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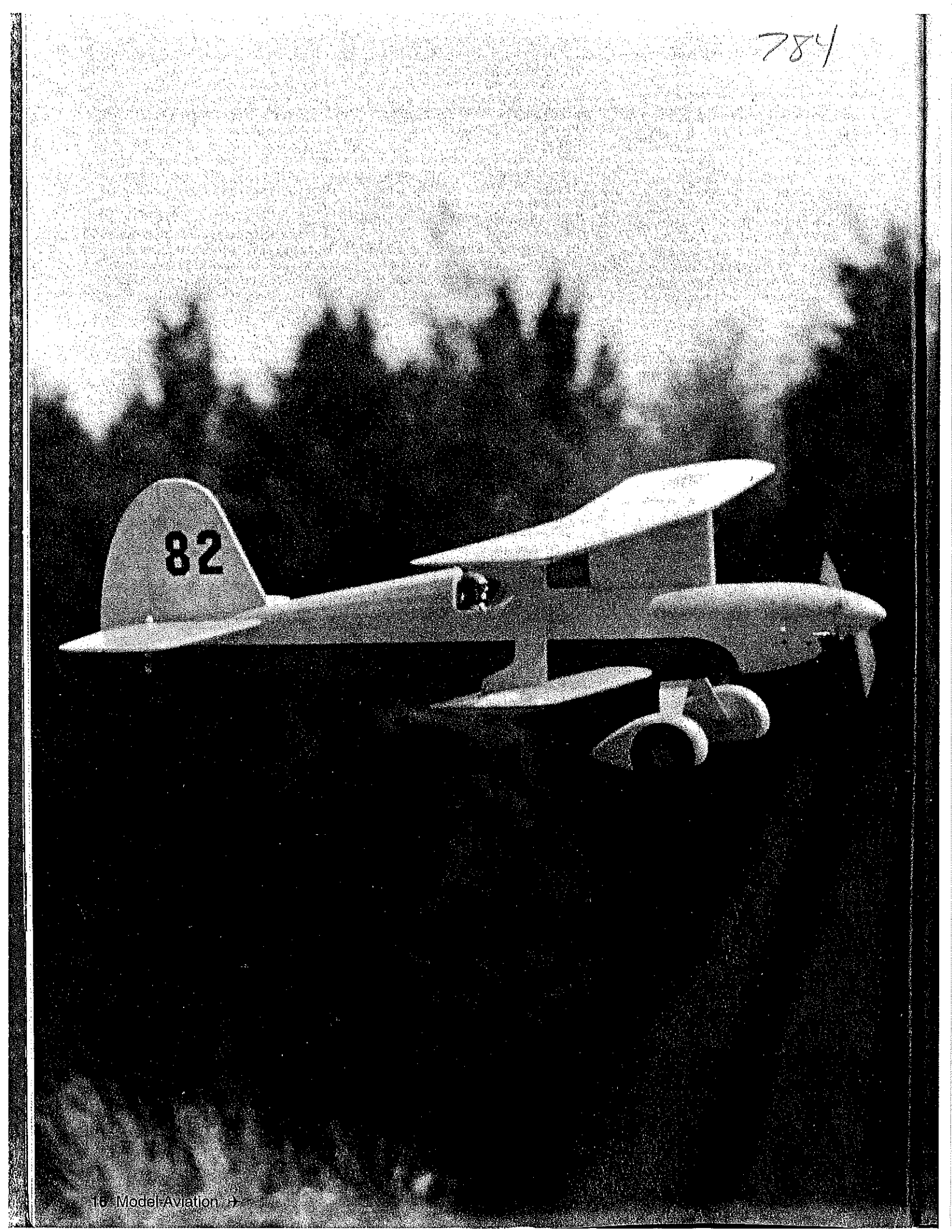
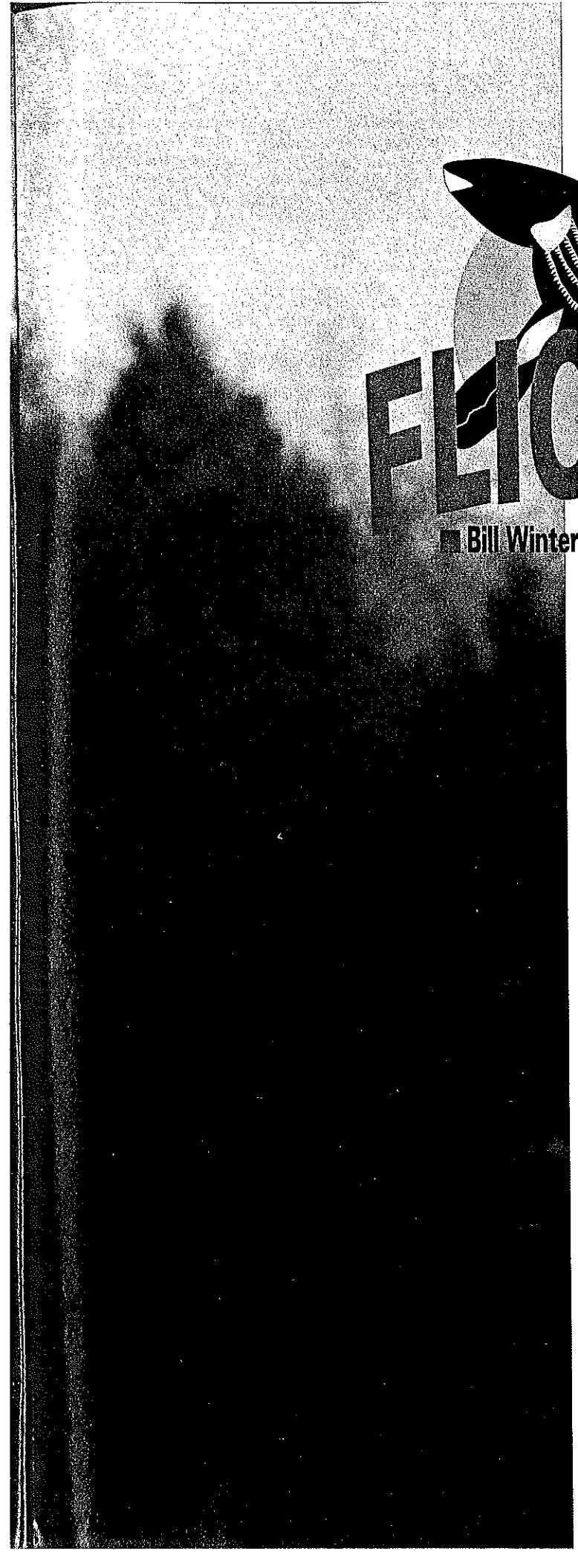




