HOW TO BUILD FROM PLANS
BOB NELITZ' FANTASTIC J-3 CUB

Here's how the former world champion developed and built his gorgeous Piper Cub

OF ALL the light aircraft produced in the last half century, I'm sure the most familiar is the Piper Cub. It became synonymous with all light aircraft and has probably been modeled more often than any other aircraft.

My acquaintance with the Cub first came in the early '50s when I was serving my apprenticeship in the aviation business. I assisted in recovering and restoring a number of Cubs. One of the reference manuals we used was the Piper Service Manual. This publication had enough diagrams and drawings to build an exact scale model, so I went to work and built a six-foot, free-flight model of one of the Cubs we had restored.

Many years later, after taking up modeling again, that first J-3 model and maintenance manual came back to mind. When 1/4 scale became popular, I could think of no better aircraft to model for breaking into larger models. I soon obtained a copy of that original service manual along with the Wag Aero plans of the Cub. From these I compiled the plans for a 1/3-size model.

Twelve feet of wing for the Quadra may seem like too much, but since the full-scale plane is a high-wing, stable, slow-flying aircraft, so should the model be. I will admit to some apprehension about the power-to-size ratio and asked myself, "How can this monster possibly fly with just a Quadra?" I figured I could always install a larger motor if the Quadra proved inadequate, but my worry proved to be a waste of time after flying the model. It performs most realistically and has proven to be one of the most forgiving and docile R/C models I have ever flown. In spite of its tame performance, it offers plenty of challenge in perfecting basic maneuvers such as wheel and three point landings, sideslips, loops, and spins. Even realistic crosswind landings can be performed with this model.

The basic construction is not much different from the old free-flight cabin models of years ago. The big differences are in engineering for the extra stresses and weight of a model this size.

The system I used in making up the landing gear and fuselage cabin areas has worked out well.

After some experimenting with 1/4-inch music wire for the landing gear, I was not happy with its strength or scale appearance. The welded steel tubing method shown on the plans has proved its ruggedness and durability, and is scale in operation. If you have no experience in silver brazing, you may want to practice before constructing the landing gear parts. The steel tubing is expensive. A good silver solder is Handy and Harman's "Easy-Flo." Be sure to use the higher-temperature (1100-1200°F) solder. Some hobby shops sell silver solder, but it usually has low silver content and melts at a low temperature. It is all but useless for this type of work, since it doesn't have enough strength. The steel tubing can be obtained from most homebuilt-aircraft companies, one of which is Aircraft Spruce and Specialty Co. (P.O. Box 424, 201 West Truslow Ave., Fullerton, CA 92632). They have a mail-order department and catalog available for $4.00.

CONSTRUCTION. Once you have the landing-gear-support truss welded together, build up the two fuselage side members directly over the plan. Keep in mind that the sides are different in the cabin area. The 1/8-inch plywood doubler on the left side should be cut out and placed directly over the plan and marked where the cross members are placed before starting construction. When doing the right side, place scraps of 1/4-inch balsa under the plywood. This is so the plywood will show only on the inside of the cockpit.

The dowel crossmembers on the right side over the plywood should be added after removing it from your building board. When building these two sides, do not install the 3/8-inch dowel members on the bottom ahead of the steel landing gear truss. These are added after the two fuselage halves are joined and the steel landing gear truss is epoxied in place. The 3/8-inch dowel members running from the front of the landing gear truss up to the instrument panel should also be added after the two halves are joined.

The fuselage bends sharply forward in this area, so you'll have to either score the plywood deeply and crack it, or make it in two sections. Then reinforce this area with layers of fiberglass cloth and resin on both sides. Then epoxy the dowel member on over the fiberglass.

After the two sides are mated and the steel cabin area installed, add the two plywood inner root ribs along with the vertical window frame members. Then add the fuselage formers and stringers.

The drawings show an adjustable stabilizer for trimming, but this is of questionable importance. Once the correct position has been established through test flying, it will probably never require further adjustment. The stabilizer incidence shown is from my original after test flying, so, that is where it should be for yours. But due to building and accuracy variations, I don't guarantee it. It's up to you whether or not to mount the stabilizer permanently to the fuselage.

