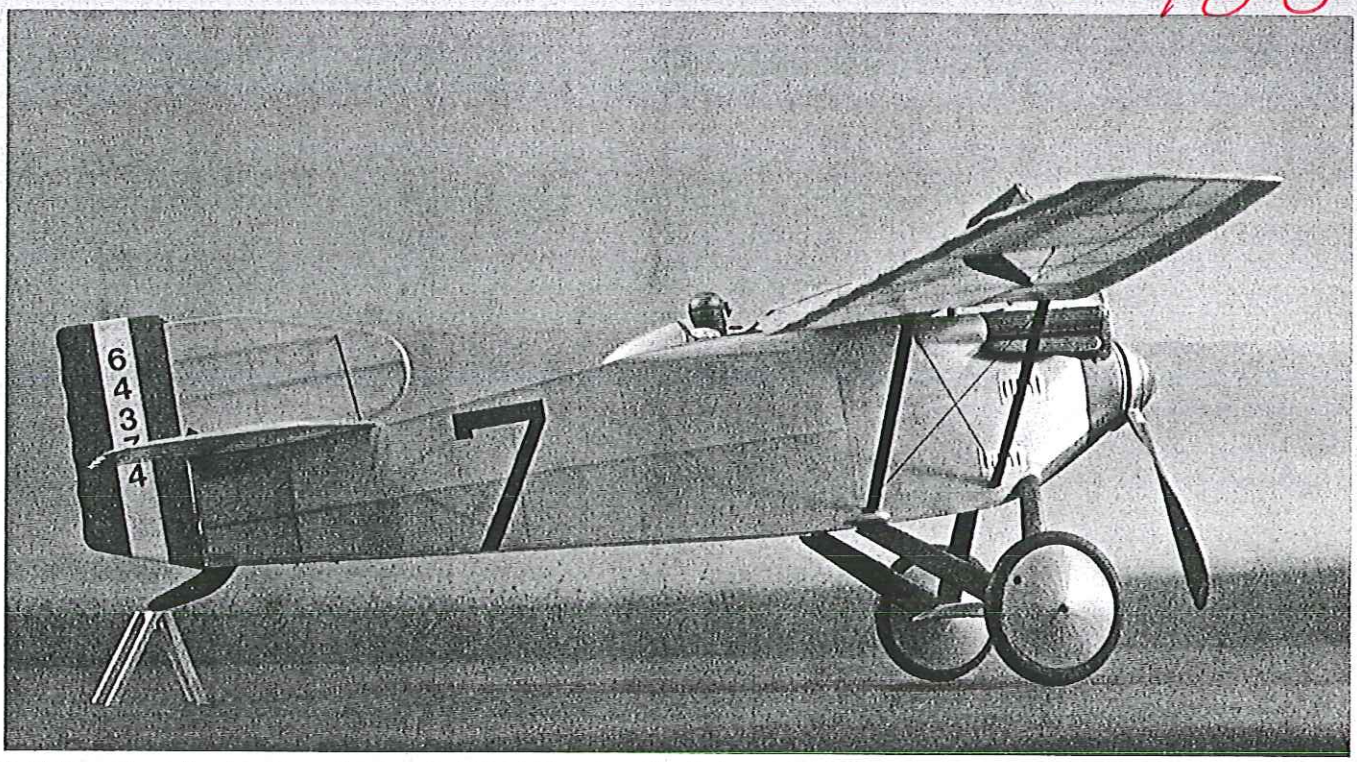
#488



Big picture: Our author hand-launches for a test flight. The plane flies in large left-hand circles averaging 40 sec. on 12 strands of 3/16-in. rubber. Flight adjustments are easy to make. The thrust line can be altered by placing balsa scraps behind the thrust plate. Above: There were two MB-7s built to compete in the 1921 and 1922 Pulitzer Prize races. The particular one modeled raced in 1922 as Number 7.

Influenced by the early 1920s racing era, this model's unique wing and short fuselage combine to make it a delightful Jumbo Scale rubber-powered project. Flight qualities are outstanding. ■Bill Noonan

THOMAS-MC

THE SUBJECT AIRCRAFT was developed as part of a contract with the Army Air Service for construction of 265 Thomas-Morse MB-3 pursuit aircraft. It represents innovative thinking in airframe design immediately after World War I, yet it reflects some of the naivete that prevailed at that time regarding aerodynamics.

In July of 1921, the Marine Corps was interested in competing in the Pulitzer Races, and it processed a request, through the Army, for the development of two aircraft out of the contract of 265 MB-3s which would be suitable for racing. The highly-involved inter-service paperwork which was necessary has caused great confusion among aero historians. About the only tangible evidence of the Army's involvement is the number, 64374, which appears on the second MB-7's rudder.

The Thomas-Morse company had become intrigued with the experiments and ostensible successes by the British Martinsyde company with their "Alula" wing principle, and decided to incorporate it in the design of the MB-7. Thomas-Morse maintained the curious humped centersection in their design, but increased the thickness and chord, thereby making a substantial change in the basic British concept.

