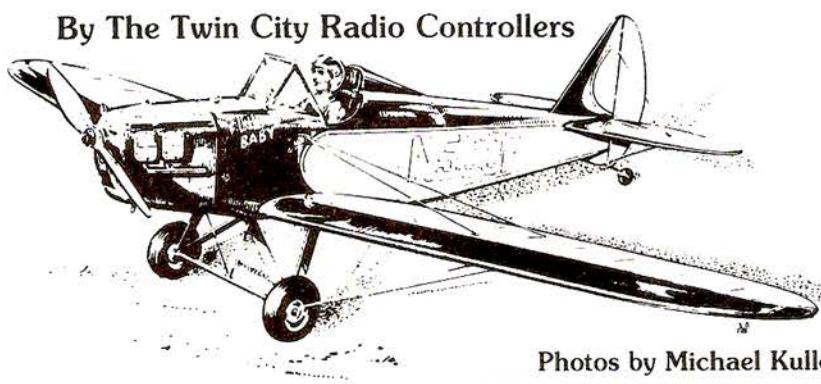


This Fly Baby model is a modeler's model of a full size home-built that was designed and built by a modeler.



By The Twin City Radio Controllers



Photos by Michael Kuller

Fly Baby

ABOUT THE AUTHORS

The Twin City Radio Controllers have been active in the Minneapolis — St. Paul area for twenty-two years. The one hundred members participate in all forms of RC --- contests, airshows, displays and sport flying. Float plane fun-flies in the summer and ski flying in the winter are TCRC traditions on the lakes of Minnesota. At present the Twin City Radio Controllers are working hard at developing a permanent flying site in the Minnesota River Valley.

FLY BABY

Designed By : Twin City Radio Controllers

TYPE AIRCRAFT

Sport Scale

WINGSPAN

72 Inches

WING CHORD

11½ Inches

TOTAL WING AREA

760 Square Inches

WING LOCATION

Low Wing

AIRFOIL

14% Flat Bottom

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

2¾ Inches

OVERALL FUSELAGE LENGTH

47 Inches

RADIO COMPARTMENT AREA

(L)10" x (W)4½" x (H)4"

STABILIZER SPAN

24¾ Inches

STABILIZER CHORD (incl. elev.)

8½ Inches

STABILIZER AREA

210 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top Of Fuselage

VERTICAL FIN HEIGHT

11¼ Inches

VERTICAL FIN WIDTH (incl. rud.)

10½

REC. ENGINE SIZE

.40-.61 Cu. In.

FUEL TANK SIZE

12 Oz.

LANDING GEAR

Conventional, Skis, Floats

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa and Ply

Wing Balsa and Ply

Empennage Balsa

Wt. Ready-To-Fly 6-12 Lbs.

Wing Loading 21-36.4 Oz./Sq. Ft.



PART I

It was a hot Sunday afternoon in the summer of 1963 when "Red" St. Aubin brought his Fly Baby to the Twin City Radio Controllers' field. It was built with the best equipment of the day --- F & M radio, Ancco servos, Veco .45 engine, silk and dope covering, and lots of number 64 gum bands to strap the wing onto the fuselage. "Red" fueled up the new Fly Baby, started the engine and taxied past the other ships in the pit --- a couple of Tauruses, a Mambo and several rudder-only Champs --- and took off crosswind to avoid the pine trees on the south side of the field. Just then a small tumbleweed was also making a take-off run of its own, blown by the wind, on a collision course with Red's Fly Baby. Other flyers looked up from their task of winding escapement rubber bands or tuning their superregen tank coils and

gasped as the Fly Baby hit tumbleweed just as the Fly Baby was rising off the ground.

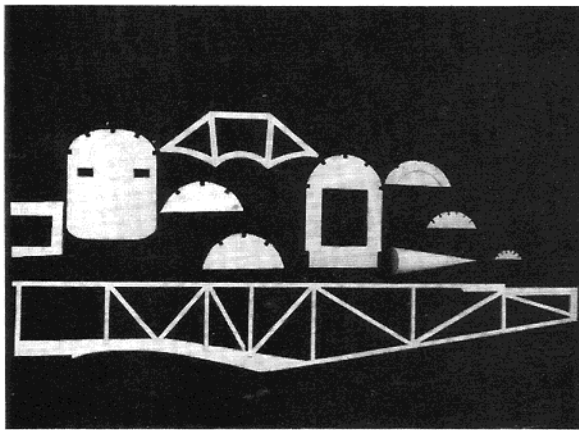
Both plane and tumbleweed arose together into the air; the tumbleweed was snagged on the Fly Baby's tailwheel. Although Red was the best flyer in the club, we all wondered how he would handle this problem.

