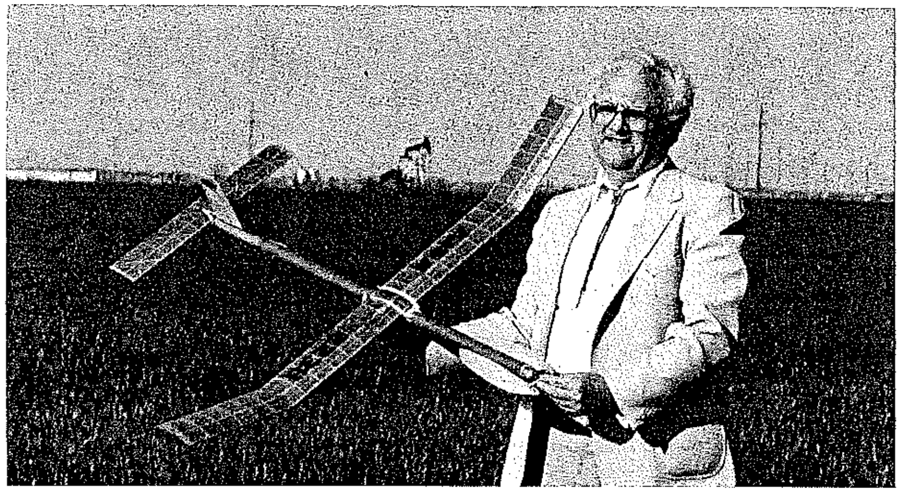
#665

Conscientious Objector

Looking for a model that can stand up to the rough-and-tumble of AMA Category II and III competition—and win? This robust rubber-powered Mulvihill is a good bet.

■Bill Baker



Above: The author showing off his Conscientious Objector in a wheatfield near Norman, OK. No, that oil well in the background isn't Bill's, but he probably wouldn't object if the owner bequeathed it to him. Below: The author's long-suffering (and hungry) wife, Paula, holding up the model to show its lines on the promise of lunch as soon as this ordeal was over.

MOST MULVIHILL DESIGNS that have been published seem intended for Category I competition (five-minute maxes), to judge from their relatively large and fragile structures. This one was designed to succeed in events flown under AMA Category II or III rules. I knew the contests I'd be flying in would involve windy weather and small, rough fields, so most of the time Category II or III rules would hold (three- and two-minute flight times for the first three flights).

Conscientious Objector is somewhat smaller than the typical Mulvihill design and it's also much less fragile. A model capable of five minutes in early morning air won't do you much good if the wing folds on the first windy flight or gets beat to shreds as you push for five maxes just to reach the requirement for a five-minute max.

This model is as competitive as I'd hoped. It will do three minutes easily. The tactic is to fly early, getting in the first three or four flights before the wind and downdrafts strengthen, and then try to pick up some lift for the four- and five-minute maxes. Most of the competition will be eliminated by then—sometimes even all of it!

I can look back on a half-century of model building, and I've enjoyed being involved in nearly every facet of the hobby. I've flown CL and RC, mostly as a sport flier. And of course I have flown practically every type of Free Flight model known. Most of my competition flying has been in Free Flight, concentrating on Gas events.

I dropped out of Free Flight about 1964 and flew RC until 1976. Around that time the old Free Flight urge crept up on me again. I attended a contest to see what had changed, and decided it would be fun to learn a new (to me) event like Rubber, rather than falling back into the old Gas groove.

It so happened that, not long before, Bob Dunham had published his Draft Dodger in the April 1975 issue of *Flying Models*. I'd long been in awe of Dunham's great-flying Rubber models, and the Draft Dodger immediately claimed my interest.

Mass-produced Draft Dodger parts tumbled out of my workshop like Henry Ford cars. At one point early in the process, I counted three wings, five fuselages, four stabs, and four props just to keep two models flying in competition. To my surprise (as a novice Rubber flier at the time), these models flew very well and were even winning contests.

In 1979 I started making a few changes, the most important of which was the rolled balsa tube fuselage. This did nothing to improve performance, but the fuselage was much less prone to damage. I also redesigned the wing mount. The modifications added up to a very practical Category III model which I dubbed Conscientious Objector, because it wasn't exactly a Draft Dodger anymore.

I took both a stock Draft Dodger and my newly evolved Conscientious Objector to the 1979 Nationals. The CO had a very high pitch prop, giving it a longer and slower climb in contrast to the explosive power burst generated by the low-pitch prop on the Draft Dodger.

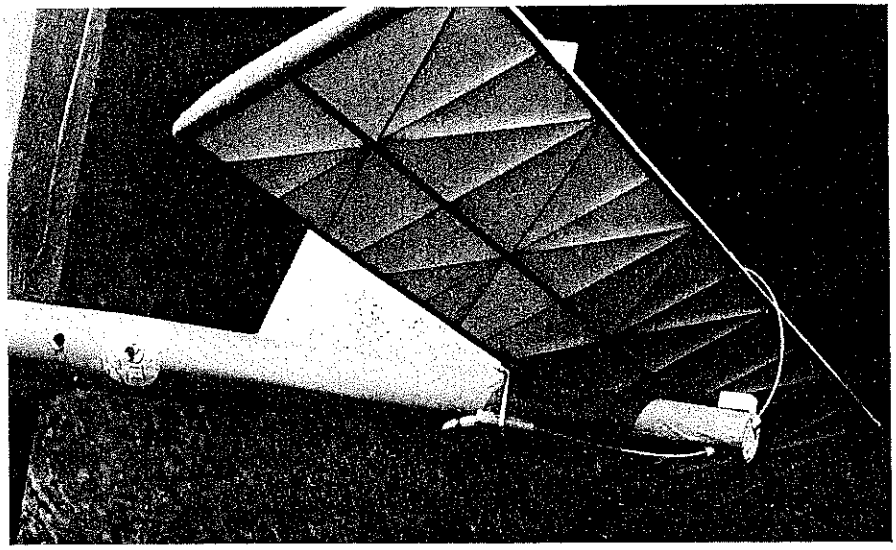
Wind conditions were very strong and blowing right across an ocean of corn. With two planes allowed in the event, my strategy was to fly the Draft Dodger in the first four flights, knowing that within three minutes it would be either in the corn or OOS (out-of-sight), and that it would most likely be lost on the fourth flight. I held Conscientious Objector in reserve for the fifth—and (I hoped) winning—flight.

