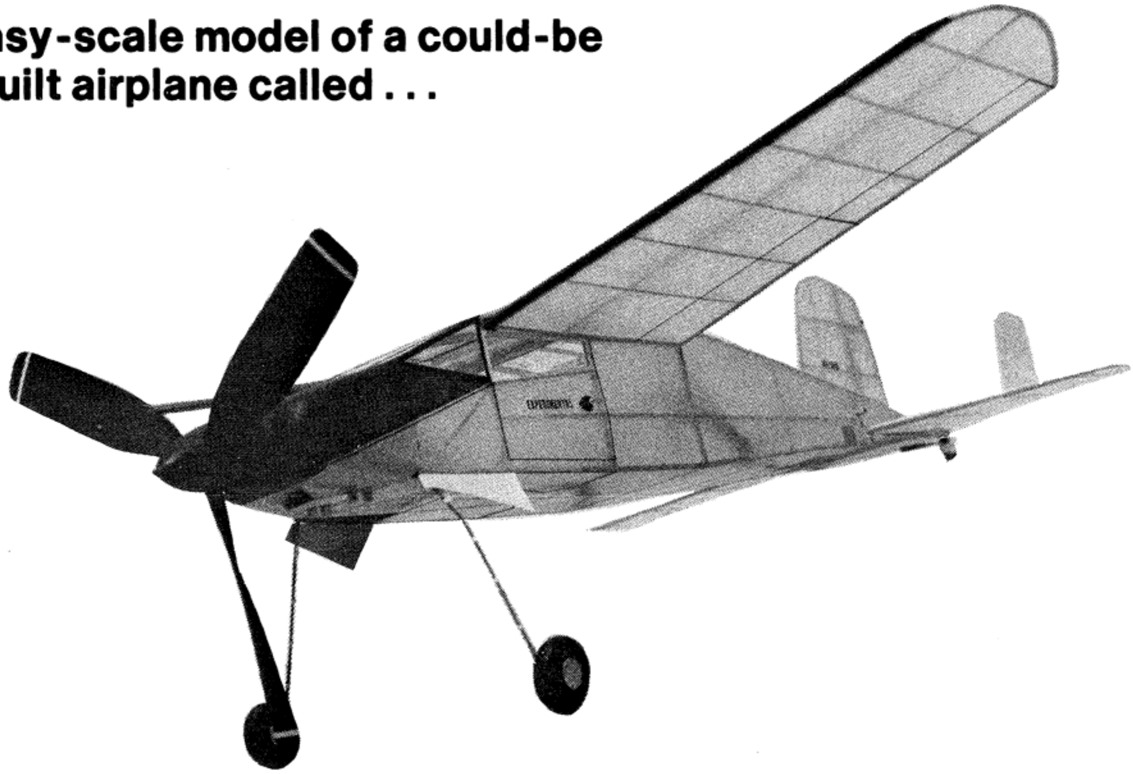
A fantasy-scale model of a could-be homebuilt airplane called . . .

