A remarkable airplane turned into a remarkable RC model, the Lunar Rocket is a good example of modern commercial aviation: a work-horse with outstanding STOL capability. It's a real crowd pleaser in Quarter Scale. ■ Dom Palumbo and Myron Pickard

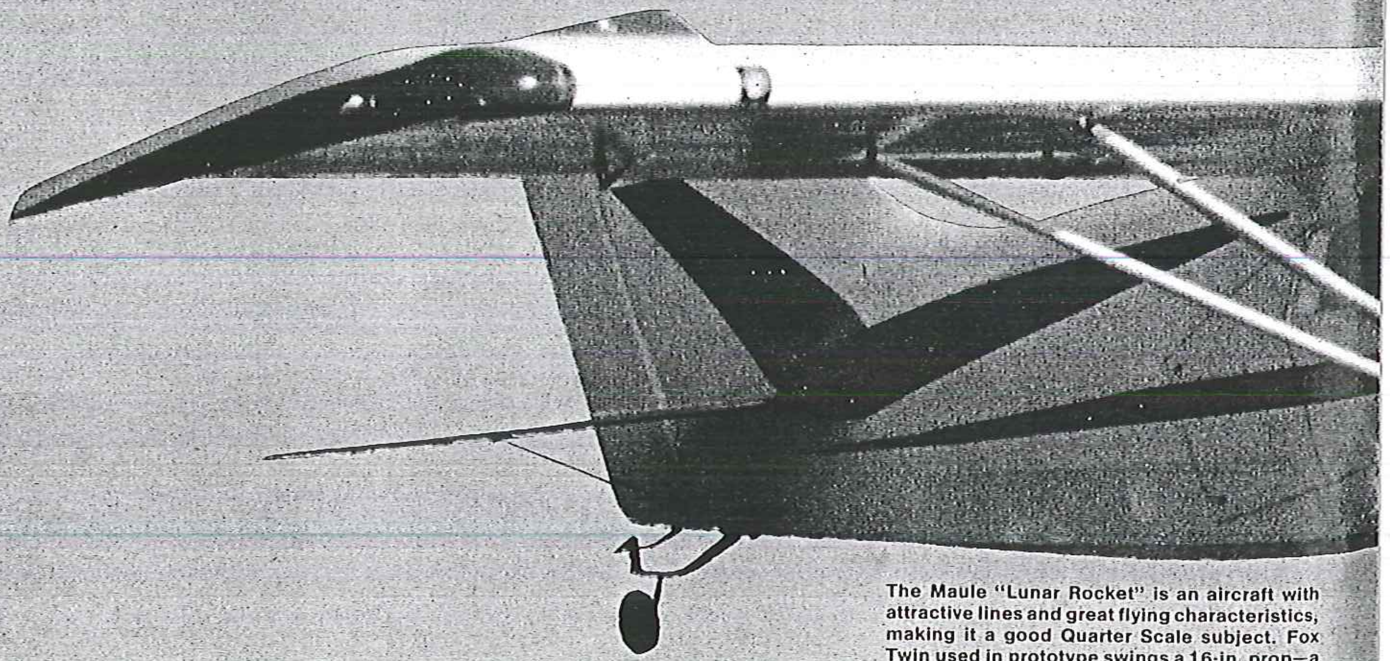
356

Nestled unobtrusively in four modern hangars at the Air Force's abandoned Spence air base, just outside Moultrie, GA, the Maule Aviation Corp. is one of the latest arrivals on the commercial aviation frontier. The company's president, Belford Maule, and his wife, June, opened the doors in 1974 in order to produce and market their original design airplanes. The M-5 Lunar Rocket is the only airplane produced by the 75 employees of this small but prosperous company, and two complete aircraft come off the assembly line each week.

The M-5 is a short-takeoff-landing (STOL) airplane designed specifically for operation in and out of tight unimproved airfields, typical of those found in Australian bush country, the southwestern U.S., most of Canada, and the Amazon. The float-equipped version is very popular in these and other areas, for obvious reasons. The airplane's remarkable STOL performance (takeoff and landing over a 50 ft. obstacle fully loaded within 600 ft.) is achieved with a lightly loaded flapped wing and fairly high power loading for an airplane of its size.

I recently witnessed the maximum performance short takeoff maneuver at a local air show. Standing on the brakes with full up elevator, the Lycoming 0-540 was gunned to full power. With the massive 84-in. prop, this translates to about 235 hp at sea level. Simultaneously releasing the brakes and tipping the elevator down caused the M-5 to jolt forward with its tail end up. A short run up to minimum flight speed and the flaps were fully deployed, pitching the Lunar Rocket's nose up into a 40-degree climb and

Maule M-5L



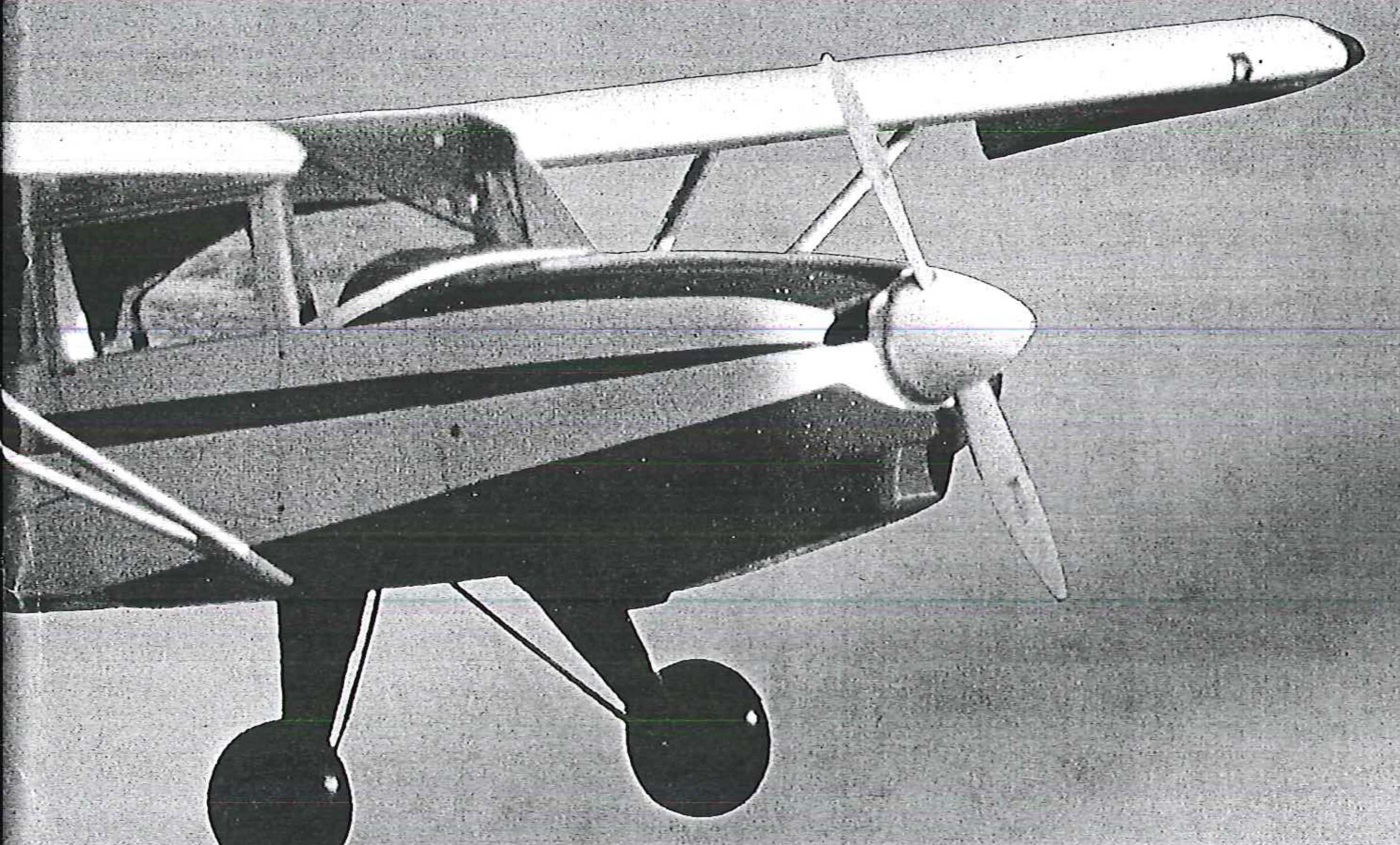
The Maule "Lunar Rocket" is an aircraft with attractive lines and great flying characteristics, making it a good Quarter Scale subject. Fox Twin used in prototype swings a 16-in. prop—a bit small for true scale. Quadra or similar power would allow a scale 21-in. prop.