The strategy worked, even though the

Draft Dodger was damaged after each flight (mostly wing mount damage and diagonals broken out). With its explosive climb rate the model flew through ground turbulence that the slower climbing Conscientious Objector wouldn't have been able to cope with.

Still using the tubular fuselage, I continued to adapt the Conscientious Objector until virtually no remaining parts were identical to those of the Draft Dodger. I guess the difference between plagiarism and research is how many sources you borrow from.

I adapted a prop published years ago by Frank Parmenter. I borrowed the stabilizer structure from Bob White's Twin Fin. I also used his simple Z-bar-type propeller hub. I copied the wing mount and a few other ideas from Jim O'Reilly. I invented a better winding hook and worked out a simple and reliable dethermalizer setup that probably owes something to a lot of different people. I tried longer motor tubes, a variety of wings (some with more area or different dihedral schemes, others with different airfoils), and I experimented with several propellers.



Close-up view of the simple, effective, and reliable dethermalizing mechanism. The motor peg tube and fuse tube, with the aluminum drink can heat sink, can be seen on the fuselage forward of the fin. Small pieces of ⅛-in. aluminum tubing serve as guides for the limit line.

The model presented here represents what in my judgment is the best compromise for achieving my key objective: a Mulvihill that's competitive in Category III. You might want to increase the wing area to 300 sq. in. and the motor tube to 42 in. so that the model will serve for your flyoff (five-minute) rounds, or for Category I. You may also want to increase the propeller diameter a half-inch or so. For 95% of the Mulvihill flying done in the U.S., the model as presented is very competitive.

After my 1979 AMA Nationals win with the Draft Dodger, I flew in two more Nationals under Category III rules and placed in both (third and fifth). The only time the Conscientious Objector failed to place at the Nats was when the event (to my surprise) was flown under Category I rules.

As time went on my interests shifted to Old-Timer events, and I began attending the SAM Champs instead of the AMA Nats. Nevertheless I continued to do well with my Conscientious Objector at local and regional contests until I found myself unable to meet the physical demands of Free Flight competition. At present I'm enjoying RC Sailplanes. But the Conscientious Objector has a permanent niche in my affections, and I'd like to think that somewhere, someone will be flying this Category III Mulvihill—and winning.

Construction

The motor tube (fuselage) houses the motor. It also holds the other parts of the airplane in proper relationship to one another. Though several fuselages were built square in cross section, I found that the tube configuration has the best strength-to-weight ratio.

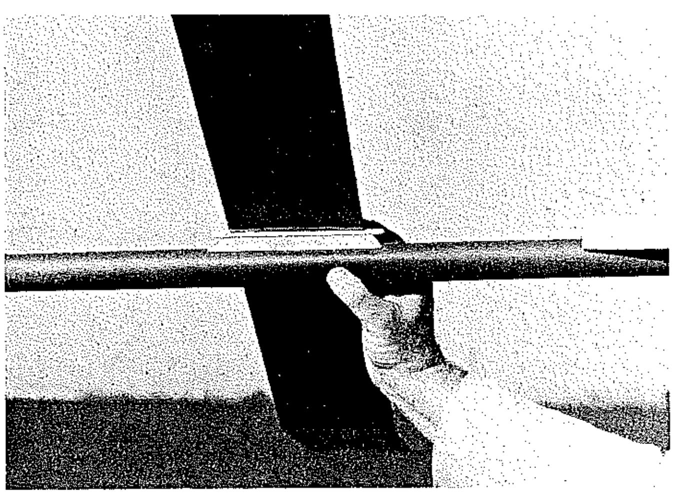
Use $\frac{1}{16}$ x 4-in.-wide, 6- to 8-lb. A-grain balsa. Make sure the wood is uniform in density and grain through the entire length of the piece. If it's much harder on one edge than the other, or if it transitions to C-grain, don't use it.

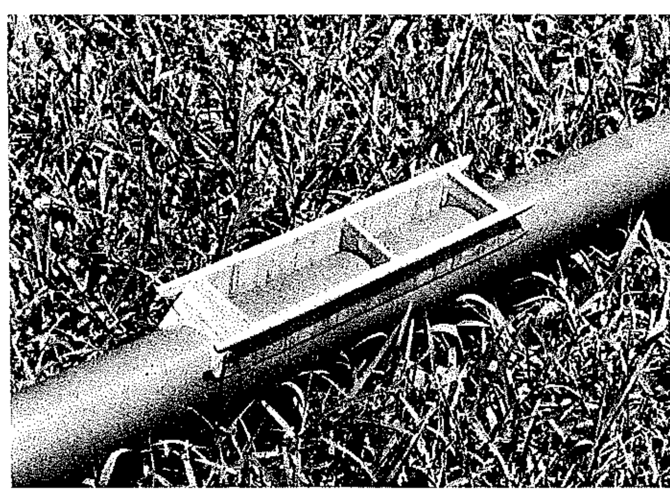
Using a metal straightedge, trim the sides true. Seal the wood on one side only with two coats of Deft (semigloss) or clear dope. Sand gently between coats. When dry, wet the entire piece with water. This will cause it to curl as the unpainted side expands.