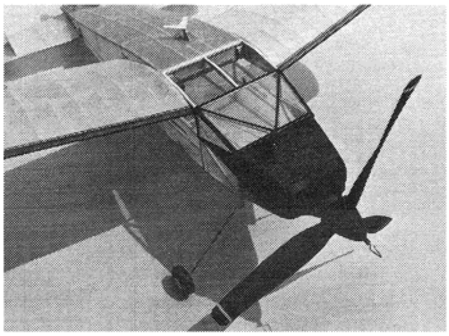


HYPERWIND

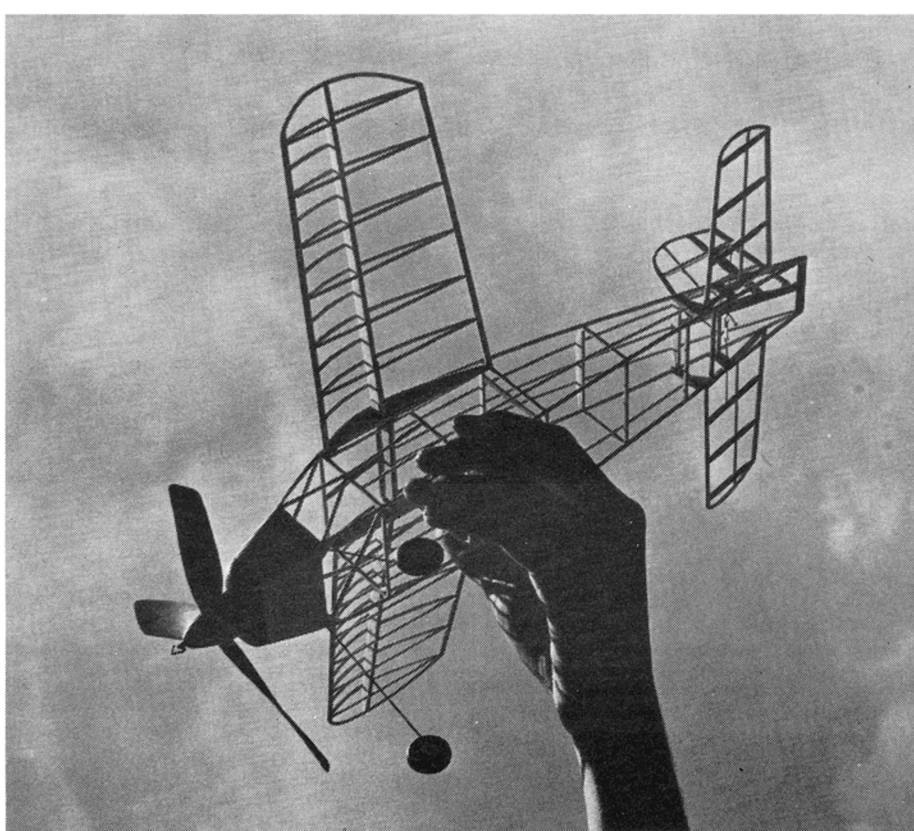
by Nick DeCarlis

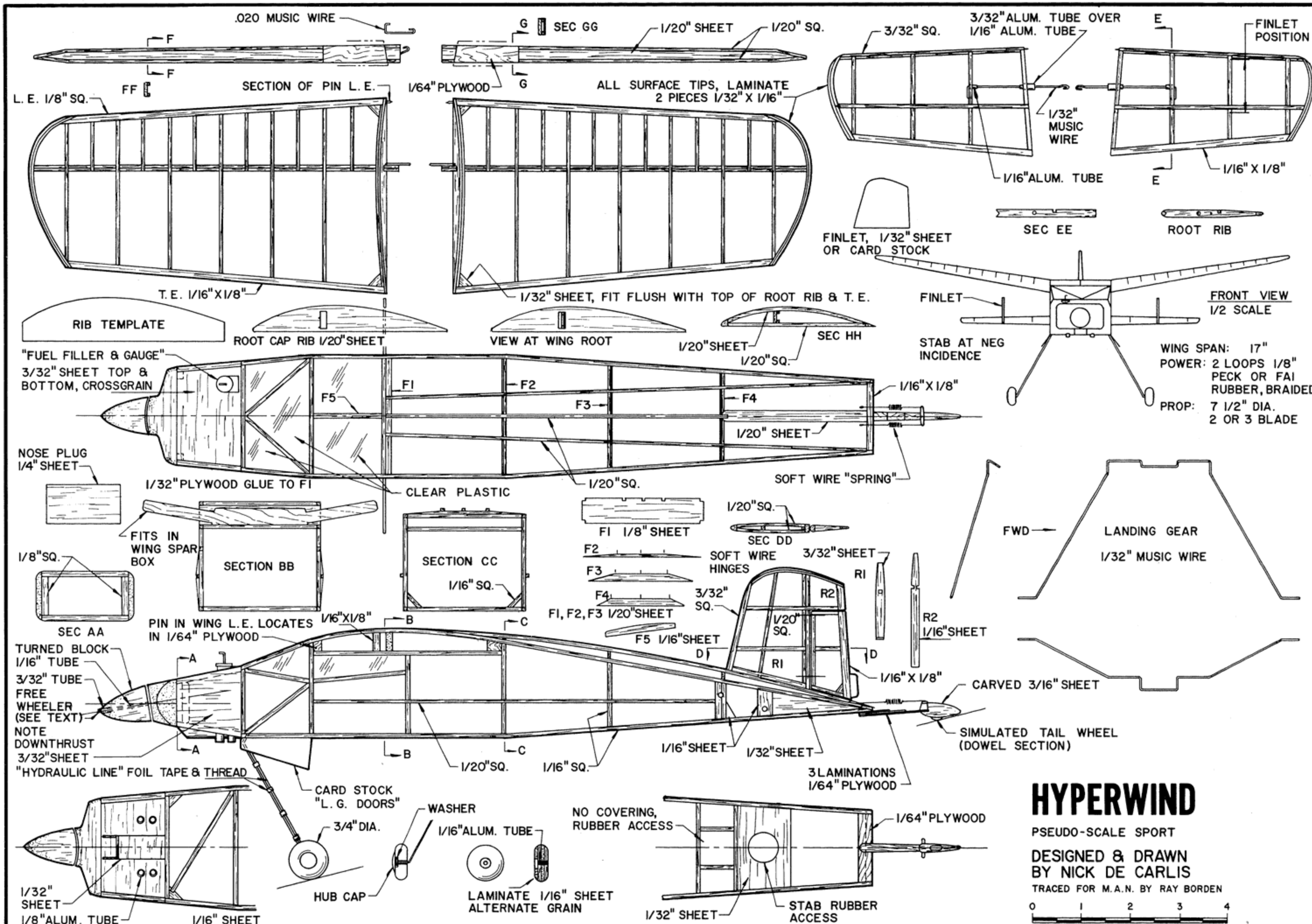
HYPERWIND
TYPE: Free Flight "Fantasy Scale"
WINGSPAN: 17 inches
WING AREA: 48 square inches
LENGTH: 17 3/4 inches
WEIGHT: As light as possible
ENGINE: Rubber

