Round nose, wheel pants, and that " Mr. Mulligan look" take Mini-Coupe out of the rut. Arcs to the left under power to make an "S" transition into the glide. No stall when engine cuts.

mini-coupe

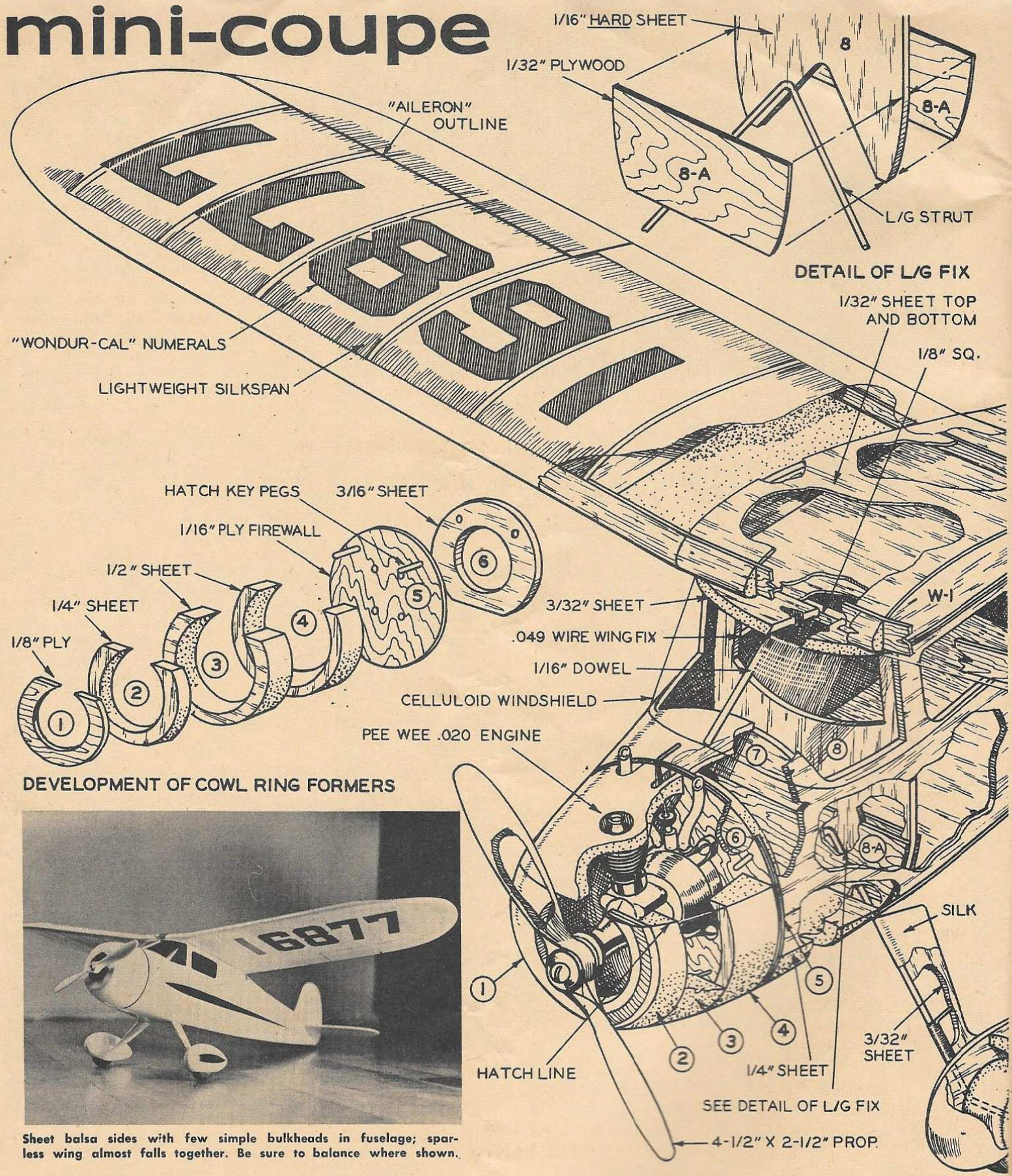
Peppy flying speed with a low climb angle make this .02-powered free flight a happy project. No trophies but will win high praise.

