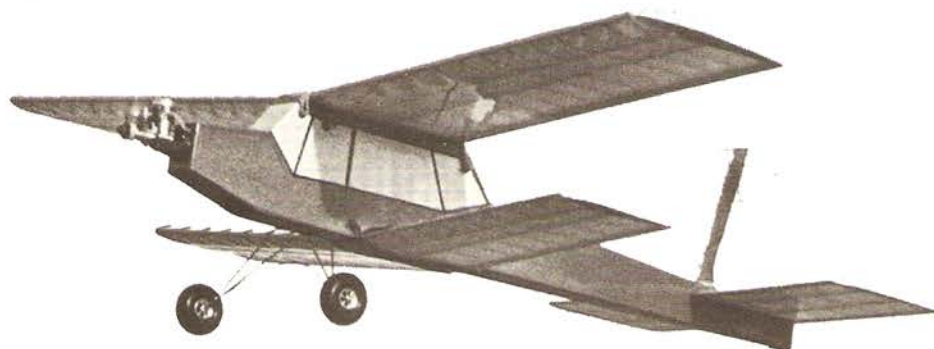


D R A G G I N -



BY

A SLOW FLYING FUN BIPE FOR .09 TO .15 ENGINES AND GREAT FOR FUN-FLYS

By L.F. Randolph

The advice that a mother is supposed to have given her son, who had just become a pilot --- "fly low and slow." --- has an application in Draggin-By, for it is an airplane that can be flown in just that manner and not only to survive, but thrive. We older flyers need two things in an airplane; first, it must be easy to fly and, second, it should be visible. Draggin-By is both. It is a very gentle airplane to fly, in fact, it is almost too gentle to be called a trainer for it will take care of itself so well there is no need for the pilot to acquire anything other than basic skill. By being a rather large biplane (span nearly 5 ft.) it is quite visible, especially so when flown slow and close. The fuselage-wing configuration helps a great deal to eliminate disorientation at reasonable distances. Add to the above the fact that Draggin-By is a very thrifty plane to fly. A 4 oz. tank will fly it for almost 20 minutes at half throttle and nearly a half hour when power is reduced to the minimum to keep it airborne. Others on your frequency will hate you.

Hanging from my shop ceiling are ten airplanes, all of them in flying condition, but, since its completion Draggin-By has gotten the call every time the wind is less than 15 mph. It will handle more wind than that, but landings become a problem. About landings --- touch and goes are so graceful that I have spent whole sessions doing nothing but that and enjoying each one.

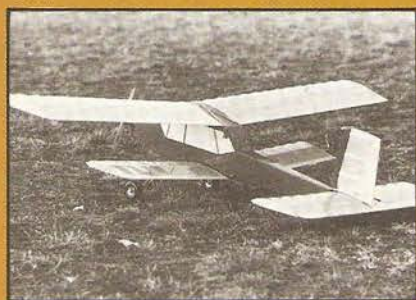
Unfortunately, Draggin-By is not an aerobatic airplane. It will snap, but it won't spin. It will loop, but it won't roll; it will fly inverted quite well for a flat bottomed wing, but without the roll ability, it will stay well above the split-S altitude. Do not try to over-power it, a little Schnuerle ported Speedy .10 flies it just fine, and a sport .15 would be okay but, please, no more.

CONSTRUCTION

This is an easy airplane to build; it has one extra wing to build but no aileron hardware to fool with so it about balances out. Build it light, it is strong just the way it is; in fact, it has survived a straight down full power crash with only the loss of the firewall and some wing tip damage. It took longer to find the broken wire in the radio than to repair the damage to the airplane.

Wings:

Make templates for the ribs and, while you are at it, make one for the stab as well. If you are careful with placement you can cut all the ribs from four sheets of 1/16" x 3" x 36" balsa sheet with some left over for sheeting. When the ribs are cut, stack each group together and gang sand them to the same outlines. Set the stab ribs aside for later. Trim 1/16" from the top and bottom of three ribs from each wing; these are the



DRAGGIN-BY

Designed By: L.F. Randolph

TYPE AIRCRAFT

Sport Biplane

WINGSPAN

Upper 58", Lower 37"

WING CHORD

Upper 9 1/4", Lower 6 1/4"

TOTAL WING AREA

777 sq. in.

