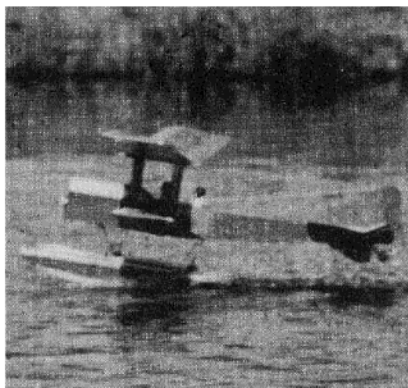




HOPPER



If you have a pond nearby or just like biplanes, the Hopper is for you. A simple to build .15-.25 size biplane for wheels or floats. You can also use the floats as skis if you're in snow country.



I must be honest --- this is my first float airplane so I researched many float designs and then built a set that did not work. I miscalculated the size and, although the floats would support the airplane, there wasn't enough of the floats left above water and I had a two winged submarine when I applied power. I modified the floats by increasing the thickness and changing the front shape until the Hopper would easily take-off from the narrow, and often too short, local pond.

The biggest improvement in take-off performance came when I changed from an 8/5 to an 8/6 prop and the take-off distance was cut in half from the resultant gain of a couple of miles per hour. The steerable water rudder and sub fin that is removable came from an earlier RCM article.

Rather than following the usual construction sequence, I will discuss various aspects of the construction not readily visible. The fuselage is simply a box with a "Coke can" cowl on top. The cowl is open all the way back to the 1 1/2" Williams Bros. pilots for the engine cowling. Although not shown, glue a small piece of plywood on the inside of the engine compartment for the cowl mount sheet metal screws. After running the screws in once, put a drop of Hot Stuff into the holes



to harden and seal the wood. Note that the plywood fuselage doublers are 3/32" narrower than the fuselage sides to allow the top to fit inside but not have to be notched around the doublers. It is easier to cover the fuselage and tail parts before assembly. Just cut away any covering where there will be a glue joint. Cover the cockpit area with black MonoKote trim and then epoxy in the cabane struts. Seal the edges of any trim colors or stripes with Hot Stuff to prevent them from loosening with time and oil.

Cutting the aluminum cowl was a little trickier than I expected as the can is much thicker at the bottom. First cut the can in half lengthwise using a razor saw. To cut out the bottom of the can, leaving the rolled edge, I first scribed the cut with an X-Acto knife and then made several cuts with tin snips to the scribe, like cutting a pie. You can then bend and break out the wedges. The complete cowl is two pieces, a front and rear section. The front section of the cowl fits over the front of the rear cowl section. Use the rolled edge of the can for the front end of each cowl section.

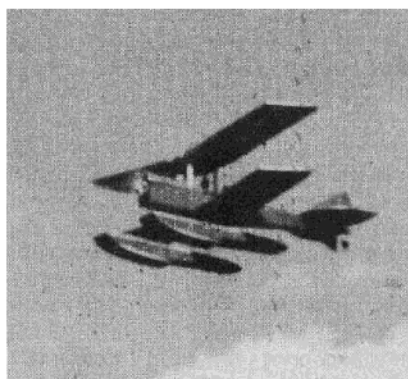
The wings use basic construction methods except for the joining of the panels. One panel is built complete with the plywood wing joiner epoxied in place and all of the top sheeting added. The other

The Hopper is an easy to build sport biplane with outstanding performance for two or three channel radios and a .19 for power. It can be flown with floats from ponds or snow and the floats can be exchanged for wheels in just minutes.

While going through my old magazines looking for some inspiration for a new knock-about airplane, I found a picture of a 1916 Boeing biplane on floats and that started the wheels turning. I really did not want to build a scale model as I needed something that would build fast, yet, I wanted something with character. It was then I realized that the top of the cowl of the Boeing biplane could be made from an aluminum beverage can — instant character.