Form the wet balsa around a 1¼-in.-dia. dowel, after first scoring a line down the center of the dowel to align the balsa. Large-diameter dowels can be procured from any hardware store or lumber supply company. I believe they're intended as clothes closet hanging rods. Jim O'Reilly once suggested using fluorescent tubes to form the motor tube. Fearing I would fall off the ladder during construction, I opted for the wood dowel. It's also easier to carve the tail cone from wood. Ever try carving fluorescent tubing?

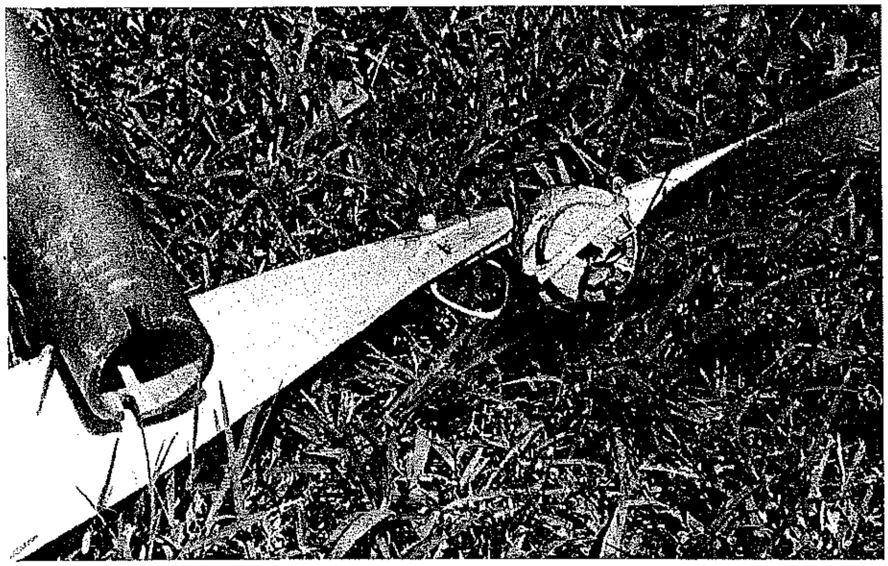
Wrap the wood gently with strips of cloth, gauze, or even an Ace bandage, and let it dry. Remove the wood from the dowel, apply Titebond along the edges, and draw them together. Secure with bits of masking tape, and allow to dry.

Make a one-inch-wide nose doubler and a tail doubler about 1½ in. wide from similarly prepared balsa. These doublers will

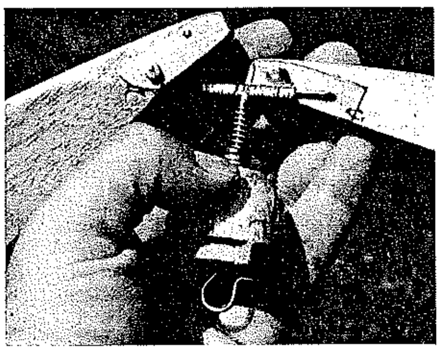




Left: Looking at the underside of the wing mount, you can see one of the two lengths of ⅛ x $\frac{1}{16}$-in. balsa used to key the wing to the pylon mount. One piece is glued to each side of the wing. These pieces also serve to fill the gap between the top of the pylon and the bottom of the undercambered wing. Right: Construction details of the wing mounting pylon. The side rails are ⅛ x $\frac{3}{16}$ spruce. An easy way to shape the base of the pylon is to wrap sandpaper around the motor tube and then sand the pylon base to a perfect fit before final installation.



The prop/hub/nose block mechanism. The offset slot in the motor tube is clearly seen. The offset makes it impossible to mount the nose block upside down. The plastic press-on wheel collars that attach the blade to the Z-bar must be on the leading edge or they'll be thrown off, along with the blades, creating a lot of noise, very little thrust, and one crashed airplane.



Another view of the prop/hub/nose block assembly showing the doubled blade hinge assembly, Z-bar, spring, bearing, and motor hook. Complete instructions for carving the blades and nose block and fashioning the hub mechanism are included in the text and clearly detailed on the plan. Finished aluminum hubs function just as well. They can be purchased through FAI Model Supply.