• The Hyperwind is a high-performance homebuilt capable of speeds in excess of 200 miles per hour—that is, it *would* be, I am confident, if one were to be constructed! The model presented here is *not* scale. It is, rather, a *pseudo*-scale model designed mainly to appease a fantasy for a homebuilt design. The fantasy involves an "aerial contraction" of the Sorrell Hiperbipe, and the Wittman Tailwind. I liked the novel aspect of a wide lifting fuselage on the Hiperbipe, but biplanes never did much for me. Enter the Tailwind, with its single wing. For even better aesthetics, let's taper the panels and make them cantilevered, thus eliminating the struts. We'll stick with the basic Tailwind rudder, but have a new all-moving "stabilator." Finally, Hyperwind will receive a retractable landing gear, not unlike the type installed on several Tailwinds. Of course, the gear won't retract on our model, but the mere simulation of such leads many



Windows and windshield framing do a lot to enhance the scale-like qualities of this exceptional model. Huge three-blade prop is distinctive, easy to build. Framework (right) is delicate but strong.





FULL-SIZE PLANS AVAILABLE . . . PAGE 130

HYPERWIND

onlookers to believe that the model *is* scale!

The model shown in the photographs is the second prototype. The first was an all-yellow bird that met an early demise with a tree that I'm certain was a relative of Charlie Brown's kite-eating friend. When I finally retrieved the model, only the prop, cowl, landing gear, and wing panels were salvageable. Flight testing had not progressed far enough to show the model's capabilities, so a second Hyperwind was constructed. The new model wouldn't outfly an AMA Cub until I tried installing finlets; it would then average 45-50 seconds in dead evening air. A shortage of large fields locally prevented me from testing its thermal-riding abilities until I traveled to Jacksonville, Florida, for the annual Rebel Rally. After a few test hops, I managed two flights in the two minute vicinity. Pleased for the moment, I decided to rest the model for a while, and went to fly my peanut scale models.

Around this time the thermals really started to move across the runway, and I put up three out-of-sight flights ($3^1/_2$, 5, and $5^1/_2$ minutes) with peanuts! Needless to say, I didn't dare take the Hyperwind out of the car. I didn't relish the thought of losing it, as I had yet to take photographs of it, and the model was not equipped with a dethermalizer. After all, it wasn't really intended to fly very long, even with a thermal.

I still have the second Hyperwind, and it continues to be one of my favorite models, especially for early-evening flying. The air is still and Hyperwind spirals straight up—literally clawing for altitude—and then slowly spirals down, the prop freewheeling, ready for another flight. If this all sounds interesting to you, read on. Many of the construction details refer to non-functioning details, which may be included or omitted as desired.

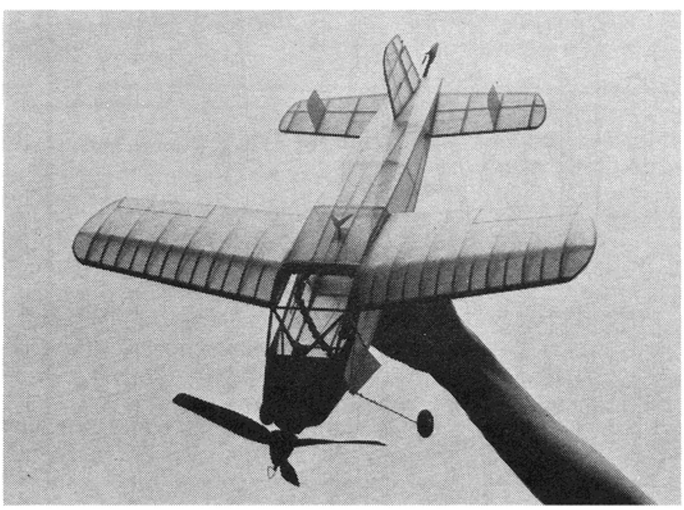
CONSTRUCTION. Start with the fuselage. Two basic sides are constructed in the conventional manner, one over the other to insure their being identical. Since the fuselage is fairly large for $^1/_{16}$" square stock, be sure to use firm strips. Add all the sheet reinforcements indicated on the plans. These parts are important, so do not omit any or reduce the size of balsa from which they are cut. When the sides are dry, add all the crosspieces by your favorite method to end up with a basic box. I prefer to cut all the crosspieces in the cabin area first, which are of equal length, and glue them all to one side. When nearly dry, I add the second side, and make sure everything is square and aligned. Once dry, the front and tail crosspieces may be added, followed by those in between. Note the additional crosspiece shown in section C-C.

Several small gussets from $^1/_{16}$" square strips may be added into the corners as also shown in section C-C. They seem to strengthen a lot, with almost no penalty in time or weight.

