions.

FINAL ASSEMBLY. Cut out the rudders from $\frac{3}{32}$ " medium balsa, sand smooth, and glue in place. Add the balsa gussets, made from $\frac{1}{4}$ " sq balsa, for strength. Now go back over the entire model and sand to a smooth finish wherever necessary. Mount the engines, cowlings, and wheels.

Calvin's original model was covered with Japanese tissue and dope. If you choose to use a heat-shrink mylar, select the thinner, lighter weight types. Silkspan and heat-shrinkable silkspun coverings are also alternatives. Colors of the original model are light blue wing and nacelles, with dark blue tail and fuselage top, and red flaps and fuselage bottom. Wing trim is red and dark blue. Rudder trim is light blue. The Blackhawk insignia is hand-painted. The pinstripe on the tail is tape. This is a real snazzy-looking model!

Make the loops in the leadout wires and check the balance. It should be between 20% and 30% of the wing chord. Add ballast, if necessary. Now take this model out to your favorite flying field and check out the looks of admiration from your buddies for this little model with big ideas! ■