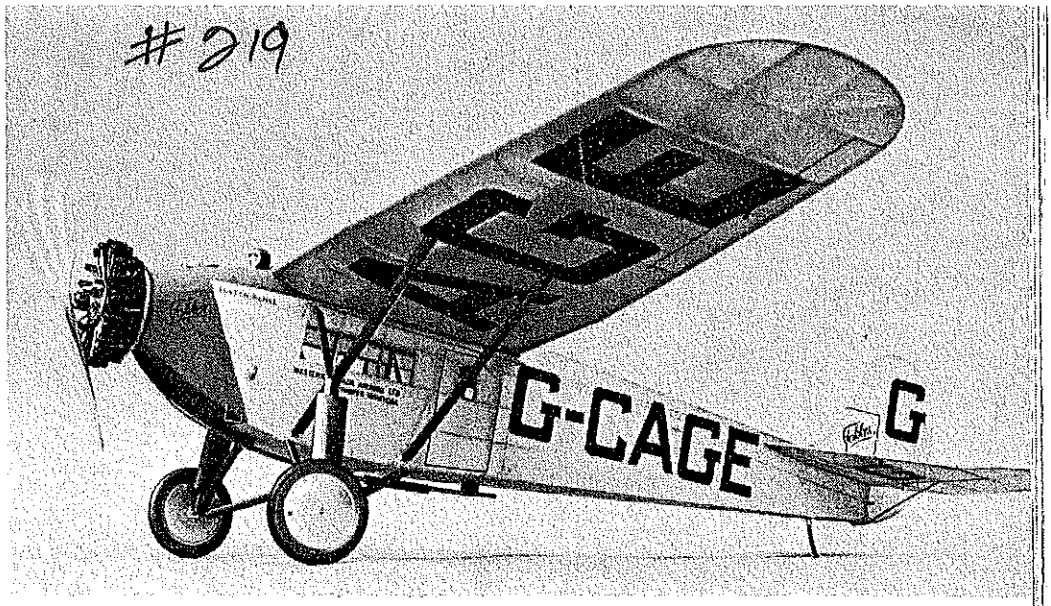
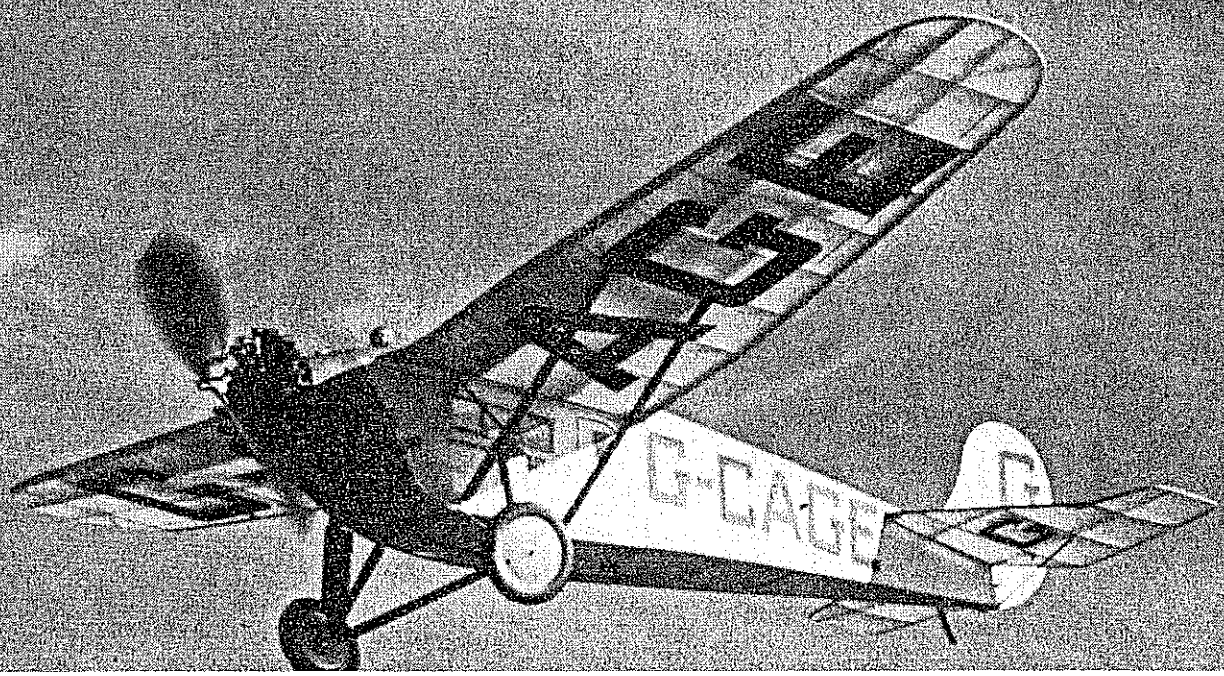
#219



Above: Designed in 1925 by Robert Noorduyn, who in later years would design the Norseman, the Universal was used (our model) in the Canadian wilderness on floats, wheels, and skis. Below: A big rubber model is dramatic, says the author and, once you've flown one, you'll quickly agree.

Almost 4 feet in size, this Jumbo Scale rubber-powered model consistently flies 45 to 50 seconds. ■ **Bill Noonan**

Fokker UNIVERSAL



ONE OF THE more pleasurable pursuits of the flying scale enthusiast who prefers to "start from scratch," is the search for a design that seems to fulfill a number of requirements. Is it esthetically pleasing? Is it proportioned so as to have a reasonable chance of flying well, without excessive design distortion? Is it graphically pleasing in color and marking scheme? Finally, is it historically significant?

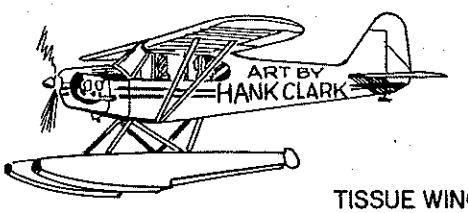
The Fokker Universal, designed in 1925 by Robert Noorduyn and built in America by Fokker, comes very close to satisfying these elusive criteria. The Universal was a colorful and robust machine, with no-nonsense symmetry. It was one of the last production aircraft where the pilot sat in lonely isolation from the passengers, in an open cockpit which offered little in the way of comfort.

Our model reproduces the Universal registered G-CAGE and used extensively by Western Canada Airways, during 1927 and 1928. It could be fitted with floats, skis or wheels. It was reliable and withstood the rigors of the Canadian wilderness, transporting cargo and passengers to remote mining camps.

Production of Universals started May, 1926 and ended in April, 1931. They were manufactured by Atlantic Aircraft Corp., Hasbrouck Heights, New Jersey, Fokker's American subsidiary.

Our model is 1" scale, which puts it a shade under four feet in wing span. Documented specifications indicate the span to have been 47' 9" and the length 33' 6".

