



Jack's daughter, Lisa, proudly shows off Dad's "Kittiwake."

By Jack Headley

moons.

Most of the current crop of sailplanes seem to have been designed with a meat axe, then scattered with red, white, and blue stripes to disguise their outlines. Let's face it, they're not much better shapes than the box the kit came in.

The recent World Championships showed that tremendous performance can be obtained with elegantly shaped models, so there's really no reason for continually building square soarers.

That's about all the preaching I intend to do on this subject, so I'll step off the soap box and leave you with this final plea. Why not improve things at your local flying site by taking along something shapely --- and bring along a nice looking glider as well.

CONSTRUCTION NOTES

Fuselage:

Cut out the basic 1/8" fuselage sides first; which are shown on the plans with small triangles on the outline. The 1/16" plywood doublers are next, and these can be glued to the fuselage sides now. This gluing operation is done with the fuselage sides curved to approximately their final shape, and this needs a few weights and blocks, and is best shown by the sketch on the plans.

Don't forget to make a left and a right hand fuselage side. After this operation, the sides can be joined with Frames 1-4 and the bottom block and sheeting. The fin, which is discussed in a later paragraph, together with its control rod attached (for the flying stab), can be installed now, and the NyRod or equivalent can be put in place for the rudder control. Note that Frame 4 seals up the rear fuselage; this is to prevent small items collecting in the aft end, and possibly jamming the elevator horn.

Close up the rear fuselage by adding the top block, then sand away for a while until a pleasing shape appears. The plans show some typical fuselage cross sections and these can be used as guidelines for the final fuselage shape.

The basic attachment for the wings is a hardwood piece glued to the back

I am always designing the ultimate glider, which is just as an elusive task as doing the ultimate anything. Previous ultimate gliders have taken a variety of forms; sometimes they are stick soarers, sometimes scale, then there's always the MonoKote Overcast, which crops up quite regularly. (One of the pleasures of aeromodelling is that you can make your daydreams come true, at least sometimes.)

My current version of the ultimate glider came about after the recent purchase of a new book. This was "James World Sailplanes and Motor Gliders" which I can heartily

recommend to any glider fan. After a few days of thumbing through this volume, the old urge to do a little glider designing appeared and, borrowing bits from this page and that, I concocted the Kittiwake.

One of the requirements for this design was that it should look a little 'scale-ish' and another was to have something a little more elegant for my local slope. All I seem to find these days are **ugly** models. I know that beauty is in the eye of the beholder, etc., but really, what's happened to all the Cirrus? I haven't seen a model around that was designed with french curves for many

The author, in searching for a sailplane design that was just a little more elegant and 'scale-ish,' derived the unique Kittiwake.

KITTIWAKE

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Designed By: Jack Headley

TYPE AIRCRAFT

Slope Soarer

WINGSPAN

96¾ Inches

WING CHORD

5½ Inches

TOTAL WING AREA

460 Sq. In.

WING LOCATION

Shoulder Wing

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord Center

Tapered Tips

DIHEDRAL, EACH TIP

5 Inches

O.A. FUSELAGE LENGTH

35½ Inches

RADIO COMPARTMENT AREA

(L) 12" x (W) 2" x (H) 1½"

STABILIZER SPAN

18 Inches

STABILIZER CHORD (incl. elev.)

3¾ Inches (Avg.)

STABILIZER AREA

60 Sq. In.

STAB AIRFOIL SECTION

Symmetrical

STABILIZER LOCATION

Fin Mounted

VERTICAL FIN HEIGHT

7¾ Inches

VERTICAL FIN WIDTH (incl. rudder)

4½ Inches (Avg.)

