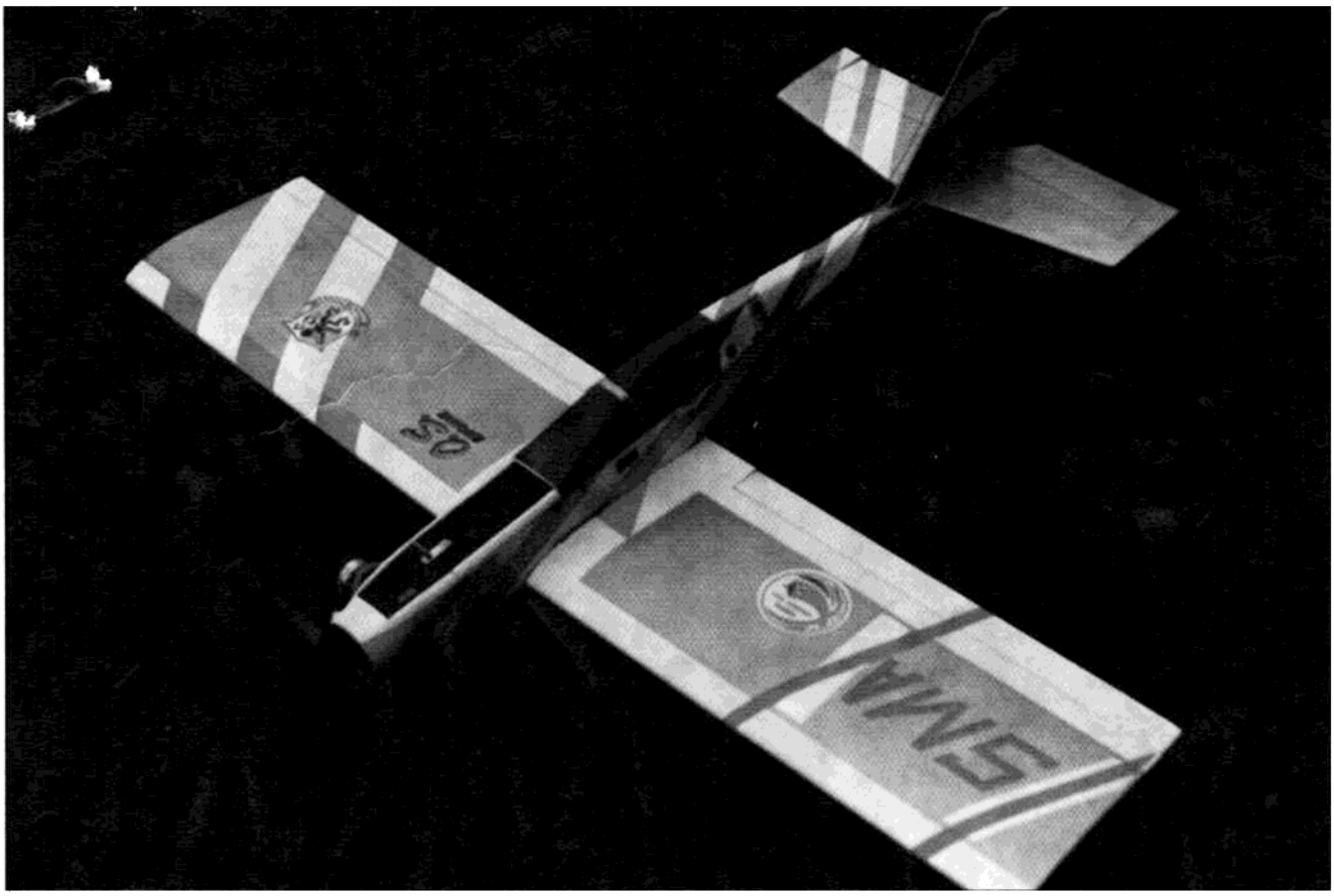


SLYCAT

If You're Looking For A Small, Lightweight Aerobatic Ship, This One Is A Real Performer On A .25 2-Stroke

Slycat is one of a series of designs, varying in size from .06 cu. in. to .60 cu. in. engine powered airframes; all of which fall under the CAT family banner. While all of these designs bear a family styling theme and have many common features and ideas, they all have their own design parameters and are not just scaled-up or scaled-down versions.

The model featured in this construction article has been designed to be powered by a .20-.25 2-stroke or a .26 4-stroke engine.

For many years I worked as a Styling Feasibility Engineer in the studios of Chrysler UK, Coventry, which included packaging tasks — i.e., obtaining the most space for passengers, luggage, etc., in the area left between engine, gearbox, wheels, etc.; an interesting task but at times a very frustrating occupation. Now, designing R/C aircraft (especially in the smaller sizes) is a somewhat similar parallel, but, in this field, the task is to get the most compact and lightest structure around a currently available, reasonably priced receiver and servos. With recent technical advances and price competition, especially relating to mini sized servos and receivers, the design of an acceptable package has become somewhat easier without having to dig deep into the checkbook.