WING LOCATION

Bi-plane

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord

DIHEDRAL EACH TIP

Upper 2", Lower 1"

O.A. FUSELAGE LENGTH

37 1/4 Inches

RADIO COMPARTMENT AREA

(L) 9" x (W) 2 1/4" x (H) 5"

STABILIZER SPAN

25 1/2 Inches

STABILIZER CHORD (incl. elev.)

7 1/2 Inches

STABILIZER AREA

183 Sq. in.

STAB. AIRFOIL SECTION

Flat Bottom

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

8 Inches

VERTICAL FIN WIDTH (incl. rudder)

5 1/2" (Avg.)

Rec. ENGINE SIZE

.099-.15 cu. in.

FUEL TANK SIZE

4 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

2-3

CONTROL FUNCTIONS

Rud., Elev., & Engine

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa and Ply
Empennage	Balsa
Wt. Ready To Fly	44 Oz.
Wing Loading	8.15 Oz./Sq. Ft.

center section ribs, R2 and R4. Strip the spars from 3/16" medium balsa, one 3" x 36" sheet will supply them for both wings. The trailing edges are 1/4" stock for the top wing and 3/16" for the bottom. Cut the webs for both wings from 1/16" balsa with the grain running vertically and use the webs as a gauge to notch the trailing edges. Cut the dihedral braces from 1/16" plywood and set them aside.

Cover the plans with waxpaper or clear plastic and build the wings right over the plan. Pin the trailing edges in position, then place several ribs in the notches and use the ribs to position the two bottom spars then pin them in place. By doing this, any differences in depth of the notches are compensated for. Start at the center and add the webs then the second center rib. Shim the bottom up from the plan 1/16" to allow for the center section sheeting, more webs, the first regular rib, webs, ribs etc., out to the tip.

When all the ribs are in place, glue the two top spars in place and add the leading edge. Build the bottom wing half at the same time as the top and, when both halves are complete, the other halves can be built over the same plan by simply putting webs, the second center section rib, etc., at the opposite end of the plan and building from left to right rather than from right to left. When all four halves are complete, bevel the spars, leading and trailing edge at the center, to fit the dihedral angle and enlarge the spar notches to receive the dihedral braces.

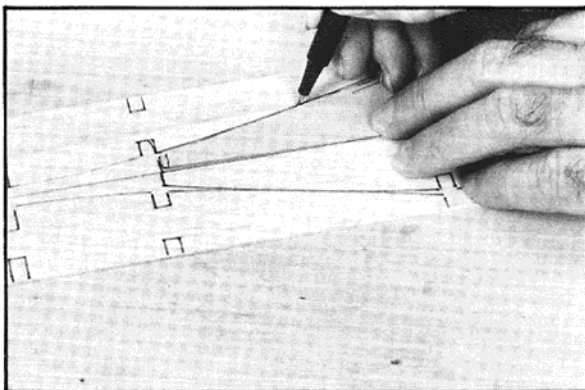
Starting with the top wing, glue the top dihedral braces in place and clamp them with clothespins, then add the bottom braces and clamp them the same way. The bottom wing is joined in the same way.

When everything is dry, cut the remaining center ribs in front of, and behind, the spar notches to match the dihedral braces and glue them at the dihedral joint. Sheet the center section and sand the leading edges round to match the airfoil. Sand the completed wings and epoxy a piece of 1/16" music wire, bent to the dihedral angle, at the trailing edge in the center of both wings. This will guard against denting by the rubberbands that hold the wings in place on the fuselage.

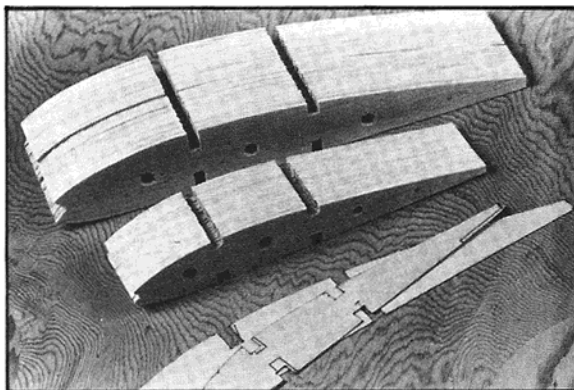
Fuselage:

The fuselage sides are cut from soft 3/32" sheet balsa. This can be 6" wide stock or you can edge glue three pieces of 3" wide stock to form one sheet 9" wide by 36" long and cut both sides from it. The new instant glues make edge gluing a snap, assuming the edges match. Cut the doublers from 1/32" plywood and glue them in place.

