PHOTOGRAPHY: DOC MATHEWS

Kloud King XL

This 1938 Mickey DeAngelis design has been enlarged and modernized for R/C assist to use .40 engines as per SAM rules/**Doc Mathews**

The current surge of interest in Radio Assisted Old Timer Free-Flight is of considerable delight to those who have been extolling the fun aspects of the hobby for several years. We have all felt that any activity with such a high degree of enjoyment in relation to building time, and expense, was certainly destined to undergo a rapid growth in popularity. The 1979 flying season has seen our prophecy come to realization. From coast to coast and border to border converts are shifting from more taxing modeling activities to the low key R/C OT Free-Flight events where model longevity is often measured in years, not months. Where a Free-Flighter for whom retrieval of a max flight has become physically exhausting, if not downright unhealthy, can now fly his model in a thermal, or thermals, for minutes and even hours, then land it right at his feet. A situation in which a few dollars of materials, a hot pattern flyer's old radio and engine and a small local field can be combined in that magic recipe that is so satisfying to fly. A little ingenuity in this direction produces boundless quantities of fun, pleasure and fulfillment.

The design presented in this article is an effort to further expand that surge to include the literally thousands of potential builders who own, or can obtain, a sport sized .40 engine. The immense popularity and availability of these engines is best illustrated by the fact that K&B's #8011 Sport .40 is the longest run in continuous production and the most owned engine in world history. To make this even more astounding, one must also recognize the popularity of .40's of other manufacture, both domestic and imported. Stangely, only a very few Old Timer model designs are of suitable size for a .40 powerplant. Under S.A.M. rules a model used in competition must have 225 square inches of area for each .10 cubic inches of displacement. In other words, a .40 powerplant must have a model of 900 square inches or more. Conversely, the majority of designs from prior to December 31, 1941 (the S.A.M. cut-off date) are much too large for optimum performance with a .40. As an example, the Cumulus and Miss America have well over 1100 squares.

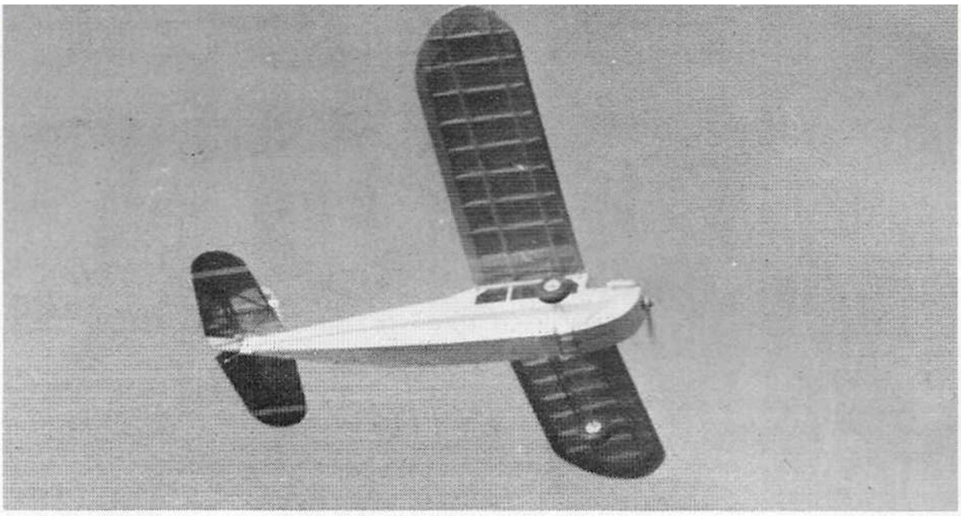
This size-power disparity lead to the development of the Kloud King XL (XL is the Roman numeral for 40). My friend Bruce has been building and flying (more or less) a series of .40 sized trainers over the last two summers. Actually, to be more specific, he has been building and repairing a lot more than he's been flying. This increasingly frustrating chain of events has been in marked contrast to the low key get it out, strap on the wing, fire up, ride the thermal and land at my feet kind of thing I do. Bruce became increasingly more quizzical about our no winch or hi-start "glider" activities and eventually was bitten by the Old Timer bug. He came to me asking what he could build for his old faithful K&B 8011, the only engine he owns. Having gone through the process of examining the majority of available prototypes, I advised him that those designs suitable for his powerplant were for the most part rather difficult to construct, and were, frankly, possibly over his head in the skills required.

