SIKORSKY S-39

Whether you're at the lake or at the field, this great looking, smooth flying amphibian is sure to draw a crowd.

By Bob Rich

I have had a soft spot for the Sikorsky S-39 ever since reading about and seeing the pictures of Osa and Martin Johnsons' ''Spirit of Africa.'' Their S-39 was flown all over Africa and Burma in the middle thirties and their adventures made very exciting reading.

The S-39 was developed from the larger twin engine S-38 to land at smaller fields with lower operating costs which was important during the great depression. The first production model was made in April 1930 with a price of $21,500.00. Of the twenty S-39 production models that were made there were three in existence at last report. Several were lost during sea rescues in World War II as was the Johnson's

I decided against a copy of the Johnsons' plane after looking at all of the giraffe spots; that's a little more work than I wanted to put into it. I'm a firm believer in the KISS philosophy. The Varney Air Ferry color

Photo by Ron Morris

scheme was an attractive blue and white and a whole lot easier.

The NC-55V was sold to Varney Speed Lines Inc., San Francisco Bay Airport in 1932. It was used as an air taxi under the Varney Air Ferry name until it was sold in 1934. Varney Air Ferries flew several of the S-39s around San Francisco Bay and Chicago's Lake Michigan ferrying passengers.

The drawings I used are from the June 1988 issue of Fine Scale Modeler. I later learned these drawings have some discrepancies. Since this is a ''stand way way off'' scale model, it didn't matter to me and the essence of the S-39 is still there.

The plane takes a four channel radio with five servos. I have used K&B .61s in both of mine — maybe a little overpowered but it gets off the water very well.

It certainly doesn't hurt to have a vehicle that can transport the plane assembled. It could take more than thirty minutes to assemble at the field or lake, that is time I would rather spend flying. It's a good thing my friend Ron has a van.

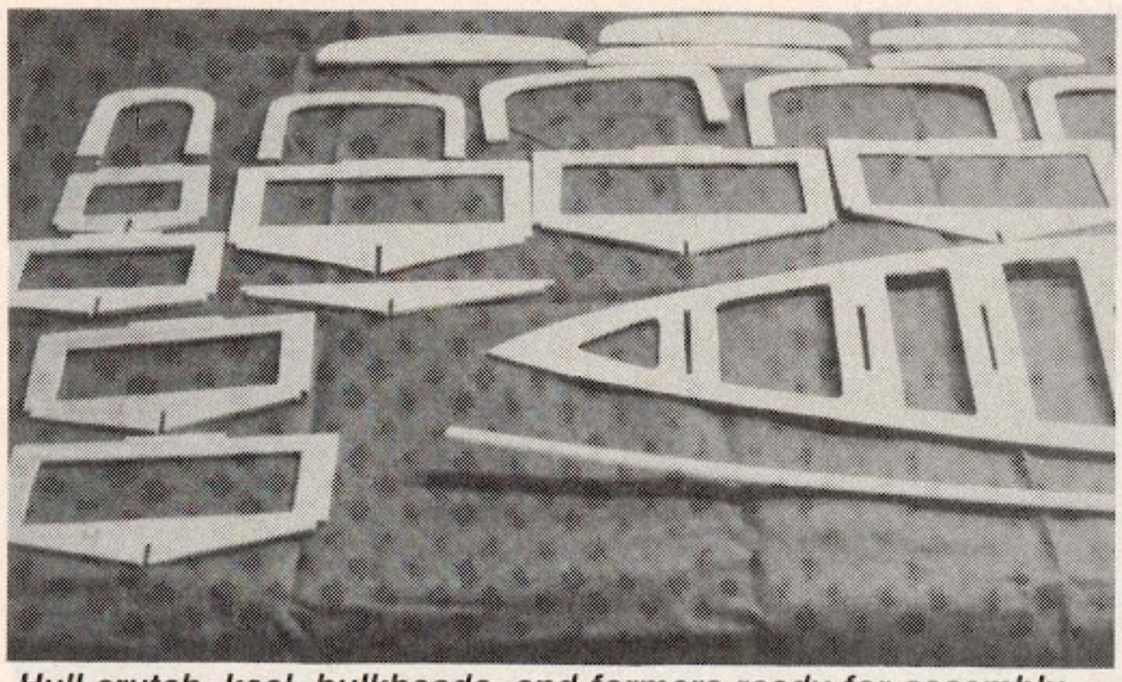
Since I had a Goldberg Anniversary Cub wing kit available and it's a very good wing design, I decided to scale the rest of the plane to match. This gives the plane a span of 76½'' and an overall length of 49''.

The S-39 is a relatively easy airplane to build, everything is very straightforward and no super building skills are required. Although it flies as easily as a trainer with no bad habits, I would highly recommend a person have some scratch-building experience before tackling the construction.

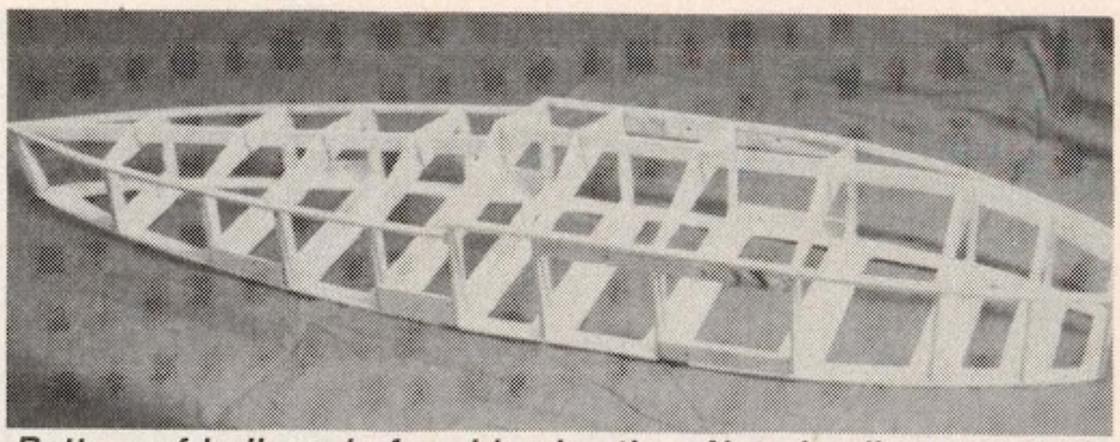
Since this is not a beginner's project we won't go into complete step by step instructions. Just the more important steps will be covered in enough detail to make it easier and hopefully avoid mistakes. Before starting construction I highly recommend you read the instructions, study the plans, and look at the construction photos until

SIKORSKY S-39

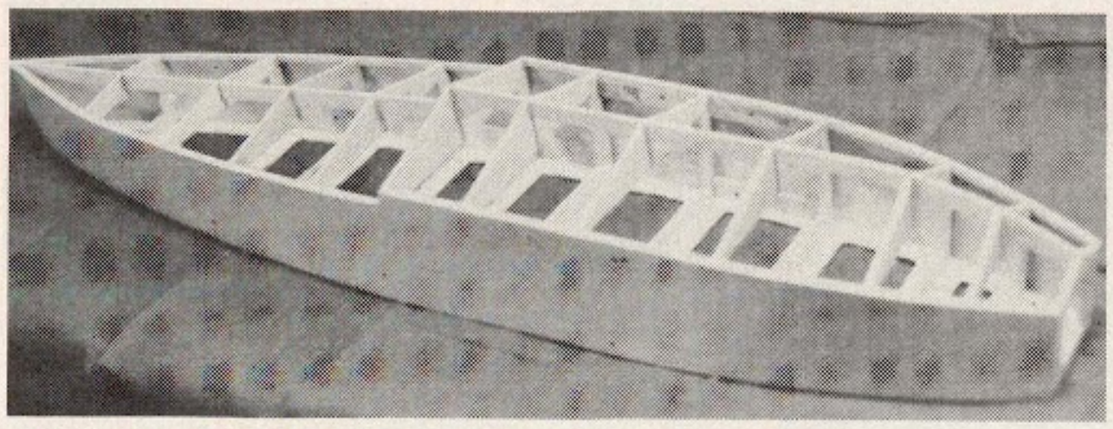
Designed By:
Bob Rich
TYPE AIRCRAFT
Sport Scale Amphibian
WINGSPAN
76½ Inches
WING CHORD
10¾ Inches
TOTAL WING AREA
806 Sq. In.
WING LOCATION
Parasol
AIRFOIL
Clark Y
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1 Inch
OVERALL FUSELAGE LENGTH
49 Inches
RADIO COMPARTMENT SIZE
Adequate (in wing)
STABILIZER SPAN
24¾ Inches
STABILIZER CHORD (incl. elev)
5-3/16 Inches
STABILIZER AREA
124 Sq. In. (Approx.)
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Top of Booms
VERTICAL FIN HEIGHT
12¾ Inches
VERTICAL FIN WIDTH (incl. rud.)
6½ Inches (Avg.)
REC. ENGINE RANGE
.45-.60 2-stroke
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Conventional (up or down)
REC. NO. OF CHANNELS
4 (5 servos)
CONTROL FUNCTIONS
Rudder, Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Lite Ply, & Ply
Wing ..... Balsa, Spruce & Ply
Empennage ..... Balsa
Wt. Ready To Fly ... 120 Oz. (7 Lbs. 8 Ozs.)
Wing Loading ..... 21.4 Oz./Sq. Ft.



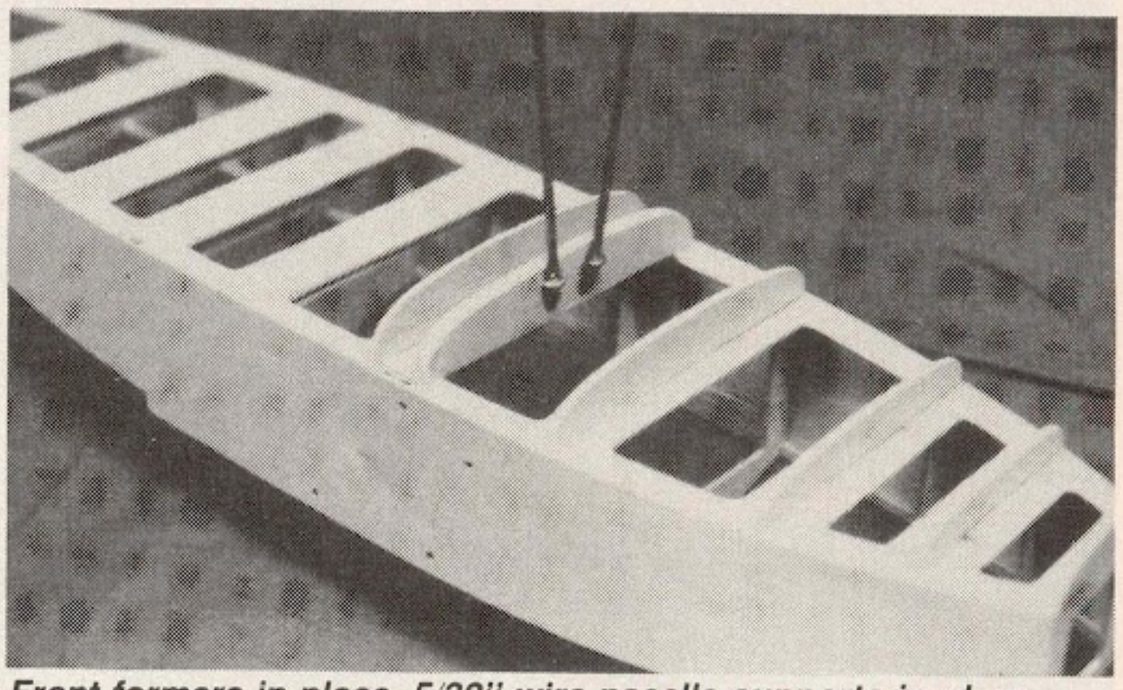
Hull crutch, keel, bulkheads, and formers ready for assembly.