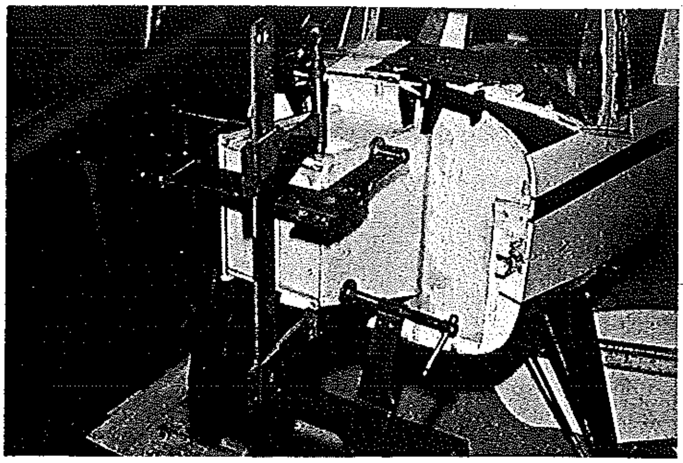
causing the tail wheel to slam into the runway pavement. Then, at about 75 ft. off the ground, the flaps were retracted to the 10-degree maximum rate of climb configuration, with the airspeed at about 65 knots. With a light load, this all occurred within 300 ft. of the starting point. I was impressed. It was obvious where the airplane got its space-age name. Movie-goers will have a chance to see this maneuver executed from the main street of Moultrie in the movie, Cannonball Run, starring Burt Reynolds.

Our one-quarter size model of the Lunar Rocket is dimensionally correct in every respect. Scale documentation can be obtained from Maule Aviation Corp., Attn: Mr. Ray Hooper, Moultrie, GA 31768. (Editor: The three-view

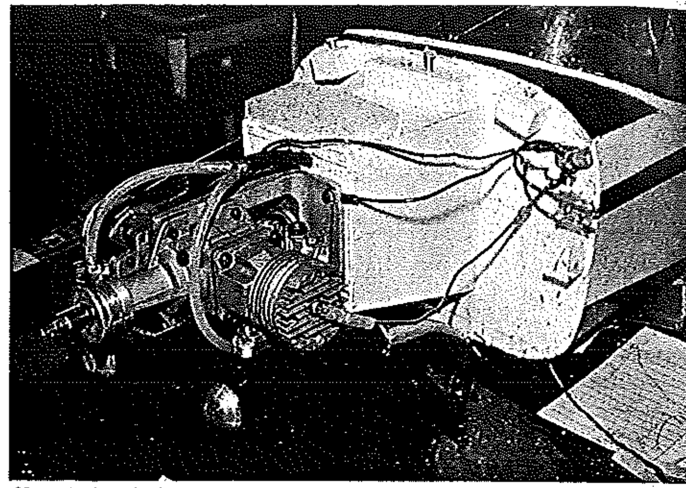
The creators pose with their baby: left, Myron Pickard, right, Dom Palumbo. The Lunar Rocket is an exceptionally sleek airplane. The opportunity of visiting the plant where the prototypes were made helped add a lot of detail to this Quarter Scale model.

unar Rocket

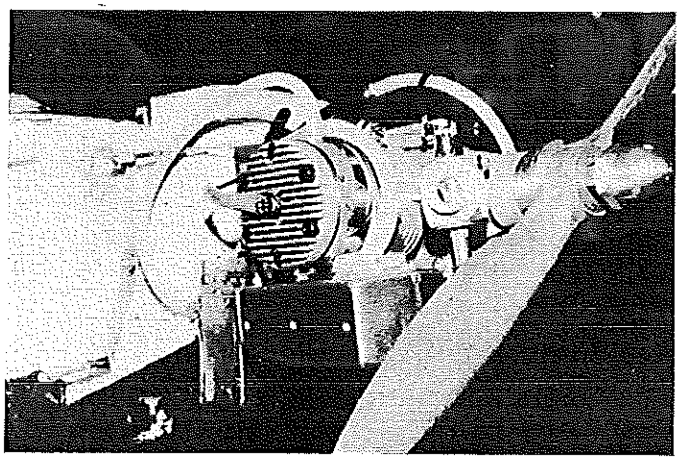


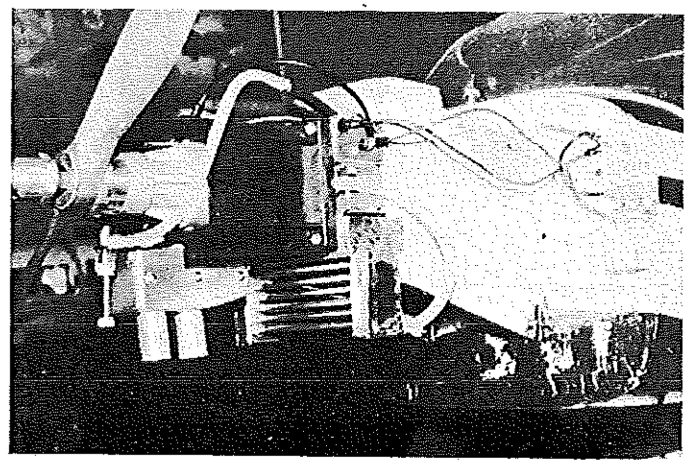


Firewall extension box is shown here clamped for gluing. An alternate dovetail-type extension is shown on the plans; pick the one that suits your intended power source.



Mounted and wired Fox Twin, with fuel lines in place. Firewall area has been thoroughly sealed and painted to prevent fuel seepage.





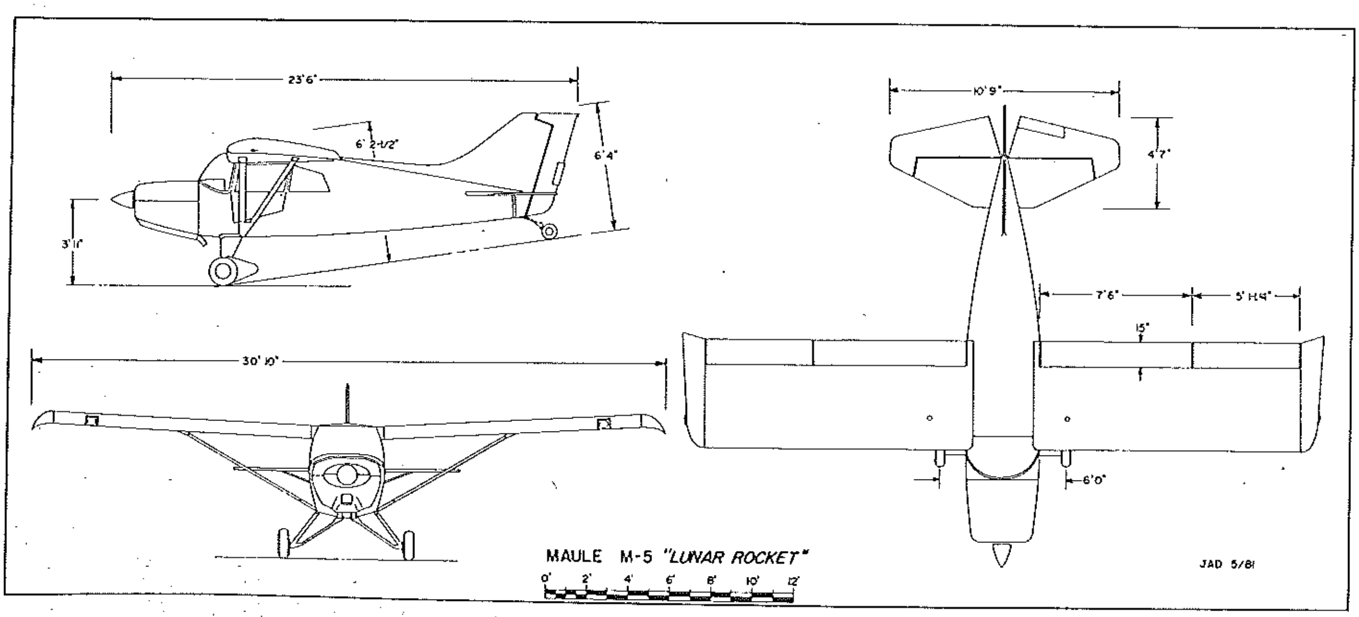
The Maule firewall design allows much choice in engine installations. The addition of a 1½-in. spacer allowed the mounting of this Webra .91. It's a water-cooled engine, connected to a homemade radiator, with a Robart Super Pumper moving the coolant through the jacketed head. It pays to put clamps on the tubing to avoid loosening due to vibration.