However, in models the size of the Slycat, I still prefer to use normal size servos for the main pitch and roll surfaces — i.e., elevator and ailerons (although a modern mini servo in **each** wing could be substituted), especially if the aircraft is powered with a more powerful .25, say an O.S. SF type engine whereby the performance and speed could get rather fast and exciting.

Before we get down to the "cutting and sticking" bit, a few comments on the design features in general:

(1) The plans show a normal aileron servo system, and to accommodate this, the servo is sunk low into the wing to

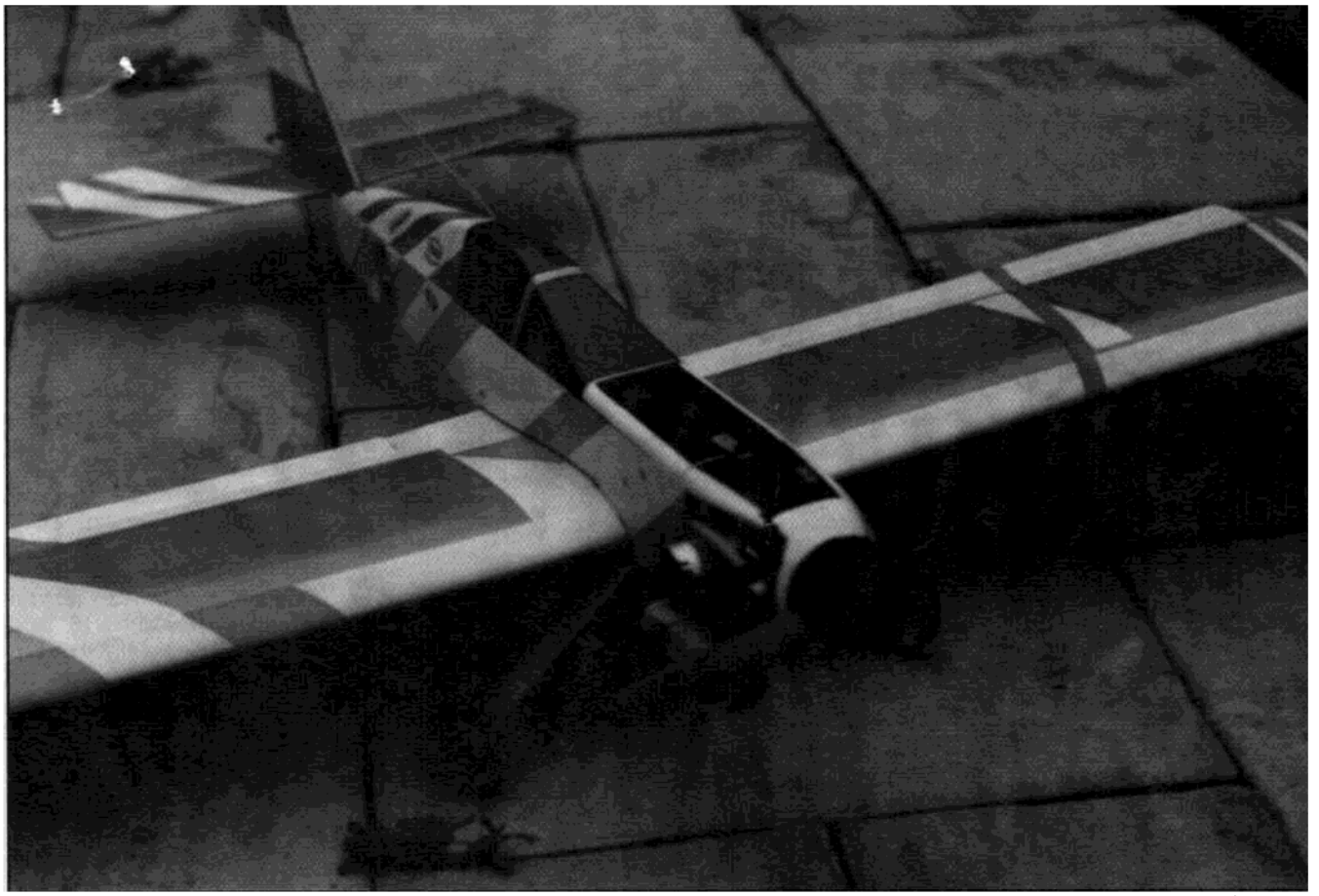
Designed By:
Harry W. Gilkes

ABOUT THE AUTHOR

Harry Gilkes, the designer and builder of the Slycat, submitted this article to RCM sometime back, and while it was being prepared for publication, we received a letter from one of his long-time friends and flying buddies stating that Harry had passed away due to heart failure.

Harry had been a modeler for about 50 years and had been involved in just about all aspects of building and flying model aircraft. We know Harry would have been very pleased to see other modelers have the chance to build and fly this great little .25 powered Sport Flier. It's a real performer!

From The Editor



provide maximum interior fuselage space, with a plate to provide support for the rx and to prevent the various wiring leads from becoming tangled in the aileron control rods and horns.

