SNIPER

By Hans Hochradel

A small .051-.10 size acrobatic airplane designed for standard size radios

In flying radio controlled model airplanes, many types and sizes are available. As is normal for me, when the urge came I took to the catalogs and magazines. I wanted a small airplane that fits in the trunk of the car with the wing on the airplane --- one that was quiet and maneuverable enough to fly in a schoolyard. Now the problem --- I wanted to use a "standard" size radio, meaning "standard" size servos and a 550 mAh battery pack, not a mini size radio control. One more thing, I'm not a great flier, but I didn't start in the hobby yesterday either, so the airplane should not look or fly like a trainer. As you probably guessed, I could not find anything as a kit, or as plans, so I ventured into no man's land and designed my own. The results are worth sharing with fellow fliers.

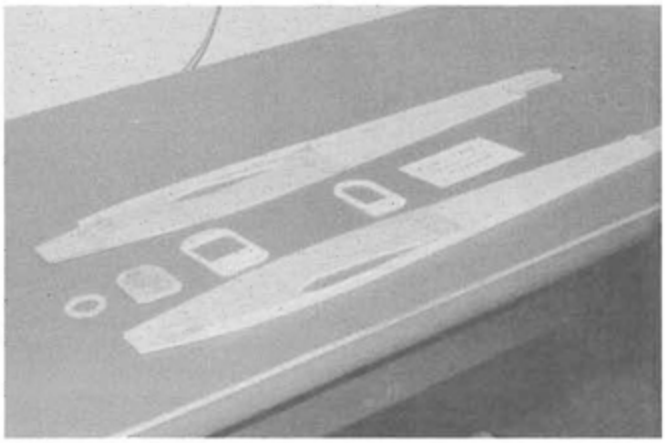
Not being a trailblazer (or an aeronautical engineer), I figured that canards, rear engines, multi winged, etc., designs were out of the question. The first question was: What fits into a "normal" trunk in terms of wingspan, taking into consideration today's

ABOUT THE AUTHOR

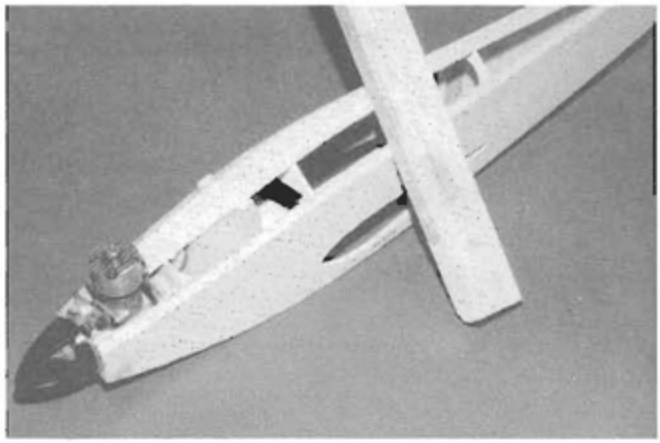
Hans Hochradel started into R/C in 1977 flying various sport aircraft. At first, like many newcomers, he crashed a lot. His solution to this problem was to build more than one of the same design. After a few years he was crashing less and less and started to build airplanes for other people. Hans still loves to build, and builds around five airplanes per year.

Currently Hans is mostly involved in sport flying, but occasionally finds time for R/C Pattern or Stand-Off Scale contests as a contestant. Just to complete the picture he also flies an R/C helicopter.