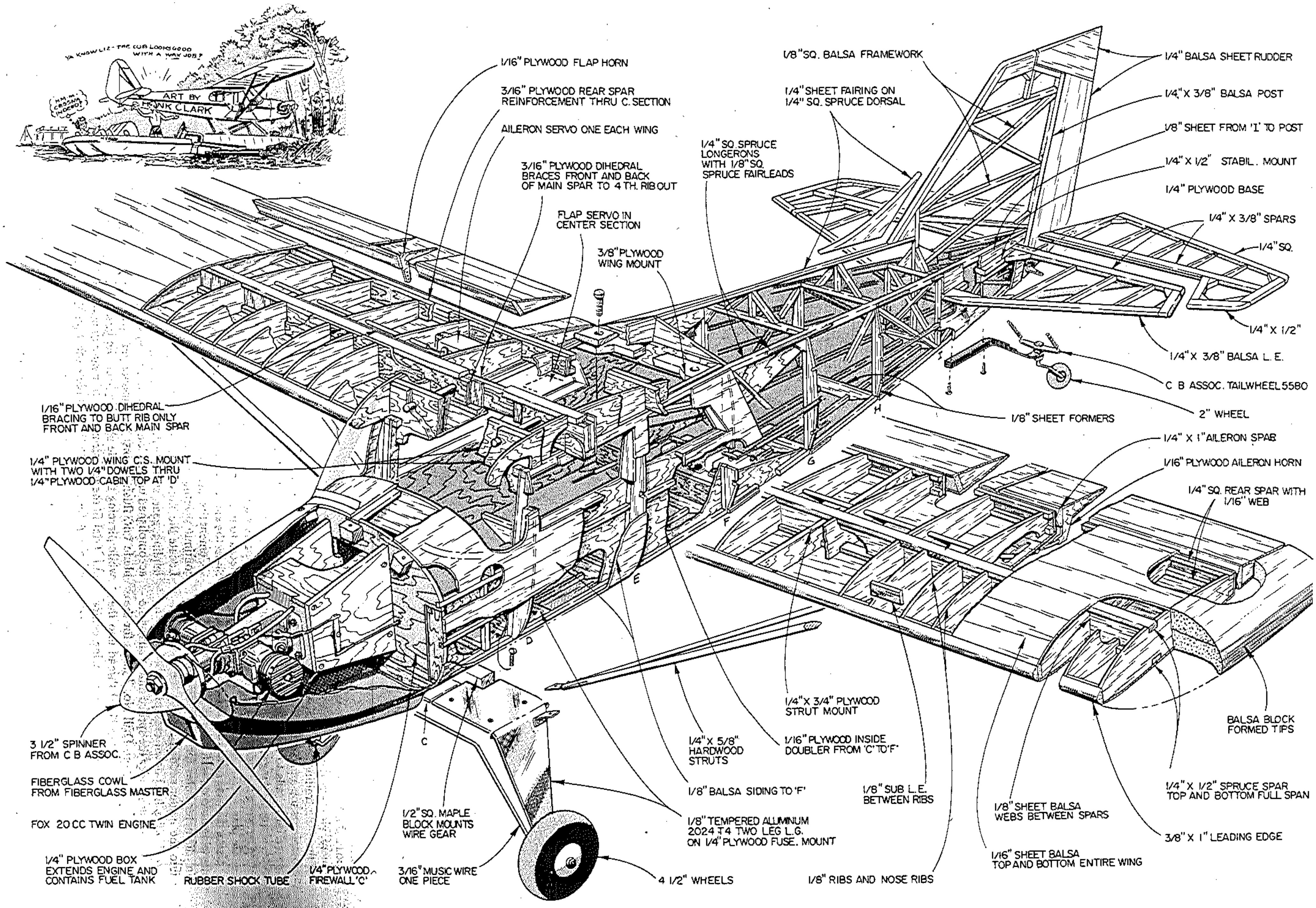
drawing presented with this article was traced from a factory drawing.)

One of the most distinctive features of this airplane is the conformal dorsal fin. The Razorback covering used on the actual airplane is a dope-shrinkable fiberglass, which is not suitable for use on models because of its tremendous shrink factor. I'm told that extreme care and a lot of skill must be exercised when the actual airplane is covered, because a little too much dope in the wrong place will actually cause the steel tube structure to bend out of shape when the Razorback shrinks. We were able to achieve the conformal dorsal using Super Coverite. A key to success in this operation is patience and a very gentle application of heat; more on this later.

Wing construction is in three sections, the center and two outer panels. These can be bonded together permanently, or left independent for ease of storage and transportation. The flat bottom modified USA35B airfoil which is used on the full-size airplane was checked out and found to be suitable for use on the model. Wing sections are built directly over the plan on a *flat* building board.

Note that the outer panel rib layout is such that both the left and right panels can be built over the same plan. Simply make allowance for passage of the dihedral bracing on the *inboard* side of





YA KNOW LIZ - THE CUB LOOKS GOOD WITH A WAY JOB ?
ART BY HANK CLARK
1/16" PLYWOOD FLAP HORN
3/16" PLYWOOD REAR SPAR REINFORCEMENT THRU C. SECTION
AILERON SERVO ONE EACH WING
3/16" PLYWOOD DIHEDRAL BRACES FRONT AND BACK OF MAIN SPAR TO 4 TH. RIB OUT
FLAP SERVO IN CENTER SECTION
3/8" PLYWOOD WING MOUNT
1/4" SQ. SPRUCE LONGERONS WITH 1/8" SQ. SPRUCE FAIRLEADS
1/4" SHEET FAIRING ON 1/4" SQ. SPRUCE DORSAL
1/8" SQ. BALSA FRAMEWORK
1/4" BALSA SHEET RUDDER
1/4" X 3/8" BALSA POST
1/8" SHEET FROM 'I' TO POST
1/4" X 1/2" STABIL. MOUNT
1/4" PLYWOOD BASE
1/4" X 3/8" SPARS
1/4" SQ.
1/4" X 1/2"
1/4" X 3/8" BALSA L. E.
C B ASSOC. TAILWHEEL 5580
2" WHEEL
1/8" SHEET FORMERS
1/4" X 1" AILERON SPAR
1/16" PLYWOOD AILERON HORN
1/4" SQ. REAR SPAR WITH 1/16" WEB
1/16" PLYWOOD DIHEDRAL BRACING TO BUTT RIB ONLY FRONT AND BACK MAIN SPAR
1/4" PLYWOOD WING C.S. MOUNT WITH TWO 1/4" DOWELS THRU 1/4" PLYWOOD CABIN TOP AT 'D'
3 1/2" SPINNER FROM C B ASSOC.
FIBERGLASS COWL FROM FIBERGLASS MASTER
FOX 20 CC TWIN ENGINE
1/4" PLYWOOD BOX EXTENDS ENGINE AND CONTAINS FUEL TANK
RUBBER SHOCK TUBE
1/4" PLYWOOD FIREWALL 'C'
1/2" SQ. MAPLE BLOCK MOUNTS WIRE GEAR
3/16" MUSIC WIRE ONE PIECE
4 1/2" WHEELS
1/4" X 5/8" HARDWOOD STRUTS
1/4" X 3/4" PLYWOOD STRUT MOUNT
1/16" PLYWOOD INSIDE DOUBLER FROM 'C' TO 'F'
1/8" BALSA SIDING TO 'F'
1/8" TEMPERED ALUMINUM 2024 T4 TWO LEG L.G. ON 1/4" PLYWOOD FUSE. MOUNT
1/8" SUB L.E. BETWEEN RIBS
1/8" RIBS AND NOSE RIBS
1/8" SHEET BALSA WEBS BETWEEN SPARS
1/16" SHEET BALSA TOP AND BOTTOM ENTIRE WING
BALSA BLOCK FORMED TIPS
1/4" X 1/2" SPRUCE SPAR TOP AND BOTTOM FULL SPAN
3/8" X 1" LEADING EDGE
C
D
E
F
G
H

each, and note the different locations for the strut support members. It is suggested that Nyrods be used for aileron and flap control since this approach keeps things simple. Separate servos (one in each outer panel) should be used for aileron control, while one heavy duty servo in the center is sufficient for control of the flaps. Our model was fully equipped with directional lighting and search beams in the wings.