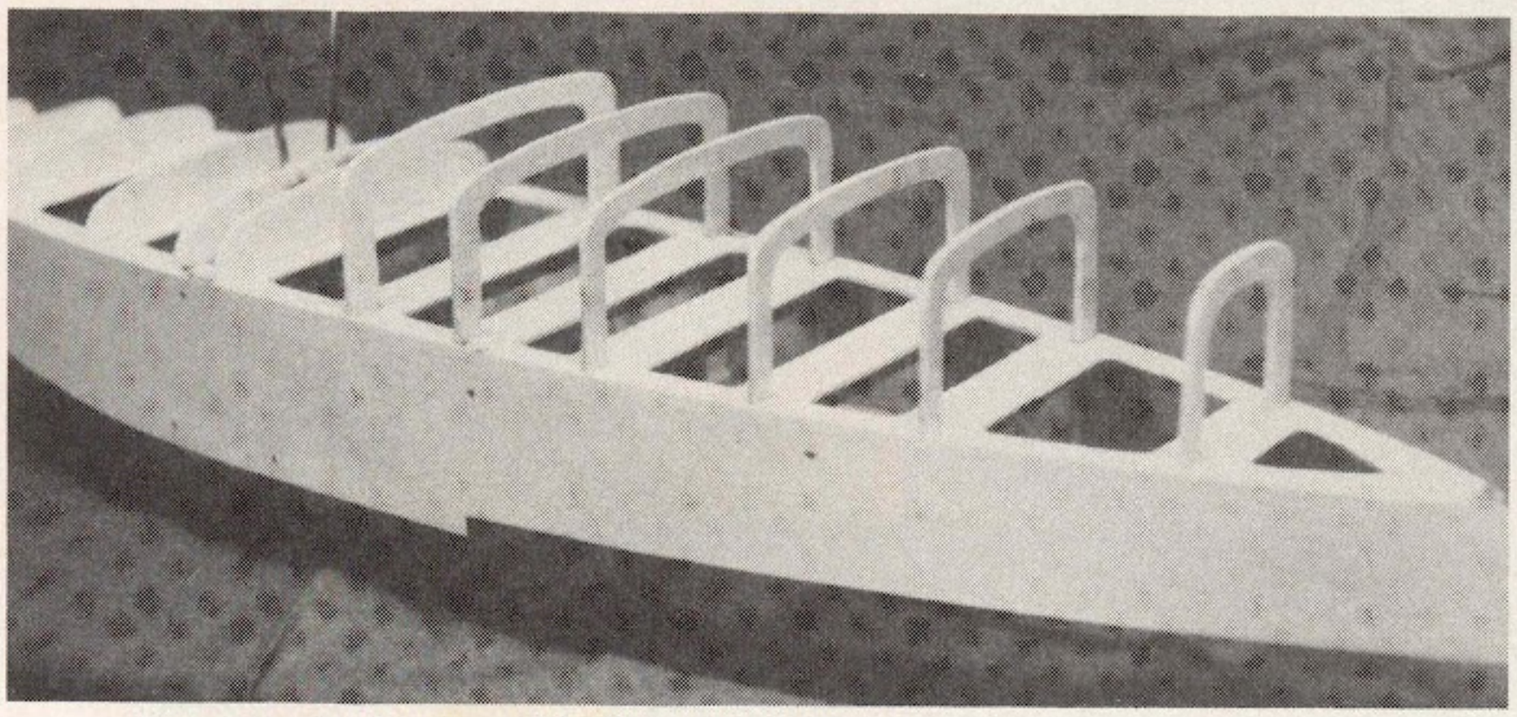
Bottom of hull ready for side sheeting. Note landing gear and strut mounting plates in place.



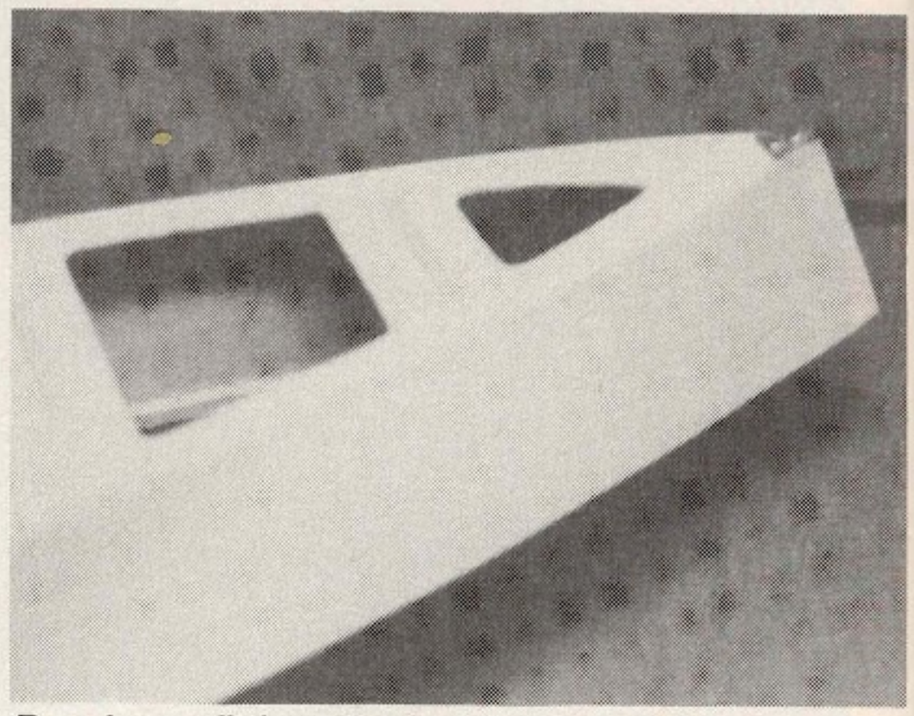
1/32" ply sheeting glued to hull sides. Note holes for mounting blind nuts.



Front formers in place, 5/32" wire nacelle supports in place.



Formers glued to top of hull perpendicular to crutch.



Rear boom fitting attached to ply crutch.

everything is clearly understood.

Like most scratch-builders, I like to cut out all of the pieces first when possible. As some parts have to be cut to fit this isn't always feasible, but at least the major parts will be ready when needed.

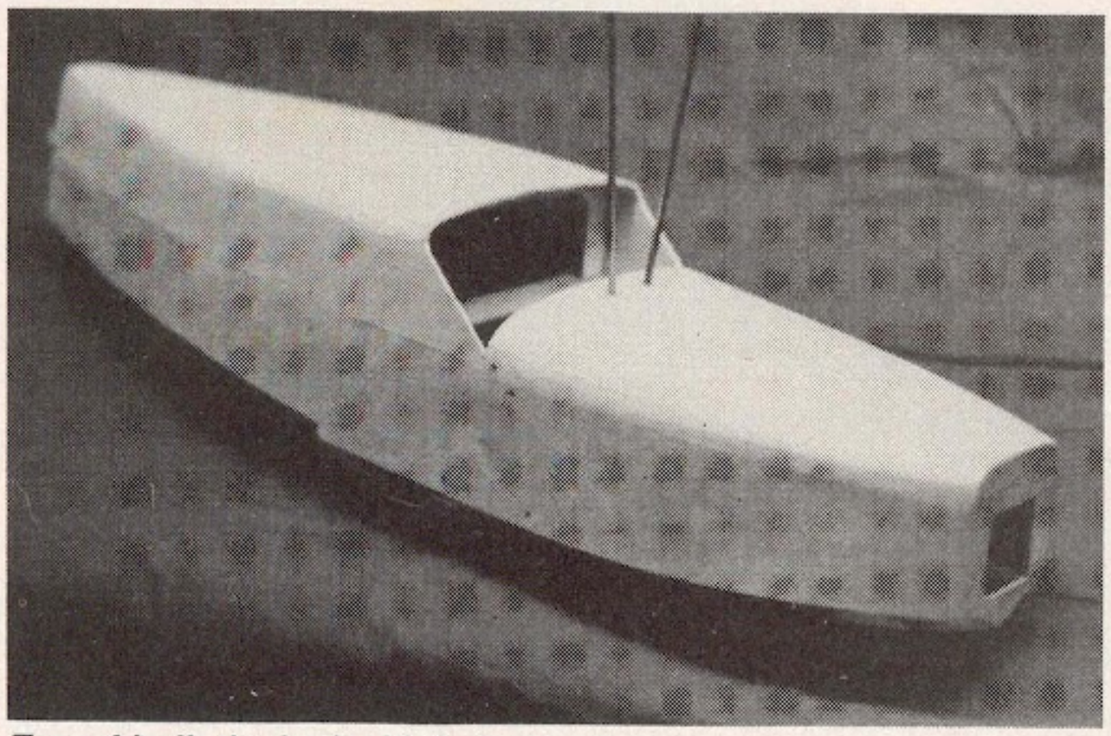
CONSTRUCTION

Tail:

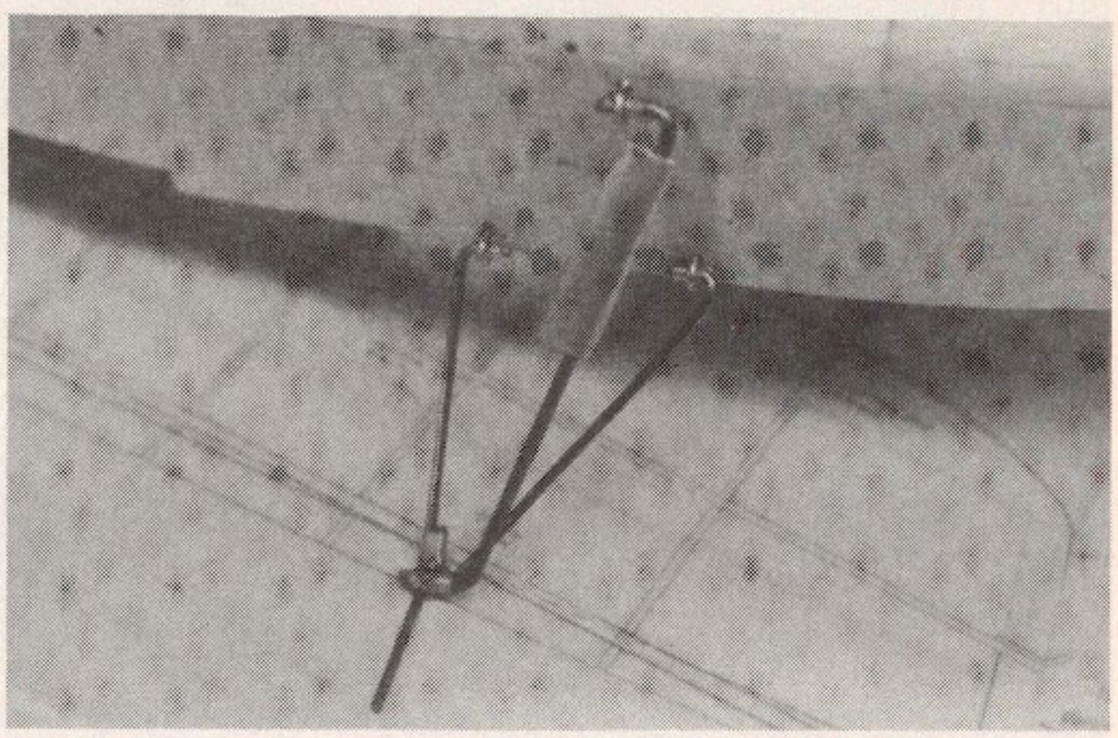
Construct the tail pieces over the plan using the materials called out. Sand to shape and glue the fin to the stab. Since it is very important that all controls move very freely, I used Klett pin hinges on all movable surfaces.

