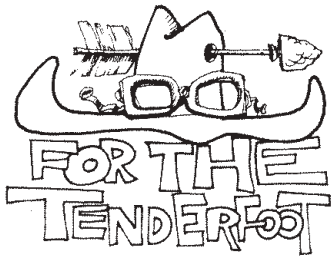
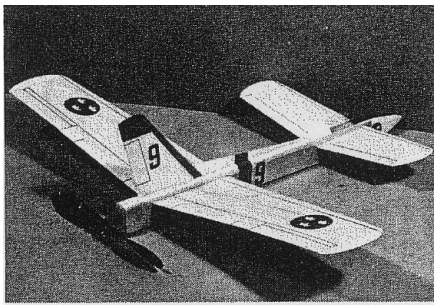
# Tailup

**Be the first on your block to fly backwards. Complete plan on back of centerfold.**

by Ray Malmstrom

Author demonstrates launching technique. Plane must have adequate airspeed before release, no prop wash over surfaces.



THOSE WHO BUILT the fascinating little Tail First (a canard-type model in the Nov. 1969 AAM) will need no urging to get going on this follow-on model with its easy sheet construction and modern fighter-like appearance.

Trace the fuselage side and transfer it to 1/16" sheet balsa. Cut out two sides, making sure the front elevator and wing slots are lined up accurately. Cut a length of 1/4" and one of 1/16" balsa for the top and bottom of the fuselage and build this assembly (see sketches), adding reinforcing pieces A and B. Carve and sand the fuselage top, and round off the bottom edges to the section shown. Push a length of 1/8" dia. dowel rod through the hole at the front of the fuselage.

Make the nose cone from three pieces of 1/4" sheet and cement it to the front of the fuselage. Fair the nose cone into the fuselage shape with fine grain sandpaper. Then give the fuselage two coats of clear thin dope.

Construct the propeller block from a piece of 1/4" sheet cemented to two thicknesses of 1/16" sheet. Accurately drill a 3/32" dia. hole and insert a short length of 3/32" outside dia. aluminum tubing. Insert the propeller block into the fuselage rear and sand it to shape.

Take a 7" dia. Kaysun plastic prop or a small Sleek Streak prop and sand or file the center flat. Bend a loop in a piece of 18-gauge wire and push the wire shaft through the prop. Since this is a pusher model, the prop must go on with the front of the prop facing the propeller block. Slip two washers or beads on the shaft and insert it through the prop block (see sketch). Then form the hook for the rubber motor with small pliers, and the prop assembly is complete. Give the block two or three coats of dope and put a tiny drop of lubricating oil on the shaft. Check prop for absolutely free revolving.

Cut the fin from 1/16" sheet, noting the grain direction, as well as the small cut near the bottom. The fin fairing piece also is cut from 1/16" sheet. Pin all sheet surfaces down to a board and dope one side at a time. Pinning avoids warps. Give these parts two coats of thin clear dope, lightly sanding between coats. The canopy can be a commercial bubble type or, as we used, the end from a plastic toothbrush container.

The wing is cut from 1/16" sheet (joining is needed with the usual 3" wide sheet). With a knife or razor blade, score, but do not cut through, the centerline on the underside of the wing. Crack along the scored line and tilt the wing panels upward. Run cement into the crack and pin the wing to the building board while the tips rest on the dihedral jigs(x). Wax paper under the joint will prevent the wing from sticking to the board.

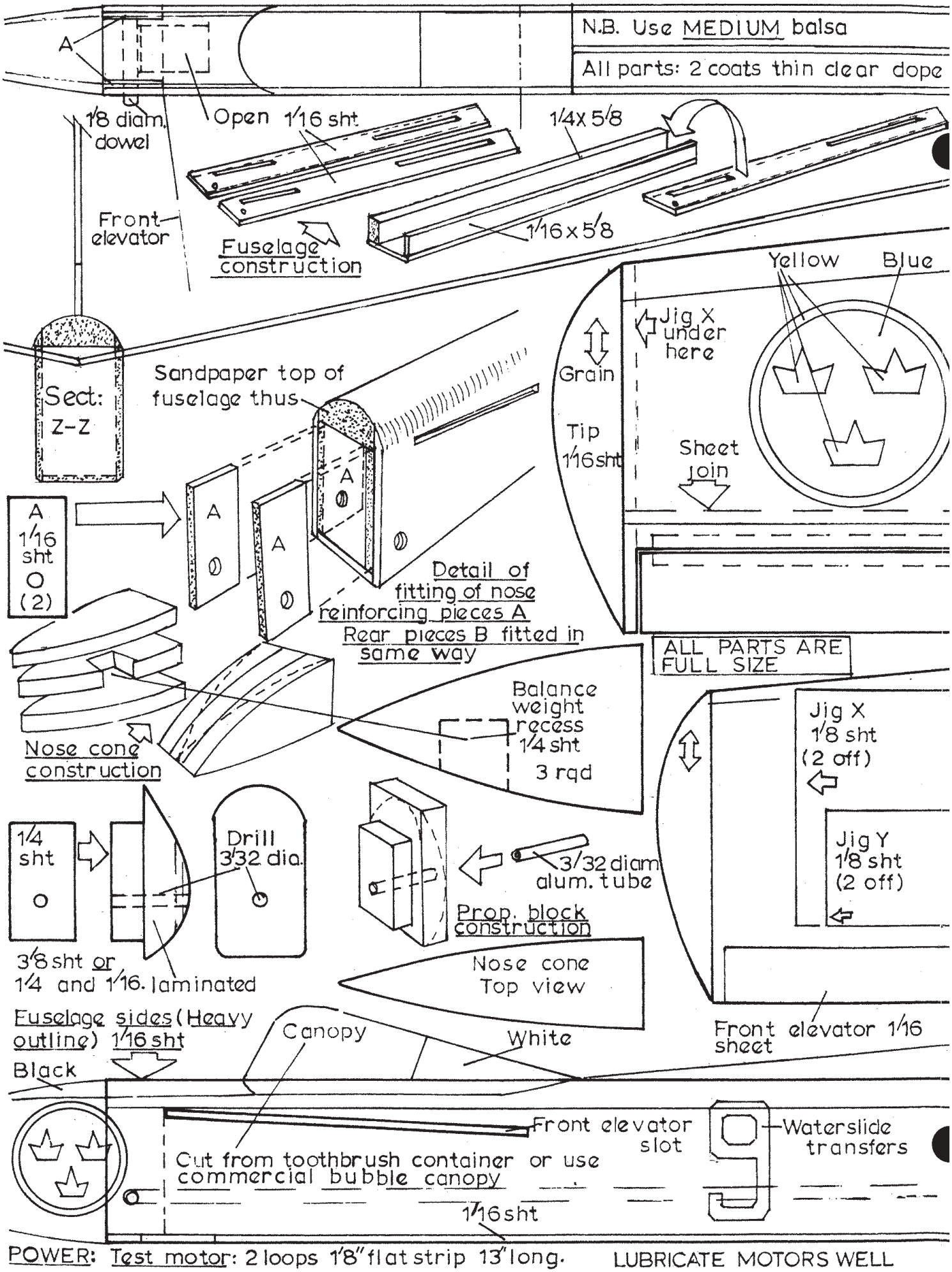
Elevators are fitted as shown in the wing construction sketches. Round off all edges with sandpaper and give the wings two coats of dope, following the same procedure as for the fin. Two layers of tissue doped over the center of the wing on the underside reinforce the center section. Repeat this method for front elevator, using dihedral jigs(y).

