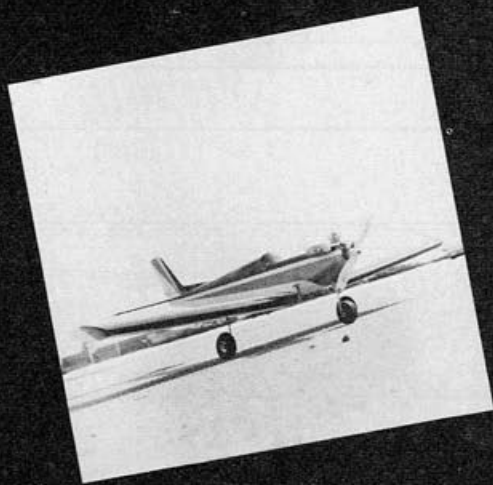


# FLY BY



... designed to fit a car containing two children, one wife, and one dog ...

Approximately a year ago a friend of mine asked me to help him with the construction drawings of a scale airplane, which he wanted to build. He spent many hours with the design and now and then helped him. Although he has not yet built his plane, the experience I gained is well worth the time I spent working with him. It was about this same time that my wife said to me: "You have been helping everyone build airplanes. Why not design and build your own?" So, thanks to my wife, the Fly-By was born. It came all my old drawings, and about a week later I had finished the outline of a model.

I wanted a small ship, but big enough to hold most equipment. I had a few other calculations, too. Due to unavoidable circumstances I needed a ship that was small enough to fit into the trunk of my car. To see, the rest of the car contains two children, one wife, and one dog. I also wanted an economical airplane (a friend of mine shouldn't use the word "cheap").

This was to be a good, full-house Sunday flier. Using a small engine such as a .35 would insure more flights per gallon, too. I now had all my ideas—the next step was to combine them into one ideal ship.

The Fly-By is small, having only a fifty-one inch wing span. With a .35 engine the ship moves along smoothly even at  $5\frac{1}{4}$  pounds. I am using the Digitrio 4 with Orbit type servos. By the way, this is just about the fastest servo I've seen. It makes the Fly-By very responsive, especially on ailerons.

The Fly-By has proven to be a very strong ship. Although it is an easy ship to build, the fuselage does require special construction. You will notice that there is no hatch in the battery compartment. This is because I feel it would weaken the front end.

One word of advice before you begin construction. Don't begin to cut any wood until you have laid out all the parts to be cut from the same stock sheet of balsa. Many parts of the ship are cut from a

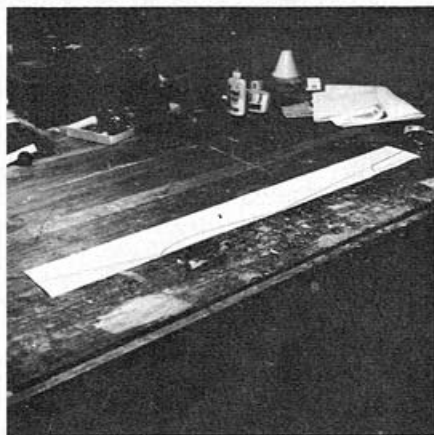
single piece of stock balsa. This is the feature that makes this ship inexpensive to build. I will explain further in the construction details exactly what parts are to be made from the leftovers.

Here are a few of the design features:

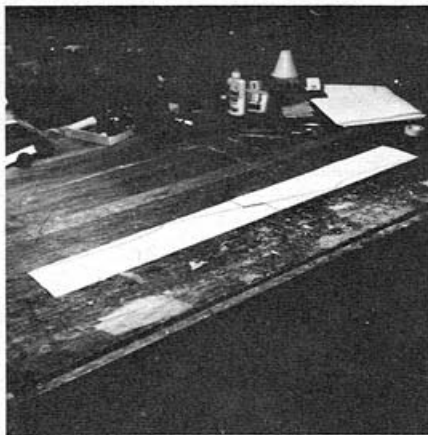
1. Three inch inside body dimension for most equipment.
2. Strip ailerons for ease of construction.
3. Standard size wood.
4. Splice at the tail end of the body. This will give you a 42" body from 36" stock wood. Don't let that splice fool you. It's strong!
5. A semi-symmetrical sixteen percent airfoil for good lift.
6. Sheet fin, rudder, and elevator.
7. Light weight sandwich type stabilizer.