FLICKER

Bill Winter & John Hunton

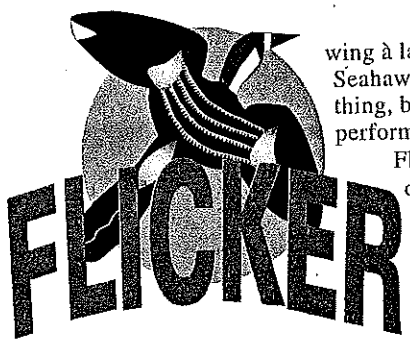
The Flicker was designed to fly the way that I wish it could if I could fit into it. There are no mysteries to the parameters that enable an airplane to fly within the particular flight envelope envisioned, but there are many subtleties blended together for the "feel" or personality of the airplane. It helps to think of these things as people, not to be put down by a pears-and-apples comparison. There is intentional whimsy and nostalgia in Flicker's persona, which hopefully may prove to be irresistible.

Once the basics were determined, I decided to marry the characteristics of two glamorous airplane designs of the past for proportions and relative areas, and to snitch cosmetics from other much-loved airplanes.

The world-famous Curtiss racing biplanes of the early 1920s were a landmark; one utilized the center-section wing-mount pylon that adds verve and simplicity to a model.

A prewar WACO taildragger cabin also provided inspiration. I flew a .15-powered WACO by Don Srull, and was greatly impressed by its beautiful characteristics. It was published in *Model Aviation* (May 1979, plan #260).

I obtained three-views of these aircraft at the same scale, then added and divided by two for an average span, length, gap, moment arm, chord, and area. A sense of balance led me to subtract 2 1/2 inches from the resulting tail moment and add 1 1/2 inches to the nose. I opted for a swept top



wing à la the Great Lakes and Curtiss Seahawk. A touch of sweep is a nice thing, both in appearance and performance.

Flicker performs somewhat differently from the typical high-power-loading RC bipes of today. Most importantly, it flies "on the wing" and not by power or brute force. It flies just fine on a K&B Sportster .65 turning a 13- or 14 x 6 prop—no need for a $300 engine. Flicker uses any economical four-or-more-channel radio, and needs no mixing, although the use of about 25% CAR (Coordinated Aileron and Rudder) is nice for sport flying.

Airfoils are symmetrical 00— series (as on the B-17) with an average of 2½° incidence in the flat top wing (with washout) and 2° in the bottom wing, which has modest dihedral. A forward center of gravity (CG) as marked is critical for this angular difference (decalage) which provides pitch stability and makes the model easier to fly. Inverted flight requires only slight down elevator, so it is not overdone. Actually, in spite of its stability and ease of flying, Flicker is quite close to stay-where-you-put-it capability.

We wanted enough stability to make the airplane less tense to fly, and to have fluidity in every maneuver without noticeably detracting from professional-style aerobatics. This is an aerobatic airplane—including knife-edge flight and flat-turn rudder-only 360s.

A touch of "coupling" is designed in but only a flier of no-dihedral and zero-zero (or nearly so) airplanes would detect it. The latter machines in less-than-high-time pilots' hands are awkward on lower-end portions of the flight envelope. Since biplanes do not balance where many modelers expect, I cannot overemphasize the importance of balancing Flicker as shown on the plans. If the CG is moved aft the model will be "squirrely."

The airplane is "big" for the power, having a 60 x 10 top wing and a 56 x 9 lower wing, which produce a generous 1105 square inches area. At a gross weight of seven pounds, two ounces, wing loading is just over one pound per square foot. Flicker is not a floater, but it excels in tight places with a short takeoff run, a great climb angle, and small landing pattern footprint.