Hull/Fuselage:

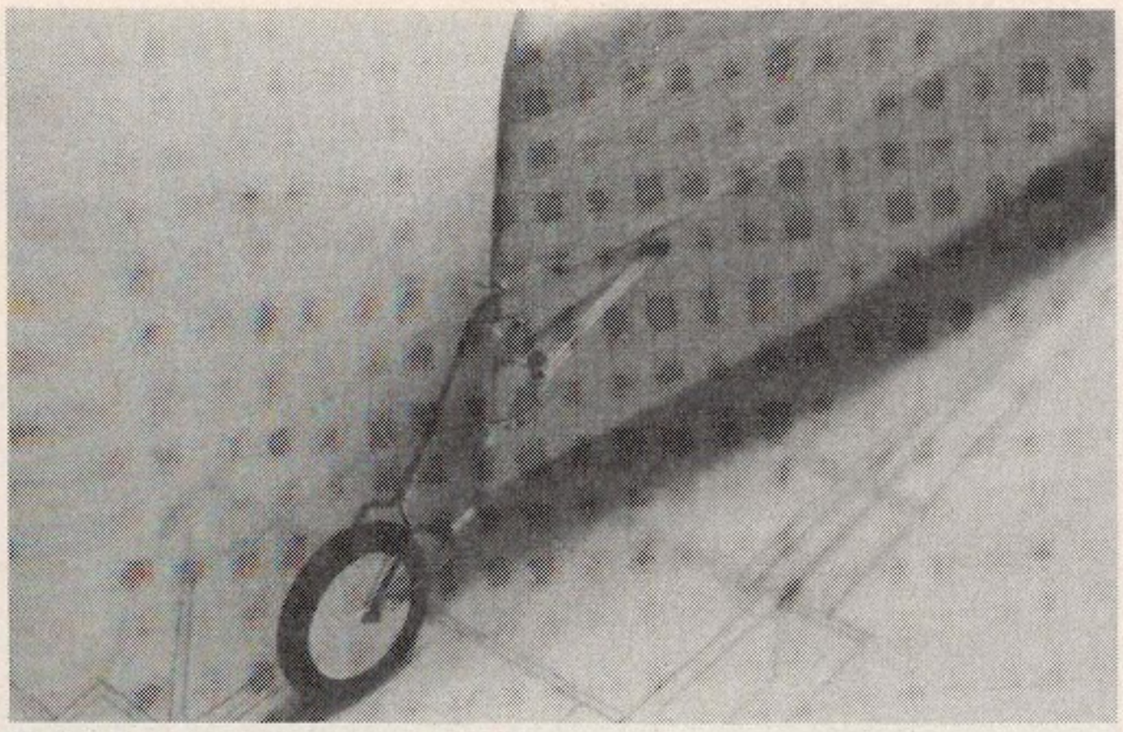
It is important that the instructions be followed in order, especially when constructing the hull. If some things are not



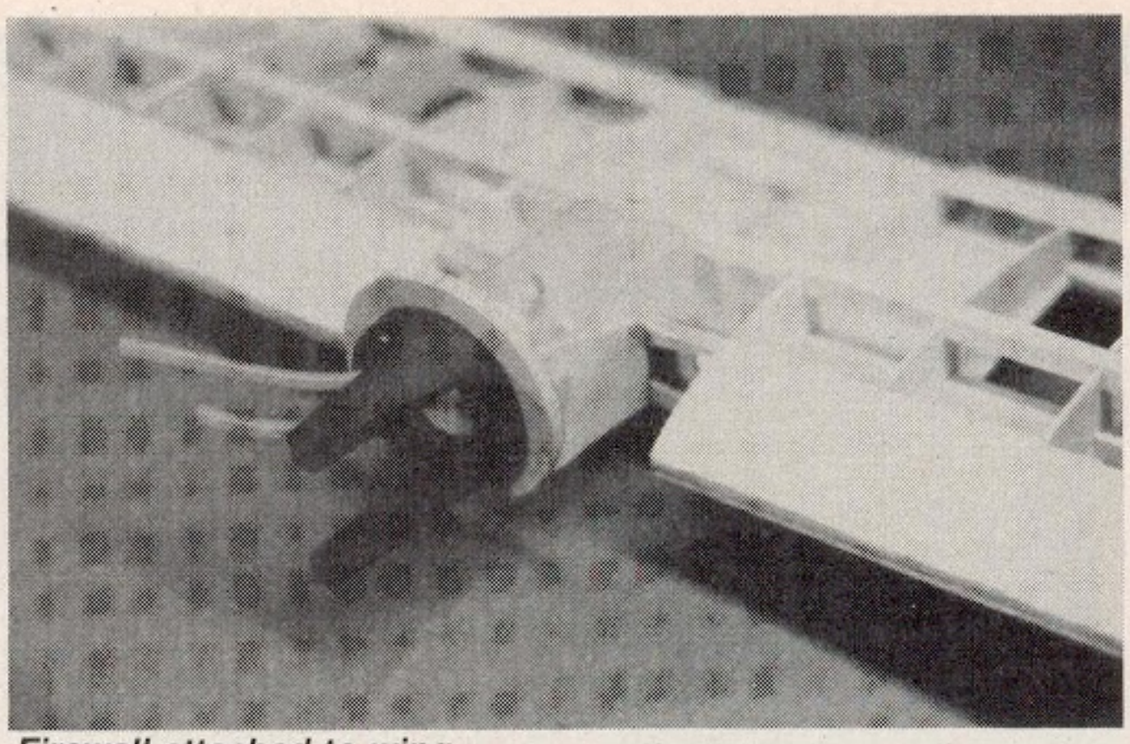
Top of hull planked with balsa.



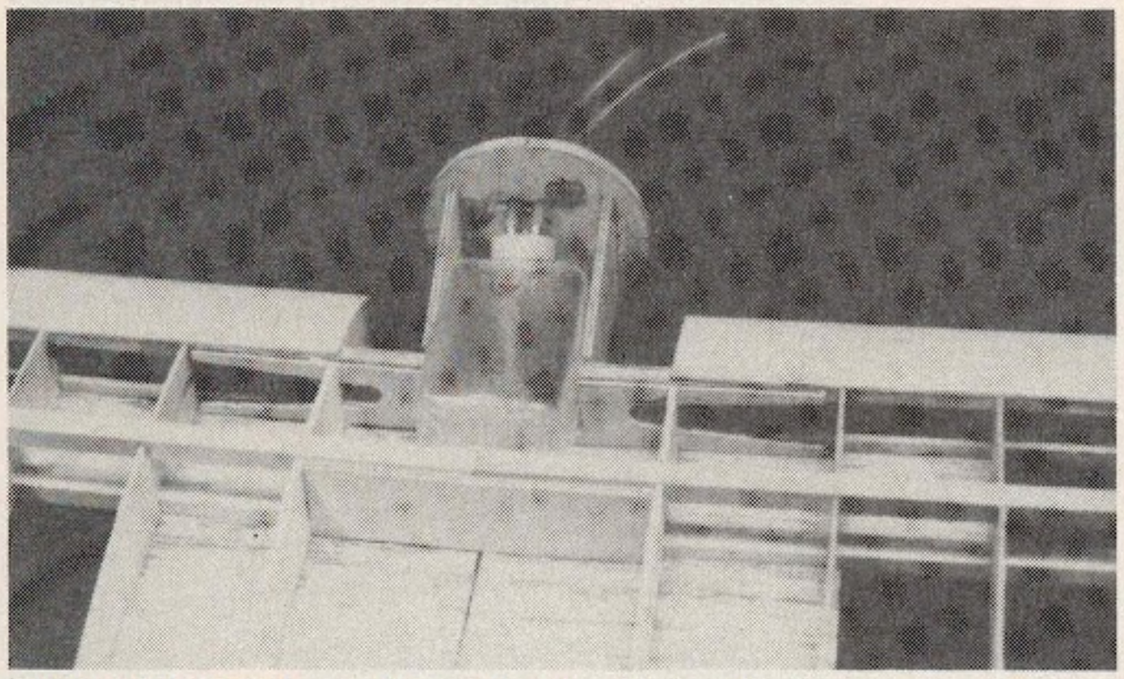
Landing gear struts mounted. Land flying strut in place.



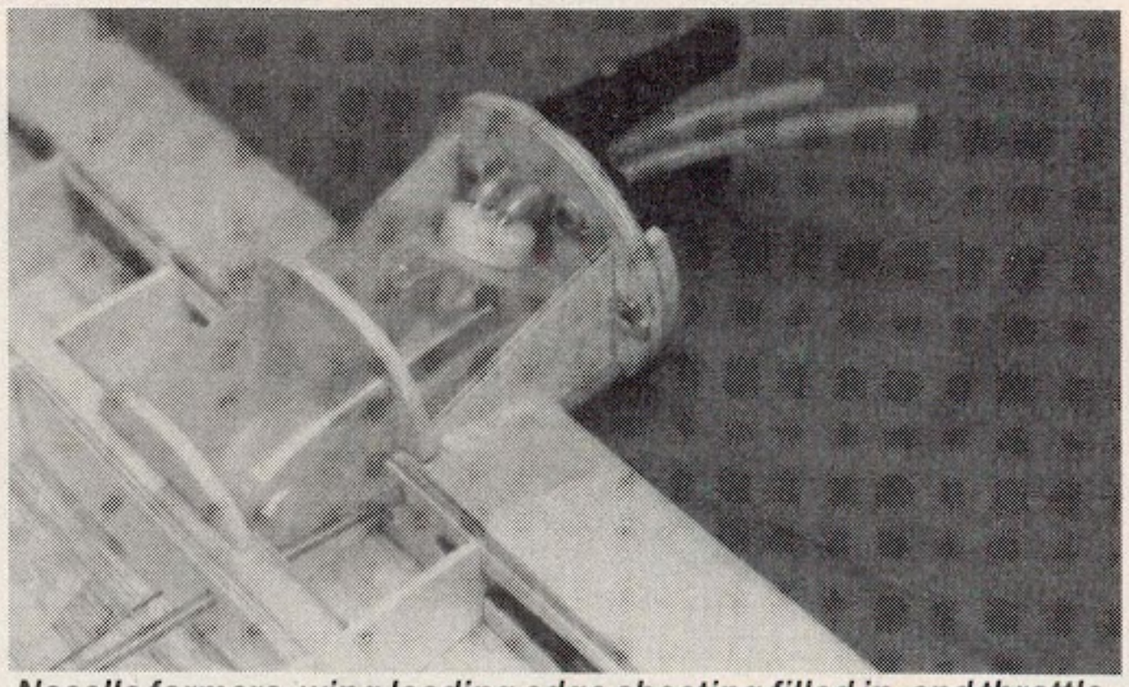
Tail wheel/water rudder detail.