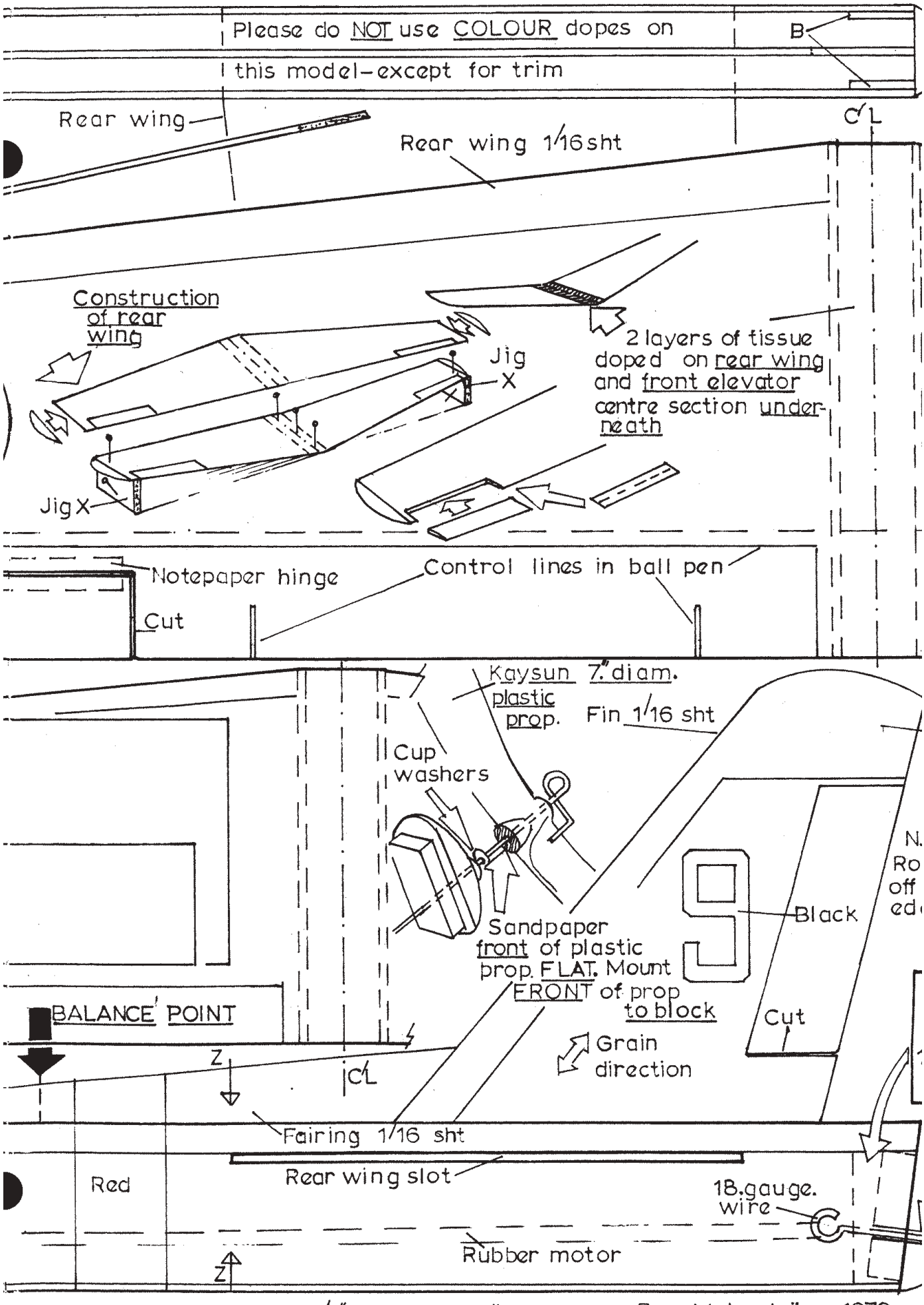
Ballpoint pen lines can be drawn on the wing and elevator, and the insignia (ours is that of the Swedish Royal Air Force) can be painted directly on the model, or painted on thin paper, cut out and glued in position. Wing and front elevator are then slipped through their respective slots, checked by viewing from the front for equal dihedral and firmly cemented in place.

