FLYBABY

FLYBABY
Designed By:
Chuck Cunningham
TYPE AIRCRAFT
Sport Scale
WINGSPAN
84 Inches
WING CHORD
14 Inches
TOTAL WING AREA
1120 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
2¾ Inches
O.A. FUSELAGE LENGTH
56½ Inches
RADIO COMPARTMENT SIZE
(L) 14" x (W) 5" x (H) 4½"
STABILIZER SPAN
29 Inches
STABILIZER CHORD (incl. elev.)
10" (Avg.)
STABILIZER AREA
232 Sq. In. (Approx.)
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top Of Fuselage
VERTICAL FIN HEIGHT
9 Inches
VERTICAL FIN WIDTH (incl. rud.)
11" (Avg.)
REC. ENGINE SIZE
.61-1.08 2-stroke
.90-1.20 4-stroke
FUEL TANK SIZE
16 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Spruce, Ply
Wing ..... Balsa, Ply
Empennage ..... Balsa,
Wt. Ready To Fly ..... 160 Oz.
Wing Loading ..... 20.5 Oz./Sq. Ft.

Chuck has done Pete Bowers' "Flybaby" in a 7' span especially for the 1.2 4-stroke. A .90 4-stroke or a .61 2-stroke will also work very well.

By Chuck Cunningham

The Flybaby design lends itself to the modeling world just about as easily as any full size aircraft can. There is no reason why it should not, since the original aircraft was designed by Pete Bowers back in the late fifties. Pete was a model builder prior to his interest in designing and constructing experimental aircraft; even today he probably still is a model builder. Somewhere lost in my files is a Bowers design Flybaby that was published way, way back in the dark ages. I can't recall if it was a free flight or a ukie, but when he set about designing his classic experimental single place full size monoplane he logically named it the Flybaby also. Several years ago RCM presented a fine 72" span Flybaby (RCM plan #798) along with a set of floats (RCM plan #801).

When I purchased an O.S. 1.2 engine I cast about thinking of something to design that would be scale-like, look good, fly great, be easy to build, and would be the perfect mate for the larger 4-stroke engines. Since I had done the Turbulent series in just about every size, it seemed logical to turn to the Flybaby. About five years ago I had designed one for my Quadra, having a wingspan of 8'. I liked it, so I decided that a 7' Flybaby would be just the ticket for the 1.2.

The finished model, sporting its covering of MonoKote, tips the scale at 10 lbs. With a wing area of just about 1100 square inches, the wing loading is a very fine 21 ounces per square foot. This airplane can fly both on the engine and the wing. If you have a .90 4-stroke, it will pull it and, as a matter of fact, if you want to stick a .61 2-stroke engine in the nose, the weight will be about 9 lbs., and will be very flyable. Naturally, you can also cram a .90 or 1.08 2-stroke up front since the airframe structure is plenty strong for just about any power.

This Flybaby is also suitable for any Quarter Scale event since the wingspan of the full size aircraft is 28'. The model is not a full blown scale replica. It is a Stand-Off Scale type model that has been intended to be a fine flying aircraft that looks like its full scale counterpart. The airfoil is the 20% thick symmetrical section that I have used with great success on the entire Turbulent series (from 5' span through 8' span), on the very acrobatic Hooker, and the smooth flying boat A-Hoy. I like the way models fly with this wing. The horizontal stab is not a slightly lifting section this time, but it is pretty thick, and the landing characteristics of the Flybaby are really super.