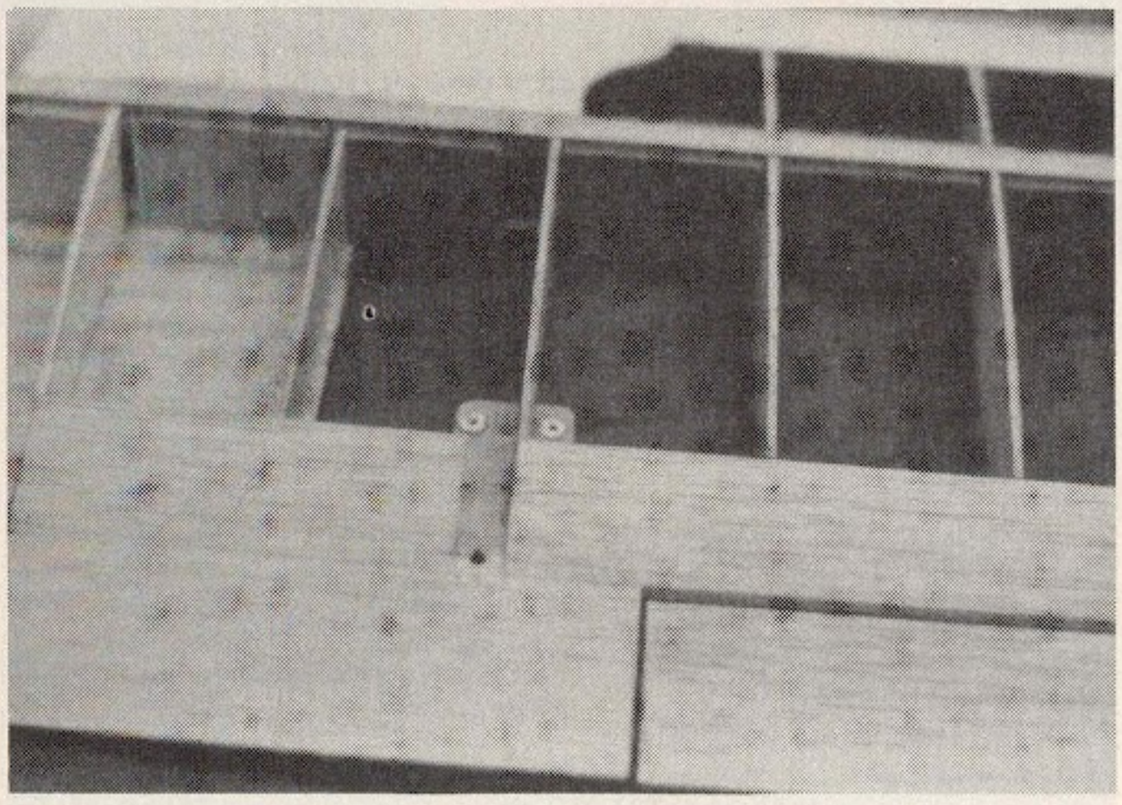
Firewall attached to wing.



Tank installed in engine nacelle. Note blind nuts for engine mount.



Nacelle formers, wing leading edge sheeting filled in, and throttle cable installed.



Wing center sheeting cut away for boom mounting.

Left boom details before cut out for elevator control.

done in the proper sequence it may not be easy to complete the following steps.

Cut the crutch, keel, and lower bulkheads 1, 5, 5-T, 7, and 7-A from 1/8'' lite ply. Former 4-A is cut from 1/4'' aircraft plywood. All other bulkheads and formers are 1/8'' balsa. Make two each upper formers 3-T and 4-T; these make the removable hatch.

Glue 7-A to 7 as shown on the plans.

With the crutch upside down (I haven't yet figured out which side is up) place lower bulkheads in their proper positions and check for fit. When everything fits and looks right, glue them making sure they are vertical.

Fit the keel (90 degrees to table top) and glue in place. Glue the 1/2'' x 3/8'' plywood lower sternpost in position. (Note: Sternpost is made up of three pieces.) Shape the sternpost to match the hull lines.

Glue the 3/16'' square balsa chines into the lower hull notches, as shown on the plans, and taper at stern to fit end of keel.

Now shim entire hull assembly 1/2'' above table (be sure it is well supported).

Install the four 1/8'' aircraft plywood lower float mounting plates and the four 3/16'' A/C ply landing gear mounts. Drill 1/8'' holes where indicated and install 2-56 blind nuts in the float mounts and wing strut holes.

Sheet the sides of the hull with 1/32'' plywood. Be sure the top of the plywood has a straight edge; it corrects any misalignment of the hull and straightens any slight warps in the lite ply.

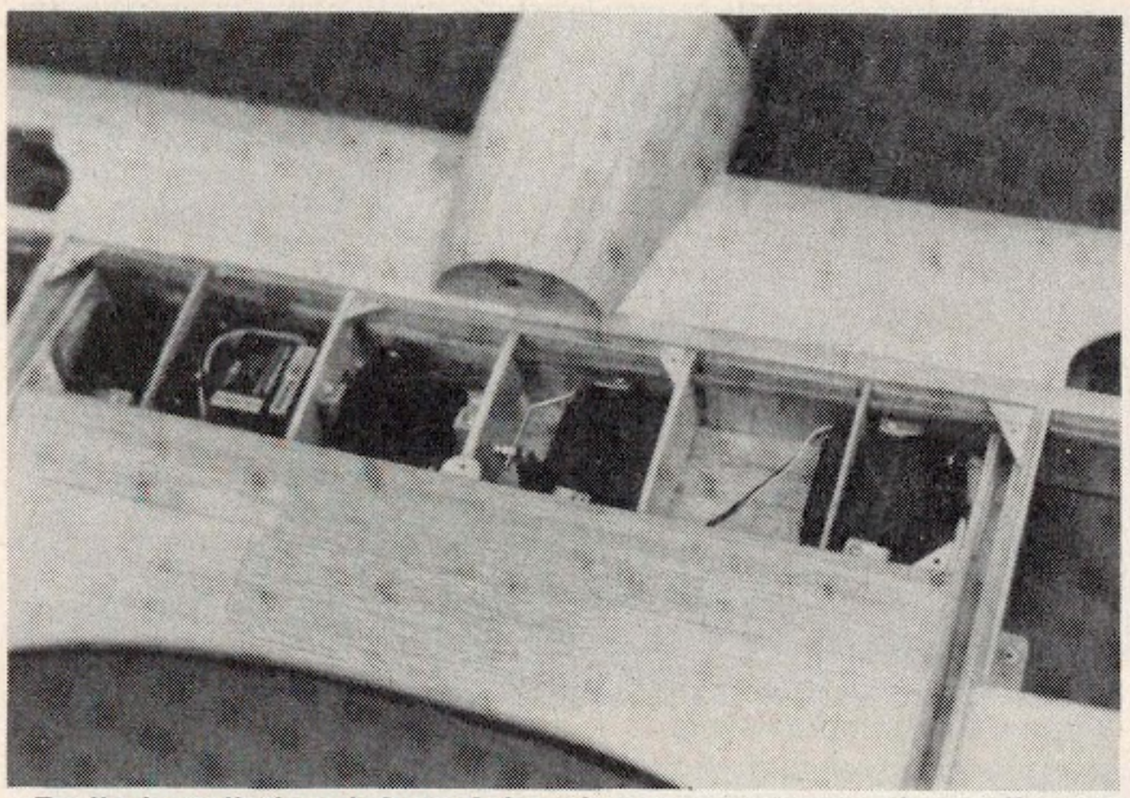
Drill holes in the ply sides to match the holes in the mounting plates. (Drill from inside if you have the proper tools.)

With the hull right side up, install the brass tail boom support at the rear of the hull.

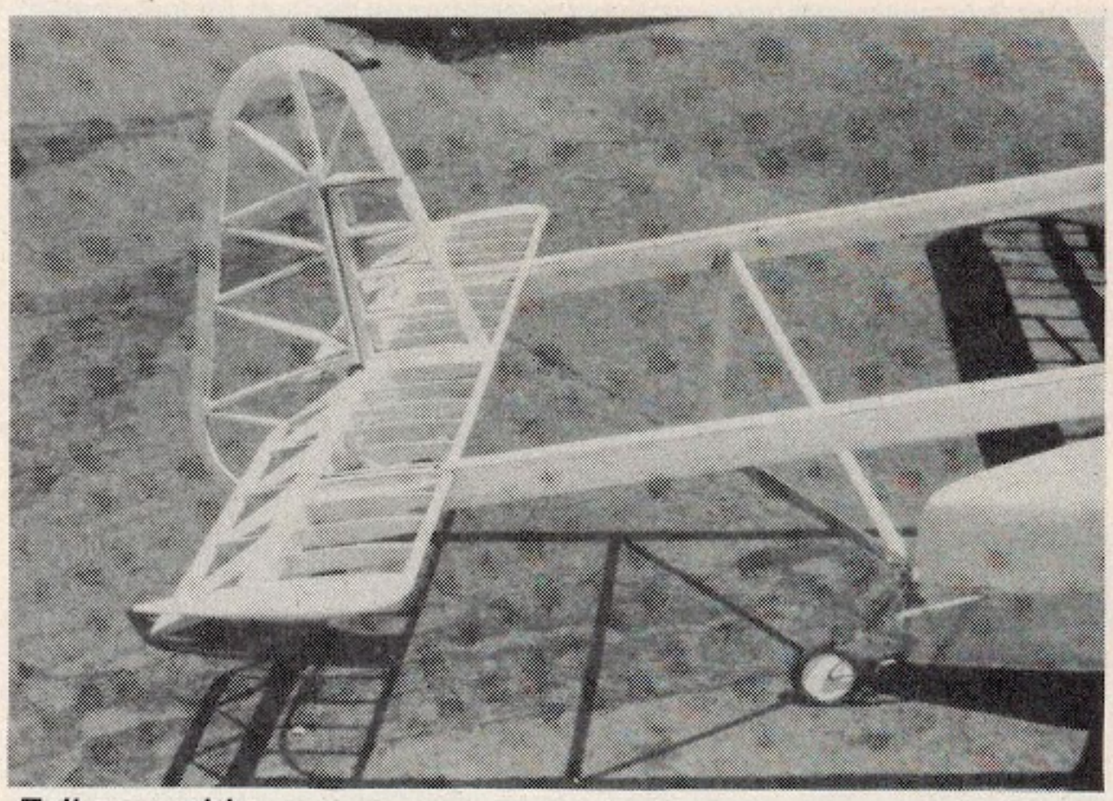
Bend 1/8'' steel wire main gear supports as per pattern. Bend the 5/32'' wires to shape, two for land use and two for flying off water.