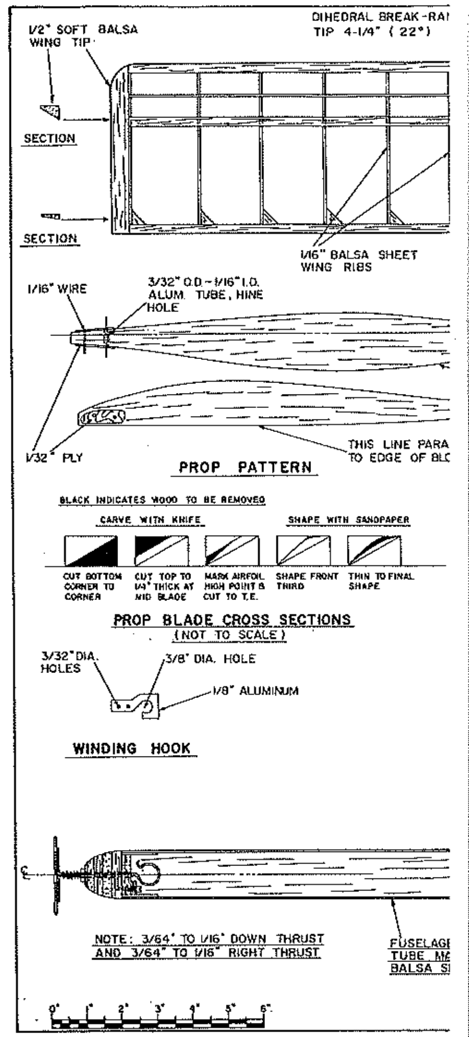
slip *inside* the tube. Glue them in place with Titebond or a similar product. Be sure to let the aft doubler protrude from the tube about ¼ in., so you'll have something to glue the tail onto.

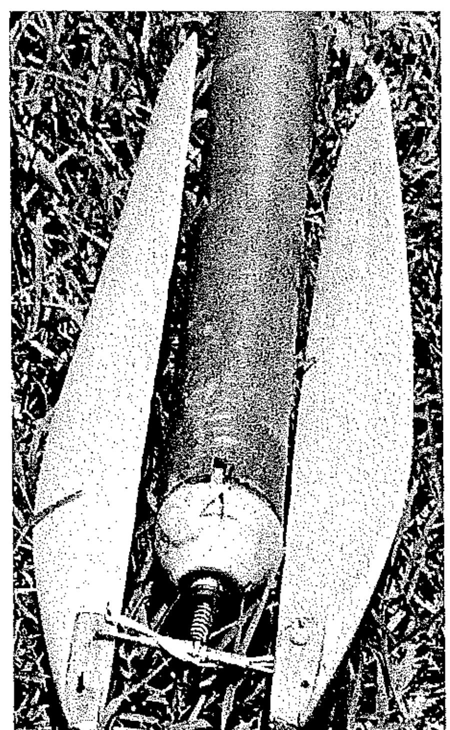
I tapered the end of my forming dowel with a plane and rasp to more easily form the tail cone. The amount of taper isn't critical: from 1¼ in. narrowing to ¾ in. is about right.

Make a circular former from hard ⅛-in. balsa or two cross-grained 1/16 pieces. Fit this former inside the aft doubler at the end of the motor tube. It will prevent damage to the tapered cone should the motor break. Place another ⅛-in. former in the area of the SHOC mount (a multifunction stabilizer mount attributed to the Sky Hoppers of Orange County in California).

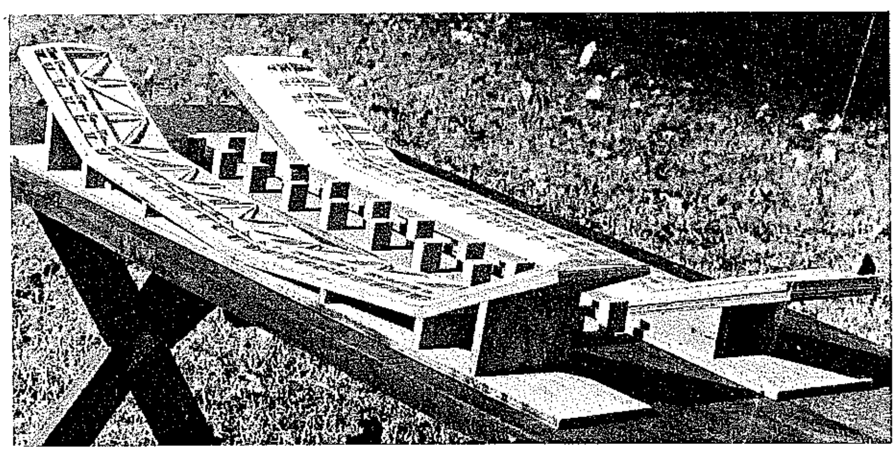
Don't worry if your rolled tube isn't perfectly circular. Lay it on a table, and allow it to roll until it stops. Let that flat spot be one side, with the top and bottom 90° to it. If there is a discernible curvature to the tube, let the concave side be the bottom. When joining the tail cone, eyeball it as closely as you can. If it isn't a perfect cone, mount it so that the top forms the straightest line to the motor tube.

The motor pin must be strong, since tremendous force is exerted upon it. The pin must, of course, be removable in order to change motors. Use at least a ¼-in. pin,