REC. ENGINE SIZE

NA

FUEL TANK SIZE

NA

LANDING GEAR

NA

REC. NO. OF CHANNELS

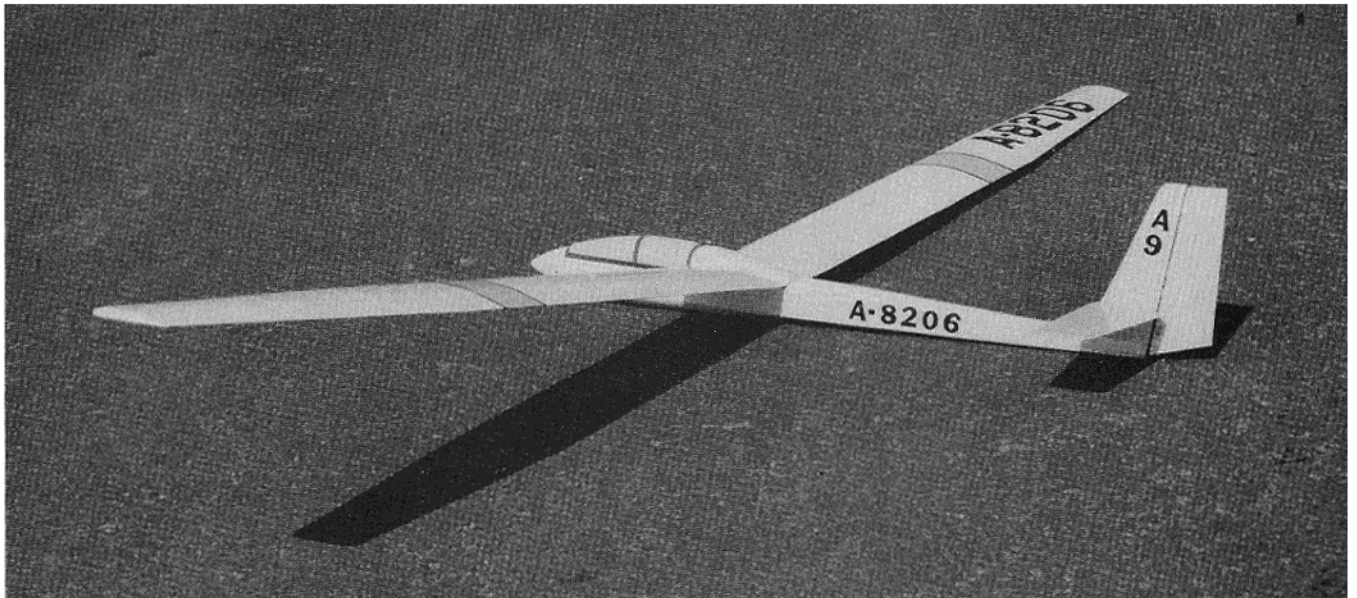
2 — 3

CONTROL FUNCTIONS

Rud., Stab., (Spoilers Opt.)

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa & Ply
Wing Balsa & Ply
Empennage Balsa
Wt. Ready To Fly 30 Oz.
Wing Loading 9.4 Oz./Sq. Ft.



of Frame 3, and is further held in place by the 1/8" x 1/4" strips glued to the fuselage sides. This strip has the two nuts embedded in it for the wing bolts. These nuts are installed after the wing is completed, and the holes drilled through the wing root and the fuselage strip. The locating dowel hole is also drilled after the wing is completed.

You can, of course, still use the old rubberband dowel method to hold the wings in place, however, if this is done then it's best to move Frame 3 to the leading edge of the wings, to prevent possible crushing of the fuselage.

Canopy:

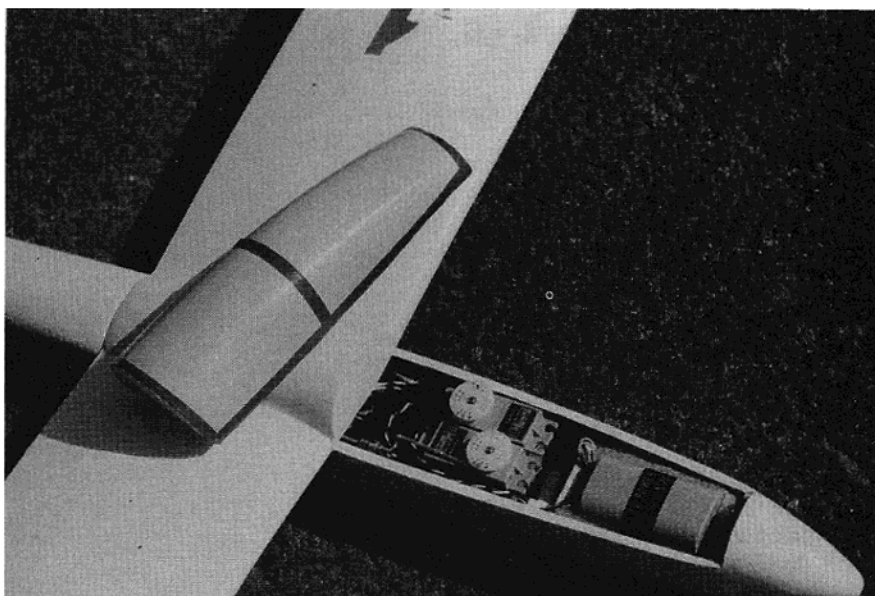
The canopy is simply a large block of balsa shaped to fit, and hollowed out, if necessary, for clearance for the servos.