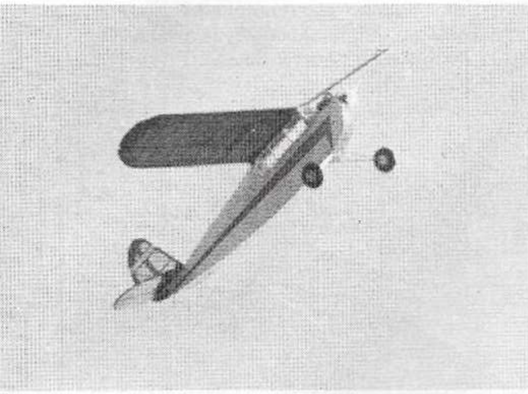
After several bull sessions on the subject Bruce mentioned one evening how nice it would be if Mickey DeAngellis had designed his "Kloud King" in a suitable size. As a hopeless plan scaler up or downer these words precipitated a dive for that old issue with my trust scale ruler. Sure enough, a little action with the calculator revealed that one could enlarge the original Kloud King to 900 squares with relative ease.

Bruce's immediate enthusiasm prompted me to draw up a further simplified model, incorporating several additional refinements which were learned through trial and error with previous aircraft of this type. It was built up in remarkably short order by Bruce and was ready to fly in the Spring of

1979. I admit to a certain degree of second guessing myself as I loaned Bruce a Fox .29 for the initial flights, fearing a .40 would produce something of a hairy monster. The initial test flights were highly satisfactory with the .29, so at that point we switched to the .40. About the only difference in trimming seemed to be in the throttle setting. The .29 machine needs to be at full throttle for take-off, whereas 65% is adequate with the .40. Climb out is of course much steeper with the .40, but any power under a 6.5 K&B should produce a docile thermal-loving model for anyone who builds her.

Although markedly altered structurally, the Kloud King XL is an exact scale-up of DeAngellis' 1938 classic design and it is perfectly legal for S.A.M. competition.





If a picture is truly worth a thousand words, then these three should be good for a volume. Still one of the prettiest sights in the hobby. The thirties feeling is intact (**below**).

In general

The principal adhesive used throughout is aliphatic resin (Sig, Tite-Bond etc.). Epoxied joints are made with conventional slow setting formulas, *not* the 5-minute variety. The term C.A. as used in this text refers to Cyanoacrylates (Hot Stuff, Jet, etc.). This model uses a great deal of 3/16" x 3/16" sq. spruce and although 36" lengths are useable, 48" sizes would be more helpful in constructing the fuselage. You will need several sheets of the speckly wood referred to as "C-grain", as well as several scrap pieces of other types. Always be certain the grain direction runs as drawn for a given part.

The plywood used for the fuselage siding is not 5-ply aircraft type as used for the bulkheads, rather it is lightweight paneling or construction plywood "scrounged" from a cabinet maker or construction site. The ply we are using presently is made up of one thin layer of mahogany, a thick inner section of some soft material (poplar?) and a third layer of pine. The weight of the 3/16" material is about that of 1/8" aircraft plywood as we normally use. In essence what we have here is light-ply in 3/16" rather than 1/8" thickness.