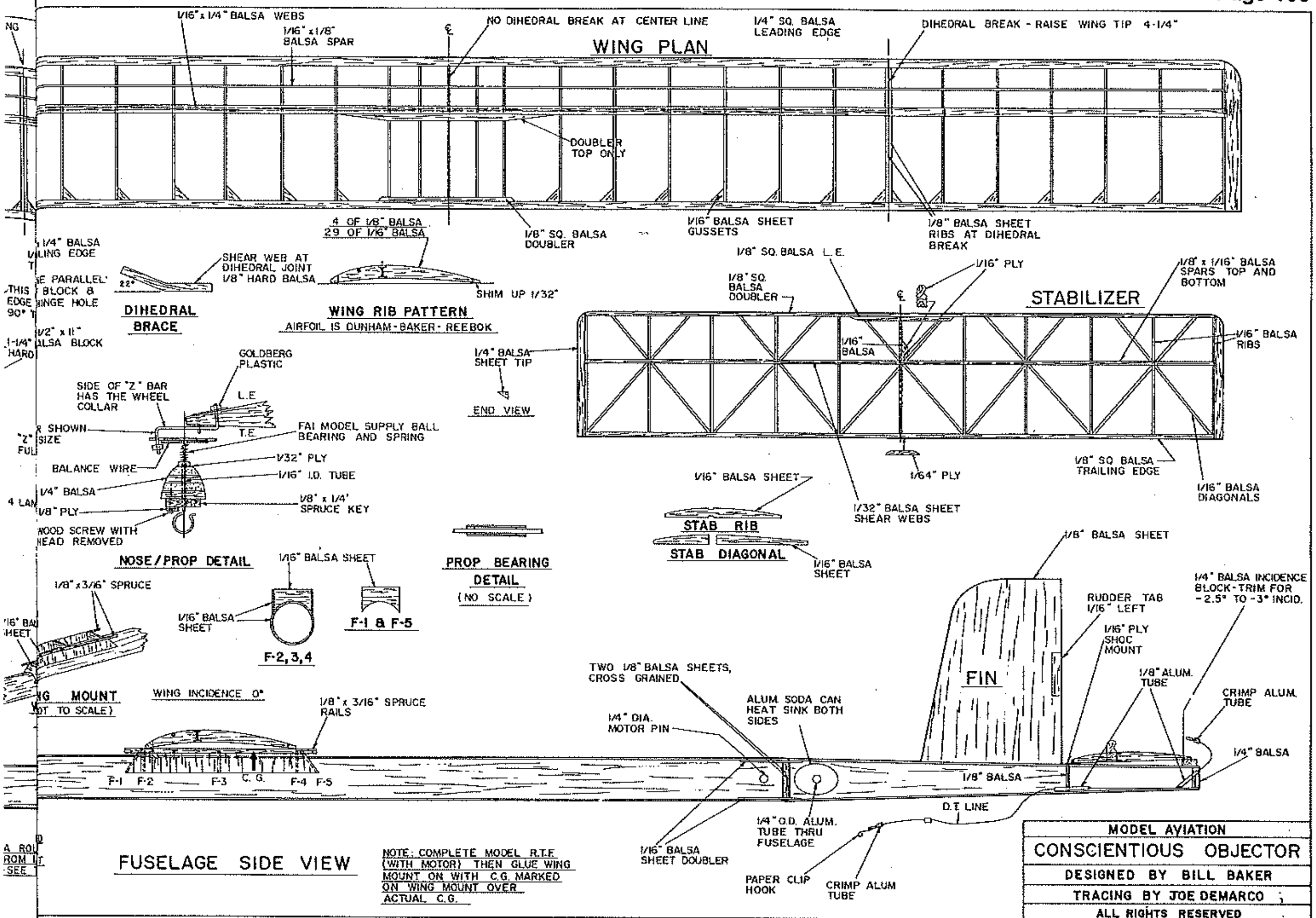


The prop/hub/nose block assembly attached to the motor tube. Note how the blades fold flush against the tube. It's important that they fold all the way back against it as shown and stay that way during the glide. Otherwise the glide trim will be thrown off.



Wing jigs are important, especially in mass-producing wings. The jig for building the wing as shown on the plan is in the background. In the foreground is the jig for a polyhedral variant.

Full-Size Plans Available . . . See Page 196



and reinforce the tube where the holes are made for it.

The fin can be made from ⅛-in. light sheet balsa. To save weight, or if you can't find four- to six-pound sheet, a built-up fin could be used. Of course, it would be more prone to "battle" damage. To install the fin, lay the tube on its side on a flat table. Block up the fin with books or pieces of wood so that it's centered on the tube and parallel to the table, and glue it in place. As long as the fin is parallel to the direction of flight, the symmetry of the tail cone is not critical. Ron Robertti once told me, "Your tail ain't on straight." To which I retorted, "The thing needs to turn, anyway!"

Covering the fuselage. I cover my tubes with tissue, and sometimes with silk. I've also used polyester cloth intended for dressmaking. It's very tough, comes in many pretty colors, and wrinkles can be eliminated through heat shrinking. On the down side, it's a little heavier than other materials. On my next tube I'd like to try 0.6-oz. fiberglass cloth with clear dope as an adhesive. I don't usually cover tail cones and fins but would use tissue if I did. These uncovered areas, including the prop, are usually finished with Deft semigloss (a wood filler/sealer available in any hardware store).

The stabilizer is quite conventional. It's also lightweight and trouble-free. Note that both the leading and trailing edges are made from ⅛-in.-sq. stock. Round off the leading edge, and put in only a slight taper, if any at all, on the trailing edge. Beauty is secondary to lightweight and warp-free construction. For a model flying at speeds this slow, a wide, sharply tapered trailing edge would simply be excess weight. Hence truncated trailing edges are used on both the stabilizer and wing.

Note that only one point is needed to connect both the DT (dethermalizer) limit line and the front stab hold-down rubber. Also note the absence of any need for sheet fill.

