F1 1/16" sht.

A - 1/16" sht. keel

1/32" sht. top decking

F2 1/16" sht.

F3

1/16" sht keel

1/32" sht. top decking

Fin 1/16" sht.

F3 1/16" sht

1/4" x 1/16" doubler inside

F1

F2

1/16" sht. under

1/16" sht. sides

Noseblock 3 laminations 1/8" hard
3/4" sq. x 1/8" nose plug

1/16" x 1 doubler

Cross pieces 1/4" x 1/16"

1/8" dowel

1/16" sht. trimmer

7" KK. prop.

18g. U.C.

1/16" sht. stringer

LE 1/2" x 3/16"

Note rudder offset

Celluloid strengthening piece for line attachment

Ribs 1/16"

Tips 3/16" soft sht

TE 3/4" x 3/16"

For a simplified model the entire wing may be cut from one piece of 1/8" balsa.

TP 1/16" sht.

Slit and lightly cement

Movable elevator

1/8" sheet.

3/4"

3/4"

1/8"

1"

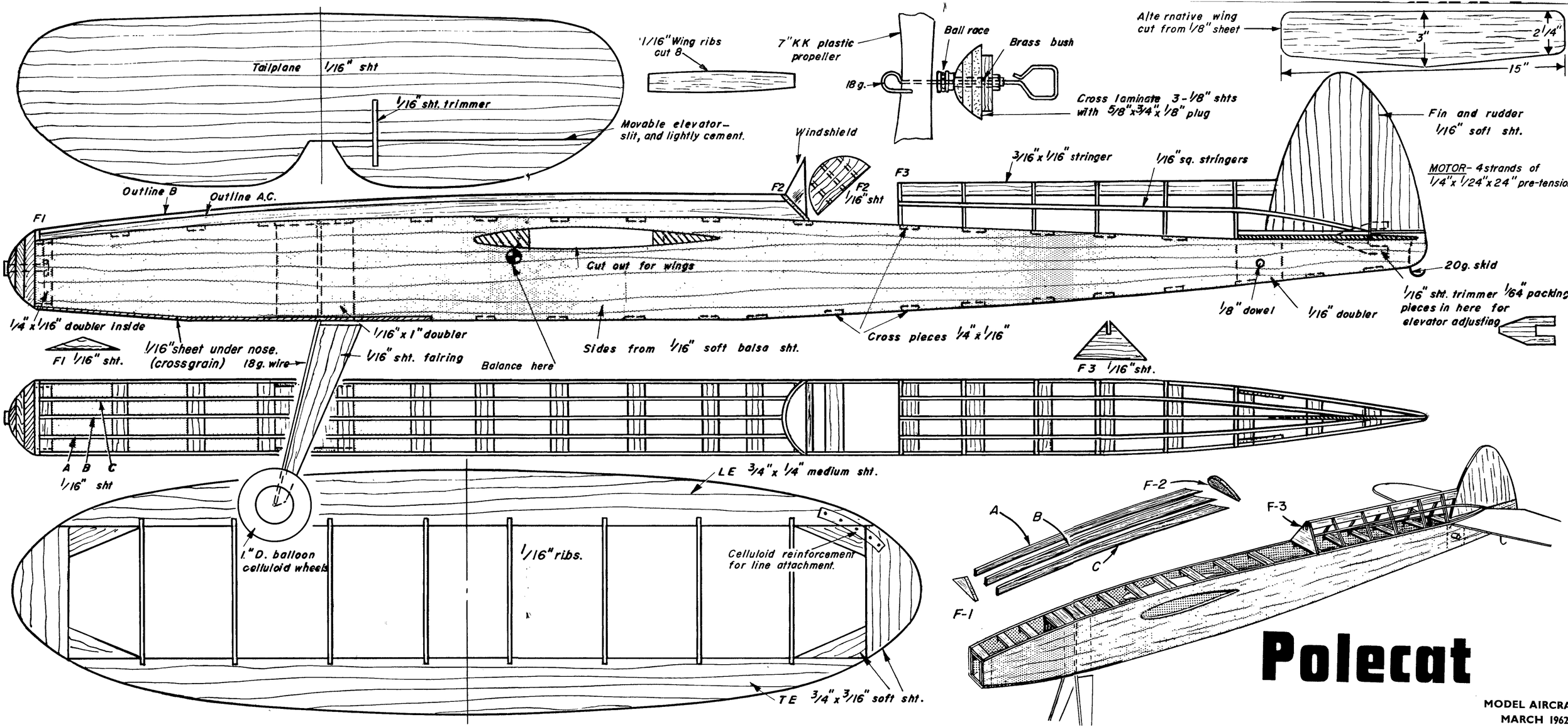
Noseblock rear view

Wing ribs. Cut 12 - (1/16" balsa)

MOTOR - 4 strands of 1/4" x 1/24" x 18". pre-tensioned.

