



Living in an area where beautiful lakes are available, Ed Westwood designed this seaplane to take advantage of the situation. It's a perfect answer for the increasingly popular float fly event.

**P**icking a name for a new design is almost as taxing as building it. In the end something catchy that describes the machine is usually best; thus "Light & Up" --- a lightweight .40 powered low wing

# LIGHT & UP

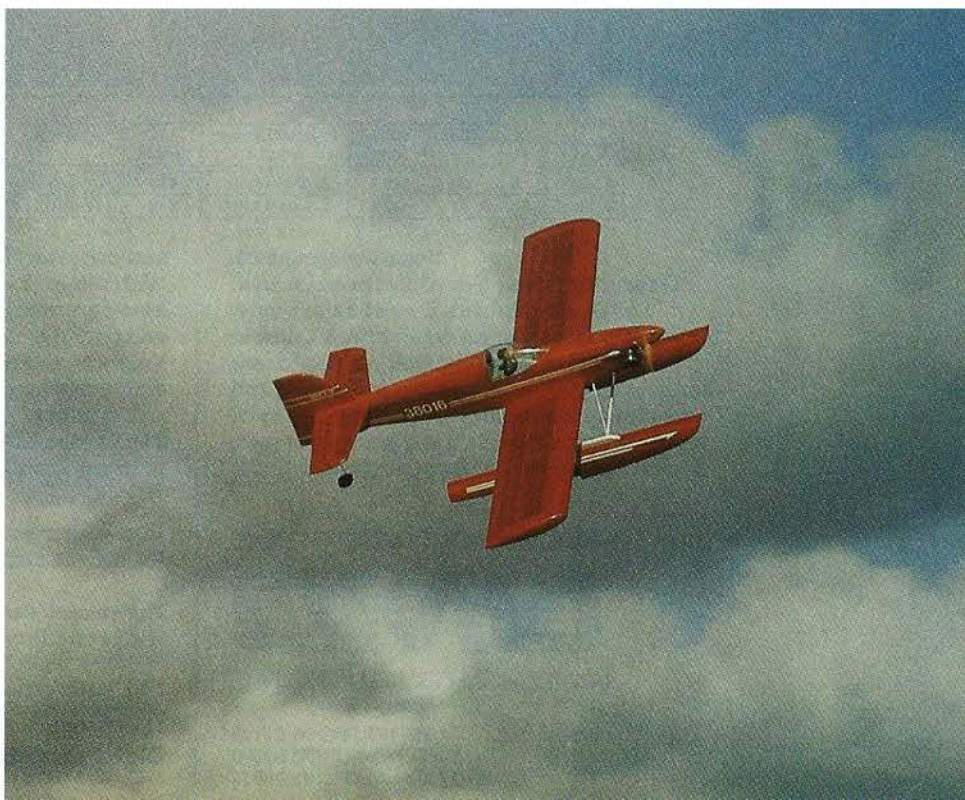
By Ed Westwood

seaplane that's fun to fly. Right here you probably are saying ho hum, another sport model with floats. Read on anyway; this design weighs less than 5 pounds dry and still looks like an airplane. With 560 squares the wing loading averages only 21 oz./sq. ft. The flat bottom ogee floats allow almost instant planing with nothing but throttle and a touch of aft stick to launch the bird off the water in about 50 feet. The "Light & Up" is specifically designed for float flies. The tail mounted water rudder, although not aesthetically as pleasing as the float mounted variety, gives quick turning even in wind (due to the greater moment arm). Some float flies will even throw in a bomb drop. You can add this extra equipment if necessary; it's sketched on the plans.

## CONSTRUCTION

Some folks always start with the same component. It really doesn't make any difference but I picked the

fuselage since it is a bit more complicated and I can keep motivated easier if it's demanding. Since much of this model is based on "curb appeal" a clean nose section is mandatory, so begin by selecting the engine. My plans show an O.S. .40 FP installation but any 2-stroke .40 will do. Secure the engine to the mount and put on the 2½" spinner. Now measure the distance from the rear of the mount to a point 1/16" short of the spinner backplate. This is your firewall to nose distance. My O.S.





cylinder is oriented 25° down from the horizontal because this position centers the muffler at the 180° position. I'll do almost anything for a clean machine! The .40 size Kraft mount holes are for this position. Now build the two sides over each other with tabs of wax paper between the cluster joints. Leave the front



the lower front spar cap and webs installed. The outboard ribs all have small notches marked so that the ailerons can be cut loose at the right angle and the beveled, slotted aileron L.E. will fit correctly. Go ahead and cut the ailerons loose now and glue in the L.E. Install the 1/16" plywood horn backing plates and cut the Easy Hinge slots as shown, 1/8" below the upper surface. Sheet the leading edge, secure the capstrips, and contour the L.E. Cut the rib 1 dihedral and peg backing plate slots out. Install the aileron bellcrank assemblies and the Sullivan semi-flexible control rods in the pre-drilled 3/16" holes. Now join the wings remembering to put in the L.E. peg backing plate. The tips are