by VERN CLEMENTS

► For free-flight fun, try the Mini-Coupe, a smooth flying little sportster of classical appearance. Peppy flying speed is maintained during the realistic low-angle climb, which arcs slightly to the left due to torque. No stall occurs when the motor quits; the "Coupe" makes an "S" pattern at the top, and glides smoothly back to earth in a wide right-turn. Such flights can be duplicated consistently, but do not launch with a full fuel tank or your Mini-Coupe will become a very small speck in the sky. Trophies were not in mind when the Mini-Coupe was designed, but the rewards will be many, in the form of the compliments it receives every time it is exhibited and flown.

Trimming the original Mini-Coupe for flight proved to be a simple matter. It was safely flown at full power on the second flight, indicating that success can easily be obtained by beginners too. The procedure of testing was as follows, with added tips to cover any variations in flight behavior that could appear due to possible construction differences of various builders. Our engine was installed with one washer between the firewall and backplate on the upper two bolts, for downthrust. Approximately 1/32" of right turn was warped and cemented into the last ¼" of the rudder trailing edge, for a right-turn glide. We made several hand-launched glides, which should be fast and flat, with no indication of turn. If turn should appear in the glide, be sure that it is not to the left. We then fired up the Pee Wee .020 engine, and made the first powered

mini-coupe

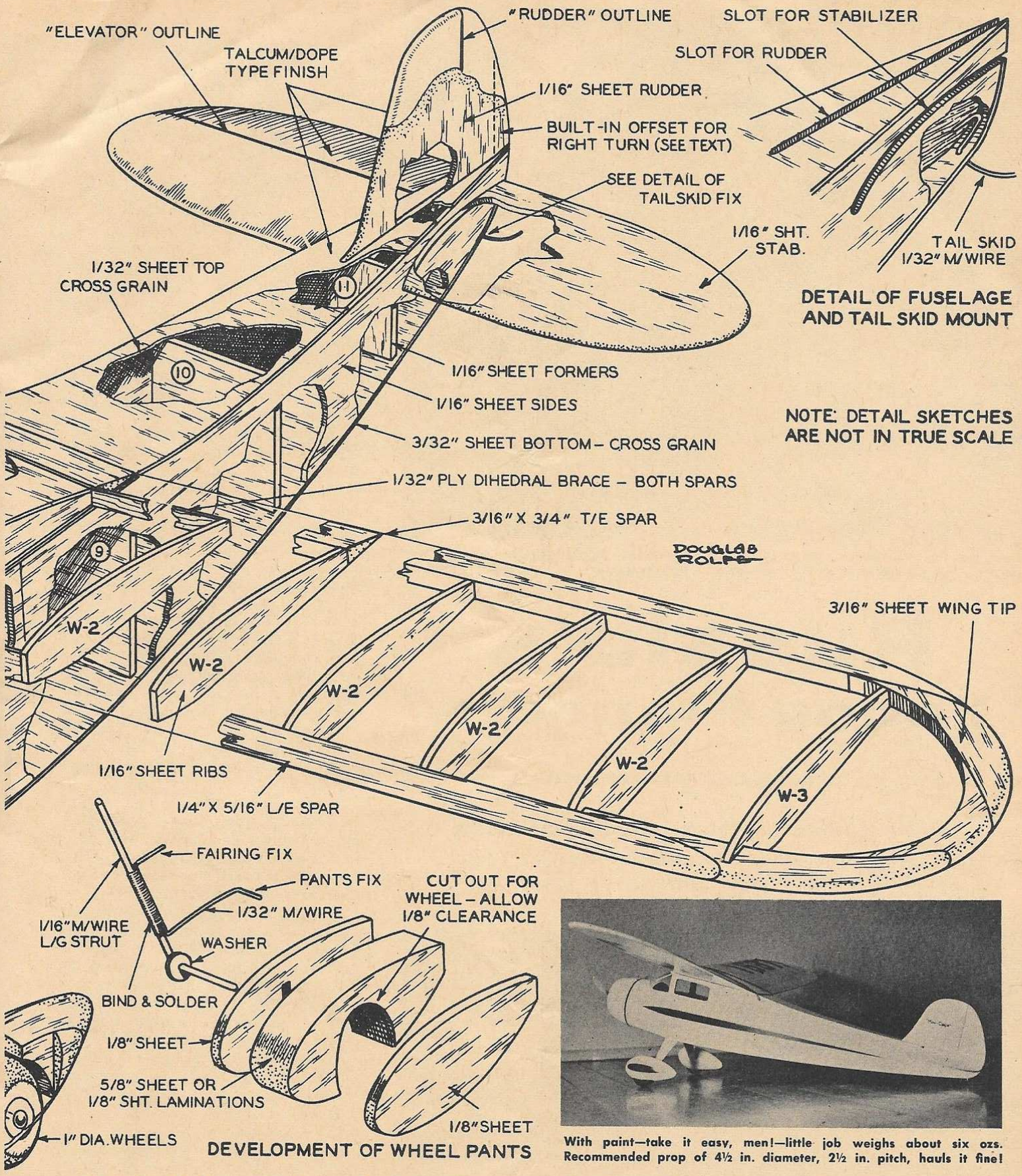


Sheet balsa sides with few simple bulkheads in fuselage; sparless wing almost falls together. Be sure to balance where shown.

flight with a rich needle-valve setting. This flight revealed a slight natural left-turn due to torque, with a large circle to the right in the glide. If your "Coupe" follows this flight pattern you can safely increase power progressively each flight until full power is being used.

If necessary, add left engine thrust to maintain the safe left power turn, against the right-turn glide. The radial type cowl allows thrust adjustments to be easily made. The left-right flight pattern insures safety; the right rudder keeps the nose up in the left power-turn, thus eliminating a spiral dive under power. If the rudder requires re-adjustment to achieve the large diameter right- glide circle, do so, but maintain a touch of right turn in the rudder.

