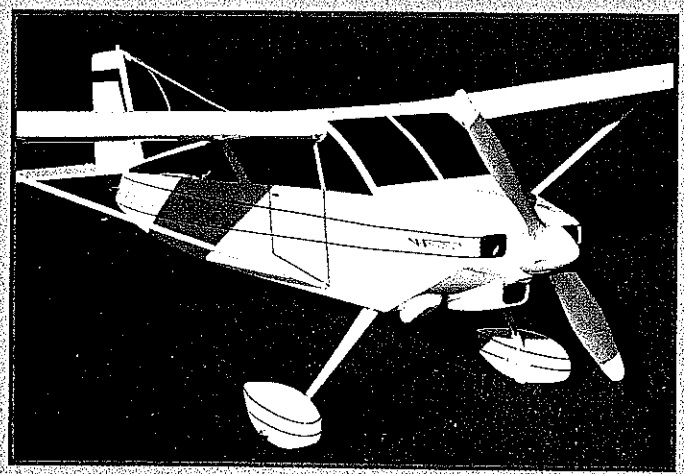
Windsport

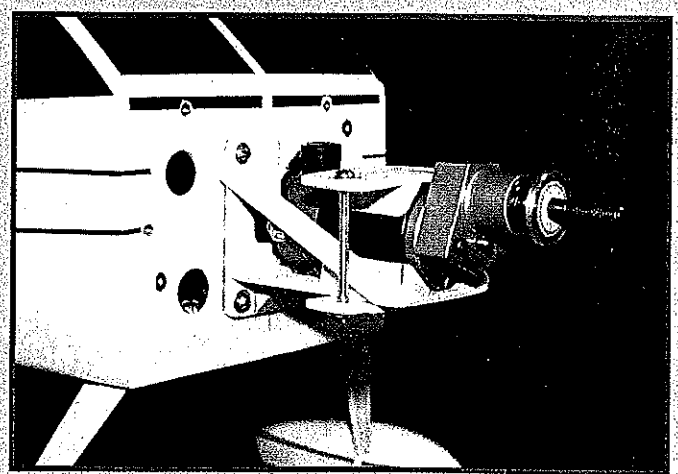
■ Fred Ewing

Here's a "Reminder Scale" Electric for 05-15 power

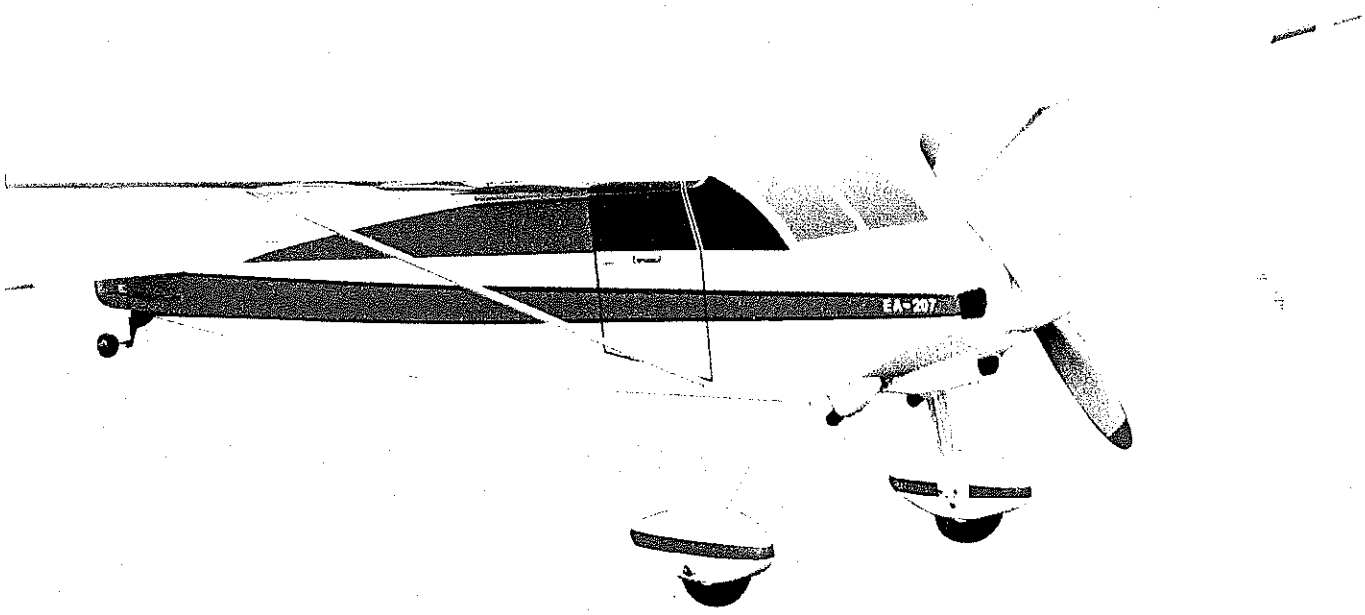
I HAVE TO ADMIT that certain types of airplanes "turn me on," especially Experimental Aircraft Association (EAA) home-built types. When I look at civilian aircraft development in recent years, it is evident that the EAA's member designers and builders have been at the forefront. The current crop of home-builts, as well as the



The Windsport can be used as a trainer with the right supervision. The wheel pants and struts are optional.



The airplane was designed for the Astro Cobalt 05 geared motor, but other motors and (mounting options) are possible.



earlier designs, are very appealing. Some examples of good-looking older designs are the Wittman Tailwind, the Nesmith Cougar, and the SD-1A Dapne.

One day not so long ago, while I was trying to decide which Electric model to build next, my eyes settled on a Rubber Scale Tailwind model that was sitting on a nearby shelf. I started to sketch a rough outline that was similar to the model. As I progressed, I decided that it was not my intention to build a Scale airplane, but rather one that would incorporate some of the distinguishing features of three or four different home-builts. The model would have simplified outlines to make it easy to build, and proportions that would be suitable for a sport-type three-channel model.

By now you probably have an idea of how I came up with the name Windsport. I call this model a sport design, although perhaps "Reminder Scale" would be more appropriate.

Comments that begin "It reminds me of ... ", "It looks like a ... ", or "It resembles ... " confirm what I had in mind when I designed this model. Four models have been built so far. Number Four is the latest; it was built from the current drawings.