The final design isn't the Boeing, but it could be. It could also be any one of a dozen other designs by changing the shape of the tail or wing tips or adding a turtledeck on the fuselage. The important criteria would be to keep the same dihedral and rudder height and approximate stab area. I chose to keep things simple and light and, as a result, the finished weight with floats is only 2 3/4 pounds.

I was concerned about the rudder and fin area with the floats and was quite nervous when I launched it for the first time, but I needn't have worried, everything was perfect. The model flies great, the rudder response is good with power on or off. The Hopper will do a nice slow rudder roll with either the floats or wheels. In fact, I was amazed that there was very little difference in performance with the floats on. The .19 has plenty of power, even with a muffler at 6000'



HOPPER

Designed By : Fred Reese

TYPE AIRCRAFT

Sport Biplane (Wheels or Floats)

WINGSPAN

Top 40 Inches

Bottom 34 Inches

WING CHORD

6 1/2 Inches

TOTAL WING AREA

455 Square Inches

WING LOCATION

Biplane

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

Top 2 Inches

Bottom 1-11/16 Inches

O.A. FUSELAGE LENGTH

31 Inches

RADIO COMPARTMENT AREA

(L) 6 1/4" x (W) 2-5/16" x (H) 2 1/4"

STABILIZER SPAN

12 Inches

STABILIZER CHORD (incl. elev.)

7 1/4" Average

STABILIZER AREA

77 1/2 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

4 3/8 Inches

VERTICAL FIN WIDTH (inc. rudder)

4" Average

REC. ENGINE SIZE

.15 To .25 Cu. In.

FUEL TANK SIZE

4 Ounces

LANDING GEAR

Conv. Wheels or Floats

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Rud., Elev., Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa and Ply

Wing Balsa and Ply

Empennage Balsa

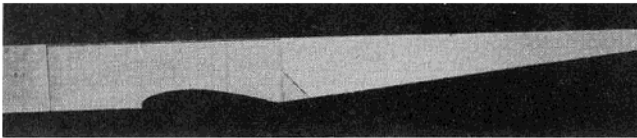
Weight Ready-To-Fly Wheels 39 Ounces

Floats 44 Ounces

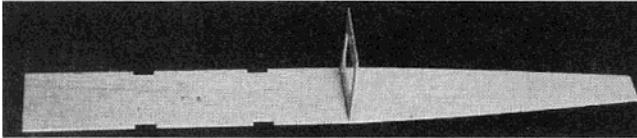
Wing Loading Wheels 12 1/2 Oz./Sq. Ft.

Floats 14 Oz./Sq. Ft.

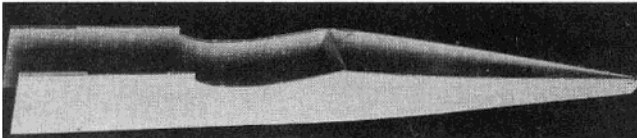
By Fred Reese



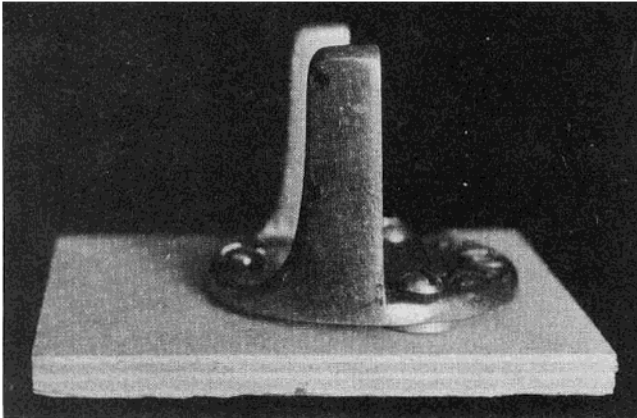
(1) Glue the nose doubler and the plywood side doubler and the rear wing dowel doubler to the fuselage sides. Leave a 3/32" edge above the plywood doubler for the top fuselage sheet, F-3.