## LIGHT & UP

Designed By:  
Ed Westwood

### TYPE AIRCRAFT

Sport Float Plane

### WINGSPAN

56 Inches

### WING CHORD

10 Inches

### TOTAL WING AREA

555 Sq. In.

### WING LOCATION

Low Wing

### AIRFOIL

NACA 2415 Semi-Symmetrical

### WING PLANFORM

Constant Chord

### DIHEDRAL EACH TIP

3/4 Inches

### O.A. FUSELAGE LENGTH

44 Inches

### RADIO COMPARTMENT SIZE

(L) 10" x (W) 3" x (H) 2 1/2"

### STABILIZER SPAN

22 Inches

### STABILIZER CHORD (inc. elev.)

5 Inches

### STABILIZER AREA

110 Sq. In.

### STAB AIRFOIL SECTION

Flat

### STABILIZER LOCATION

Top of Fuselage

### VERTICAL FIN HEIGHT

10 Inches Overall

### VERTICAL FIN WIDTH (incl. rud.)

8 Inches

### REC. ENGINE SIZE

40 2-Stroke

### FUEL TANK SIZE

8 Oz.

### LANDING GEAR

Twin 31" floats

### REC. NO. OF CHANNELS

4

### CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

(Opt. bomb drop off extra engine servo)

### BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Lite Ply
Wing	Balsa, Birch Ply
Empennage	Balsa & Spruce
Wt. Ready To Fly	75 Oz. (Dry) (4 lb. 11 oz.)
Wing Loading	21 Oz./Sq. Ft.

longerons open to accept bulkheads 1 and 2. Join them in the usual manner but add a temporary tie between stations 3 and 4 to keep the sides from bowing out in this area when the rear is drawn together. When drawing the nose together remember to put a 1/16" shim between bulkheads 1A and 2 to facilitate cutting off of the completed cowl. Due to the 2° of side thrust the cowl cut will not be completely perpendicular with the fuselage centerline; don't worry, nobody will ever notice. The turtledeck formers are not marked for the stringers; just remember to keep them straight between formers 4 and 7. Once the front upper sheet is in place and the angled instrument panel secured, the ties can be cut out. The Sullivan 8 oz. fuel tank is now installed. 3-M a piece of 1/4" foam on the station 3 tank hole and tie a piece of dental floss around the tank front to aid in removal before you slide it in place. Fuel tubing on the brass tubes provides the front support and the foam provides the damping in the rear. The throttle cable sheath is now installed. Be careful not to drill a hole in the tank since it is very close. The foam wrapped battery pack is checked for fit under the tank but not installed yet. Install the 1/64" cockpit bottom and set the fuselage aside.

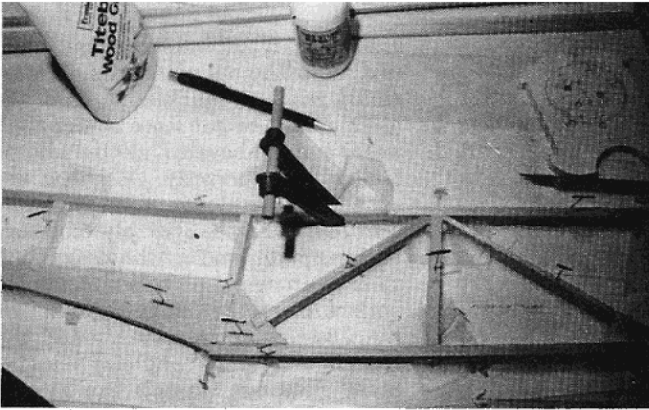
### Wing:

Begin by cutting and beveling the T.E., then pin it down. Pin the slotted rear spar in place and bevel the upper surface to match the rib angle. Now install the ribs. The 1/8" square spruce upper rear spar cap will have to be beveled also before installation. I suggest that the rear spar not be glued until the 1/4" L.E. with the alignment strip attached is glued to the rib fronts. Now glue the rear spar, cap, and front spar top cap in place. Don't forget the two extra aileron stub ribs. Install the upper T.E. The wing can now be removed from the board and