Any center of gravity correction that may be required for the smooth, fast glide can be made with small lead weights cemented inside the cowl or tail of the fuselage, as the case may be. A soft balsa tail assembly is indicated on the plans, which should give you the proper center of gravity. You will find that the Mini-Coupe requires a fast launch, especially if a small diameter propeller is



With paint—take it easy, men!—little job weighs about six ozs. Recommended prop of 4½ in. diameter, 2½ in. pitch, hauls it fine!

used. A Thimble drome 4"½" diameter by 2½" pitch propeller is recommended. My Mini-Coupe weighs six ounces, with a finish that is heavier than necessary, which naturally would contribute to its fast flying speed and the fast launching speed required. You can easily have a lighter version by using fewer coats of filler and dope, and the wheel pants and strut fairings can be eliminated if you like.

Tracing of parts from the plans onto the specified wood can be easily accomplished by using pencil carbon and a dry ball point pen. All parts should be double checked after cutting them to shape and block sanding the edges, by laying them on the plan patterns to check your accuracy.

Choose identical sheets of 1/16" medium balsa for the fuselage sides, or better yet, cut both sides from the same sheet to insure equal curvature during construction. When tracing the fuselage sides, follow the dotted lines on the top and the bottom at the nose (indicated on the plans as the flat side sheet pattern) to allow enough material for curving around Former #6. Extreme care should be taken when tracing the wing-rest angle (*Continued on page* 54)

Mini-Coupe

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and stabilizer cut out, so that the angle of incidence will be correct. Bulkhead locations should be marked on the top and bottom edges of both fuselage sides, to aid in assembly later.

Cut and block-sand Formers #6 through #11 to shape. You will note that Former #8 is cut from hard balsa and that it has a "V" cut out at the bottom for the landing gear installation. Cut two Formers #8A from 1/32" plywood, and cement one to each side of Former #8 to form the slot for the gear to slide into place after the fuselage is completed; then the Former #8 "V" cut out is cemented into the slot, to hold the landing gear in place. The ⅜" square cross brace should be cemented onto the top of Former #8 before the fuselage is assembled.