Spread four ''J'' bolts to fit the 5/32'' OD brass tubing and two ''J'' bolts to fit the 3/16'' OD brass tubing. See detail on plans.

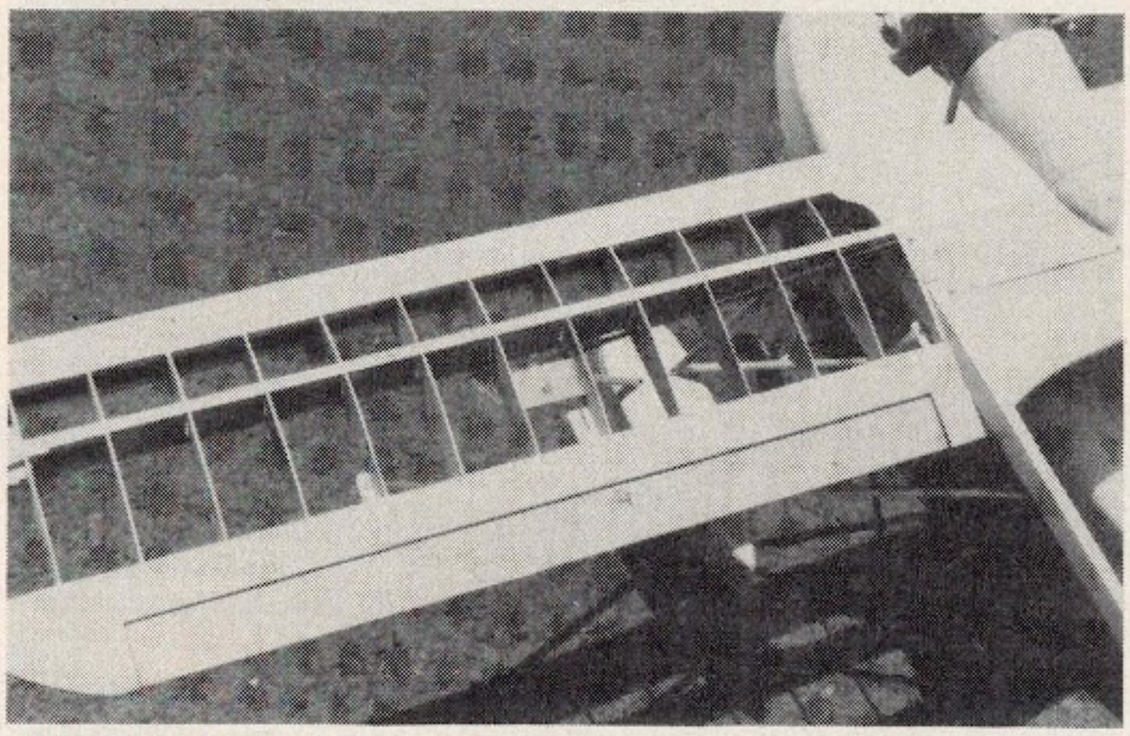
Solder the brass tubing pieces to the ''J''



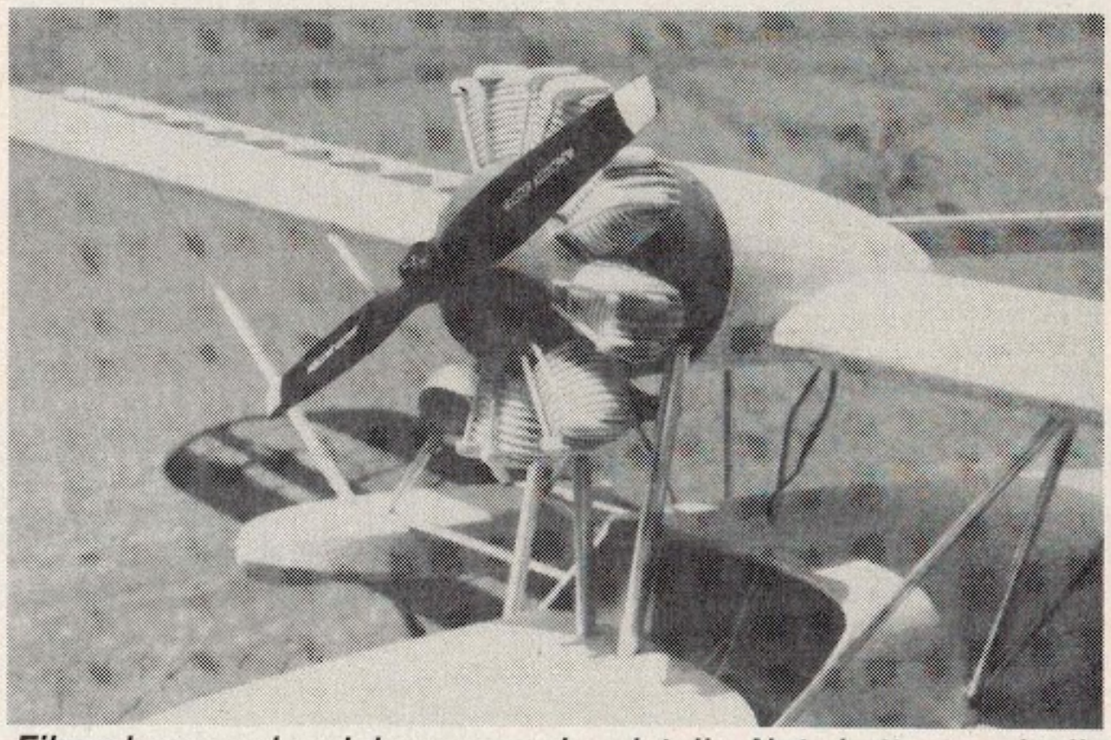
Radio installation, left to right: elevator servo, receiver, aileron servo, throttle, and rudder.



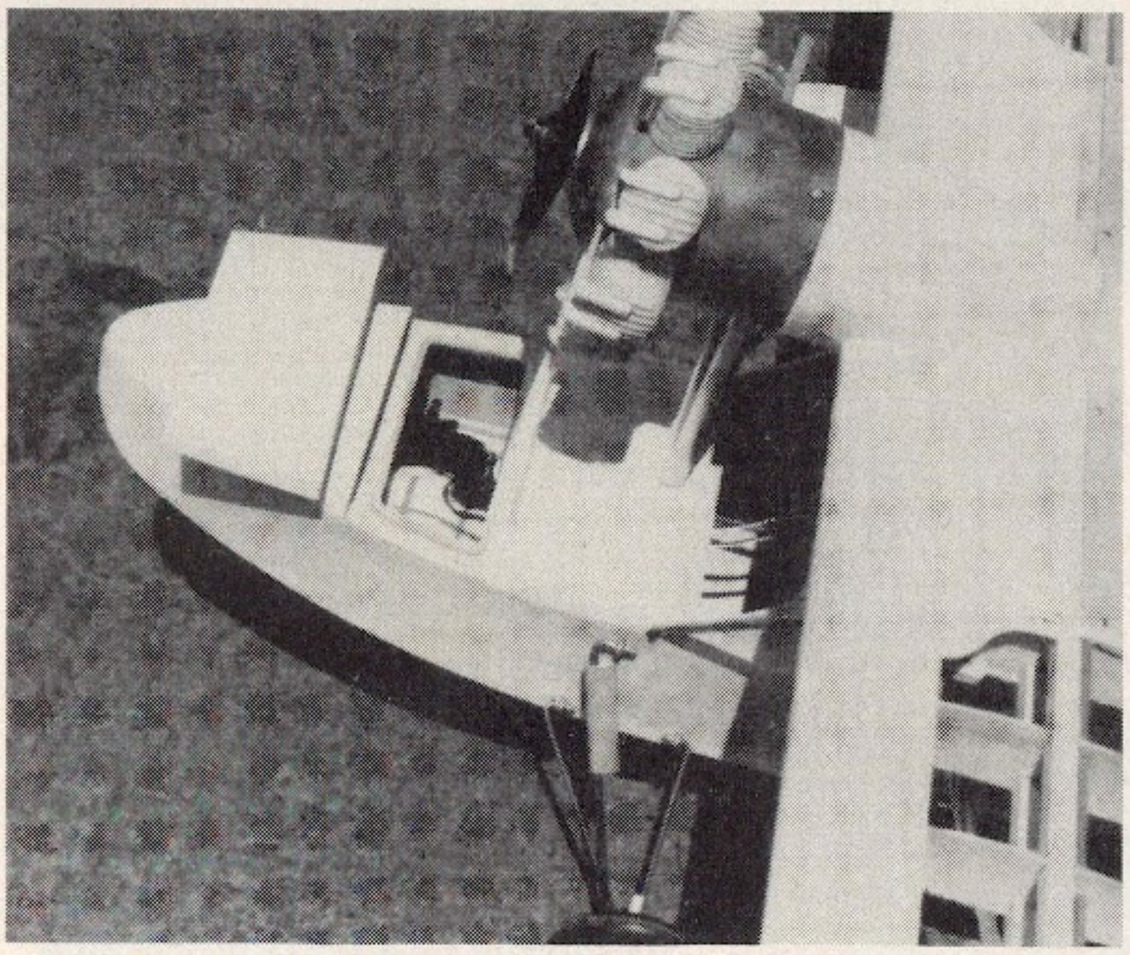
Tail assembly.