(2) The nose length, like all of the other dimensions, was arrived at after much prior experience and calculator bashing — so please don't be tempted to lengthen it to get a monster fuel tank in, you don't need it. The engine bay length is designed to take an O.S. .26 4-stroke. The tank used is a 4 oz. type; with a 4-stroke this will run forever. I currently use an O.S. .25 SF (9 x 7 APC), and the times I have run out of fuel are very few and far between. In fact, with this combination, the only time you need anywhere near full power is for vertical figure 8's or big loops, and I mean **big** loops. Full power for long spells in any other direction means running out of field, sky, space, or eyesight.

(3) This relates to the structure of the fuselage which has laminated sides (no, not the kitchen work top stuff!). This is to help maintain strength around the wing seat/radio compartment, which brings us to the final feature.

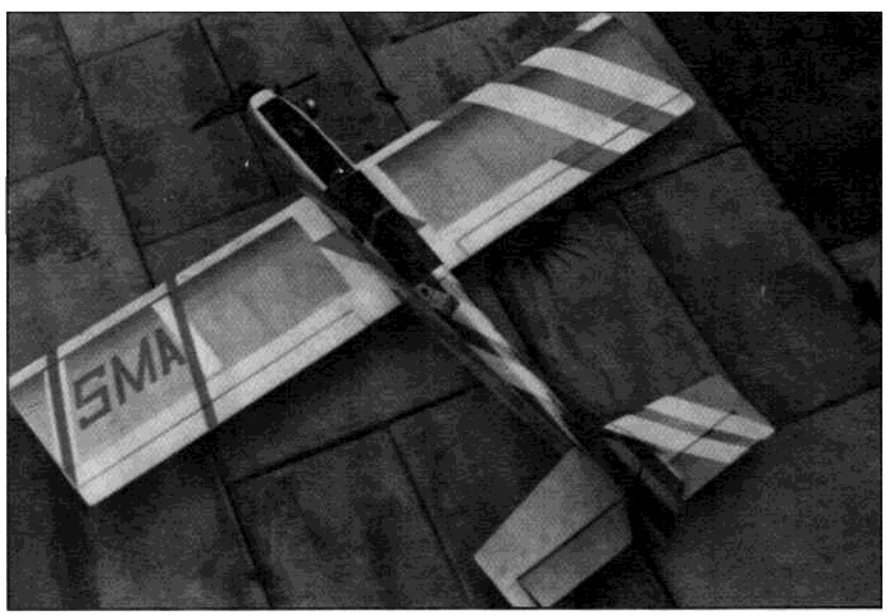
(4) The fuselage stowed radio equipment, together with the tank, is all fitted through the top of the fuselage (a common feature on my CAT designs). This is, in my opinion, far better and easier for installation and servicing.

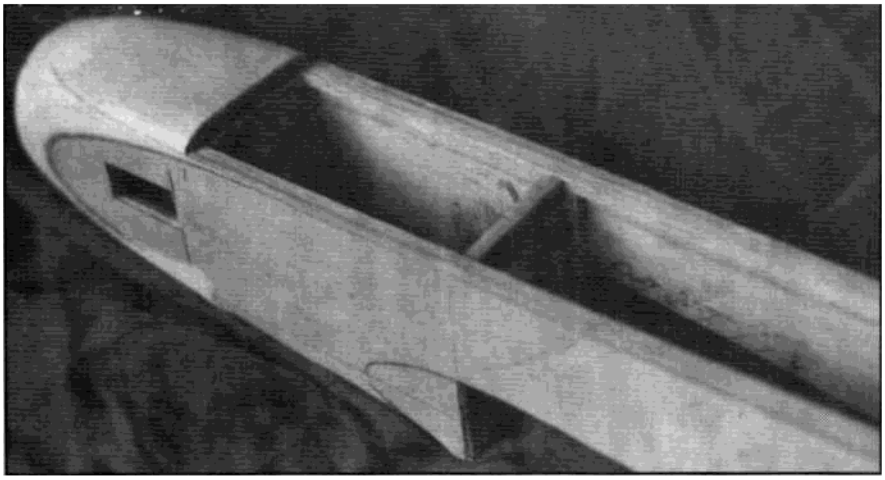
So, if you have some experience under your belt — both building and flying — you will have no problems either way with the Slycat, as a cooking .20-.25 powered Sunday sports model — or, if you fancy yourself as a hot rod flier, fit an O.S. .25 SF or similar type engine in and go punch holes in the clouds, or knife-edge from horizon to horizon. Okay, enough sales talk, let's get to the balsa and plywood butchering.