The canopy is keyed to the nose by a small strip of 3/16" square glued in place at the front end, and is held down by a small rubberband stretched between a hook at the bottom of Frame 2, and a hook in the canopy "roof." Epoxy these hooks into place as indicated on the plans. This system makes the canopy very easy to remove, and so I use this as access to the on/off switch, which is tucked inside the fuselage, rather than being mounted externally.

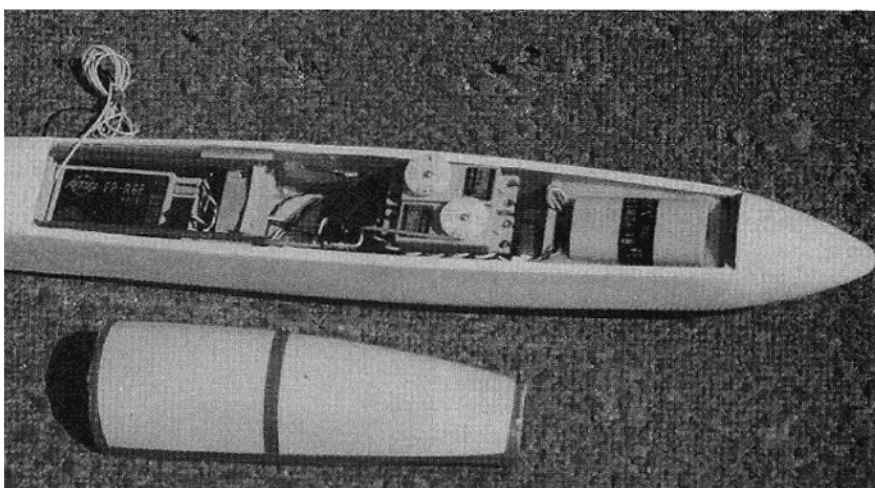
Fin and Rudder:

Both of these items are made with 3/16" sheet internal structures, with 1/16" balsa sheet skins on each side for covering. The fin is essentially rounded off front and back, but the rudder tapers to a point at the rear. The plans indicate typical cross sections.

The only tricky item here is the control horn, which is buried inside the fin. This horn is cut from 1/16" ply, and is reinforced at its main pivot with a scrap of 3/16" dowel, just smaller than the gap inside the fin. Two pieces of 1/16" OD brass tubing are then epoxied into the horn as shown in the small sketch on the plans. These brass



Canopy removal allows easy access to servos and pushrods.



Fuselage was designed to accommodate all standard size radio equipment.