Now, if you are thinking 4 ft. is pretty big for rubber power, let me proselytize on behalf of Jumbo (over 36 in.) rubber scale. The model consistently flies 45 to 50 seconds. It has taken second place in two major scale contests sponsored by the Los



TISSUE WING COVERING

1/4" BALSA BLOCKS
FOR STRUT WIRE CLIPS

1/32" WIRE
CEMENTED
TO STRUTS

1/32" X 3/32" BA
LAMINATED ALL

1/16" X 1/8" BALS
DIAGONAL BRACE

1/8" ALUMINUM TU
WING HOLD DOW
DESIGNED FOR QU
DISCONNECT ON I

1/16" SHEET BALS
SPAR JOINERS
AT CENTER ONLY

1/32" WIRE CLIPS
DESIGNED TO PULL
OUT ON IMPACT

FRONT WING HOLD
DOWN WIRE CLIP

TOP FRONT COWL
FROM SOLID BALSA

1/16" SHEET BALSA
PILOT MOUNT DECK

1/32" PLYWOOD 'FIREWALL'

2 - 1/8" BALSA DISK

1 - 1/4" BALSA
ENGINE BLOCK

1" SCALE WILLIAMS
WRIGHT J-5 PLASTIC ENGINE

3 - 1/32" PLYWOOD
SPACER DISK

4 - 1/16" PLYWOOD
LOCK PLATE
CEMENT AT 30°

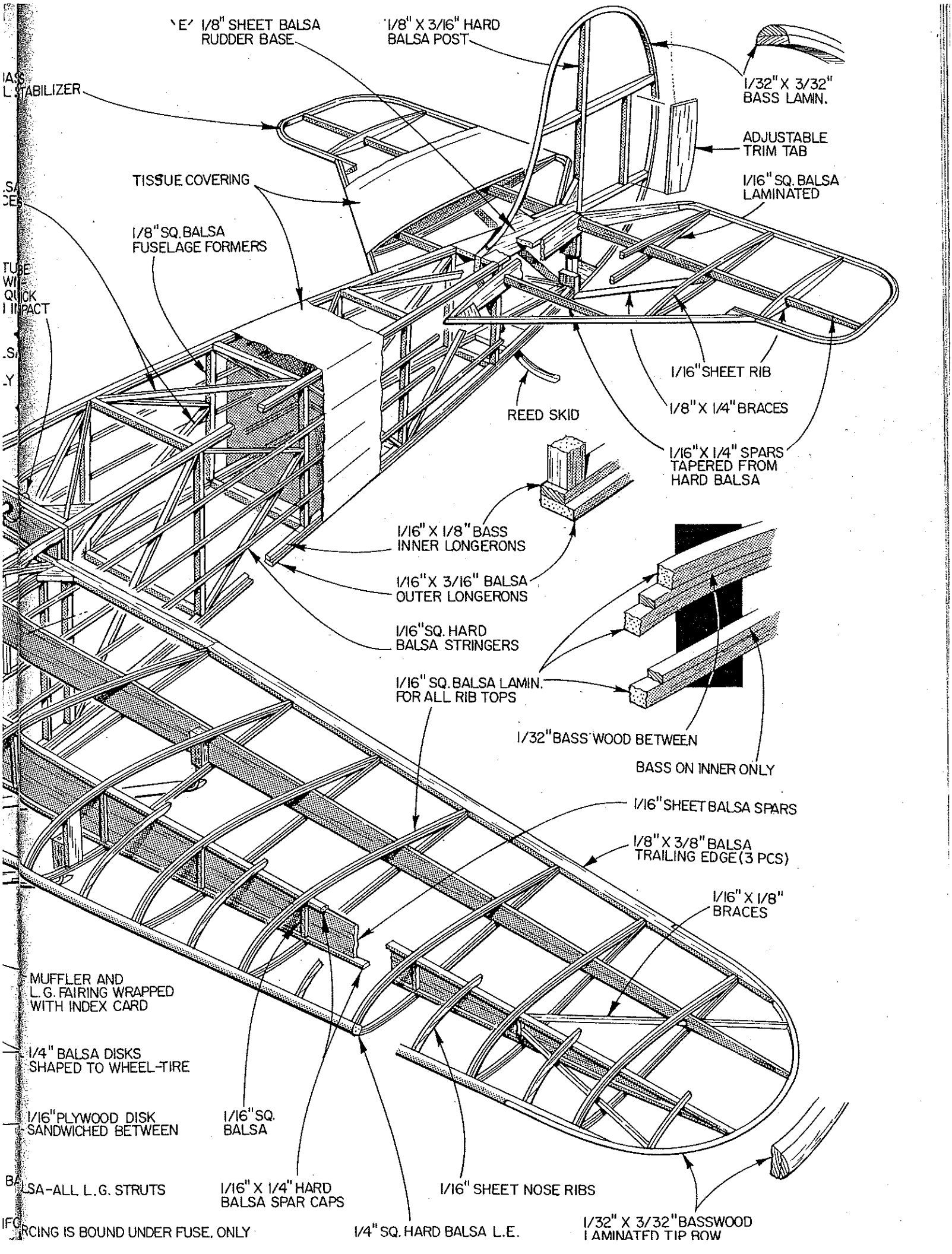
3/16" REED EXHAUST AND COLLECTOR

.005 ALUMINUM
APRON

1/32" SHEET BALSA
LOWER COWLING

1/8" X 1/4" HARD BA

1/32" WIRE REINFO


'E' 1/8" SHEET BALSA RUDDER BASE
1/8" X 3/16" HARD BALSA POST
1/32" X 3/32" BASS LAMIN.
ADJUSTABLE TRIM TAB
1/16" SQ. BALSA LAMINATED
TISSUE COVERING
1/8" SQ. BALSA FUSELAGE FORMERS
1/16" SHEET RIB
1/8" X 1/4" BRACES
REED SKID
1/16" X 1/4" SPARS TAPERED FROM HARD BALSA
1/16" X 1/8" BASS INNER LONGERONS
1/16" X 3/16" BALSA OUTER LONGERONS
1/16" SQ. HARD BALSA STRINGERS
1/16" SQ. BALSA LAMIN. FOR ALL RIB TOPS
1/32" BASS WOOD BETWEEN
BASS ON INNER ONLY
1/16" SHEET BALSA SPARS
1/8" X 3/8" BALSA TRAILING EDGE (3 PCS)
1/16" X 1/8" BRACES
MUFFLER AND L.G. FAIRING WRAPPED WITH INDEX CARD
1/4" BALSA DISKS SHAPED TO WHEEL-TIRE
1/16" PLYWOOD DISK SANDWICHED BETWEEN
1/16" SQ. BALSA
1/16" X 1/4" HARD BALSA SPAR CAPS
1/16" SHEET NOSE RIBS
1/4" SQ. HARD BALSA L.E.
1/32" X 3/32" BASSWOOD LAMINATED TIP BOW

Angeles Flightmasters, competing against some of the best scale builders anywhere. Add consistent and predictable duration with upper rank scale points (89 out of a possible 100 at the last Jumbo meet) and you have a combination that encourages this type of model. Big rubber models are dramatic. Besides, they are easier to embellish than smaller scale.

One minor change incorporated into the plans, was a reduction in the dihedral, as compared with the pictures. This gives a better scale effect. On the real aircraft, the wing was flat on top when sighted from the front. The taper on the underside provided the equivalent of slight dihedral.