Make up the test motor (see plan), lubricate with rubber lube, and install it in the model. Balancing is important. Many beginners, and old hands too, so often neglect this all-important item before flight testing. Suspend the model from a thread tied to a pin which is pushed into the balance point shown on the plan (black arrow). Put a little weight (sheet lead or folded empty cement tube) into the recess provided in the nose cone until the model hangs level. The ship should not hang with one wing down (front view). If it does, add a tiny spot of plasticine or modeling clay to the top of the lighter wing.

Choose a calm day for flying and test over long grass. Without winding the motor, launch the model into the breeze, from shoulder height, with a smooth follow-through movement of the arm. Never throw the model. It should glide down straight ahead and land about 15 to 20 yd. away. To get a really shallow glide, bend the elevators on the wing tips up a wee bit (about 1/16"). Correct a sharp turn in either direction by gently warping the rear part of the fin in the direction opposite to the turn. Now it is ready for a power flight.

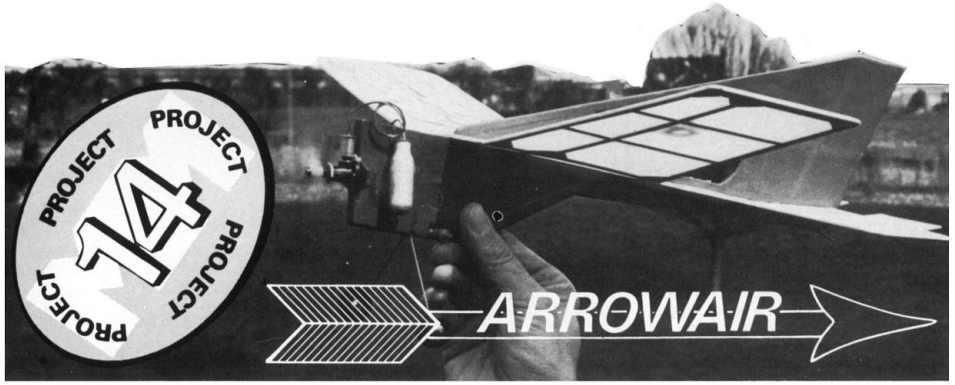
Wind the propeller in a counterclockwise direction and put on about 200 to 250 turns. The model should climb away gently from a smooth follow-through launch, cruise a short distance and glide in to a smooth landing. If the model dives, put a piece of 1/16" sq. balsa strip between the bottom of the prop block and the fuselage, or bend the elevators up a little more. If the model stalls (climbs steeply, falls backwards, and then nosedives) put a piece of 1/16" sq. balsa strip between the top of the prop block and the fuselage. When the model is making short but steady flights, install the larger motor, which will take about 700 turns on run-in lubricated rubber.


N.B. Use MEDIUM balsa
All parts: 2 coats thin clear dope
A
1/8 diam. dowel
Open 1/16 sht
1/4x5/8
Front elevator
Fuselage construction
1/16x5/8
Yellow
Blue
Jig X under here
Grain
Tip 1/16sht
Sheet join
Sect: Z-Z
Sandpaper top of fuselage thus
A 1/16 sht O (2)
Detail of fitting of nose reinforcing pieces A
Rear pieces B fitted in same way
ALL PARTS ARE FULL SIZE
Balance weight recess 1/4 sht 3 rqd
Nose cone construction
Jig X 1/8 sht (2 off)
Jig Y 1/8 sht (2 off)
1/4 sht O
Drill 3/32 dia.
3/32 diam alum. tube
Prop. block construction
3/8 sht or 1/4 and 1/16. laminated
Nose cone Top view
Fuselage sides (Heavy outline) 1/16 sht
Canopy
White
Front elevator 1/16 sheet
Black
Front elevator slot
Waterslide transfers
Cut from toothbrush container or use commercial bubble canopy
1/16 sht
POWER: Test motor: 2 loops 1/8" flat strip 13" long.
LUBRICATE MOTORS WELL




Long flight motor: 2 loops 1/8" flat strip 20" long.

Ray Malmström. 1970.

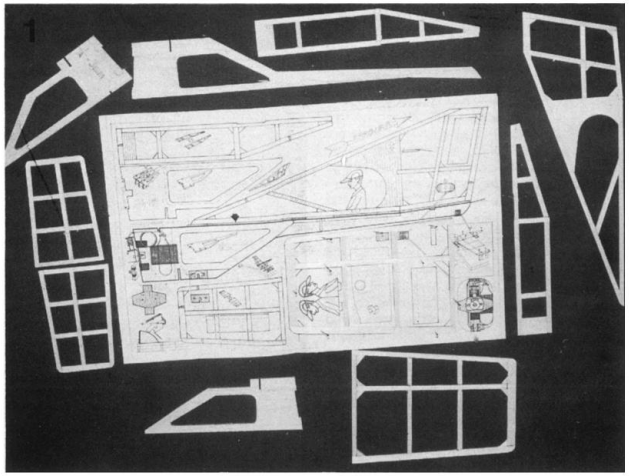



# Build this unusual $CO_2$ powered sports model from the stable of Ray Malmström.

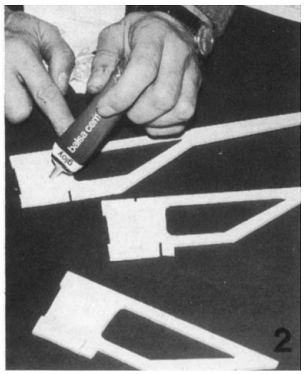
If building and flying a model which is just that bit different from the rest, yet possesses plenty of "flyability", is what turns you on (as it does us) let's get together, grab some balsa, open a tube of cement, and have fun building "Arrowair"