The first MB-7 showed promise, achieving a recorded speed of 180 mph before crashing during a 1921 Pulitzer Race because of a broken fuel pump spring. Pilot Harold Hartney, a much-decorated survivor of World War I, managed to set the plane down in a brush-covered gully near Honey Creek, IA—but not without major damaged to the aircraft and injury to himself. While recuperating in the hospital, he learned, with great sorrow, that the remains of his mount had been consumed by fire, the result of a careless souvenir hunter's cigar being dropped in the gasoline-soaked debris.

The second MB-7, number 64374, was delivered to the U.S. Marine Corps in January of 1922. It was assigned race number 7, and it was flown in the Pulitzer by pilot Pat Mulcahy. An overheated engine forced the little silver racer from competition, and it was quietly put in storage in Philadelphia until May of 1925, at which time it was stricken from the Navy inventory. It had logged only a little more than 5½ hours of flight time in its undistinguished lifetime.

The MB-7's shortcomings were not with design, but (as it was with many promising aircraft of the early 1920s) the lack of reliability of the power plant. The pressure of competition, coupled with relative ignorance of metallurgy and engine limitations, caused unfortunate and wasteful results. These factors conspired to cut short the career of the Thomas-Morse MB-7.

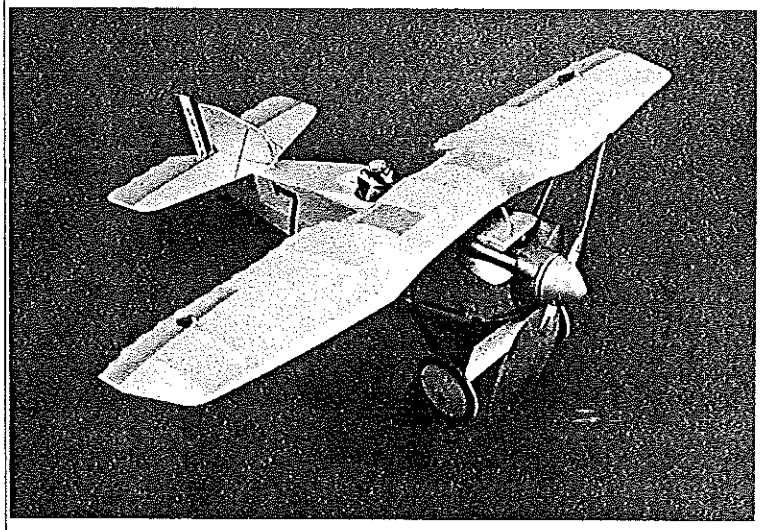
Fuselage construction. Before starting, it is best to cover the plans with Saran Wrap or wax paper to prevent surplus cement from adhering the structure to the paper.

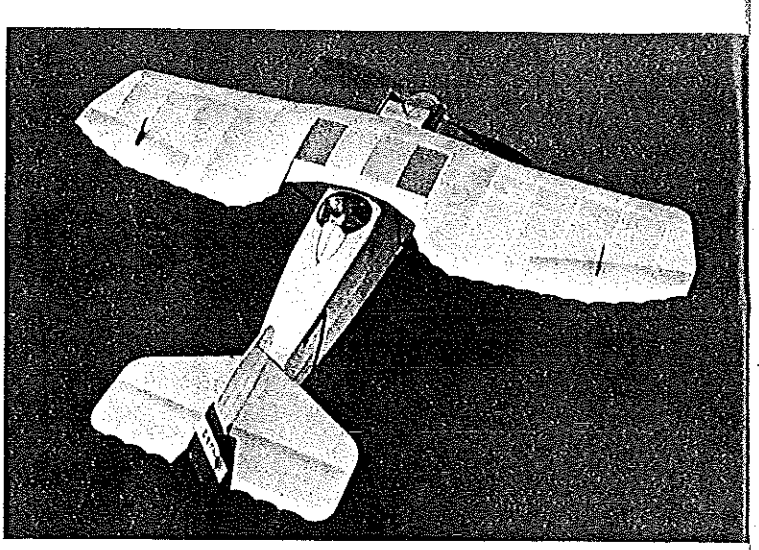
Start by laying laminated longerons in place over the side view. Be sure the 1/20 x 3/16-in. component is positioned correctly to allow tissue covering to be cemented along the 1/20 edge later on. The tissue will not touch any of the upright structure except at both ends of the fuselage. Cut and cement 3/32 sq. uprights and diagonals in place. Cement the basswood 1/32 x ⅛-in. stringer in place along the fuselage centerline, starting at the station immediately in front of the cockpit and working aft to the tail post.

Cement hard 1/16 sheet balsa parts in place on the bottom longeron between the front and back landing gear legs. These act to reinforce the fuselage bottom at a critical stress point. They also act as an anchor plate for wing struts.

Add the 1/64 plywood crescent-shaped gusset to the top longeron behind the cockpit.