This airplane has exceeded my expectations and has proven to be "user friendly." It's docile, has a wide speed range, takes off nicely from a hard surface and short grass, does nice touch-and-gos, clean loops, and everything a good three-channel airplane should do. It has a rather aggressive climb, partially because of the high-lift airfoil and the fuselage shape, which I believe contributes lift. This airplane can be easily hand-launched.

The Windsport even makes a good trainer, with supervision. I've turned it over to rather inexperienced fliers with no problems—a properly trimmed Windsport is a pussycat. I'm also considering adding ailerons.

CONSTRUCTION

Select all of the balsa carefully. Sig contest-grade balsa is recommended for most applications. "Keep the structure light everywhere but strong where needed," as Bob Kopski would say.

Average weights of the components (final-sanded and prior to covering) are as follows: the tail group, struts, and pushrods weigh two ounces; the wing weighs six ounces; and the fuselage weighs six ounces. A nominal finished weight of 50-52 ounces can be expected with the 05 cobalt geared, 7 1,400 SCR cells, and the optional wheel pants and struts.

I use cyanoacrylate (CyA) glues extensively, and I use all types: thin, gap-filling (medium), and slow (extra-thick). The slow works great for gluing Lite Ply to Lite Ply and Lite Ply to balsa. In the few areas where epoxy is used, go easy and apply *light* coats.

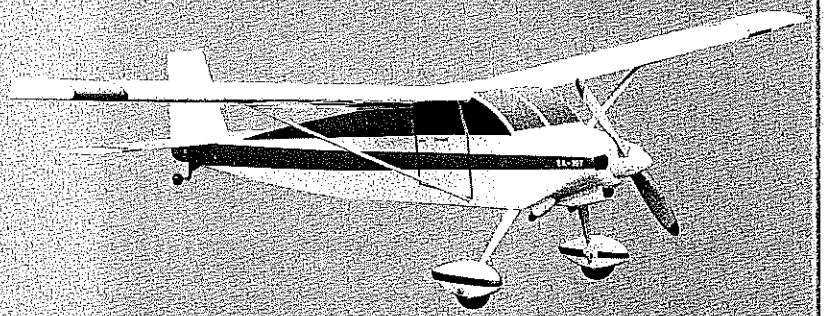
Lightweight radio equipment is suggested, as is an electronic speed control. Don't fly this airplane without one! Two versions I have built use Jomar SC-4 speed controls. A Windsport has also been flown with the Futaba 4NBL-E radio for Electrics with the MCR- 4A combined receiver/speed control. Note that you're limited to 8.4 volts (seven batteries) with this unit.

I designed this airplane for the Astro Cobalt 05 geared motor (# 605G) and it performs quite well with it. I have also used other lower-power systems, such as the Master Airscrew 05 with 3:1 gear drive (#MA 3030K 3.0:1). It uses seven 1.4 SCR cells. Performance with this motor was acceptable, but not as impressive. Start off with the 05 or 15 cobalt motor and you will not regret it.

With the 05 geared cobalt motor I have used seven and eight 900 SCR cells, seven and eight 1,400 SCR cells, seven SR 1,800 SCE cells, and seven SR 1,250 SCE cells. Of these combinations, my current favorite is the 05 geared cobalt on eight 1,400s using a Master Airscrew 11 x 7 Electric wood prop. An even more potent combination uses the Kyosho 9 x 8 prop.

Flight times with the above batteries were in the 6- to 12-minute range, depending on how the throttle (ECS) was used. Initial testing with the cobalt 15 geared and 12 1,400 SCR cells indicates a more-aggressive performance. I really believe the

Windsport

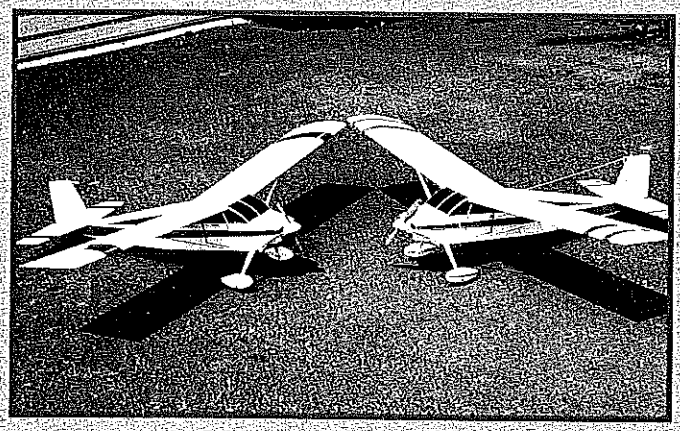


airplane does not need the 15 cobalt to fly acceptably, but it's your choice.

Tail Surfaces: This is where I get to use that much-used word "straightforward." Construction is straightforward, with the exception of the rudder-tail-wheel connection. The forward edge of the stabilizer will be trimmed to match the fuselage.

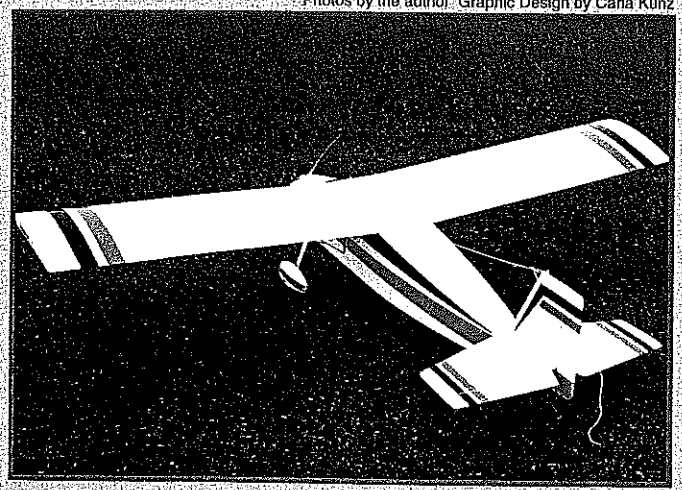
Once the rudder is framed, cut a one-inch length of ⅛ O.D. aluminum tube. Notch the lower edge of the rudder as shown to accept the tube. Glue the tube to the rudder with slow CyA. Make ¼ plywood doublers as shown, feather the edges, and glue them to the rudder. Support the rudder upside down, and plug the open end of the tube. Apply a small amount of epoxy and allow it to flow around the tube.