Red flew Fly Baby as if the tumbleweed didn't exist. He pulsed the five switches on his ten channel transmitter through rolls, loops, hammerheads, inverted flight --- the whole aerobatic sequence. The Fly Baby flew as though the tumbleweed wasn't there. Most of us were so fascinated that we collapsed the antennas on our Orbit and Ace tone transmitters and watched the entire flight.

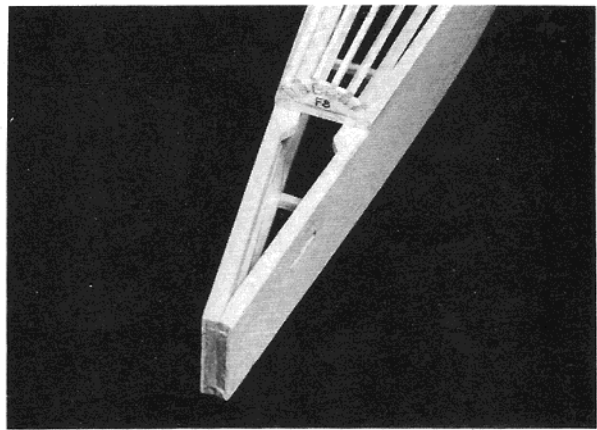
Since those early days of "multi" radio control at least eighteen Fly Babys have been built by TCRC members. Its popularity is due to those flying properties



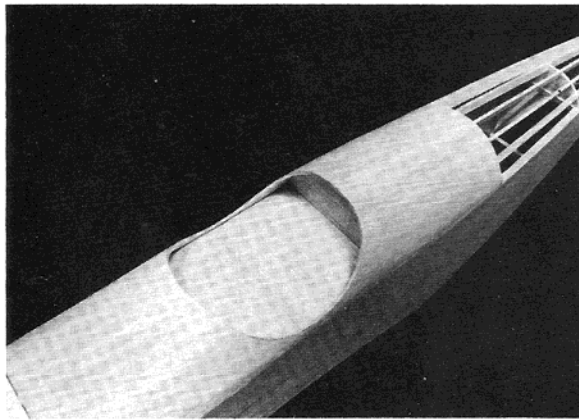
The full size Fly Baby --- photo courtesy of Pete Bowers.



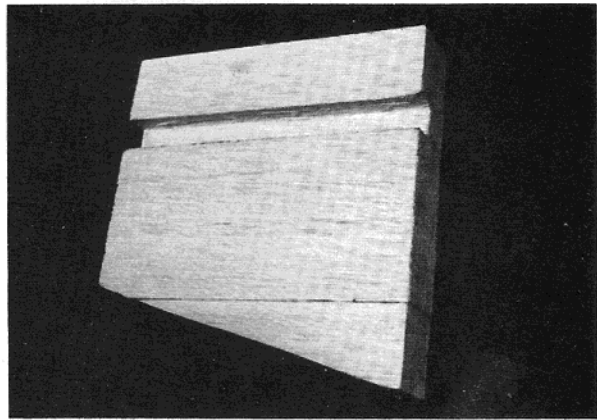
Fuselage frame and formers.



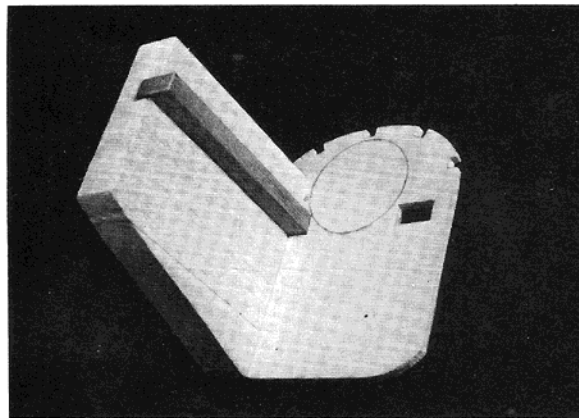
Fuselage rear ready to receive empennage.