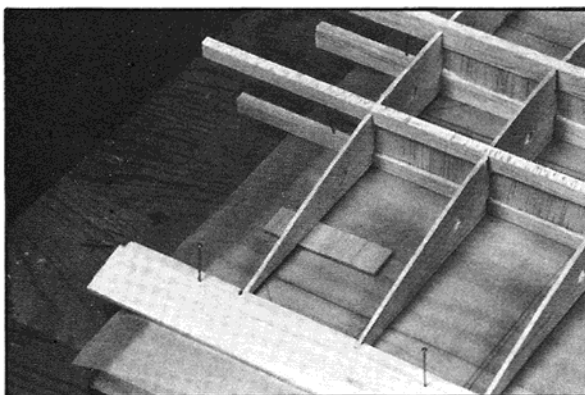
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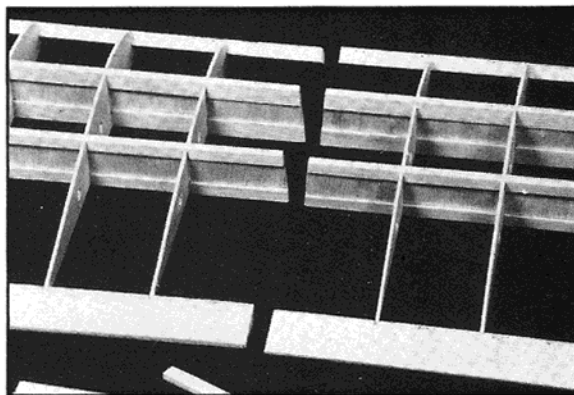
A template made from heavy card stock is used to make a printed sheet of ribs.



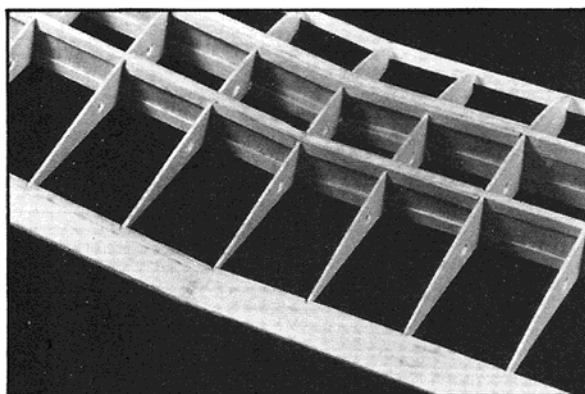
Completed ribs after gang sanding with their templates, the holes allow the plastic covering to breathe when it is shrunk tight.



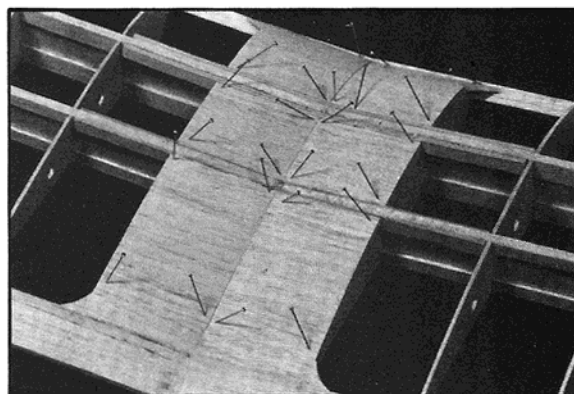
Shim center section ribs up from building board to allow for later sheeting.



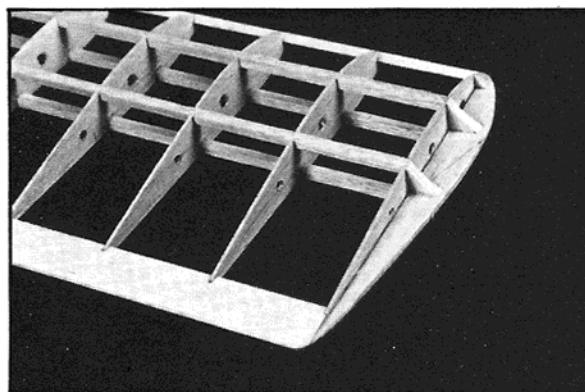
Leading, trailing edges, as well as spars, beveled to the dihedral angle ready to be joined by the dihedral braces.