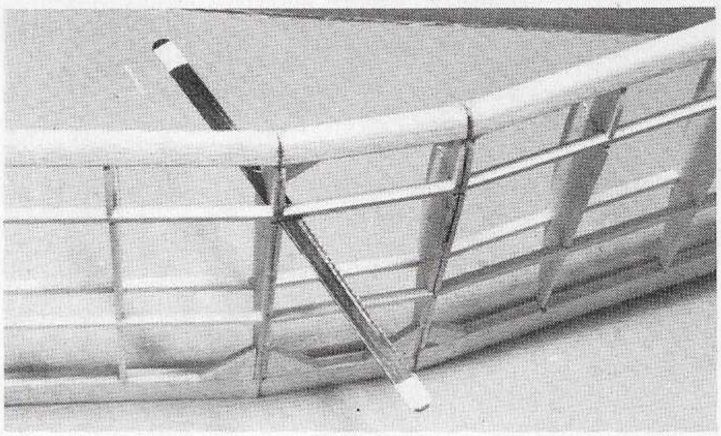
Tail Structure

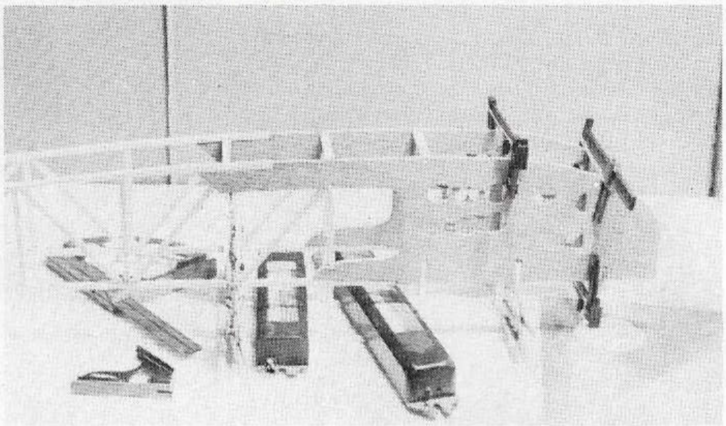
Make the stab and the rudder first, as they will be needed in the fuselage final stages. The outlines are laid down, the tip sheets trimmed to fit and the ribs and cross braces added, all while the assembly is pinned to the plans. Mark the position of the hinges with an appropriate tool but do not install them permanently yet. Cut the notches and drill the approximate holes for the Sig offset horn or the optional wire joiner and epoxy into place. When it has cured, cut the center-section, sand the tips to outline, final sand and cover. At this point install hinges back into the slots, drill 1/16" holes down into the hinges and C.A. toothpick pieces into the holes for a durable perament hinges.

The vertical fin and rudder construction is nearly identical, with the need for some special attention to the cut-out and stub set-up for locking into the stab. Use the longest available nylon horns as these surfaces are not small; although the model does not fly very fast. Start your flight testing with the connectors in the outside holes for minimum movement.

The fuselage

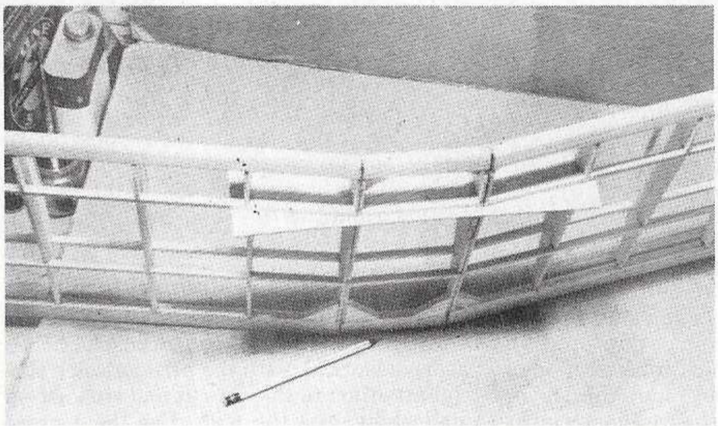
Cut the formers from their respective sizes of wood. That is, kind of make yourself a kit. We prefer to make copies of the parts off the

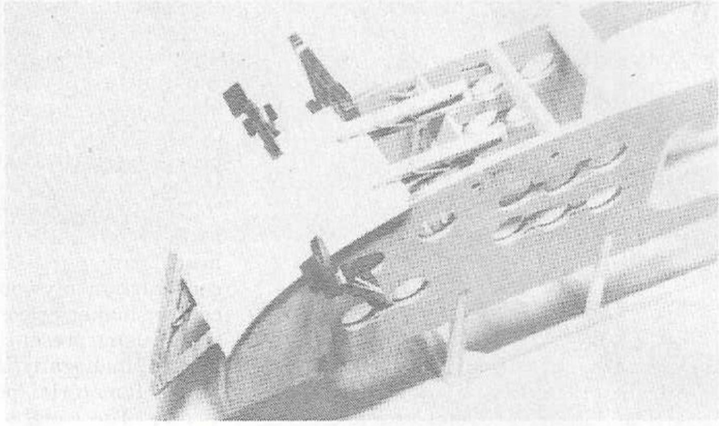




These two pictures, (**above** and **below**), show the method used to cut the slots for the plywood gussets. Two hacksaw blades are tapped together to achieve the desired thickness of cut. Plans clarify.

Here we see the fuselage crutch taking shape (**above**). Note the use of old, burned out, flourescent light ballasts as weights. Accuracy is a must. Kraft clamps and clothes pins secure the plywood bottom (**below**).





plans on a copy machine. These are first cut to rough outline using a scissor, then sprayed with 3-M Spraymment. Stick it onto the wood, cut the part and peel off the pattern. A simple and accurate method of creating a kit of parts, and vastly cheaper.