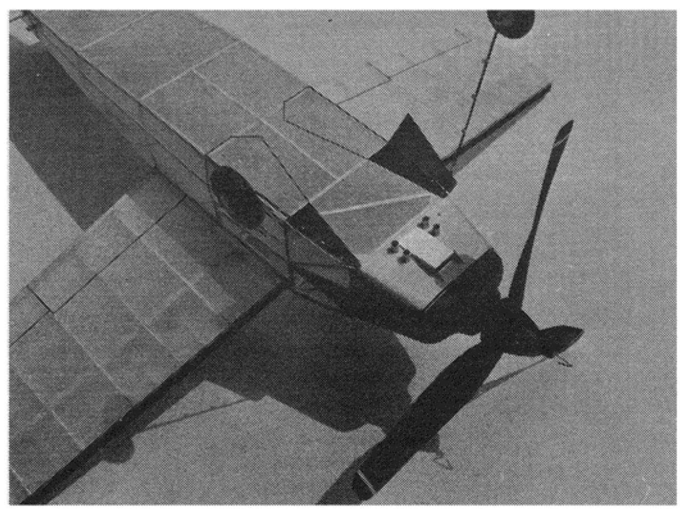
The landing gear is bent from $^1/_{32}$" diameter music wire as shown on the plans. Glue it in place as the cowling is installed, which is from $^3/_{32}$" sheet. Note that on the top and bottom pieces the grain runs sideways. Add the $^1/_8$" square reinforcement to the inside edges of the cowl sides, referring to section A-A. Also add the $^1/_{16}$" sheet gussets on the fuselage bottom where the landing gear struts exit. Refer to the bottom view of the cowl area. While working at the front of the fuselage, add the $^1/_{16}$" square pieces that make the "V" on the windshield. Cut F5 from $^1/_{16}$" sheet and install as indicated between the two crosspieces over the cockpit.

Make the wing stub spar at this time. It may be of $^1/_{32}$" ply, although mine was laminated from two thicknesses of $^1/_{64}$" ply joined with cyanoacrylate (such as Hot

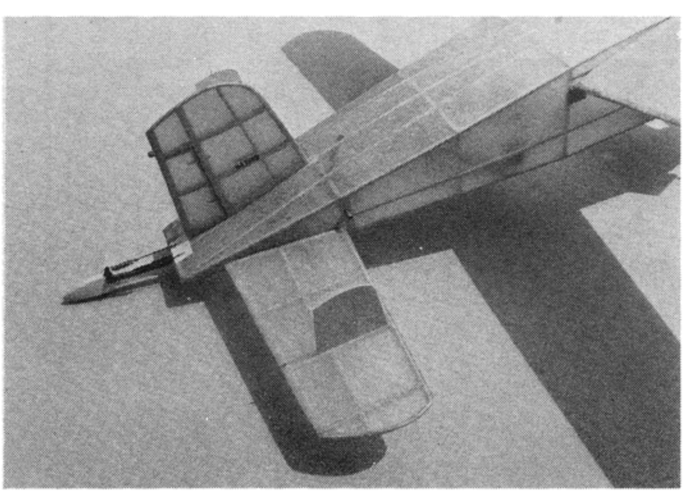
(Continued on page **64***)*



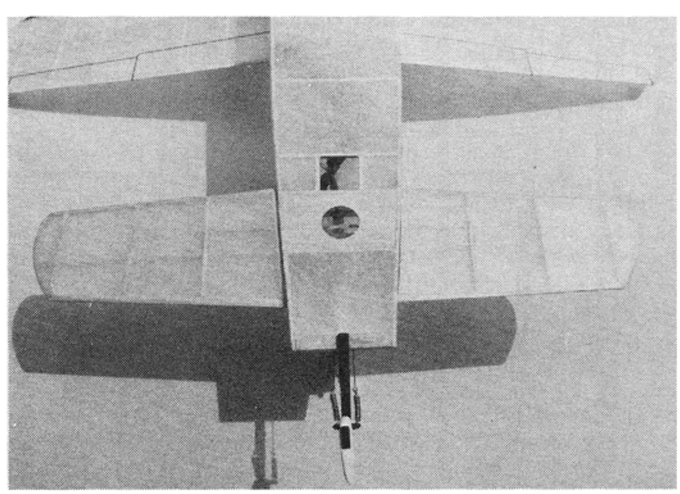
The blend of Hiperbipe and Tailwind is evident in this photo.



Carb air scoop, exhaust pipes, "retract" gear details shown here.



Vertical finlets on stabilizer were necessary additions. See text.



Access to plug-in stabilizer mounting is through hole in fuselage.

HYPERWIND

(Continued from page 63)

Stuff). Note that just ahead of section B-B (on the fuselage) there is a small 1/16" x 1/8" piece in the wing mount area. Fit the stub spar just aft of these small uprights, but don't glue anything. Next cut out F1, and glue in place as shown. The stub spar will be glued to F1 later on.

Direct your attention to the bottom-aft area of the fuselage. Note that there is an additional crosspiece under the motor peg to allow access. This open area is further reduced by the addition of two small 1/16" square pieces, running fore and aft between the two crosspieces. This is to keep airflow disruption to a minimum. Aft of that is light 1/32" sheet fill with a 5/8" diameter hole cut in it to allow access to the rubber band that will hold the stab sections to each other as well as to the fuselage.