Tail construction. The horizontal and vertical stabilizers are built over the plan using stock balsa and spruce. Note, however, that the completed model was found to require some tail ballast for proper CG placement. Therefore, you could go for the more expensive solid balsa tail surface if you so desire, but for scale purposes the rib outlines should be duplicated. This can be accomplished using narrow strips of heavy paper or thin cardboard cemented to the solid sheet.

Fuselage. Begin by building two side frames of ¼ balsa and spruce. Build one directly over the plan, and the second directly over the first with a sheet of waxed paper in between. This will assure two identical sides. Next, cut the 1/16 plywood

inner doublers (including cut-outs for the windows) and epoxy these to the *inside* of one *right* and one *left* side frame. Taper the aft end of each frame for a proper joining angle by matching the frames up over the top view and tapering accordingly.

Cut out the firewall, landing gear mounting plate, wing hold-down former, and ¼ x 1 in. crosspieces from a good grade of ¼ plywood. Epoxy the firewall to one of the sides, using a square. Now join the two sides at the firewall and at the wing trailing edge using ¼ x 1 plywood crosspieces top and bottom. Epoxy the ¼ x 5/16 spruce inner rails to the insides of the fuselage sides along the wing saddle. Epoxy the mounting plate between the sides at the location indicated on the plan.

Using the wing center section as a guide, epoxy the wing hold-down former in place. Drill the ¼-in. diameter holes for the leading edge dowels into the center section. Epoxy the ½-in. hardwood wing hold-down crosspiece between the fuselage sides under the spruce inner rails at the trailing edge location. Drill No. 7 holes for the hold-down bolts, and tap ¼-20 thread into the block. Drill clearance holes in the wing center section, and bolt it in place. Check alignment, and make any minor adjustments required to assure a square fit all around.

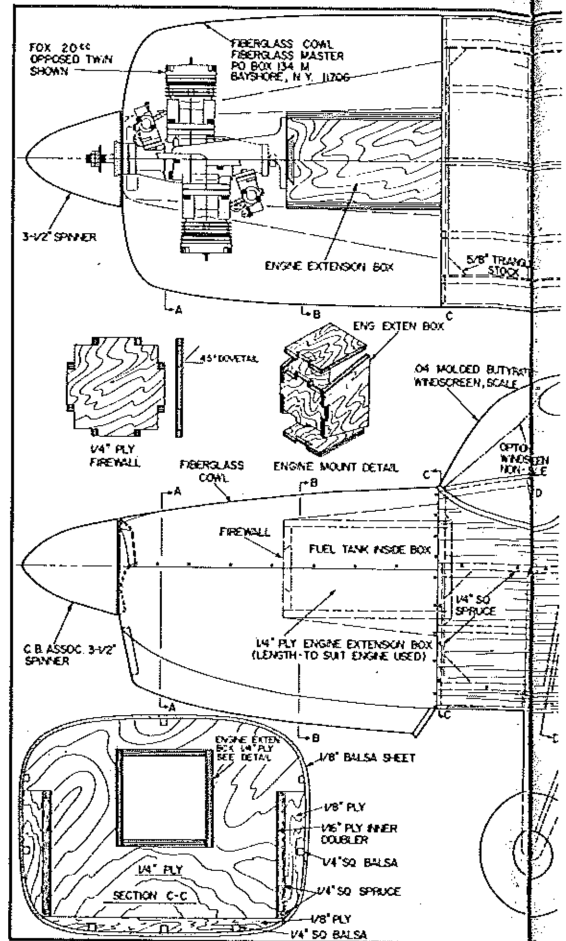
Cut out and bend the ⅛-in. aluminum main landing gear struts, and drill mounting holes through the mounting plate after aligning and clamping the struts in place at the correct location. Bend the 3/16 music wire secondary strut/axle to the exact shape shown on the plan, and fit into position between the main struts. Locate the grooved hardwood block on the landing gear mounting plate, and tack-glue it in position.

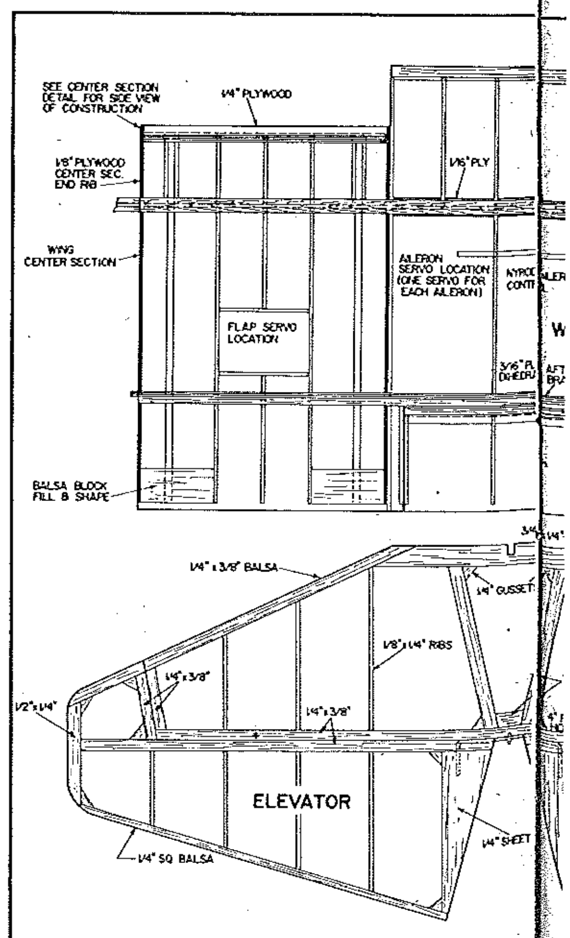
Make sure that the secondary strut slips into the groove easily and that the axles slide into the main struts without binding. Now tap all holes and assemble by bolting one of the main struts in place, sliding the axle through the hole in the strut and into the grooved block, slipping the other main strut over the opposite axle and bolting it in place to the mounting plate. Note that since all screws are accessible from inside the cabin, the gear can be removed at this time and set aside until the model has been completed.