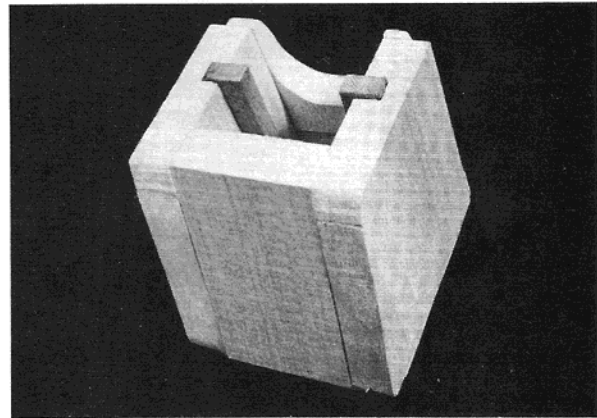
Cockpit cut-out.



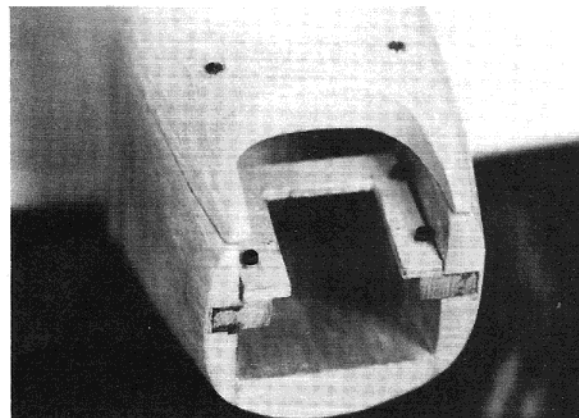
Right cowl block.



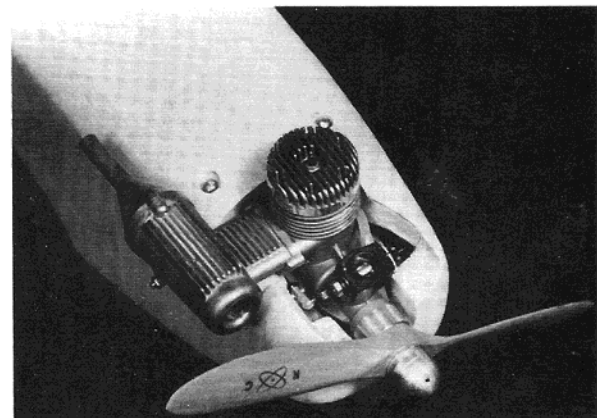
Right cowl block and engine bearer against firewall.



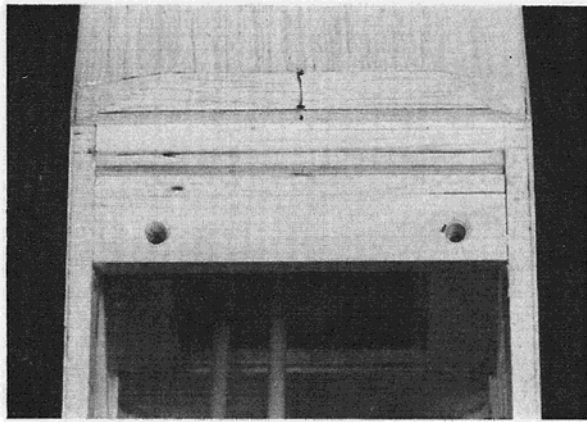
Nose block assembly without front block.



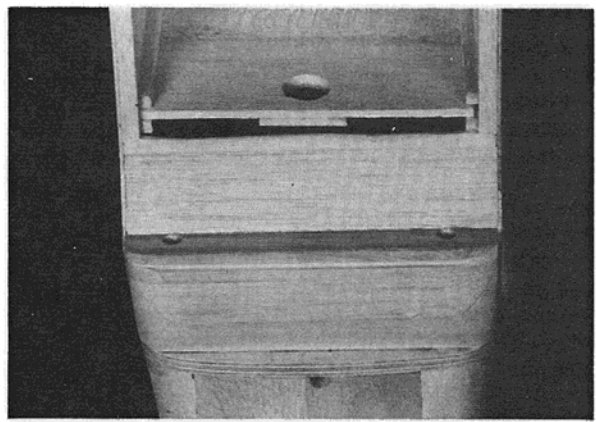
Completed nose section minus front block showing engine mounting plate.