A small rectangular piece of 1/64" ply is glued under the tail crosspiece to serve as a mount for the simulated leaf-spring tail gear. If you don't intend to install that detail, the mount may then be dispensed with.

Next cut out formers F2, 3, and 4, and glue in their respective locations on the fuselage spine. Then add the 1/20" square stringers. Note that the center stringer ends over F4 (the 1/20" sheet rudder platform completes the transition to the tail crosspiece), and that the forward ends of the stringers set in notches along the top of F1. The 1/20" square side stringers may also be added at this time, keeping in mind that they fit flush with the uprights at their beginnings and ends.

Add the 1/64" ply pieces around the wing mount area if you have not done so already. Do not drill the small hole in the forward piece yet, as the plan shows only an approximate location. If the 1/64" ply presents a problem, use 1/32" material. The forward piece will serve as a locator for a pin in the wing's leading edge that will determine incidence. The aft piece will prevent the rear-inboard corner of the wing panel from puncturing the fuselage tissue on hard landings.

The nose block is from soft balsa block glued to the 1/4" sheet nose plug. The fit to the front of the fuselage should be snug. To shape the nose, first cut the nose block to the shape shown in the side view. Then draw a 3/4" diameter circle on the front. Fit the nose block to the fuselage, and trace the outline of the cowl on the backside. Remove, and begin rough shaping. If one attempts rough shaping with the nose block mounted on the fuselage, damage to the fuselage is likely. Refer to the plans for the proper contours. When the shape is nearly correct, fit to the fuselage and complete final shaping and sanding. Drill a 1/16" diameter hole in the nose block, beginning through the center of the circle that was drawn on the front. Note the downthrust. Then glue in a section of 1/16" diameter aluminum or brass tubing with cyanoacrylate to serve as a bearing. An alternate Bill Henn style bearing may be made as follows: Drill a hole through the nose block as directed above, only make it 1/4" in diameter. Cut a 3/4" length of 1/4" *inside* diameter aluminum tubing, round off one end slightly with sandpaper, and force the tubing into the nose block. Now take two of Peck Polymers' large nylon bearings, and press one into each end of the tubing.

Now for the tedium of the wings. If it sounds like I don't like to build them, it's because I don't! But at least these split-rib structures make it a little more interesting, and are not nearly as hard to make as you might think. If you've tried the technique before, I think you'll know what I mean. The first step for the wings (as well as the other flying surfaces, discussed later) is to laminate the tips from a 1/32" x 1/16" strip of basswood (on the inside of the curve) and a similarly-sized strip of balsa (outside). To do this, soak the two over-length strips in hot water. While waiting for them to become pliable, lay some plastic wrap (*never* use waxed paper) over the plans, and push pins through the plan along the inside edge of each tip at 1/8" intervals. Take the strips and blot off the excess moisture. Spread a small amount of white glue evenly along one strip, join the other to it, and form against the pins. Use additional pins against the strips to hold them in place, and allow to dry very thoroughly before attempting to remove.

While the tips are drying, cut a rib template from some cardboard, aluminum, or plywood. Cut a piece of 1/20" sheet the length of the template (grain running lengthwise), and place the template near the top with the edges even. Make one or two gentle cuts along the template with your brand new No. 11 blade, move the template down 1/16" or so, and make another cut. You should now have one sliced rib before you. Make 14 in all, plus a few spares. Then cut 12 false ribs from a piece of 1/20" sheet 1 3/8" wide using the forward portion of the template.

By now the tips should be dry. If so, remove them and the pins from the plans. Pin the leading and trailing edges down in the proper locations. All the rib bottoms are from 1/20" square strips cut to fit snugly between the leading and trailing edges. Cut and glue these in at this time.

The basic wing spar is cut from 1/20" sheet, with 1/20" square strips glued over the edges. Look at section F-F to see how the strips are placed. Then cut the 1/64" ply parts that are glued over the strips in the root section to form a shallow box when viewed from the end. It is into this box that the stub spar will fit to mount the wing panels to the fuselage. Glue the spars to the rib bottoms, and add the laminated tips, noting that they are raised slightly to contact the tips of the spars.

Now the sliced ribs can be added. Each will have to be individually trimmed to fit. As the chord decreases towards the tips, so shall the sliced ribs decrease in length. Always trim from the trailing end of the ribs. Once these are in, the false ribs may be added. Simply glue them in place, allow to dry, and trim the trailing ends flush with the rear edge of the wing spars. Be sure that the root ribs are angled towards the tips to account for dihedral. The root gussets are cut from scrap 1/32" sheet, and glued so they are flush with the upper surface of the wing. Their main purpose is to prevent wrinkles in the corners when covering.

Bend two small hooks from .020" music wire, except for the hook portion, and fit these into and through the small holes in the root cap ribs, which are cut from 1/20" sheet. Complete the hook bend, and glue the root cap ribs in place. Using cyanoacrylate, fasten the hook against the root cap rib, as well as against the forward side of the wing spar that projects through the root cap rib. Finally, carve and sand the leading and trailing edges to the proper cross-section.

