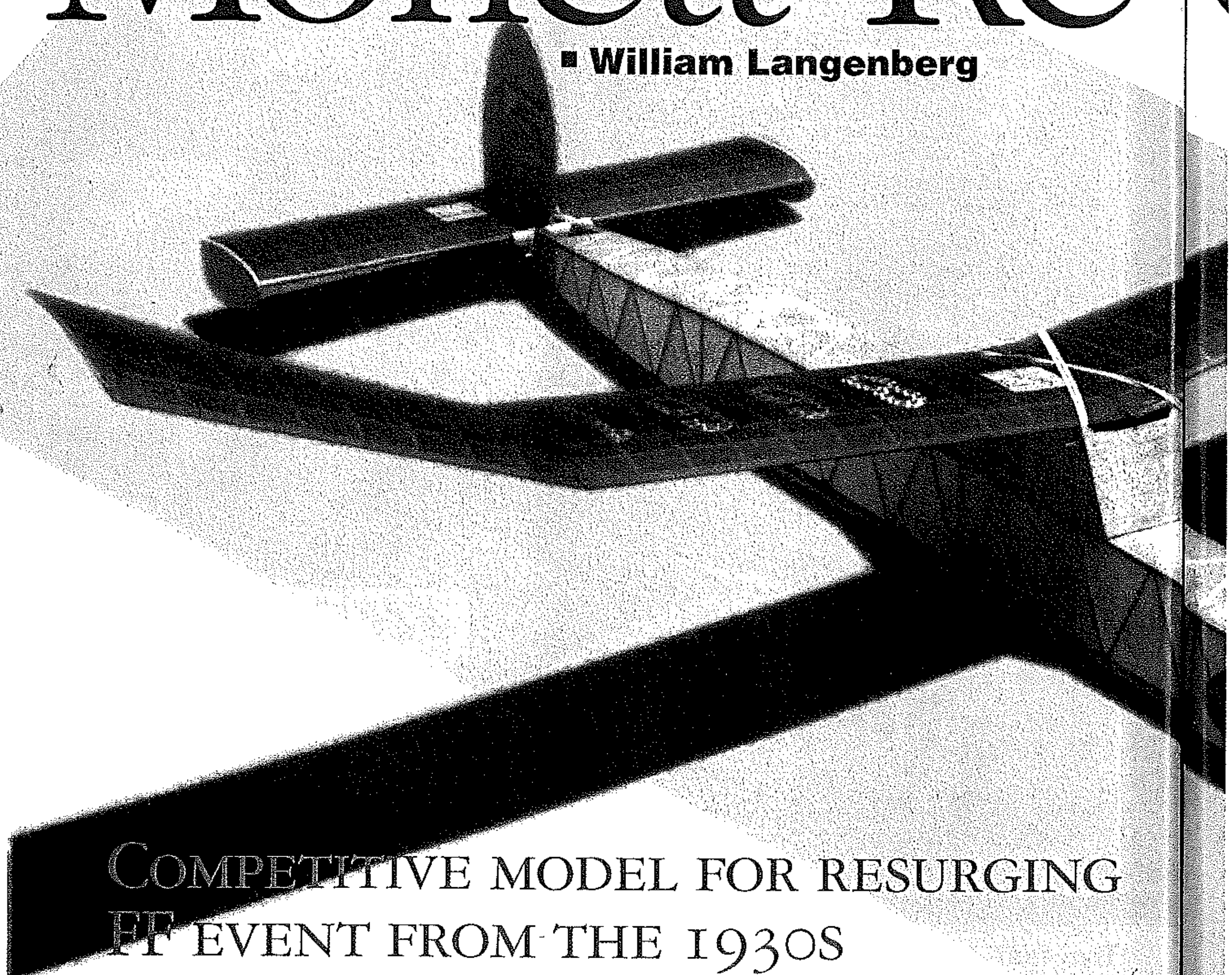
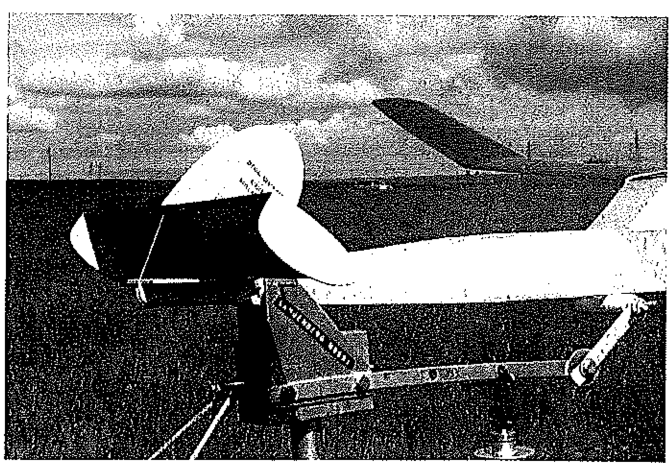
Moffett Re