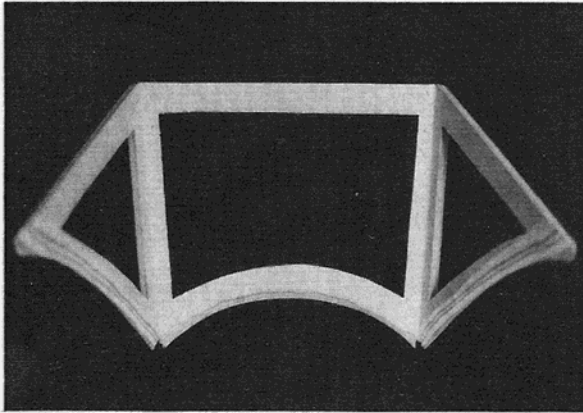
Completed nose, ready for finishing. Super Tigre .60 with Perry carb.



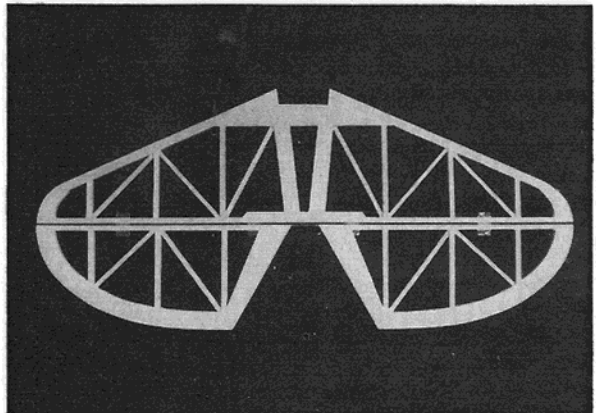
Fuselage at wing bolt holes.



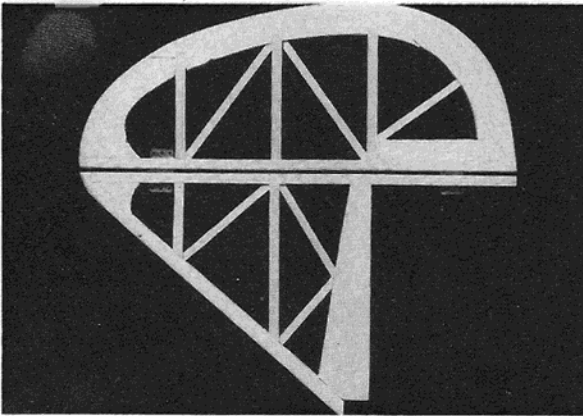
Fuselage at wing leading edge. L/G block also used for wing dowels.



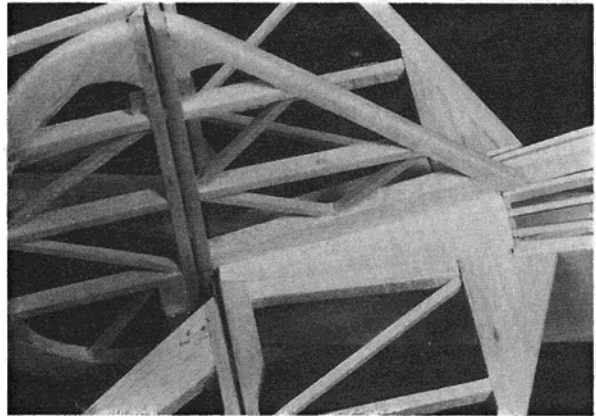
Windshield frame — note bevel to fit fuselage contour.



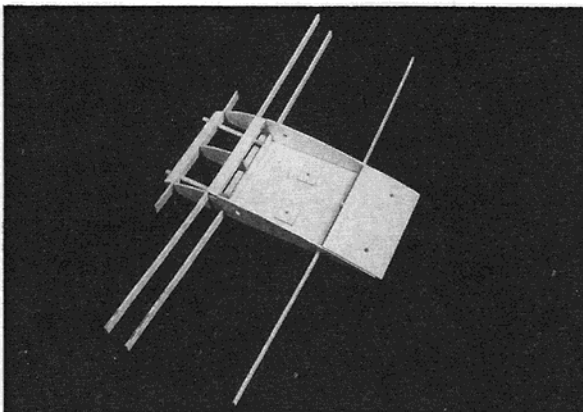
Completed stabilizer and elevator.



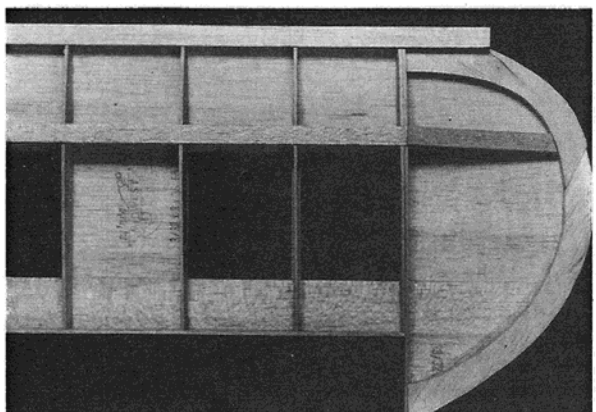
Completed rudder and fin.