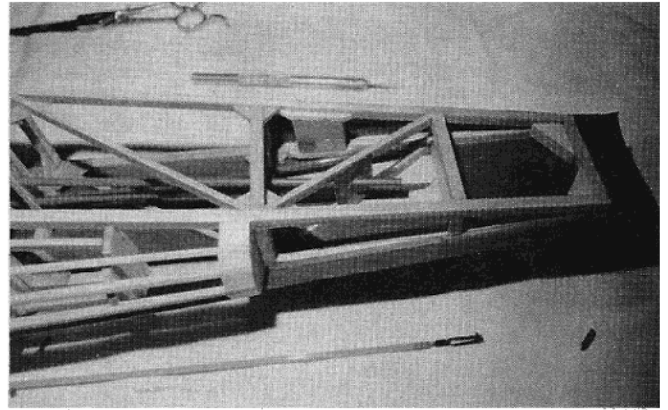
profiled, hollowed, and attached, then sanded to the contour shown on the plans. Block up one tip 1 1/2" and glue. Install the servo being sure the sheaths have some up and down freedom as the servo arm swings. Epoxy the .007" carbon tension strips on the bottom spar caps. Cut them only as wide as the items covered. Now sheet the remaining top root section and glass the first 4". Align the wing on the fuselage and drill the 1/4" L.E. peg holes through the L.E. peg backing plate. Glue the 1/4" hardwood pegs in place. Drill through the T.E. into the previously installed triangular hardwood hold-down blocks with a 5/32" drill and tap for the 10/32 nylon screws. Remove the wing and enlarge the T.E. holes slightly. Put some thin CA in the tapped holes to harden the threads.

### Tail:

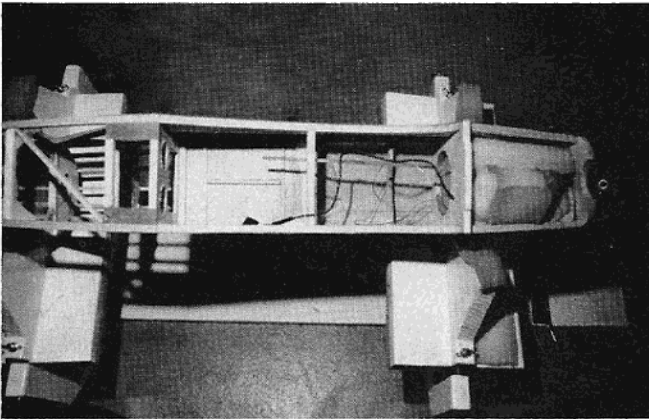
There's nothing new here except to remember to use light stock. It's best to cut all the Easy Hinge slits now, otherwise you'll end up with little push-through chips inside your covering. Pin the tail sections in place and contour the turtledeck rear extension blocks. Bevel the elevator and rudder hinge edges and install the water rudder shaft. The 1/16" plywood ventral bearing is fabricated but not installed until after covering. Install the Sullivan semi-flexible pushrod sheaths, being sure they line up nicely with the horns. Since the wing pegs are now installed the battery can be dropped back in and the bottom front



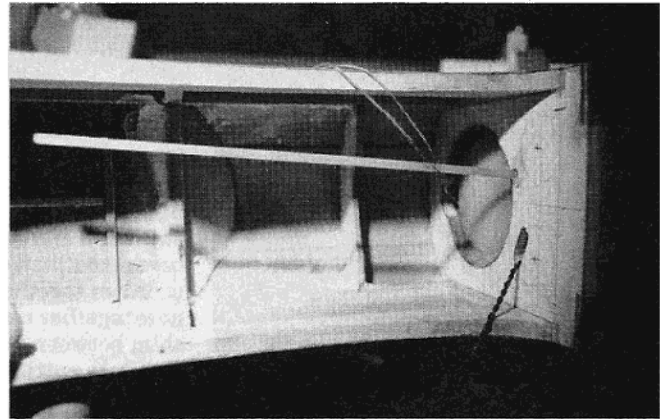
*Wax paper tabs keep sides separate during overlap lay-up.*



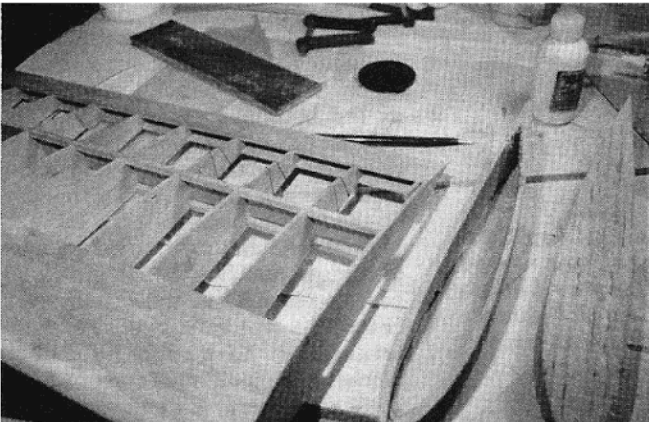
*Rear fuselage showing gussets and 1/64" ply reinforced cluster joints.*



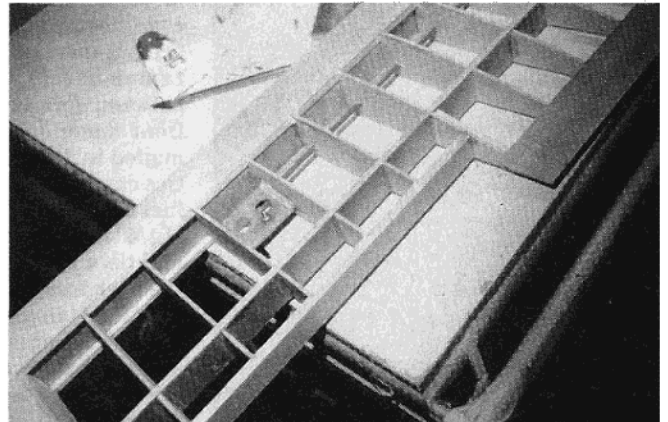
*Bottom ready for wing peg drilling. Triangular rear wing hold-down blocks not installed yet.*