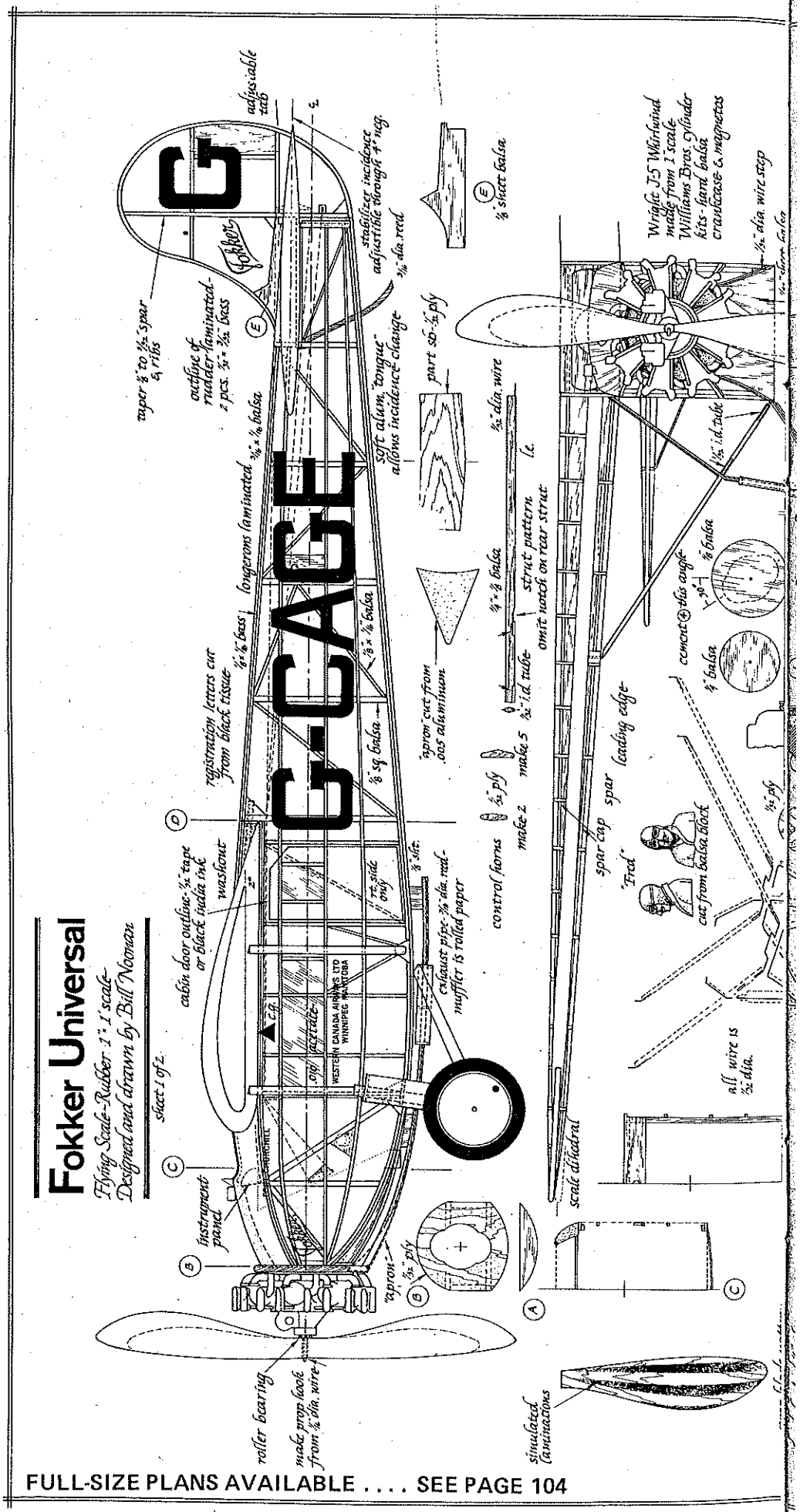
Construction

There is one admonishment that seems to apply to successful flying scale rubber models. Build light! This does not infer flimsy construction. I could name a host of top West Coast scale builders who, without exception, follow this dictum. Their models are wonders of light-weight engineering, incorporating attention to stress detail (strategic guesseting, sheer panels, etc.) to achieve the optimum model. I have attempted to apply this logic in the Universal.

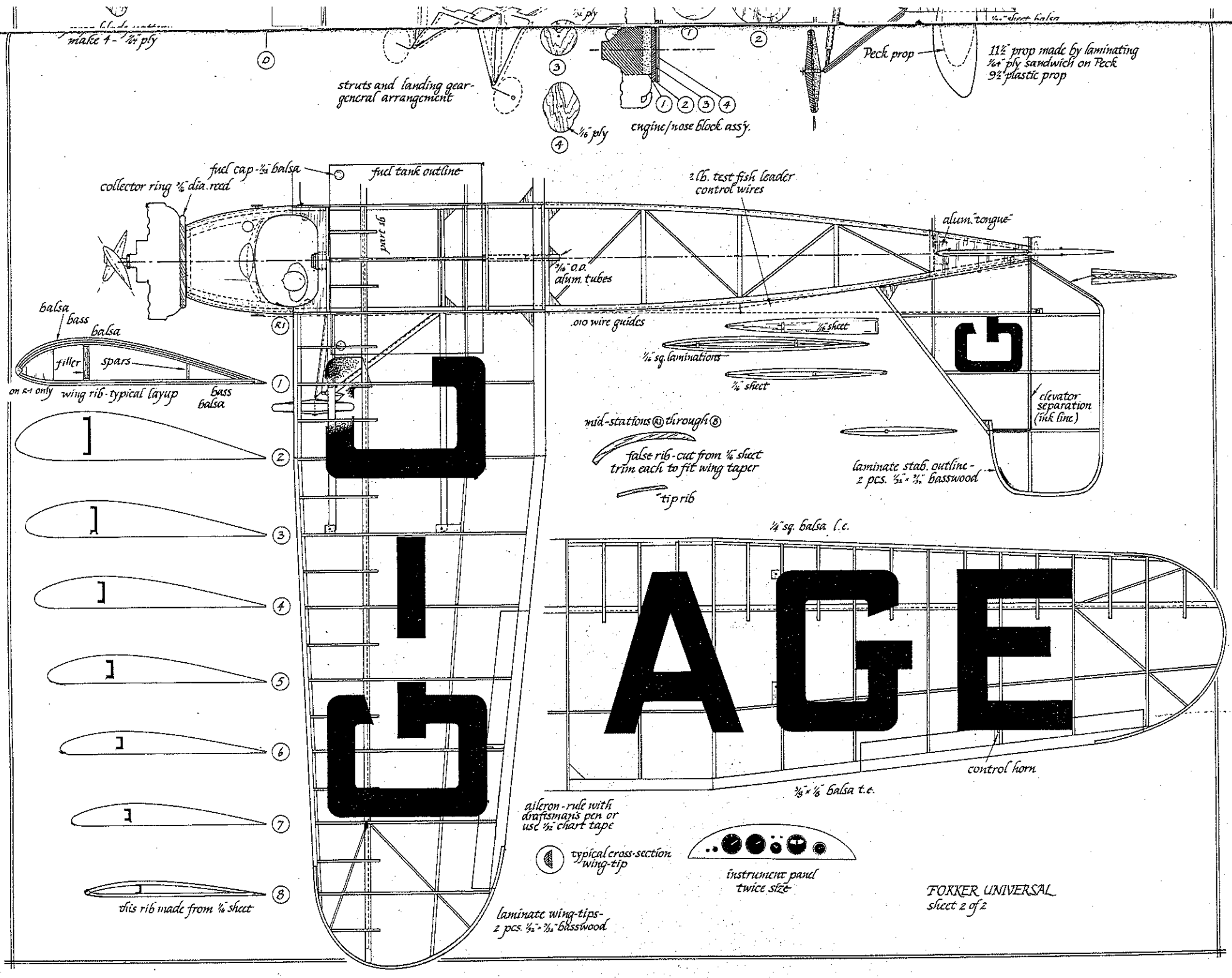
Wing: Construction follows fairly conventional practice. Cut the front and rear spars from 1/16" hard balsa sheet. Follow taper shown on plans. The front spar gets 1/16 × 3/16" "caps," top and bottom, which enhances the rigidity. The spar was to have diagonals to effect a truss, but they were omitted because they seemed only to contribute extra weight. If the model is to be powered with electric, CO^2, or engine, it would be well to include them.