All right, let's get started with the construction. Cut the sides from  $\frac{1}{8}$ " x 4" x 36". (See photo #1.)

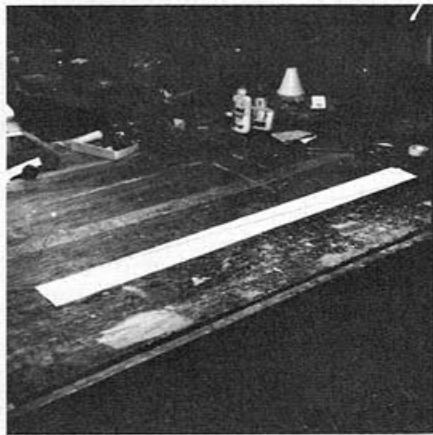
Before you cut the doubler, lay out both sides of the doubler with the front of the doubler in the center of the sheet. This



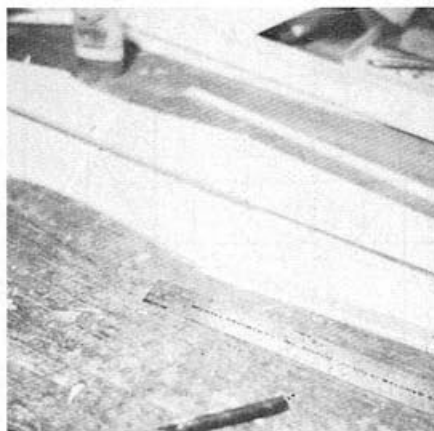
Layout of fuselage sides on stock wood.



Layout of doubler on stock wood.



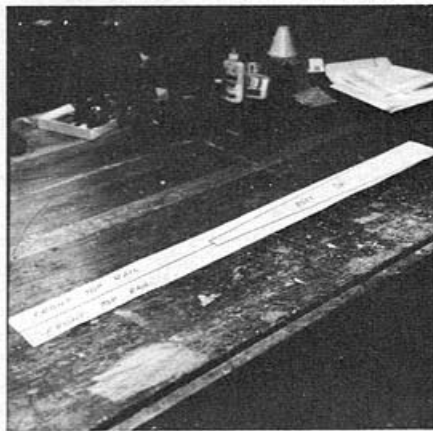
Layout of turtleback on stock sheet.



Fuselage side with doubler and longerons glued in place.



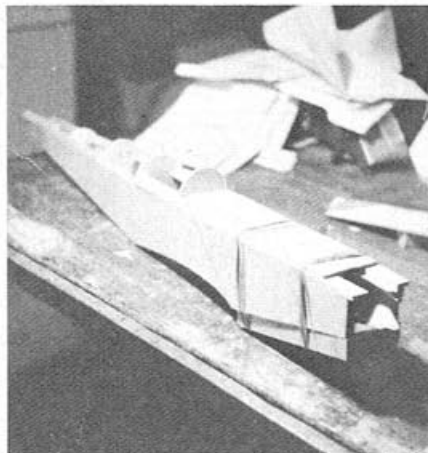
Layout of F-2-F6, fin and front top block.



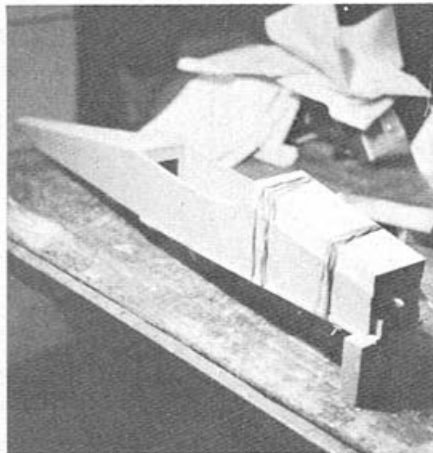
Layout of bottom sheet and front top rails.



Front top rails in place.



Front top block and bottom block in place.