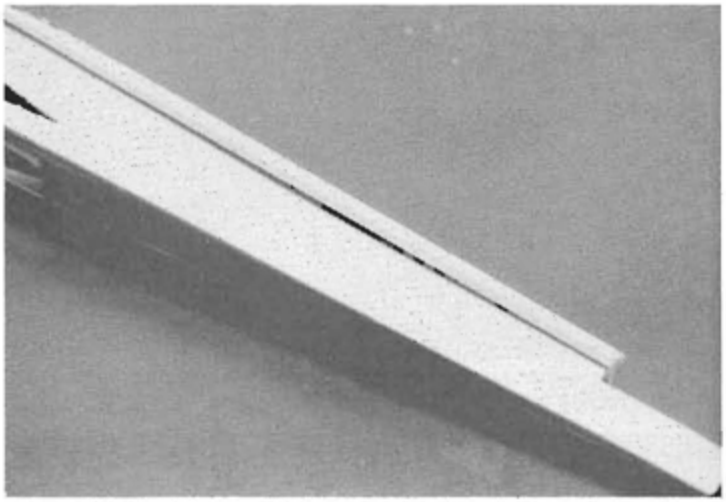
SNIPER
Designed By:
Hans Hochradel
TYPE AIRCRAFT
Sport Pattern
WINGSPAN
37½ Inches
WING CHORD
6½ Inches
TOTAL WING AREA
234 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
None
O.A. FUSELAGE LENGTH
31¾ Inches
RADIO COMPARTMENT SIZE
(L) 6½" x (W) 2⅜" x (H) 2"
STABILIZER SPAN
14 Inches
STABILIZER CHORD (incl. elev.)
2⅞ Inches (Avg.)
STABILIZER AREA
40 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
3¼ Inches
VERTICAL FIN WIDTH (incl. rud.)
4⅝ Inches (Avg.)
REC. ENGINE SIZE
.051-.10
FUEL TANK SIZE
2 Oz.
LANDING GEAR
None
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Lite Ply
Wing ..... Balsa
Empennage ..... Balsa
Wt. Ready To Fly ..... 30-34 Oz.
(1 Lb. 14 Oz. - 2 Lbs. 2 Oz.)
Wing Loading ..... 18.5-21 Oz./Sq. Ft.



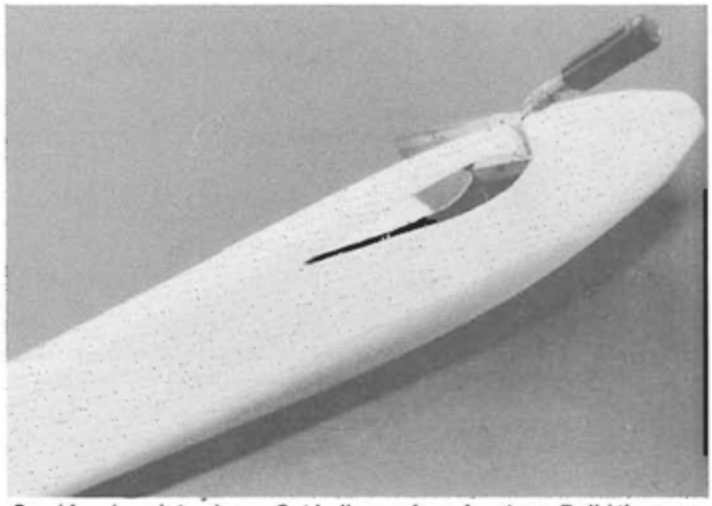
Cut out fuselage parts, then glue together as shown. Next assemble fuselage over top view of plans.



Glue fuselage top on, then sand to 45° angle as shown in the photo. Next trial fit engine and tank.



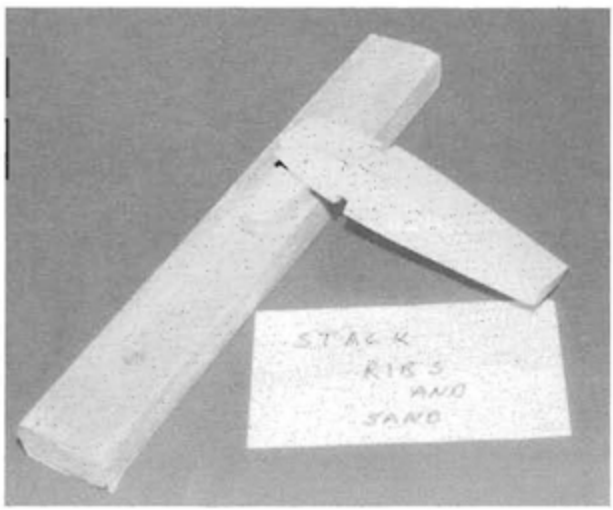
Glue the fuselage 45° sides onto fuselage as shown in the photo. Next glue 1/8" balsa to fuselage bottom.



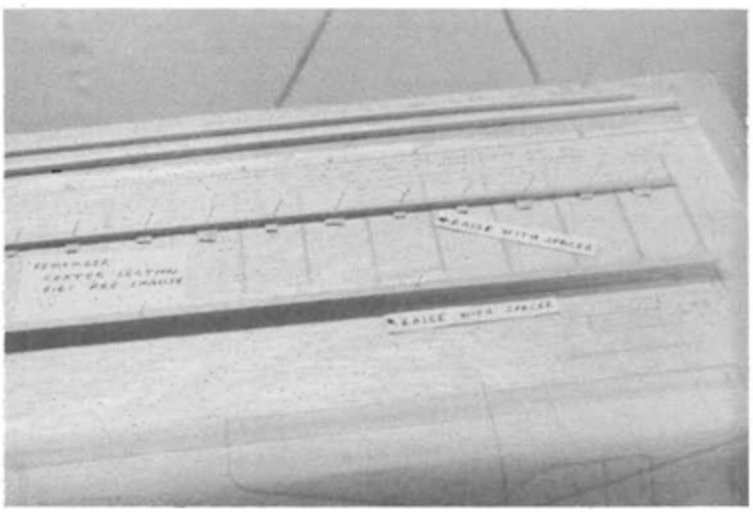
Sand fuselage into shape. Cut belly pan from fuselage. Build the wing next.