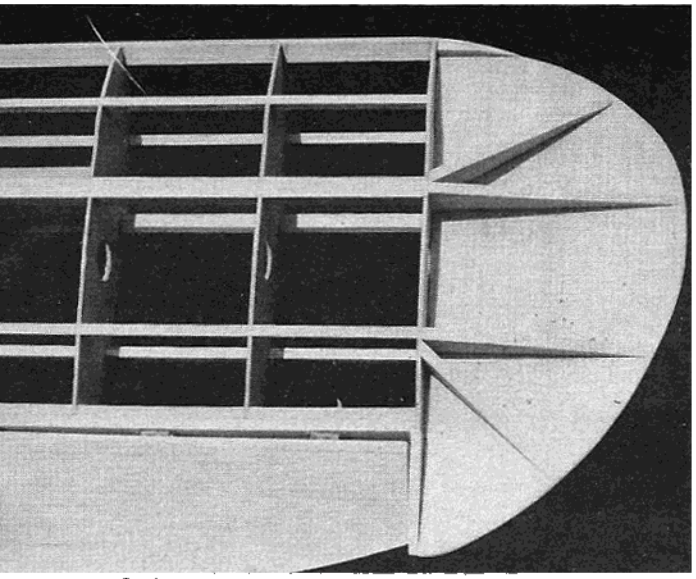
If you're planning to use an engine other than the 1.2 or .90 4-stroke, you can do this simply by moving the firewall further forward. The 4-strokers are about 1½" longer than the 2-strokers, but measure your engine on the mount, and locate the firewall accordingly. Better get out the wood pile and get started chopping up bits and pieces. You will be glad that you built a Flybaby — it's an enjoyable airplane to own and to fly.

CONSTRUCTION

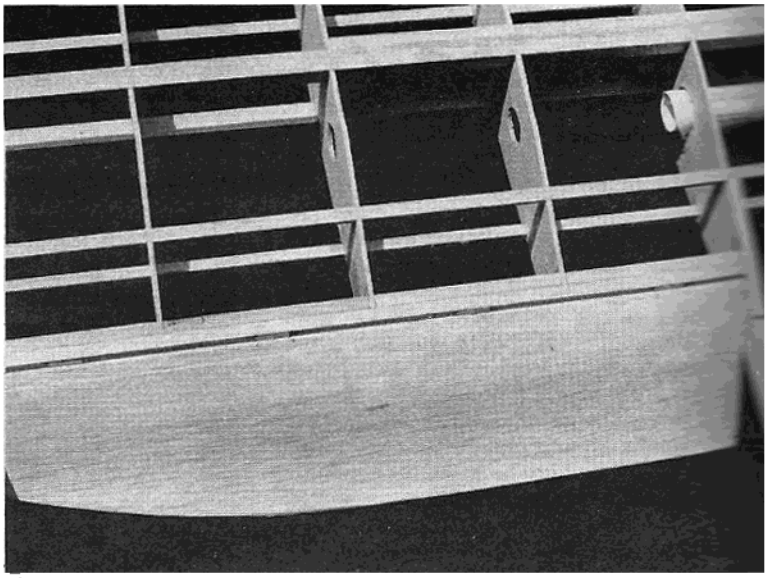
Wing:

Construct the wing first so that when it comes time to mate it to the fuselage you will be able to do so, and go on with the fuselage construction. Select very hard balsa for the wing spars, and medium hard balsa for the leading edge. Cut the wing ribs from medium hard sheet balsa. Note that there are two sizes of wing ribs. A more narrow rib for the center section as this area is covered by 3/32" sheet balsa, and wider ribs for all of the rest. Cut out all of the B ribs the same, then make the minor adjustments that are needed for the ribs at the tip due to the elliptical wing planform.

When all of the ribs are cut out and sanded, make sure that you mark the top of each rib so that it does not get placed in the wing bottom side up. Drill 3/4" hole in ribs at this time. See wing plan for location. Next, cover the plans with waxpaper and pin the lower main spar in place over the plans. Pin down the aft spar just in front of the spar location on the plans. This will serve to position the ribs correctly as you're building the wing panel. Glue all of the ribs in place on the main spar, using Hot Stuff Super T or similar CA adhesive. Next glue the top spar in place, cut all of the webbing and glue this in place. An even quicker method is to cut all of the webbing pieces first, glue in the center section ribs, then when you get out past the location of the dihedral brace, add a rib, glue in the webbing, add a rib, webbing, rib, webbing, and so on, working toward the tip. Then add the



Outboard end of right hand wing panel.