Now you will see why we waited to glue the stub spar. Fit each wing panel to the fuselage by inserting the protruding sections of the stub spar into the box portion of the wing spar. Note that the part of the wing panel spar that extends past the root cap rib fits into the fuselage side. The stub spar should be able to contact F1. If not, shim it with card stock, thin balsa or ply. With the panels still in place, trace around the stub spar against F1 to mark its location. Remove the panels, and glue the stub spar (and whatever shims found to be necessary) to F1 using cyanoacrylate.

By now you should be curious as to how the wing incidence is set. First drill a .020" diameter hole in the leading edge of each wing panel from the root towards the tips to a depth of 1/4" or so. Sink a section of a straight pin (with the head cut off) into the hole so that the point projects 3/32". Glue in place with cyanoacrylate. If you now fit the panels back on the stub spar, you will note that the pin will contact the small 1/64" ply plate installed earlier. Position each panel for a slight amount of positive incidence, perhaps two degrees, and mark where the pin hits the ply panel. Remember, the plans show only an approximate location. Remove the wings and drill a 1/32" diameter hole in the marked location. When the wings are refitted, the pins will fit into the holes to set the incidence. The wings are held to the fuselage by stretching a small rubber band between the hooks glued to the spars. A piece of 1/32" music wire with a small hook bent on one end is useful for coaxing the rubber band from one panel, through the fuselage and to the other panel, which is then fitted against the fuselage. For rubber bands, I prefer the small type used by orthodontists because they stretch well, yet will not collapse your structure with undue tension. Three of them hooked together will suffice for mounting the wings.

The rudder shown on the plans is a rather extravagant structure designed to resemble actual aircraft construction methods. The first prototype, however, utilized a simple flat structure of 1/16" square strips, which you may choose to duplicate instead. If so, skip this paragraph. If you choose to be daring (and maybe time-consuming), here is how to construct the second prototype's rudder. It is assembled, for the most part, "in the air," and care must be taken so as not to build a twisted structure. Laminate the curved tip in the same manner as the wing tips. While it is drying, add the 1/16" x 1/8" trailing edge to it over the plans. Make the trailing edge in one piece, from top to bottom, separating the movable portion later. Cut out R2, and glue a 1/20" strip to its front. Glue R2 to R1, holding them over the plan so that the proper angle between them is achieved. Add the 1/20" square strip spar that fits into the square hole in R1. When the tip/trailing-edge assembly is dry, glue it to the R2-R1 assembly. Add the 1/16" x 1/8" piece that forms the bottom of the movable rudder, only tack-gluing it to the base of R2. Now add the 3/32" square leading edge. Cut the 1/20" square ribs to the proper length, then gently roll an X-acto knife handle over the inboard side to give them a slightly curved contour before gluing them in place. Finally add the additional 1/16" x 1/8" pieces that complete the formation of the movable rudder. When all is dry, the leading and trailing edges may be sanded to shape. Then the movable rudder may be cut away, and its leading edge rounded. After covering, the two parts are rejoined with two small lengths of soft wire.

The stabilator halves are a little more conventional in construction, yet unorthodox in attachment. You will note that the ribs are from 1/16" x 1/8" strip stock. Cut the pieces to the proper length, then cut a notch in the front where the leading edge will fit. Note that the root rib and the one adjacent to it have holes to be drilled; complete this before assembly. Laminate the tips, then set them aside. When pinning down the 1/16" x 1/8" trailing edges, block them up with scraps of 1/32" sheet. Glue the ribs against the trailing edge, add the spar, and finally the leading edge. When they are dry, the ribs can be sanded down to the trailing edge as shown in section E-E.

Bend the stab attachment hooks from 1/32" diameter music wire, noting that the hook itself must be capable of passing through a 3/32" diameter hole without damaging the hole. The purpose of having small lengths of aluminum tubing over the wire is to increase the gluing area of the wire, and at the root to provide a locating bearing. Be sure to slip the needed pieces of tubing onto the wire before completing the bends. Note that at the root rib the 3/32" diameter tubing fits over a 1/16" diameter piece. Slip the wire/tubing assembly into the stab half from between the second and third ribs towards the root. When the wire and tubing parts are in their proper positions, glue everything in place with cyanoacrylate. To mount the halves to the fuselage, the hook on each stab half is fitted into the opening aft of the rubber peg. The two hooks will be visible through the access hole in the bottom of the fuselage. An orthodontic rubber band is then stretched between the hooks with the aid of a pin or a small piece of wire. As on the wings, a pin sunk into the leading edge is used to determine the incidence of the stab halves. On the fuselage, the pin should contact the triangular gusset that fits against the back of the rubber peg reinforcement. Once the optimum setting is found (through test flying), a 1/8" square of card stock with a pinhole in the center is glued in place over the correct hole in the gusset; in this way, the hole will not become enlarged.