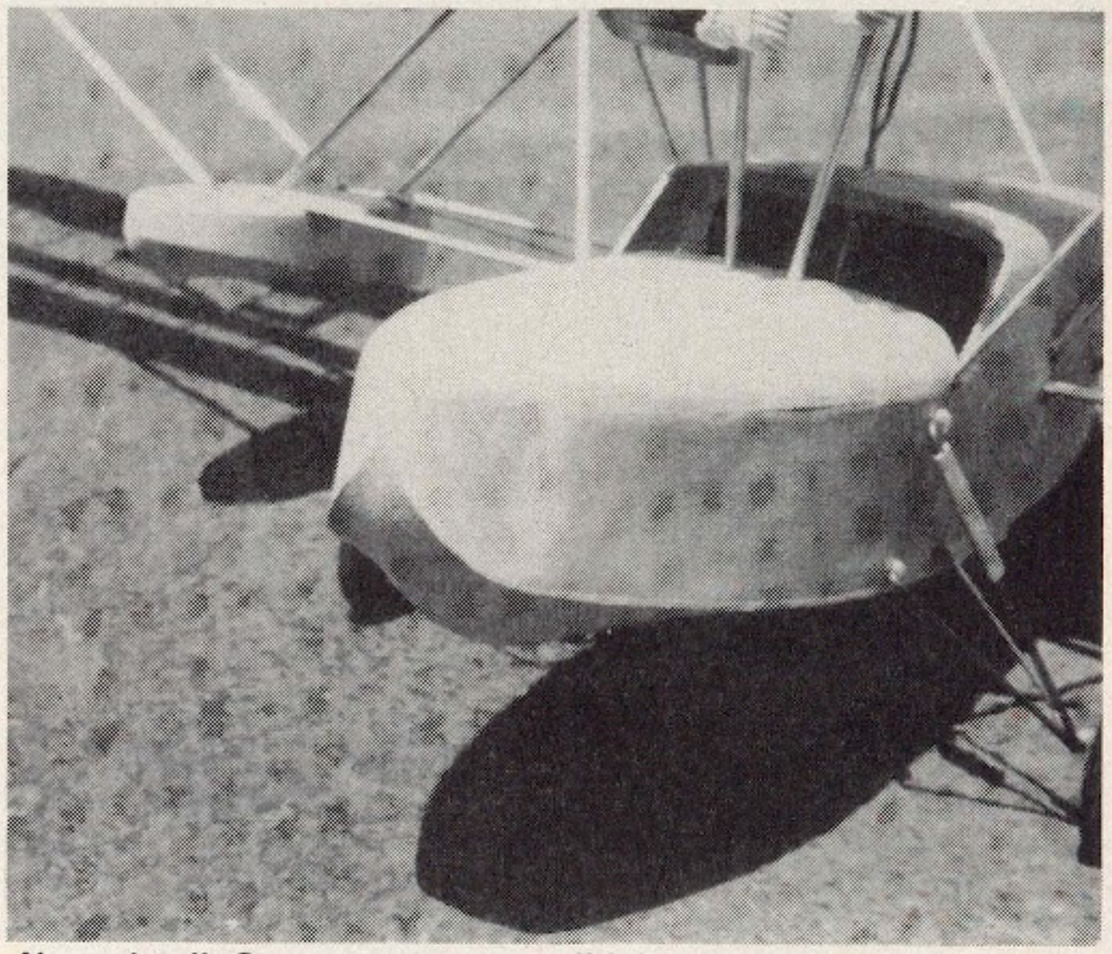
Aileron bellcrank assembly.



Fiberglass cowl and dummy engine details. Note battery and tail wheel servo wires.



Hatch detail with rudder servo and battery installation.



Nose detail. On prototype nose didn't curve up so much, but it gets on the step great.

bolts as shown in the detail drawings. File the tubing so the landing gear wires fit and rotate easily. Install the "J" bolts on the hull and check for proper fit.

Solder a piece of 3/16" OD tubing to the landing gear strut at the axle; wrap it well with brass or copper wire for strength. Make sure both the long and short strut braces fit and will slide in and out of the fittings.

Bend the 90 degree angles in the 5/32" steel wire nacelle mounts. Drill the holes in former 4-A and install the nacelle mounts with "J" bolts to match the angles on the plan (see detail).

Glue formers 1-T through 11-T in place. Glue upper tail post in position and taper to match lower hull.

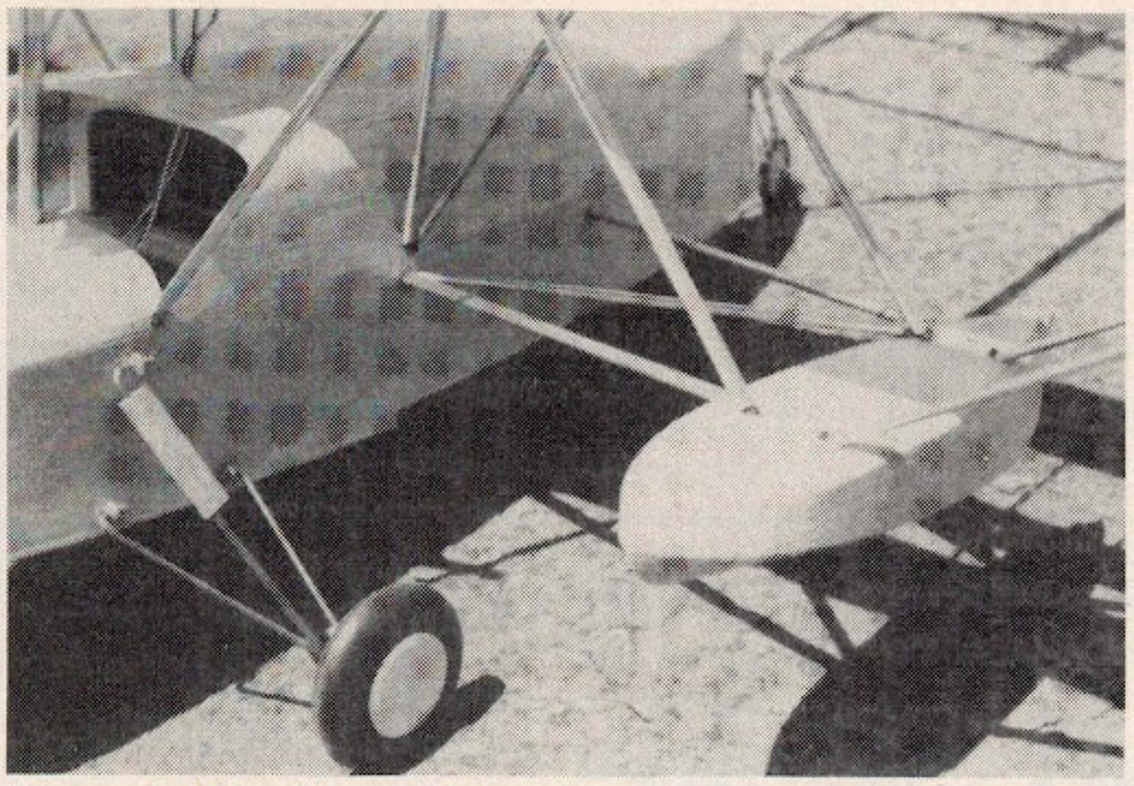
Plank the top of the hull with 1/8" balsa. Cut away hatch opening and make hatch to fit.

Rough sand the hull.

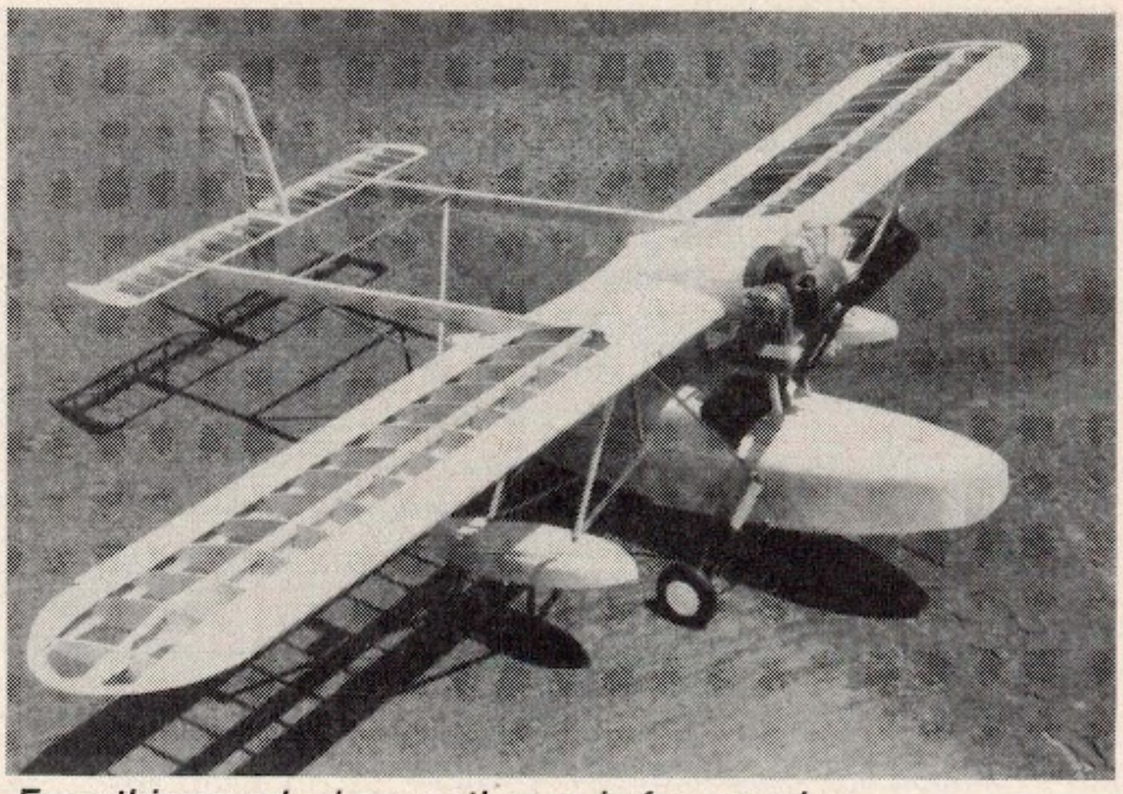
Make the nacelle mount fittings from brass stock or you may use heavy duty solder lugs. Install the 5/8" streamline aluminum tubing over the wires and solder the nacelle mount fittings to the 5/32" wire.

Tail Wheel:

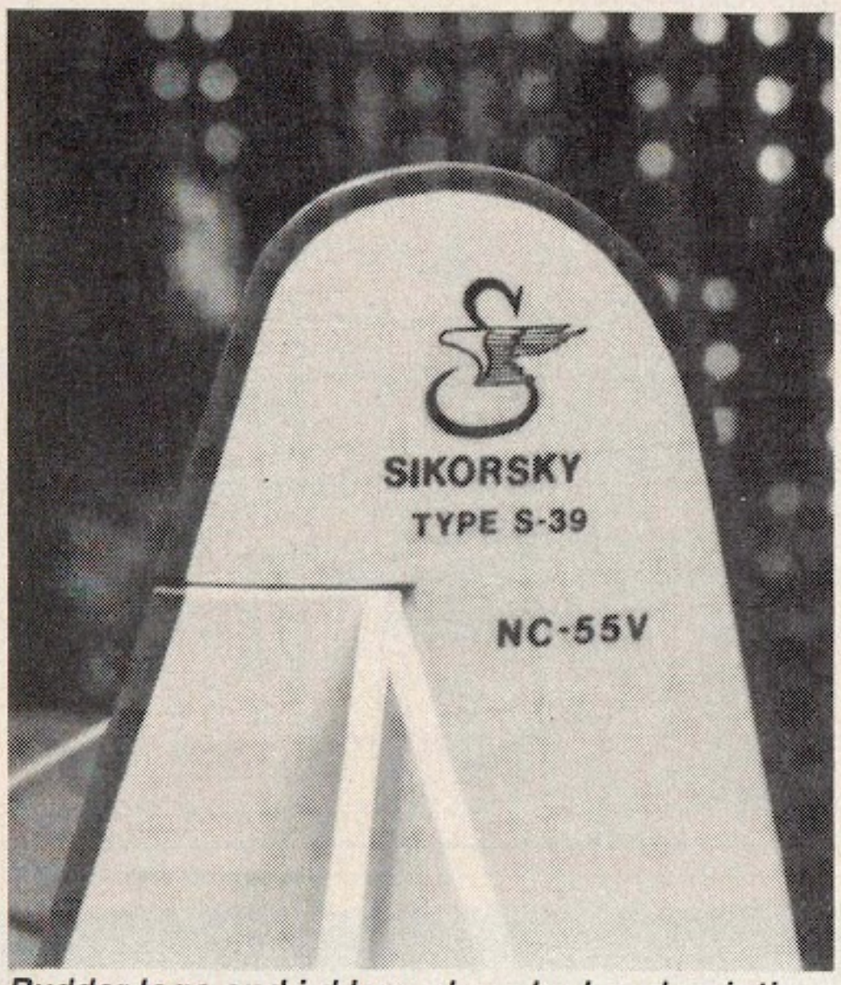
Bend the 1/16" tail wheel wire to shape with the brass tubing and wheel in place (see plan). Solder the .032" sheet brass straps to