Construct the right fuselage side in the same manner, with the tissue-bearing surfaces of the longerons in the correct position. When the two fuselage sides are completed, cut the 3/32 sq. crosspieces





Left: This view reveals the model's nice proportions and adequate nose/tail moment arms. Right: The simulated wing radiators were made from patches of painted coarse silk cloth. Aileron and elevator separations can be indicated with inked lines or by airbrushing.

immediately in front of the cockpit, this being the widest part of the fuselage. Temporarily clamp the tail post together, and cement the crosspieces in place. Cut the remaining crosspieces, confirming their length by checking the top view of the plans. Cement the crosspieces in place aft of the cockpit, checking for symmetry as you go. End up by cementing the tail posts together.

Carefully cut the upper and lower longerons at the station in front of the cockpit. A fine-tooth saw will ease this operation. Cement the front fuselage frames back in place, noting the taper toward the nose on the top view of the plans. Cement in the crosspieces, and finish this part of the operation by cementing the circular nose Bulkhead A in place.

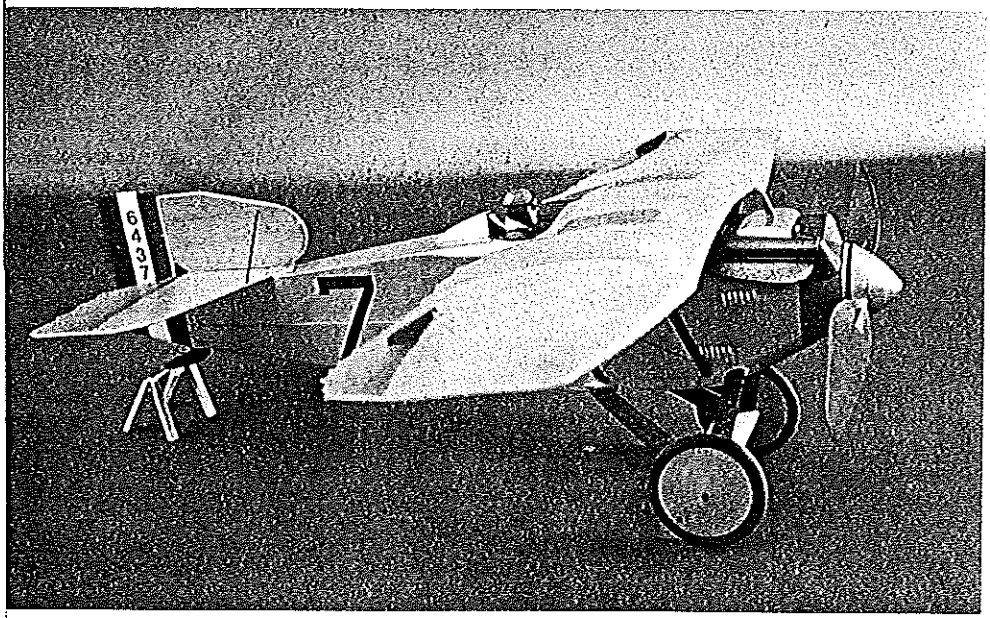
The top cowl decking is carved from soft balsa and hollowed-out to about a ⅛-in. wall thickness. It makes a peculiar transition from the absolutely round nose to the flat turtleback behind the cockpit. This is one of the elements which gives the MB-7 its character, so it pays to work it slowly. It is helpful to have the side Formers B through E cut out so they can be used to check that the top decking fairs-in nicely with the fuselage sides. Make any necessary modifications. Remember that the sides are covered with 1/32 sheet balsa back to the rear wing strut, so make allowances when fitting the side formers. Carefully cut the cockpit opening in the top decking, maintaining the elliptical symmetry.

Cut the 1/32 sheet balsa for cowl sides slightly oversize. Trim to fit by holding in place against the fuselage to confirm accurate shape and dimensions. Cyanoacrylate (CyA) glue works to good advantage when making the final fit. Wetting the outside of the 1/32 sheet with an ammonia-and-water solution makes the wood malleable and easier to form.

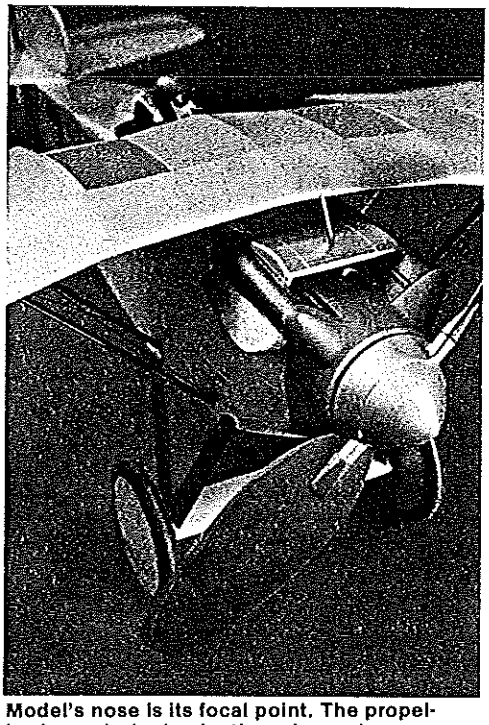
Cut the valve cover assemblies from light balsa. Each is made by carving the unit from a single piece of wood and separating the trailing fairing as shown. The cone-shaped leading fairing is cut separately, with the grain running vertically along the centerline. Exhaust collectors are cut from ¼-in. sheet balsa and sanded to a streamline shape. The cross-over between the valve covers is soft ¼-in. sheet, also faired to a streamline shape. Add the hard balsa breather pipe on top and the carburetor intake under the unit.