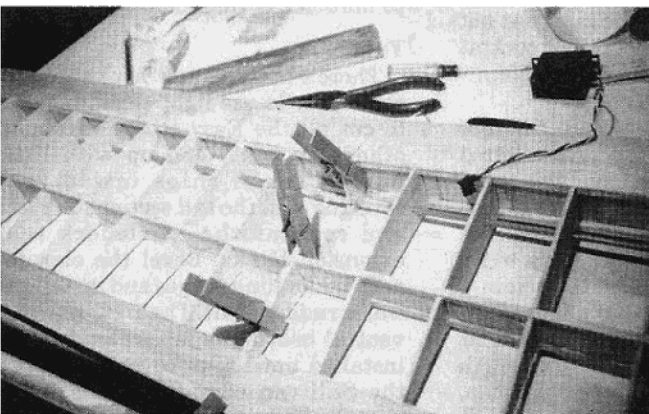
*Wrap dental floss around tank neck. Removal is much easier.*



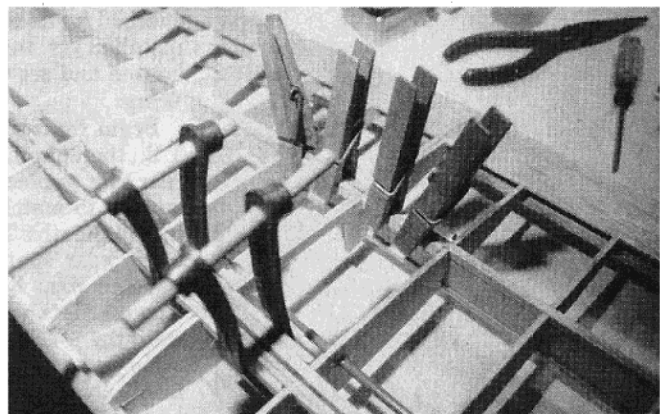
*Band saw tip blocks prior to hollowing out cap. Note marks for aileron separation.*



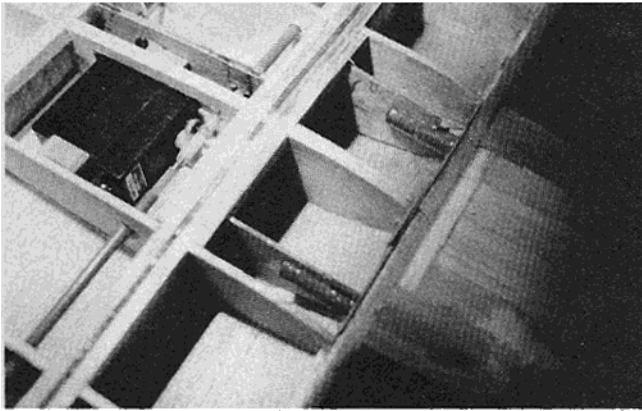
*Final wing design combines rear spar with aileron spar. Carbon fiber maintains C.G. design.*



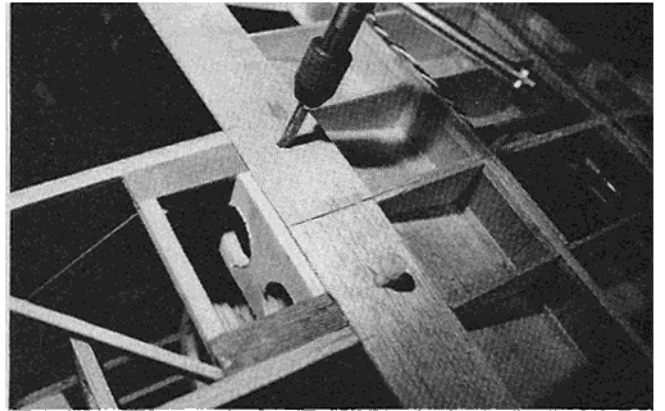
*Initial wing joining — flex controls already in place.*



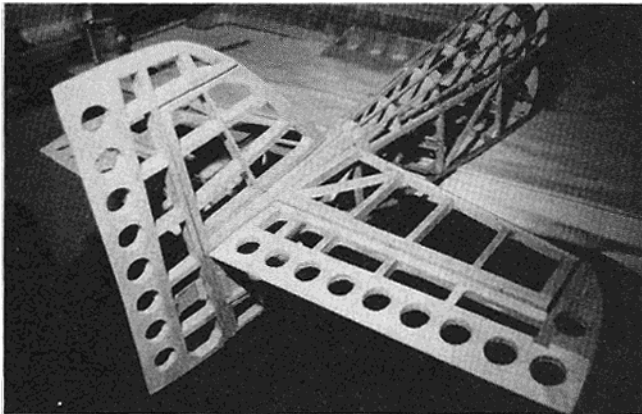
*Spar lower cap dihedral braces clamped during wing joining.*