The engine mount shown is an older Andy Sheber aluminum mount. The Mill mount extends the same distance from the firewall, but any type of mount may be used. Just check that the clearance works out. If it doesn't, the firewall may have to be moved back and the pattern enlarged slightly to maintain the correct shape of the fuselage nose section.

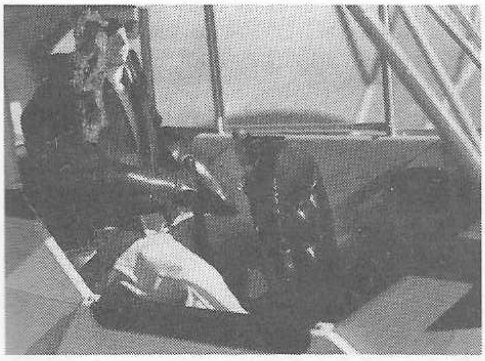
The motor is shown tilted 25 degrees from vertical so it's fully enclosed. If you install it this way, be sure to duct air to the carburetor as shown.

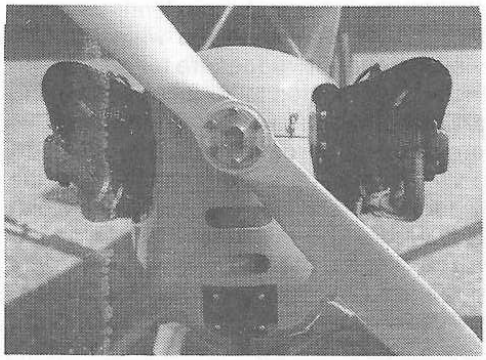
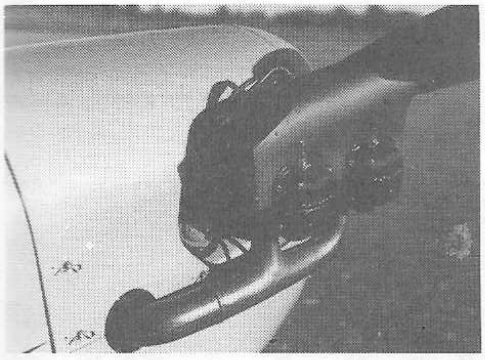
If you can't find 3/8-inch dowels long enough for the fuselage, 36-inch lengths can be used. Just make an angular splice at least one inch long, cross-dowel with two 1/16-inch dowels, and hide the splice behind a gusseted area of the fuselage. All dowel-to-dowel joints should be bevelled for a snug fit using a Dremel tool and sanding drum. Dowels were used on the main structure for scale appearance. Square stock would show through the fabric *unlike* the full-size aircraft. If this is unimportant to you, however, square stock can be used instead of dowels.

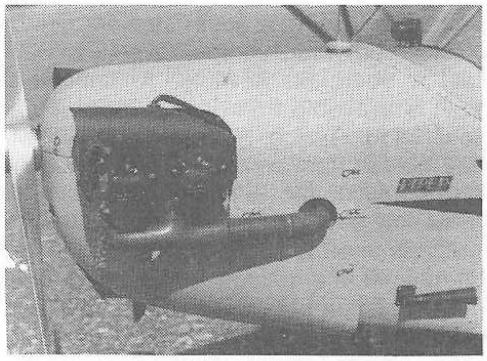
If you prefer not to weld up the required steel structures, R&M Quarter Scale Specialists (P.O. Box 3091, Riverside, CA 92519) are now manufacturing all of the steel components for the Cub. For details and prices contact them directly.

It is not necessary to build the wings directly on the plan. First cut out the wing spars as shown, and mark each wing-rib position. Drill two 2-56 clearance holes in each wing spar for attaching the lift-strut anchor plates. It is best to leave the root of the front wing spar square at this time. Install the 5/32 brass tube for front spar anchor when the wing is complete and mated to the fuselage. This will help correct any misalignment that may have crept into the cabin truss support area.

Now slide each wing rib into its proper position on the wing spars. Number 11 wing-rib pattern is not shown since it is virtually the same as ribs 1 through 10. Trimming and shaping will be necessary at the trailing edge only. The fastest method for cutting all ribs, except number 12, would be to stack them and use a band saw.