Always be sure to drill appropriate holes at the time of fabrication. Avoid the age-old problem of the forgotten and inaccessible hole. The throttle line holes are positioned to match the engine used. A four ounce Sullivan tank will provide flights of ample length for the beginner and those interested in riding thermals. If the builder prefers a six-ounce tank it can be made to fit.

Cover the plan with Saran Wrap. Place the previously cut 3/16" plywood siding over the drawing and pin around it to hold it in position. Assemble one side and allow the glue to set (cure). Four to six hours is suggested. Remove the pins that will obstruct construction of the second side. Cover deep joints with small pieces of masking tape and build a second side directly over the first. Allow to dry overnight. Separate the sides using a table casing knife. Gently pop apart, then remove the masking tape pieces.

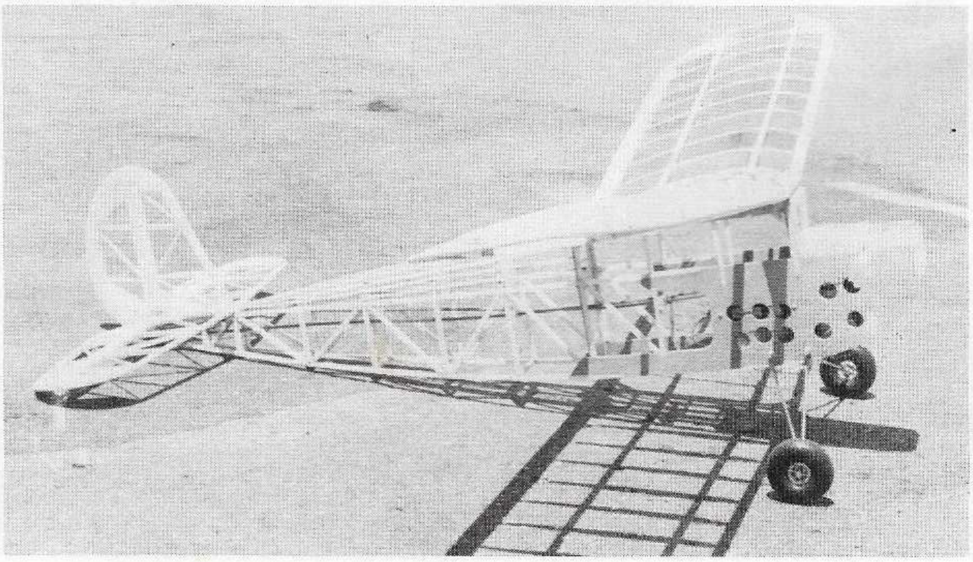
Trial fit the bulkheads into their respective notches, adjusting for a snug but non-binding fit. Glue bulkheads to the sides with fuselage wing rails pinned and weighted to the top view drawing. Use clothespins and masking tape to hold everything in place. Square up with a triangle and an adjustable carpenter's square. Just be certain to keep the forward section square in all dimensions as it sets by adjusting the clothespins and tape for optimum alignment. Complete all cross-braces etc. back to bulkhead C. Allow everything to set for at least 24 hours.