Bottom view of photo 9.

will enable you to get two side doublers from one piece of  $\frac{1}{8}$ " x 4" x 36" balsa. You will notice (photo #2), that two doublers don't quite fit perfectly. That's all right, because you will trim this away later. Glue the doubler in place with Epoxy and set aside to dry.

Cut a piece of  $\frac{1}{8}$ " x 3" x 36", as per plan, for the turtle back and glue together with Ambroid to form a large triangle (see photo #3). When dry, dope one side of the triangle and allow to set over night.

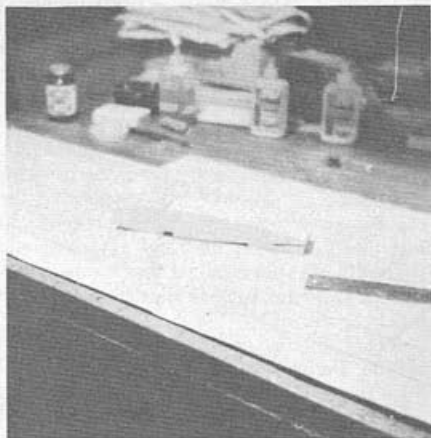
After the sides have set, glue on the  $\frac{1}{4}$ " x  $\frac{1}{2}$ " and  $\frac{1}{2}$ " triangle longerons.

Excess  $\frac{1}{2}$ " x  $\frac{1}{4}$ " will be used as the spar doublers. This will strengthen the sides of the fuselage. Make sure that the  $\frac{1}{4}$ " x  $\frac{1}{2}$ " longerons are  $\frac{1}{4}$ " above the top of the sides, and the  $\frac{1}{2}$ " triangle longerons are  $\frac{1}{4}$ " inside the bottom of the sides. Make the bulkhead and glue F1, (when you cut F1 decide whether you will use the Tatone mount with the nose wheel or Top Flite nose wheel, then drill holes to suit), F2, F3, and F4 in place with Titebond. The fin, rudder and top block are cut from the same stock as F3, 4, 5, and 6, (see photo #5), so lay out the parts on the stock be-

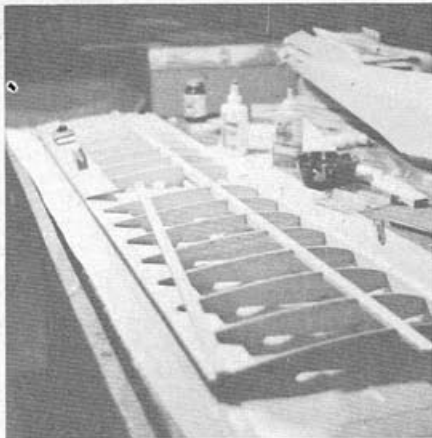
fore cutting. Make sure to keep the body in line. Set this aside to dry.

Take the turtle back and wet the side that wasn't doped. Keep it wet about fifteen minutes. You will see it begin to curl. Help it along by taping it to a round form, then allow to dry on the form.

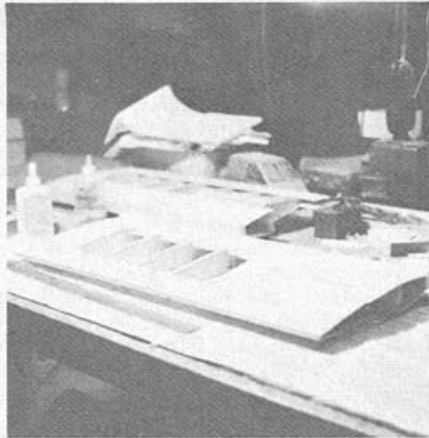
The bottom of the fuselage is cut from  $\frac{1}{4}$ " x 3" x 36" soft wood, and you should be careful how you cut it, (see photo #7). The tip of the triangle of the bottom sheet should be cut from about the middle of the wood. The leftover piece will be used for the top front rails.



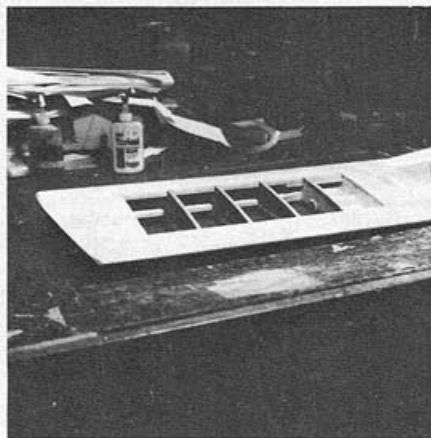
Stacked ribs for wing.