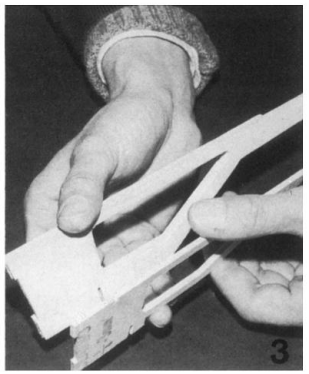
### Fuselage

Cut out the basic fuselage and nose doublers ($\frac{1}{8}$th sheet). Cement doublers to fuselage as shown. Add the $\frac{1}{8}$th strips to fuselage sides, and tailplane support. Sand lower fuselage to section and cover cut-out with lightweight tissue. Give fuselage one coat of clear dope. Cut engine mount from $\frac{1}{16}$ in. ply and drill engine holes. Chamfer the engine mount cut-out. Cement mount in position. Off-set it before cement dries, using the off-set jig, see sketch. Reinforce with strips cut from an old linen handkerchief by smearing cement on the under-surface, position, and rub cement on top. Cut $\frac{1}{16}$ in. ply filler nozzle mounting pieces and cement in place. Form tail skid from 20 s.w.g. wire, insert in fuselage and secure with cloth patch. Form undercarriage from 20 s.w.g. wire, bind tightly to rectangular piece of $\frac{1}{16}$ in. ply. Cement into undercarriage slot. Use lightweight ¾ in. dia. plastic (or carved balsa) wheels. Retain with tight fitting electrical tubing, or tiny blob of solder.




***1. Mark out the fuselage by pricking through the plan onto the sheet balsa. The first half of the wing is made over the plan using pins to hold the structure firm while cement sets. Make the second half directly on top of the first before removing from the plan.***




***2 and 3. Put a liberal amount of cement on one surface, then slide doubler back and forth to spread the cement evenly.***

### Fitting the engine

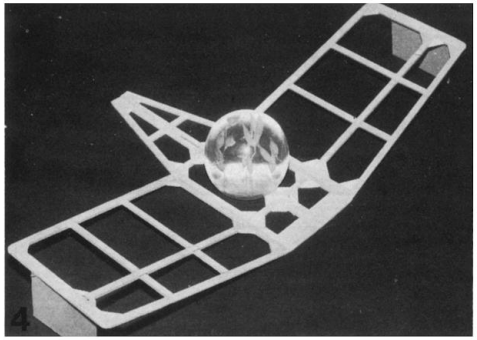
Bolt a $CO_2$ engine in place — we used the Telco unit. Coil the tube from the engine to tank holding in position with a cloth patch, cementing as detailed above. Take the other tube (with filler nozzle) through slot in fuselage top and down through lower slot. Bolt filler nozzle to ply mounts. See side and front views on plan. The stiff notepaper cowling is optional, but it "perks" appearance — and hides the plumbing!

### Wings, tailplane and fin

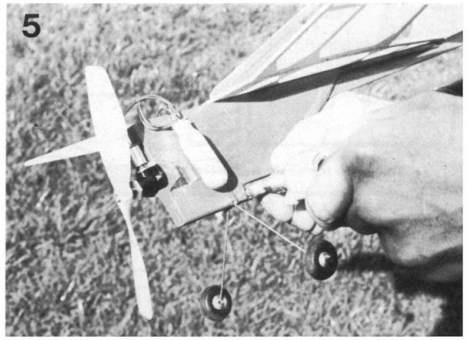
Cut all strips for centre-section, wing panels, tailplane and cabin/fin assemblies to widths as shown from $\frac{3}{32}$ sheet. Build frames over plan, rubbing a candle over plan to prevent sticking. Join halves of centre section and tailplane, sand edges to section shown. Cover with lightweight tissue both sides. Assemble the wing panels to centre section, chamfering the inner edges of the panels slightly. The wing panels are tilted upwards (dihedral) using the $\frac{3}{32}$ sheet dihedral jig. See sketch. Cover wing with lightweight tissue both sides. Water shrink, pinning sections separately to board, raised on scrap balsa blocks as shown, while drying. Brush water on the tailplane tissue and shrink in the same way. Construct cabin/fin using thin acetate sheet for cabin. Cover with tissue both sides and shrink. "Dan the driver" is optional, but looks good! Trace onto stiff notepaper, decorate 'nattily' with felt-tipped pens and cement into slot. If you fit Dan, do so *before* covering the cabin! The wing, tailplane, cabin/fin assemblies are now doped with one coat of dope, thinned 50/50, dope and thinner. Please *do not* use full-strength dope — it could warp the framework — and pin frames down as for the water-shrinking above. Firmly cement wing assembly and tailplane to fuselage and finally cabin/fin unit, using a set square, and checking at each stage for accuracy. Add the trim tabs cut from postcard. Finally, dope 3 or 4 ½ in. wide strips of tissue over the joins between the centre section and the wing panels, top and bottom, to strengthen the joins. Decorate with tissue trim.

### Flying

Balance "Arrowair" by pushing a pin attached to a length of thread into the balance point. It should hang level. A tiny amount of Plasticine added to nose or tail may be needed. Our model balanced without any. For test flying, be patient! — and wait for a *calm* day. Test glide (and fly) over long grass. From a shoulder-high launch, "Arrowair" should touch down about 25 ft. ahead. Try and avoid adjusting any of the control-tabs at this stage. Under power our model tended to turn rather steeply to the right, so the fin tab was bent $\frac{1}{8}$ in. to the left, and the right wing-tip tab was bent very slightly down (model viewed from the rear). Very satisfactory flights resulted and we advise this trim — at least until you and "Arrowair" get really acquainted.