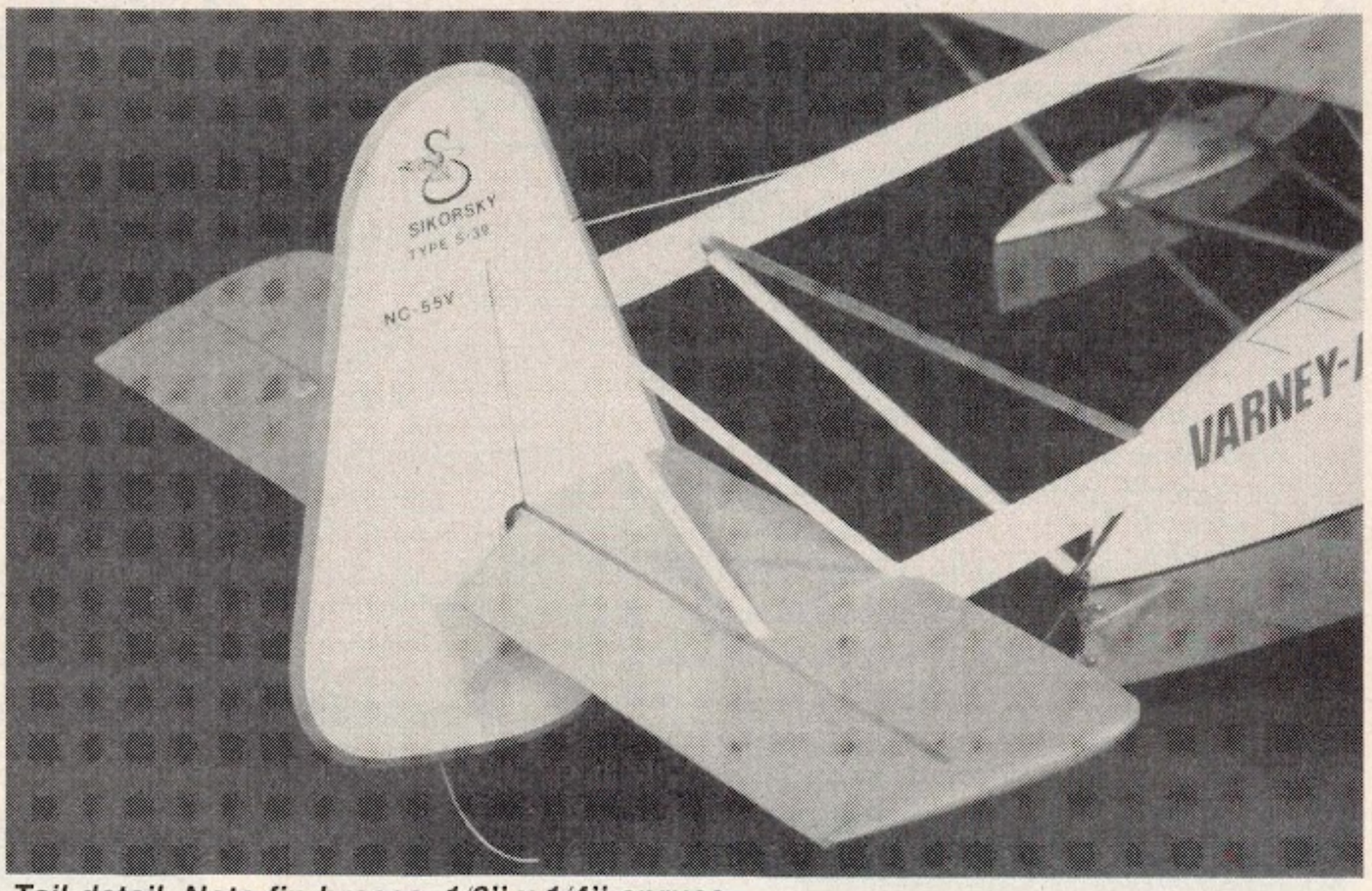
Wing mount and float strut detail.



Everything worked correctly, ready for covering.



Rudder logo and i.d logo done by hand, printing Letraset transfers.



Tail detail. Note fin braces, 1/8" x 1/4" spruce.

the tubing for mounting the tail wheel to the stern post. Bend and install the brass tiller arm, .032'' brass, 1/4'' wide.

Mount the tail wheel to the rear of the hull with #2 x 3/8'' sheet metal screws.

Drill the hole for tail wheel steering. Install the NyRod to the tiller arm with a ball link. Curve NyRod as shown on side view to keep water out of hull.

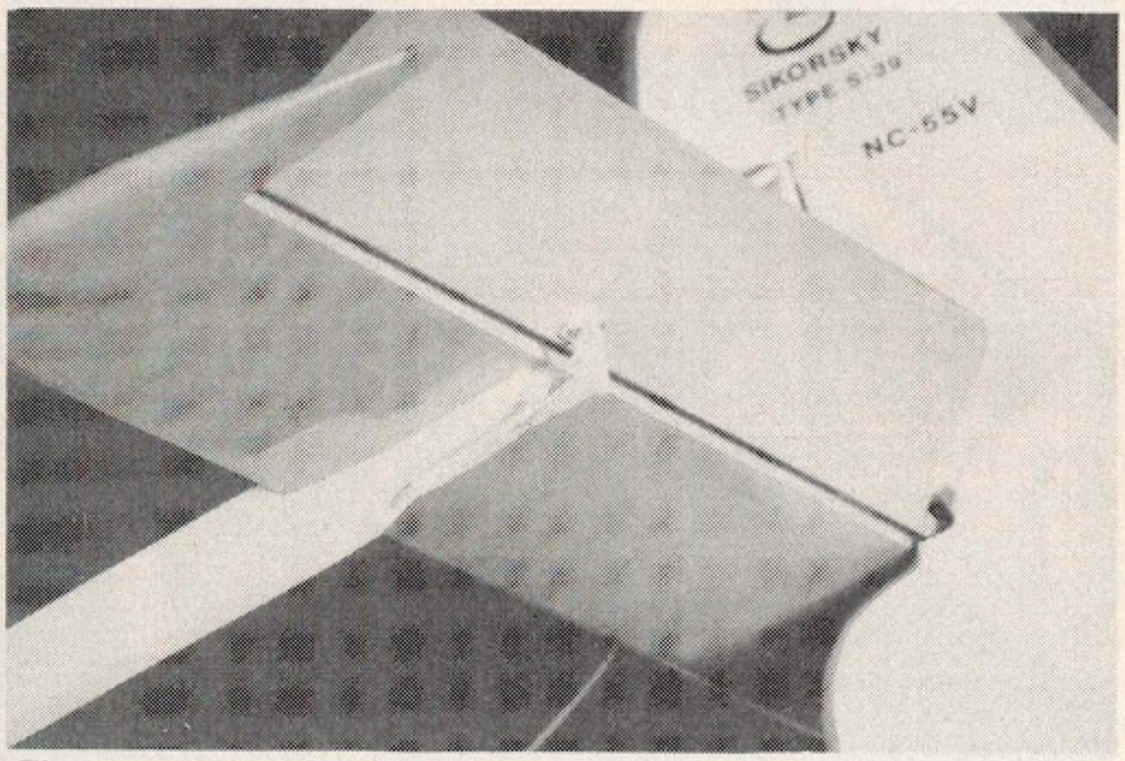
My first S-39 has the side windows cut out, but the second one doesn't. It's your choice, but for me the look wasn't worth the extra effort.

Install the tail wheel servo mount/battery holder. Install the two servo extensions through the top of the cabin, long enough to reach the tail wheel servo and battery in the hull and the rudder ''Y'' harness and the switch leads in the wing. I used Futaba 400mm servo extensions.

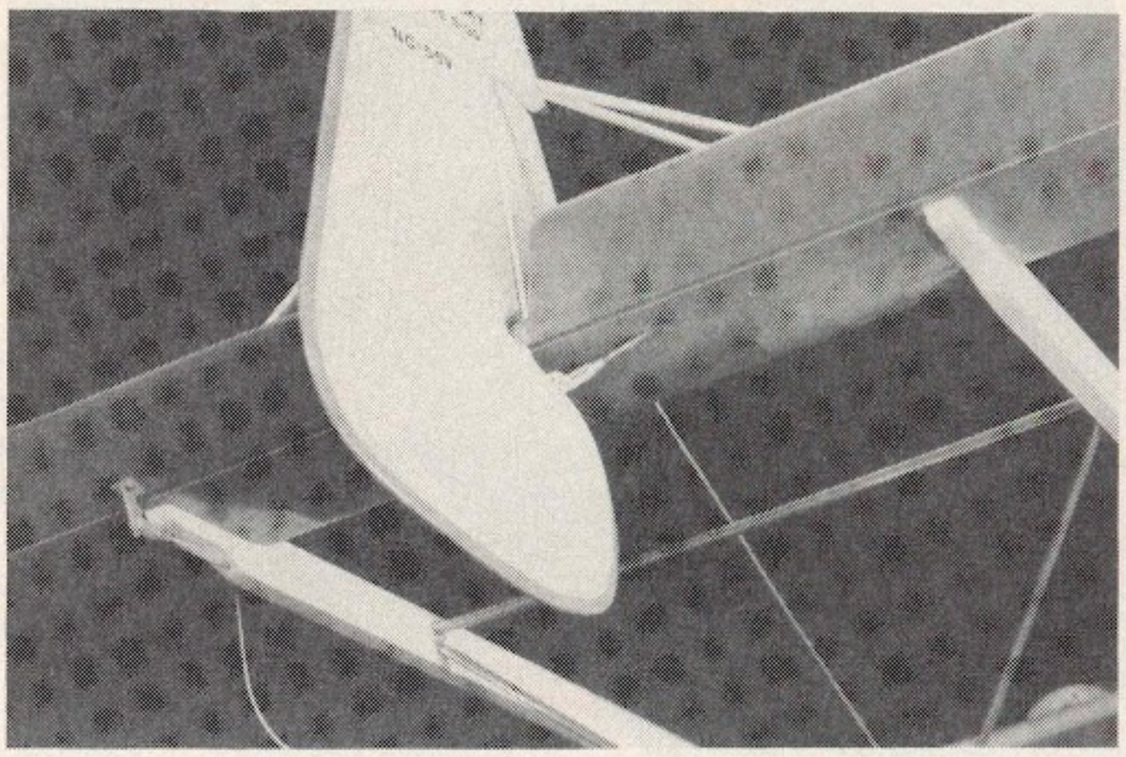
If everything is in place tight, blind nuts secured, and the NyRod secured, plank the bottom of the hull with 1/8'' balsa, crossgrain.

Install the balsa noseblock and carve to shape (see plan).

The installation of the windshield



Elevator control detail.



Rudder control detail.

completes the hull.