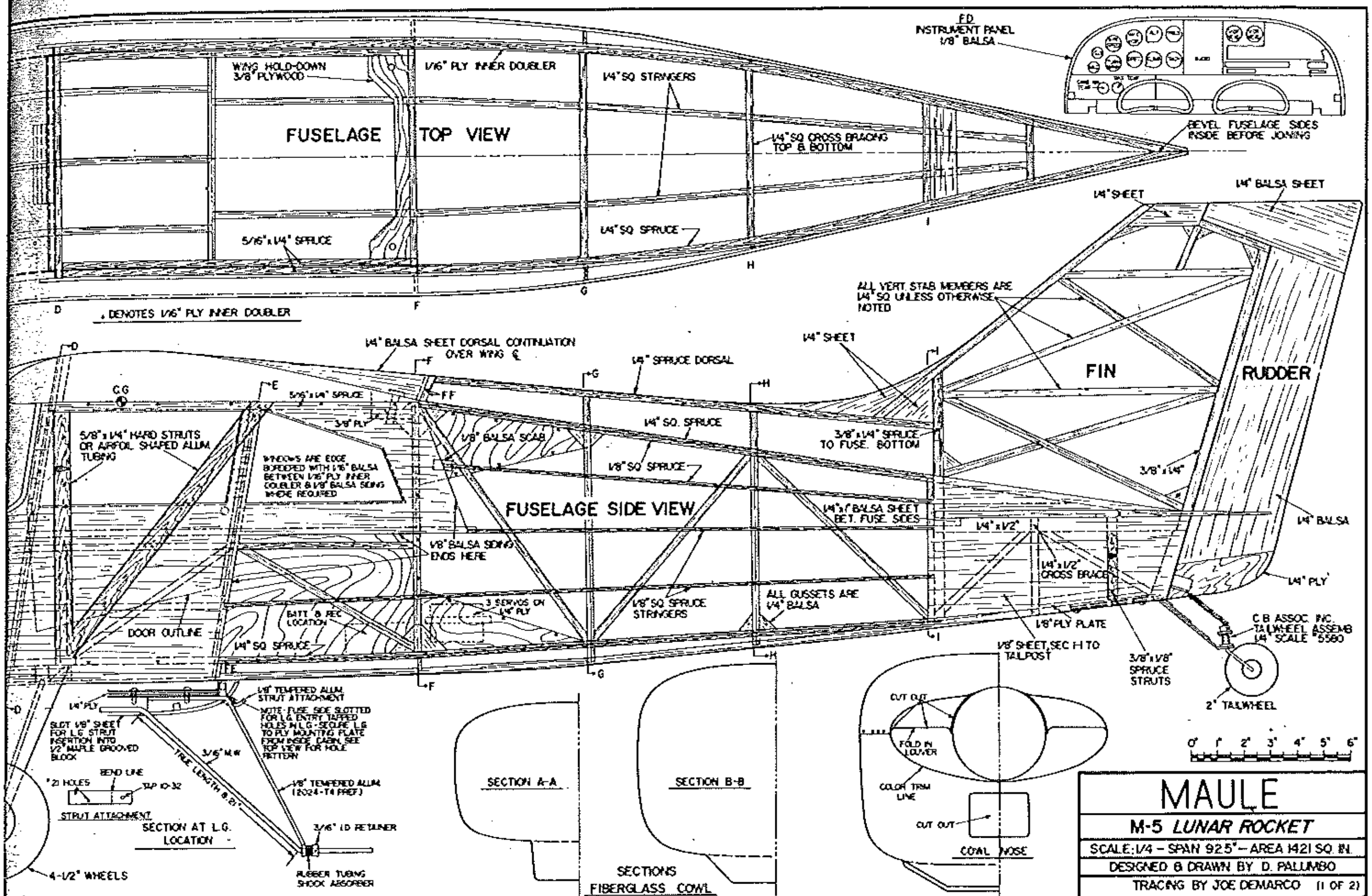
Using the top view as a reference, clamp the fuselage in place over the plan and join the tailpost, assuring symmetry about the center line. Glue the ¼ sq. balsa cross braces and gussets at each vertical side-member location, ensuring a true match to the top view of the side contour as you go from one frame to the next. Be sure not to twist the box-like framework as you do this, by squaring up the sides to the building surface before and after each section is completed. Epoxy the ⅛ plywood tail wheel mounting plate in position across the lower longerons, and the ¼ x 1 cross braces at the stab location.

Drill holes and insert mounting hardware for the tail wheel assembly, and cement ¼-in. balsa filler blocks on either side of the assembly. Cement fuselage side formers in the area which will be sheeted, and cement the instrument panel former between the sides where shown. Cement ¼ sq. balsa stringers to the formers, and line the windows with 1/16 balsa sheet. Sand these liner pieces to match the contour of the side formers. Sheet the sides using a medium grade of ⅛ balsa.

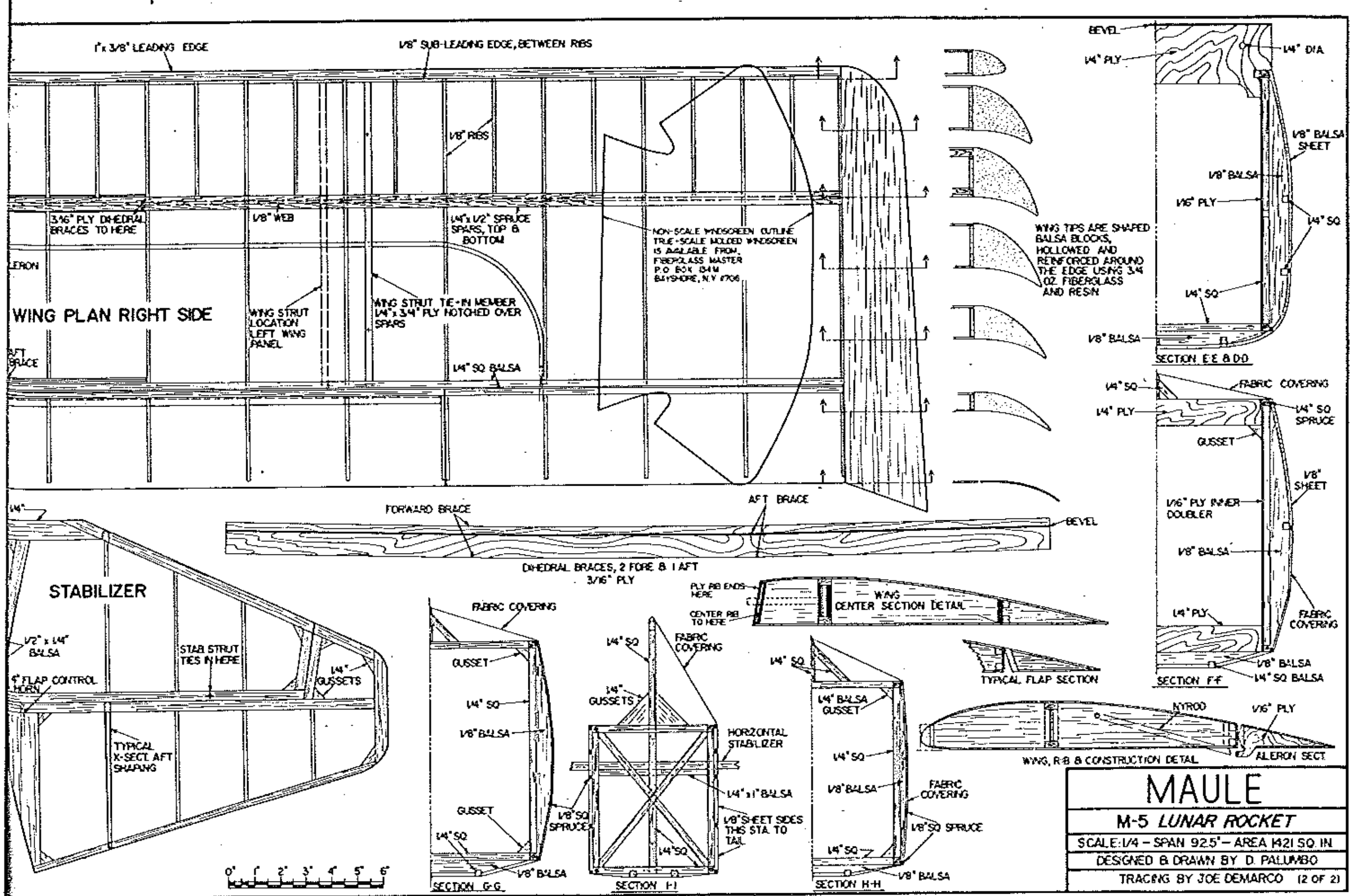
Cement the fuselage belly formers in place, and continue sheeting up to the ¼ sq. balsa stringers. Locate the slots in the siding through which the landing gear struts will pass. This is easily accomplished using a long X-Acto carving knife blade laid flush against the landing gear plate while piercing the side sheeting from the inside out. Trial-fit the gear struts, and trim the siding as necessary for a smooth fit. Complete sheeting of the belly, and sheet the forward top deck. Cut