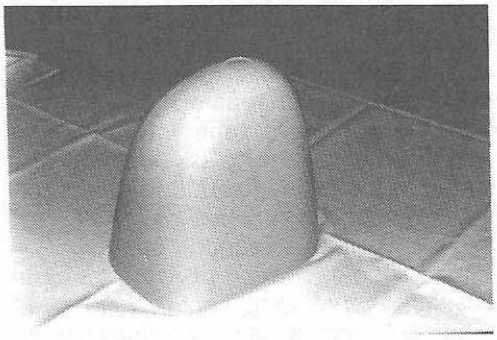



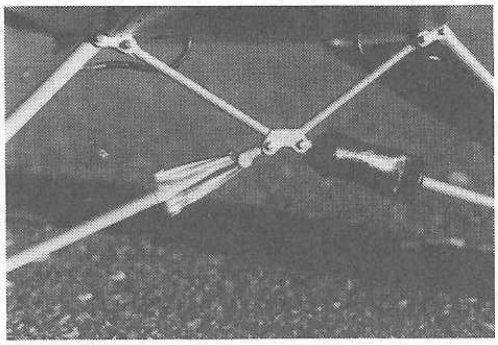


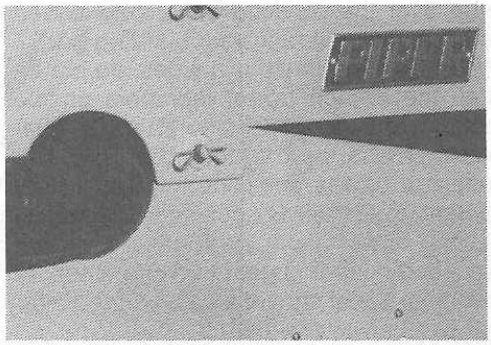
Cut off the rear portion of ribs in the aileron section and save them for constructing the ailerons.

The wing tip bow from 3/8-inch dowel works quite well. First trim off a 1/8-inch linear section as shown. Do not cut to length at this time. Let each dowel soak overnight in a tub of hot water, then nail down to a flat board over a pattern of the wing tip radius. Let them dry completely. Trim as necessary and glue them to the wing as soon as releasing them from the plan. After the glue has set, trim dowel to fit at the aileron tip rib.

The wing struts are made from straight-grained pine or spruce, planed and sanded to shape. Be sure both upper and lower strut fittings are well anchored. The







Du-Bro 4-40 steel rod ends could be used instead of machining your own, and they must be anchored properly in the struts, since the struts support the *full weight* of the model in flight.

The horizontal stabilizer is made of 3/8-inch dowel, similar to the wing tip. The elevator and the rudder are made from 1/4-inch dowel, slotted to 3/32-inch depth using a Dremel table saw before wetting. This provides a groove for the 1/16-inch plywood, making a gluing surface for the rudder and elevator ribs. Both stab and elevator can be built over the plan sheet.

The hinges shown work very well with virtually no end play. However, C&B Associates make a similar 1/4-scale hinge that could be used.

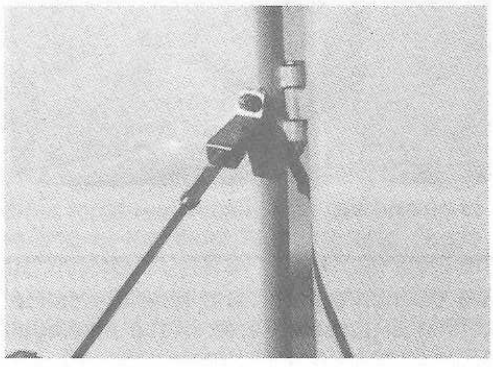
A plug for the cowl was built directly over the fuselage nose section using plaster and wood scraps. Over this was cast a fiberglass cowling. A laminated cowl is available from Hobby Barn (P.O. Box 17856, Tucson, AZ 85731). This cowl was molded from my original, and has embedded seam lines and embossed cutout areas for prop shaft, exhaust, carburetor air inlets and more.