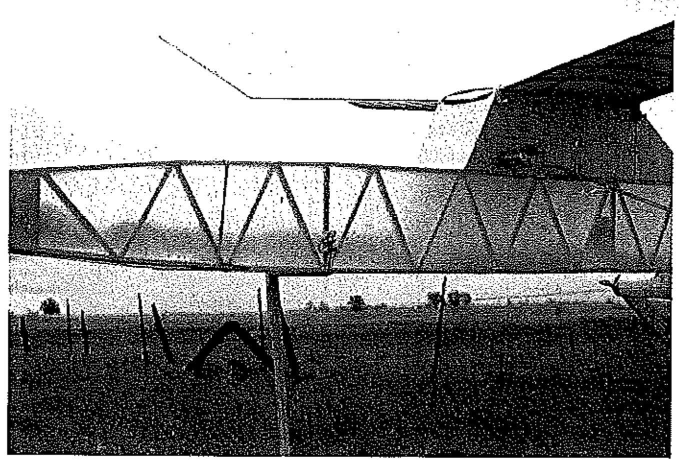
■ William Langenberg



COMPETITIVE MODEL FOR RESURGING FF EVENT FROM THE 1930S

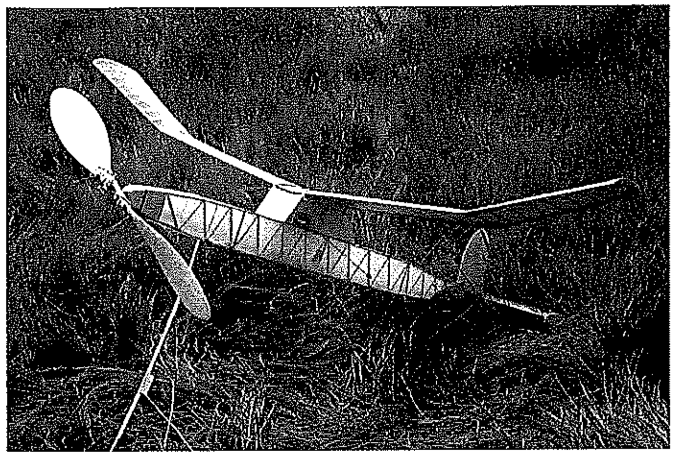


Close-up of stabilizer in DT position. Site is Northern California Free Flight Council field near Sacramento.



Rubber band attached to end of pivot wire loops over hook shown in fuselage side and snaps takeoff peg to retracted position.

dux



Model in takeoff position. Wide fuselage, boxy wing mount are necessary to meet minimum cross-section required by rules.

Rear Admiral William A. Moffett headed the US Navy's Bureau of Aeronautics from its inception in 1921 until his death in 1933. His primary duty during that assignment was to effectively integrate fledgling naval aviation into fleet operations.

Former skipper of the cruiser USS *Chester* and the battleship USS *Mississippi*, Moffett was surprisingly not a qualified naval aviator. However, during the 1920s and 1930s he became one of the Navy's best-known and most articulate naval-aviation supporters.

Perhaps most closely associated in the public's mind with rigid airships, commonly known as dirigibles, Moffett was killed in the crash of the USS *Akron* off the New Jersey coast in April 1933.

Because of his support for aviation, an international Free Flight model-airplane competition bearing his name began in the 1930s. It was held as an annual event at the AMA Nationals and featured teams of six candidates from the US, Canada, England, Australia, and New Zealand. Participants for the latter three nations were frequently represented by American proxy fliers.