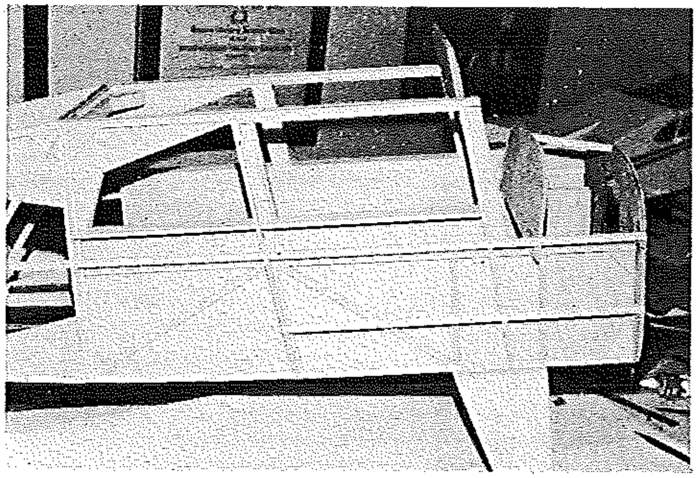




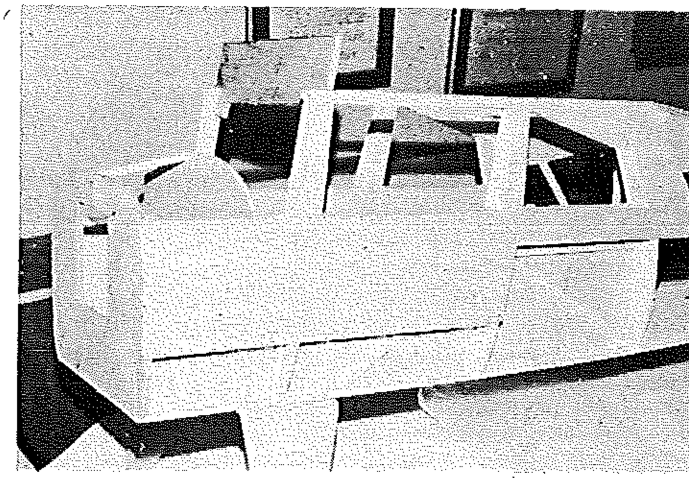


FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 140

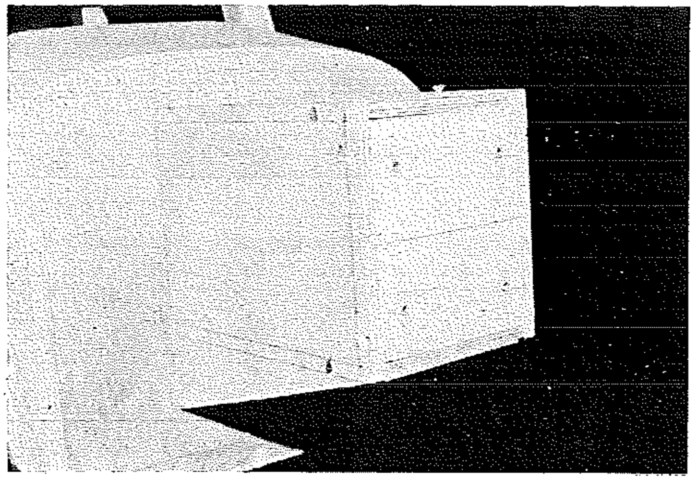




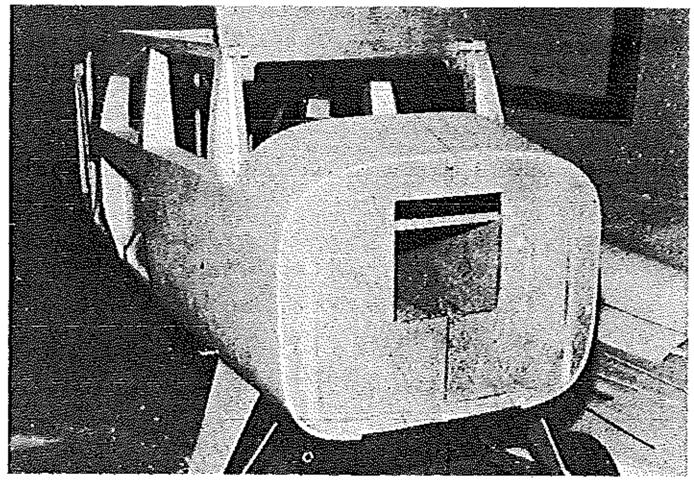
View of fuselage side shows structure prior to addition of side formers and outer longerons. This structure is extremely strong.



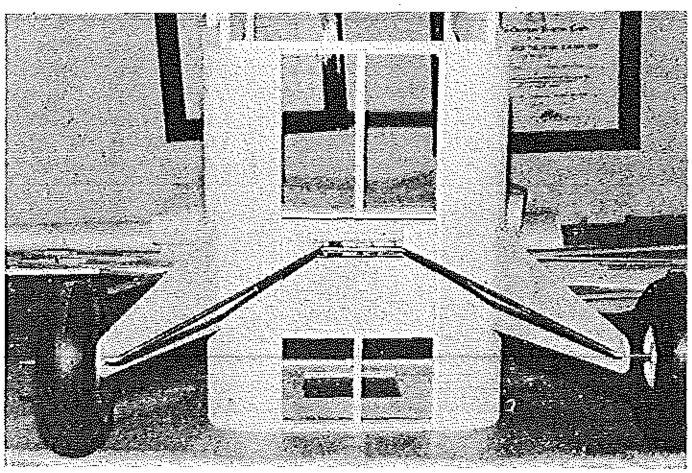
Fuselage siding is ⅛ balsa sheet. Windows are cut out from the inside after the sides are completely sheeted.



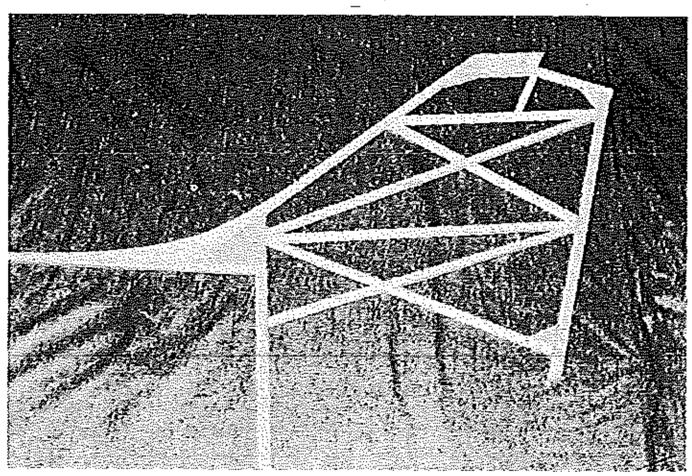
Firewall extension box in place. Note tapped sockets for engine mounting bolts. Length of box can be varied for different engines.



Side and top deck sheeting installed. Sheeting of ⅛ balsa over box structure is very strong. Firewall extension box is fitted later.

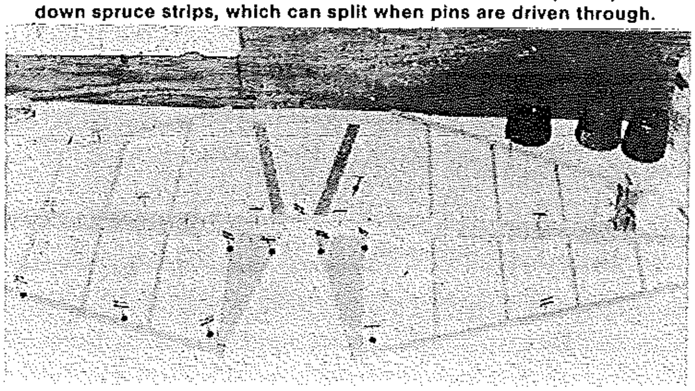


Main landing gear struts bolt to the ply mounting plate from inside the cabin. The secondary strut is one piece, and includes axles.

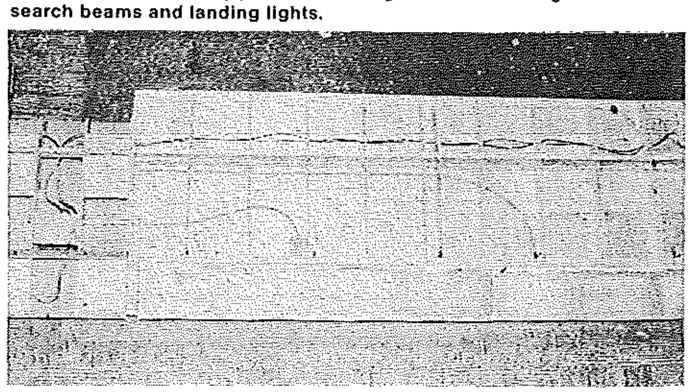


Vertical stab assembly. The curved leading piece serves as a former for the conformal dorsal during application of Super Coverite.