Before adding the solid balsa lower cowling, bend the landing gear legs from 1/32 wire. With care this can be bent as a single unit. Bind crosspieces of the fuselage to the wire with thread and apply cement. Reinforcing gussets are applied where the crosspieces contact the longerons and help resist landing gear shock.

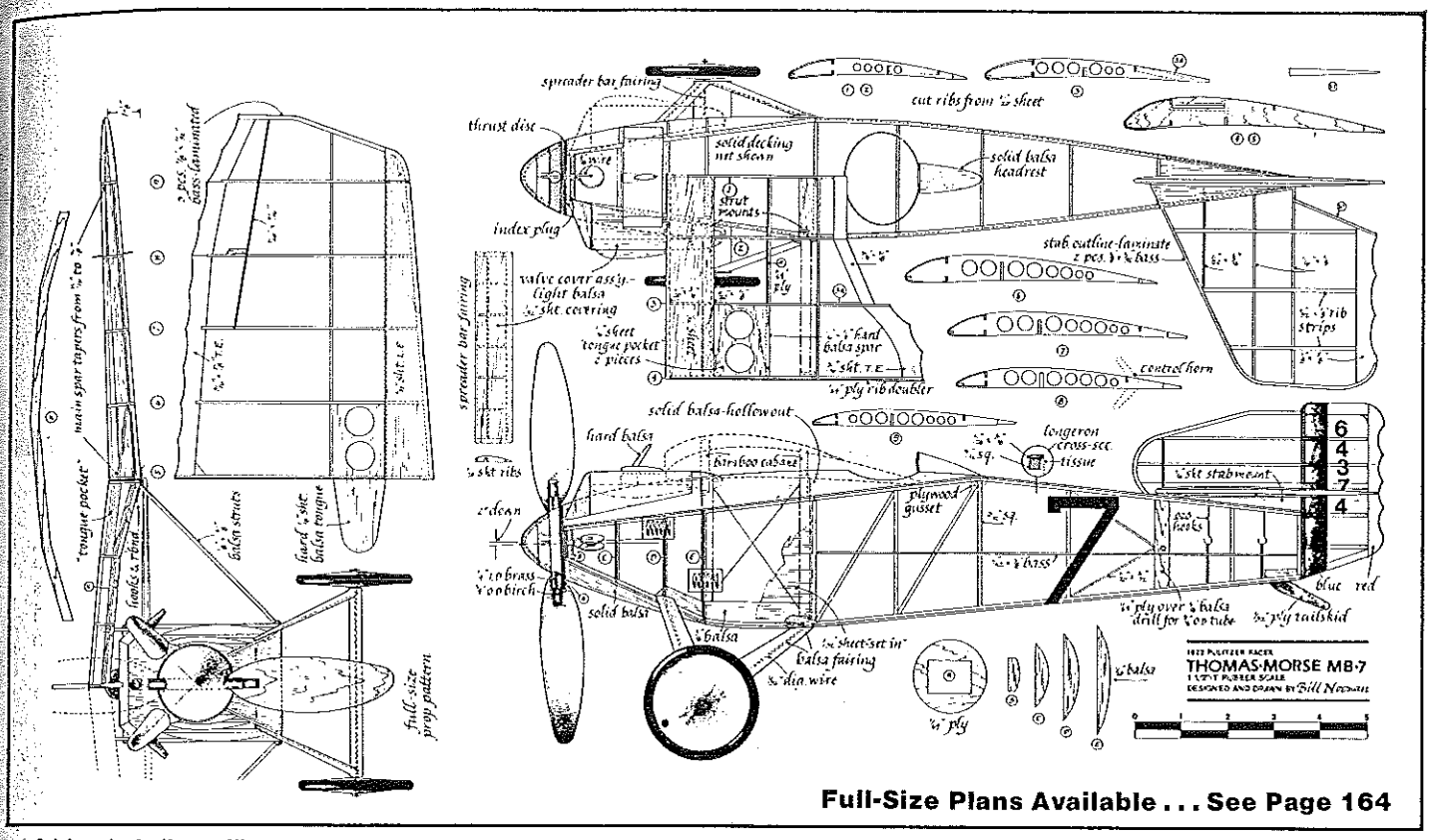
Cut a piece of .045 wire about 7½ in. long for the spreader bar. Solder this in the Vs of the landing gear legs. The spreader bar



Although short-coupled, the model exhibits excellent stability. Long landing gear allows easy ROG launches. Stabilizer incidence is easily changed by a shim inserted between the fuselage mount and stab underside. All in all, it's an excellent Jumbo Scale subject.



Model's nose is its focal point. The propeller is made by laminating plywood over a pitch block. Birch dowel hubs insert into spinner's brass boss. Pins lock the blades.