"normal" size car? I figured about a three foot wingspan. The question that follows next is what kind of power is required to move around a maneuverable, single winged aircraft with a three foot wingspan? Remember we would like a quiet airplane. My first choice was a .10 to .20 size 4-stroke motor. The size, expense, and power to weight ratio makes these motors marginal for this kind of design. What about electric? Maybe, but I don't know enough about electric. How about the Cox .051 motor? Great, but they are annoyingly noisy and, if muffled, they lose a lot of power. Well that leaves a .10 size motor with muffler.

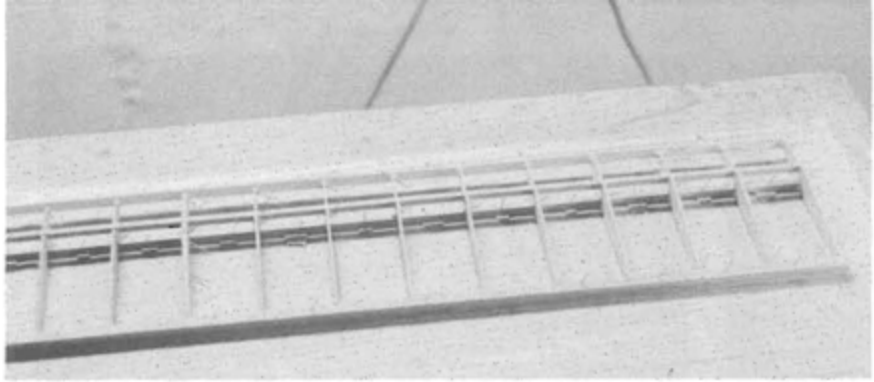
First, I took a large sheet of blank paper and drew in the motor, motor mount, muffler and spinner. The tank for an airplane this size is normally about two ounces. Next, I drew in a two ounce retangular tank in the centerline of the engine's needle valve. Then I measured the distance of the motor to the wing, and the wing to the tail (normally called moments) on several small airplanes to get the ratio. I added a little common sense



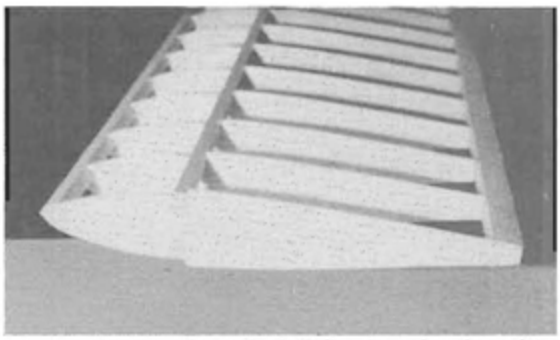
Cut all 20 wing ribs. Stack and sand all the ribs. Next, make 6 ribs slightly smaller for under the center wing sheeting.



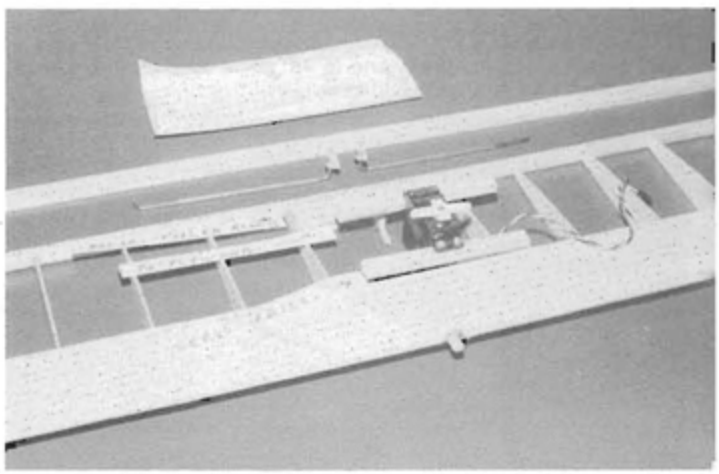
Pin the 3/16" square balsa spar on 1/16" spacer on top of the plans. Pin the 5/16" x 3/8" balsa spar on 1/8" spacer on top of the plans.