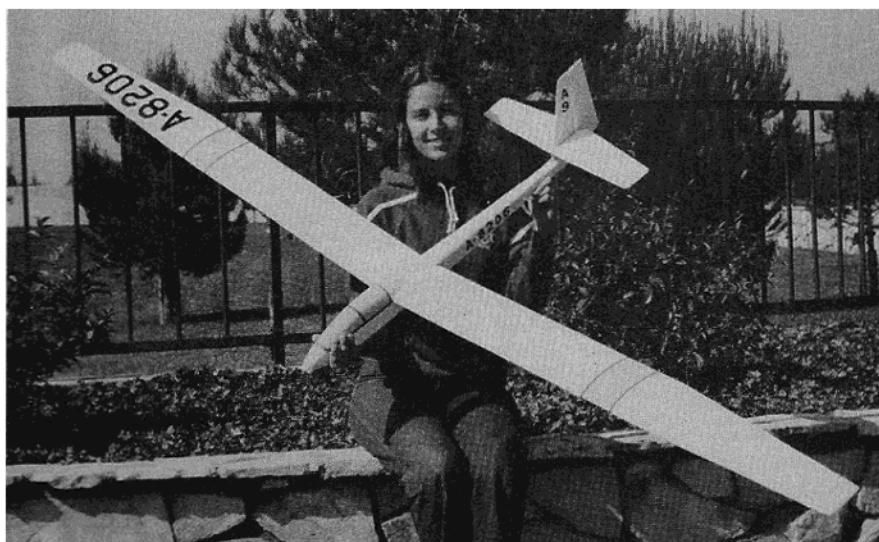
tubes carry the 1/16" wire horizontal supports.

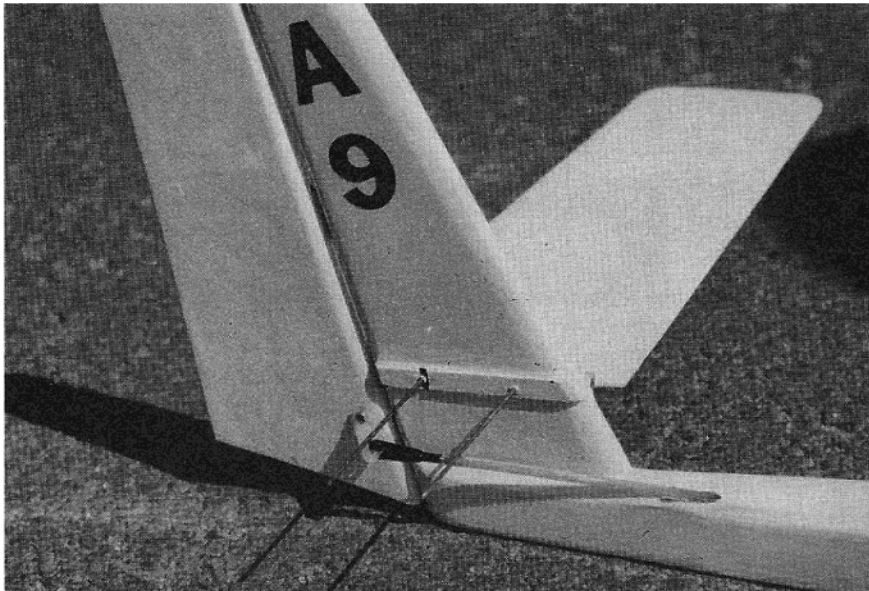
This horn is installed after the basic fin structure is complete, and one fin skin has been added. Don't forget to

attach the 1/32" plywood reinforcement inside the fin skin around the pivot points. A crescent shaped slot is needed at the aft wire station to permit the required horizontal motion. On the outside of the fin the two R1 plywood strips are added before the fin is sanded to contour. These ply pieces act as rubbing strips for the stab, and also provide a little more bearing area for the main pivot. Make sure that the control moves freely (but not sloppily) before attaching the flying stab control rod, and gluing the fin into the fuselage.

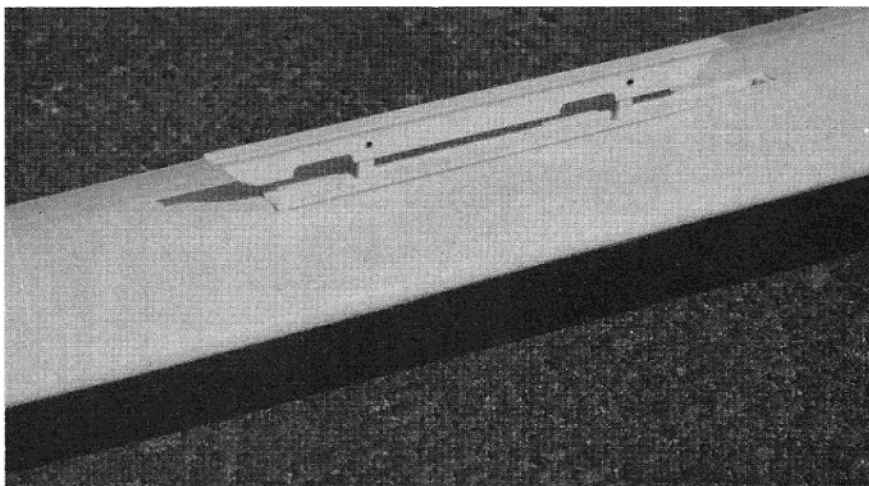
Stabilizer:

The stabilizer is an all flying type and, initially, is made as a single piece. Begin by cutting out the basic framework from 1/8" sheet, and then assembling this over the plans. When dry, cut out the slots for the bearings (which can be made from scraps of inner NyRod), and epoxy these bearings into place.





Aft fuselage view showing rudder controls and flying stab control details.



Optional spoiler shown extended. A KDH spoiler available from Hobby Lobby was used. See text for additional information.

The resulting framework is next covered with 1/16" sheet top and bottom, and sanded to a symmetric airfoil section. Now, carefully cut into the two halves required, then notch the trailing edge back to provide the necessary clearance for the rudder.

Look on the plans for the detail showing the flying stab in place on the fin. This sketch shows the small filler pieces needed to close the gap in the leading edge, so make these items now, and cement them to the tailplanes.

The flying stab is now ready for covering.

Air Brakes / Spoilers:

A few words about these items before we begin to discuss the wing construction. First, do you want to include the spoilers? If not, then skip over the next paragraph, but if the answer is "yes," then read on.

The wing drawings show the structure needed for the spoilers I used on the prototype, which are made by

KDH in Germany. (Available from Hobby Lobby International as KDH 293.) If you intend to use this type, then the structure is as drawn; but any other type will probably result in a

little redesign. Be sure and do this now!

(I have to admit that, at this time, I haven't actually used these spoilers, due to a lack of an available servo. However, as soon as one of my other projects cracks up, I'll be fitting the third channel into the Kittiwake.)

Wings:

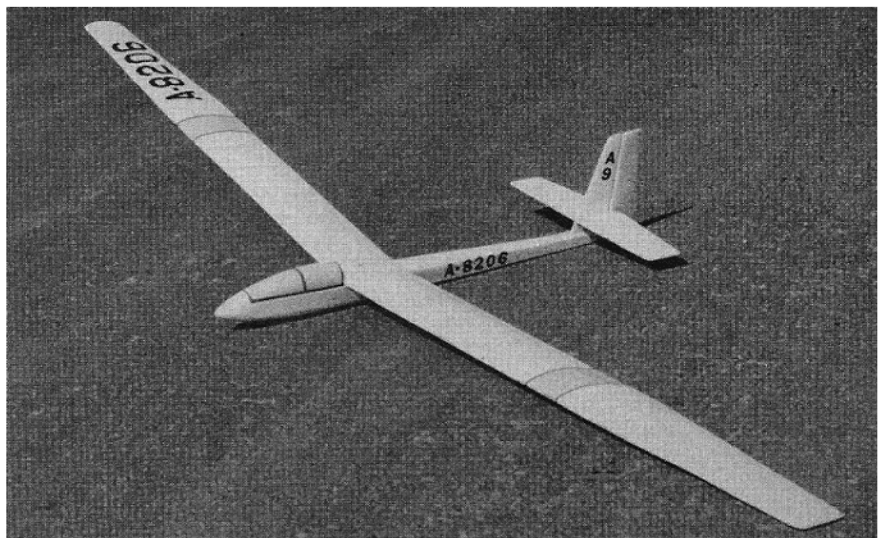
The wings are all sheet and, when finished, are a single unit. If you're a fan of two piece wings it shouldn't be difficult to add some joining tubes in the center section, and omit the plywood braces.

For either the single or the two piece wing version the initial construction is the same, and begins with selecting the wood for the panels.

The easiest approach is to trot down to your friendly hobby store and buy four sheets of wood 4' long and 6" wide of about the same weight and stiffness. Two of these sheets should be 3/32" thick for the lower surface, and two 1/16" for the top. If you can't find wood this size then buy the 36" stock, and piece it together, keeping all the joints at the tip end of the wing.