Full-Size Plans Available . . . See Page 164

fairing is built-up like a small wing and cemented in place over the wire. Fit ¼-in. sheet balsa streamline leg fairings in place so both ends fit neatly with respective contact surfaces. The 3¾-in.-dia. wheels may be turned from ½-in. balsa (two pieces of ¼-in. sheet laminated at right angles) or purchased commercially. The streamlined teardrop fairing at the juncture of the rear landing gear leg and wing strut is added after the model is covered.

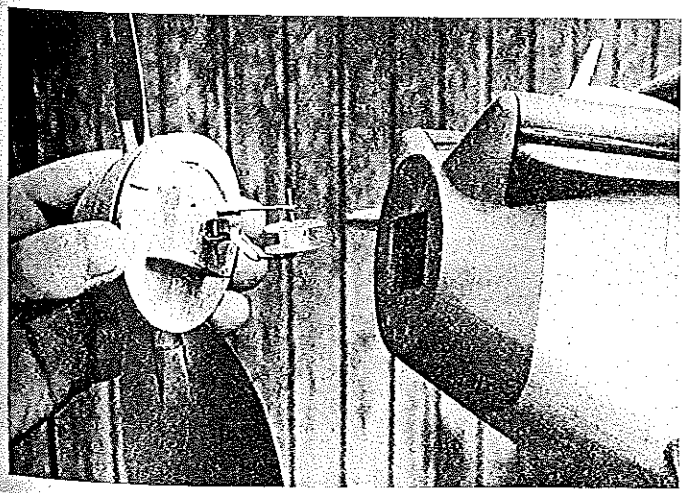
The prop unit is freewheeling and contained inside a hollowed-out balsa spinner. Blades are two pieces of 1/64 ply laminated over a pitch block. We have found this type of propeller to be an improvement over carved ones. The main advantages are ease of replacement of broken blades and a broad latitude in pitch selection. A well-carved balsa prop is better looking and may have an aerodyamic edge, but we think the advantages cited outweigh these factors.

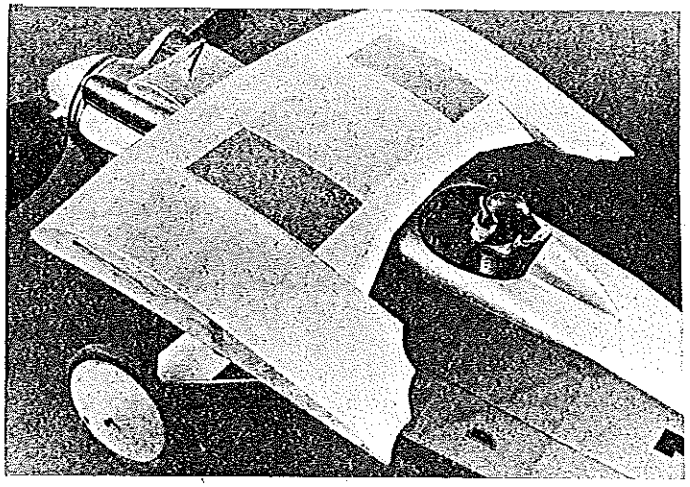
The prop boss is ¼-in. I.D. brass, drilled at the center to accept a 1/16-in.-dia. shaft. The spinner is made by laminating six pieces of hard ¼-in. sheet balsa together at right angles to make a 2½ x 2½ x 1½-in. cube. This will allow you to accurately drill (on a drill press table) the "tunnel" which the brass boss will slip into later on.

Drill a ¼-in.-dia. hole through the 1½-in.-dimension centerline. Insert a birch dowel, allowing about 2 in. to protrude out of the side, which will become the back of the spinner. This can then be chucked into a drill press or hand drill, and the spinner can be turned as if on a lathe. Rough-cutting the circular shape before turning saves wear and tear on sandpaper, and it makes the operation safer. When turning, be sure the hole drilled for the boss is at the large end of the spinner!

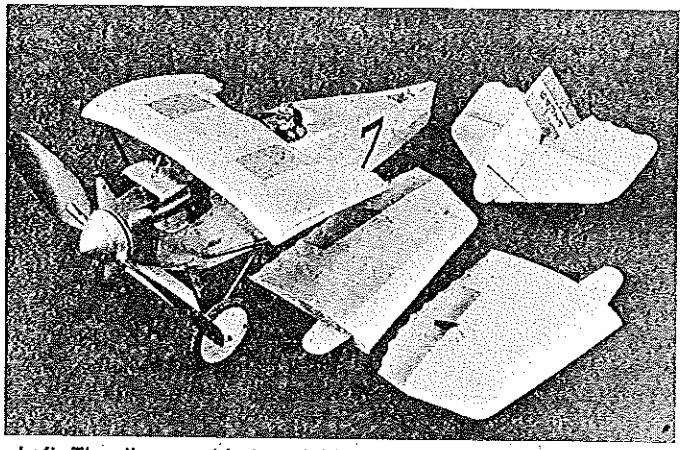
When finished, cut off any surplus birch dowel, and carefully cut through the spinner to separate the disc that surrounds the boss tube from the bullet-shaped nose portion. Hollow-out the nose to accommodate the freewheeling clutch. Insert the brass boss tube in the balsa disc, and cement it in place. A 1/64 circular plywood doubler on the back of this unit makes it a stronger part.