CONSTRUCTION

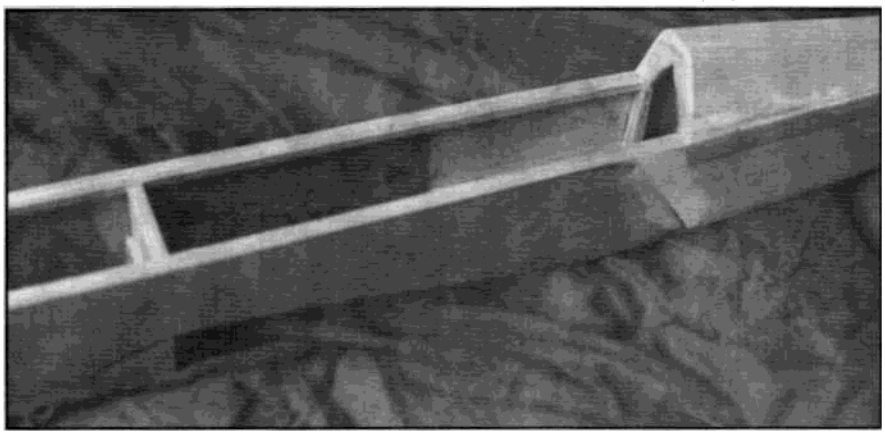
Fuselage:

As stated, the fuselage is laminated; so start by kitting all the bits and pieces, with the exception of the outer (1/64") plywood skins. Start assembly by fitting the inner ply doublers (Aliphatic glue) to the 3/32" balsa assembly by fitting the inner ply doublers (Aliphatic glue) to the 3/32" balsa sides. When dry, again using Aliphatic glue, install the 3/16" sq. spruce/hardwood main longerons and 1/8" sq. lower strips, etc. The next stage is to join the sides with the lite ply bulkheads. Use a good quality, slow drying epoxy for this phase, not the 5-minute variety. Also, note the fuselage sides are not parallel above the wing seat. The best way to tackle this stage is with the fuselage upside down on the plan. When dry, remove and fit the 3/16" sheet tail/skid support wedge-shaped pieces, bottom sheet-



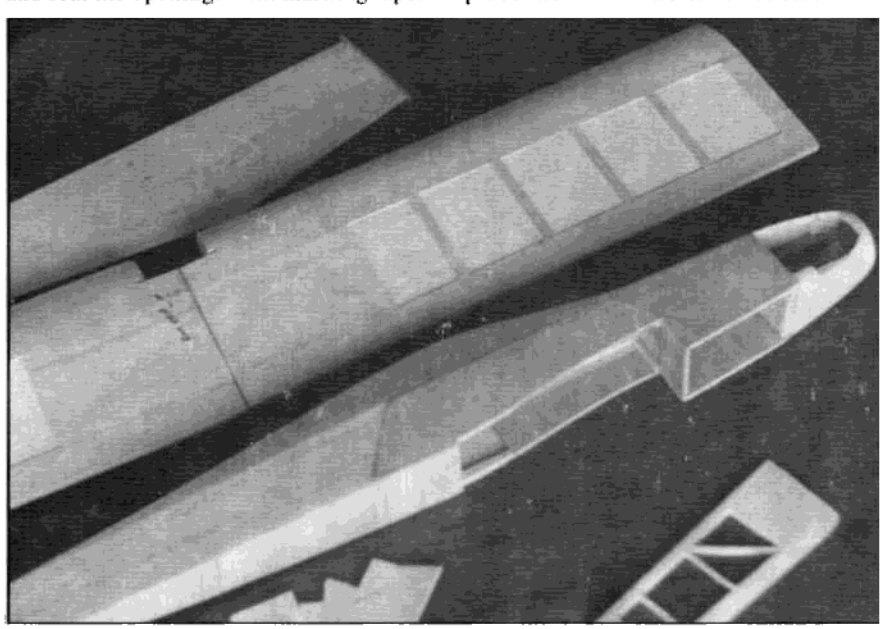


Top front of fuselage; note spruce longerons, plywood is used on both inside and outside of fuselage.



Fuselage top hatch provides easy access to all equipment from fire wall to turtledeck. Again, note ply doublers.

ing, and ply landing gear plate, etc. Next, tack glue the 1/32" plywood hatch base to the top of the fuselage and build up the hatch cover. Now, temporarily install the engine mount and engine with side thrust as indicated on the plan. At this time, remove the carb and muffler from 2-stroke engines, and seal the openings with masking tape. Build up the engine cowl area with 3/4" triangle stock or scrap balsa. Leave room to remove the engine sideways. The clearance for the carb, throttle control linkage, and muffler can be cut out after initial shaping. At this stage, fit the 1/16" plywood nose ring by aligning it with the spinner in place. Leave around 1/16" of clearance between the spinner backplate and the nose ring. After removing the engine, finish the fuselage by carving and sanding. **After** fitting the 1/64" plywood outer skins, blend in the edges with a good quality lightweight filler. The hatch can now be carefully cut away and the general fuselage detail bits added — i.e., wing bolt plate and hatch location dowel; the aluminum hold-down plate is added after covering. So now let's look at the lifting surfaces.



Original prototype wing utilized a foam core. Plans show a built-up wing, but you can also make a foam wing if so desired — easy access to engine.

Wings:

You will have noticed that the wings shown in the photos are foam. This is my normal practice on new designs, but the built-up wing is of proven design and goes back to the "good old days" of control-line aerobatics.

If you wish to construct a foam core wing, you can fabricate foam cutting templates using the W3 rib outline for your guide. After the foam cores have been made, cut in the tip angle and then sheet the leading and trailing edges with 1/16" balsa wing sheeting. Install the simulated rib capstrips, leading and trailing edge pieces, and center section sheeting, etc.

As for the built-up wing as shown on plan, begin by kitting the basic parts, noting the variation in ribs R1 and R2 from R3.