Wing:

You may construct the wing using the Goldberg Cub wing kit or cut your own parts using the plan and assemble it according to the plans and instructions. Join the wing panels using the doublers furnished, except for the front full doubler and main spar front doubler. Glue the two nacelle mounts to the front wing joiner as shown on the plan and in the photos. Cut out the center part of the front wing joiner between the nacelle mounts for the fuel tank, leaving the bottom 1/8'' x 1/4'' hardwood spar.

Mount the firewall to the nacelle mounts. Install 1/8'' ply-fuel tank floor. Trial fit the Sullivan 8 oz. flex slant tank.

Mount the motor mount with 6-32 bolts and blind nuts. Mark and drill holes for the fuel lines.

Install the wing leading edge pieces between the wing leading edge and nacelle mounts.

Install nacelle mount hardwood blocks. Drill holes for the 8-32 bolts and blind nuts.

Mount the throttle servo in the wing.

Mount the engine so the hole for the throttle control may be drilled. Make sure the throttle control rod will clear the nacelle mount 5/32'' wire and fittings.

Install all of the 1/8'' A/C ply strut mount blocks in the wing at the locations shown on the wing plan. Install 2-56 blind nuts in the strut mount blocks.

Add the sheeting from the main spar to the front spar. Plank the area between the wing and nacelle mount.

Plank the nacelle with 3/32'' x 1/4'' balsa.

Install the aileron servo in the wing.

Install aileron bellcranks in the wing. Trial fit the ailerons and hook up aileron servo to the bellcranks using NyRod.

Booms:

Now it's time to make the booms.

Cut four pieces of 1/8'' lite ply, 7/8'' wide by 27¾'' — two pieces 3/16'' x 25'' and two pieces 3/8'' wide, 24'' long.

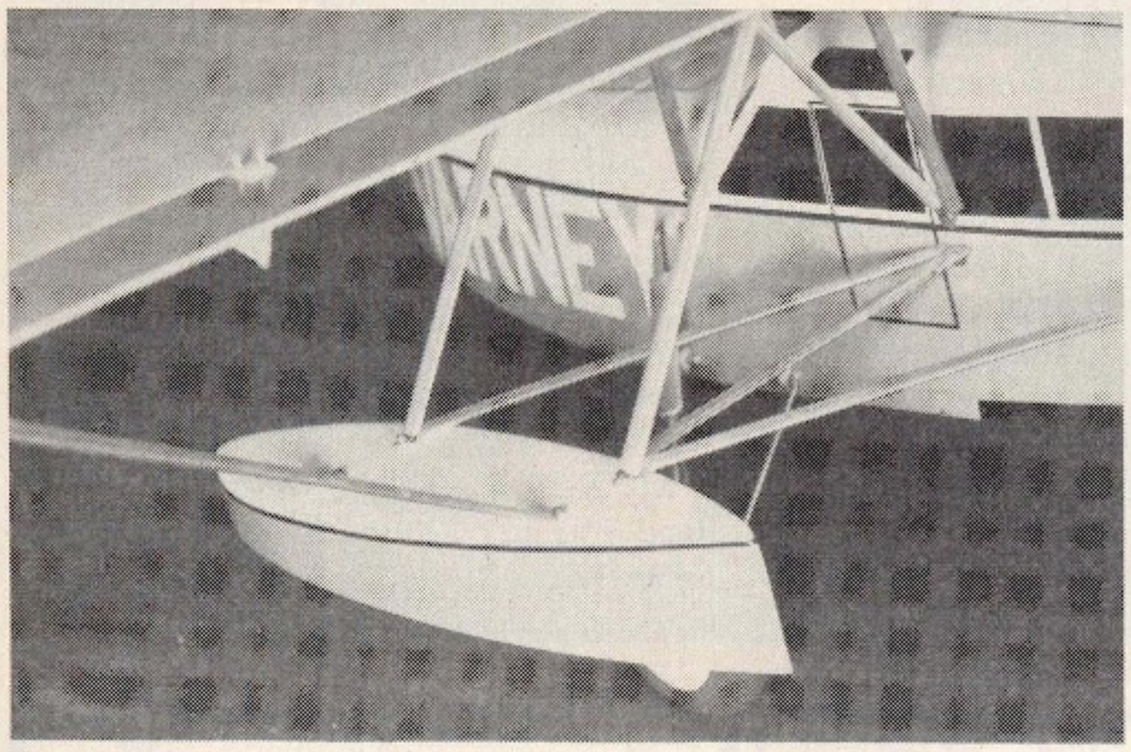
Glue the 3/16'' wide piece to the inside bottom of the side pieces as shown on the plans. Shape the booms as shown on the side view.

Do not glue the top pieces on the booms at this time. Install all of the boom doubler pieces, the ones at the front and near the rear for the boom supports.

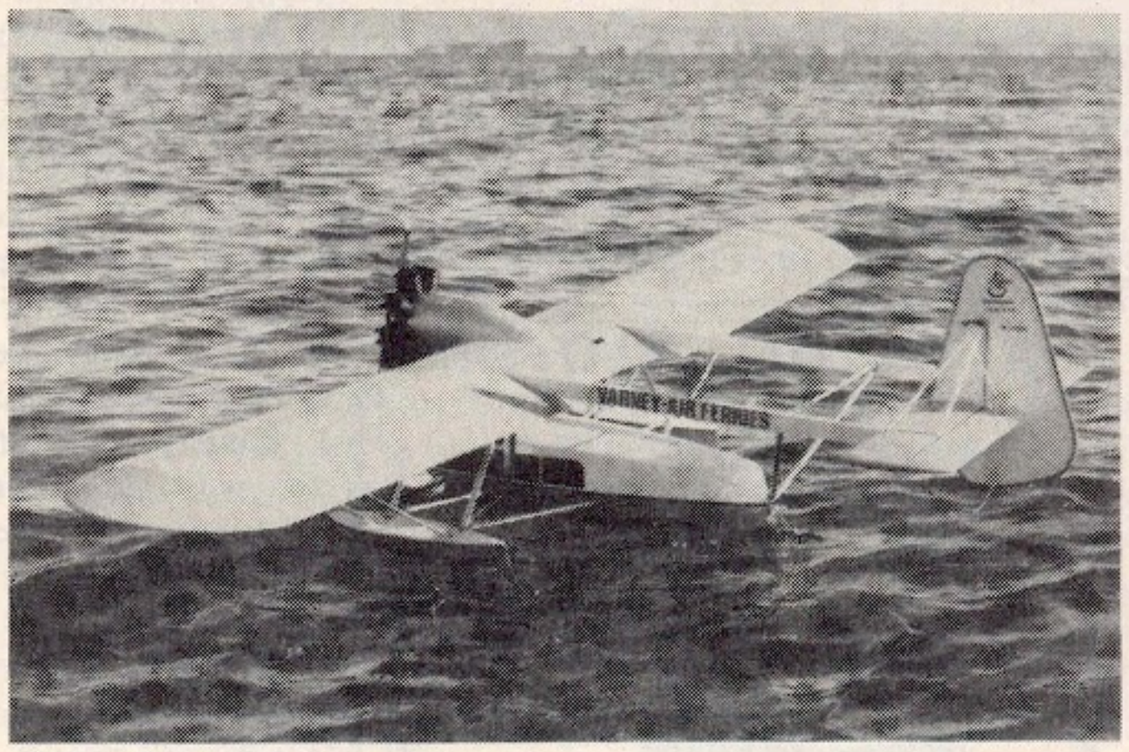
Glue the stab and fin to the booms.

Slide booms into the wing between the wing main spars and check for fit. Fit should be snug but not tight.

Carve the trailing edge sheeting away at boom locations, just to the trailing edge; make the cut deep enough so the bottom of the wing is +3 degrees to booms. Insure that the booms are in line with each other so the stab will be horizontal with the wing.



Float mount and wing strut detail.



At home on the water.

Drill a hole in the bottom wing spar through the boom for the 2-56 screws and blind nuts in the booms.

Drill the holes through the wing trailing edge piece for the 2-56 screws and blind nuts.

Glue the two false ribs next to the booms on the wing center side.

Cut exit holes for NyRod connections to the rudder and elevator servos in the sides of the booms and false ribs.

Mount the rudder and elevator servos in the wing. The mountings shown in the photos have worked very satisfactorily on

both planes, but use your favorite method. Ball links were the easiest way for me to make the connections to the servos.

Now its time to glue the top pieces on the booms.

Make the wing hatch from 1/16'' plywood, cut to fit equipment area.

With the wing hatch in place, carve the rear nacelle piece from soft balsa, sand to shape for a smooth fit to the nacelle. Glue the rear nacelle piece to the hatch cover. Use a piece of dowel to key the rear part of the nacelle and radio hatch cover to the main nacelle.

Carve the two floats from soft balsa, the tops of the floats are 1/8'' aircraft plywood. Don't forget to install the 2-56 blind nuts in the float tops before gluing the hollowed-out floats to the tops.

Now we come to the fun part, putting it all together.

Mount the wing to the hull at the main nacelle supports. (You did take all of the equipment out of the wing?) Block up the tail so the booms are parallel with the hull main crutch.

Making sure everything is square and straight, measure and make the tail support struts using 3/8'' streamline aluminum tubing. Make the attachment fittings from sheet brass and balsa carved to fit the aluminum tubing as shown in the drawings.

Do not glue the strut fittings to the aluminum struts at this time.

When the booms are solidly anchored and everything is still square and aligned, install the other wing struts by the famous old cut and try method (I said this was the fun part).

Mount each of the floats so the top of the float is parallel and even with the hull crutch. The centerlines of the floats are 9-5/8'' from the side of the hull at the center wing mount (V strut).

If everything is still properly aligned and fits well, glue the strut fittings to the aluminum struts. I have glued the tubing and fittings with Instant Jet and have never had one come loose.

Install the equipment, hook up all of the controls. The rudder takes a ''Y'' harness for the two servos. Check the operation of all of the surfaces, everything should work easily with no binding.

If everything works correctly you are ready to take it all apart for finishing.

Both of my S-39s are completely covered with Goldberg Colortex.

The first one was finished with Sig dope, Miami blue and white. The second one was painted with K&B Superpoxy. Choose your favorite finish, but if you plan to fly a lot off of the water as I do, I don't recommend a film covering (that's a personal opinion).

The side windows and lettering were cut from Coverite trim sheet. The rudder decals were made with Letraset transfers. The Sikorsky logo was drawn with india ink.

Flying:

When assembling the plane for flight with all of the 2-56 machine screws I heartily suggest using split or lock washers. Vibration could loosen some of the struts and that's not good.

Balance your S-39 so it is slightly nose heavy when supported at the **front edge** of the main wing spar. Both of mine took a small amount of lead forward of the hull hatch.

The plane is very stable and easy to fly and does basic maneuvers with ease. At half throttle flights are very realistic and scale like.

When flying off water the S-39 gets up on the step quickly and will make a very scale take-off.

Landings are smooth if the water isn't rough and a power-on glide is set up with a nice flare just before touch down.

When flying off water I seal the two hatches with Scotch tape and I have had no water problems.

My S-39 has been a fun airplane and I hope you enjoy yours as much as I have mine. May all of your landings be smooth and right side up --- happy flying. □