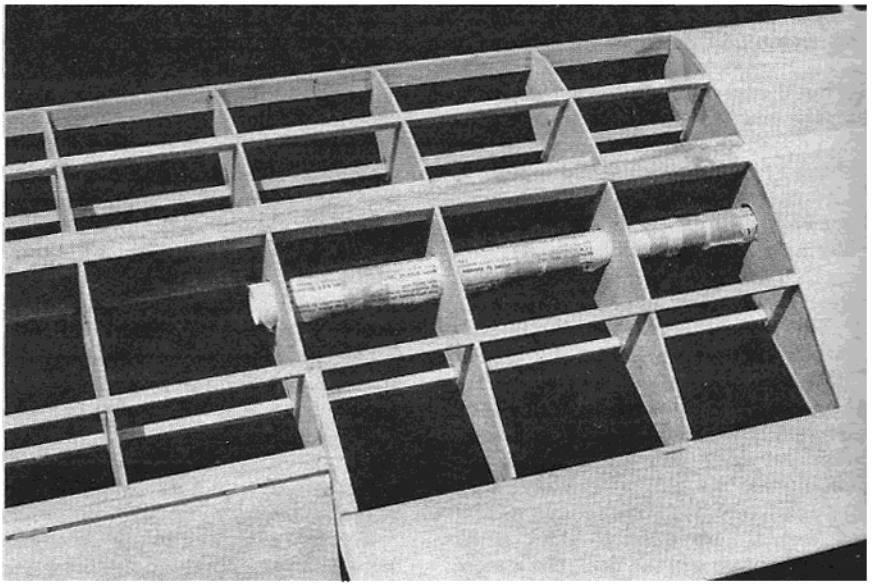


Outboard end of left wing panel.

top main spar. Whichever method you choose is okay. Next, glue in the other top spars and the trailing edge sheeting. Add the wing tip pieces, making sure that they are centered on the ribs. Do not cut out for ailerons yet.

The 3/4" hole you drilled in the wing ribs is to accept a small tube, rolled out of typing paper or other lightweight material, held together with Scotch Tape or glue. As you remove each wing half from the building board, slip this tube into position and hold in place with glue. This is the path for the aileron servo extension cords to run. It's a lot easier if you do this now rather than later.

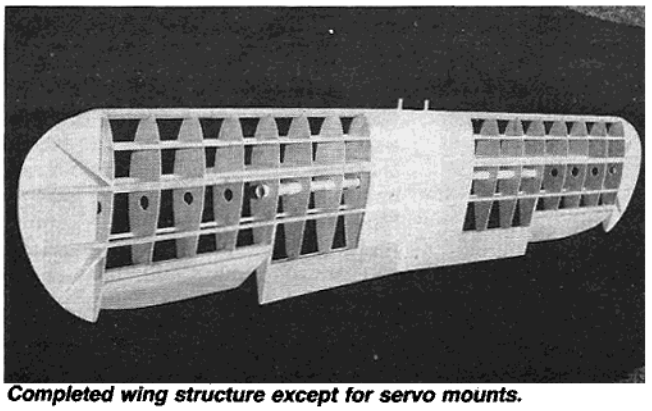
Now that you have removed the wing from the building board, add the bottom trailing edge sheeting and the leading edge. Add the bottom spars. Do not sheet the center section until later.



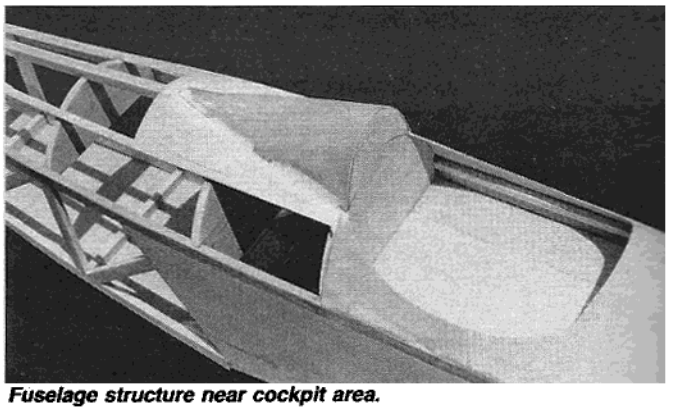
Rolled paper tube facilitates extension lead for aileron servo to be installed at aileron.

Now that you have both wing panels semi-completed, and you have slipped the aileron guide tube into position, it's time to join the wing panels. Squirt Hot Stuff Super T on the inside of the center wing rib, and stick both halves of the wing together. Use numerous clothespins to hold all of this together. If you have set the two centerline ribs to the correct dihedral angle when you were building each half, then everything will work out perfectly. When the CA has set up, remove the clothespins. Carefully saw a 1/4" slot in each rib to accept the main dihedral brace. Glue this in place with CA or epoxy, swabbing it between the spars and the main dihedral brace.