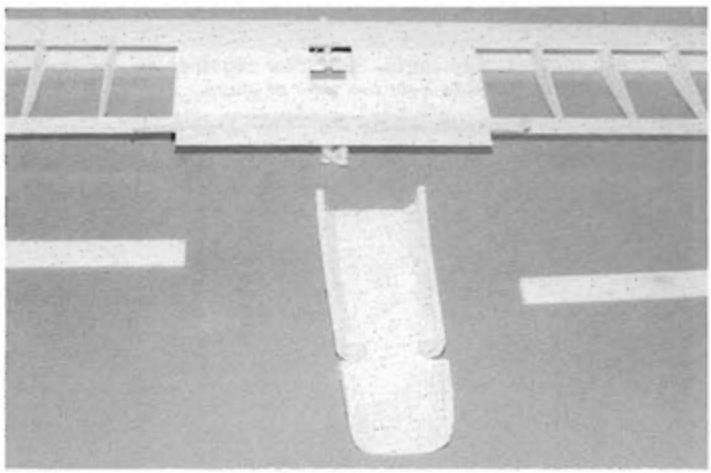
Install the wing ribs, top 3/16" square balsa spar and the 1/4" square balsa leading edge.



Remove the wing from the building board and sand to shape. Install leading edge sheeting.



Install balsa filler block and servo rails. Install 1/4" maple dowel. Check aileron torque tubes for fit.



Sheet the center section. Install the torque tubes and trailing edge. Fit and hinge ailerons. Finish belly pan.

and drew in the wing and stab location. This also defines the Center of Gravity.

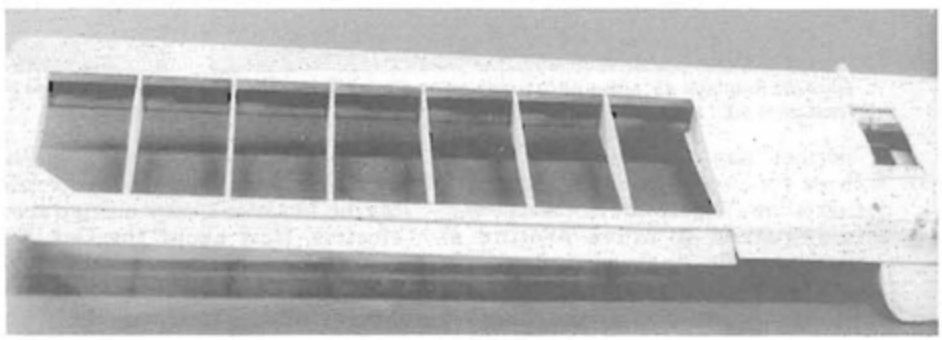
Now that leaves the easy fun part of designing. I used a fully symmetrical airfoil to keep the airplane maneuverable, and a constant chord wing to keep building simple. The stabilizer is simple sheet stock. The creative part of design is the shapes of the wing and fuselage to create eye appeal. I tried to keep the airplane attractive but relatively simple to build. The wing and stabilizer surface areas were determined by the time tested method known as "looks about right."

Material List

4 — 1/16 x 3 x 36 balsa sheet
4 — 1/8 x 3 x 36 balsa sheet
2 — 3/16 x 3 x 36 balsa sheet
2 — 3/16 x 3/16 balsa spar
1 — 5/16 x 3/8 x 36 balsa spar (sub 3/8 square)
1 — 5/8 x 36 trailing edge stock
1 — 1/4 x 1/4 x 36 balsa spar
1 — 3/4 triangle balsa stock 18 inches
2 — 1/4 triangle balsa stock 36 inches
1 — 3/8 triangle balsa stock 6 inches
2 — 1/32 x 6 x 12 plywood sheet
1 — 1/16 x 2 x 2 plywood sheet
1 — 1/8 x 2 x 3 plywood sheet
1 — 1/8 x 6 x 12 popular plywood sheet
1 — 1/4 x 2 round maple dowel
1 — 3/8 x 3/8 x 6 spruce spar