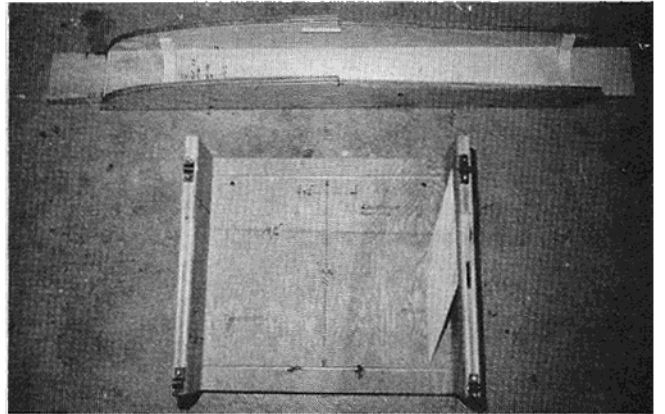
**Alleron servo installation. Front hold-down peg configuration simplified in final drawings.**



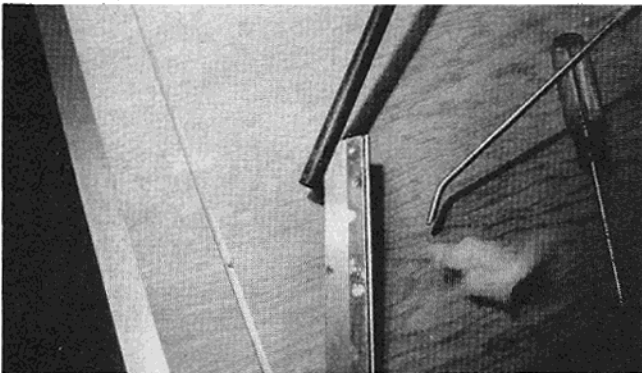
**Tapping the rear hold-down blocks. Note additional bracing added to rear float mount.**



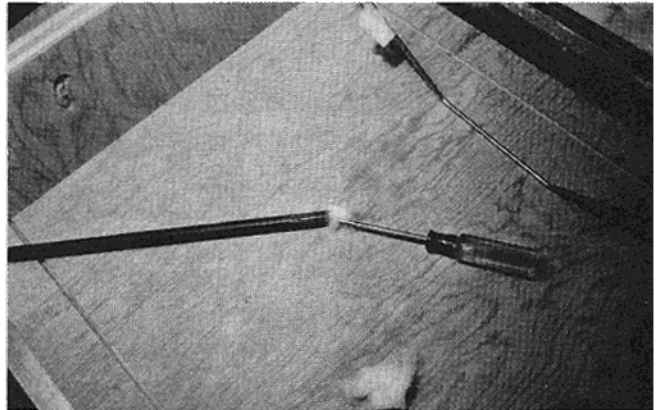
**Turtle deck rear extension blocks are MonoKoted and added after horizontal is secured to fuselage, note lightening holes. Final drawing reduced elevator size and eliminated aero-balances.**



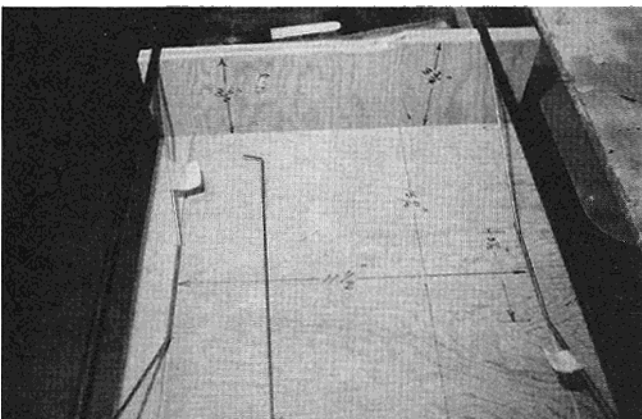
**Float attach fitting assembly jig and foam core bottom contour holder shown here.**



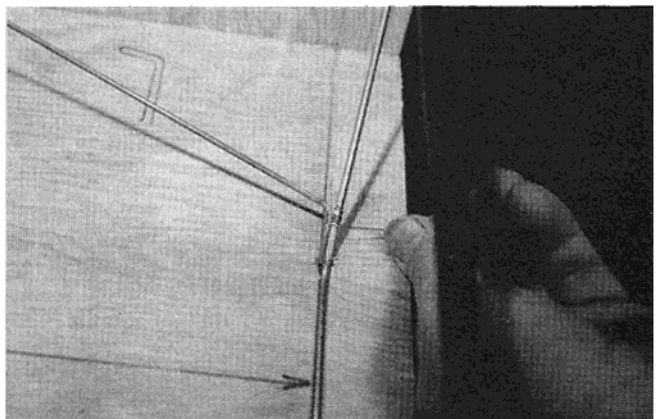
**Splitting arrow shaft almost to end aids connecting down-strut. Note beveled wire end to help in joining.**