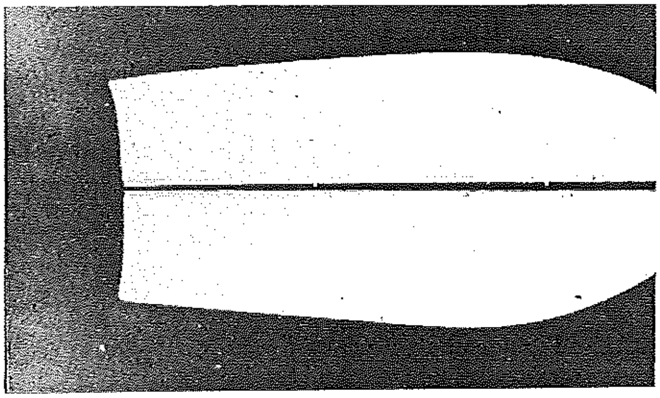
Horizontal stab going together over the plans. Pin clamps help to hold down spruce strips, which can split when pins are driven through.



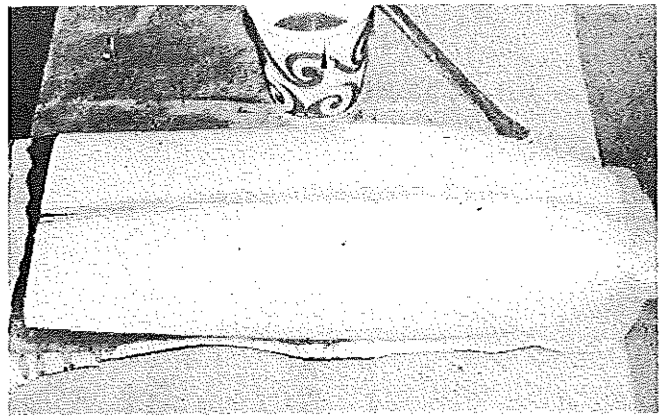
Top surface of the wing prior to sheeting. Electrical wiring is for scale search beams and landing lights.



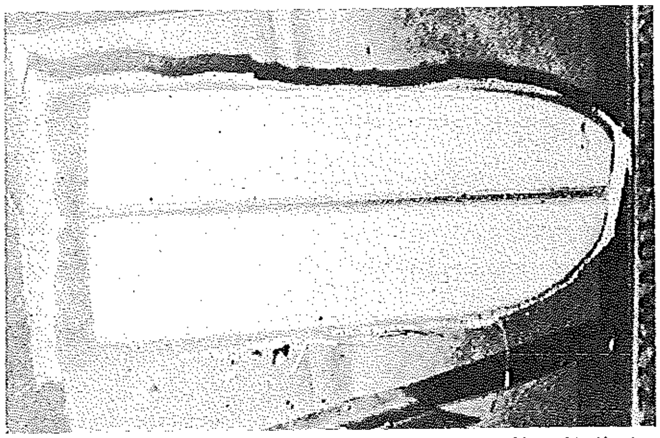
Glass Wing Tips



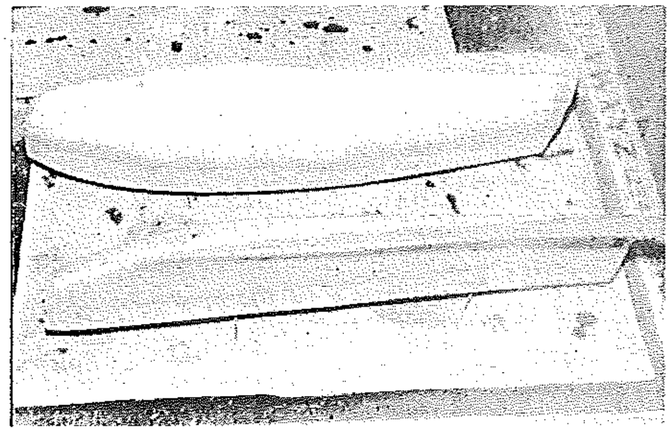
If you're handy with fiberglass, you can fabricate your own wing tips. Tips are cut from foam, and plywod ribs are epoxied on. Dowel holes are drilled, and the tips are rough-sanded to shape.



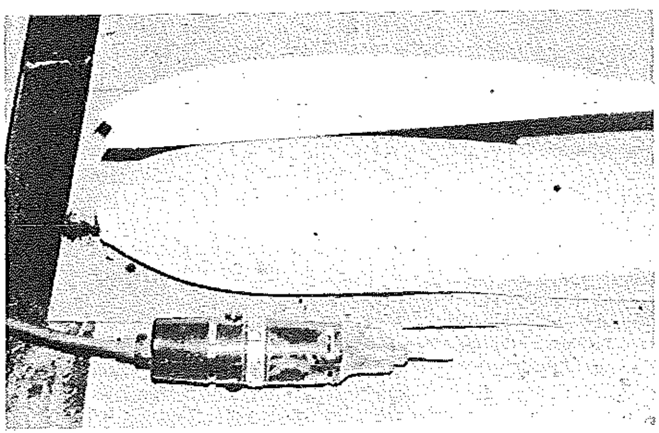
Tips are supported on the dowels, and 4-oz. glass cloth is applied. Keep the tips separate while the resin is curing.



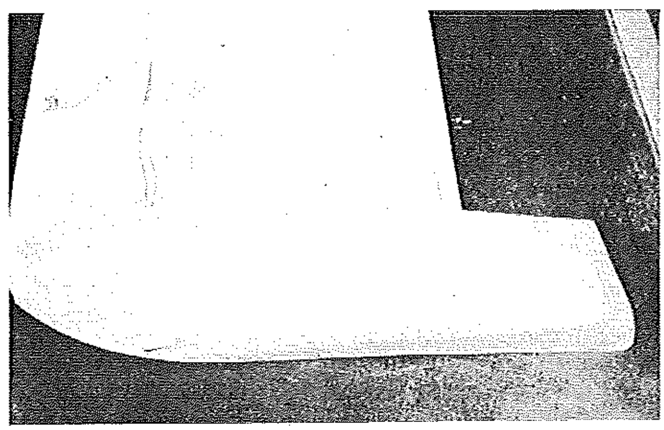
Once the top layer has set, lay glass over the bottom and bond to the top layer of resin. Be sure that they don't touch in this step.



Cut the tips apart, and trim and sand to final shape. Apply one more coat of resin overall to give a smooth surface for painting.



A Dremel tool and high-speed router head can be used to hollow out the tips for lightness. Holes in outside are for scale running lights.



Left wing tip installed. When hollowed they are very light, and glass cloth makes them scuff-resistant.

through the sheeting from the inside for the windows, and trim flush with the liners.

You may now glue the side and lower stringer locating formers to the fuselage and cement the ⅛ balsa sheet to the sides at the tail. Cement ⅛ sq. spruce stringers to the sides and ¼ sq. stringers to the bottom.

The engine box assembly can now be fabricated and epoxied to the firewall. Note that the length of this box will depend upon the particular engine and mount you will use, so double check the spinner backplate-to-firewall dimension prior to cutting the box parts. A fiberglass cowl was used on our prototype, and you can purchase a duplicate from Fiberglass Master, P.O. Box 134M, Bayshore, NY 11706; or make one yourself from the cross sections given on the plan.

Final assembly. It will be much easier to cover the horizontal stab and elevators prior to assembly. Cut away any material which covers the glue area and be sure to align the stab perfectly with the fuselage center line and the wing. It is necessary to install the elevator and rudder linkage now, because once the vertical stab is cemented in place, there is very little room to get into the aft end of the fuselage. Dual rods (or wires) are suggested, and you should figure on having to mount your servos as far aft as possible, since this will probably be required to achieve proper balance.

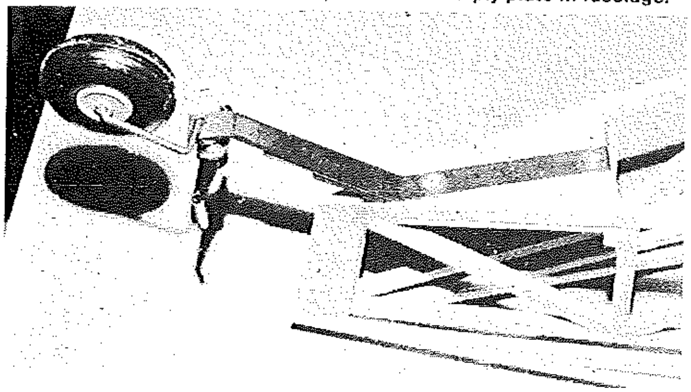
You may cover the sides and bottom of the fuselage before cementing the vertical stab in place. Cement the fin to the fuselage structure, assuring that the fore and aft posts make good contact with the structure and the long dorsal member comes up to meet the former at the wing trailing edge at the proper height and angle. Check the alignment of the rudder post with the fuselage tail post, using the rudder to hold the proper position while the glue sets. Cement gussets and vertical standoffs between the dorsal and fuselage crossbraces at each location as shown on the plan.