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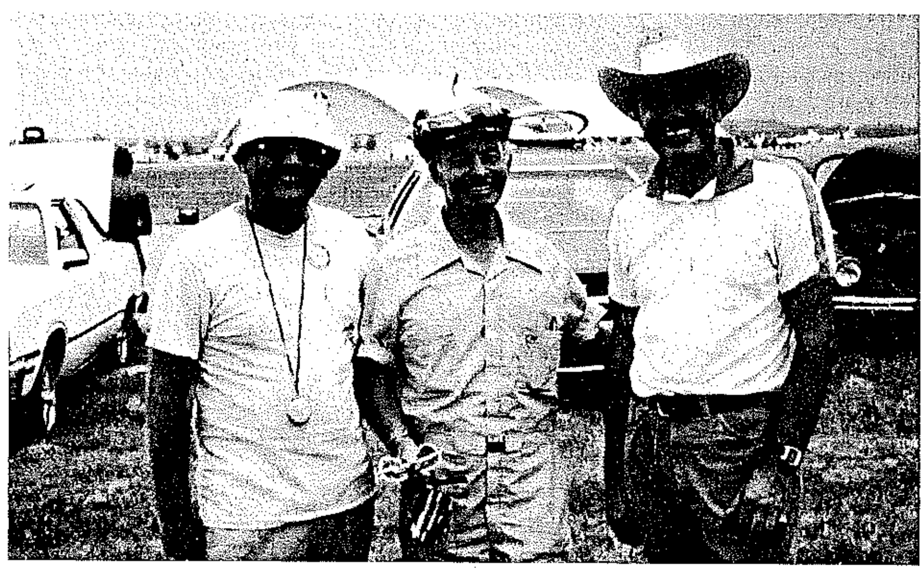

Three Mulvihill standouts: the author, Bill Baker (left), George Perryman (center), and Jim O'Reilly. They placed first, second, and third at both the 1979 and 1982 AMA Nats.

FF Duration/Linstrum

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"I have been coloring model planes using this method for years. Unlike Floquil or butyrate-jar skimming, it is inexpensive. All food markets and fabric outlets sell Rit dye—the powdered kind which comes in an infinite variety of colors that can be used straight or blended for that 'just right' color.

"I use baby food jars for mixing. Open a pouch of Rit dye, pour a few beads into the jar, then pour some dope thinner or acetone on top of them. You will be surprised how quickly the thinner snatches color from the dye. Keep blending, using raw balsa sticks to test against a color sample you want to match. Once satisfied, add about 20% clear dope to your mix.

"I always put a couple of thin coats of clear dope on the model first to prevent creeping. Rit will give you a lively-looking color, and saving a little in the jar will allow patching later. Just add thinner—there is no pigment. Work with it. (It takes longer to tell about than to do it!)"

FF Scale/Warner

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Investigation into the problem turned up the fact that the Federal Standard is screwed up. In 1964 they changed the color standard from the original WW II olive drab to a new one, but kept the old number (FS34087) to confuse modelers and restorers.

To make things even worse, Uncle Sam gave the same number to a very dark brown olive drab in March 1979. This meant that modelers had three FS34087s to choose from! In January 1984, 34087 reappeared as the original shade, but the gloss and semigloss versions of OD were the dark brown version of 1979 (14087 and 24087).

Then in June 1984 the GSA decided to straighten things out, and issued a change notice to the effect that "the color chip for 34087 dated March 1979 is the wrong color and shall not be used," and "colors 14087, 24087, and 34087 represent two different colors . . . the colors have been renumbered as follows: 14087 is now 14084, 24087 is now 24084, and 34087 is now 34088." This makes *five* matte olive drabs: pre-1964 34087, post-1964 34087, March 1979 34087 (which is the wrong color), 1984 34087, and 1984 Change Notice 34088 (which is the same color as the later 34087).

The new FS595B is being printed right now and should take care of all the confusion, right? Don't count on it! Don suggests that we all build Navy aircraft and forget about olive drab altogether! In any case, it's nice to see a company concerned about getting it right. Perhaps that's because Don is a perfectionist, the kind of person who would balance the wheel on a wheelbarrow!

Czech submarine contest: One of the high points of my life is getting news of what other modelers are doing. I'd like to share Lubomir Koutny's account of a contest in Czechoslovakia, the likes of which we drought-ridden Californians long for.

"Boys from Zabreh (north Moravia) began to arrange 1/20-scale contest in their little town. They did it very well, but I am sorry the weather was perfect for a submarine contest. In the rain and damp air is very well when your Scale is big and perfect varnish, like as was Stranik's twin Ba man, which won there. Other boys had to giv their Scales over hot car engine before their ne flight."

You get the idea. I guess we are spoiled. I re member flying with the guys in southern Franc who flew rain or shine and often packed thei model boxes on the cars after sunset.

Plastic vs. rubber: I have been hearing nast rumors of late that rubber stored in plastic cor tainers may be deteriorating at an accelerate rate. This might be due to the outgassing of th plastic container. If you have had your rubbe stored in this type of container for any length c time and under optimal conditions (airtight, ou of the heat), you might want to check it out an let me know if any harm seems to have been done

I'm sure other readers would be really happy t know whether or not this is a good way to stor precious rubber motors.

Well, until next time, guys and gals, always re member: Don't dope models in sandstorms, an things won't be too rough.

Conscientious/Baker

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The stab is so lightweight that it aligns itse with the small notch for the DT line in tl trailing edge. The action of the SHOC-ty stab front mount centers the leading ed well enough, negating any need for keyin An added advantage of this system is th it's free to move when meeting an obstru tion that would break a keyed stabilizer.

The notched peg that holds the rubber and DT line can be made from 1/16 ply, a popsicle stick or tongue blade, or even from a wood dowel or aluminum tubing. The peg mounting platform in the stabilizer should also be 1/16 ply, as the peg must be able to withstand a certain amount of strain.

Wing. With the heavy-duty spar shown on the plans, I've never broken a wing. Maybe the spar is *too* heavy, but I like it. The upper main spar can be made either from very hard balsa or from spruce. The other spars can be medium (8-10-lb.) balsa.