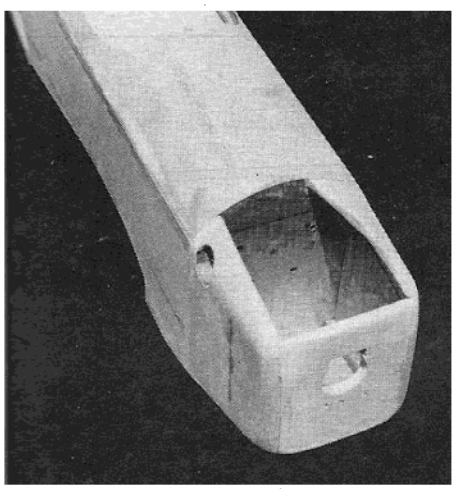
When all of this mess has set up,



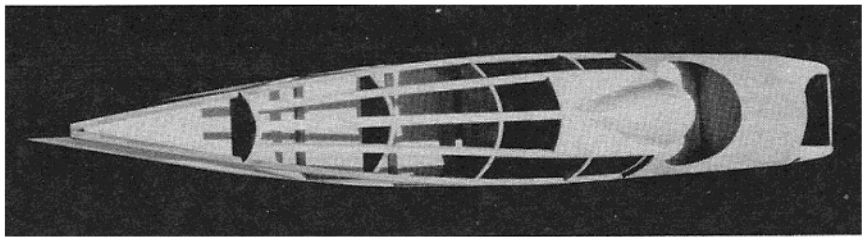
Completed wing structure except for servo mounts.



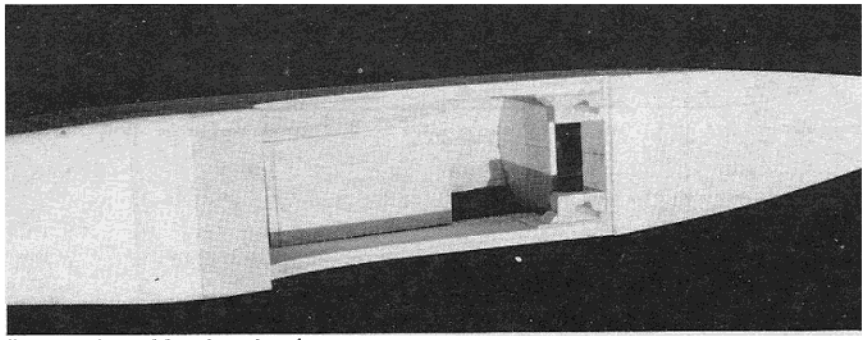
Fuselage structure near cockpit area.



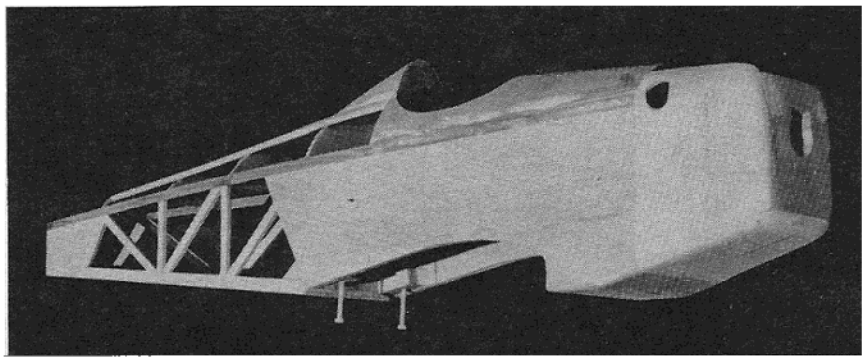
Nose section assembled.



Top rear view of completed fuselage.



Bottom view of fuselage in wing area.