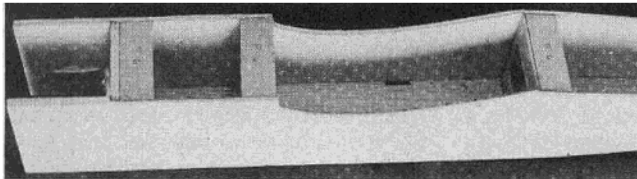
(2) Glue bulkhead F-5 onto the top F-3.



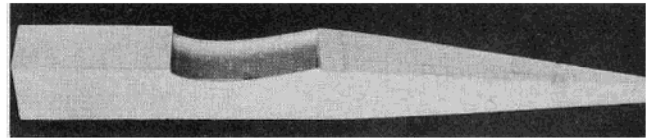
(3) Glue one side, then the other, to the fuselage top and bulkhead. Glue the fuselage together at the tail.



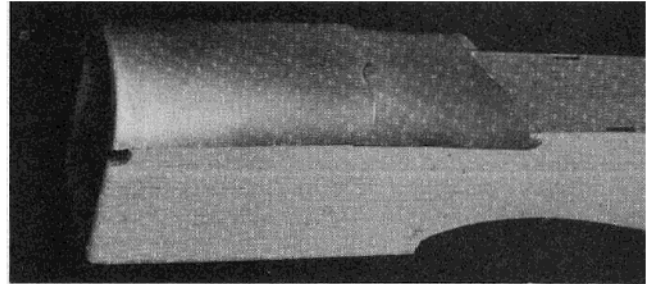
(4) Bolt the engine mount to the firewall and then epoxy the firewall into the fuselage.



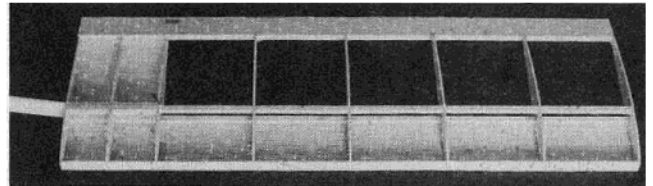
(5) Epoxy the three gear mounts, F-6, into the fuselage.



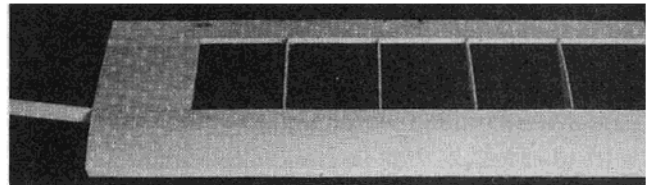
(6) Add the 1/16" plywood front fuselage bottom and the 1/16" balsa rear fuselage bottom and the 1/16" plywood tailwheel mount.



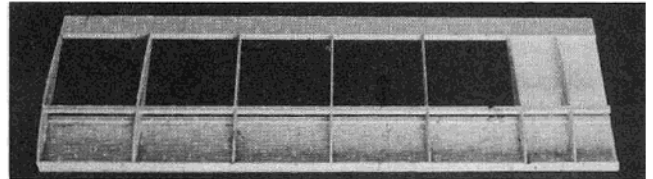
(7) Prepare the "Coke" can engine cowl by scouring the finish from two cans with an abrasive kitchen scouring pad. Each section of the cowl is 1/2 the diameter of the can.



(8) Pin down all of the bottom wing sheeting and the trailing edge. Add the bottom spar and ribs and the 1/16" x 3/8" leading edge. Epoxy the dihedral brace W-3 in place.



(9) Complete the top 1/16" sheeting.



(10) Build the other wing panel except for the top sheeting.

panel is then built complete except for the top sheeting. The two panels are then epoxied together and the top sheeting completed. The bottom wing is the same as the top except that it is one rib shorter on each side.