Start the wing assembly by gluing the 3/16" sq. in. trailing edge to the lower trailing edge sheet and pin it down to the building board. Take the main spar subassembly (spar and ply) with **predrilled dowel hole** and, using white glue, slide on the ribs. Locate onto the trailing edge pieces and shim under the main spar. (I use aileron stock for this.) Pin down well and carefully check that the ribs are at 90° angles to the spar and trailing edge. When dry, add the 1/16" sheet subleading edge, subspars, and leading edge sheet, not forgetting the capstrips on **all of the outboard ribs**.

(**Do not**, at this stage, fit the center section sheeting on the **upper surface**. This is added **after the initial joining of wing panels and after the dowels have been fitted**.)

When dry, turn the partially completed wing panel over on the building board, carefully align it and pin it down well. Semi complete the wing panel by adding the bottom trailing edge and leading edge sheeting, bottom center section sheeting, and all bottom capstrips. Remove the wing panel from the building board, and add the 1/4" sheet leading edge and filler sheeting between the subspars. At this time, add the tips and initially shape and sand; carefully join the wing panels — checking the dihedral angle. Fit the ply dowel mounting plate and wing bolt plate. Fit the wing to the fuselage and mark the dowel positions through the fuselage from tank bay (**make sure wing is at 90° in plan and square in front view, etc.**). Fit the dowels through **into the main spar**. To complete the wing, install the top center section sheeting, the aileron control linkage, and install the fixed trailing edge pieces. The wing center section can now be sanded and reinforced with a 4" wide band of 4 oz. fiberglass

cloth and resin (top and bottom).

When fully cured, lightly sand with fine sandpaper. All that remains on the wing assembly is to make the ailerons — from 3/8" sheet stock. Try for a nice close fit with a minimum hinge line gap!

Dummy Radiator/Servo Cover:

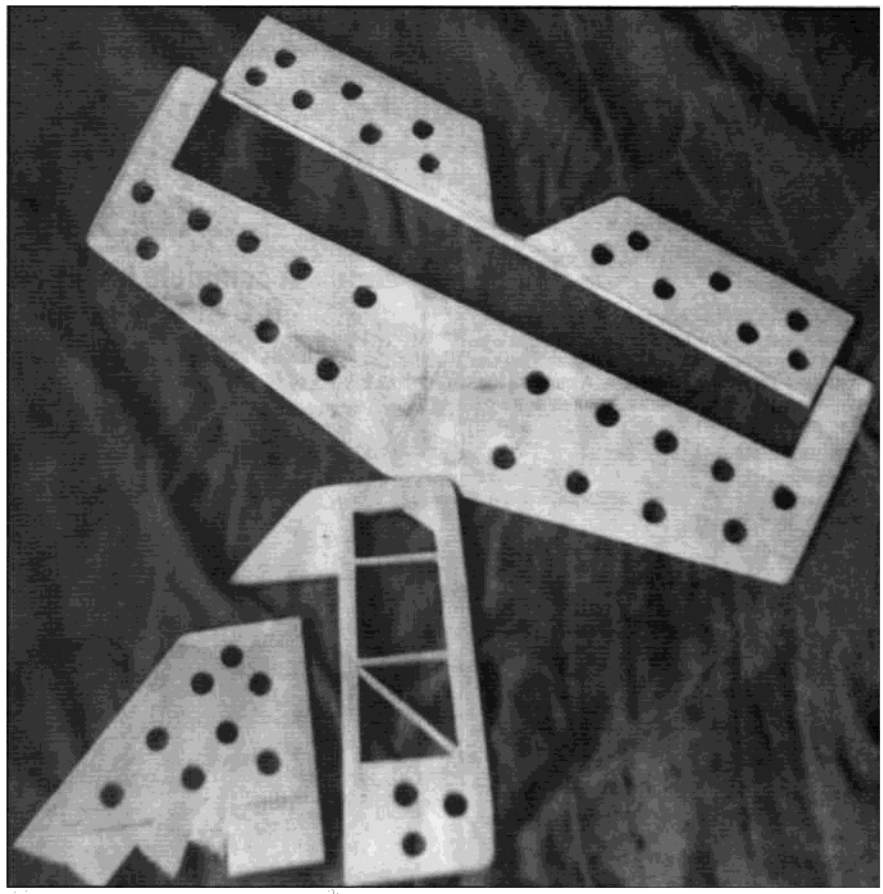
Locate the servo in wing per the plan, cutting out the minimum size hole through top and bottom, and frame in the opening with 1/16" sheet. Install the 1/4" sq. hardwood servo mounting blocks. Fit servo as low as practical and make up the "dummy" radiator per the plans. It is best to cover/paint this assembly separately and install it after covering. The alternative method is to fit a mini servo in each wing. If you decide on this, add an extra rib to suit servo width and **do not forget to cut your servo lead holes** in the ribs and to fabricate servo access covers.