Pre-cement the outside edge of Former #6; while this is drying, give the *inside* of the fuselage side sheets one coat of black dope from the nose back to Former #9 position. Formers #7 and #8 can also be doped black, to improve the cabin interior appearance.

Start assembling the fuselage by cementing Formers #8 and #9 in place, holding together with several pins and light rubber bands at these former locations. After the cement is dry, moisten the *out-*

side of the fuselage sides with water from Former #8 location to the end of the nose. The shrinking action of the dope already applied to the inside, combined with the expansion of the water moistened outside, will allow the side sheets to be curved around Former #6, which is well cemented into place, and held with pins and rubber bands for several hours to give the cement time to dry completely. While this glue joint is drying you can glue Formers #10 and #11 into place, as well as the sides at the tail end of the fuselage. Check the fuselage carefully for proper alignment. The dash panel Former #7 can now be cemented in, as well as the 3/32" sheet cabin top windshield piece. After the nose Formers #6 and #7 are completely dry, block sand the top nose seam, then cement the front wing hold-down pin and 1/16" dowel windshield post in their proper positions. A piece of silk should be cemented over the hold-down pin to insure that it does not break loose. The top of the fuselarge can now be covered with 1/32" sheet balsa, running the grain across. Before cementing the 1/32" fuselage bottom sheeting in place, from Former #8 to the tail, you may want to apply a coat of black dope inside the cabin roof to improve interior appearance. Don't forget the two 1/16" balsa gussets at the bottom of Former #8, before covering the fuselage bottom.

The 1/16" plywood firewall Former #5 should be coated with several coats of butyrate dope (on each side) before bolting the motor to it, and cementing into place on the nose. Pre-cement the front of Former #6 several times before making the permanent glued joint of the firewall (Former #5) to it. I soldered the motor mount nuts to a scrap tin plate on the back of the firewall, which could eliminate any trouble one might have in the event you should want to remove the engine, reinstall it, or make thrust adjustments.

The cowl Formers #2, #3, and #4 are sawed to shape with a vibrator or band saw, from the sheet balsa thicknesses indicated. The front cowl ring Former #1 is sawed from ⅛" plywood to withstand hard abuse. Pre-glue the edges of all cowl ring formers before cementing them permanently in place, starting with #4 and working through #1 in order of assembly. A piece of ¼" sheet balsa is cemented on the bottom of the fuselage, between Former #8 and #4. Let dry several hours before sanding the cowl to a smooth contour.

The removable top Cowl-hatch is carved and hollowed from a medium balsa block. Cut a hole in the top of the hatch for the glow plug to extend through, as well as the two holes for fuel tank extension tubes (fuel line) which are cemented to the firewall with a piece of silk over them. You will also have to fashion a needle valve extension from 1/32" wire, which is soldered to the needle valve and extended through a slit cut through the cowl-hatch. The removable hatch is held in place by a rubber band, looped inside the cowl, over two pins in the back of cowl former #3, located on each side of the motor. This rubber band loops around the front of the engine cylinder, and can be easily hooked over the pin glued inside the front of the hatch. A pair of tweezers should be carried in your tool box to assist with this operation. A couple of alignment pins can be extended though the firewall to hold the cowl-hatch in its proper position. Don't forget to give the inside of the cowl six or seven full strength coats of butyrate dope, for hot fuel proofing and fire resistence (the exhaust is expelled inside the cowl). An oil drain hole (approximately ¼") is also a necessity, located through the bottom of cowl Former #4.