Mark the centerline on the stabilizer and elevator. Block- or T-bar-sand the top and bottom of all of the pieces on a flat surface. Round the corners and edges as shown. Use your favorite hinges, but note that the lower rudder hinge should be a nylon pin-type one. I use the small Du-Bro pin-type hinges (#119) at all locations. The rudder horn screws go through the lower hinge. This adds support to lower portion of rudder and tail-wheel mounting. Set all of the pieces aside for now.



The author's first and third Windsports. The latter version was a KRC Electric Fly raffle prize.

Photos by the author. Graphic Design by Carla Kunz



The Windsport's "Reminder Scale" appearance makes for a realistic-looking model in the air or on the ground.

Wing: Each Windsport has been built with a different dihedral. My final design choice is the 4° per panel shown on the plans. Greater lateral stability is possible with dihedral up to 7°.

Make rib templates from plywood or aluminum. Medium-firm balsa is recommended for the ribs. Make all of the ribs using templates and your favorite method of cutting outlines. I prefer to cut individual ribs, using the template as a guide. Stack the ribs and place the pieces of spar stock in the upper and lower

Windsport

Type: Electric RC Sport
Wingspan: 56 inches
Wing Area: 504 square inches
Power: 05-15 geared cobalt motor
Functions: Throttle, rudder, elevator
Flying Weight: 49-62 ounces
Construction: Built-up

Covering/Finish: Coverite Black Baron Film or equivalent

notches. Pin the ribs together, and block-sand them lightly for uniformity. Check the ribs for proper fit to their mating parts.

Start construction with the wing center section. Cover the plans with waxed paper. Position the lower spar and pin it down. Leave the excess material on the spars, trailing edges, and leading edges—it will be trimmed later. Make the trailing edge from firm ¼ x 1 trailing-edge stock. Indicate the centerline and mark the rib locations. Cut notches for the ribs; two pieces of hacksaw blade taped or cemented together work well for this purpose. Pin the trailing edge in place. Cut, fit, and pin down the 1/16 lower sheet. Note the opening in the forward lower sheet for the joiner. Apply thin CyA to the sheet joints.

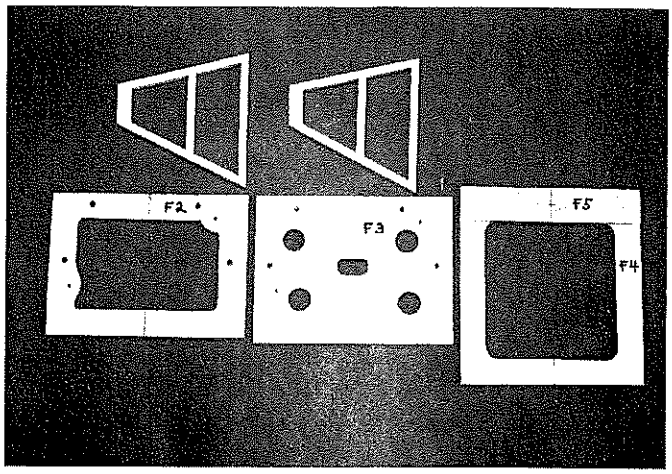
Check the fit of all W1 ribs and glue them in place. Use a small square or triangle to vertically align the ribs. Check their fit and glue the top spar in place. Locate the leading edge and glue in place. Cut and check the fit of the top 1/16 sheeting from the trailing edge to the mid spar. Make any adjustments for proper fit, but do not glue at this time.

Remove the center section from the plan and trim the ends of the spars, trailing edges, and leading edges flush with the sanding block or T-bar. Check the outboard ribs for alignment.

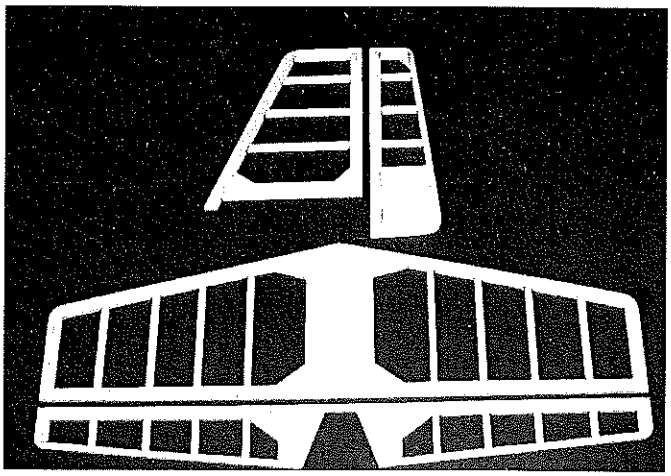
Make right and left wing panels. Rough-cut the upper and lower spars to oversize length. Rough-cut the trailing edge, mark the rib locations, and notch them. Using a straightedge, lay down the lower spar and trailing edge and pin them in place. Locate and glue all of the W3 and W4 ribs to the spar and trailing edge. Place the W2 root rib in position, but do not glue it. Set the top spar in place and glue it in place.

Locate and glue the leading edge in place. Accurately position the W2 root rib, and tilt it to the proper angle using the dihedral gauge. Glue the root rib to the spars, trailing edge, and leading edge. Cut the vertical-grain shear webs, check their fit, and glue them in place. Omit the shear webs in the area of the dihedral joiner. Make and glue the strut blocks in place, if you intend to use the struts. The 4-40 blind nuts can be installed in their blocks prior to installing if desired. Make and install all of the gussets. Trim the spars, the trailing edge, and the leading edge flush with the root and tip ribs. Block-sand the root rib and tip rib.