Tail Feathers:

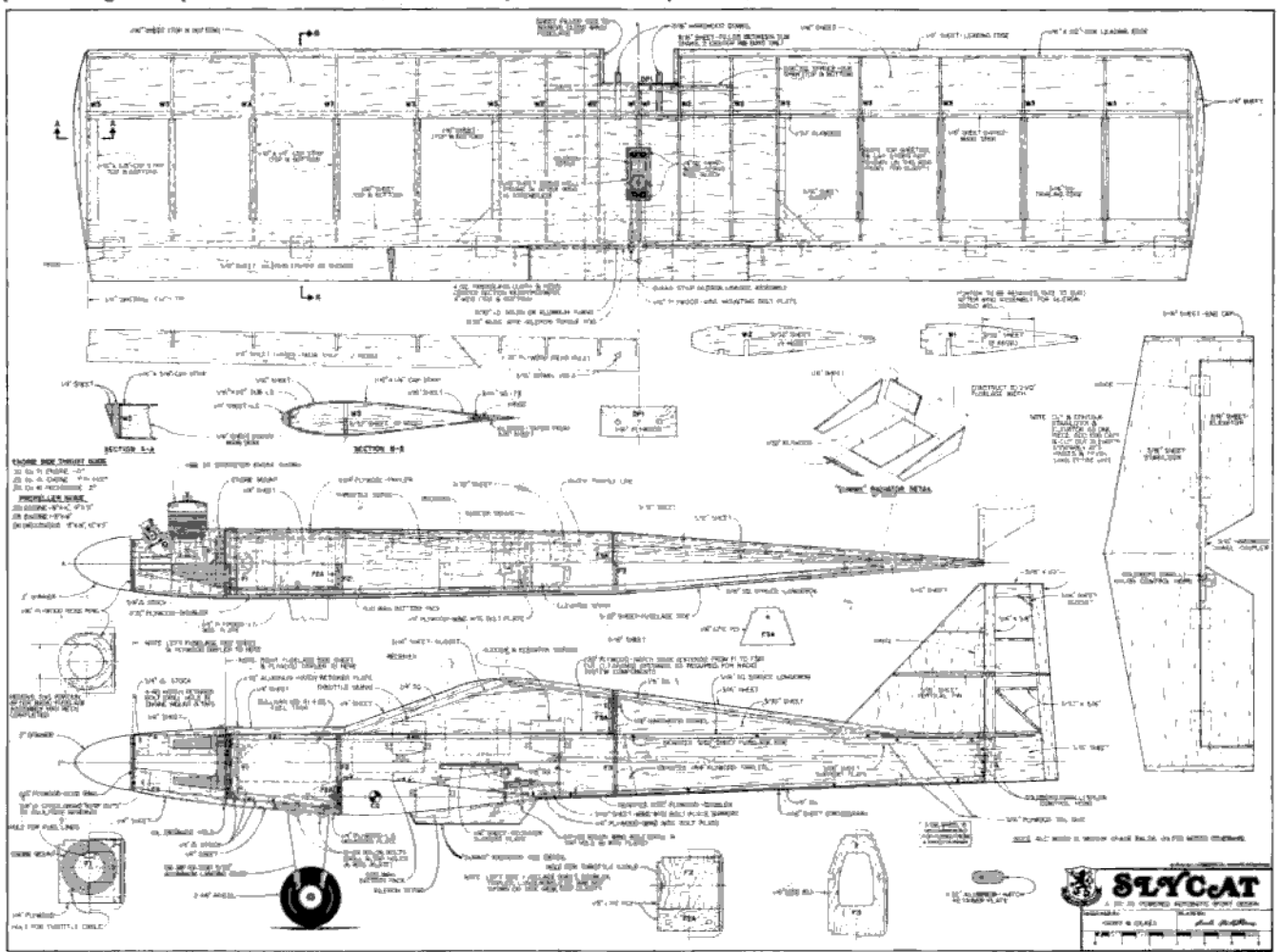
These parts are straightforward, using 3/16" sheet for all component pieces except the rudder, which is made from 3/16" wide strip stock and sheeting. Sand to a streamlined section per the plan. The photos show lightening holes cut with an X-Acto tool, which is purely an option, but do keep the tail surfaces light; careful wood selection is important in achieving this goal.

Radio Installation:

At this stage, you may wish to trial fit your radio gear. Experience has shown that

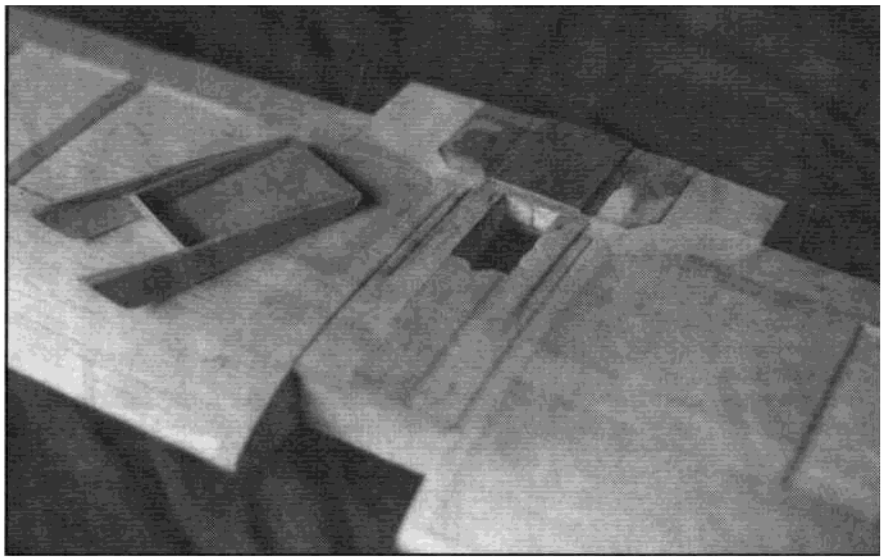


All tail pieces are built up from balsa sheet and sticks.