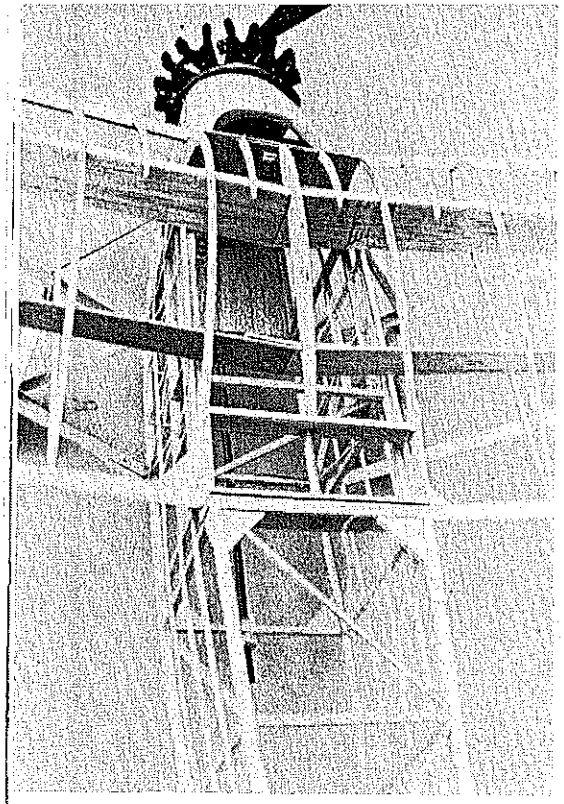
The main ribs are laminated. Although more work, this has advantages over ribs cut from sheet, among which are strength and light weight. Both top and bottom rib components are made of 1/16"-sq. basswood and balsa, bent on a cardboard or balsa form, at least 1/16" thick, the edge of which is coated with parafin or crayon to allow easy release in case cement creeps in during the lay-up.

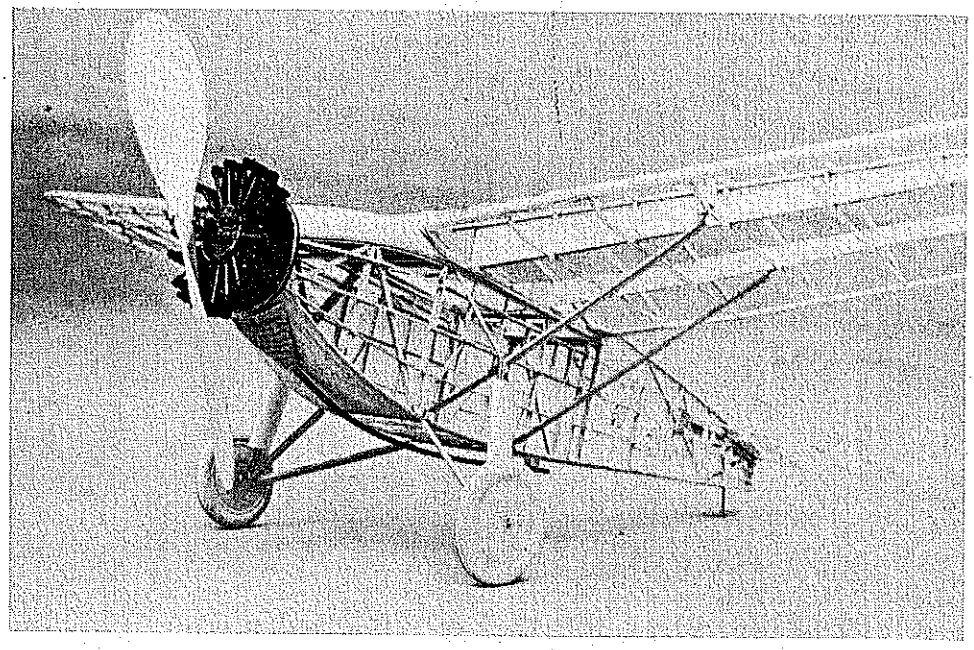
Make the rib components by soaking 9½" long pieces of 1/16"-sq. balsa and basswood in hot water, spiked with about 10% household ammonia, for about half an hour. Top ribs alternate balsa, bass, balsa in a sandwich; bottom ribs are of two parts only, bass and balsa. Wipe these parts with paper towel after soaking, then apply white glue (like Wilhold) sparingly along two longitudinal edges of the basswood, and apply the 1/16" balsa to the cemented edges, creating the lamination. Three of these combinations can be bent around the airfoil form at one time. I used "Pin-Downs" to hold parts in place (available from Peck Polymers, P.O. Box 2498, La Mesa, CA 92041). These are handy red plastic blocks which allow securing of to bench without damage to ribs. Repeat this procedure until you have 18 ribs, both top and bottom components. These parts



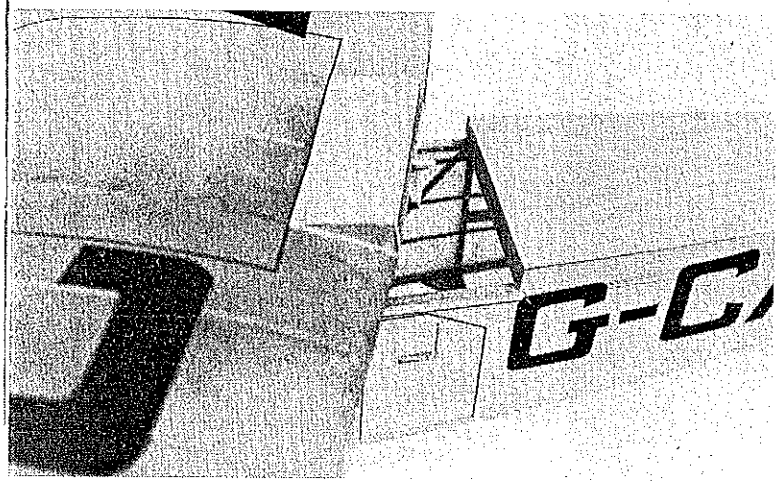
FULL-SIZE PLANS AVAILABLE . . . . SEE PAGE 104

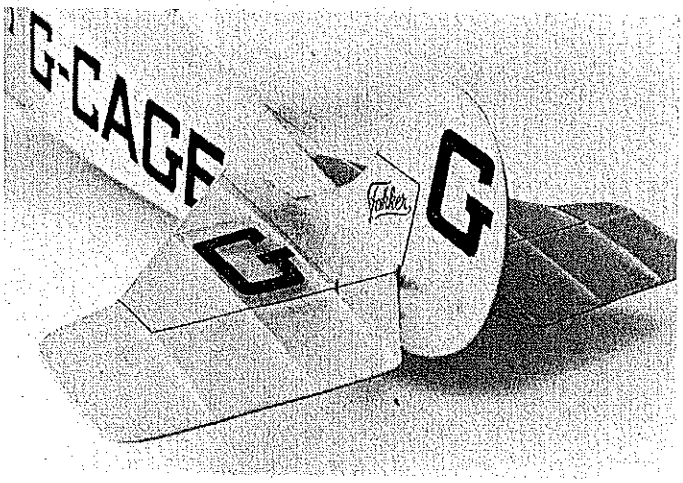

make 4 - 1/16 ply
struts and landing gear - general arrangement
1/16 ply
engine/nose block assy.
Peck prop
11½" prop made by laminating 1/64" ply sandwich on Peck 9½" plastic prop
fuel cap - 1/32 balsa
fuel tank outline
collector ring 1/16" dia. reed
2 lb. test fish leader control wires
alum. tongue
3/16" o.d. alum. tubes
.010 wire guides
1/16" sheet
1/16" sq. laminations
1/16" sheet
elevator separation (ink line)
balsa
bass
balsa
filler
spars
on R-1 only
wing rib - typical layup
bass
balsa
mid-stations R1 through 8
false rib - cut from 1/16 sheet trim each to fit wing taper
tip rib
laminate stab. outline - 2 pcs. 1/32" x 3/16" basswood
1/4" sq. balsa l.e.
control horn
3/8" x 1/8" balsa t.e.
aileron - rule with draftsman's pen or use 1/32" chart tape
typical cross-section wing-tip
instrument panel twice size
this rib made from 1/16 sheet
laminate wing-tips - 2 pcs. 1/32" x 3/16" basswood
FOKKER UNIVERSAL
sheet 2 of 2