Cut out the bottom sheet first, then mark on this the position of the various ribs and spars with a thin tipped marking pen. Pin this sheet down to the building board, and make sure it's really flat before cementing anything in place. (It's impossible to 'de-warp' a sheet wing such as this after it is built.)

Make the full depth main spar, and cement this to the bottom sheet, followed by all the ribs except the ones around the ply root joiners. Add the structure for the air brakes, if required; then attach the first leading edge spar. Now add the plywood joiners to one wing, and then the hardwood block at the root, and the remaining wing ribs. The top sheeting can now be added to the wing which has the plywood joiners. Because of



the taper at the tip, this has to be done in two pieces. The first piece is the one covering the parallel inboard section; then the tapered tip piece can be attached.

Joining the two wing panels should be done with some care so that no built-in warps are introduced at this stage. First, pin down the uncompleted panel to the building board, prop up the other panel 10" at the tip, and check that the root joint is chamfered correctly. When this is okay, cement the two halves together, then add the hardwood block and the remaining root ribs. The top sheeting can now be added to the pinned down panel.

Finishing touches include adding the true leading edge, tip blocks, and making the cut-outs for the spoilers.

Before the fairing is added over the wing root, it's necessary to drill holes in the wing for the wing bolts. This should be done with the wings mounted to the fuselage, so the holes in the wing will line up with those in the hardwood strip in the body. Again, this is a job to be done with a little care, as it's not too good to have the wings leave the fuselage at any altitude above ground level.

The soft balsa block fairing is added when the fuselage is completed so that a "fair" fairing is produced. Back drill the mounting holes through this fairing then counterbore for the bolt heads.

Now that the wings are fully assembled take care (again) not to wave them around the room too vigorously as an 8' wing can reach over and break all sorts of things without any trouble at all!

Covering/Trimming:

My prototype was covered with white MonoKote and trimmed with light blue patches and black numerals. Before I actually decided on this scheme I had a quick look through my copy of Jane's (mentioned previously) to see how modern full size gliders are decorated. Generally they all seem to have the same finish — all white! A few have the odd number on the fin or wing, and the very daring ones put stripes on the rudder. I guess when you've paid for a new sailplane, there's nothing left over for a nice paint job. So for lack of any other inspiration I used this approach (all white plus minimum trim) and it doesn't look too bad. (Although the people at RCM did say something about "another white model" when they saw the prototype.)

Radio Installation:

My prototype was fitted with a Futaba radio, and standard size servos, which were hooked up to the controls with NyRods. The frames in the fuselage are located for this particular system, and so another

radio may require a little relocation of the frames. Do not, however, change the location of Frame 3, which keys the wing to the body.

You may have noted on the plans that some of the frames are only partial depth. I prefer this for wire access (rather than cutting holes) and so the gap between Frame 3 and the lower skin is for running all the wires to the receiver.

Component location is the standard system. The battery is wrapped in foam rubber, and then placed in the front compartment. The two servos, for rudder and stab, are fastened with servo tape to the plywood floor between Frames 2 and 3, and the receiver, again packed in foam, goes aft of Frame 3. The space aft of the servos contains all the spare wiring, and also the on/off switch.

For the three servo installation, the basic pattern is the same, and the small spoiler servo is placed in the aft end of the servo bay. The photos show the installation on the prototype.

Assembly For Flying:

After arriving at the flying site and putting the model together, there's a couple more steps before actually launching the model into the wild blue.

First is to cover up the two large screw holes in the wing fairing with a piece of tape, and the other is to join the two stab halves with an additional piece of Scotch Tape across the leading edge stubs. I don't suppose the stab halves could actually separate in flight if you've kinked the joining wires a little, but this piece of tape gives some extra security.

FLYING

About the only comment I have to make regarding flying is to go out and do lots of it. My prototype flew "straight from the drawing board" as they always say. The only modification made after the flight trials was to add the small dowel in the wing fairing, as this helps to stop the wings rotating relative to the body on "ground loop" landings. Use the full rudder deflection on the first few flights until you get the feel of the controls, then reset everything --- and enjoy yourself. □

**From
RCModeler
Dec. 1981**