Visual cohesiveness was enhanced by using rounded forms for the planforms (wingtips, stabilizer, rudder bow), then reinforcing the theme with the rounded nose, canopy, open spats, and even the airfoil.

Construction is straightforward and simple, featuring quick assembly and disassembly at the field with the clevis-attached interplane struts. A glow plug heater is recommended for the inverted engine to keep idle reliable; we have one but don't use it. Mysterious engine failures are sometimes due to nitro evaporation in old fuel or fuel frequently exposed to air.

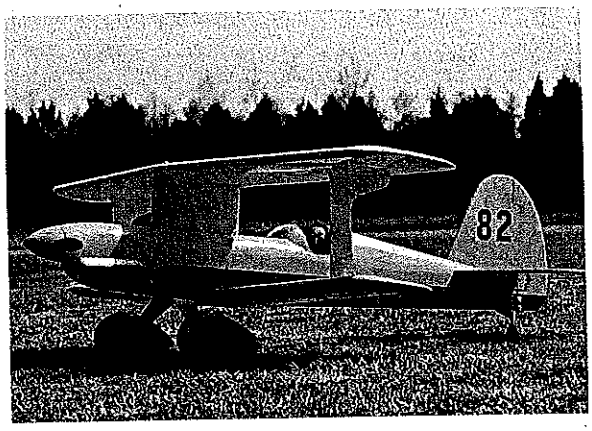
Please get back to us through the magazine with comments, suggestions, how your Flicker flies, and any personal modifications that you have made.

Bill Winter

FLICKER

Type:	RC Sport
Wingspan:	60 inches (top)
	56 inches (bottom)
Engine:	K&B Sportster .65
Number of channels:	Four
Flying weight:	7 lb. 2 oz.
Construction:	Built-up
Covering/finish:	21st Century film/paint

Bill Winter (L) and John Hunton with Flicker. Some test flights made without cowl to facilitate engine setup.



Looks like you could walk right up and get in! Number on rudder was designer's age when Flicker was built.

The Flicker is my first excursion into a classic-type biplane. Having flight-tested many single-wing sport models, I thought that emphasizing the differences with this model would help if this was also *your* first biplane.

Flicker is a simple, big, clean model. The basic differences compared to typical trainers and sport models are a steeper angle of climb, lower top velocity, and a lower stall velocity. Washout (or twist) in the top wing provides excellent stall propagation characteristics. The model will not drop a wing in a stall or at landing. Downthrust and sidethrust reduce trim transitions with power changes.

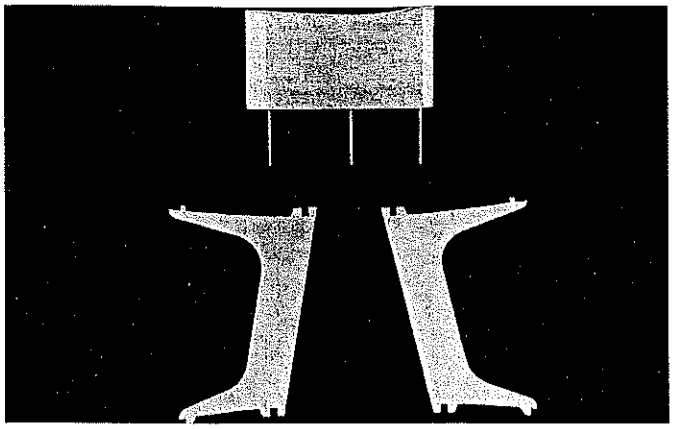
CONSTRUCTION

Good balsa selection is critical for a light model, so note the firmness indicated and order plenty of extra balsa to give yourself a good selection of stock.

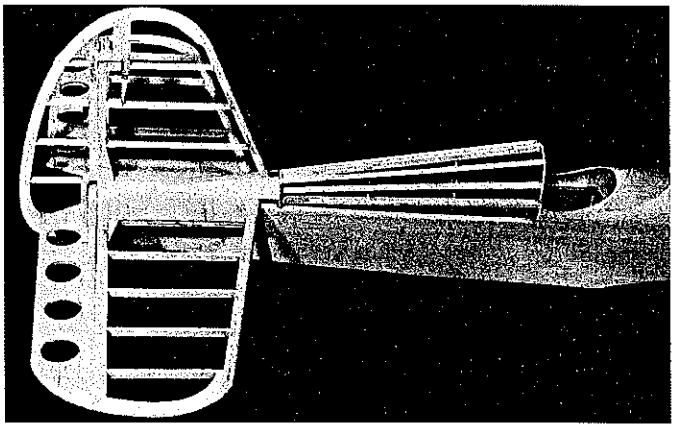
Wing: Construction is detailed for completion of the D-tubes on the workbench for accuracy. Cut spar notches in the ribs and true the ends as accurately as possible for good alignment. Stack the ribs and fit to scrap spars to check uniformity.