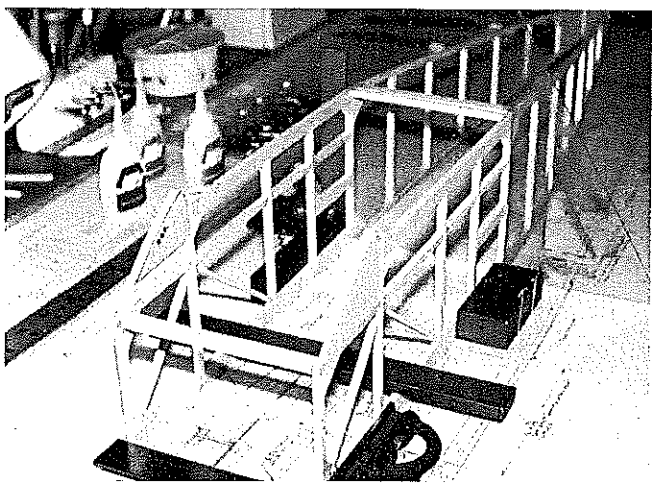
Prepare to join the wing panels to the center section. Pin down the center section. Check the fit of each wing panel to the center section. If you're satisfied with how everything fits, do a dry run prior to final joining. Gather up your clamps, epoxy,



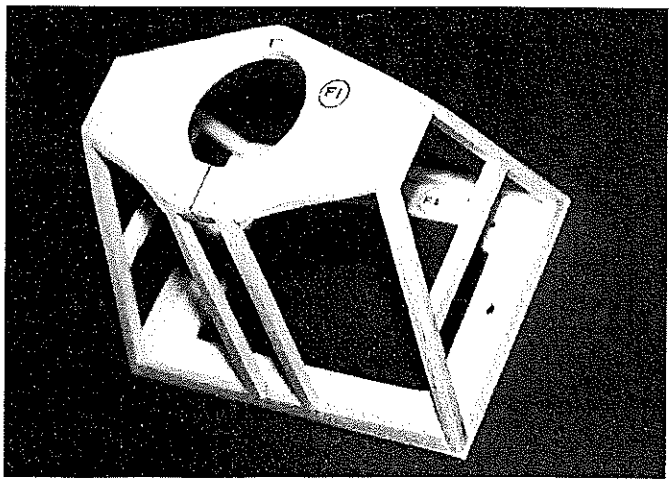
Formers F2, F3, F4, and F5. All are made from ⅛ Lite Ply except for F5, which is made from 3/32 birch plywood.



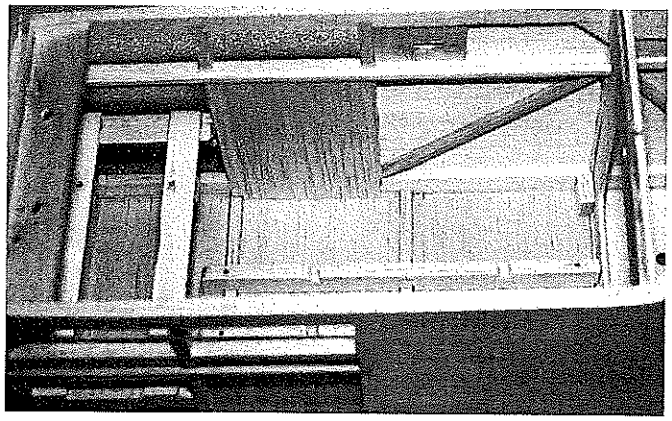
The assembled tail pieces, ready for sanding and covering. Construciton of both assemblies is straightforward.



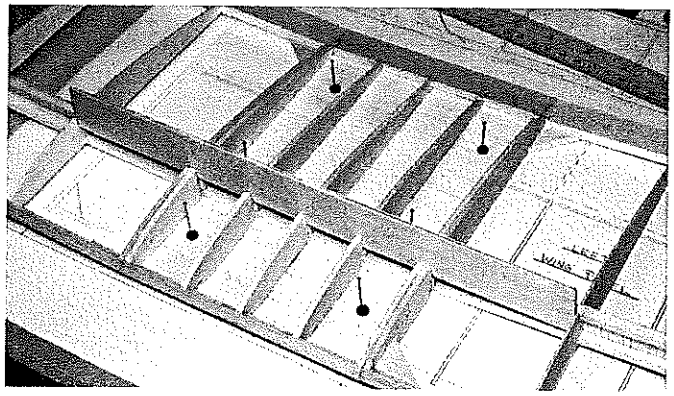
raming the fuselage. Note the squares, triangles, and weights hat keep the assembly square during construction.



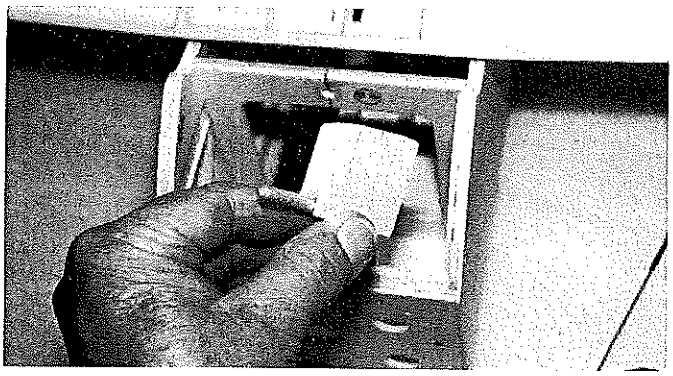
After the cowling is framed, soft 1/16 balsa sheeting is added. Plenty of interior space allows a variety of power options.



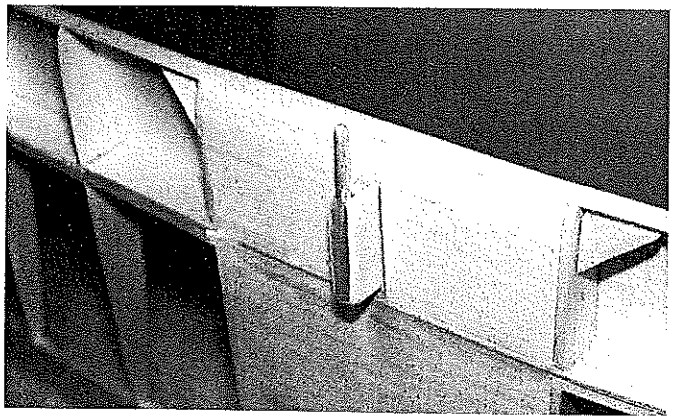
Fuselage interior. How many models can you fit both hands inside? The model is easy to hand-launch; outside width is only 5⅛ inches.



With the outer panels glued to the center section, the plywood joiner can be test-fitted and installed with slow-cure epoxy.



Wing hold-down dowel assembly. Note that the wing's lower sheeting is slotted to allow the dowel assembly to be inserted.



The completed wing hold-down dowel assembly. Don't forget to allow for the 1/16 x ¼ wing saddle tape during assembly!

mixing sticks, rubbing alcohol, etc. I prefer a slow-cure (30-minute) epoxy for this purpose.

Block up each wing panel the same amount to ensure proper fit of the root ribs to the center section. Mix epoxy, apply a light coat to the mating surfaces, block up the panels, join them, and clamp the assembly. Wipe off the excess epoxy with alcohol. Allow the epoxy to cure.