Hardware List

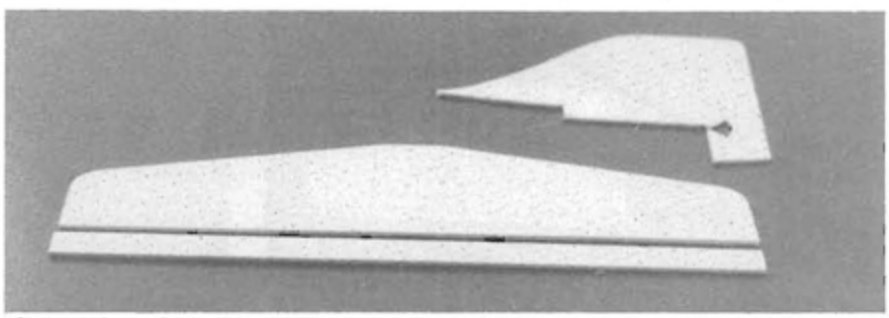
1 — engine .051 TD to .10
1 — radio control system (two channel min.)
1 — 1½ Goldberg spinner
1 — engine mount
1 — pack 4-40 x 1/2 bolts and blind nuts
1 — 2 oz. Sullivan tank (SS-2)
1 — strip aileron torque tube set
2 — nylon wing bolts
1 — small elevator horn
Servo mounting hardware
Pushrod



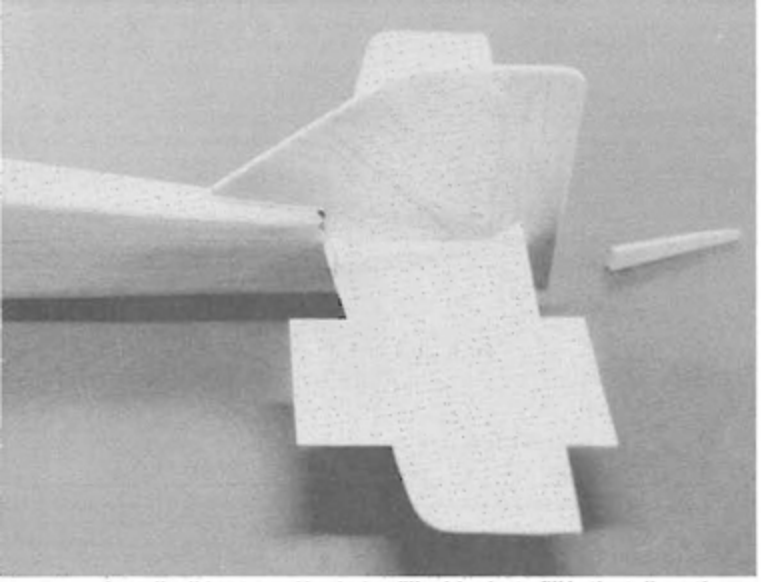
Glue on the wing tips and sand to shape. Finish the wing.

CONSTRUCTION

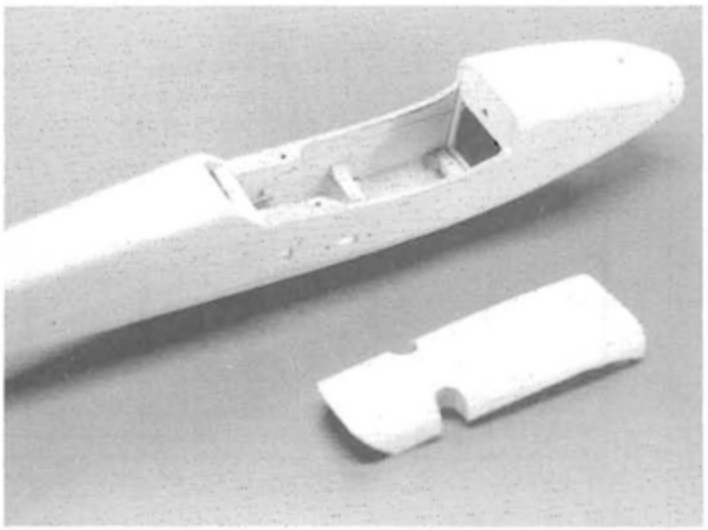
Study the plans and look at the photo sequence instructions provided in the article. After the material list is completed, cut out the various parts. Building is straightforward; read the



Cut out the rudder, fin, stabilizer, and elevator. Hinge surfaces as required.



Install tail feathers. Use balsa filler blocks to fill in the tail section.



Install engine, tank and radio equipment.

building notes on the plans. There are no "tricky" or difficult areas I can think of. Here are a few building hints:

(1) The aileron servo **must** be installed into the **very** bottom of the belly pan. Minimize the aileron servo's extension into the radio compartment or else the wing will never fit.