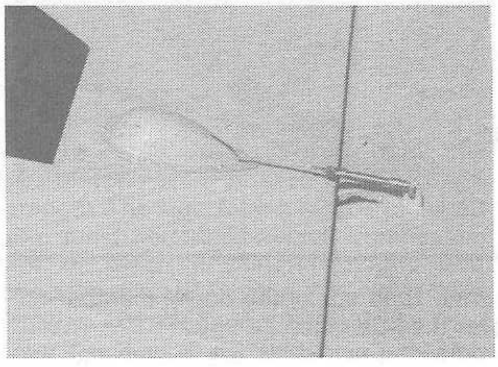
I placed the aileron servos near the wing roots simply to avoid any possible radio problems with long leads. A servo at each aileron would certainly help to remove excess slop in the system. All other radio components are situated under the rear cockpit seat, with the batteries in the scale luggage compartment. The throttle cable runs under the cockpit floor boards to the engine.

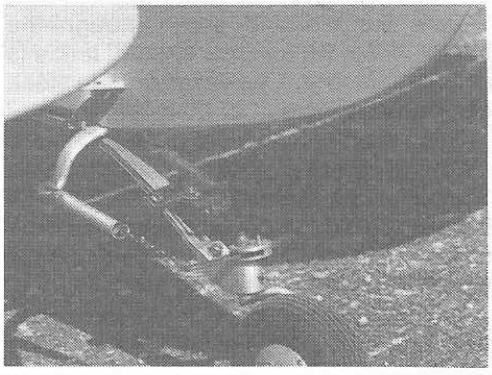
The balance worked out quite well, but remember that my dummy Continental engine weighed about 2 1/2 pounds. Unless this weight is accounted for with a similar dummy engine or maybe an Eastcraft electric-starter system, I'd suggest moving the radio gear forward. I ran my antenna along the forward wing strut to simulate the scale aileron control cable.

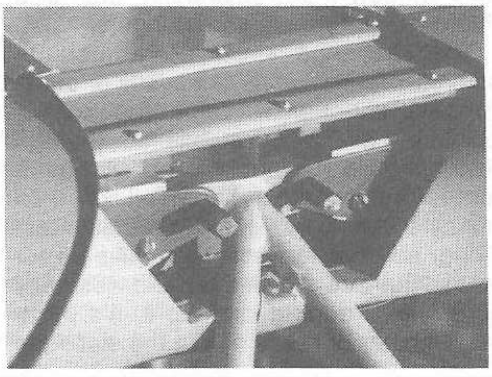
Any good covering could be used on the Cub, but for realism it's difficult to beat fabric and dope. For fabric I used 100% polyester dress liner, available at most yard goods stores. It costs about $2.00 per linear yard of 45-inch wide material.

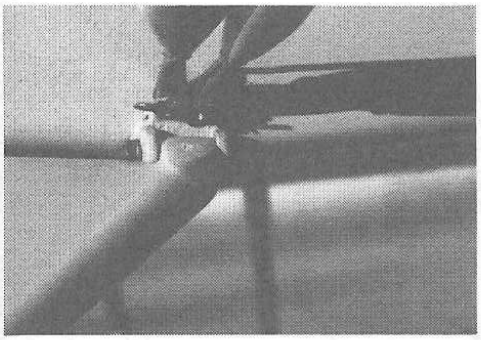
From any angle, the J-3's realism is evident. In this photo the prop disc gives away the model—it's too small. Note the safety chocks holding the J-3 in place.