Cut through the W1 center-section ribs and W2 wing root ribs to create a slot against the spar faces. Sand all of the surfaces that will contact the dihedral joiner. Make a dihedral-joiner blank as shown on the plan from 3/32 aircraft plywood. Pin down the center section, and block up each wing panel. Slide the joiner blank in place and check the fit.

With the joiner blank in place, mark the outline with a pencil. Remove the blank, saw the outline and check the fit. Do another dry run with clamps, etc. Epoxy the joiner in place with slow-curing epoxy, clamp everything, and allow the epoxy to cure. This method has worked well for me and has proven to be quite accurate when working with a joiner of this type.

Install the balance of the shear webs. Fit and install the 1/16 center-section top sheeting from the trailing edge to the mid spar. Note: Omit the forward top sheeting at this time. This will allow access to the hold-down dowel assembly when the wing is fitted to the fuselage.

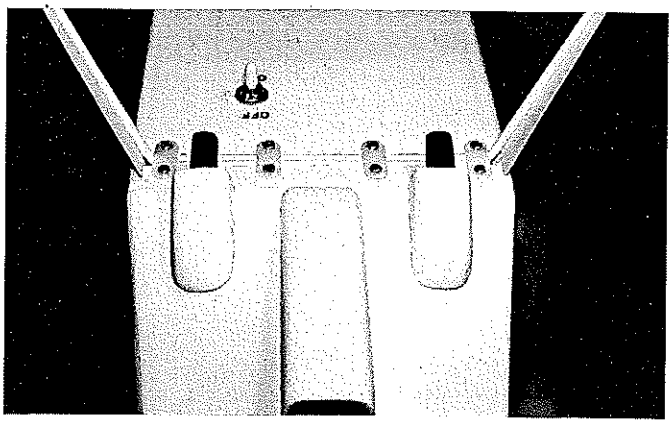
Lightly sand the top of the ribs if required to remove any high spots or irregularities. Fit the top 1/16 leading-edge sheeting for both wings. Use soft, straight-grained balsa for this. Trim the sheeting at the rear edge of the spar. Butt sheeting to leading edge and apply masking tape at intervals. This will allow the sheet to hinge and open. Here again, a dry run is helpful prior to gluing. I use a slow CyA to glue the rear edge of the sheeting to the spar.

A long straightedge or weights are useful to hold the sheeting down until the glue sets. Use thin CyA and apply small amounts between the masking tape at the leading edges from the inside. Remove the tape and from the inside, and finish gluing the sheeting to the ribs and leading edge. Trim the excess sheeting at the tip and block-sand flush.

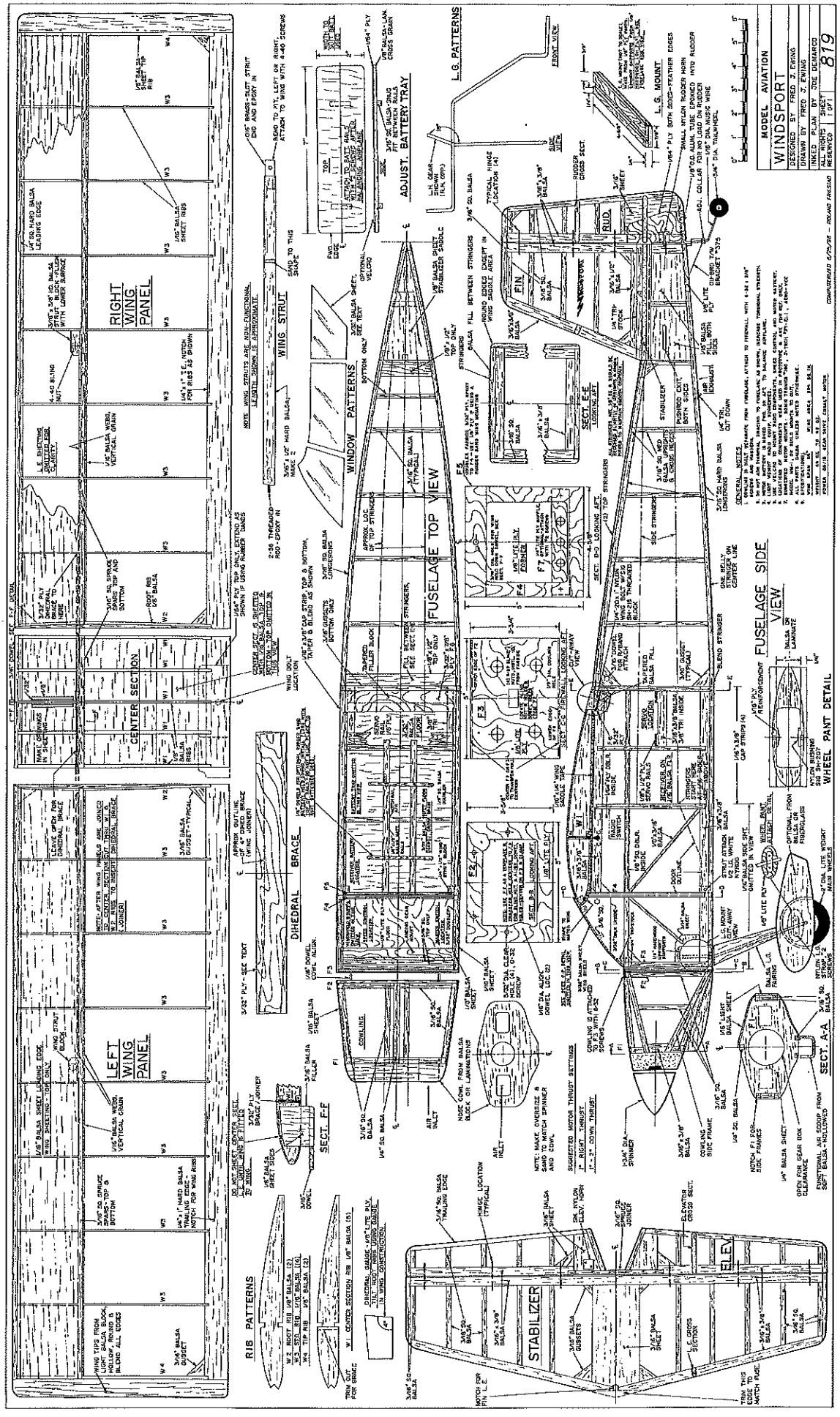
Make the wingtips from light balsa and rough-cut their contour. At this stage I like to take a check on the balance of the wing supported on the centerline. If one panel is heavier than the other, I use the lighter of the two tip blocks on the heavy wing panel. Both tip blocks are hollowed, but more wood is removed from the block that will be used on the heavy wing panel. The wing can be supported and the tip blocks temporarily placed on top of the tip ribs to get a fairly accurate indication of balance.