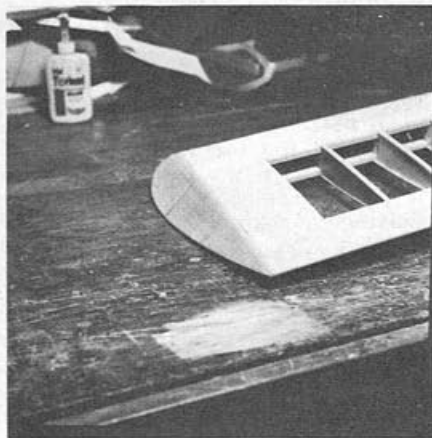
Construction of wing.



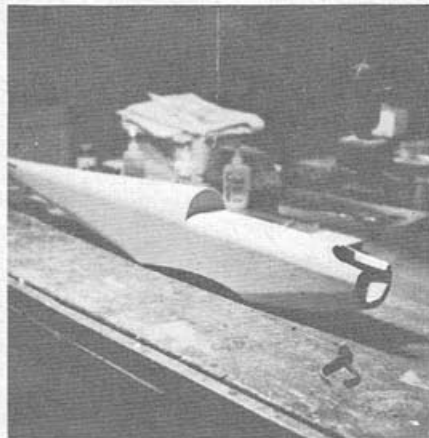
One wing panel completed.



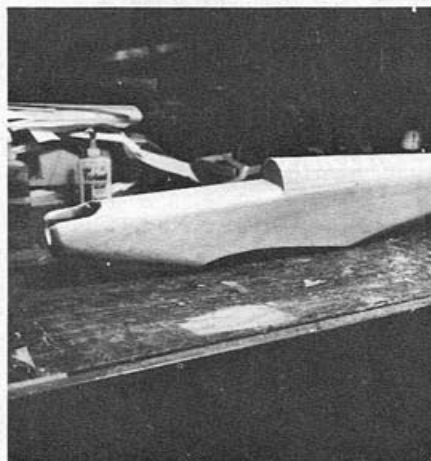
The joined wing panels.



Wing tip construction.



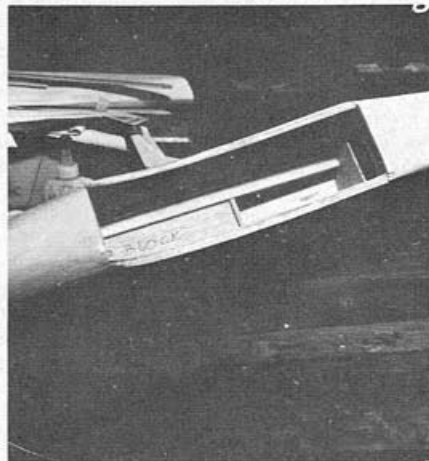
Body shaped and ready for covering.



Front end of the shaped fuselage.



Empennage ready for covering.



Fly-By's large equipment compartment.

After the bulkhead has dried, pull the tail section together and fit the tail post. Now fit the bottom sheet as well. F5 and F6 can be glued in place, with tape and pins used to hold it together. You can also make and install the elevator saddle at this time. Cut and fit 1/16" ply tripler and 1/16" ply brace for 1/4" dowels. Cut the four pieces of the 1/2" triangle wood for tank compartment and four for the engine compartment. Glue in place using Titebond. Now the front bottom block can be glued in place, also with Titebond. The leftover from the 1/4" bottom sheet is cut into two 1 1/2" rails (odd shape) and glued

to the front top from F4 to the engine compartment, (see photos #8 and #9). It will be trimmed later. Glue the 3/16" x 3" x 12" on top of these rails from F3 to complete the front end. Glue in 1/4" square hardwood servo rail. The only thing left is the turtle back. Fit and glue it in. You may have to wet it again to make it form to the bulkheads. Use tape to hold it in place. Glue the bottom front block (3/4" x 3" x 12"). (See photo #10.) Now allow the fuselage to dry. This may sound like a lot of work, but it really moves along very fast.