True the edges of all wing sheeting with a straightedge. Begin the wing panels by pinning down the bottom leading edge sheet and the bottom spar. Glue the spar to the sheet. Slip the ribs onto the spar. Pin the trailing edge into place, propping it up appropriately (note the upper-wing washout), then glue the ribs. Install the top spar.

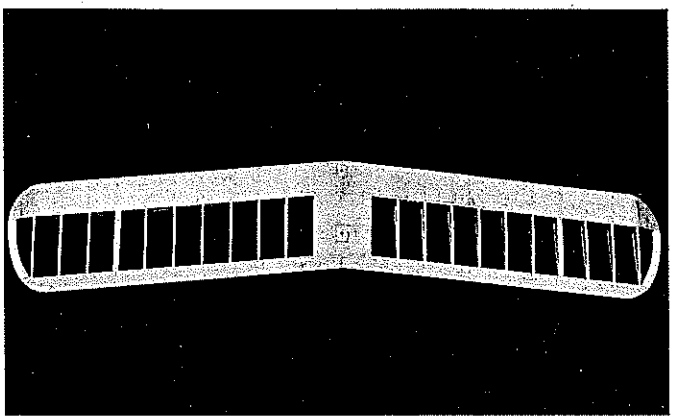
Continued on page 23



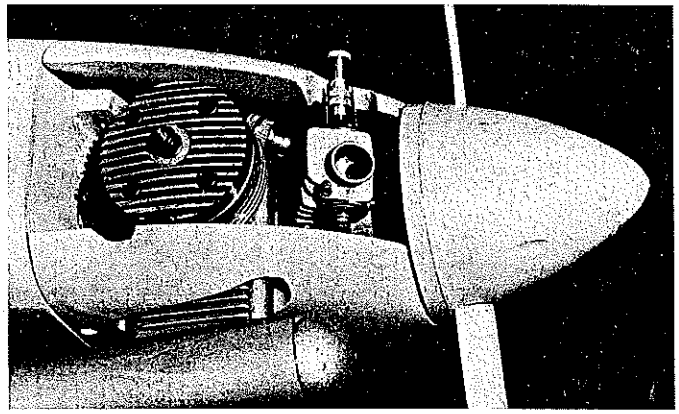
Main wing pylon is simpler than a cabane strut system. Fit cardboard interplane struts first, then cut from plywood.



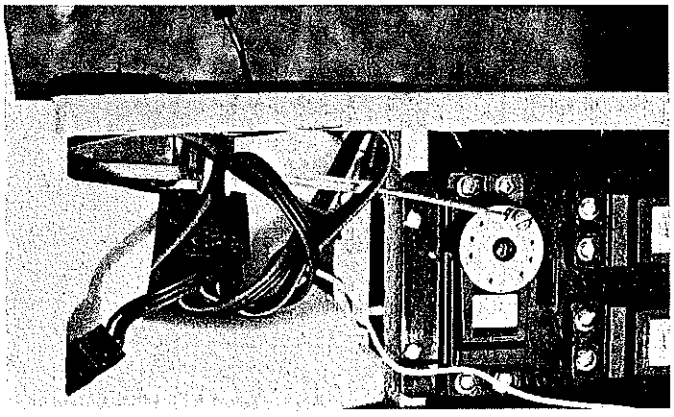
Conventional empennage is simple. Rudder balance may take some load from the servo but is primarily for looks.



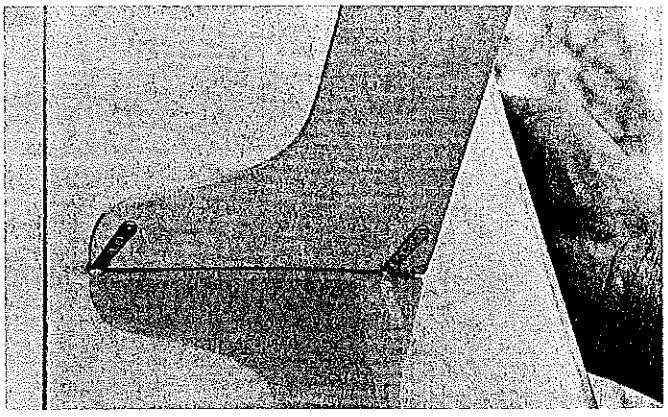
Wing assemblies are uncomplicated. Airfoil is a symmetrical NACA 00 series. Model flies as well inverted as upright.



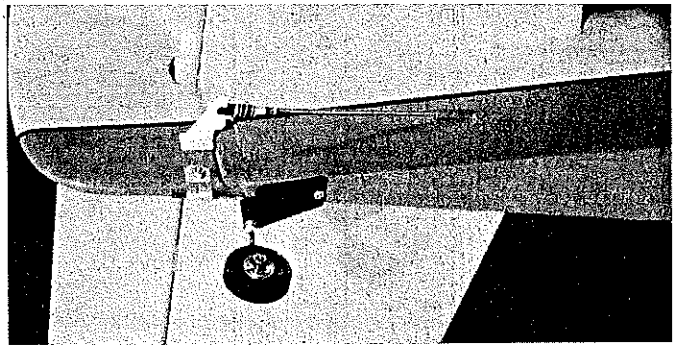
K&B Sportster .65 provides plenty of reliable, economical power. The cowl is tight, but simple.