To hollow out the tips I use wood-carving blades such as X-Acto assortment #135 in lieu of using a Dremel tool. These blades fit X-Acto handles #5 and #6 and work great for scooping out soft balsa. Chips are neater than sanding dust. Glue the wing tip blocks in place and finish shaping.

Fill the openings in the center-section lower sheeting with scrap balsa. Sand the entire wing.



Forward underside, showing the landing-gear mounting, power-system arming switch, dummy exhausts, stacks, and fairings.


RIGHT WING PANEL
LEFT WING PANEL
CENTER SECTION
WING STRUT
ADJUST. BATTERY TRAY
WINDOW PATTERNS
FUSELAGE TOP VIEW
FUSELAGE SIDE VIEW
L.G. PATTERNS
L.G. MOUNT
RIB PATTERNS
DIHEDRAL BRACE
WHEEL PANT DETAIL
STABILIZER
ELEV.
FIN
RUD.
SECT. A-A
SECT. F-F
SECT. E-E
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Make the 1/64 plywood doubler for the wing's trailing edge. Feather the sides and glue them to the center section. At this point you should have a complete wing, except for the wing hold-down dowel assembly and the top-forward 1/16 center-section sheeting.

Fuselage: Tired of squeezing components and batteries into narrow fuselages? Take a look at this wide-body fuselage—you can get both of your hands inside it! This accessibility precludes the need for a hatch.

The fuselage uses typical box-type construction. This is my preferred type of construction because it can be light, yet strong. It is comparable to typical Free Flight model construction. Just choose firm and matched pieces for the longerons—this assures contour symmetry when the sides are drawn together at the tail post.

If you elect to use rubber bands to hold the wing on, disregard the parts relating to the bolt and dowel hold-down, except retain the F5 support and make it from 1/16 plywood instead of 3/32.

Place waxed paper over the plans. Build two identical sides using your favorite method. I prefer to make one side, and remove it from the plan, leaving the outside perimeter pins in place. Remove just enough of the interior pins to allow removal of first side. Use the pins to position the second side and add pins where required.

Another method I have used is to place pieces of Scotch-type tape over the joints of the first side (to prevent sticking) and then build the second side over first. Note that the cowling side frames can be built right along with the sides. Reference drawing notes 1 and 2.

I know how tempting it is to add diagonal bracing to this fuselage, but I assure you it's not required. When the stringers are added, I think you will agree. Add gussets and sheeting at the tail after the sides are removed from plan. When side frames are complete, place them on a flat surface and block-sand both sides lightly to remove any glue blobs or unevenness.

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Make the nose former F1, cowling former F2, firewall F3, former F4, doubler F5, support F6, baffle F7 (optional), and the landing gear mount. A few notes are in order:

All of the section views are looking left. Also note that F5 and F6 are made from 3/32 x 7/8 plywood, so plan your cut sizes accordingly. The cowling former F2 and firewall F3 are 1/8 Lite Ply. Cut out these parts mark centerlines where applicable.

When using F2 as a template, the holes are to be small pilot size. Clamp as required, and transfer drill six places from F2 through F3. Step up the drill sizes progressively when you drill the holes to their final size. Open four screw holes in F2 to 5/32 diameter. This size is a clearance hole for the 6-32 screws. Open 1/2-inch-diameter cooling holes in F3. Open the center wiring-access hole and the four blind nut holes. Install four 6-32 blind nuts. Install two 1/16 alignment dowels in F2—do not glue them; these will be glued in place after the cowling is made.

Position F2 on F3 and check the alignment of the holes. Fit and epoxy doubler F5 to former F4. Locate and drill a 3/16 hole for the wing hold-down dowel.

The fuselage has a inside constant width of 4 5/8 inches from the front to section E-E. Prop up the two sides over the plan and start framing by adding crosspieces. Use 90° triangles or squares to insure the squareness of the fuselage. Do not glue the tail posts together yet. Epoxy the gear mount to the longerons, making it flush at the front. Note the forward edge of the gear mount shown on the plan. Clamp everything, and allow the glue to cure.

Add former F4 and the fabricated frame at view E-E. Add 1/8-square doublers inside from F4 to view E-E. Bevel the tail posts and glue them together, checking them against the top view of the plans and the fuselage centerline. Add the balance of the crosspieces, the tail wheel mount, the floor pieces, and the battery rails.

Block-sand the front of the fuselage, and trial-fit firewall F3. Glue F3 to the

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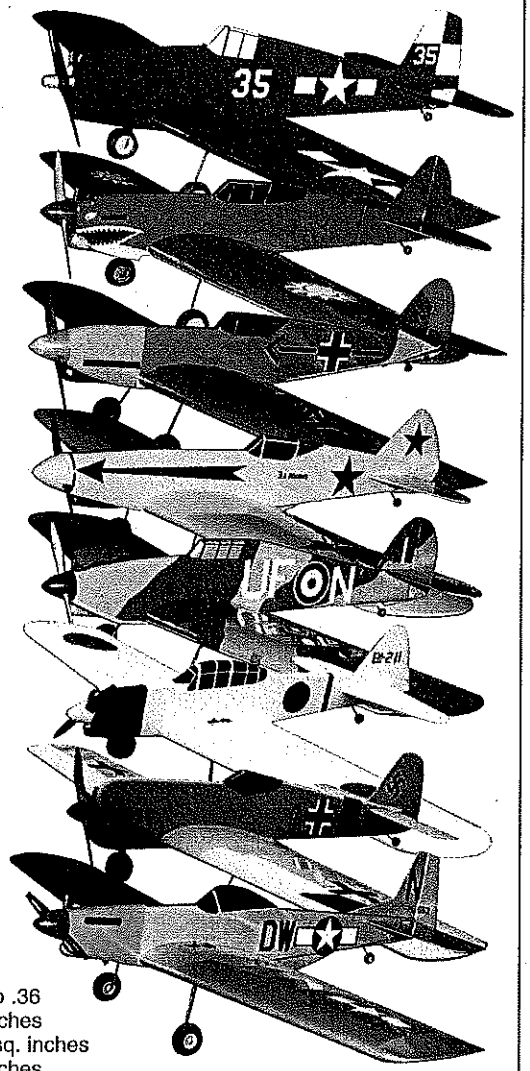

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uselage using slow CyA or a light coat of poxy.