(2) Use the recommended hardware including the following: Klett small hinges; Carl Goldberg 1/16" strip aileron horn. Wing hold-down bolts should be 10-24 nylon or plastic. Cut the threads into the wing hold-down blocks mounted to the fuselage.

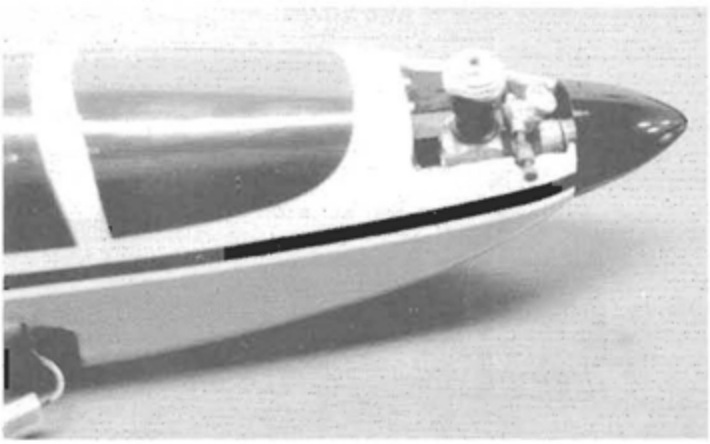
(3) When building the Sniper keep in mind weight should be minimized at all times wherever possible. One way is to use heat shrink covering.

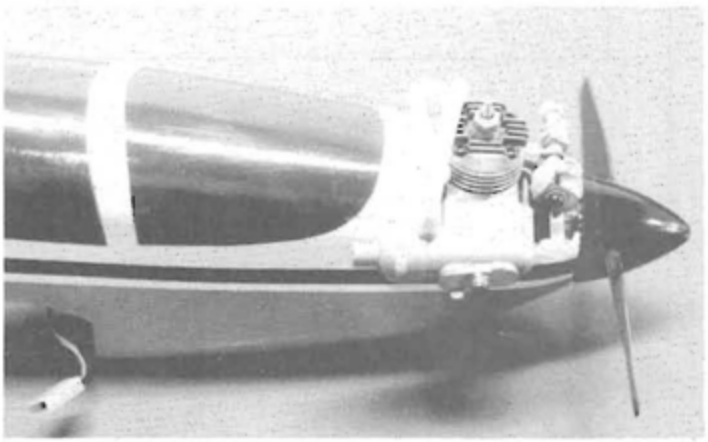
(4) My personal recommendation for power is the .10 size engine with muffler, for noise reasons. However, the .051 size engine without muffler has plenty of power to fly the Sniper. I did fly the prototype with an unmuffled .051 Cox engine and it flew fine.

(5) The dents in the belly pan, to give clearance to the wing hold-down bolts, are finger holds used to hold the airplane when hand launching it.