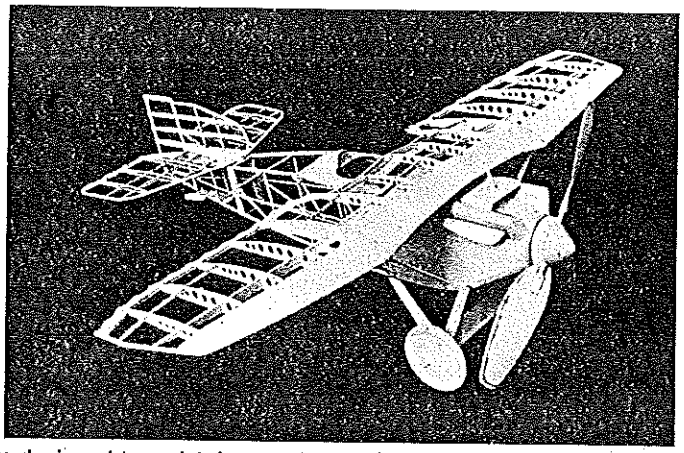
Bend the 1/16-in. wire prop shaft to accept either a bobbin or Crockett rubber hook. We have had good luck with the bobbin, utilizing a safety latch. The model is powered with 12 strands of 3/16-in. rubber, and this becomes quite a handful with 900 turns on the winder. The bobbin facilitates transfer of the rubber from the





Left: A close look at the indexing block and bobbin. A full load of rubber with 900 turns can be hard to handle, but this bobbin has worked well in helping to transfer the rubber from the winder to the prop shaft. Right: Wings are easily removed from the fixed center section. A "tongue and pocket" is used for alignment. Rubberbands stretched between hooks on the wing's underside hold the panels in place.





Left: The disassembled model is easy to store or transport. Wings are designed to resist damage in case of impact, and the tail surfaces can be adjusted easily. Right: Lightening holes in the wing ribs (lightness is a key ingredient for the model to fly well) can be put in with punching tools made from brass tubing. Grind a sharp cutting edge on one end of the tube, and rotate it against the wing rib.

winder to the prop shaft.

The prop shaft passes through a 1/16 ply circular "thrust plate" right behind the spinner assembly. This accommodates both the thrust bearing and indexing block, which is cemented on back and fits snugly into the rectagular aperture in Bulkhead A. Bend the shaft at a 90° angle in front of the brass boss after slipping on a small spring which serves to disengage the clutch once the rubber is unwound. Cement the hollow spinner back in place when you are sure the freewheeler works OK.

Add a soft balsa headrest, and cement the plywood tail skid into the slotted block at the tail post.

Drill holes in the top decking to receive the bamboo cabane struts, which have been sanded to an oval cross section. Do not cement the struts in place at this time. Leaving this until later facilitates center-section incidence adjustments.

Wing. The most difficult part of the unusual "Alula" wing is the center section. Start by cutting the ribs. Slot them to receive the main spar, but leave the slotting for smaller spars until later.

Make the center-section main spar from hard 1/16 x ¼-in. balsa. The four pieces that make this bridge-like part are held together with 1/64 plywood Joiner F. Mark off the rib positions on the spar, and slip the ribs in place. Don't apply any cement yet!

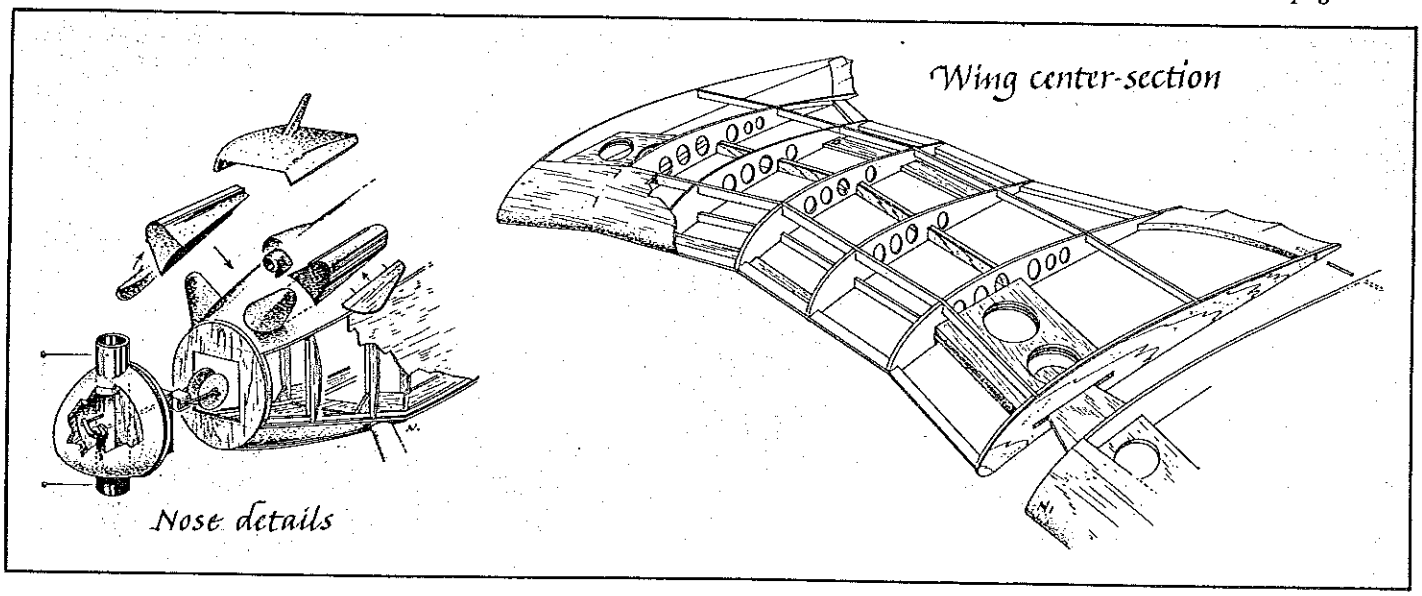
File notches into the ribs for the front and rear spars and leading edge. Carefully force the sparts into place, checking the assembly for symmetrical alignment. If everything is OK, apply CyA glue to all joints. Cut the trailing edge from 3/16 sheet balsa, and cement in place. If you are going to make the wings removable, it will be necessary to make the "tongue and pocket" parts to index the wing panels to the center section.