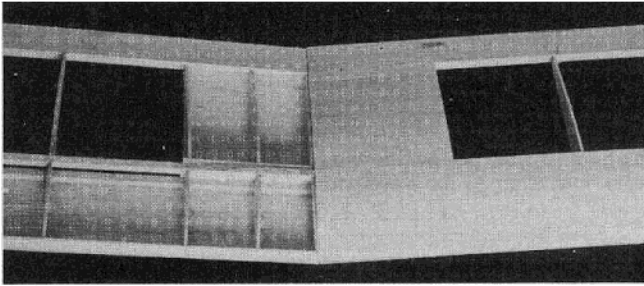
The floats are 1/8" balsa sides with 1/16" or 1/32" plywood top and bottom. The mounts are 1" squares of 1/8" plywood epoxied to the top of the floats after covering with 3/4 oz. glass cloth and resin diluted 50/50 with acetone. Apply a second layer of heavy glass cloth or matt on the step as this is the point of greatest wear. Apply one coat

of primer and one coat of color. I used red Solarfilm on the fuselage and the matching Pactra Formula U red on the floats.

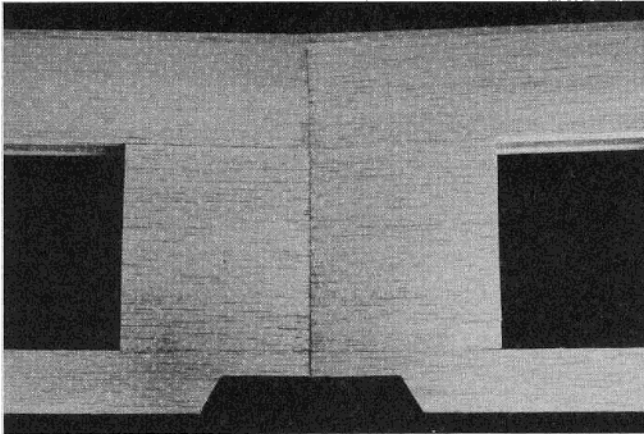
The landing gear was designed for simplicity for the float mounts and will work with wheels if flying from grass or pavement. The landing gear can be made shock absorbing for wheels if you cut the axle in the center and bend a hook on each side from the cut ends then connect the hooks with a small rubber band. I have been flying the Hopper with floats (off of snow) and this works very well. I considered making skis at first but found they were not

necessary. To fly from snow, make a second sub-rudder without the steerable water rudder. Do not try to fly the model with floats without the sub-rudder, as it is necessary for stability.

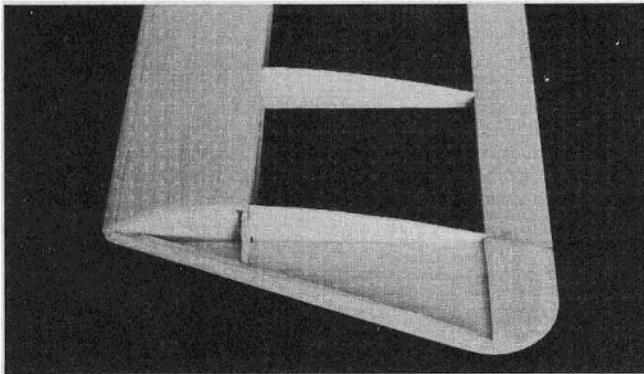
If flying from water it will be necessary to waterproof the radio compartment. To make a seal around the bottom wing, glue a piece of 1/4" square across the bottom of the rear bulkhead and a piece of 1/8" x 1/2" balsa between the forward cabane struts to form a base for a bead of silicone. To prevent the silicone from sticking to the wing, smear a liberal coat of Vaseline over the entire wing



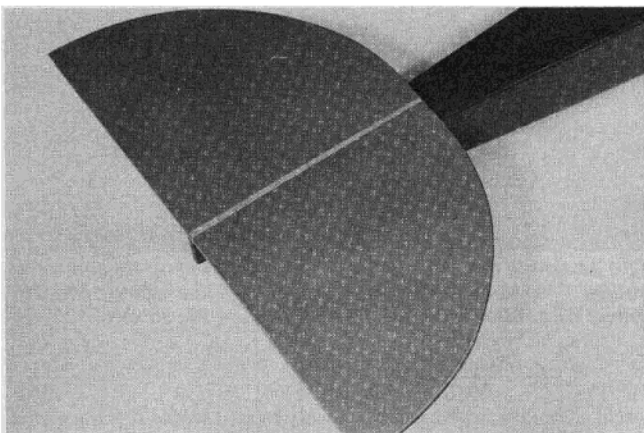
(11) Epoxy the wing panels together.