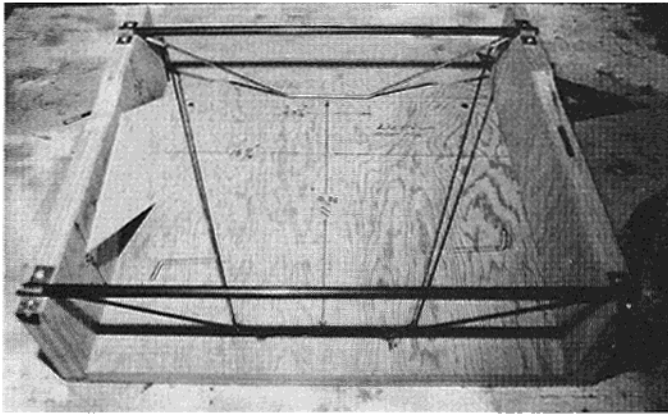
**Tuft of cotton stuffed just beyond axle hole keeps glue in end area only.**



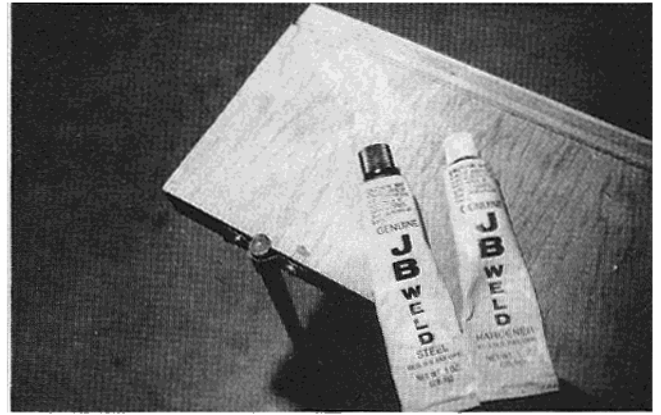
**Down strut spreader bar assemblies in jig prior to fitting "N" struts.**



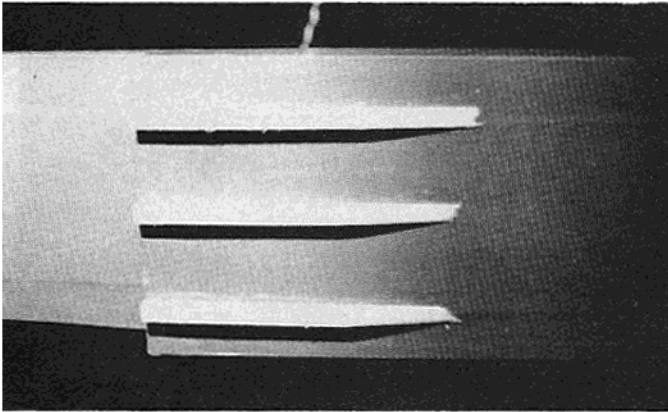
**Wrapping "N" strut joint with copper wire before soldering — struts must fit loose — no force fit here!**



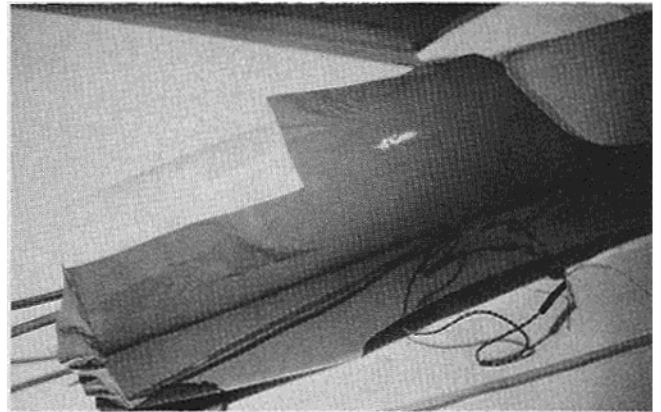
*Spreader bar down-struts with "N" struts attached, locked in jig and ready for soldering and end joint filling.*



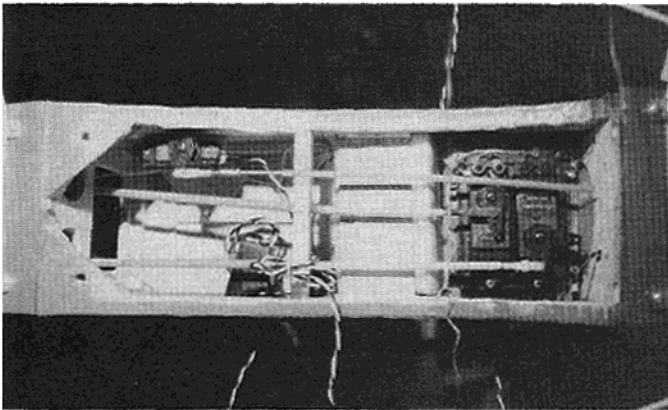
*Author found J.B. Weld does super job of "welding" those end joints.*