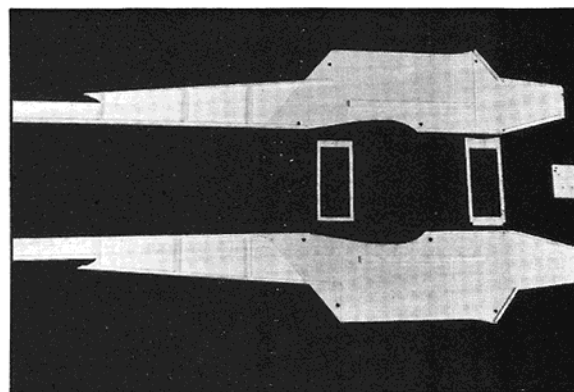
1/16" plywood dihedral braces installed and center rib in place.



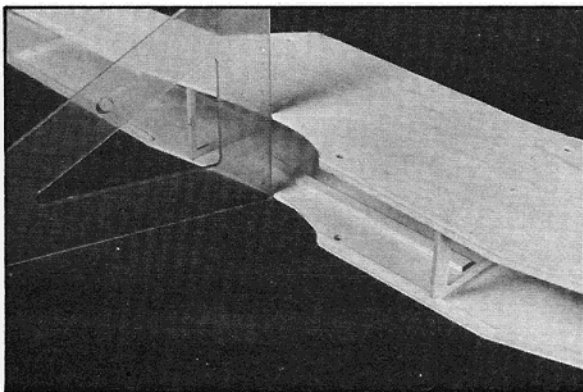
1/16" balsa sheet installed on wing center section.



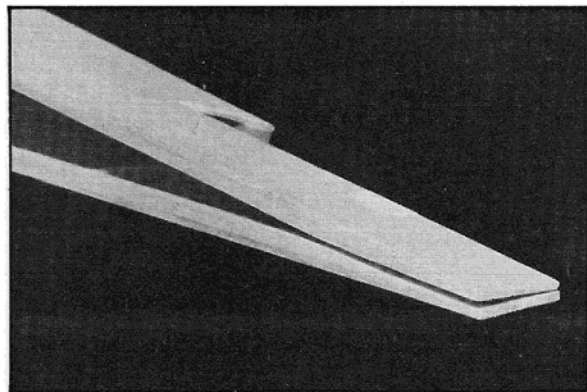
3/16" balsa gussets are added to keep covering from wrinkling on tip.



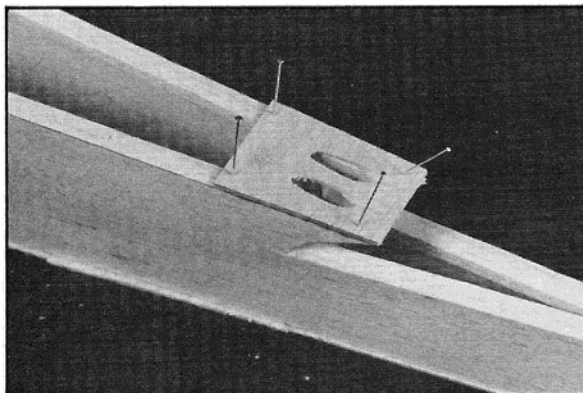
Fuselage sides with doublers, longerons and uprights installed ready to be joined by formers F2 and F3.



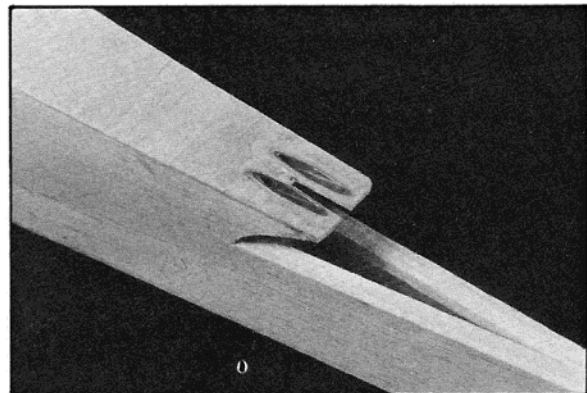
A square is used to align the two sides when joined by the cabin formers.