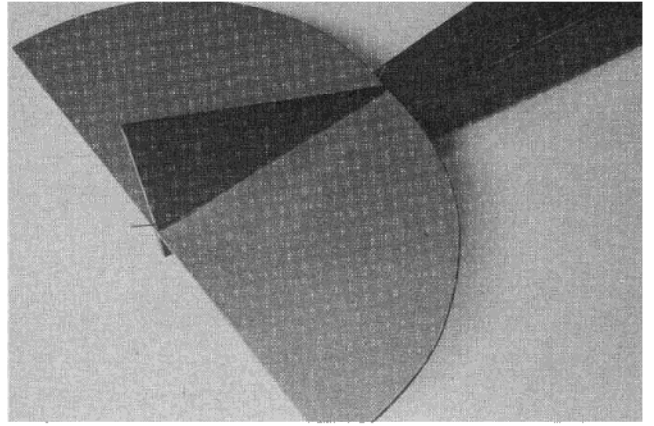
(12) Complete the top sheeting and notch the trailing edge.



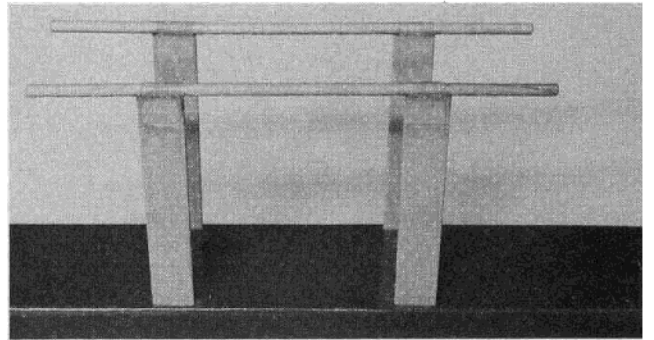
(13) Add the wing tips and 1/4" x 1/2" leading edge.



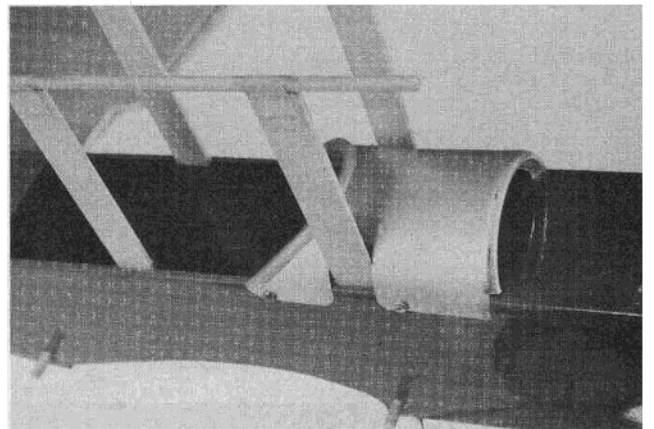
(14) Apply a coat of Balsarite to all surfaces to be covered with iron on film then cover before further assembly. Cut away the covering on the stabilizer for the fin and where the fuselage is to be glued, then epoxy the stabilizer onto the fuselage.



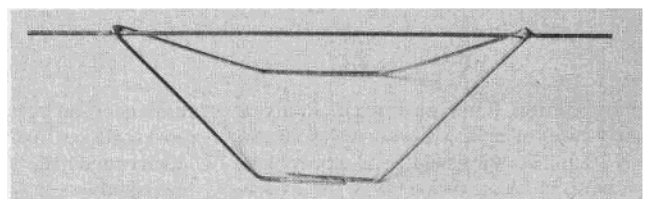
(15) Epoxy the fin in place.