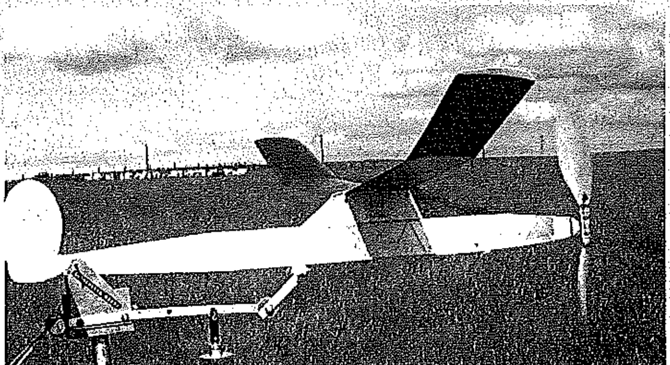
The Moffett competition languished after World War II, but it was reincarnated as an official National Free Flight Society (NFFS) event in 1992. The simple rules are:

1) The wing and stabilizer area must not exceed 202 square inches.
2) The distance between the propeller thrust bearing and the aft end of the stabilizer, fin, or fuselage must not exceed the projected wingspan.
3) The fuselage cross-section at the point of the maximum area must be at least the length squared divided by 150.
4) The airframe weight must be at least 1.74 ounces per 100 square inches of projected wing area.
5) There is no limit on rubber motor weight.
6) The model must stand unassisted on three points.
7) All championship and record flights must rise-off-ground (ROG) with no push.

The contemporary Moffett rules are attractive to me because they give a designer considerable freedom to conceive and construct a competitive model. As did the pre-1956 Wakefields, they reward a modeler who can build a light, durable airplane and power it with a rubber motor that approaches the airframe weight.

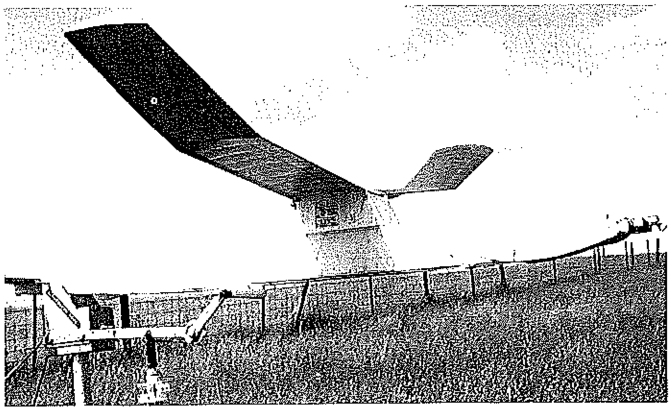
Once a flier masters the challenge of the ROG launch, particularly in wind, the result is a high-performance model that is easily capable of achieving the necessary three-minute-maximum flights.

If this preamble and the accompanying photographs of the Moffett Redux have piqued your interest, the following suggestions may help you create a competitive model—one that is easy to trim and fly.

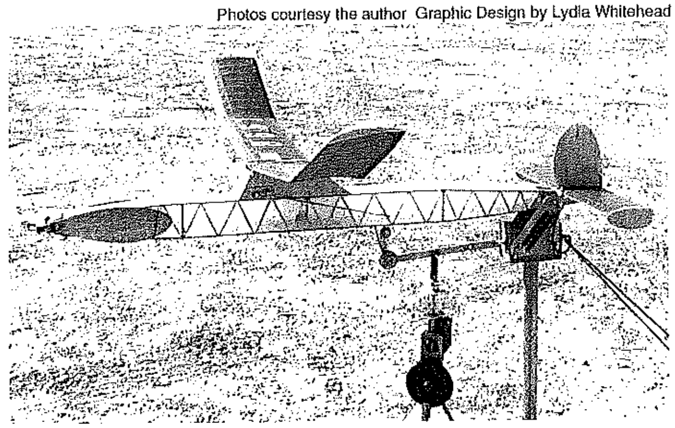


ID label on side of pylon attests to compliance with wing plus stabilizer area and fuselage cross-section rules.

Photos courtesy the author Graphic Design by Lydia Whitehead



Model on winding stooge. Takeoff peg is in fully retracted position; dowel stop protrudes from fuselage's right side.



Serious competitors should get stooge and sturdy winder. One shown has integral counter, torque meter, extended crank arm.