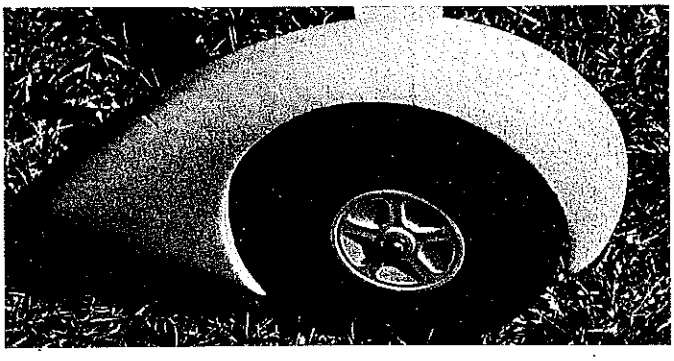
Four-channel Aitronics Vanguard system has plenty of room. Note that the receiver is suspended in foam.



Wing attaches with clevises rather than screws. Clevises can be removed for covering or changing incidence.

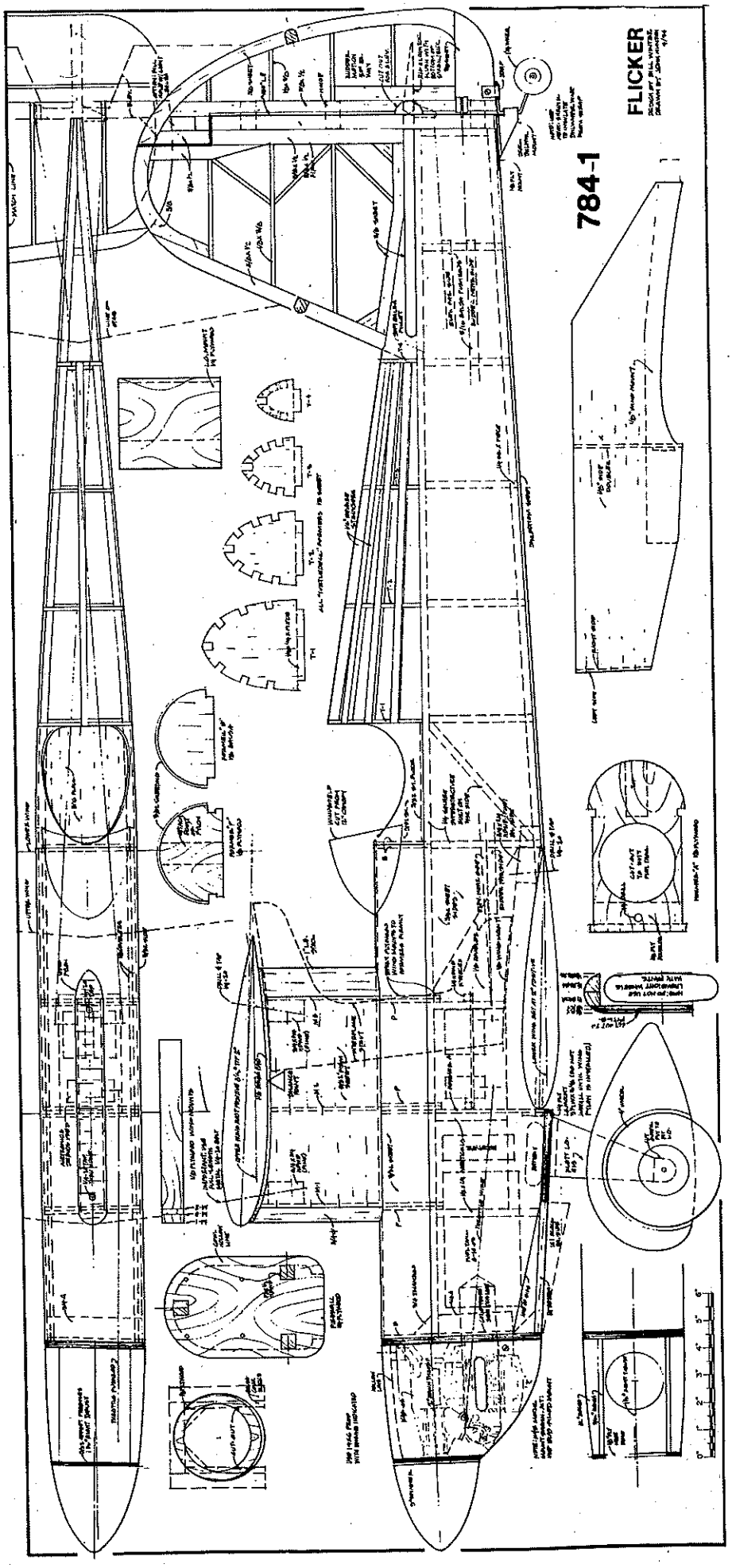


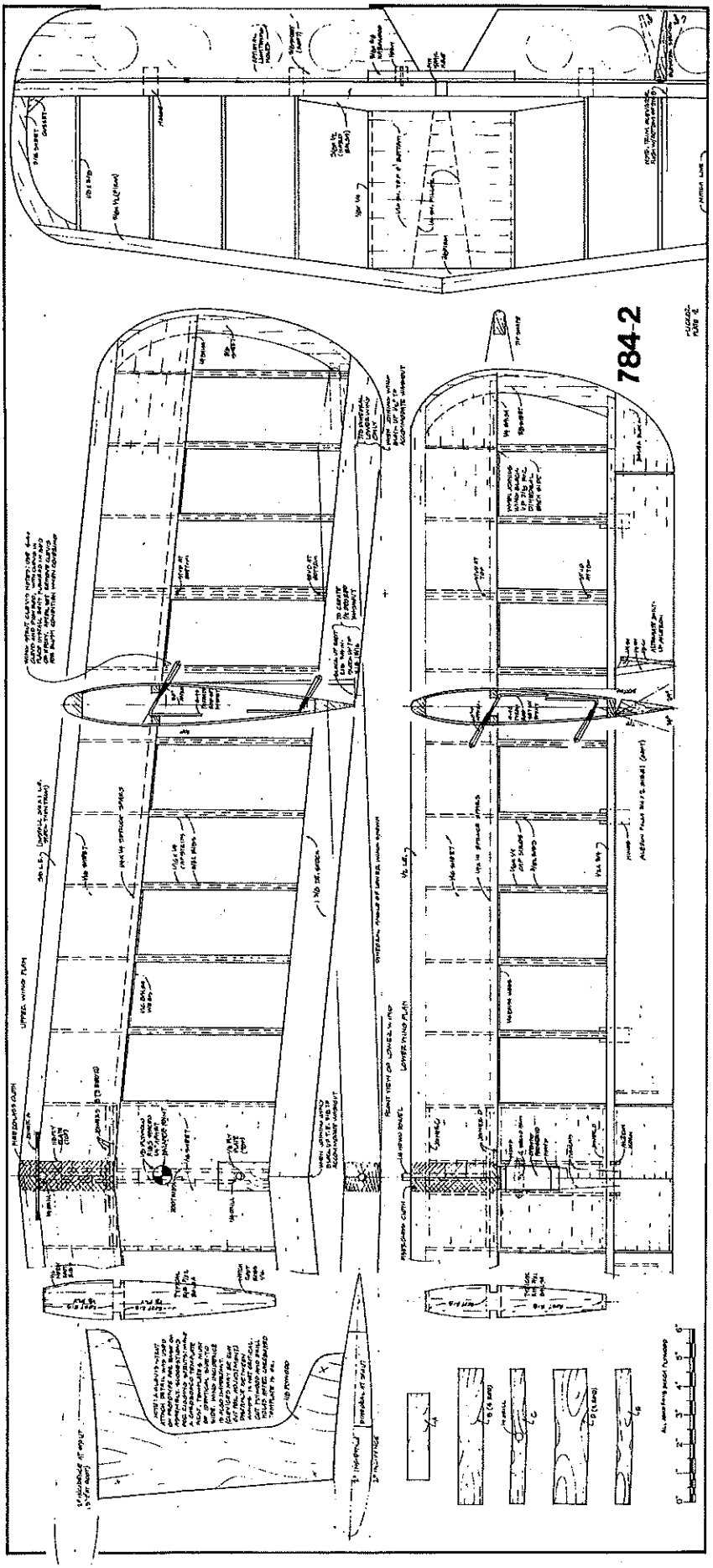
Stock tailwheel assembly has a small piece of heat-shrink tubing to insulate torque rod from metal strap.



Partial wheel pants add to the 1930s look and help keep mud off the lower wing on damp days.