The fin and rudder is now cut from

3/16" stock. (You used a piece for F3, F4, F5, F6, and the top block.) Shape and sand to a smooth finish. The top and bottom of the stabilizer is built from 1/16" sheet with 3/16" x 1/8" ribs in between. The excess of the 1/16" sheeting will be used for webbing in the wing. After the stabilizer is built, leave it pinned down for at least 24 hours in order to allow it to dry completely.

The construction of the wing was copied from VK's Cherokee with some modification. It is a very strong wing. It is a **must** to use a flat and warp-free surface while building the wing. I use a full size draw-

ing board and it's perfect for the job. Cut all the ribs first, (photo #11). I like to stack "blanks" together and cut them on a band-saw. Start by building one wing half at a time. After the ribs have been shaped and sanded, pin down a  $\frac{1}{4}$ " x  $\frac{1}{2}$ " spar on the plans. Cut off the excess piece flush with the last rib. The excess is now your spar doubler. Install all ribs. The top spar and doubler is made first and then installed. You will notice that the excess piece of spar is not large enough for the doubler. (Use the excess of the  $\frac{1}{4}$ " x  $\frac{1}{2}$ " longeron.) Check your plans and you will see that the top spar extends past the last rib. The 2" wide  $\frac{3}{32}$ " bottom sheeting is now glued in place. Before gluing the top 2" wide sheeting in place, first cut the  $\frac{3}{16}$ " x  $\frac{3}{4}$ " T. E. stock to  $\frac{3}{16}$ " x  $\frac{1}{2}$ " wide, (photo #12). When all three are glued in place they will all line up. Glue the  $\frac{1}{2}$ " x 1" L. E. in place and let dry. While you're waiting, build the other half of the wing in the same manner. Now sit back and bite some of the glue off of your fingers, then back to the first half of the wing.

Cut the top  $\frac{3}{32}$ " sheeting to length. Remember the top sheeting extends past the last rib. The excess piece will be used for the wing tips and center section. Glue top of L. E. sheeting, center section, and wing tip sheeting in place. Cut and glue cap ribs in place. Weight down the wing panel and leave it to dry for 24 hours. Go back to the other half of the wing and repeat this process. After the wing halves have dried for 24 hours, flip the wing halves over and install the landing gear blocks. Don't forget the  $\frac{5}{8}$ " x  $\frac{3}{4}$ " hardwood support block. Use a scrap piece of  $\frac{3}{32}$ " for the webbing around the L. G. block. Trim the rib tabs off and finish the sheeting on the bottom of the wing. Add cap ribs. (Photo #13.) In order to allow enough drying time for the glue, do one wing half at a time. Make braces B1, B2, B3, from the  $\frac{1}{8}$ " ply. The spar filler block is made from the  $\frac{1}{2}$ " scrap balsa. Join the wing halves using Titebond and set aside to dry. Wrap 6" fiberglass tape around the center section and saturate the tape with HobbyPox Formula 2, (see photos #14 and #15).

Now it's time to go back to the fuselage and shape it. You will notice from the plans that there is a lot of balsa that has to be trimmed away, (see photo #16). Sand the fuselage to a smooth finish and give it two coats of dope. At the same time coat the firewall and the whole engine compartment with HobbyPox.

Shape and sand the fin and stabilizer and fit it to the body. The fin will fit into a slot in the elevator saddle and will help align the whole assembly. Use Titebond here. When the tail section has dried give it two coats of dope, sanding between coats. Cover the body with silk and the fin and stabilizer with silk-span.

The wing is shaped and sanded the and silk. Three or four more coats of clear dope and you are on your own. Finish it the way you want to. Remember, keep the ship around five pounds.

If you use Acrylic lacquer, as I did, don't forget to add 25% Aero Gloss clear dope to the acrylic to plasticize it. If you wish, you can rub the ship with compound after about 72 hours drying time. I have

heard that you can lose as much as 2 pounds just by compounding the ship, (about 1 oz. from the ship and 1 lb. 15 oz. from you!)