The pocket is made by cutting two pieces of hard 1/16 sheet balsa and framing three edges by inserting 3/32 sheet which has been reduced in thickness to almost 1/16 in., just enough oversize to allow easy passage of the 1/16 balsa tongue which projects from the wing panels. Cement these "pockets" in place as shown on the plans, having first determined the accurate position of the slot in the root rib. You may prefer to cut the slot in both the rib and its 1/64 plywood doubler before final installation of the "pocket." A 1/16-in. I.D. aluminum tube set about ½ in. into the trailing edge allows for insertion of a 1/16-in. O.D. alignment pin to keep the wing panel correctly aligned with the center section. Cut the cabane strut mounts from hard 3/32 sheet balsa, and drill them to receive the struts. Note that these pieces are cemented between Ribs 1 and 2. Add small blocks of balsa, about ¼ x ¼ x ½, to the inside of Rib 4 along the bottom to provide a base to cement the wing struts to later, after the model is covered.

The strength of the wing comes primarily from the 1/32 sheet balsa leading edge which is carefully bent around the airfoil. Start by cementing straight-grained balsa to the 1/20 x ⅛-in. upper spar between Ribs 1 and 3. Apply a solution of ammonia and water to the outside of the sheet, and draw it around the ribs, at the same time using CyA glue at each rib. The sheet covering is finally cemented to the lower spar. Trim away any excess wood. Repeat this process between Ribs 3 and 4. Fair the sheet in with the ribs to produce an unbroken airfoil.

The outer wing panels utilize hard 1/16 sheet as the main spar, and it tapers from 11/16 at the root to ⅜ in. at Rib 9. Mark off rib stations, and slip the ribs into place. File notches for leading edge spars, and insert them into place. Slip the notched trailing edge into place. Check the panel for correct alignment. Be sure the root ribs of the panels mate with the center section for proper dihedral. Apply CyA to all joints.

Continued on page 162



1/5-scale B-25 Mitchell bombers, a squadron of A6M5 Zero fighters, P-47 Thunderbolts, P-51 Mustangs, and an F4U Corsair. Stir these together, add a couple of manned 1/2.5-scale M-4 Sherman tanks, and season with indescribable pyrotechnics to yield the extravaganza called Striking Back.

Jet Rally '85 was an unqualified success in terms of exhibiting ducted-fan airplanes to modelers and the public alike. The equipment is evolving into the third generation of fan units, and realistic jet performance levels are now achievable. Current developments are directed at improving operability and simplifying usage for the average RC modeler. Ducted-fan technology has matured, as evidence by the wide variety of models that were seen. The future is bright, and we can all look forward to continued events of this type to promote this new dimension of RC powered flight.

My sincere thanks are extended to Byron Godbersen and his able staff who worked long and hard to provide the setting and hospitality for one of the most memorable events in modeling history.

If you missed this one and are interested, please note that Jet Rally '86 has already been scheduled for June 21-22, 1986 in Ida Grove, IA. Plan, now, to attend. I look forward to seeing you there.

MB-7/Noonan

Continued from page 88

The wing tips are made by laminating three pieces of 1/32 x ⅛ basswood around a cardboard form. Join this part with the

leading edge 1/20 x 3/16 part.

Cut the wing indexing tongues from hard 1/16 sheet balsa. Hold them temporarily in place while fitting the panel against the center section, checking alignment for proper dihedral. Cement the tongues in place. Apply the 1/32 sheet balsa leading edge in the same manner as was done on the center section. It will be necessary to fabricate the 1/32 sheet leading edge tip outboard of Rib 9 as an independent unit, pinched around the laminated part and cemented in place. Add the root gusset and 1/16 sheet "collar" surrounding the simulated control horn. The horn is cemented in place after the wing is covered. Trim the trailing edge and laminated tip to fair-in smoothly with the airfoil.