Full-Size Plans Available–see page 168

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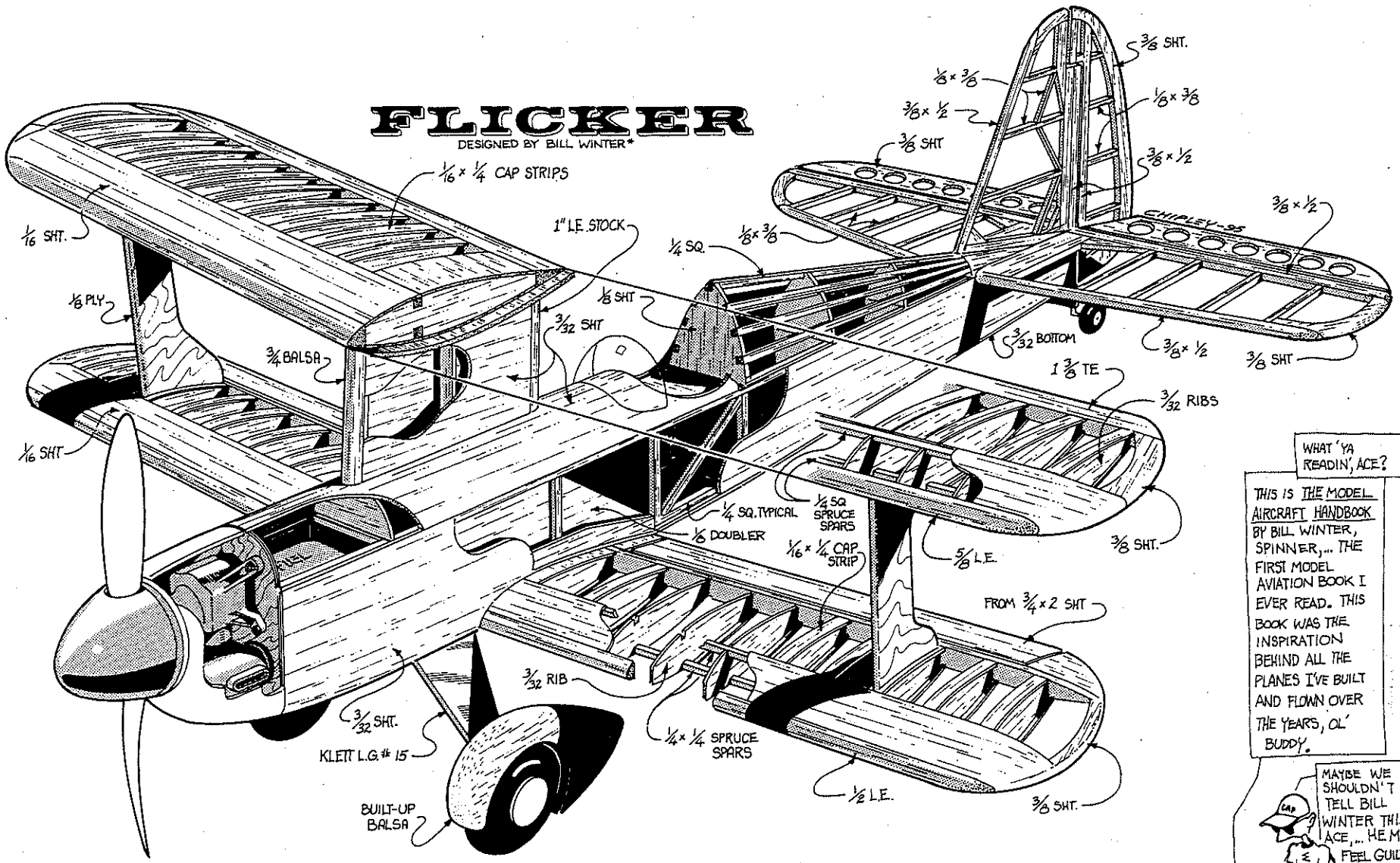
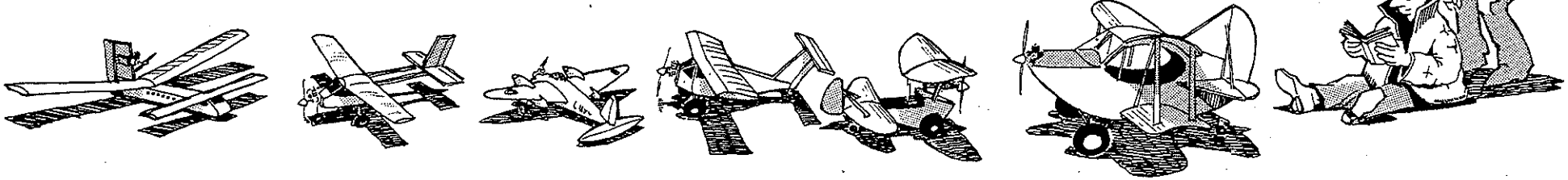
FLICKER

DESIGNED BY BILL WINTER*





Check for good alignment by laying a straightedge over the spar to check for high points. Press down lightly on the straightedge. Shim the lower leading edge sheet up from the bench and glue it tight to the ribs. Run slow-curing glue (like Titebond) to the leading edge tops of the ribs and spars and install the top sheet. Install all spar webs (grain vertical). Glue on the trailing edge sheet parts (or the trailing edge, for the top wing). Trim and block-sand the leading edge and install the leading edge part. Glue the tip parts in place. Add the top capstrips.

Remove the panel from the building board and add the bottom capstrips and tip sheet. Butt-fit the wing panels. Block the panels for dihedral and/or washout as indicated on the plan, tack glue, then add joiners and center section sheeting (only the bottom wing has dihedral). Install the wing strut clevis studs so that they do not protrude above the wing surface.

Use a long, straight sanding block to sand and true up the wing. Most of the top surface truing, shaping, and sanding can be done while the wing is still on the board.

The ailerons can be cut from solid stock, but they will be lighter if built-up as shown.

The only unusual aspect of construction involves the wing struts. They snap on, instead of being bolted on, making field assembly/disassembly quick and simple. The center section pylon eliminates cabane struts.

Tail Surfaces: Assemble the horizontal stabilizer, fin, and built-up rudder directly over the plan. Pay particular attention to weight here, because every extra ounce at the tail results in three ounces of nose weight required to balance the model. Block-sand the ends of all mating members to ensure a good, solid fit. Cut parts a little long, let them hang there just over the edge of the bench, then sand to length with a sanding block.