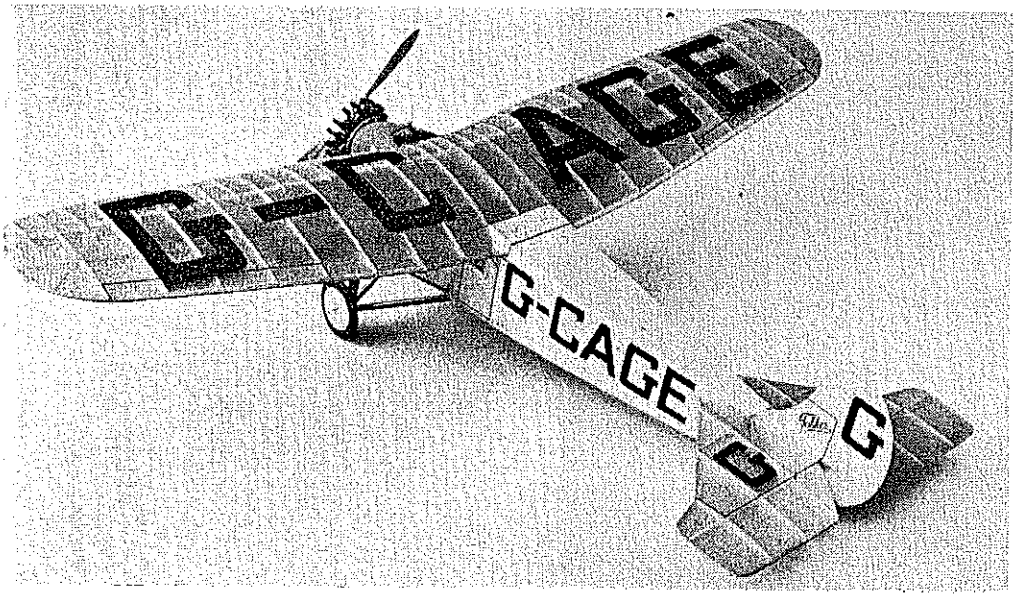




Left: Construction appears fragile but actually is carefully stressed for maximum strength to weight, so is light and robust. Above: Details of the gear, strut attachment, and the laminated strip ribs are worth investigating in copy even if you don't build the model. Left, below: Wing is positioned by dowel at rear, rubberbands at front. Below: Construction has a crisp quality that affects appearance after covering. Note the control horns and simulated control cables.







Breathes there a soul so dead. . . . Plans show less dihedral than thought necessary for original model, but for gas job conversions the pronounced dihedral may be playing it safe. Oddly, the real airplane used struts with cantilever wing. Later Super Universal eliminated struts, and enclosed the pilot. Scale wing was flat, tip to tip—OK for RC provided ailerons available.

will be about 1in. longer than the chord at the wing root.

Establish reference points on the rib sides, because they will be trimmed in length at their respective stations along the tapered wing plan, and the airfoil must maintain continuity from root (wide chord) to the tip (short chord). This is the way to do it: Nest all rib tops and all rib bottoms in two neat rows on the workbench. They should be about the same length. Draw a line with a soft pencil perpendicular to the chord line. This line should be immediately above the front spar on rib tops. Now you have reference points when cementing ribs in place.

Cut rib bottoms to appropriate lengths, referring to pencil mark on the rib sides, which should align with front spar. Secure ribs to plans over which wax paper, or Saran Wrap, has been laid. Cement ¼ × ¼" leading edge in place, blocking up above plans with scrap balsa to index properly with rib contour. Cement ¼ × ⅛" trailing edge in place. Block up trailing

edge at tips to achieve about two degrees wash-out. Cement front spar only in place on top of the ribs, leaving about ½ in. surplus length at the airplane center line; later to be trimmed to mate with other wing half and to accommodate proper dihedral.

For fitting top ribs, hold a full-chord rib above spar at penciled reference on the rib; mark the cut-off points at leading and trailing edges for each rib, root rib (R1) to number 8, the tip rib. Note that these ribs do not abutt the trailing edge, but cement on top of the bottom rib. (See detail on plans.) Cement each rib in place. Each should contact the leading edge, spar, and bottom rib at the trailing edge.

The wing tips are laminated from ⅛ × 1/32″ basswood, soaked, and bent around a wing-tip form, in the same manner as the ribs. This gives you a 1/16-in.-thick tip, when viewed from above. Notch leading and trailing edges to receive the tips after they are dry.

Slide the rear spar into position, starting at the root rib, until it comes into contact with the tip, and cement it in place. Note break at rib number 2. Cement the two parts carefully. This spar is a little longer than necessary, allow for joining with other half wing.

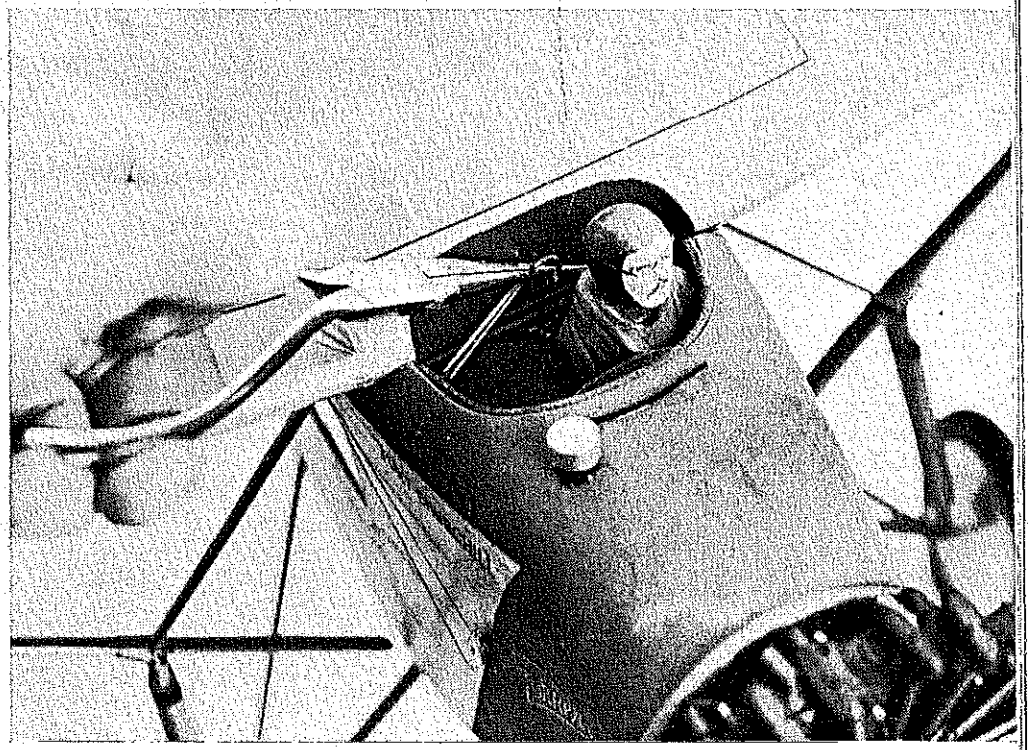
Add diagonals at wing tip as shown. Cut 1/32″ plywood dihedral spar brace (part SB). When both wing panels are complete, trim spar surplus so both spars mate with precision. Apply a coat of cement on the end grain of the spars and allow to dry. This will provide a superior bond when final assembly is made.

Apply cement to spar brace and position on front of front spar. Join the two panels, using clothes pins or spring clips (stationery supply stores) to hold the brace tightly while cement dries. Cut similar brace for rear spar and follow same procedure. Fill in trailing edge between panels with hard ¼ × ⅛″ balsa. This is a stress point if the wing is subjected to a hard blow. The center-section leading edge is made of a soft balsa block which bridges the root ribs. The "cove," a continuation of the cockpit, is cut after the fuselage is complete.