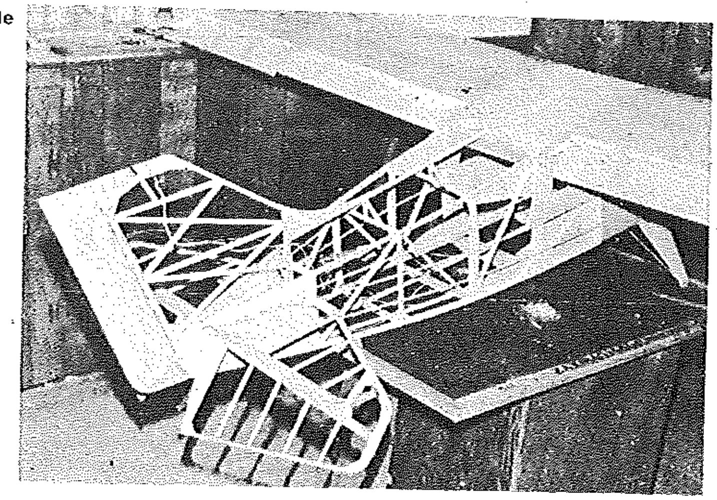
Shape and cement the ¼ balsa dorsal continuation over the wing center section starting at the trailing edge. Balsa filler blocks should be cemented to the center section over the hold-down bolt locations, and then shaped to conform to the slope which the fabric covering will assume.

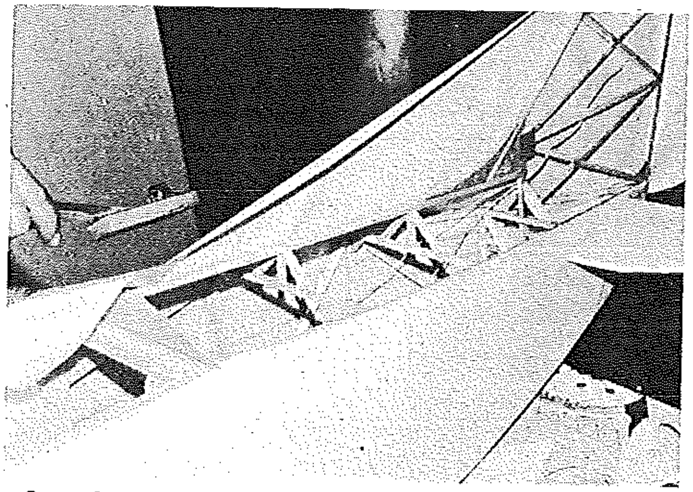
Finally, you're ready to tackle that conformal

Fuselage and tail structure shows clearly in this view. Wiring is for scale tail and running lights. Note gussets.

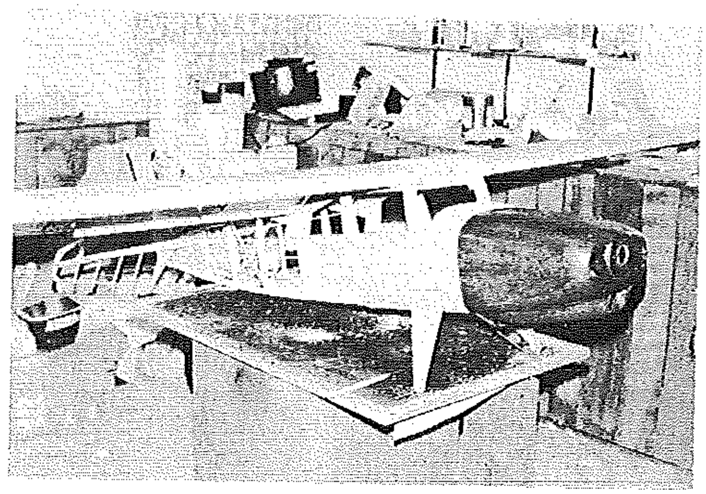
Tail wheel assembly, by Robart, is mounted to ply plate in fuselage.







Super Coverite is tacked to the vertical tail and fuse, and carefully shrunk to simulate the conformal dorsal. It's easy. See text.



Ready for covering, fiberglass cowl in place. Wing is built in three sections; can be left separate for easy transportation, or joined.

dorsal. Begin by cutting a piece of Super Coverite about 2 in. too large on all edges. Position the fabric over the area to be covered with approximately equal overhang all around, and tack the fabric to the upper fuselage longeron. Fold the fabric over the radiused section of the fin (between the fin leading edge and the dorsal) and, leaving a more-than-normal amount of slack, tack the fabric to this section. Now tack to the fin tip, rudder post, and dorsal in that sequence, trying to keep the covering as uniform as possible each step of the way. Finally, tack to the former at the trailing edge location. Work any irregularities out by releasing and retacking to the fuselage longeron. Now, don't get carried away by shrinking the covering just yet. Follow the procedure outlined above to do the other side, or you will wind up with a twisted fin.

When both sides look roughly the same in terms of tautness, apply heat as uniformly as possible to both sides, working from the wing trailing edge back, until the fabric just tightens. When you're done, you will be very pleasantly surprised by how the entire aft fuselage simply merges with the large fin. Now do a final application of heat to tighten the covering up to its final stretch limit.

Windows are best handled using .04-in. butyrate clear plastic. Since the windows will have to curve in order to conform to the fuselage contour, the thicker plastic will be easier to work with and will have less tendency to buckle. A simple framework of 1/16 sq. spruce cemented inside the window outline, away from the edge by the thickness of the plastic, will provide a good surface onto which to cement the windows. The windshield outline of the full-size airplane is shown on the plan, as well as one which is simplified in that it can be formed from a flat piece of clear plastic (cut to the outline shown on the plan) by simply wrapping it. The scale windshield required vacuum forming over an appropriately carved plug. Fiberglass Master is also capable of supplying formed windscreens for Scale enthusiasts, but for stand-off or sport flying, the modified windshield will do just fine.

Finishing. If you've used Super Coverite as we did, four coats of clear dope followed by two light coats of epoxy or polyurethane white should be sufficient to achieve the scale fabric appearance of the fuselage. The wing should be covered with ¾-oz. fiberglass and resin, sanded with 400 wet and given a high gloss finish, as the fullsize airplane has a metal-skinned wing.

At the time our prototype was finished, the standard assembly line colors were either red and white with a black pinstripe, or blue and white with a black pinstripe. Since then, Maule has introduced a new (and for my money more attractive) color scheme. It consists of the same pattern in bright yellow and white with a maroon pinstripe. This is a real eyecatcher.

Flying. Our initial expectations were not realized on the first couple of flights. The Fox 1.2 opposed twin which Myron selected for use as a power plant just didn't seem to have the right thrust/power for this airplane. It flew, but the snappy performance exhibited by the M-5 just wasn't there. We both felt that the engine should perform better, so it was sent back to Fox for adjustment.

Upon receiving the engine back with a very nice letter, we set the engine up once again and ran it. We found that we really couldn't get the full rpm for any length of time without the engine quitting. This led us to conclude that the engine just wasn't fully broken in yet. It was run on the rich side for a couple of tanks and then leaned out in stages. Voila, we finally got a good run at rated rpm. This was not the same engine we had run when it was first received! A considerable break-in period is clearly required in order to obtain peak performance.

Our next flight proved worth all the effort expended in getting the engine to run right. The Lunar Rocket flew true to its name. Takeoffs were effortless, and even vertical climbs were respectable. Maneuverability was all that any aerobatics pilot could wish for, while landings were made at a mere 20 mph with 20 degrees of deployed flaps.

Our prototype weighed 20 pounds, but this included the extra servo and batteries for the lighting system. The M-5 will no doubt fly as well with a chainsaw engine, or even a good .90, so take your pick. Whatever your selection of engines, you are not only going to have one of the best flying Quarter Scalers at the field, but also one of the best looking airplanes to come along in a long time.

Happy flying.