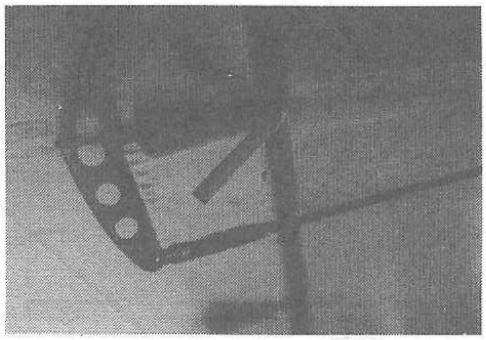


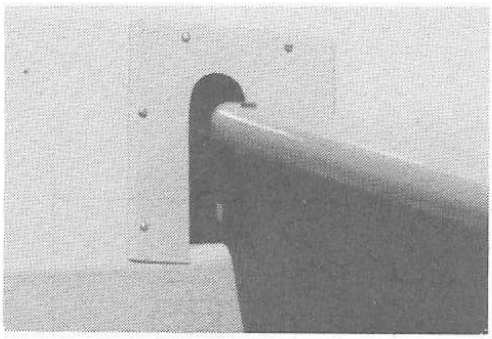












Seven yards are required. This material is similar to Coverite, is heat-shrinkable, but does not have the adhesive backing. I used nitrate dope for gluing the fabric to the structure, followed with 6 coats of clear butyrate after shrinking. Color coats are 2 of silver and 4 of Randolph Lock Haven Yellow followed with black trim. I then sprayed the entire model with a light coat of clear with just enough flattening agent to take away that butyrate shine. All dope coats were sprayed. Don't neglect the silver undercoat. This is full-scale practice and keeps the structure from showing through the fabric against a bright sky. I used Randolph Aircraft enamel, yellow M 9521 to match Lock Haven Yellow, on the fiberglass cowl and aluminum wing fairings. In all, I used one gallon of clear, two quarts of yellow and one gallon of thinner.

If you finish your Cub in yellow, I have scale decals of the Cub logo in 1/3-size available.

In spite of the model's relatively monsterous size, I manage to transport the model in the back of my '76 Vista Cruiser station wagon. It's something else for longer junkets by air, where I remove the tail surfaces, landing gear, and engine, and pack the parts into two coffin-like plywood crates.

I've experimented with various propellers and have found that a 20x8 prop is the best for this Quadra aircraft combination. Brands don't seem to differ much.

When it comes to flying the Cub, be sure that all is working well. Do some taxi runs, and open up the throttle. The tail will come up almost immediately. It has very little tendency to wander from its takeoff heading, and when it's up to flying speed it virtually lifts off on its own. Should it be out of trim, you'll find that any deviation will be gradual with plenty of time to think and make corrections.

Keep in mind that, like its full-size counterpart, it takes its own sweet time in gaining altitude. Be sure you have at least a hundred feet before making your first downwind turn. It responds well to ailerons when compared with other Cubs which simply won't turn without rudder. This is due to the built-in differential aileron setup. I always keep my first test flight down to one time around, bringing the model back immediately to check all stress areas and look for loose components.

If all is well after the first hop, take it up and try stalls, loops, and whatever. You'll have to precede your loops with a shallow dive to build up airspeed. If it has to be coaxed into a spin, try using about 1/3 throttle on entry and back off once it's in the spin. Recovery is good and almost immediate. Stall turns are impressive, and again begun with a shallow dive. It will even do a very un-scale barrel roll, but be sure to have lots of altitude.

As the model does approach the flight characteristics of its big daddy, your landings are going to require some planning. After setting up your approach, decide then and there if you are going to wheel it on or do a three-point landing. If you get it in between the two and try to do a three-point landing with forward flying speed. It will jack-rabbit down the runway with each successive bounce getting larger as you try to correct it. Just go around and try again. Next time, hold it off the ground till all forward flying speed is gone. The stick should be full up on touchdown.

Wheel landings are probably easier — and safer in windy conditions — as you can put it down at a much higher speed. Once on the ground, hold the elevator stick slightly forward to keep it down.

I have flown the Cub in various weather conditions and in spite of its huge wing it still behaves very well in 25 mph winds. Barring any radio problems — unlikely or pilot errors — you'll have a fun machine that you'll be proud to own and one that will give you many years of flying enjoyment. □

Pilot enhances the scene and is a Nelitz look-a-like. Kraft radio was employed in Bob's original project. Note the fine engine detail that helps set this J-3 above others.

J-3 Cub plans are available from M.A.N. (#GS12815 for $30—632 Danbury Rd., Georgetown, CT 06829) and Cedarbridge Scale, RR 4, Creemore, Ontario, Canada L0M 1G0.