Install 1/16″ sheet balsa false ribs in place midway between main ribs, cementing them to leading edge and top of front spar. Cement center-line rib in place. Don't forget the gussets at critical points at the trailing edge.

A two-part 3/16″ O.D. aluminum tube provides a method of holding a balsa sheer pin in the center of the wing trailing edge. The function of this is to allow the wing to give when subjected to a hard blow on one side, rather than transmitting the stress to the fuselage longerons. It also works in concert with the hook and rubberband arrangement at the leading edge, which forms the essential method of holding on the wing.

Cut leading and trailing edges to conform to airfoil shape, then sand carefully.



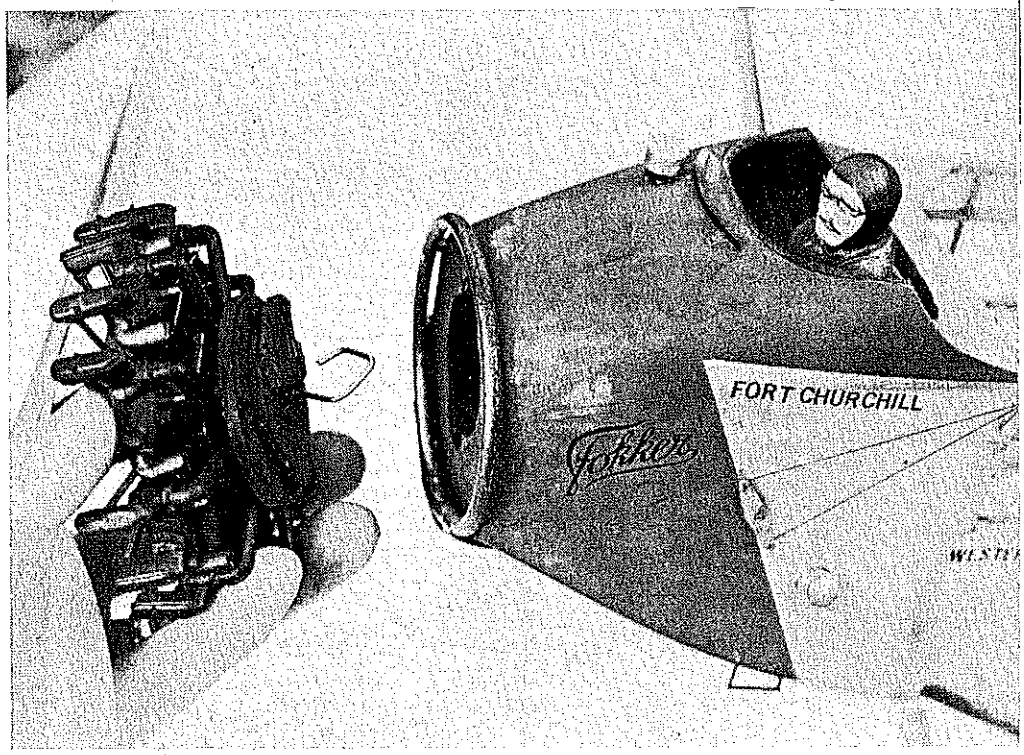
Hold down rubberbands for the wing slip over convenient hook. Rear peg is two-part aluminum tube piece holding a balsa shear pin, which keeps wing from damaging fuselage when rapped hard.

Cement strut anchor blocks in place. Drill to receive 1/32″ I.D. aluminum tubing, epoxied in place (don't plug tubing entrance on underside of wing). This tubing receives 1/32″ dia. wire strut ends.

Bend hooks to secure wing to fuselage. The center one, of .045″ diameter wire, is epoxied in the center-section leading-edge block. The right and left hooks, of 1/32″ diameter wire, are cemented to the cockpit filler piece, which also serves as a shelf to cement the pilot to. Two rubberbands are stretched between the cockpit hooks and over the wing hook, compressing the leading edge to the fuselage. The aluminum tube at the trailing edge, stuffed with a soft balsa dowel acting as a "shear pin," indexes the trailing edge with the fuselage.

Fuselage: The longerons are laminated 3/16 × 1/16″ balsa and ⅛ × 1/16″ basswood soaked in hot water, like the ribs. Looking at the typical fuselage cross-section, note the purpose for the offset in the lamination. It accommodates the three stringers which run the fuselage length,

Continued on page 91



The realistic Whirlwind engine is assembled from Williams Brothers cylinders. Engine/nose plug engages front opening in such manner that it locks in place, won't fall out due to slack rubber.

Brown "Whal Banger." However, long before Herb became involved with the splendid Brown reproductions, he found the Hurleman parts and which had been in storage for about 25 years. Starting out with a few engines assembled from the old parts, Herb gradually has developed a large clientele of collectors and fliers who appreciate his high quality and impeccable honesty.

Included in the previously mentioned parts were the remains of several opposed-twin prototypes. To quote Herb, "What I've done is design and construct a low-volume crankcase, crankshaft, con rods, and induction system. Then, following the techniques of the old prototypes, used two original .48 cylinders, two original pistons. The result is a splendid horizontal-opposed, simultaneous-firing twin, and feel it is the completion of a fine engine prototyped 30 or 40 years ago." His address: Herb's Model Motors, P.O. Box 61, Forksville, PA 18616.

Johnson Space Center: The JSC/RCC held their R/C Old-Timer contest on Sept. 18, according to Owen Morris. They flew two events, 10-second duration and 15-minute precision. The 15-minute precision was run as follows: 1) Total target time of 15 minutes, 2) One second off for each second over or under, 3) Longest single flight seven minutes, 4) Ten-point bonus per flight for stopping inside a 25-foot circle, 5) Motor runs: 20 seconds glow, 40 seconds ignition.

The JSC/RCC flying site is at the space center, where they have about 700 acres with a paved runway of 2500 feet. There are two steel towers in the middle of the field, but no other problems. Owen Morris is a project engineer on the Space Shuttle Program, and a modeler of many years experience.

Poly Who?: I've received several letters recently, concerning the covering technique described in several of my articles. Seems there is some confusion in the fabric shops over the term "acetate sheathing." There really shouldn't be, because acetate is the same as polyester. The sheathing I use is intended as a lining for home-sewn dresses and coats. It is available in bolts in every fabric shop I've been in. Produced in a multitude of colors, it has a sheen and a grain much like heavy weight silk. If the shopkeeper gives you a blank stare, look around the store. Chances are they have just what you want.

I apply it wet, using the classic silking techniques. Mine does fade irregularly as the water dries, *but* I recently purchased some that is "sweat proof," which eliminates the water spots. One of the other columns recently suggested using a heat gun to shrink the sheathing after is is applied to the frame work. *Do not do this!* The shrinkage with heavy dope can be severe enough to tear the material. I tried a hair dryer several years ago and split the acetate to shreds. I use one or two thin coats of butyrate for shrinkage, then finished up with plasticized (castor oil or T.C.P.) dope. Nitrate dope is ideal if you are not using a glow-plug engine.

Dr. D. B. Mathews, 506 South Walnut, Greensburg, KS 67054.

Fokker Universal/Noonan

continued from page 35

and whose bearing surfaces are on the same plane as the longeron edges—just as it was on the real aircraft.

The vertical components are ⅛"-sq. medium balsa, with the exception of the two which form window separations, which are ⅛ × 1/16", as are all diagonal members.

Lay the laminated longerons over waxpaper protected plans, then cement in verticals and diagonals. Repeat the process for the second side, keeping in mind the lamination arrangement of the longerons, which have a right and a left orientation to allow for the stringers. After the glue is dry, remove frames from plans, and separate them. Add stringers after sides are joined. Back up stringers with ⅛ × 1/16" balsa doublers where they form top and bottom window frames.