***4. Setting the correct dihedral. Place a weight in the centre of the wing, and use card supports at each wing tip. Note: to make good butt joints, pre-cement both surfaces, allow to dry then re-cement and bring into contact.***




***5. When filling with $CO_2$, place one finger behind the filler nozzle to give support, as a considerable pressure is required to avoid gas escaping. Like diesel and glow motors, it's possible for these little units to run backwards, so always check you have forward thrust before you launch.***


***6. The $CO_2$ sparklet bulbs give about three good flights. It is safer after the third flight to reduce the power of the motor to avoid a stall at low altitude. "Arrowair" is reasonably strong but, just like a real aircraft, power failure on "climbout" can be disastrous.***

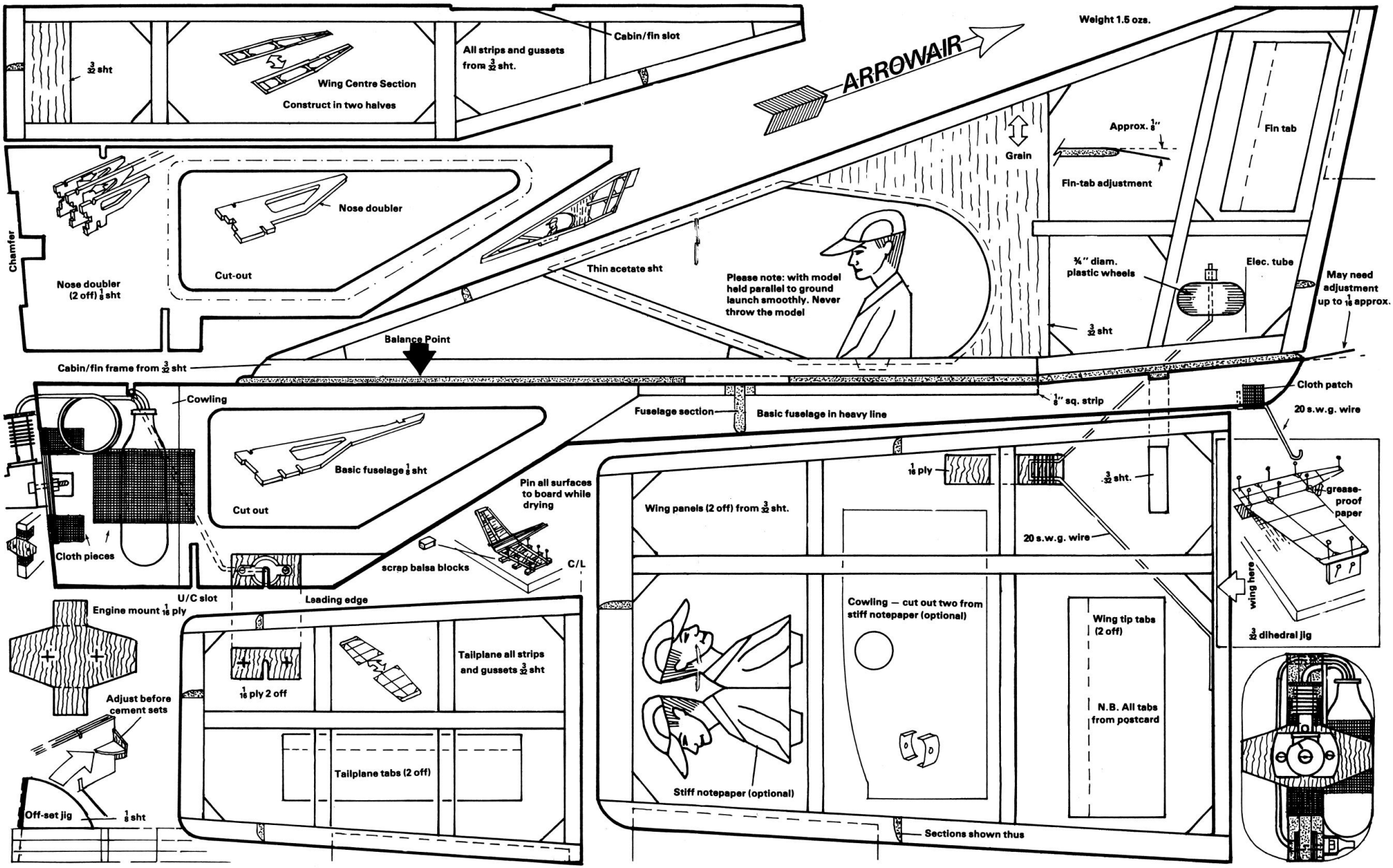
**MATERIALS LIST**

- 1 sheet $\frac{1}{8}$" × 3" × 36" balsa wood (medium hard)
- 1 sheet $\frac{3}{32}$" × 3" × 36" balsa wood (medium hard)
- 3" sq. $\frac{1}{16}$ plywood
- 1 sheet lightweight tissue
- 1 small tube tissue paste
- 1 small tube balsa cement
- 1 small tin clear dope
- 1 small tin thinners
- 6 in. length fine thread
- 10" length 20 s.w.g. wire (piano)
- 1 small piece linen cloth (old handkerchief)
- 1 sheet stiff notepaper
- 2 postcards
- 1 short length electrical tubing
- 2 ¾" dia. lightweight plastic wheels

### Notes

A last word. When charging up your Telco $CO_2$ motor, try and ensure a **full** charge (approx. 3 from each sparklet bulb). After three flights, the gas remaining in the sparklet bulb will only give very short power runs anyway, and as "Arrowair" climbs away fairly steeply, this can result in the engine stopping during the critical moments of climb-out a "hairy" business both for models *and* the real thing(!). Better than risking it, run off the residual gas with a few static runs (model held in one hand) and then put a new bulb in the charging gun.

It's been great building "Arrowair" with you; have fun — and Happy Landings!