CONSTRUCTION

Stabilizer: Begin with the stabilizer so that it can be covered, doped, and cured before you attempt any test flights. Use contest-grade balsa to keep weight down. During assembly, the front of the trailing edge should be packed up to conform with the airfoil as shown on the plans. Assemble the parts on a flat surface, adding the spruce dethermalizer (DT) hooks as the last operation.

Carefully sand the stabilizer, and cover it with tissue. You should add the tip plates before the tissue is water-sprayed, and you should give the entire structure at least three coats of thinned dope. I normally prefer nitrate to butyrate dope because it appears more resistant to moisture in the air.

The completed stabilizer should be free of warps. The finished weight should not exceed 8 grams, including the attached fin.

Wing: The wing is next in the construction sequence. It is straightforward and should present few building problems. Select the wood with care; the structure should be kept as light as possible. Ribs are cut from 1/16 quarter-grain stock. The trailing edge is made from similar 1/8 sheet balsa.

As on the stabilizer, pack up the front of the trailing edge to conform to the proper airfoil shape. Using liberal amounts of glue on all joints, join the wing panels to the polyhedral dimensions indicated. Do not cement spars to the ribs at the polyhedral breaks until the panels are blocked up to the proper angles.

Install the center basswood gusset and triangular balsa reinforcements as shown. Carve the wingtips from soft 3/8 sheet balsa, then cautiously sand the entire completed structure to facilitate an attractive covering job. Cover the wing with good-quality tissue. As with the stabilizer, apply at least three coats of nitrate dope. Set the wing aside and allow it to cure thoroughly.

Each outboard wing panel should have 1/8 inch of washout, which should occur naturally as the doped covering cures. The finished weight ought not to exceed 19 grams. Remember that the maximum projected area of the wing and stabilizer is 202 square inches. Trim off of the wing trailing edge to meet this parameter if necessary.

Fin: Cut the fin from soft 3/32 sheet balsa to the outline shown on the plans. It should be carved and sanded to a streamlined shape as indicated, to give a left turn in the glide. Glue it to the top of the doubled center stabilizer rib, ensuring that it is perpendicular.

Fuselage: Select four hard 3/32 x 3/32-inch balsa strips for the longerons. I used spruce longerons for durability, but what you use is your preference. Build two fuselage sides on the plans, ensuring that the diagonals do not run the same direction on both sides. Add the 3/32-inch sheet fillers for the rear rubber peg and nose area.

When joining the fuselage sides, tack-glue 3/32 x 3/32-inch crosspieces to the longerons approximately every eight inches, to set up the fuselage shape throughout the length of its square section.

Insert the 3/32 x 3/32-inch diagonals, proceeding equally along the top and bottom. You can remove the tack-glued 3/32 x 3/32-inch pieces as diagonals take their places. If you prefer, a simple fixture can be constructed to facilitate fuselage assembly.

Add the 3/32 sheet balsa fillers at the front top and bottom of the fuselage, then glue the remainder of the diagonals in place. Insert the 1/8-sheet-balsa reinforcing pieces, with their 1/8 plywood inserts, inside the rear motor-peg section as indicated on the plans.

Carve and sand 3/32-inch right thrust into the fuselage nose. Cut out the 1/16 plywood nose former and glue it accurately in place. Sand the entire fuselage smooth, and cover it with Polyspan or equal. For durability you may want to double-cover the fuselage bottom, cross-graining the Polyspan.

To finish the fuselage, cut out the wing mounts and the stabilizer platform. Glue them to the fuselage as shown, then add the 1/16-inch aluminum tubing DT line guides and the 1/16-inch-diameter dowel rubber hooks for the wing attachment and stabilizer DT system.

The mini-timer shown in the photographs weighs 6 grams. If you elect to use one, you should position it on the wing mount; if it is mounted on the fuselage side, the unwinding rubber motor disrupts its accuracy.

The single-peg retracting landing gear is not nearly as difficult to build as it may look to a neophyte. Cut a 17-inch peg from 1/8 square spruce. This peg is actuated by a 1/32-inch-diameter music-wire hinge, which is epoxied to the peg then bent at right angles and run through 1/32-inch-inside-diameter brass tubing cut to the width of the fuselage. The tubing is epoxied to the fuselage at the bottom crossbrace forward of the wing, ensuring that the hinge wire can turn freely within it.