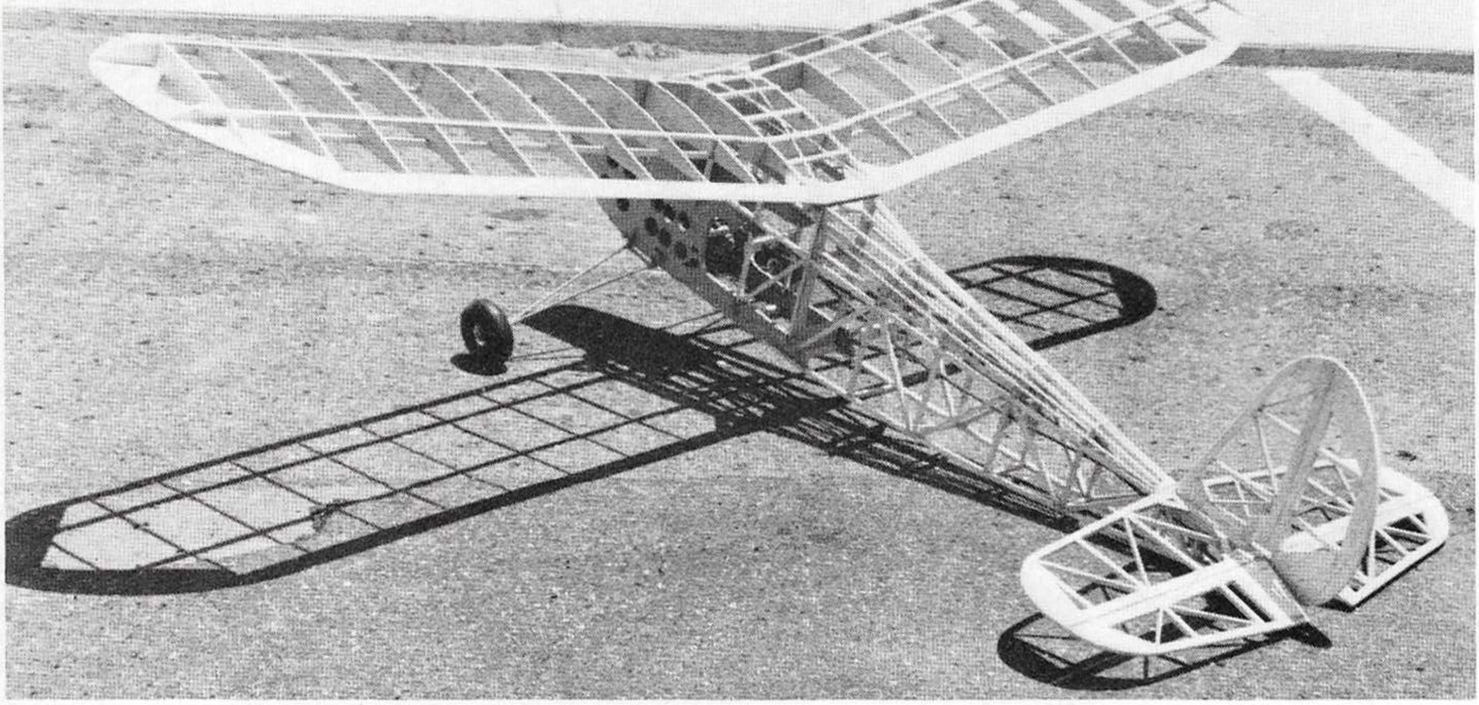
With the fuselage still on the board, locate a mid-line on the bottoms of the three bulkheads. Lay a straight edge (yard stick etc.) over the marks and tape it in place. Pull the tail post ends together to meet directly over the center of the plan view. Check squareness in the vertical plane with the triangle, then glue the tail posts together. Mark the mid lines on the cross-pieces of 3/16" sq. spruce, match them to the stright edge and cement in position.

The 1/16" plywood bottom is epoxied to the siding by flexing it in cross-grain. Hold in place with masking tape as it cures. The tail skid mount of 3/32" ply can be marked directly off the fuselage bottom, cut and epoxied in place. Mount the wire after the covering has been completed.

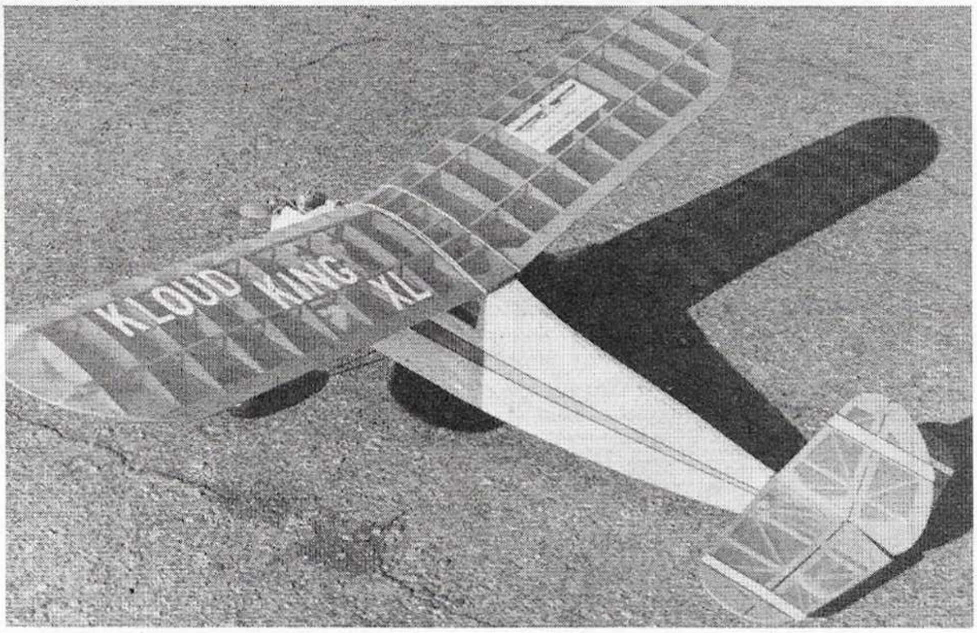
Remove the fuselage from the board. Build up a tank hatch (see cross-section and photos) using ½" sheet, ply former D and 3/8" sq. bass wood. Cut and carve the nose blocks and hatch, smooth contour after spot gluing. Drill gussets for the 3/16" dia. dowel wing hold-downs and try for contact with spruce. Do not permanently affix dowels until after covering. In-fill the tail area for the stab mount with 3/16" cross-grained balsa.