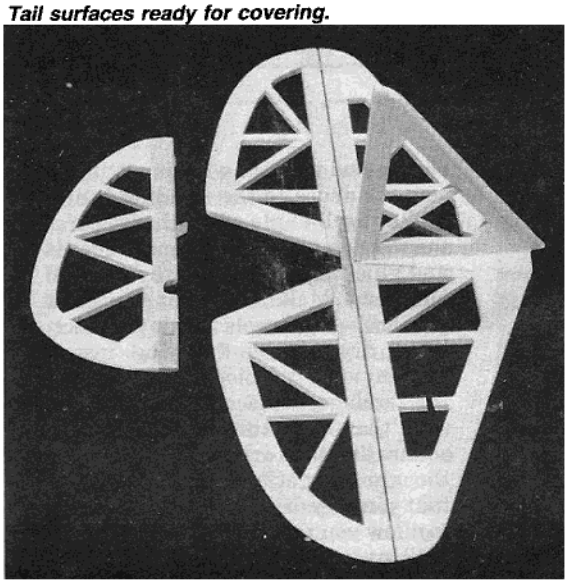


Another view of completed fuselage.

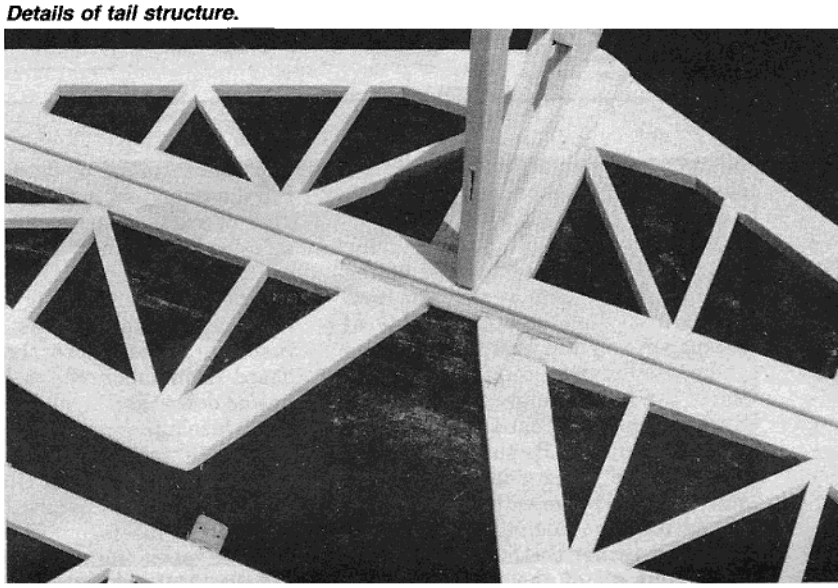
then, and only then, you can saw the slots for the front and rear braces and glue them in place. Next, glue the landing gear block in place in the wing. Add the plywood brace ribs at the correct location. Next is a very important part. Locate the plastic clips that are to be used to hold the landing gear to this wing block. Mark the location of the screw holes on the block and drill the screw holes. Install 2-56 blind nuts and screws. It is very important to do this assembly at this stage as the landing gear brace attached to the wing must be removable in order to remove the wing. After this is done, add the dowels at the leading edge of the wing. When completed, add the center section sheeting on both top and bottom of the wing.

The next step is to cut the ailerons out of each wing with a razor saw. Add the 1/4" wide trailing edge piece to the slot vacated by the ailerons. Add the extra braces for the hinges. Add the leading edge piece to each aileron and sand to shape. Make sure that you have added the aileron horn mounting block inside each aileron before you add the leading edge piece. Make the aileron servo boards from 1/8" plywood, and install scrap pieces of 1/4" plywood in each wing to serve as bolt blocks for the wing servo boards. Sand the wing structure; be sure to round off the leading edge of the wing to the shape shown on the plans. Do not leave this sharp. Hinge the

Tail surfaces ready for covering.



Details of tail structure.



ailerons to the wing, then set aside in a safe place and tackle the fuselage.

Fuselage:

Lay a piece of waxpaper over the plans and construct one side of the fuselage. Do not remove this side from the plans. Lay another piece of waxpaper over the first fuselage side and construct the second side right on top of the first. Remove the two sides from the building board and add all of the 1/4" doublers. Be sure that you're building one right side and one left side. Add the servo rails to the inside of each fuselage side. It's a lot easier to do it now rather than later.