Carefully conforming to the close-up photographs, with the peg on the right side of the fuselage, bend the 1/32-inch-diameter wire at right angles to the tubing. Shape a small hook into its end so that the short rubber band on the left side of the fuselage can snap it into retracted position after takeoff.

Glue a small piece of 1/32 plywood to the peg, as shown, to serve as a retraction stop. Likewise, a 1/16-inch-diameter dowel running across the fuselage above the pivot tubing serves as a forward motion stop for the peg during ROG launch.

If you are a rubber-powered-model flier who has never used a retracting-peg system, you may be apprehensive of doing so at first. However, be assured that if the model is built as shown without excessive weight, it will spring into the air on the power burst with few problems.

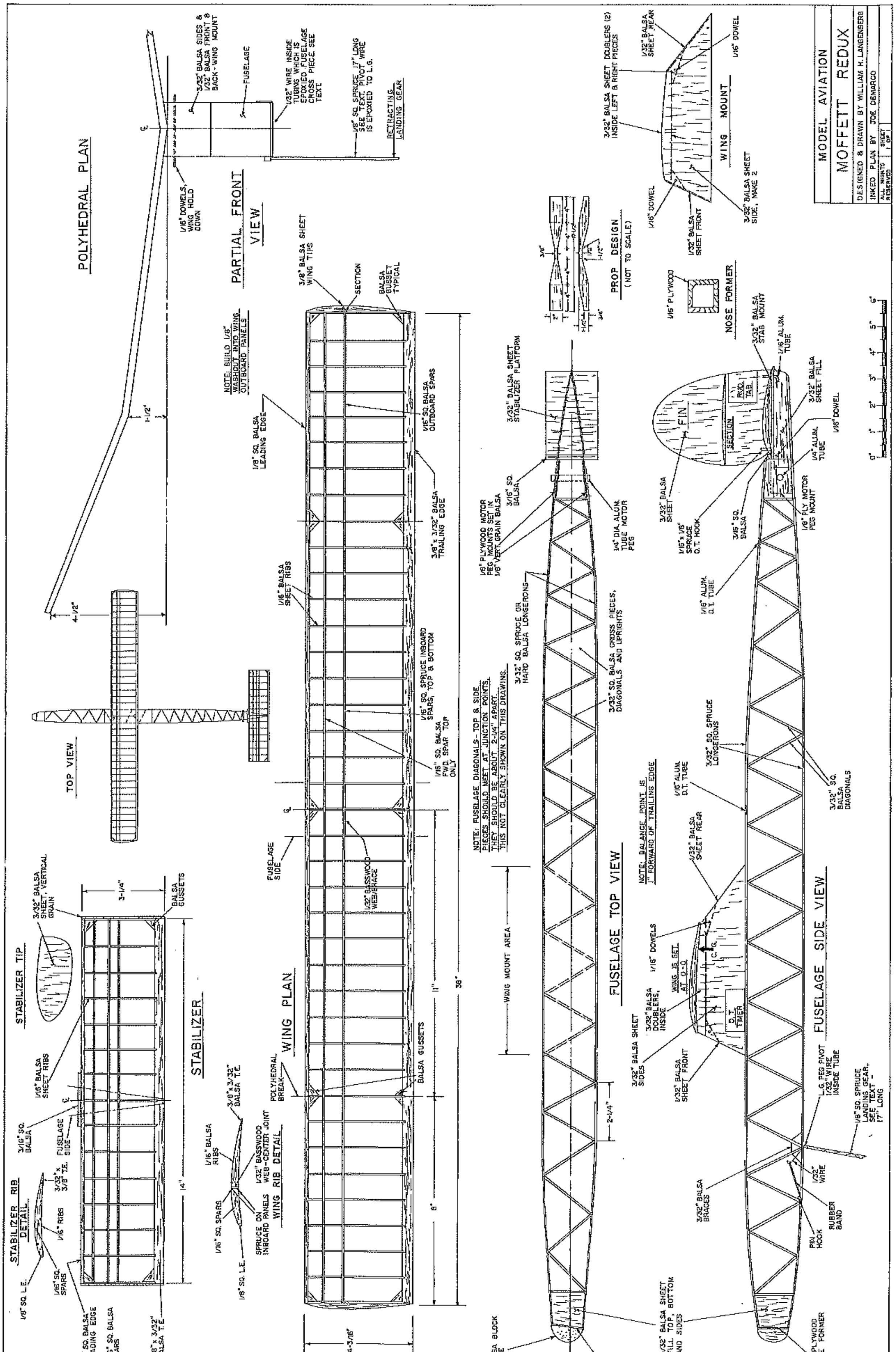
The fuselage's finished weight, including retracting-peg landing gear, should not exceed 50 grams with a DT mini-timer.