With all the basic framework out of the way, we can now direct our attention to some of the other components that will complete the model. While the wheels may be of the ready-made plastic variety, homemade balsa wheels weigh considerably less, and often look better since they can be internally retained. To make them, start by cutting eight discs from 1/16" sheet slightly larger than 3/4" in diameter. They needn't be perfect. Drill a 1/16" diameter hole in the center of each, and then glue four discs together to make a basic wheel. Rotate the grain of each disc 45 degrees when laminating so that the wheel will be strongest with the grain evenly dispersed around the circle. Now mount the wheel in a Dremel Moto-Tool mandrel of the type used to hold cutting discs. Put a washer on each side of the wheel to prevent the mandrel from crushing it. Now mount the mandrel in the Moto-Tool, and turn the wheel to final shape by using 320 wet-or-dry sandpaper. You will be surprised how fast it will shape the balsa.

Remove the wheel, and using an X-acto knife, carefully cut out the recessed portion on one side of each wheel. This recess will allow the retainer to be concealed by hubcaps. Glue a short length of 1/16" diameter aluminum tubing into the wheel for a bearing. Now is the best time to paint the wheels. I usually brush on two coats of flat black enamel (to fill the grain), sand lightly, then spray with flat black enamel from a spray can, such as Testor's. The hubcaps are four discs cut from thin aluminum, such as an offset printer's plate. Drill 1/32" diameter holes in the centers of two of them. Lay the discs on a piece of cardboard, such as from the back of a pad. Then roll a marble over each one, while at the same time pressing down. The result is that the hubcaps will take on a convex section. The inboard hubcaps (with the holes drilled in them) may be glued to the side opposite the recess. Fit the wheels on the landing gear, and solder a small brass washer onto the wire, making sure the washer fits easily in the recess. Trim the excess wire flush with the washer, and glue the remaining hubcap over the recess, being careful not to get any glue on the washer or bearing.

The model will fly on a variety of propellers. Probably the best bet from an endurance standpoint is a prop based on a design from a recent article by Bill Henn. The hub is from aluminum tubing, with blades of formed 1/64" ply. These are attached to small sections of dowels, which fit into the aluminum tube hub. I later returned to the prop I had started with, however: a 7 1/2" diameter three-bladed affair made from two 7 1/2" North Pacific plastic props. While the three-blader produces more drag during the glide (even though it freewheels), it produces a dramatic climb, and simply looks neat on the front of the Hyperwind. The two 2-minute flights mentioned earlier were with the three-bladed prop, so it's not exactly a detriment to the Hyperwind's flying ability.

To make the three-blader, start by cutting two 7 1/2" props in half. Take three of the blades and trim the cut faces of the hub to 120°. Take a 1" thick block of wood large enough so that a 7 1/2" diameter circle can be drawn on it and drill a 1/32" diameter hole in the center of the circle as straight as possible. Draw three lines on the block out from the hole, spaced at 120°. Push a piece of 1/32" diameter wire into the hole so that an inch or so projects from the block. Using regular plastic model cement from a tube, glue the three blades together around the wire, while lining up the blades over the three lines. Use a pin against each tip to hold the blades in place against the wire while they dry. Leave it overnight, then spread a fillet of Sig Epoxolite around the hub. This will make a really strong unit. Epoxy may be substituted, but will not work as well. As a final touch, the blades should be sanded with 320 wet-or-dry, and the prop should be balanced.

The spinner will probably end up as more work than the prop. Start with an appropriate stack of 3/4" diameter discs, laminating them over the same wire used to form the prop. Be sure to keep rotating the grain of the discs. When dry, a thin woodscrew (with the head removed) is twisted into the base of the spinner to allow it to be chucked in the Moto-Tool. Turn the spinner to its final shape in the same manner as the wheels. Then the base is hollowed and notched to accept the prop. Now glue the prop in place, being liberal with glue. A 3/4" diameter 1/64" ply disc may be cemented on the back of the spinner to complete the unit. Don't forget to drill a hole in the disc first so it can be aligned with the prop center. Now successive layers of glue can be used to fill any of the gaps present between the edges of the notches and the blades. When all is smooth, brush a few coats of flat enamel on the spinner and the root portions of the blades, and sand smooth. A final sprayed coat of flat black, as on the wheels, will finish everything off nicely. The lines on the blade tips are from 1/16" wide white graphics tape.

(Continued on page **70***)*

FREE FLIGHT NEWS

(Continued from page 69)

is an AMA Scale since the boom should be included in the OAL, but Greg felt that the pod under the wing (see photos) was the body that could not exceed 9". Whatever, the rubber-powered ship is a novel idea.

Thomas did his usual fantastic job of construction (he regularly wins at MMAC club contests, the Nats and NIMAS Record Trials) on this 34" span, 2.6 gram, clear-microlite-covered aircraft. The 1/8" diameter motor tube is made of 1/64" sheet and the wing scallops, made on a form, are 1/32" square—very light construction for a scale ship! Greg has been using a foam blade prop and this has caused some problems under high torque, which is something the full-size ship never had (Pilot Allen had to pedal like crazy to get it off the ground), and he is switching to a balsa fan. He first flew it at the MMAC December Indoor Meet. If you would like further details, write Greg c/o John O'Leary, MMAC, 11425 Kell Circle, Bloomington, MN 55437. Please send an SASE and tell them that "FF News" sent you.