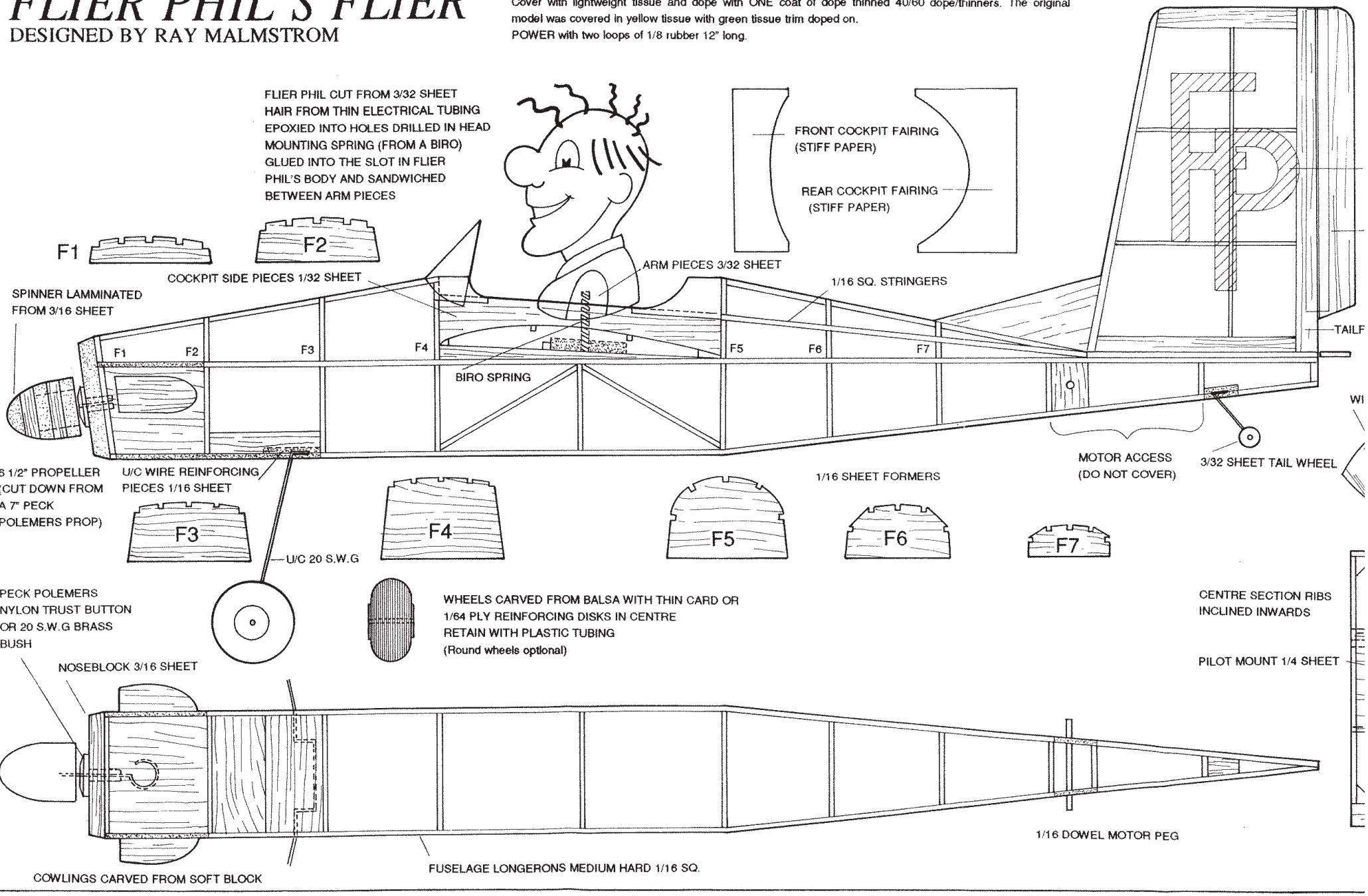



Enlarge 143% to appear full size.

# FLIER PHIL'S FLIER

DESIGNED BY RAY MALMSTROM

USE MEDIUM GRADE BALSA AND BUILD MODEL AS LIGHT AS POSSIBLE FOR BEST FLIGHTS.
Cover with lightweight tissue and dope with ONE coat of dope thinned 40/60 dope/thinners. The original model was covered in yellow tissue with green tissue trim doped on.
POWER with two loops of 1/8 rubber 12" long.