The turtle deck formers are notched only for the top stringer initially, the others are makred in pencil and cut as the stringers are actually added, in the interest of the straightest job. The top three stringers should be of spruce to prevent fracturing in





The completed framework ready for covering (**above**). Note the geodetic ribbing in the stabilizer. Doc is well known for his neat finishes. Transparent covering lets us appreciate the wood work (**below**).



handling, but not all stringers need run all the way back if you're interested in saving a little aft weight. If weight isn't a balance problem with your engine we recommend all spruce stringers.

Temporarily install the engine, batteries and receiver with the landing gear and tail surfaces taped in position. Adjust the servos and mount to obtain a C.G. about ½″ forward of the final psoition (this allows for weight build-up in covering and finishing). Slide the tray fore and aft, then drill through the ply siding into 3/8″sq. bass wood rails and secure with sheet metal screws and epoxy. Cut and adjust the Nyrods to length. Install scrap balsa guides and epoxy outer nyrods into final position. They exit at the rear through scrap guides as visible in photos.

Wing structure

Notch the tapered trailing edge stock 3/16″ and pin in place over plans that have been covered with Saran Wrap. Next, cut the tips to fit inside leading and trailing edges, but do not bother with the outline until assembly is completed. Pin the bottom spars over the plan using ribs to accurately position them. Glue the tips to top and bottom spars as well as the trailing edge.

Glue the ribs into the T.E. notches and over the lower spars, using pins to insure alignment. Notch the pre-formed L.E. stock 1/8″ and glue in the front of the ribs, blocking as required. With a sheet jig angle, slant the two ribs that butt against the center-section. The center section proper can be fabricated with either the left or right wing panel, then cut apart after assembly. The right wing panel is drawn. The left panel may be traced on the reverse side of the plan sheet, picking off key points and outline while the plan is held against window glass.

Top spars, any tip filler sheet and 3/16″ gussets are now added. If a powerplant stronger than a K&B .40 is to be used, consider shear webbing on the front spars with vertical grained 3/32″ sheet. This would be particularly advantageous if heat shrink covering is to be used.

Remove panel or panels from the plan, separate the center-section and sand center faces flush using a sanding block and the table's edge. Block up the wing tip for the proper dihedral. With this determined join the wing panel to center-section using epoxy. Repeat for the opposite wing. The plywood wing gussets will of course help the whole procedure. Trim the ribs away as necessary at the time of their installation.

If you were lazy and left the trimming of the sheet tips to the end, now is the time. Transfer the curvature to the tip with a pen and paper outline and use a razor, Dremel saw or coping saw to make the cut. Sand and prepare the wing for covering. Extra 3/16″ sq. balsa strips reinforce the center-section and stand up to the pressure of the wing rubber. Cover the wing with your favorite material per the manufacturer's suggestions. Epoxy 1/16″ dia. music wire at the trailing edge to prevent wing hold-down elastics from cutting into the wood.

The finish

The model in the photos is finished in transparent MonoKote on the wings and tail. This was applied in the instructed manner, with the exception that the wood was given a coat of Coverite Balsa-Rite in an effort to control "creeping" of the film. The fuselage is covered with polyester sheathing (also known as dress lining or acetate coat liner) purchased for $1.29 per yard at a local sewing department store. The fabric can be applied over a pre-doped structure in the classic silk technique, or stuck to a framework coated with Coverite Quick-Stik using the Coverite hot iron technique.

The fabric is tightened with an iron or with several coats of dope, then filled with plasticised clear nitrate dope. Color is white polyurethane.

Letters and numbers are EZ-Letters Quick-Stick from an office supply. They are die-cut on sheets and are adhesive backed, easily positioned on MonoKote by spraying with water and adjusting them before squeezing out the water with a sponge. Apply a heavy coat of epoxy or polyester resin to all areas that will come in contact with raw fuel.

Well, time now to balance up, check it over and go fly the bird.