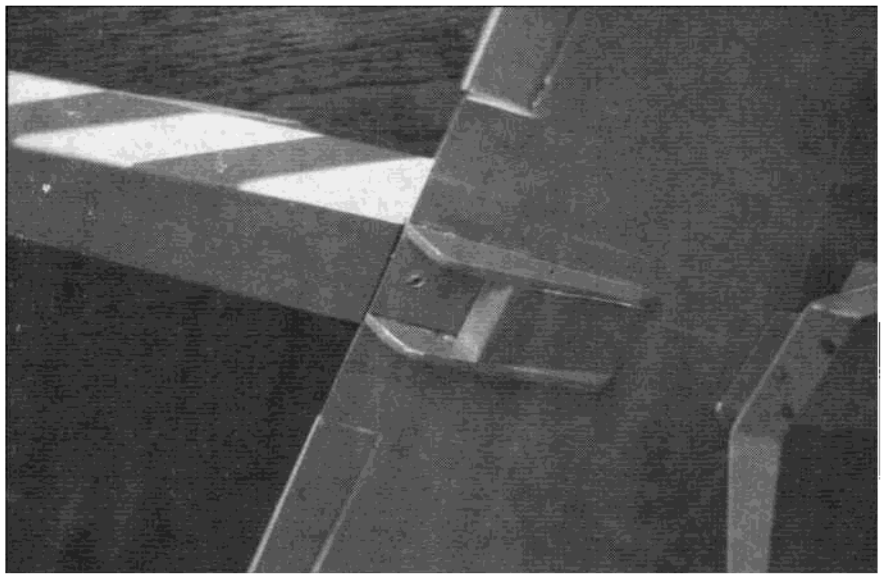


FULL-SIZE PLANS AVAILABLE – SEE PAGE 198

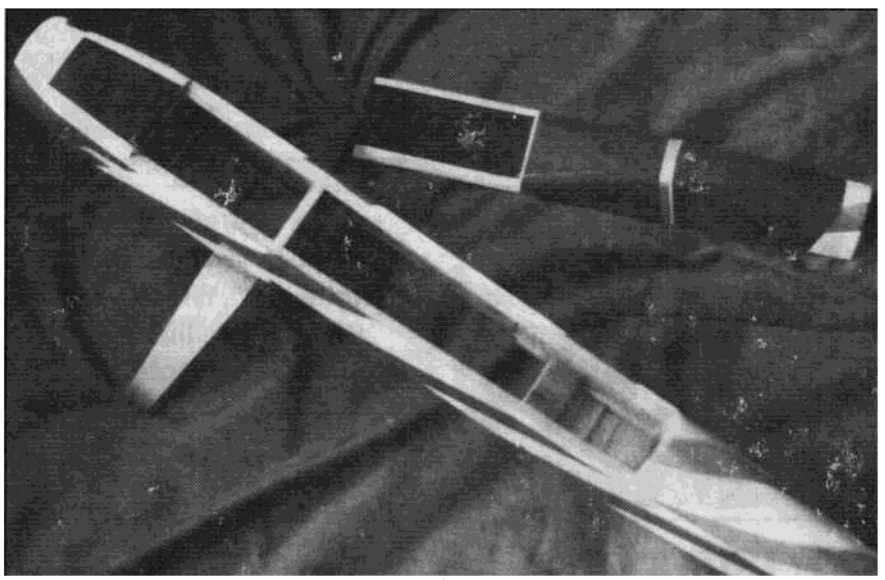
PLAN #1216



Wing center section is wrapped with glass cloth and epoxy after joining. Note cut-out for aileron servo and dummy radiator that covers the servo.



Dummy radiator glued in place on bottom of wing.



Completed fuselage is ready for final installation of engine and equipment. Canopy/hatch is a one-piece unit held in place with a dowel pin at the rear and a latch at the front.

placing everything as far forward as possible is best. The throttle servo is placed behind bulkhead F2 alongside a standard 500 mAh battery pack. The receiver stands vertical on the 1/16" sheet mounting plate over the wing, loosely wrapped in foam. The rudder and elevator servos are positioned directly behind the receiver.

Setting Up:

First check to see that all of the surfaces have no warps, and in the case of the elevators, that they are completely in line. Second, check that the **wing incidence angle is as shown on the plan** — also, that the stabilizer has been installed at zero incidence. The fuselage side top edges can be used as a measuring guide. Incidentally, the engine thrust line is set at zero/zero.