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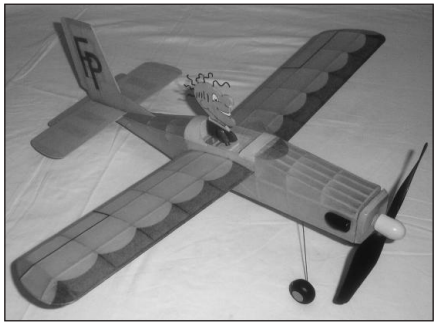
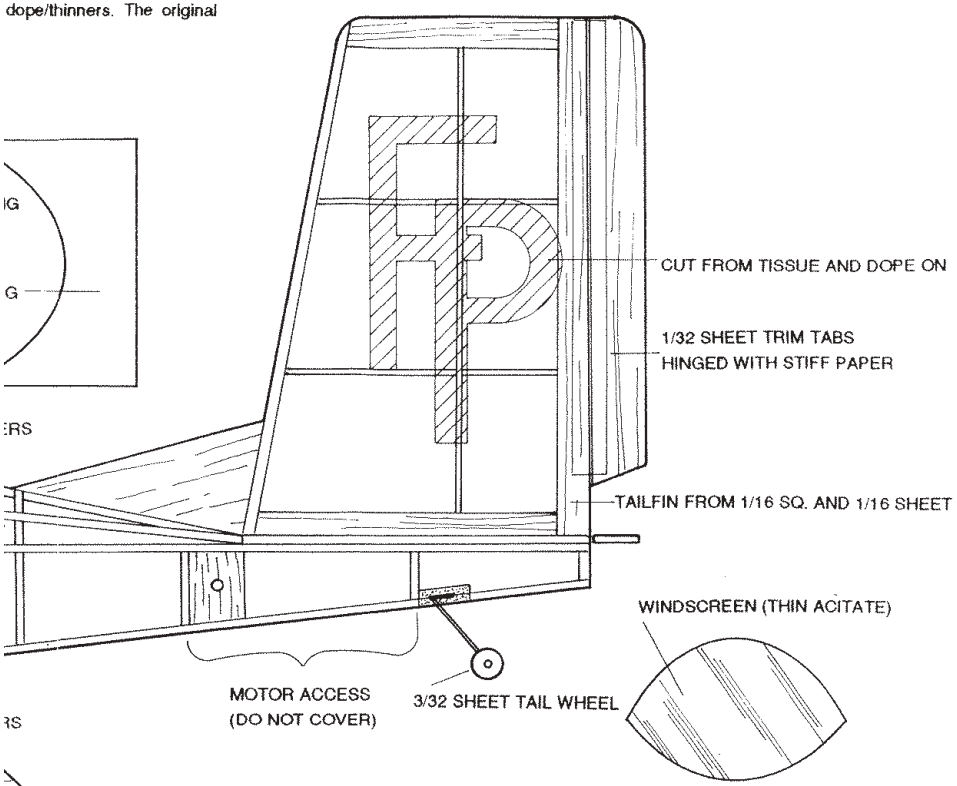
R BEST FLIGHTS.
dope/thinners. The original