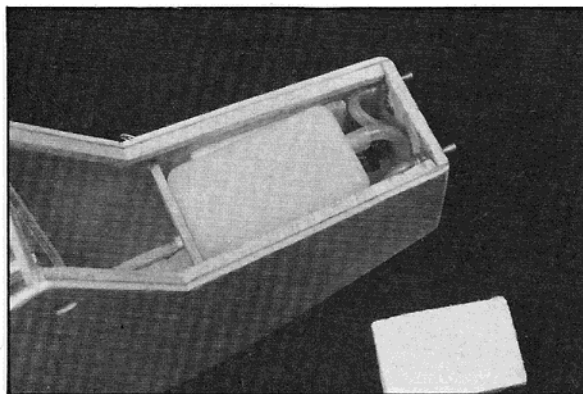
The fuselage sides are beveled at the tail before joining.



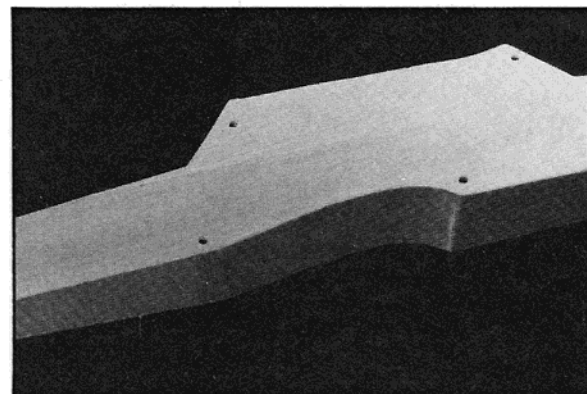
Fabricate exit holes for nyrod guides in sheet balsa top sheeting before it is installed.



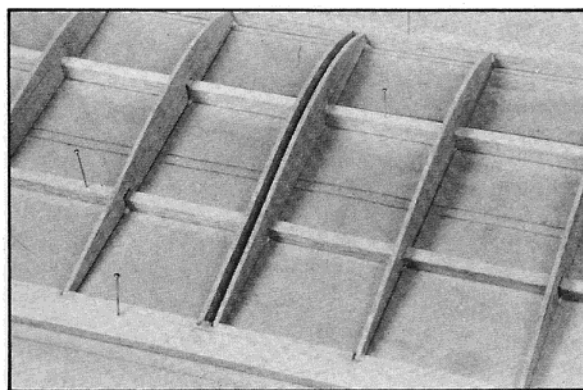
Nyrod guide exits after sheeting is complete and final sanding.



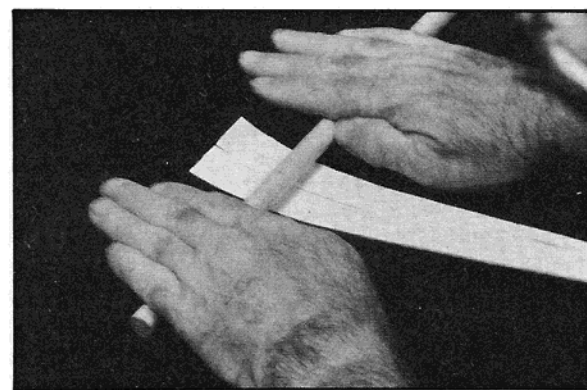
Fuel tank is installed and held in place with foam wedges, 1/8" brass tube fuel and overflow line carry throughs.



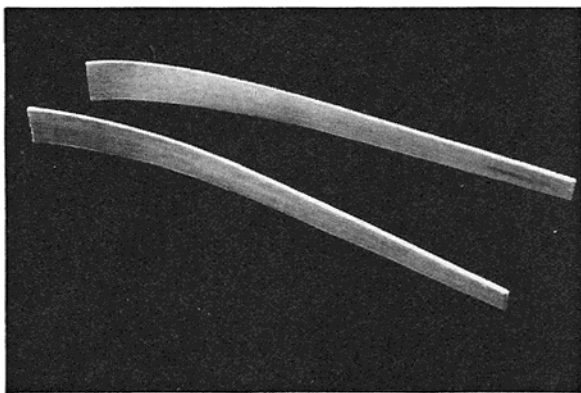
Completed fuselage showing sheeting of bottom wing saddle.