Cut triangle shaped gussets from 1/16" plywood for the high-stress points where landing gear and strut wire ends contact the fuselage. These are cemented to the

longerons and the verticals, flush with fuselage sides. Drill 1/32" diameter holes for strut anchor wire to protrude from.

Join the sides, starting at the tail post, holding it together with a clothespin while drying. Next, put in ⅛"-sq. cross pieces at the widest part of the fuselage, under the wing. Be sure fuselage is square. Add balsa gussets as shown; these points are subjected to considerable stress later when bending longerons together at the nose. Add the hard 1/16" sheet balsa plate immediately behind the wing center section (the one the 3/16" diameter tubing goes through). This is important too, as the top longerons do funny things when you pinch the nose, which is next.

Cut the cross pieces which bridge the fuselage sides right behind the plywood nose bulkhead (B), apply cement, and carefully bring the sides together to compress the parts. Allow to dry overnight. For good measure, cement temporary scraps across the longerons, removing after all cross pieces are in. Cut the cockpit block from soft balsa, hollow to about ¼ in. thick wall, and cement to top longerons. Cut former (A) and cement in place under nose. Cover portion from this former to the cross piece, that the front landing gear wire secures to, with 1/32" sheet balsa, grain running with the fuselage. Add the hard ⅛"-thick balsa squares at point shown to form support for aluminum tube rubber anchor. Add any missing gussets.

The 1/32" plywood nose bulkhead has a distinctively shaped hole to act as a retainer for the nose block (dummy Whirlwind), which has a mating piece (4) cemented to its back. Rotate the mating piece and engine about 30 degrees after insertion, to bring the engine into correct position. This constitutes a lock, preventing the nose block/engine/prop from falling out after rubber tension ceases when rubber unwinds.

Williams Bros. make the Wright Whirlwind easy with their 1"-scale plastic cylinders, available individually, each with crankcase diagram. The case is cut from hard balsa, and becomes the nose block. Finish the crankcase with three coats of sanding sealer. I achieved a very satisfactory "worn" look by spraying the part with silver enamel, and following with flat black (lightly) while the silver was still wet. The same procedure was followed on the exhause collector ring and long pipe. Assemble nine cylinders, epoxy in place, add ignition harness (made from 1/16 O.D. aluminum tube), and magnetos. Drill hole through the crankcase and associated back pieces to accept 1/16" I.D. brass tubing, which acts as bushing for prop hook. Provide about two degrees downthrust when drilling. No side compensation is made.

Bend the collector ring from reed (about 3/16" diameter). Soak the reed in water overnight, and find a suitable can or bottle to act as a form during drying. I obtained the reed from a display store where it sold them as handles for childrens' balloons. The main exhaust pipe is the same stuff, with a paper tube muffler. Note the aluminum "apron" that covers the place where the collector ring and exhaust join. This had the brushed swirls patterning indigenous to some planes of this vintage. These were achieved with an electric draftsman's eraser.

Propeller: The prop is made by extending a 9½-in. Peck Polymer plastic prop (PPpp) to 11½-in. diameter. Cut four pieces (see pattern) of 1/64" plywood, and epoxy in place on the plastic prop, using plenty of clothespins during cure. The right pitch merely extends to tips, and has proved satisfactory. Sand edges to achieve appropriate airfoil. Our prop simulated the laminations found on some Universal props, with mahogany stain alternating with the natural plywood. Apply two coats of clear nitrate dope for finish. Although Peck prop incorporates a free-wheeling notch, I drilled out the prop to receive a brass 1/16" I.D. insert, and notched this in a similar manner for the free-wheeling device.

Landing Gear: Bend landing gear, and strut fastening parts, from 1/32" diameter wire. Bind landing gear to fuselage cross pieces, and follow with epoxy cement. Epoxy 3/32" × ¼" streamline balsa fairings to complete the struts.

Wheels were turned from two pieces of hard ¼" sheet balsa, set at right angles to each other, sandwiching a piece of 1/16" plywood in the middle as a core. Here's how: Cut wheel diameter about ⅛ in. oversize, make up the balsa and ply sandwich. Drill ¼"-diameter hole in center hub. Epoxy 1½-in. length of ¼"-diameter birch dowel in the hole. You should have what looks like a bad attempt at a balsa umbrella, flattened out. Secure the dowel in the chuck of your handy drill motor (a drill stand facilitates things) then turn the wheel, contouring it using progressively finer grades of garnet paper. It's a poor man's lathe. Cut off dowel flush with hub after turning. Drill hole in center of dowel to accept 1/32" I.D. brass bushing. Fin-

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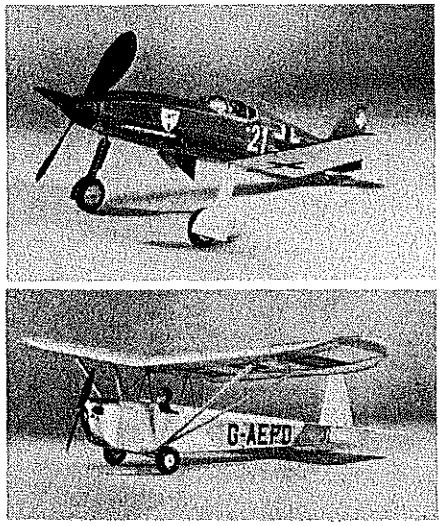

Four More From Flyline: Pictured are the 02 powered, RC version of the Classic British Luton Minor lightplane, ideal for schoolyard flying; and a rubber-powered Heinkel He 100d. The Luton ($12.95) spans 34 in. and is exceptionally easy to fly. Spanning 24 in., the Heinkel ($7.95) was designed by Don Srull who won with it, first place in outdoor rubber scale at the '77 Nats. Other two are the Earl Stahl-designed Stinson Voyager, a 30½ in. rubber model ($7.95); and the Herb Clukey-designed Inland Sport, a 37½ in. RC version of historic sport plane, for 020, electric, or 049, another natural for schoolyard RC flying ($13.95). Flyline Models, Inc., 2820 Dorr Ave. (B-2), Fairfax, VA 22030.

product review product review product review

ish with three coats of sanding sealer. Spray it silver. Tires are finished in flat, dark gray.

Struts: The main struts are constructed from ¼ × ⅛" hard balsa, cut and sanded to streamline shape. The strut bottom ends are notched at the leading edge to accept ½-in. length, 1/32" I.D. aluminum tubing, which mates with the wire protruding from fuselage sides at bottom longeron. Top ends reverse the tube and wire combination. About one third the way up the front strut, a notch is cut to receive ½-in. length of tubing, which in turn, will receive 1/32" diameter wire from vertical (oleo) landing gear strut. This strut has the wire running the full length of the leading edge. It solders to the other landing gear components at the axle. Note that the oleo cover is a broad chord sheath made from stiff paper formed on streamline formers. A short jury strut runs from the top of the oleo strut to plug into a tube in the fuselage.

To simulate gray anodized metal, we wrapped the struts with 3M Scotchcal Mylar foil, a chrome-like film about 1-mil thick, with an adhesive backing. It is available from sign shop suppliers. This, in turn, was covered with translucent gray Zip-A-Tone, an artist's color aid. It comes in adhesive backed sheets in a considerable range of colors and shades of gray. It provides a finish which cannot be simulated with paint, and makes the struts almost indestructible.

The short stabilizer support struts are cut from bamboo and finished color similar to main struts. Cement them in place, after a few test flights which allow stabilizer incidence to be set.

Tail Surfaces: Bend the outlines of both fin and stabilizer from 3/32 × 1/32" two-ply basswood laminations. Follow soaking process as described for ribs, bending the outlines around a cardboard or balsa form. I am a firm believer in the benefits of laminating where it is appropriate, and an advocate of balsa and basswood combination on a model of this size.