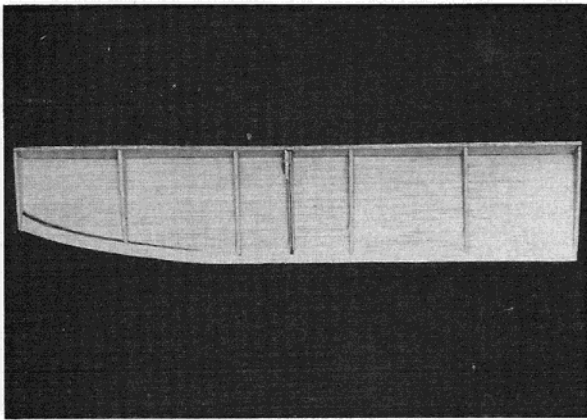
Tail assembly complete and installed.



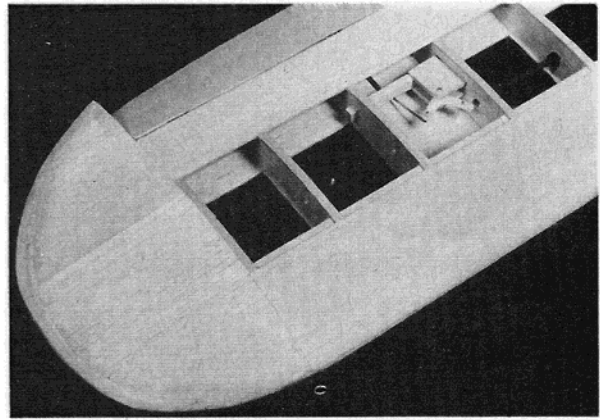
Wing center section with dihedral braces and wing dowels in place.



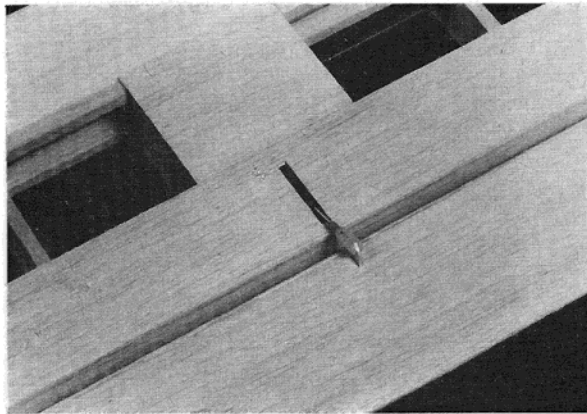
Wing panel shown with bottom sheeting. Bellcrank to be added.



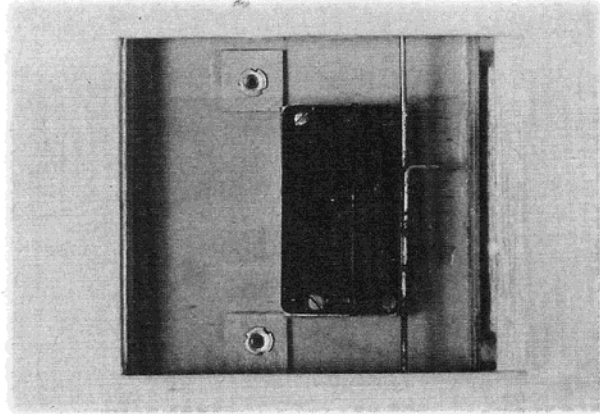
Aileron structure without top sheeting.



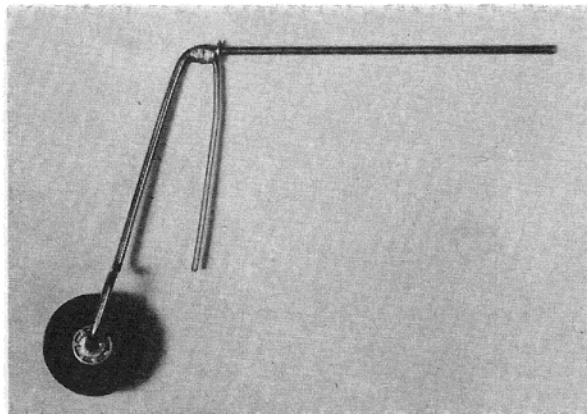
Wing panel complete except for sanding. Nice bellcrank mounting.