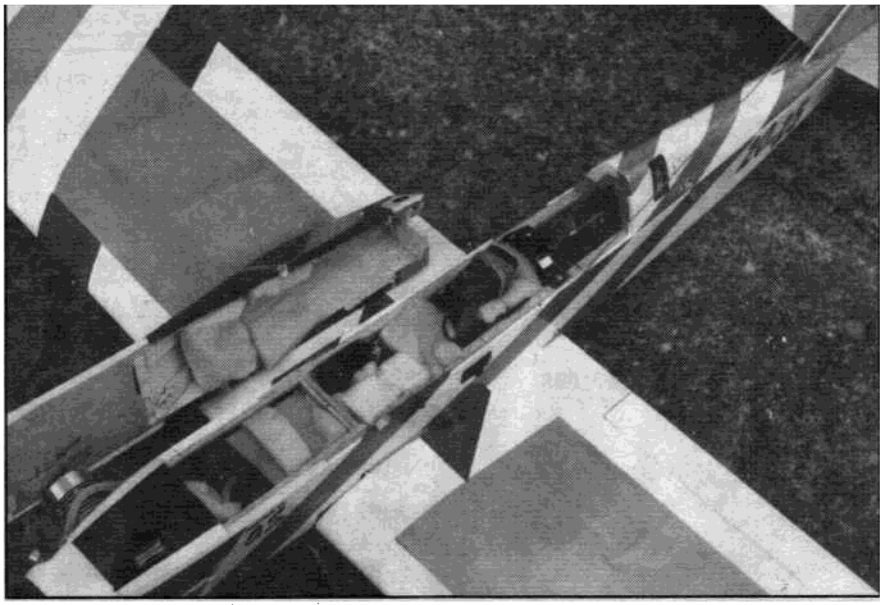
The next step is to do what I call my "diamond" check. Place the wing on the fuselage and measure diagonally from the centerline of fuselage — both at the nose and the tail to the trailing edge tip of each wing. These dimensions should be equal to one another. When satisfied, mark the wing bolt position, and pencil guidelines on the wing at the fuselage joint. Drill the wing and fuselage, then tap fuselage for bolts. Finally, with the wing in place, position the stabilizer by measuring from the wing trailing edge to the trailing edge of the stabilizer. When properly aligned, mark a line on the under surface of stabilizer — this is your location and covering line. Last, but not least, cut the slot for vertical fin in the top sheeting and mark the position of the vertical fin on the top surface of stabilizer.

Cover And Finish:

I cover all parts before hinging; however, the choice is yours. My own method is to fuelproof the engine and fuel tank areas, and then install the film covering. Any of the various heat shrinkable film type covering materials may be used on the Slycat. Install the radio system components, fuel tank, hinges, landing gear, tail skid, engine and mount, etc.

Final Assembly:

If you have not already done so, cut away the bottom of hatch cover assembly to clear the rx and servos. Fill the top of the hatch cover interior with foam to cushion the receiver. Bolt on the wing, prop, spinner, etc., and check to determine that your C.G. is as indicated on the plan sheet. We are almost ready to go, except for the basic (low rate) control surface travel limits which are as follows: ailerons 1/4" up 1/4" down; elevator 5/16" up 5/16" down; rudder 1" each way approximately. All-up weight: 47-52 oz. dry. Now we get to the fun bit.



Everything is installed and ready to button-up. Plenty of foam is used to help protect the R/C equipment.

FLYING

The Slycat is basically very stable and vice-free if set up and built true. Carry out your normal radio range check and a final airframe inspection. Confirm that the control surface movements are in the proper directions, free of play, and do not bind.

Take-off is simple; a touch of right rudder, hold the tail down, roll, and ease off. Simple as that. That is, unless you are using a .25 SF or similar, then it is steady on the throttle or your new pride and joy could catch you napping and leave terra firma as though its pants (wheels) were on fire!

For your first flight, use the suggested low rate control surface throws which are about 60% of the elevator and 40% of the aileron full rates. This is ample for all normal flying and maneuvers. If you use full rate throws and full power, dependent on engine, Slycat will perform literally any form of aerobatics that the average club sport flier will want or, indeed, can do, and plenty more if asked.

This covers knife-edge, upright/inverted spins, stall turns, 4-8 (16 if you are quick enough and count right) point rolls, tumble rolls (low throws), prop hanging, it all depends on you and the engine you are using, and your level of expertise and total stick time, and, of course, an accurately built airframe. However, let's not frighten those of you who are just getting the hang of low wing machines — the Slycat with a good performing .20 or an O.S. .26FS is a docile, pleasant, Sunday flier — with a very wide range speed envelope. She won't drop out of the sky — that is, providing you keep the weight down to the recommended range, and don't expect it to amble around the sky like a vintage model!

Well, that's about it, my fellow mad (or should I say dedicated) "stick twiddlers." I hope you build a Slycat — it certainly has a good pedigree — and enjoy yourself. Let the Editor have some pictures!

Good luck, and keep those NiCds charged — and mind the prop. Happy landings and sunny skies.

From RCModeler June 1996