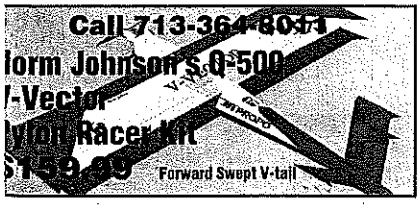
Make left and right landing-gear legs rom ⅛ music wire. Drill the gear mount nd attach the landing gear with ½-inch ylon landing-gear straps. Make and fit he gear upright supports. Remove the ear and glue the supports in place.

Install support F6 using tapered filler lock to help align things at the proper ngle. Install the balance of the details, ncluding the 1/16-sheet balsa sides, the apstrips, the stabilizer saddle, the tringers, the filler between the stringers, he triangle stock, and the servo rails.

Cowling: The cowling is made by uilding a frame and covering it with soft alsa sheet. Study the plan's top view, ide view, and section A-A. Note that ormer F2 must be kept flat for a snug fit gainst firewall F3. Glue the 1/16 lignment dowels in F2. Refer to the lan's top view.

The cowling is attached to firewall /ith 6-32 x ⅜ socket head cap screws and /ashers. The screws and washers are nserted inside the cowling, then the owling is lowered onto the fuselage with ne dowels entering their mating holes. A 64 x 6 ball wrench tightens the screws.

The nose cowling can be made from alsa block or from balsa laminations. Glue it to F1, but only rough-shape it at his time. Final shaping will be done /ith the motor and spinner in place. Make the air scoop and the optional xhausts. Install the cowling to the uselage and completely sand the uselage. Blend the stringers using a anding block or a T-bar sander. Blend ne fuselage and cowling sides. Round ne edges as shown in view E-E.



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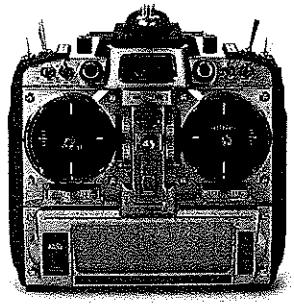

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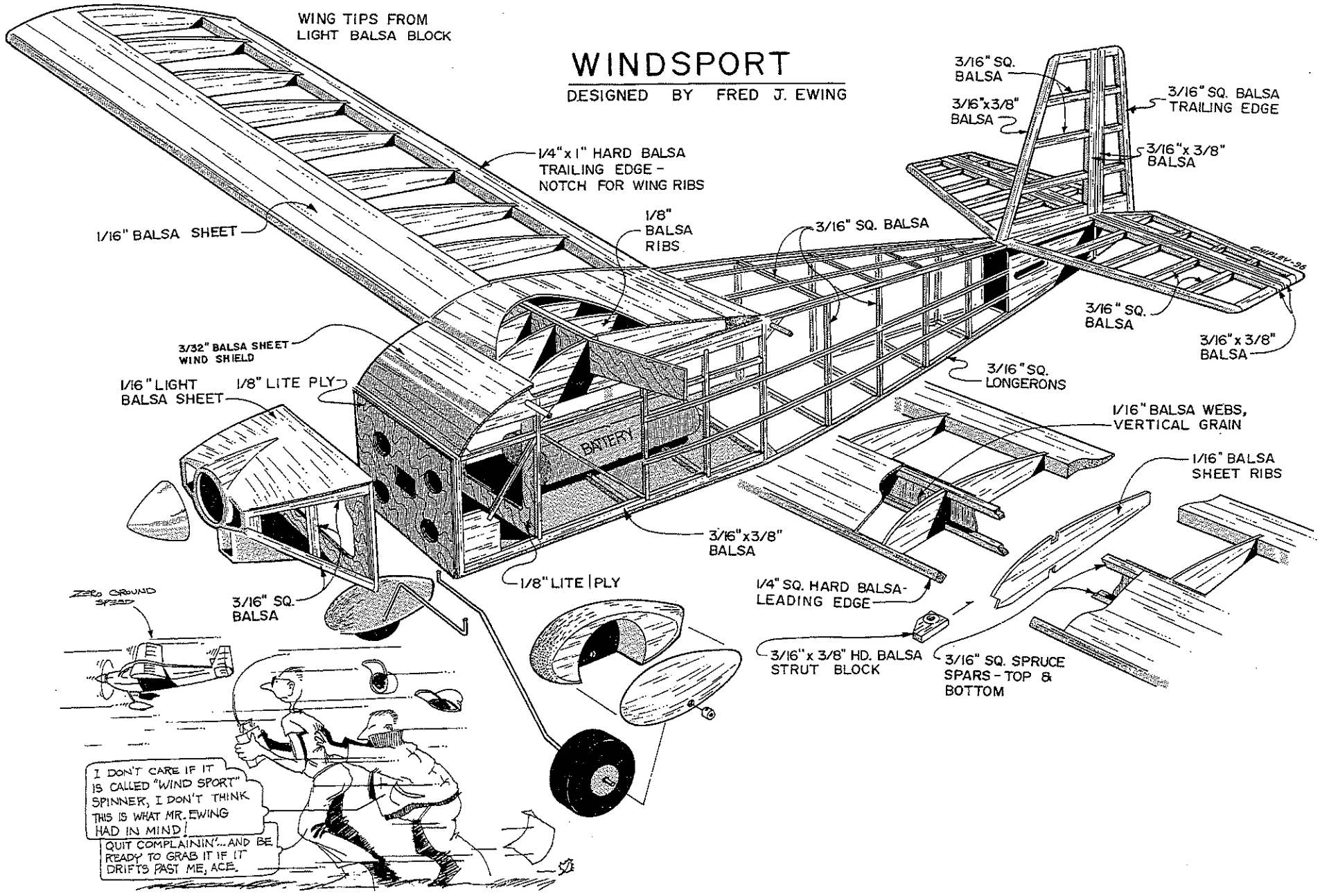
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Motor and Motor Mount: Install the motor and mount of your choice on firewall F3. Coordinate the installation with the cowling for proper fit. Note that the inside of F1 and the nose cowling should be cleared as required for gearbox clearance. If required, a spacer block can be added to the motor mount to help with its fit. Final-shape the nose cowling, blending it into a 1¾-inch-diameter spinner.