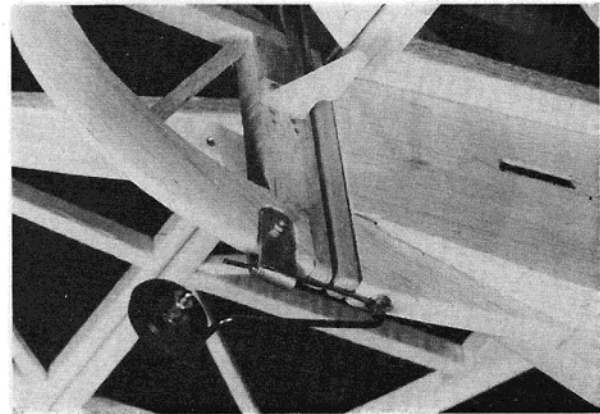
Aileron pushrod exit and horn.



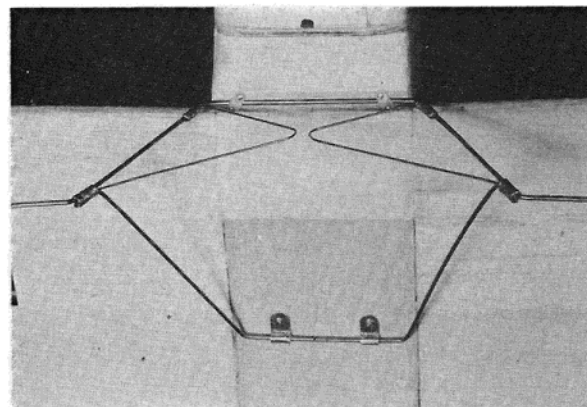
Aileron servo mount and pushrod. Note blind nuts for rear L/G leg hold-down screws.



Tailwheel and strut.



Tailwheel assembly mounted on fuselage.



Landing gear detail.



Completed model ready for covering.

that made Red's tumbleweed duet possible --- a large tail area for stability, generous control surfaces for positive handling and a simple rugged structure to survive the unexpected.

The plane is as popular as ever. To date there are seven Fly Babys in active use by TCRC club members.

Larry Gelo designed the TCRC's model version of the popular homebuilt in the early 1960's. Larry's original Fly Baby is still flying, having changed hands among club members several times and flown with skis and floats as well.

The Twin City Radio Controllers feel that it is about time that we share the Fly Baby with the rest of the aeromodeling world. So we proudly present the Gelo Fly Baby brought up to date as it is built and flown by the TCRC today.

The Full Sized Fly Baby:

Pete Bowers designed the full sized Fly Baby, but Pete started his career in aviation as a model builder. He designed a high wing free flight also named Fly Baby and flew it in the Nationals in 1940. Much later the full sized Fly Baby was designed; its construction remarkably similar to its model predecessor. Fly Baby was designed in response to a contest sponsored by the Experimental Aircraft Association to develop a homebuilt design that would be safe to fly and easy to construct by the many amateur air enthusiasts remaining after World War II. The Pete Bowers Fly Baby won the EAA contest and the design has been very popular among homebuilders ever since. Given this history, it is not surprising that returning the Fly Baby to model form has resulted in a rugged and well flying model.

Construction Notes:

The plans presented here show the Fly Baby as Stand-Off Scale in the original intent of the term, i.e., the outline and shape are close to scale, yet scale details have been simplified. The intention is a model that build easily, flies great and looks scale in the air. To win contests might require inverting and cowling the engine, adding flying wires and cockpit details. Scale references are shown on the plans for those who wish more attention to scale.

Fuselage:

The fuselage is a time honored stringer and former structure. Start by building the fuselage sides over the plans. Glue medium to soft 1/16" sheet balsa slightly larger than the fuselage sides to the side frames while the frames are laying flat on the work bench. Trim the side sheeting. Now lay one of the fuselage sides flat on the bench, sheet side down and glue formers F1 and F4 in place. Be sure that these formers are perpendicular to the fuselage side by using a protractor or triangle. Then glue the other side in place, with weights above F1 and F4 while the glue dries. Add the formers and cross braces between F1 and F4. If you have used the

same density balsa for the two fuselage sides, it is possible to pull the ends of the fuselage together, each side bending by the same amount. Add the remaining formers and cross braces. Cut the pushrod exits and fit, but don't install, the rudder and elevator pushrods. It is best to do this now, when the insides are so accessible. Stiff balsa pushrods are recommended, especially for the elevator.