The shear webbing between the spars is very important. Installing the pieces along the centers of the spars (as shown on the plan) is ideal, but I find making them full depth and locating them along one side to be easier and more than adequate. The 1/8-in. hard balsa angled center dihedral brace can also be made full depth.

Shim up the rib fronts 1/32 in. above the leading edge so that a small taper cut can be made. This will shape the leading edge to conform to the undercambered ribs. Shim up the rear end of the ribs and the trailing edge 1/32 in. for the same reason.

The wing can be built without a jig, but if you're going to build several wings, a jig is highly recommended. The jig I used for this airplane allowed the wing to be built in one piece, except for the lower spar which was added "in the air" later. My use of jigs dates from the discovery that many of the warps that plagued me were induced during the process of adding the dihedral.

I don't usually shim in any washout, since about 1/8 in. of washout seems to occur automatically when the tissue is doped.

The wing mount on the motor tube is designed as a lightweight, rigid platform for the wing to rest on. A quick way to achieve a perfect fit is to wrap a piece of sandpaper around the tube and lightly sand the mount base to shape. Don't glue the wing mount to the fuselage until the model is ready to fly, as it must be adjusted to achieve the correct CG (center-of-gravity). After the mount is glued in place, make sure there's enough stabilizer tilt to produce a left turn.

Propeller. I may try to write a detailed article on propeller carving soon, but the subject has been covered thoroughly elsewhere. Wood selection is of primary importance. The block should be hard (about 14 lb.) and of uniform density to produce blades that are both thin and strong. Lay out the top and bottom profiles, making sure the centerline of the top profile is parallel to the edge of the block. Do the same for the bottom line of the side profile. Set the block in a drill press, and drill the hole for the hinge. Cut out the profiles on a band saw.

Carve the bottom of the blades first, completely finishing them before starting on the top. Be sure to keep track of right and left blades. I once carved six left-handed blades before I realized what I was doing. Thankfully, my wife saved the day by suggesting that I carve six more right-handed blades.

Try for about 1/16 in. of undercamber at midblade, progressing to no undercamber at the tip.

Begin carving the top of the blade by getting it down to about 1/4-in. thickness. Make the high point of the airfoil (it's helpful to mark it) about one-third of the chord. Take your time. Carve thin slices, not chunks. Shape the blade aft of the high point to a sort of triangular profile, then start final shaping the leading one-third. The high point, or thickest part of the blade, should be about 1/16 in. at the tip and 1/8 in. at midblade.

Add 1/64 or 1/32 ply doublers and the 3/32-O.D. tubing for the hinge. Place the blade on a Z-bar hub, and drill the holes for the limiting pins with a 1/16 drill mounted in a pin vice. Take extreme care in drilling the holes so that the blades track properly; that is, when you sight the turning blades in profile, they should be in perfect alignment with each other.

Finish the propeller with Deft, or the equivalent. If you can't find Deft in your local hardware store, I've noticed it listed in Lee Campbell's catalog.

The nose plug is made from 1/4-in. sheet balsa laminated cross-grained. The first laminate fits inside the motor tube, and the second should conform to the outside shape of the tube. A brass or aluminum tube can be inserted in the plug, with smaller pieces of tubing approximately ⅛ in. long inserted at each end to form bearings for the wire prop shaft. Use Loc-Tite or a similar product to adhere the inner pieces of tubing to the outer tube. Use CyA (cyanoacrylate glue) to install the completed bearing in the nose block. Add a plywood face at least as large as the external ball bearing so that it won't crush the balsa. Use a good spring, such as the one available through FAI Model Supply. Don't use a ball-point pen spring or other cheap alternative that might take a set.

Make the Z-bar out of $^1/_{16}$ music wire. Use Sta-Brite or an equivalent hard solder. Never trust soft solder to hold a propeller hub together. First balance the Z-bar alone, then attach the blades and balance again. I used to make a batch of blades, then pair-match them according to their weight similarity. As I recall, they averaged eight to 10 grams. If you try this, don't get confused about right- and left-handed blades, as I did.

The winding hook as shown on the plan works quite well. The rubber will stay centered, unless Newton was all wrong. If you don't understand winding hooks, winding tubes, stooges, and other aspects of rubber-powered model technology, buy Don Ross' book *Rubber Powered Model Airplanes* from the AMA Supply and Service catalog.

The motor is made up of enough 34-in. strands to weigh 85 to 90 grams dry. Consistency is what's wanted; there should be no slack. I used this size motor on my Mulvihills and on nearly all of my Old-Timer Rubber models, such as the Lanzo Stick and the Korda Dethermalizer. I may not be able to do everything, but the one thing I did learn was how to wind this motor consistently. Trying to get used to different motors in different models can be very stressful at contest time. "Life," as John Wayne says in the movie "Iwo Jima," "is tough, but it's tougher if you're stupid." Keep it simple. Choose one motor and get used to it. You'll make fewer stupid mistakes when under the pressure of competition.

Trimming and balancing. The center-of-gravity as shown on the plan is best for all-around thermal and windy weather flying. For flying in early morning still air, the CG could be moved slightly aft and the decalage reduced. The model is designed for stability and reliability rather than for absolute maximum performance.

Set the SHOC stabilizer mount about $^1/_{16}$ in. into the tail cone by making careful cuts with a Zona saw and removing the wood between the cuts to create a flat spot to support the mount. It should tilt slightly to the right, making the left tip about ½ in. higher than the right.