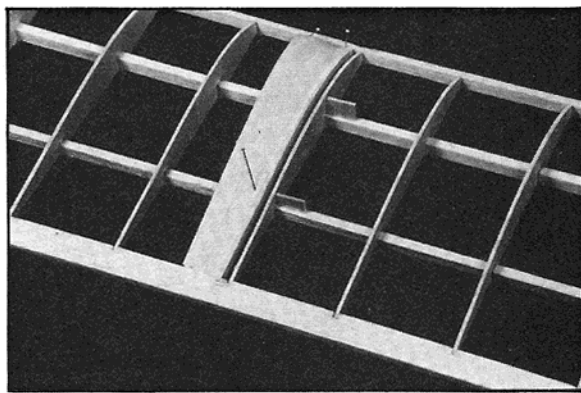
Stab construction, two center ribs must be vertical, use 1/8" sheet balsa as a spacer.



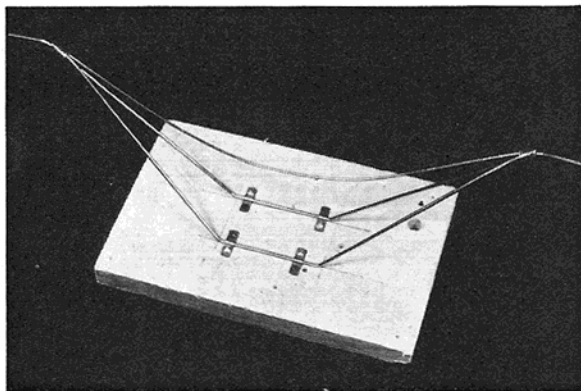
Method of rolling airfoil shape in stab top sheeting. Use a 1/2" dowel and a hard surface.



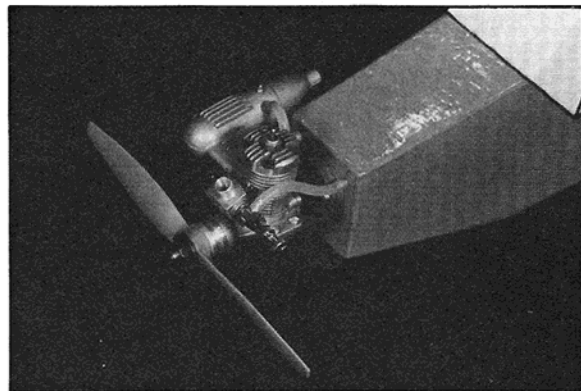
Top stab sheeting ready for installation.



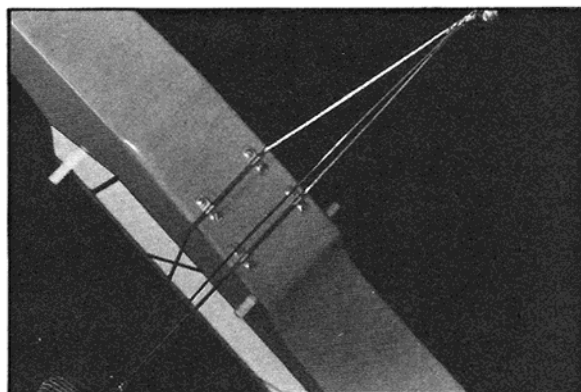
Method of installing stab top sheeting, 1/16" balsa shims anchor it in place.



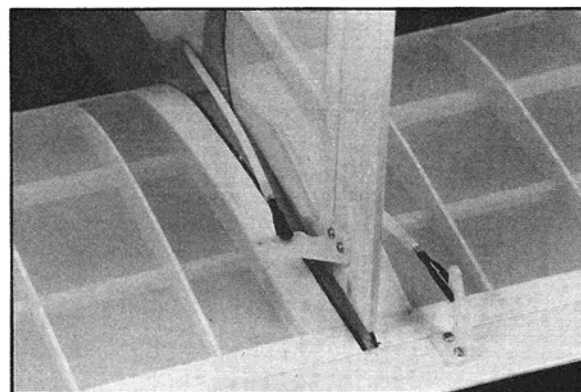
Landing gear mounted on hardwood scrap for soldering and alignment. Wheels should be installed at this time.



Engine installation, muffer pressure tap connected to overflow line.



Landing gear mounted on plywood pad with small wood screws.



Rudder and elevator with connecting clevises and nyrods. Clevises are attached to nyrods with 2-56 threaded rods.

Epoxy is heavy but it does eliminate warping so, in this case, use it.