It is possible to plank the fuselage top with only two sheets of 3/32" balsa if a notch is cut in the cockpit area and soft quarter grained balsa sheet is used. Install cockpit floor before sheeting the fuselage top. The top of the fuselage from F6 to F8 is open stringers. F5 is glued to F6 such that the outline of F6 is within the outline of F5.

Like the full sized Fly Baby, the bottom is sheeted. But, this sheeting may be omitted if you wish to save the weight.

A structurally critical part of the fuselage is the hardwood block that supports both the forward landing gear struts and the wing leading edge dowels. Cut the notch in the support balsa block that will hold this hardwood block and install the balsa block in the fuselage. Do not glue the hardwood block in place until the wing is fitted to the fuselage. The two holes that receive the wing dowels should be drilled at the same time that the holes in the wing leading edge dihedral brace are drilled. (See the Wing Construction notes.)

The engine bearers are set in grooves cut in the nose side blocks. These grooves can be cut with a razor blade or razor saw and chisel, or with a table saw or router. Note that the depth of the groove is deeper for the left bearer than for the right bearer. This difference is caused by the 3" right thrust offset.

Hatch hold-downs are simply two long machine screws that screw into blind nuts in the engine bearers.

The removable bulkhead between F1 and F2 is a throwback to reed radio days which is still useful. The original use of this slide-out bulkhead was to mount the receiver to the bulkhead with foam rubber and rubber bands. Modern radios are not so vibration critical so this purpose is no longer necessary. Instead, this bulkhead holds the battery pack and receiver wrapped in foam rubber, in place, forward of the former. The former slides out for access to the battery pack, receiver and tank.

Cut the canopy opening as follows: Trace the cockpit pattern onto tracing paper (don't cut it out of the plans, you will spoil them). Cut out the tracing paper pattern and lay it on the fuselage, positioning it equally between formers F2 and F3. Then trace around the pattern with a felt-tip pen. Finally, cut through the tracing with a single edge razor blade and trim with a #11 X-Acto blade.

The most difficult part of the whole project is the windshield. The joints should be mitered at approximately 45° and glued

with epoxy. Tape the three pieces together and position on the plane while the glue sets. A piece of waxed paper under the windshield will prevent it from sticking to the fuselage. The next step is to bevel the windshield frame to mate the fuselage. An X-Acto knife is a good tool to do this. Take your time and make a good fit. The windshield frame should be firmly epoxied to the fuselage.

The windshield has a very practical purpose. The fuselage will be supported by the windshield when the fuselage is placed upside down on the work bench or on the flying field for working on the radio or attaching the wing. The windshield frame provides a firm backstop for your hand when holding the plane while starting the engine.

Tail:

The Fly Baby has a rather large tail and a long tail moment. This gives the plane stability and control but creates the risk of unnecessary weight build-up. Excess weight in the tail must be balanced by four times as much nose weight. Most Fly Babys have not required any nose weight for balance but, because of the large tail, some care in material selection is wise. The only pieces in the tail that should be hard balsa are the stabilizer center spar, its center reinforcement, and the rudder post. Trailing edge pieces may be soft balsa and the stab-fin fairing may also be soft balsa. All other members should be medium density balsa.

Build the tail components over the plans. Taper the trailing edges and bevel the leading edges of elevator and rudder before hinging. The leading edges of the fin and stab should be rounded.

Wing:

All the ribs are derived from the same airfoil, so the stacked rib method of cutting the ribs may be used.

There are four dihedral braces. The leading edge brace must be drilled to hold the wing dowels, and these holes must align perfectly with the holes in the hardwood block in the fuselage. Clamp the fuselage block and the leading edge dihedral brace together. The top of the dihedral brace should be aligned with the top of the fuselage block. Drill two 1/4" holes through both pieces. Do not install the fuselage block in the fuselage until the wing is completed, ready for covering. The fuselage block may be glued in place as soon as the wing has been fitted to the fuselage. Use the completed wing to align the fuselage block in the fuselage.

Wing construction is classical. It may be built on a flat surface due to the flat bottomed airfoil. Use hard balsa spars.

Soft balsa should be used in the wing tips. Bevel the wing tips before top sheeting. Check this bevel by placing a straightedge span-wise over the last rib W6 and the wing tip.