The wing mount should have no incidence relative to the motor tube. The decalage is established by the angle of the stabilizer sitting on the aft block under its trailing edge. This angle should be two or three degrees, or about ⅛ in. higher at the trailing edge.

Glue the wing mount in place with the motor loaded, making sure the balancing mark is over the CG. Use a large table as a square, set the wing on the mount square to the motor tube, and key it by gluing $^1/_{16}$ x ⅛-in. balsa strips to the bottom of the wing across the chord. The wing goes on in the same position each time and can't shift during flight, which *will* happen if it's left unkeyed.

Key the nose block assembly to the fuselage. A bit of ⅛-in. ply is needed for the wood screw stop. Don't omit it, or the screw will tear out of the balsa. With the stop against the screw and the nose plug in place, its blades folded on either side of the motor tube, determine the best placement for the ⅛ x ¼-in. spruce key that locks the nose block against rotation. With a Zona saw, cut away the inner nose block ring for the key, then slot the motor tube to match. The photo will clarify this operation. It's important to have two key points so as to distribute the shock of the shaft striking the screw. That prop has a lot of kinetic energy, and the keys take quite a load. It's also a good idea to double the motor tube covering material around the key slots.

The hooks seen in the photos of the propeller blades are made of soft wire such as from a paper clip. Note the location of these hooks somewhat aft of the hinge line when the blades are folded. A rubberband from one hook goes over the front of the Z-bar and back to the other hook. Change these rubberbands before every contest for two reasons. First, it's very important that the blades fold all the way back against the motor tube and stay that way; otherwise the glide trim will be thrown off. Second, the rubberbands deteriorate very rapidly in the sun.

With a drafting triangle and again using your trusty worktable as a square, check the propeller blades for track and for identical angle in each blade. Also, check the static balance. I like the Z-bar as shown, but an aluminum hub from FAI Model Supply could be substituted.

Cut a small rudder tab, about ¼ x 1½ in., from the trailing edge of the fin, and glue it back in place with approximately ¹⁄₁₆ in. of left deflection. With a small carpenter's square, check the front end of the motor tube for downthrust and right thrust angles, which should each be about ³⁄₆₄ in. Your model should weigh about eight ounces ready to fly, with 90 grams or so (about three ounces) contributed by the motor. Oil the propeller bearings, lube the motor, and you're ready to fly.

Flight testing and trim adjustment. The model should climb in a right turn and glide to the left. Glide is controlled by stabilizer tilt and the thickness of the aft incidence block. Climb is adjusted only after satisfactory glide trim has been established.

Adjust the climb with small changes in the thrust line. Thrust is adjusted by gently filing the end of the motor tube to change the angle at which the nose block rests. Do this in very small increments. Don't fly at full power until you're completely satisfied with the model's trim. Make sure the model climbs in a right turn to avoid any tendency to loop or hang on the prop in a power stall.

When you're ready to fly at full power, launch the model at about a 45° angle; it tends to go where it's pointed. I have flown a few Conscientious Objectors that just didn't want to turn left in glide without a ridiculous amount of tilt to the stabilizer, so I simply let them turn right in glide as well as climb. Still, unless you really know what you're doing, left glide and right climb is the safe way to go.

Dethermalizer. The accompanying photo of the dethermalizer shows its layout quite clearly. The guide tube under the SHOC stabilizer mount has multiple functions. It conducts the DT line, keeps the stabilizer rubbers from touching the line, and serves as the DT limit stop. A piece of monofilament line can be used as a DT line. A loop at one end is fitted over the peg on top of the stabilizer. The rubber must be installed over this loop to stay in place. The rubber loops over the peg, extends across the leading edge of the stabilizer, then goes down and around the fuselage and back up to the peg.

A bit of fuel tubing serves nicely as a DT line limit. It can be tied to the line with a simple overhand knot and adjusted to strike the line guide tube under the SHOC mount. The tubing should be adjusted to allow about a 45° stabilizer DT angle.

Tied on to the other end of the DT line is a paper clip wire hook. The fuse rubberband extends from the hook, across the fuse, and around the motor peg. Use a sharpened piece of aluminum tubing to drill holes in the fuselage. This makes a cleaner hole than does a drill. Use a ¼-in. tube for the fuse holder, extending it through both sides of the fuselage. That way you can poke fuse material through with a piece of wire; you can also pull out a bit more fuse in case of a delay between lighting and launching. Glue the tube firmly in place.

The heat sink can be made from an aluminum can, but it must be selected with care. I've used only Coors Light cans, so I can't say whether another brand would work as well.

I will gladly try to answer any questions you might have about the Conscientious Objector. Send a SASE to me at 1902 Peter Pan St., Norman, OK 73072.

Convert/McKinley
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charge rather than three. With some planning and the use of small battery packs, one can aim, I think, for 20- or 30-sec. motor runs, with climb rates equal to glow- or ignition-powered models and little or no weight penalty.

Rally/Horner
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forget who did and who didn't fly at the AMA Rally at Scobie Field! Nor will other Houston modelers. The Bomber Field Club is planning a major event in October. Several B-17s in the air simultaneously would be something to behold.

AMA Frequency Committee member George Steiner, who traveled from Sacramento, CA, teamed with Bob Spivey of Austin, TX to handle the transmitter impound chores. Charlie and Marilyn Stevens and Vance and Dottie Wyman coordinated a host of local volunteers to assist in planning and running the event.

Of course the rally would not have been possible without the efforts of the AMA and HAMCI staff and volunteers. AMA President Don Lowe, District VIII Vice President Gene Hempel, and AMA Executive Director Vince Mankowski were on hand,

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