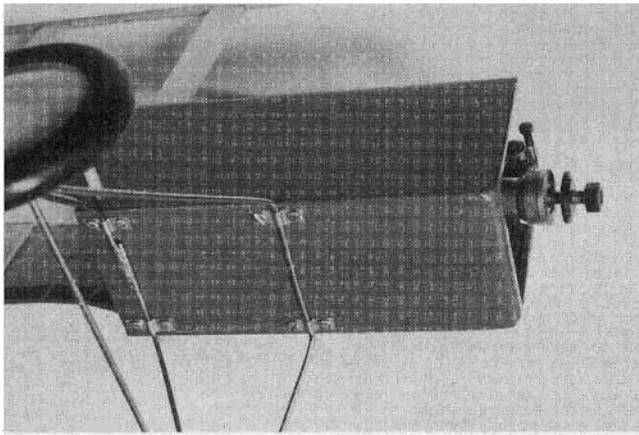
(16) Epoxy the cabane struts into the fuselage, then epoxy the 3/16" dowels onto the tops of the struts using nylon tape to reinforce.



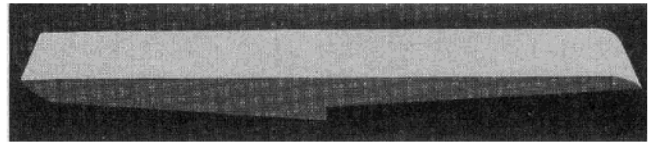
(17) Split fuel tubing is glued over the aluminum edge of the cockpit. Round all sharp edges of aluminum.



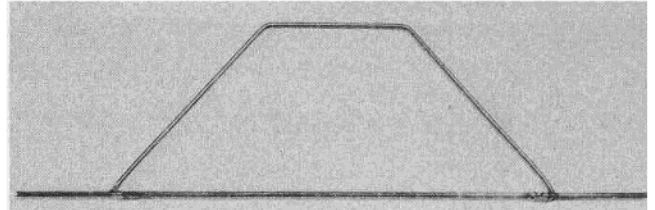
(18) Assemble the 3/32" wire main landing gear, bind the connections with copper wire and solder.



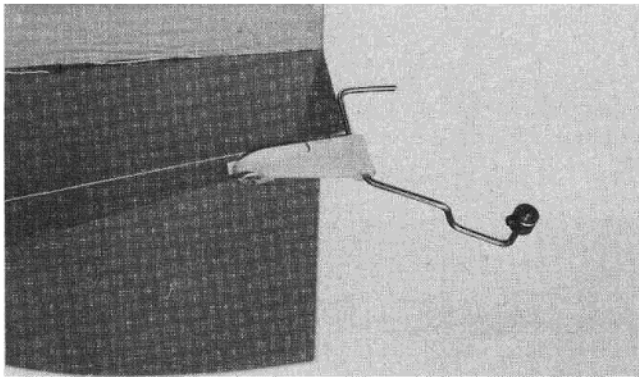
(19) Mount the landing gear with metal clips and #4 x 1/2" SM screws.



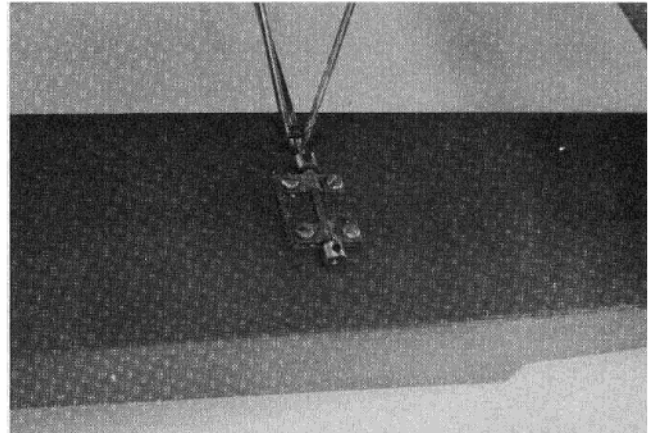
(23) Add the 1/8" sq. behind the center bulkhead and the bottom 1/16" ply. Glue on the nose and tail blocks and shape.