Flying and Balancing

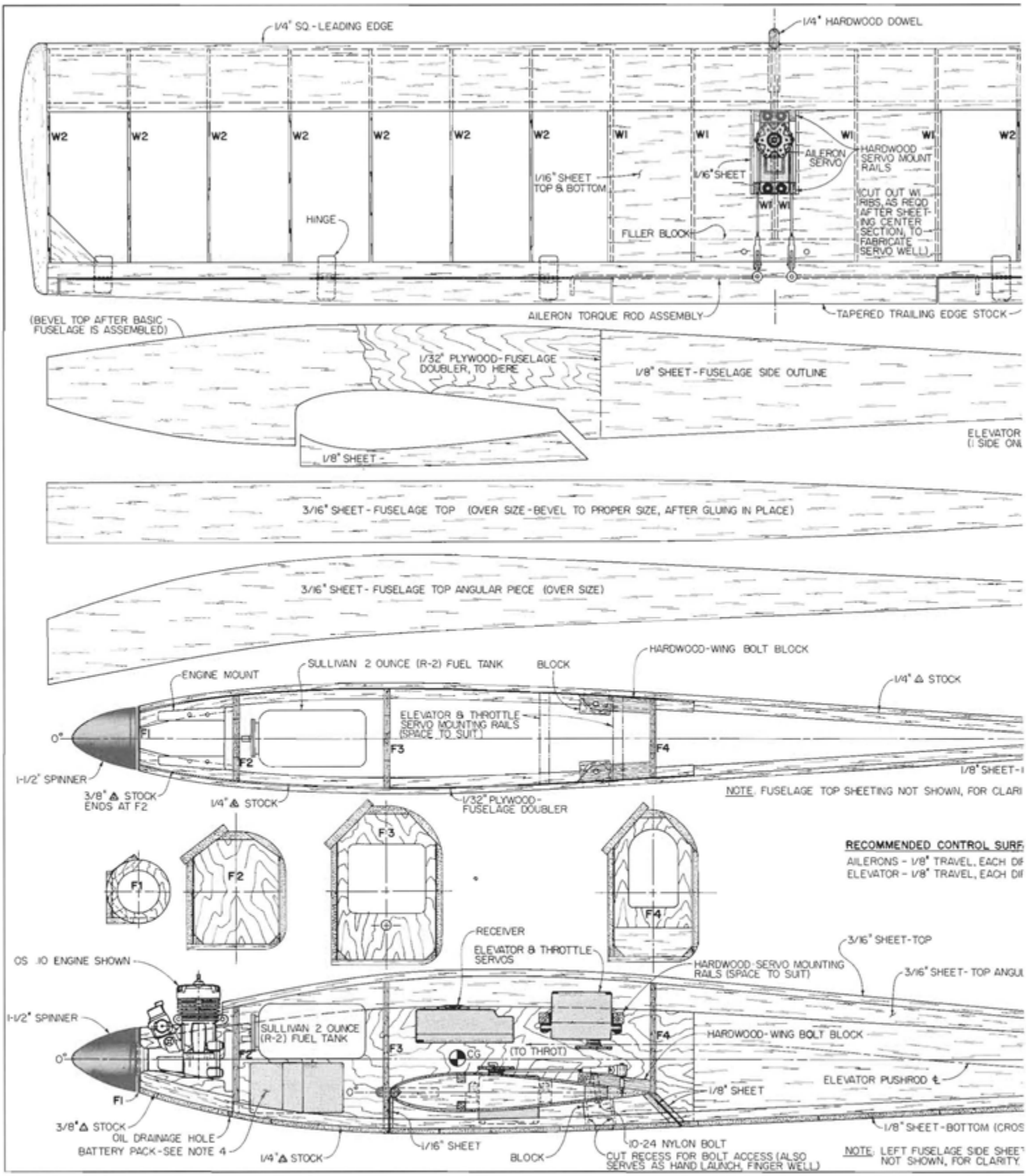
A small airplane has little room for error in balancing front to rear. Make certain to balance per the plans. Do not fly this airplane tail heavy, or as certain as darkness the plane will snap roll on your landing approach. My recommendation is to install the engine and the wing. Next, put the radio unmounted into the airplane and move the components around until the plane balances. Then permanently install the radio where





Engines shown installed. .051 at left and O.S. Max .10 at right.