Once the doublers are secure, add the longerons and uprights, then pin the two sides together with the plywood on the outside and sand them to the same outline. While they are pinned together drill the 1/4" holes for wing mounting dowels. Cut the firewall from 3/16" plywood, drill it for the engine mounts, fuel and overflow lines, as well as the throttle line, and install T-nuts on the back side for the mount bolts. Cut the two cabin formers from 1/8" plywood and, using a square, glue these formers in position on one of the fuselage sides. Again use a square to assure trueness and glue the

second fuselage side to the formers directly over the first. Epoxy the firewall in place and bevel the two sides at the tail and join them. Check that the stab cut-out is true and parallel with the bottom sides.

Install the NyRod guides to the rudder and elevator and the inner NyRod for the throttle line. Mount the tank on a foam wedge with more wedges on the sides to hold it secure, and install the fuel and overflow lines. Sheet the top and bottom of the fuselage with 1/16" balsa except for the area just in front of the bottom wing which is 1/8" plywood and the small area just aft of the top wing which is 1/8" balsa. Sand the completed fuselage with fine sandpaper and

it is ready to cover.

Empenage:

The stab is built right over the plan just like the wings. The two center ribs are installed using a piece of 1/8" sheet as a spacer; make sure they are straight up and down for the rudder fits in the slot between them. Cut the two triangled shaped pieces of 1/16" medium balsa for the top sheeting and roll the airfoil shape into them with a 1/2" hardwood dowel; do this on a hard surface, it is easy to do and works great. Place the small spacers over the spars on each side of the ribs (these spacers should be 1/16" below the top of the ribs) and glue the top

sheets in place. Add the bottom sheeting between the spars.

The vertical stab is built right over the plan from 1/2" x 1/8" medium balsa. This may seem light but it does the job and helps keep the tail light, which is the only way tails should be. Cut the rudder and elevator from soft sheet balsa.

Finishing:

The framework was designed for one of the plastic coverings and their use is highly recommended. It takes about a roll and a half to cover the airplane and the square lines make covering easy. Slightly overlap the firewall with the covering material and paint the bare plywood with an epoxy paint to match the fuselage. I use plastic film hinges on all surfaces and swear by them. Cover the vertical and horizontal stabs separately and epoxy them together after they are covered; cut the film away from the areas of contact. Epoxy them to the fuselage in the same manner --- make sure of alignment of these surfaces with the wings and the fuselage.

Bend the landing gear from 3/32" music wire to the shapes shown. Use a piece of scrap hardwood as a base and mount them on with the same brackets and spacing as on the airplane. Bind the joints with soft wire and solder. While it is still mounted on the base, check it for alignment; if necessary, straighten it and mount the wheels. Bend the tailskid from 1/16" music wire and epoxy it in place. Mount the landing gear on the fuselage and glue in the wing hold-down dowels; coat the dowels with epoxy paint or glue.

Drill the engine mounts for your engine and attach it to the firewall with bolts through the T-nuts previously installed and mount the engine.

Wrap the battery in foam, put it in a baggie and mount it just ahead of F2 behind the tank. The servos are installed in a plywood tray which is slid back and forth along the servo mounting rails until the airplane balances at the point indicated, then glued to the rails. Where the antenna exits the fuselage, glue in a piece of fuel tubing and run the antenna through it. Install the inner NyRods to the elevator and rudder with clevises and horns. The throttle line is florist wire and there is a kink bent in it just as it exits the firewall which acts as an override as well as a method of adjustment. Trial fit the wings to the fuselage and correct any misalignment, then install wing saddle tape to both top and bottom wing mounts. Connect fuel lines and range check the equipment with the engine running and, --- let's fly.

Flying:

In the case of the original, it literally flew

right off the bench with no trim changes at the transmitter. This is extremely rare so don't expect it. Do expect it to track into the wind on take-off, which should be at full throttle on the initial flight, and be somewhat sluggish in response compared to the usual sport designs. That does not mean that Draggin-By is not responsive --- it is, --- but rather it means that if you are fifty feet high you are still "two mistakes high." With the throttle fully retarded, landings are truly gently. Just keep it headed into the wind and apply a little back stick just before touch down to get the tail skid on the ground. Most of my flying is done at less than half throttle, take-off and all, because it's just fun that way. □

**Editing By Hlsat.
RCModeler
Oct. 1980.**