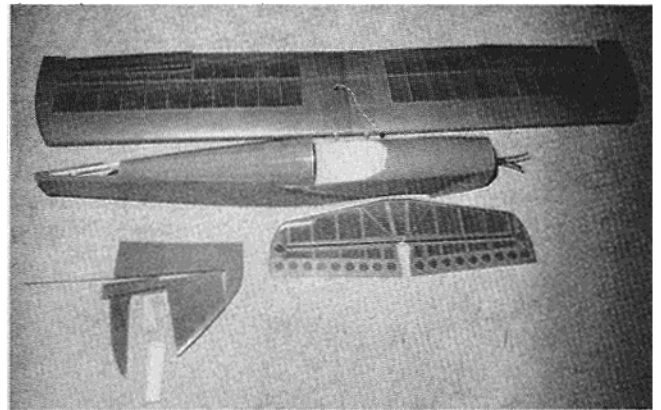
*3/16" x 3 1/2" spruce anti-skid rub strips give rudder more leverage.*



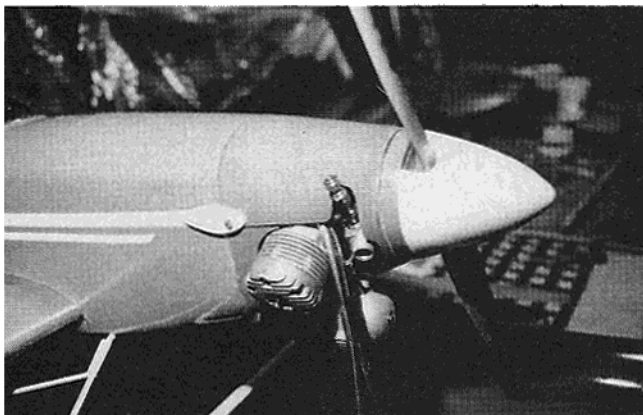
*MonoKote being pulled around fuselage.*



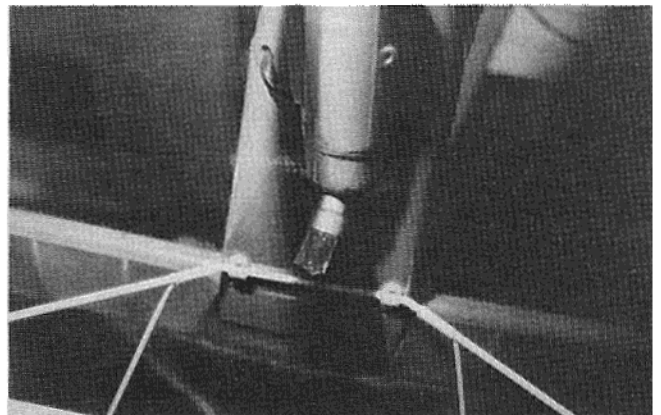
*Elevator and rudder servos up front with FPR4H mini receiver in center. S-33 engine servo in rear.*



*Covering complete ready for assembly. Water rudder soldered to shaft after ventral is attached.*



*Teardrop cowl locks epoxied to front fuselage hold cowl with sheet metal screw into cowl and backing block.*



*Small exhaust extension keeps fuselage bottom completely oil free.*

closed up. Cut around the cowl juncture to free it and smooth the inside. Temporarily install the engine, then fit up the muffler to the bottom recess. Carefully cut away the excess cowl material so that it fits nicely around the engine, being careful not to remove too much material. Install the spinner from time to time to check the fit. Some wood may have to be removed from the rear for proper alignment. If we were making several cowl, glass would be in order, but, since our models border on prototypes, a built-up cowl works nicely. Try epoxying a nylon panty hose over the finished cowl; you can pull it around all the openings before it sets up and it really does a first-rate job. My drawings are for an O.S. .40 FP, obviously other engines will do as well but the blind nut positions and firewall to spinner distance will probably have to be adjusted.