When installing your equipment in the body, shift the servo until you obtain the C.G. shown on the plans. Adjust the ailerons to  $\frac{1}{4}$ " up and down, and the elevator to  $\frac{3}{8}$ " up and down. Use  $\frac{1}{2}$ " left and right on the rudder. After the first flight change the throw to suit your own needs. As you can see from the pictures, the aileron linkage is on the outside of the wing. I like it this way because I don't have to remove the wing to make adjustments. In fact, I keep all adjustments on the outside of the ship for the same reason.

The Fly-By is not for beginners but with a little experience you should have no trouble. Building the Fly-By is a different story. It's an easy ship to build and with the rib tab, a true wing can easily be had.

**Flying:** When it is time for your first flight, test all controls, and if one is not right, **Don't Fly!** If you remember I said the Fly-By was strong. I found this out by flying when my elevator servo kept telling me not to fly. It said, "I'm not working right, don't fly, stupid!" I did! It didn't! Fly-By #1 doesn't fly anymore. It cost me an engine and a wing just because I didn't listen to my equipment. I

should know better because my equipment is all home built. I lost many hours in building time just because I didn't spend ten minutes to repair the servo!

If all systems are go, give it its head. A full roll and then just a tap of "up." It should climb with a nose up attitude. At about 150 feet up try some turns. This is where you can tell how responsive the Fly-By is. When you want to come in just line her up on the final approach and chop the throttle and let her come in. A little up on the stick is needed just before touch down.

A big thanks goes to all the members of the Pennsylvania Ave. Radio Control Society, (PARCS) who encouraged me and waited patiently to see the finished product fly. My thanks, too, to Joe D'Amico who trimmed the ship on its first flight, and to Sam Costello who did a great job of picture taking for me. My wife, too, deserves a big thank you for the many hours she watched T.V. alone so I could spend my time at the drawing board. Then when I was finished she spent many more hours correcting and typing this article. She is smart though, she lent me the money to build the Fly-By at 20% interest!

Have a ball and happy landings. May the "Bird of Paradise" never hear you say, "I ain't got it!"

#### PARTS LIST

##### BODY

Sides—2— $\frac{1}{8}$ " x 4" x 36"  
 Doubler—1— $\frac{1}{8}$ " x 4" x 36"  
 F3, F4, F5, F6, Fin and Rud.—1—  
 $\frac{3}{16}$ " x 3" x 36"  
 Turtle Back—1— $\frac{1}{8}$ " x 3" x 36"  
 Bottom Sheet—1— $\frac{1}{4}$ " x 3" x 36"  
 Front Top Sheet (Use excess of bottom  
 sheet)  $\frac{1}{4}$ " x 1"  
 Longerons—2— $\frac{1}{2}$ " x  $\Delta$  x 36"  
 Longerons—2— $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 36"  
 Front Bottom Block— $\frac{3}{4}$ " x 3" x 12"  
 Plywood—1— $\frac{1}{4}$ "  
 1— $\frac{1}{16}$ "  
 1— $\frac{1}{8}$ "—(wing)  
 Hardwood— $\frac{1}{4}$ " x  $\frac{1}{4}$ "—Servo Rail  
 $\frac{1}{2}$ " x  $\frac{3}{4}$ "—L. G. Blocks

##### WING

Ribs—3— $\frac{3}{32}$ " x 3" x 36" (18 Ribs)  
 Sheeting—5— $\frac{3}{32}$ " x 3" x 36"  
 T. E. Sheeting—4— $\frac{3}{32}$ " x 2" x 36"  
 L. E.—2— $\frac{1}{2}$ " x 1" x 36"  
 T. E.—2— $\frac{3}{16}$ " x  $\frac{3}{4}$ " x 36"  
 Spars—5— $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 36"  
 Webbing ( $\frac{1}{16}$ " See Stab.

##### STAB

Ribs—1— $\frac{3}{16}$ " x  $\frac{1}{8}$ " x 36"  
 L. E. and T. E.—2— $\frac{3}{16}$ " x  $\frac{3}{4}$ " x 36"  
 Sheeting—2— $\frac{1}{16}$ " x 3" x 36"  
 (Use excess for Wing Web)—2—  
 $\frac{1}{16}$ " x 2" x 36"