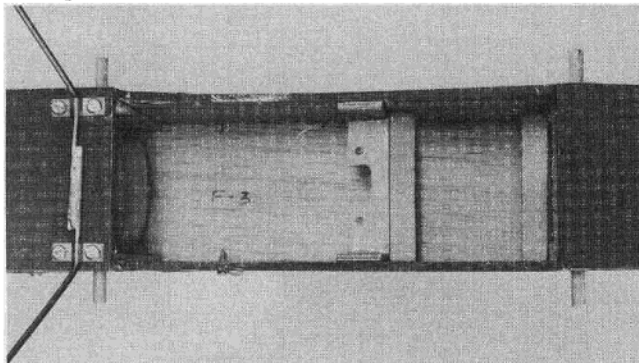
(24) Bend and solder the rear float strut.



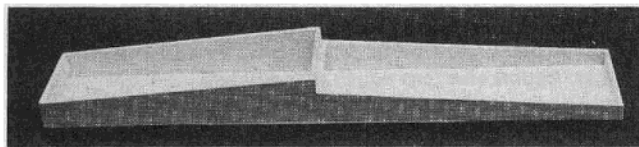
(20) Epoxy the Goldberg tailwheel bracket and wire into the fuselage.



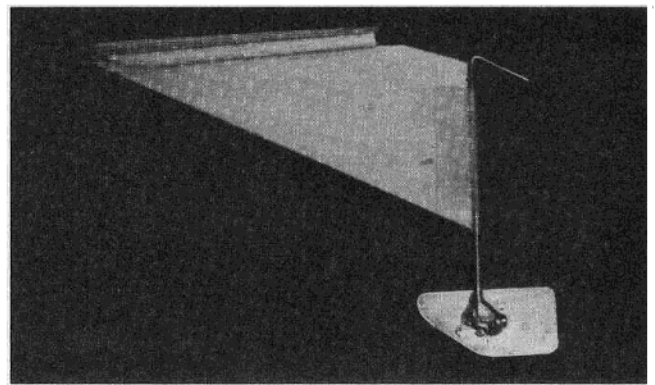
(25) Cover the floats with KB 3/4 oz. glass cloth and finishing resin diluted 50/50 with acetone. Epoxy the 1/8" ply mounts to the floats and paint. Attach the floats with landing gear clips and #4 SM screws and wheel collar retainers.



(21) Epoxy in the servo rails and switch mount.



(22) Glue the three float bulkheads and sides to the 1/16" ply top.



(26) Assemble the 1/16" ply removable rudder sub-fin and water rudder. The steering arm slips into a piece of fuel tubing on the tail wheel wire. Attach the sub-fin with two #4 SM screws.

center section (after covering). Apply a heavy bead of clear silicone sealer all the way around the wing saddle and rubber band the wing in place. Wipe away the excess silicone and allow to set up for at least overnight. In spite of the Vaseline, the silicone will stick some to the wing covering. Use a dull metal spatula or knife and carefully separate the wing from the

fuselage. The resulting seal should keep most water out, but you should also wrap the receiver and battery pack in plastic bags and seal tightly.

The control throws for both the rudder and elevator are 1/2" in either direction. I use an 8/6 prop on the .19 in order to take-off from water. The Hopper would take-off with an 8/5, but the take-off run

would be very long. I would recommend at least a .19 if you will be flying off water but a .15 is adequate if using wheels. Once in the air it takes very little power to keep it up and slow flight is excellent. Landings on either land or water are very easy.

Be it a puddle hopper or a grasshopper, I hope you have as much fun with your Hopper as I have with mine. □