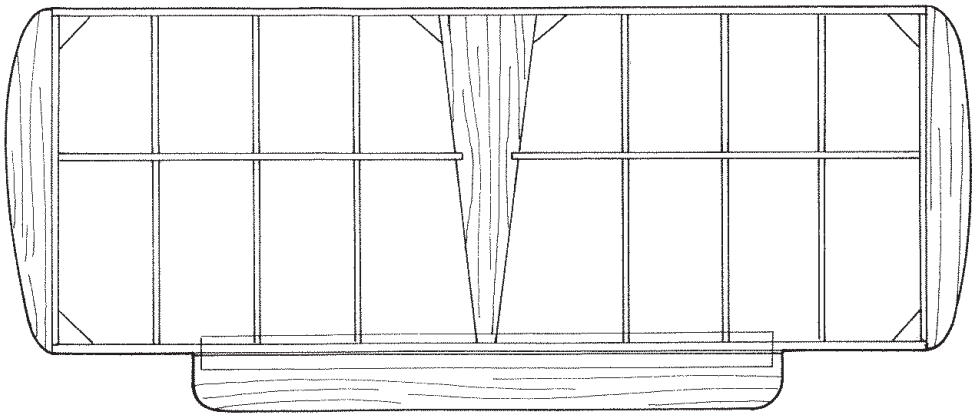


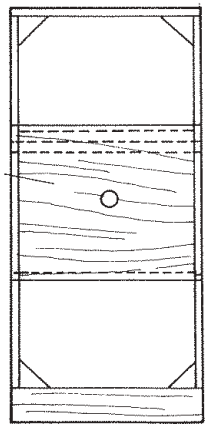
BUILDER & PHOTO: JOHN VALIANT

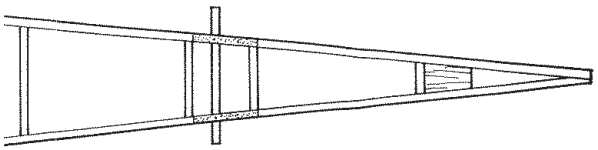




TAILPLAIN FROM 1/16 SQ. AND 1/16 SHEET

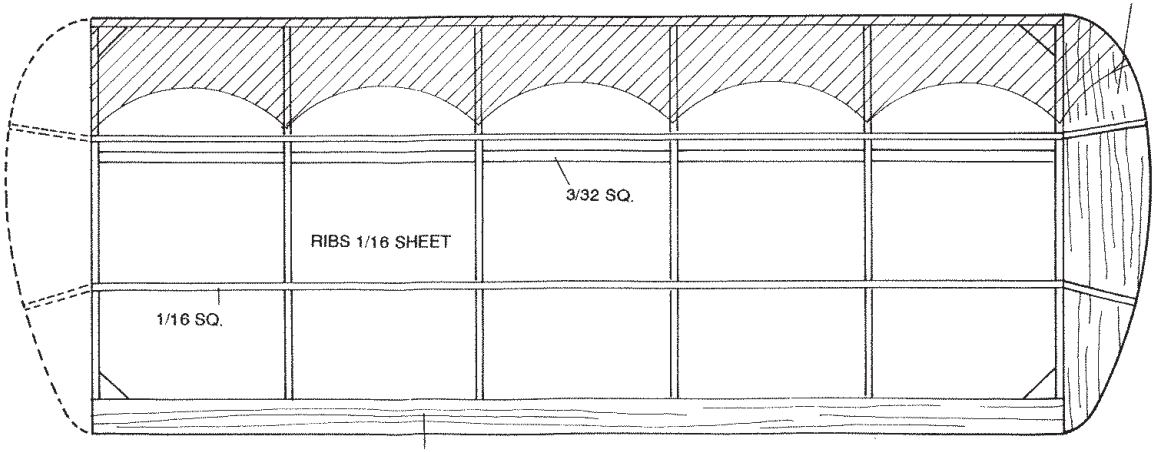
ALTERNATIVELY TAILS MAY BE CUT FROM
SOFT QUARTER GRAIN 1/32 SHEET



1/16 DOWEL MOTOR PEG




1/16 BY 1/4 TRAILING EDGE

WING TIPS RAISED 1 3/8" FOR DIHEDRAL



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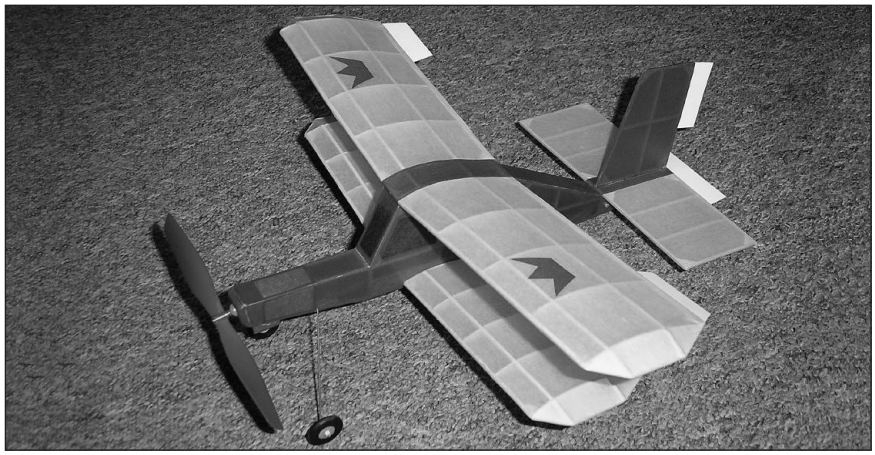
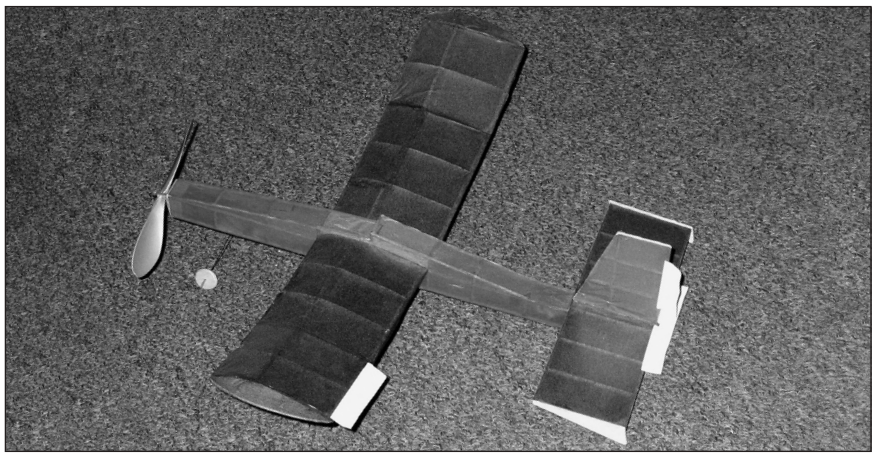


**Wren** – ARTICLE & BUILDER: CHRIS HINSON. PHOTO: JOHN VALIANT. Plan on pages 84 and 85.

Chris Hinson comments on building this bi-plane: Being a bi-plane, I would not recommend this as a first model – but when you have had a little building experience, this is an easy model to construct. With all those triangular gussets for added strength, it is quite a robust little model.

The plan is typical of Ray Malmstrom's designs, as almost every space is filled with helpful hints and tips. So it is important to read these first. I built my Wren with no problems. I covered the fuselage with red tissue and the wings and tail surfaces with white tissue – which makes it a very attractive model and easy to see when it has landed.

Trimming is easy with those thin card trim tabs. Trim to fly in left hand circles (anti-clockwise). It needed only a small amount of Plasticene, as noseweight, placed in the little "chin" radiator to get the centre of gravity (balance point) right.



**Viking** – ARTICLE, BUILDER & PHOTO: BRUCE LINDSAY. Plan on pages 82 and 83.

Bruce Lindsay who has built and flown two Vikings gives his advice. This is a fairly straight forward model, providing that it is built without warps. Both my models fly well – and remember to cover the wing before assembling it on to the rest of the model. I put a paper trim tab on the port wing and others on the fin and the tailplane. The prop is a 5 inch Peck Polymer.

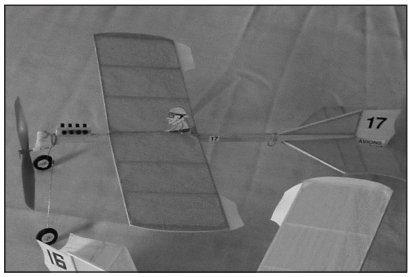
The rubber is 100 thou. in one loop, one and a half times nose block to rear peg length.

Trim the model for a left turn and balance it approximately on the lower main spar to keep the left wing up while climbing in a left circle.

**Hanriot** – ARTICLE: CLIVE KING. PHOTO & BUILDER: JOHN VALIANT. Plan on opposite page.

Having built and flown several Hanriots for flying indoors, I offer some tips to help you get the maximum enjoyment out of this great little flyer. One of Ray's sayings, "BUILD LIGHTLY MORE FLIGHTLY" really works, not only for the Hanriot but all of his designs.

When constructing the fuselage, select good stiff light balsa. It is worth fitting the dummy engine as it helps to ensure that the centre of gravity (balance point) is in the correct position.



Many of Ray's designs include wings and tail planes which are simple frames, which when covered with tissue are very prone to warp, particularly with changes of temperature. One method is to cover wings, tailplane and fins with pre-shrunk tissue. This is done by taping tissue sheets to a stiff frame, after wetting. Allow tissue to dry before covering model in the conventional way. Always try to use adhesives which dry more slowly than balsa cement as this helps you to produce light stress free structures. The commercial Butterfly propeller is very suitable for your Hanriot.

***He's enjoying himself with somebody else's puppet at an Old Warden meeting in the 1980's. Ray with no strings attached.***