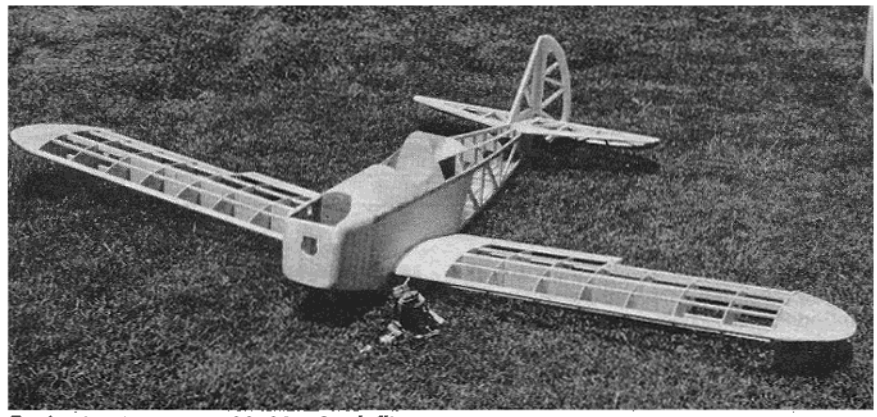
Cut out all of the main formers. Draw a centerline down each former. Pin these formers in place over the top view of the plans. Glue each fuselage side to each former; make sure that everything lines up and is square. Use an inexpensive drafting triangle to make all of these checks. Leave the fuselage fastened to the building board (remember you're building it upside down) and bring the tail end of each fuselage side together so that they are joined right over the centerline on the plans. Glue them in this location.

With the fuselage still attached to the plan, place the wing in the correct position. Make sure that everything is square and that the wing is setting at zero incidence to the building board. Make the 1/4" ply piece that secures the wing dowels, slip it over the dowels and glue the ply piece to the forward bulkhead. Make sure that you don't glue the wing dowels to this ply piece. When dry, remove the wing, install the rear wing bolt blocks to the sides of the fuselage, replace the wing, make sure that everything is once again square and then drill the bolt holes for the rear wing attachment. Make sure that you only drill the correct size hole to allow you to tap the bolt block for a 1/4" nylon bolt. Drill a 1/4" hole through the wing. If everything is okay, then you can put the wing away until covering time.

Add the cross pieces to the rear of the fuselage assembly. Remove from the plans and add the firewall and all of the other bulkheads, making sure that everything is correctly lined up. Do not sheet the bottom of the fuselage yet.

Add the front plywood pieces and braces where the landing gear attaches. Make sure that all of the plywood pieces are glued to each other. This makes a plywood assembly that carries both the wing and the landing gear and is strong enough to survive many less than perfect landings.

Finish off the fuselage structure by adding the 1/32" plywood forward turtledeck. It is best to rough cut this piece to size, even making the cut-out for the cockpit. Now, with a sponge, wet the inside of this piece and roll it into a tube. Make this tube about the same size as it will be when installed on the fuselage. Hold in shape with rubber bands or masking tape until dry. I usually mark a centerline on both the inside and outside of this plywood part. When I'm ready to stick it to the fuselage I glue it to the center brace, making sure that everything lines up from the top. Next I glue one side to the fuselage, then the other. This is much easier than trying to get everything done in one glue session.



Basic structure assembled to check fit.

When all of this is completed, glue all of the nose blocks in place and sand to shape. Clean off all of the sawdust and install the servos into the fuselage. Cut the slots at the rear of the aircraft for the pushrods to exit. I used 1/4" dowels and regular Kwik Link type fittings for all of this. They are more than adequate for the 1.2 engines. When all of the pushrods are fitted in place and moving with no binding, build "fences" around the pushrods. Build one fence at the bulkhead just aft of the wing opening, and one fence just forward of the tail. These can be fabricated from 1/4" x 1/2" balsa. The purpose of these fences is to keep the pushrods from bowing under air loads. Properly installed, a 1/4" dowel pushrod will slip easily through a balsa fence, yet you can't make it bow. Now, you can put on the bottom sheeting. Remove the servos, leaving the pushrods in place. Sand the fuselage to your satisfaction making it ready for covering.

Tail Section:

These are constructed from 3/8" thick balsa, built right over the plans. This should present no problem to anyone, so why spend any time telling you what to do. Please make sure that when the fin is fitted to the horizontal stab, it is 90 degrees to the stab, and correctly lined up fore and aft.