Aileron pushrods may be 1/16" stiff wire, long Kwik Link pushrods, or stiff dowels. Avoid Z-bends in the aileron linkage, as this will only increase aileron play and risk flutter.

Join the two panels to the center section, raising the wing tips 2 3/8". Be sure that all parts of the bottom of the wing are parallel to the workbench at this point. Top sheeting may then be applied.

The trailing edge of the wing is bolted to the fuselage with two nylon bolts. One bolt would be strong enough, but sometimes the bolts work loose during a long flying session so two are used for safety. Drill a slightly undersized hole through the wing and wing block while the wing is in place on the fuselage. Test the wing for correct alignment before drilling by measuring from each wing tip to the end of the fuselage. Remove the wing and drill the holes in the wing to the same diameter as the bolt, and thread the block in the fuselage with a tap having the same diameter thread size as the bolts.

Landing Gear:

The main landing gear works on a sort of oleo principle. On impact the struts tend to spread apart, and this force is resisted by several turns of a #64 rubber band. This landing gear will resist a smashing touchdown without breaking a prop, but yet it is absorbent enough to prevent bouncing during a reasonable landing.

Clean and wrap the joints with copper wire and solder them with silver solder. The axles must be directly below the leading edge of the wing.

For wing removal, the bolts on the rear strut must be removed from the wing. Use blind nuts Hot Stuffed in place in the wing.

Install the tailwheel strut inside its brass tube and then install it in the fuselage. This is most easily done before the tail is glued to the fuselage.

Power:

Recommended power is .40 to .61 cubic inch engines. A .40 will give scale flying speed if weight is low, but will be lacking in vertical maneuvers. A strong .60 might be too much if the pilot uses too much full throttle. One should use the power of a .60 for acceleration or climbing, not for speed. The full power of a .60 will pull the Fly Baby at a scale speed of over 300 scale miles per hour in level flight --- too fast.

The thrust angle shown contains no down thrust. This will cause the Fly Baby to climb under power, just like the full size plane. But some flyers prefer their planes to not climb under power but merely accelerate. In this case, two or three degrees of down thrust are recommended.

Flying:

The Fly Baby is easier to fly than many trainers, so no big dissertation on this subject is required. A little right rudder might be required for a straight take-off. It looks nicer if you just let it rise off the ground by itself, without using any up elevator.

Ground handling is super. One Fly Baby pilot claims that his plane has never broken a prop except when it hit a tree.

Taxiing in a strong crosswind can sometimes be a problem because the fuselage side wants to weathercock into the wind. To overcome this, hold full up elevator, and goose the throttle. The prop wash will drive the tailwheel down and improve steering.

Inverted flight requires some down elevator, and rolls require more down elevator than up elevator. This is due primarily to the flat bottom airfoil. However, this airfoil combined with the large control surfaces gives good low speed control.

Weight is not too critical. Fly Babys have been built from six pound to twelve pounds of flying weight. All flew well and not too fast.

Construction of the skis and the floats as well as flying instructions for each will be described in next months issue of RCM.

The airplane presented here is the result of sixteen years of development & nearly twenty prototypes. Fly Babys have flown in countless airshows, contests and fun-flys. They have flown off water, snow, sod, paved runways, farmers' fields, and dirt roads. They have towed banners and flags, dropped candy and parachutes, and laced the sky with smoke bombs. The Fly Baby loves to fly. If you love to fly too, perhaps there is yet another Fly Baby that is waiting to be built.

MATERIALS LIST

All material is balsa unless otherwise specified.

- (3) 1/8 x 3/8 x 36
- (1) 1/4 x 6 x 12 ply
- (1) 1/8 x 12 x 24 ply
- (2) 1/4 Sq. x 36
- (7) 1/4 Sq. x 48
- (3) 1/4 x 3/8 x 36
- (3) 3/16 Sq. x 36
- (4) 1/4 x 1/2 x 36
- (1) 3/8 x 1/2 x 36
- (2) 5/8 Sq. x 36
- (5) 1/16 x 3 x 36
- (12) 3/32 x 3 x 36
- (1) 1/4 x 3 x 36
- (1) 3/8 x 3 x 36
- (1) 1/16 Piano wire
- (2) 3/32 Piano wire
- (2) 1/8 Piano wire
- (2) 1 x 3 x 6
- (1) 1 x 4 x 6
- (1) 1 x 6 x 18
- (1) 1/8 x 3 x 36
- (1) 1/2 x 5/8 x 12 maple
- (1) 1/2 x 7/8 x 12 maple
- (1) 1/4 inch dowel

□