Fitting the Wing to the Fuselage: Contour the front of the fuselage saddle area so the wing contacts all of the surfaces. Fill in the area with scrap balsa as required. Don't be concerned with installing the windshield at this time.

Study the wing hold-down dowel section of the plans. Make the dowel, and the ⅛ x ⅓₂ side pieces. Make the openings in the center section as shown. Glue the dowel to the ⅛ side pieces. The 3/16 x ¼ wing-saddle tape must be in place at this time.

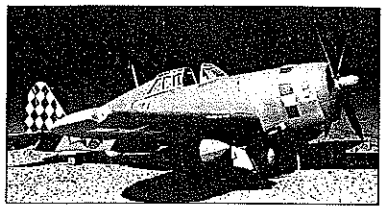
With the wing assembly clamped to rib W1, slide the wing in place and align the dowel to the 3/16-diameter hole in F4 and F5. When you're satisfied with the fit, mark the location and remove the dowel assembly. Make and install 3/16 balsa filler, and epoxy the assembly to rib W1. Add the forward-top 1/16 sheet to the wing's center section. Finish-sand the assembly.

Now is the time to install the wing bolt. Align the wing, and drill a pilot hole in the wing's center section through the filler block and support F6. Progressively open the hole to accommodate a ¼ x 20 nylon bolt. Complete the installation by gluing a Sig #218 threaded block to the underside of support F6; use slow CyA or a light coat of epoxy.

With the wing in position (and bolted down) you can proceed to the windshield installation. Cut the windshield from medium-soft 3/32 balsa sheet. The fit of the windshield to the wing should be close, as shown on the plan's side view. Sand the side mounting surfaces with a T-bar until you're satisfied with the fit. Cut and install ¼-inch triangle stock and two 3/16-square supports as shown. Glue the windshield in place, radius the corners, and chamfer the rear-inside edge as shown.

If you have decided to make the optional struts, this is the time to make them. Drill holes for them, and epoxy short lengths of white inner Nyrod in the fuselage. Make sure you drill the holes at the proper angle. The strut ends thread into these. Use 4-40 nylon screws to attach the struts to the wing.

I like to accomplish the preliminary fit-up of the tail surfaces and the radio installation, prior to covering the model. Install the servos and the pushrods of your choice. Install the radio components, the speed control, and the switches. Install the power system. Check the



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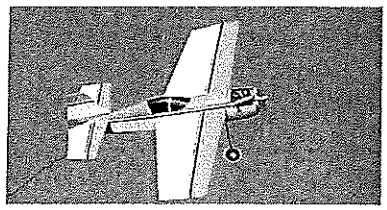

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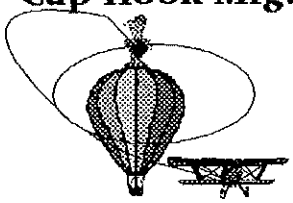

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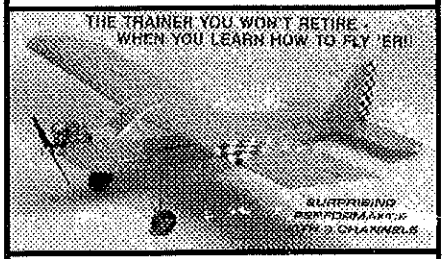

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operation of the radio, the control surface movements, and the power system.

The control throws I used on my models were approximately ½ inch each way. Remove all of the components that will interfere with covering the model.

Miscellaneous Items: Make the battery tray and fit it to the rails.

At this point you can make the optional wheel pants if desired. If you plan on flying from grass, I suggest that you install 2¼ or 2½-inch diameter wheels *without* wheel pants. The wheel pants are better suited for hard-surface runways or fields with grass that is very short.

Make balsa or plastic landing-gear fairings—I use .015 plastic. Attach it to the gear with RC-56-type glue or contact cement. Do not glue the upper ½ inch—this will allow the fairing to flex.

Covering: Any of the lightweight heat-shrink films can be used on this airplane. Two of my models are covered with Coverite Black Baron Film; it's lighter than most other films. Films such as MonoKote, UltraCote, or Coverite 21st Century can also be used. I have used most of these coverings, and I like them all.

I usually cover the tail surfaces off the airplane, leaving the areas that will be glued free of film. The cowling is covered with four pieces, the wheel pants with two pieces, and the struts with one piece. I used flat black acrylic enamel in the cowl openings and on the exhaust stacks, and spray enamel on the gear. All of the trim is Black Baron film and Coverite Presto.

The side windows and windshield were made from black Presto. Gray, silver, or chrome are other options. The door outlines are 1/16-wide striping tape. The air scoop and exhaust fairing are covered and glued to the cowling with RC-56-type glue. Don't forget the triangle stock at the rear outlet. It serves as an air deflector, creating a low-pressure area and a better flow of air. Air flow through the airplane is excellent; it has some of the attributes of a venturi effect.

Flying: When all of the detail covering is completed, check for warps. Slight washout in the wingtips is desirable. Assemble the airplane and reinstall all of the required equipment.

Balance the airplane where shown; the battery and tray can be moved to help facilitate this. Screw the battery tray to the rails with two to four #2 screws. Check all of the equipment for proper operation. When all looks well, pick a nice day for the first flights. Perform preflight checks and don't forget to range-check your radio with the motor running.

Good luck. I hope you will enjoy flying your own "homebuilt." Happy Windsporting! ✈

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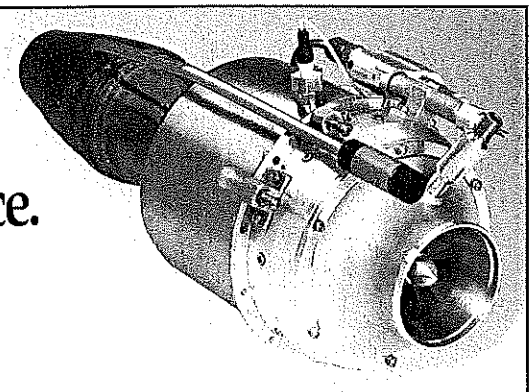

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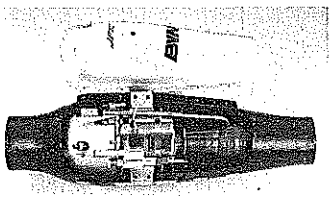

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