Covering:

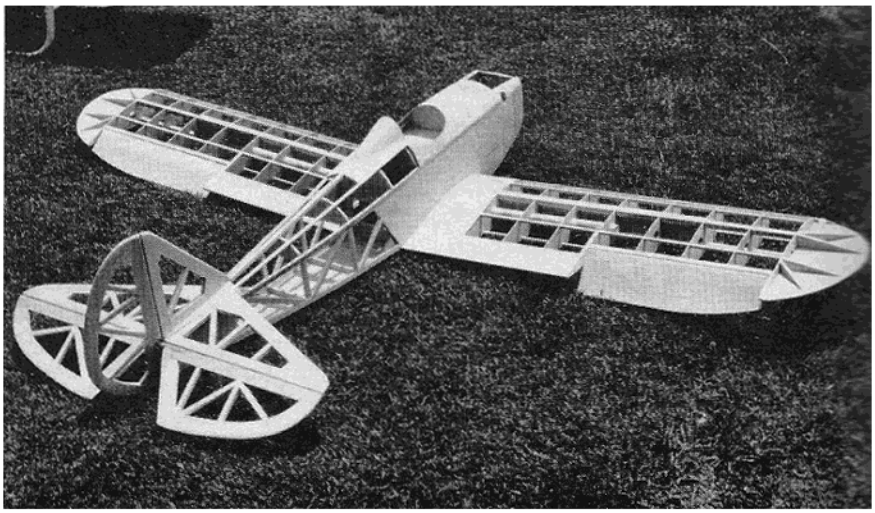
Choose any covering material that you like. I generally use MonoKote because I like it and it is easy to use. When all of the surfaces have been covered and shrunk, install the hinges. Pin them in place as well as glue them to the balsa. Clip off the hinge pins, and sand down to the surface with an emery board. Now, cut 1" wide strips of covering material and use this to seal all of the hinge gaps, even at the rudder. Make sure that you flex the movable surface away from the side that you're sealing. Seal both sides of each surface. This one little trick will really pay off in a much smoother flying aircraft. Always seal the hinges on any aircraft that you build.

Landing Gear:

The main gears are made of 5/32" music wire silver soldered together. Make sure that you clean each wire surface to be mated with fine sandpaper to remove oil, rust, or other oxidation. Wrap each joint with soft copper wire. When everything is as it should be, solder it all together. I use Stay Brite Silver Solder. It's more expensive than regular solder, but makes a much stronger joint. The landing gear is held in place with Goldberg plastic clips. You've already made the attachments at the wing, so all that you need to add are those at the fuselage location. I used Hobby Lobby rubber wheels (4½" diameter) on the prototype and I like them very much. They look good, are relatively inexpensive, and are very low bounce.

Flying:

Set the control surfaces with the elevator about 3/4" up and 3/4" down, rudder 1½" to each side, and ailerons about 5/8" up and 1/2" down. You will probably change the throws later. Make sure that the Flybaby balances at the point shown on the plans. If you're running a 4-stroker be sure that it's not set too lean. Point the nose into the wind and let her go. The tail will come up almost immediately and she will be off and tracking right into



From RCModeler Jan. 1986

Rear view of Flybaby frame.

the wind. When she becomes light on the wheels, gently ease back just a tad of up elevator and let her lift off. Make a gentle climb out. Turn back toward the field, gaining a bit of altitude all of the time. Now, you can do what you want. The Flybaby is very aerobatic and responds nicely to the 1.2 4-stroke engine. By the way, should you wish to put a .90 in the nose rather than the 1.2, you can make a simple plywood box with flanges that allow you to bolt it in place of the 1.2 mount. Then you can swap back and forth from engine to engine. Unfortunately, the only real problem is that the throttle pushrod is on opposite sides of each engine. If you plan ahead, you can install two sets of throttle pushrods while you're building, and two locations for the throttle servo. It really doesn't take much time during the building stage.

We left our bird enjoying its time in the sky. When it's time to land, reduce throttle, aim her at the runway and bring the Flybaby in for a three point landing. She can land at a pretty low speed. All in all, I know that you are going to enjoy your Flybaby. She is an easy plane to build, looks great in the sky, and is really a joy to fly. □