Fuselage: Begin assembly by building up the two sides. Note that the lengths of the front of the two sides and the angles that they are cut

at determines engine alignment (down and right thrust improve flight characteristics). Cut all formers to shape. Assemble the formers and crosspieces to the fuselage sides over the plan to insure good alignment. The rudder post must be on the centerline.

Drill the firewall for the engine mounts and install blind nuts. Install all top and bottom fuselage sheeting. Drill the landing gear mount to match the gear and add blind nuts. Do not install the landing gear mount until after the wing pylon has been attached, to ensure good access for gluing. Install the top stringers.

All control surfaces are center-hinged except for the ailerons, which are top-hinged for good upper surface continuity and a close fit (prevents flutter and improves control response). Slot for hinges with a #11 X-Acto blade. We used Sig Easy Hinges, which were glued with cyanoacrylate (CyA) after check-fitting. Trim the corners of the hinges to promote easier installation.

An inverted engine installation is shown, with an open slot for cooling. The stock K&B .65 muffler fairs well with the fuselage. The only complication with this installation is getting the cowl on and off around the muffler and needle valve (which must be removed to remove the cowl) but the installation is neat.

The cowl is built from 1/2-inch soft balsa blocks tack-glued to the firewall and built around the installed (but mufflerless) engine with spinner. Tack 1/16 balsa spacers to the spinner for clearance, then install the plywood nose ring. Carefully carve and shape the cowl, and thoroughly fuelproof the inside. If you make first flights with the cowl removed, add compensatory weight to ensure proper balance. The cowl is mounted at three points with sheet metal screws into hardwood blocks.

The prototype was covered with Coverite 21st Century film. Some parts (landing gear, wheel spats, wing pylon, cowl) were painted with 21st Century sprays, which work very well. Film covering is expedited by using the new Coverite computer-controlled iron, which maintains accurate temperature. (Jeff Troy at Coverite can provide you with an excellent tape on installing 21st Century film.) Cover the bottom panels first and overlap joints or changes in color trim by 1/4 inch.

During final assembly it is important to maintain precise alignment. Begin the assembly process by fitting the lower wing to the fuselage. A perfect fit can be had by taping the wing, applying lipstick to the tape, trial-fitting the wing to the fuselage, then removing material where the lipstick appears.

Install the 1/4 leading edge dowel. Measure from the wingtips to the tailpost to get the wing centered properly, then drill 3/16 and tap 1/4-20 for the wing bolts. Bolt the lower wing in place. Install the horizontal stabilizer, using the lower wing as a reference. Install the fin, using the horizontal stabilizer to provide reference.

Lay the upper wing on the pylon. Align the upper wing in plan view against the lower wing. Drill 3/16 and tap 1/4-20 for the hold-down screws. Check incidences using distance from the workbench. Following are dimensions to use in checking incidences: With the landing gear removed and the fuselage resting on the lower wing, block up the tailpost 2 5/16 inches. The centerline of the leading edge of the lower wing should be 9/32 higher than the trailing edge. The leading edge of the upper wing (at the root) should be 9/16 higher because of the washout. The horizontal stabilizer is set at 0°. This makes the stab parallel to the workbench reference.

The lower wing is set positive (leading edge up) 2°. The upper wing pylon holds the upper wing at 3 1/2° positive (1 1/2° more than the bottom wing) at the root. The upper wing, however, has 1 1/2° of washout and is parallel to the lower wing (2° positive) at the tip.

Do not cut the plywood interplane struts until the entire model has been assembled. First cut out cardboard templates that can be trimmed or added to make them right. Check the struts side-to-side for uniformity. When satisfied, cut the final plywood struts.

The wheel spats are held in alignment with the landing gear bow by cutting out the inner plywood part to fit the bow. Do not use easily deformed wheels, which my bulge and bind on hard landings.

Flying: Taxiing with this taildragger is not tricky at all. Keep up elevator on it to keep the tailwheel in good contact with the ground. When you apply power to take off, the rudder takes over for positive directional control. Let off up elevator when the model begins to accelerate (to let the tail rise and for the model to build speed). Very steep climbouts are possible with a fully broken-in engine.

Flicker is surprisingly responsive in all axes. The CG is placed so that it is not twitchy, yet Flicker will snap and spin if asked to. Consecutive rolls and inverted seem easy and natural. You can control the model nicely through loops and rolls. Just be cautious on landing. Flicker will descend fairly steeply on final with low idle. Keep a little power until you are over the threshold until you are used to the model.

Rudder action is strong. Stall turns, etc. are quick and precise. There is more rudder than required for knife-edge, so until you get the feel of it, your first knife-edge flights will tend to climb. Flicker will roll on rudder and will execute 360° turns without ailerons, if you are curious.

Biplanes have more drag than equivalent monoplanes, you should expect shorter, steeper approaches. Flicker may be larger than the model that you have been flying. These factors can combine to make you land short. If you are used to flying smaller monoplanes, pick a landing spot about one third down the runway for your first biplane landings to avoid landing short.

Flicker is a fine basic platform for upgrading power and fine-tuning incidence angles for the desired performance variations. Experienced biplane pilots who have tried Flicker like the way it flies. ✈