Laminate stabilizer ribs (tops and bottoms) from two pieces of 1/16"-sq. balsa, to form a streamline section. Basswood is avoided here to avoid adding weight at the tail. Cut the stabilizer spars from ¼ × 3 3/32" hard balsa, and taper them toward the tips. When the rib bottoms are dry, position them over the plans, then cement the full-span spar in place, followed by the short one. Cement right and left laminated outlines to the ribs and spars, followed by rib tops. Add the 1/16" sheet ribs, which run parallel to fuselage sides. These are bridged with 1/32" sheet balsa, grain running parallel with the spar, to form a continuation of the fuselage profile at the tail.

Provision is made for changing incidence by securing the stabilizer to the fuselage at the front stabilizer spar. This is done with a soft aluminum tongue (aluminum beer can works fine), which epoxies to cross piece in fuselage. The stabilizer sits on the notch at the extreme end of the fuselage just ahead of the rudder post.

On our model the stabilizer sat at 0 degrees, but provision was made for up to about 4 degrees negative incidence, by providing a notch in the vertical fin just ahead of its spar. This allows passage of the stabilizer spar in an upward arc (through the 4 degrees) until the correct adjustment is reached. We were sure no positive incidence would be needed. During test flights, the spar was pinned temporarily, cemented later. The 1/32" balsa that covers the stabilizer center section is cut on the center line to form a ⅛-in slot which accepts the fin; the fin is cemented to the fuselage.

Since the fin is almost flat in section, build it over the plans, using medium ⅛"-sq. balsa for spar and other parts, except the outline, which is laminated like the stab. Add rudder tab of soft ⅛" sheet, as shown. Don't forget the gussets.

Covering and Finish: The fuselage is covered with white Japanese tissue, lightly sprayed with water for shrinking, and then given three coats of clear nitrate dope diluted to a 50/50 solution. Add plasticizer to minimize warps, particularly on wing, stabilizer, and rudder. Apply the finish coat on the fuselage with an airbrush. Into the clear dope we mixed "brill", a silver

powder utilized by commercial painters to achieve simulated metallic effects. This gave an authentic and distinctive finish, but maintains the translucent quality of the tissue, the hallmark of most rubber models. The only concession in the use of opaque paint was the accent green trim on the nose. It was Testor's Pla flat green, masked and sprayed over balsa prepared with three coats of sanding sealer.

Cover the wing and stabilizer with chrome yellow Japanese tissue, grain running parallel with the spar. Follow the same procedure as the fuselage, omitting the silver, of course. The little wedge-shaped area at the wing center section trailing edge is silver like the fuselage. The vertical fin is silver.

Cut registration letters from black tissue. Apply them with clear dope after the third coat of clear dope. Wing letters and the prefix "G", which appears on the stabilizer, are repeated on the underside surfaces.

The legend under the cabin windows WESTERN CANADA AIRWAYS, LTD., and FORT CHURCHILL under the cockpit, are 14-point News Gothic rub-on type, available at better art supply stores. The Fokker script logo which appears on the fin and nose is made by hand-lettering the original Fokker style (from photographic reference), and photographing it to size. This, in turn, is converted to rub-off transfer by using I.N.T., a new 3M product available at graphic arts supply houses.

The tail skid is made from the same reed as the exhaust system. It is slightly tapered, cemented in place, painted dark brown.

Control horns, between which is stretched 2-lb. fishing leader which has been sprayed black, are made from 1/32M sheet plywood. Surface horns are painted dark gray. The movable surfaces, like the ailerons, elevator and rudder, are delineated with 1/32" chart tape, or ruled with black India ink. The same applies to cabin door and fuel tank outlines on top surface of wing.

Make individual cabin windows and windshield from .010 clear acetate, secured with Hot-Stuff, or equivalent. Paint the window sills and vertical separations light gray. The cockpit, including the wing notch, is painted flat dark gray.

The oil filler cap in front of the cockpit, and the fuel filler cap below the cockpit on the left side of the fuselage, were made from discarded marking pen caps, cut to proper length. Cockpit coaming was made from leather thong, cemented in place with, yes, Hot-Stuff. The pilot was carved from balsa, given three coats of sanding sealer. Acrylic artists colors, available in tubes, were used to apply the cosmetic touches. Moustache is optional. Goggles are bent from fine brass wire, dipped in clear dope to make microfilm lenses.

Flying: Check C.G. before testing with 14 strands of lubricated 3/16" Sig Contest rubber. When limp the rubber is about 28 in. long; it hangs out the nose about 9 in. Break in the rubber carefully, using your method. I suggest about 350-400 turns, for tests, enough to provide sufficient power to observe balance and turn characteristics.

Maximum turns we have tried is about 900. With this, the model R.O.G.'s realistically and flies in large circles. It is extremely stable, and never causes apprehension.

The Fokker Universal is a very satisfying model, one of my favorites. Whether you build to compete, or just for pleasure, it has plenty to offer.

FF Duration/Meuser

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The ½A Maverick 260, winner at the U.S. Free Flight Champs, is available as a complete kit, including machine-cut parts and stripwood, for $14.50.

The Zingo is a simple, good-performing FAI Power model, designed especially for the free flighter who wants to sample this challenging event. It also is a good Class A or B model, if not built to the required weight for FAI competition. It is available as a partial kit, including all the curved parts machine-cut from high-quality balsa, but does *not* include stripwood, fuselage sides or plans. The plans are available from Carstens Publications for $2. The price, $12.00.

Mainstay of the RM product line is the Ultimate Dragmaster, a Nordic A-2 towline glider. This model is intended for, and has been rather successful in, serious competition since its birth in 1971. And, for an A-2, it goes together rather easily. Prices for various versions are: Complete kit, $22.50; with fiberglass boom, $27.50; partial kit, no plans or stripwood, $12.50; double kit, including all wood for two models in one box with one set of plans, $40.00.

Since the entire RM Enterprises occupies only one corner of the spare bedroom, you might not find the kits stocked on your dealer's shelves, although they are stocked by a few dealers that cater to a higher class, more discriminating, competition-oriented clientele. All the above prices are postpaid in the U.S. (U.P.S. is used where possible).

It is possible that RM will kit the Flying Burrito Brother, or perhaps a Hines or Blanchard HLG, sometime after summer, according to chief of design, T. Hutchinson. Production manager Rosemary Hutchinson states that the latest RM prototype, a 3850-gram, 51.2-cm item called Michael Patrick, will definitely not be put into production.

No Non-Cents Strikes Again: Now, this is *really* getting ridiculous. Mike Van Gorder, a Junior, won the combined Jr./Sr./Open Pennyplane event at the S.W.O.F.F. Indoor Meet in Cincinnati in November, and also established new official records for both Pennyplane and Novice Pennyplane, Junior, Category III. His flight time was 10:08.6. His records displace two previously held by Marnie Meuser, also made with a No Non-Cents. That makes 14 records for No Non-Cents, nine of which stand currently. (A construction article appeared in the July 1977 issue.)

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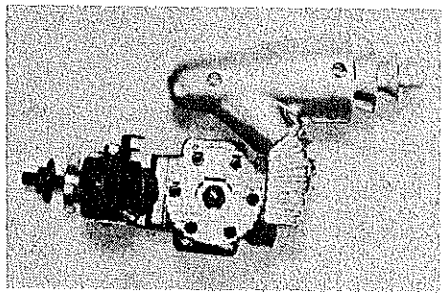

Rear Exhaust Muffler: Ingenious new muffler to fit 29, 35, 40 rear-exhaust engines reduces noise by 10 to 12 decibels with little or no power loss. Blends proportional volume expansion chamber with triple reflective tail-cone baffles into one unit for effective heat dissipation. Machine-cast aluminum, weighs 2 oz., easily attached with two screws. Price $11.95; to be announced is price of rear exhaust mufflers for 15, 19, and 80 engines. **Tatone Products, 1209 Geneva Ave., San Francisco, CA 94112.**

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