### Floats:

The foam core floats and the attach fittings constructed as shown will weigh 17 oz.; one of the keys to this lightweight design. The drawings are pretty much self-explanatory. The sequence of assembly is as follows: Install the three transom plates, the bottom rear or heel sheet, the step block and, last, the front or sole sheet. Sig Core Bond or Dave Brown Sorgham will work well as the adhesive. Carefully trim the edges and be sure the transom plates are sanded flush with the float contour. Roll the upper skin on dry a couple of times to insure you'll have overlap all around. Remember to use some alignment marks, since once the upper skin is stuck down even the slightest bit it's chiseled in stone. Cover the bottoms with 3/4 oz. glass and lap up the sides about 1/4". Paint with Formula U. The strut assembly is assembled in a simple jig to insure alignment. Begin by bending the 1/8" down struts. I mark the bends with masking tape and, using the angle pattern, bend in a vise. The wire will sometimes relax a bit so pull on the bends and hang 'em again if necessary. Don't forget to file some small notches in the axle area to give the adhesive a purchase. Cut the arrow shafts and drill the strut holes as shown. Twist the drill in the holes to elongate the hole to the same angle as the down strut entry. Now push a tuft of cotton in the shafts just beyond the strut hole; this keeps the glue from filling the whole shaft. Installing the down struts requires some flexing. Filing one axle end a bit helps as does slitting one shaft outboard of the shaft entry hole about halfway to the end. Now lock the down strut spreader bar assembly in the jig. Bend and fit the "N" struts. Sand the solder areas well, wrapping the joints with #24 copper

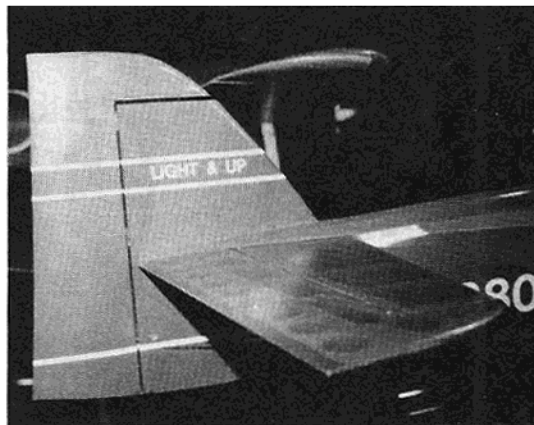
wire. A soldering gun with plenty of flux will do the best job. Don't use a torch since the carbon keeps the solder from sticking and the heat removes the temper. Now tip up your jig and fill the shaft ends with J.B. Weld. A piece of wire and a heat gun helps flow the stuff in the joints. Tape over the ends and turn the jig over and complete the other side. The 14" hardbacks are sawed longitudinally and Sig-Mented back together before the spreader bar holes are drilled. This gives the hardbacks a breakaway point in case of accidents; one less item to repair. Epoxy the hardbacks to the spreader bars and slightly concave the bottoms to the float contour. If you want them a contrasting color, paint them now. Fix the floats on a flat surface insuring they are parallel and even. Block up the outer edges 1/8" and epoxy the hardbacks on.

### Covering:

I covered my wings and stab with Coverite's red Mica Film; the fuselage and vertical with red MonoKote, and the cowl and floats with matching red Formula U. The trim and float fittings are white. I sprayed my trim with clear Formula U. If you don't seal the trim, sooner or later it's going to start coming loose, so do it now while everything's still new and clean. Now you can connect the control surfaces with the Easy Hinges. Just remember to put a pin through the center of the hinge before you slide the control surface on, otherwise you'll push the hinge on through the first side and lose it.

### Canopy:

Trim the 13" WW-2 canopy so that the rear is facing forward. This gives the Malcomb Hood look so distinctive on the Spitfire. Paint the inside of the cockpit a quiet color (I chose gray), then install the pilot bust. Don't forget some instruments on the panel. I use RC-56 as the adhesive since it takes the vibration without loosening, and dries clear. When installing the canopy, put two short pieces of 3/16" square just over the bottom edges. The masking tape over these will pull the sides in tight while the RC-56 sets up. Right about here you can install the tail. First install the wing so that the tail can be aligned properly. Many tail sections have been misaligned because they have been installed first. The covered ventral with the rudder



Clean lines apparent in this tail photo.

post bearing is now slipped over the water rudder shaft and secured to the bottom. Use some clear silicone around the tail section joints to insure water resistance.

### Water Rudder:

I use a section of steel beer can; those 25 oz. Ausatralian jobs work well. Drink the beer first — about now you'll need it. Sand off the paint and impact a "U" where the shaft attaches. Line it up with the air rudder and, with a clothespin holding it, solder it on just like the struts were done.

### Radio:

If you use the lightweight O.S. .40 your servos will have to be positioned up front with the receiver just behind. With a heavier engine you'll have some leeway in the position. In any event, totally assemble the aircraft while you check for the right radio position. No extra weight should be needed if done this way. The area of the horizontal stabilizer is purposely large so that a large C.G. range is possible. If your system is dual rate, set up the elevator and ailerons 5/8" both ways and the rudder 1" either side on high rate. Cut it back to 1/2" either side for single rate. Be sure the mini-servo you use completely shuts down the engine at cut-off. Feed the antenna wire down the internal tube and be certain to tape the cabin part as far away from any power and servo wires. Needless to say, perform a thorough range check.

### Flying:

Full power count one, two, three, aft stick. It's that fast --- so now go fly, you don't need me anymore. □