Modelers who might want to make their own version will find the September 1979 issue of *Aeromodeller* an invaluable resource. It has a special article by Ron Moulton and Martyn Cowley on the "Albatross," with an exciting in-person narrative on the Channel crossing. The airframe and personalities are well detailed and an excellent three-view is included. To order this back issue, or other numbers, try the Aviation Bookshop at 656 Holloway Rd., London N193PD, England. Send them an International Money Order for one British Pound and the unique "Albatross" issue will be on the way to you by Air Mail. It is truly a memorable event when a man-powered "model" makes such a flight, and the *Aeromodeller* staff recorded it in breathtaking detail. Get your souvenir copy today.

WILL RICHMOND REMAIN CHAMP? That is the question F1D indoor fliers worldwide are asking themselves as they prepare for the World Champs at West Baden, Indiana, June 20-24. USA flier Jim Richmond of Atlanta won the title at Cardington last time with some outstanding flying, and he will be defending the title on home ground in a site where he has done over 44 minutes (the Northwood Atrium, whose plan is symbolized in the World Champs logo, along with Jim's model). We wish Jim all the luck in the world, which he will need to compete against the world's best. USA Team Members Ray Harlan, Pete Andrews and Erv Rodemsky will do *their* best to win. You can still be a spectator, for only $100. See details in the June "FFN." ■

HYPERWIND

(Continued from page 65)

The simplest way to freewheel this prop is to first drill a 1/16" diameter hole straight through the prop-spinner assembly. Then take a piece of 1/16" diameter brass tubing that is 1/8" shorter than the hole, and solder a 3/16" long piece of 3/32" brass tubing so that 1/16" of it projects. Simply file a ramp-type freewheel notch into the wider tubing, and glue into the drilled hole with cyanoacrylate.

Make sure all the frames have been sufficiently sanded with 320 wet-or-dry (preferably with a block). A little extra time spent in this department will make for a much nicer covering job. The covering material is Japanese tissue, which I prefer to attach with a diluted white glue mixture. Since I used a rather coarse tissue, I found it necessary to apply two thinned coats of clear dope. Had I used a finer tissue, such as the type sold by Peck-Polymers, I probably would have dispensed with the dope and instead sprayed the model with a light coat of 3M Scotchguard. The model in the photos is white with black trim. Clear plastic windows are attached with white glue, with 1/16" wide graphics tape for framing. The lettering and registration are small rub-on graphics lettering, applied to scraps of tissue, trimmed closely, then applied to the model with thinned white glue. The registration, N4790D, contains my initials as well as my AMA number. Interestingly enough, a midwestern Cessna carries the actual number! Aileron and flap separations, as well as the trim pinstriping are from 1/32" wide flat black graphics tape. Those long landing gear struts looked painfully bare to me, so I added a dummy brake line of thread held in place by folded-over pieces of 1/16" wide tape as used on the prop tips. The finlets, of 1/32" sheet or card stock, may be cemented in place on each stab half.

I would like to make some comments on fuselage details. Remember that these details are purely aesthetic, and while they do add a lot to the appearance of the completed model, they may be left off if desired. This is especially true if super-endurance is your game. Under the cowl is an air scoop, as well as the exhaust pipes. The scoop is fashioned from card stock, while the pipes are from 1/8" diameter aluminum tubing. On the top of the cowling is the dummy fuel filler cap, which may be fashioned from scrap plastic or balsa. Next to the "retractable" landing gear struts are the forward doors; these are of card stock. The larger main doors remain closed except during the retraction cycle (!) so these need only be represented as lines on the tissue.

Of all these details, the one which will probably attract the most attention is the simulated leaf-spring tail gear. The leaves are cut from 1/64" ply and laminated together. The wheel pant is carved from soft balsa, while the tail wheel is simulated, being a section of a dowel glued to the base of the wheel pant. On the forward-top portion of the pant is the bearing (mine was from hardwood), and on top of that is the control horn, which is cut from 1/64" ply or card stock. The spring leaves and the bearing should be painted either gun metal, or flat black. The final touch here is to grind some graphite, and rub it on the leaves to give a real metal look. The wheel pant should be painted the same color as the rest of the model. The control cables are from thin enameled wire (like from a small electromagnet). The springs are simulated by winding the thin wire around another wire or tube of 3/32" diameter.

By now the model should be ready for flight testing. See if the model balances somewhere near the usual location. Make a test motor of two loops of 3/32" rubber. Underpowered flights with this motor will tell you much more than test glides. My model ended up needing more positive incidence on the left wing panel than the right, 1/16" left rudder, and considerable up-elevator to achieve a satisfactory left-left flight pattern. When the model seems to be behaving properly, progress to a braided motor from two loops of 1/8" rubber.

Even if you don't build the Hyperwind, perhaps it will serve as a catalyst for you to construct your own fantasy airplane. I would very much like to hear about your efforts in Pseudo-scale! Nick DeCarlis, 1721 NW 68 Terrace, Gainesville, FL 32605. ■