Bend the landing gear from 1/16" music wire and install the wheels, soldering washers on each side of them. If you plan to install wheel pants and struts, it will be easier to do so (including the finishing) before mounting the gear in the plane. The thickness for the center core of the pants will be determined by the width of the wheels you use, naturally. A medium balsa center core was laminated to a thickness of ⅝" on the original, since the wheels used were ½" thick; this allowed 1/16" clearance on each side of the wheels, inside the pants. The sides of the pants were ⅛" soft balsa. After carving and sanding the pants to shape they are notched to slide over the axles. The notches are then filled in with balsa scraps and Aerogloss plastic balsa after the pants have been secured and aligned properly. Secure each wheel pant with a bracket shaped from 1/32" wire, which is bound and soldered to the landing gear. These wire brackets are bent to follow the curvature of the pants, to a point behind the wheel wells, where they are bent at an angle and forced into the wood. The upper ends of these same brackets are bent back 90 degrees and stuck into the 3/32" balsa strut fairings. The strut fairings are later sanded to streamlined sections. The lower end of the fairings are well cemented to the pants. Fillets are then formed from plastic balsa, and sanded per the front view. The fairings are covered with silk, which is wrapped around the main landing gear wire. This will keep them from cracking loose. Do not cement the top of the strut fairings to the fuselage bottom; they should be cut away at a slight angle, per the plans, to allow back flexing of the landing gear. You will find it much easier to completely finish the fuselage, including color doping, before cementing the landing gear into its slot.

The original wing was built in one piece, then the leading edge and tips were carved and block sanded to the proper shape, before the center section was cut for the dihedral angles. The two W1 ribs were left out until after the dihedral was cemented in. The ¼" x 5/16" *hard* balsa leading edge is blocked up 1/16" above the plan during construction. You may find it easier to carve and sand the leading edge to shape before building the wing, but it can be done afterwards if care is taken not to damage the contour of the ribs. The trailing edge is a standard size that can probably be purchased from your local hobby shop already shaped. It is lightweight medium balsa, 3/16" by ¾". A plywood rib pattern should be used for shaping the ten W2 ribs. The two W1 ribs, as well as the two W3 ribs, should be pinned together and sanded at the same time to insure sameness.

The wing uses the Clark Y airfoil. The wing construction should dry overnight on the plans before being sanded. Lay the wing on the plan again, and carefully mark the dihedral cuts with a 90-degree angle. Cut and pre-cement the L.E. and T.E. joints before proping each tip up 1¼" for permanent joining. Cut the dihedral joiners from 1/32" plywood and glue in place; you can now cement the two W1 center ribs in place. After the dihedral joints have dried several hours, lift the wing from the workbench and cover the top and bottom of the center section with 1/32" sheet balsa (grain runs spanwise).

Cut the rudder and stabilizer from soft sheet balsa. Round the edges with fine sandpaper; feather thin trailing edges are not recommended, as warps might appear after doping. Sand the fuselage with fine finishing sandpaper before cementing the

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stabilizer in its slot, and the rudder in place. Don't forget the rudder offset, as described in the flight and adjustment section of this article. Apply several coats of cement at the rudder to fuselage junction joint, and sight from the front and rear (with the wing rubber banded in position) to check alignment as the cement dries.

The outline of the wing, and the center section sheeting, should be given a coat or two of thin clear dope, then lightly sanded again in preparation for covering. Cover with light weight Silkspan (the color of your choice) applied wet with a separate piece for each of the four panels. The center section is covered with two more separate pieces. The wing should be given five or six coats of thinned clear dope. Color trim along the leading edge, and at the center section will not add too much weight, but it would be best to refrain from using pigment dope on the entire wing. After the doped wing has cured, you will probably notice that the tips have developed a slight *washed out* warp, which *is good*, and will contribute added flight stability if the angle is equal in each tip. My model developed 3/16" washout (T.E. higher) at ribs #W3 location.

Apply a couple of coats of thinned talcum powder and clear dope mixture sanding sealer to the fuselage and tail. After thoroughly dry, sand with finishing sandpaper. Two or three thin coats of color dope should be sufficient to cover the wood surfaces. Allow several hours drying time, then mask, apply a thin coat of clear dope around the edges of the tape to seal, and then dope the trim design. Cement the windshield in place. The pattern is oversize at the top, for fitting, and the surplus can be trimmed from around the top of the cabin after the cement has dried. Apply clear butyrate dope over the windshield cement seam, for hot-fuel resistance. I used Wonder-Cal decals for my AMA number on the wings; hot fuel does not effect them.