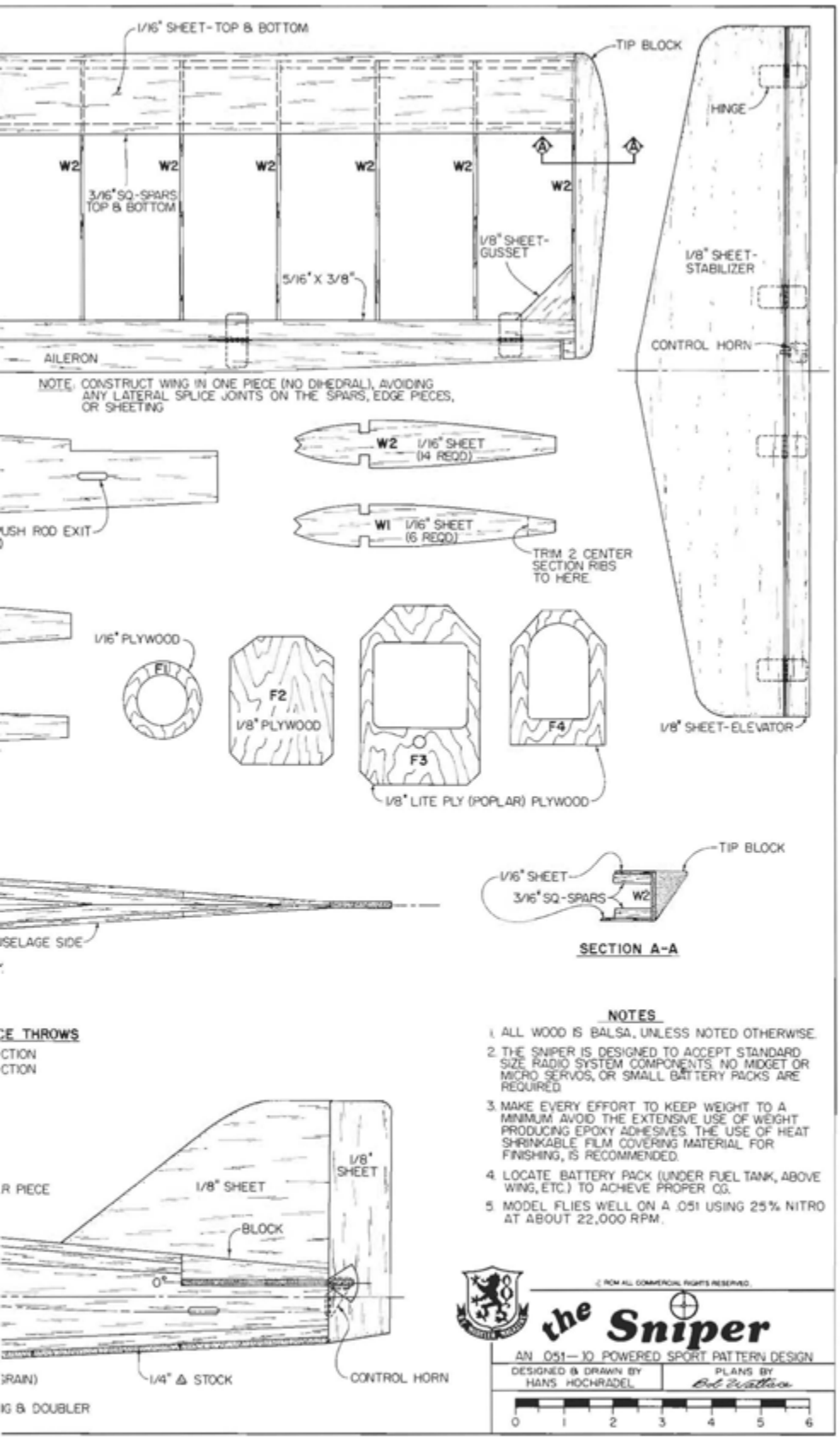
Cover the airplane, reinstall the engine, tank, and radio equipment. Check the balance and surface area throws. Go out and fly it.



indicated. Generally speaking, adding weight to an airplane to achieve balance is counter productive to performance.

Further, I recommend balancing the airplane left to right after the front to rear balance is achieved. This is to improve aileron response, so the airplane rolls both left and right more

FULL SIZE PLANS AVAILABLE — SEE PAGE 282



PLAN NO. 984

or less equally.

Now that building, covering, balancing and radio installation are completed, let's talk about flying the Sniper.

Safety first, the airplane has no landing gear, therefore an airplane holder of some sort must be provided. Follow the normal procedures and rules. Also range test your radio with the engine running and not running. Enough said.

A hand launch will be required to get the airplane airborne. A few words on hand launches are required. A good hand launch provides good forward velocity (sufficient flying speed) --- do not pitch it up or down, throw it level with the wings level also. If the airplane is thrown like a baseball, the fuel in the tank will surge to the rear of the tank and the engine will probably quit --- not great when trying to get airborne. Speaking of forward speed sufficient for flying, this airplane is not a slow flying trainer so keep the speed up on your hand launches and landing approaches.

Conclusion:

The last few paragraphs make the Sniper sound hard to fly. Actually, the opposite is true. The cautions and suggestions are applicable to almost any radio controlled airplane, particularly those intended for acrobatic flying. The comment I hear most is that the Sniper is a mini pattern airplane, and I guess that is more or less true. The Sniper grooves well (even in the wind) and will respond to the control inputs very quickly. The Sniper has no bad habits except when the airplane is flown excessively slow. Fellow modelers who have flown the Sniper think that it flies great.

Other than flying performance, the Sniper also offers other advantages. Since a "standard" radio with 550 mAh battery pack fits into the Sniper, there is no need to buy a new "mini" type radio. The .10 size engines are inexpensive to obtain and maintain. The Sniper is inexpensive to build; about twelve dollars of balsa will finish the job, and that's ignoring your scrap box. Overall, the Sniper is a bargain.

Another advantage is the use of a small flying field close to home. A .10 size muffled engine should not bother people in terms of noise. Since the airplane is small it's a good idea not to fly it too far away from yourself, since it gets smaller real fast. A small airplane far away is hard to orient. The larger the flying field, the further you are tempted to fly away from yourself; therefore, a small field is an advantage.

Go ahead, try the Sniper --- you'll like it. □