After the wing is covered, bend two sets of retainer hooks for each wing, one set to be mounted to the spar and the other to the trailing edge on the underside. A stretched rubberband holds the panels in place but allows the wing to give in case of impact.

Tail surfaces. Both the rudder and stabilizer are built using the "sprung rib" method. This provides a lightweight surface which is very strong.

Prepare a cardboard form 1/16 in. smaller than the stabilizer and fin. This is to be used to bend the two pieces of 1/32 x ⅛ straight-grained basswood which forms the outlines. Soak the basswood in an ammonia-water solution for about 15 min., and rinse thoroughly. Apply a thin bead of white glue between the laminations, and secure the two pieces against the edges of the cardboard form. Waxing the edges with parafin or a child's crayon will make it easy to remove the dry part. Allow to dry overnight.

Construction procedure is the same for all the tail parts. Secure the laminated frame in position over the plans. Cut and position the trailing edges. Cut and fit the lower part of the ribs from medium-hard 1/32 sheet balsa. These parts are ⅛-in. wide, and each lies flat on the building surface. Apply cement to these parts where they abut the leading and trailing edges.

Cut the spars and position them on the ribs over the plans. Apply cement where they contact the ribs and framework. Now, repeat the rib-cutting process for the top rib parts. Carefully position each part in place. Apply CyA glue first at the trailing edge, then, while forcing the part down over the spars, to the contact point at the leading edge. The final result is a streamline cross section.

The horizontal stab is built as one piece, so it will be necessary to make a tissue tracing of the half (left) stab and align it on the fuselage centerline, upside down, to get the right side.

The horizontal stab has a 1/32 sheet center section, both top and bottom. The bottom part rests against the two 1/16 sheet stabilizer mount parts cemented to the top longeron. The entire tail assembly is held in place with rubberbands stretched between .020 wire hooks and retainers. The hooks are cemented to the stab spars and project down into the fuselage. The bottom ends of the rubberbands are drawn through holes in the wedge-shaped balsa which forms the tail skid mount. Slip bamboo retainer slivers in place to hold the rubberbands. This method of mounting the tail surfaces allows convenient removal and incidence changes.

Miscellaneous. The wing struts are cut from medium grade ⅛ x ⅜ balsa and are then sanded to a streamline shape. Wire pins at each end reinforce the mounting when the struts are finally cemented in place. The brace wires between the struts may be made from black carpet thread.

We covered our model with white tissue from Peck-Polymers. There are no particularly difficult areas when it comes to covering the MB-7. Note that, on the underside, the wing airfoil makes a transition from a cambered section at the center to a semi-symmetrical one at the tip. Be sure to cement the tissue to the cambered portion.

Shrink the covering with a light mist of water or alcohol. Follow this with two coats of clear nitrate dope diluted 50% with

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thinner. The final coat should have silver powder added, about as much as might be held in the metal ferrule of a common pencil eraser to an ounce of clear dope. An airbrush will be needed for this operation, as the silver powder tends to streak if brushed-on.

Add details such as the fuselage numerals and rudder stripes. These may be painted or cut from tissue and doped-on. The rudder numbers are made from rub-off transfers. Aileron and stab separation outlines are inked or airbrushed.

Paint the engine rocker-arm covers flat black. The exhaust pipes can be the same, but adding a slight spray of silver while the black paint is still wet adds a realistic, mottled look. Rubbing these parts with powdered graphite heightens the metallic simulation.

Add the cooling louvers to the fuselage sides and the fake wing radiators on top of the wing center section, between Ribs 2 and 3. We merely cut pieces of coarse silk and painted them a dirty brass color before cementing in place, giving a pretty good illusion of a radiator texture. Our pilot was sculptured from light balsa and given a couple coats of sanding sealer. Acrylic artist's paints were used for final coloring. The scarf is white tissue.

Flying. The 12 strands of 3/16-in. rubber used to power the model should be about 36 in. long. We have tried both Sig and FAI rubber, and find a much different power curve between the two. The Sig seems to tolerate more winds for a given length, and the torque is more constant during the usable power run. FAI has an aggressive torque right at the beginning and then drops off appreciably toward the middle of the power run. You may wish to experiment.

Balance the model at the front strut. The incidence shown on the plans is a good starting point. You can easily add or take out stab incidence if necessary. A good starting point is 2° downthrust and about 3° right. We had to add a field twig to the thrust plate to get a little more downthrust during the initial testing. The model behaved perfectly. Naturally, we replaced the improvised part with a neat piece of balsa when we got home. The next time we flew it, it stalled again; we should have glued the twig in place.

The Thomas-Morse MB-7 is an unusual subject. Don't let the novel arrangement of the wing and stubby fuselage put you off. It is remarkably stable and a delight in the air.

We would like to propose a competition class for Pulitzer, Schneider, James Gordon Bennett, and other early racers. There's a wealth of nifty designs just waiting to be built. Why not be the first on your block to try one?

(This model was developed from information, three-views, and photos contained in Thomas Foxworth's superb book, *The Speed Seekers*. It is well worth hunting for, though it may be out of print.)