Propeller Assembly: The model shown in the photographs uses a 17½-inch-diameter Superior Props prebuilt folding propeller with the blades trimmed to the outline shown. An alternative propeller, for those more experienced or energetic modelers who want to carve their own, is also detailed on the plans.

If you elect to carve the propeller, select a straight-grained 1½ x 2 x 17½-inch balsa block. Drill the center shaft hole, then saw the blank to shape. Carve the aft concave surfaces with roughly 1/16 inch of undercamber and sand them smooth, ensuring that the two blades are symmetrical.

Carve away the front sides of the propeller until the blades are approximately 3/32-inch thick at midpoint. Shape the blades to the finished outline. Details of the folding

Full-Size Plans Available—see page 191



mechanism are shown in the accompanying photographs.

Complete the propeller assembly by carving the nose block from hard balsa, with its grain parallel to the fuselage axis. You can obtain the ball bearing, shaft, thrust bearing, and spring shown from FAI Model Supply. A ⅛ plywood insert glued to the rear of the nose block should fit into the front nose former. The propeller and nose block should be given at least three coats of dope before assembling.

Ensure that the propeller blades are balanced and track properly. The finished weight of the propeller assembly, including the nose block, should not exceed 25 grams. A total airframe weight of 102 grams, or 3.60 ounces, thus exceeds the required minimum amount by a small margin.

Flight Preparation: Make at least two 3⁄16-inch rubber motors of 16 strands, 32 inches long. After washing, drying, and lubing the motors, break them in initially using the stationary stretch method.

To use that technique, hammer two large nails—approximately six motor lengths apart—securely into a fence. Stretch the motor over the nails and leave them there for five to 10 minutes. The stretched motors should be roughly 33 inches long.

Assemble the completed model and insert a rubber motor. Check that the alignment and thrust offset are correct. Verify the balance point with the propeller blades folded. Shift the position of the DT timer if necessary to ensure that the balance point is located precisely as shown on the plans.

For the modeler who is interested in serious Moffett competition, a reliable, sturdy winder and a winding stooge are musts. The advantages of an immovable holder when winding and freedom to test-fly alone are significant.

Under calm conditions, hand-glide the model and add packing under the stabilizer leading or trailing edge until the model floats with a slight left turn.

This model should be docile to adjust under power. Start with approximately 200 turns. It should climb to the right, straighten out just before the propeller folds, then glide to the left. Use thrust adjustments and rudder tab to obtain this pattern. Proceed in increments until maximum turns are reached. Under full power, the model should climb in a steep right corkscrew, with the nose pointed up until just before the propeller folds. Motor run should be roughly 50 seconds.

One advantage of the Moffett Rubber class is that the duration potential of the model exceeds the flight maximum unless down air is encountered. Therefore, unlike a contemporary Wakefield, it is not essential to wind the motor to capacity on every flight. Nor is a blast tube necessary unless you choose to use one for safety purposes.

I normally wind the motor on my Moffett 800-850 turns, depending on the feel of the rubber. Maximum capacity, by contrast, is approximately 900 turns. Because of its smooth texture, FAI Model Supply rubber is normally resilient and unlikely to break unless mistreated. On several occasions I have used the same motor for all three competitive flights.

If you are unwilling or unable to build your Moffett Redux down to the structural weight shown on the plans and the climb suffers accordingly, I suggest an increase in power to 18 strands. One of the real joys of the Moffett Rubber event is to watch your model climb to an impressive height, which it may not do unless thermal-assisted if underpowered.

Good luck with your Moffett Redux. *MA*

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Sources:

Balsa and spruce wood:
Sig Manufacturing Company, Inc.
Box 520
Montezuma IA 50170
(641) 623-5154

Rubber, hardware, covering material:
FAI Model Supply
Box 366
Sayre PA 18840
(570) 882-9873

Propellers:
Superior Props
516 Driftwood Cir.
Slidell LA 70458
(985) 726-9673