Polestar

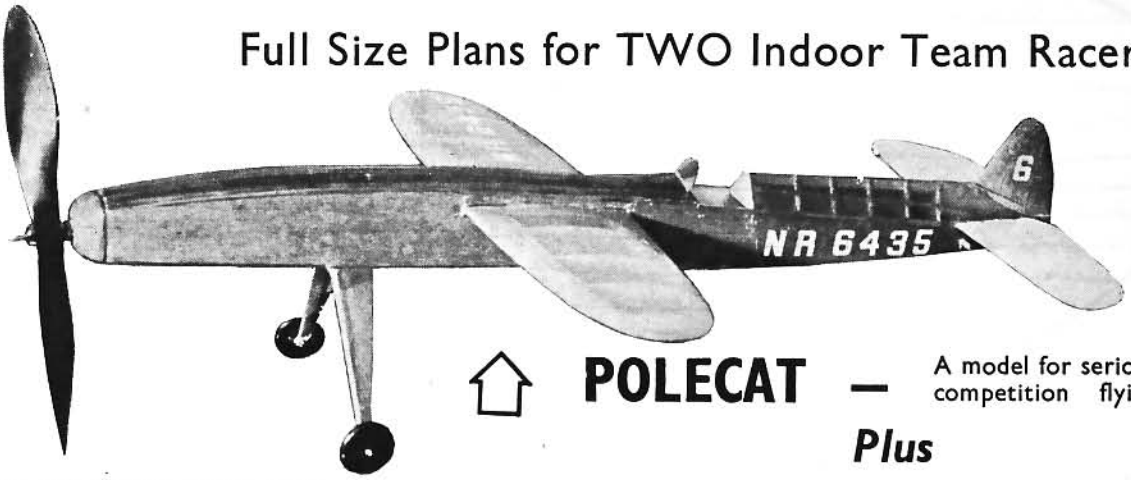
MODEL AIRCRAFT
MARCH 1962



Polecat

MODEL AIRCRAFT
MARCH 1962

Full Size Plans for TWO Indoor Team Racers



POLECAT — A model for serious competition flying

Plus

POLESTAR — a simpler design for the less experienced flier

SPEED and range are the two factors which govern the design of an indoor team racer and to increase range, a longer motor must be accommodated which, in turn, necessitates a longer fuselage. *Polecat*, with its longer fuselage (for range), plus a smaller wing to increase flying speed, is thus a logical development of *Polestar*.

A standard K.K. 7 in. plastic prop with the pitch increased, is used for both models. The gentle application of heat to the prop blades while carefully twisting them, will easily increase the pitch and, since they are formed from a thermo setting plastic, when the prop cools, the blade remains at the higher pitch.

Basically both models are very simple to build, the addition of longerons being an easy way to give a pleasing appearance to the upper fuselage.

Fuselage

Select a sheet of soft, quarter grained, $\frac{1}{16}$ in. balsa—light, yet stiff when flexed. It is important to use light wood, in order to keep the final all up weight below the maximum weight of 2 oz. allowed by the rules.

Trace the sides and cut them out, but save the scrap since the front longerons are cut from this, the shape being ready cut to the correct concave curve! Fit the $\frac{1}{16}$ in. doublers at the nose, undercarriage and rear motor peg fixing. Make the crosspieces from $\frac{1}{16}$ in. × $\frac{1}{4}$ in. strip and assemble the box fuselage, being careful that the sides line up square.

After fitting the fin, cut out the triangular formers and cement in place, then add the fin strake and $\frac{1}{16}$ in. square fairing pieces for *Polecat*, or the $\frac{1}{16}$ in. keel and 1/32 in. sheeting for *Polestar*.

Wing

The wing outline and ribs are cut from soft light balsa. Assemble "square" over the plan then carefully sand to the correct section before fitting and cementing into the fuselage.

Tailplane

Cut from light quarter grained balsa, slit the elevator on the starboard side only and lightly spot-cement back on. The tail trimmer is cemented in place and this enables accurate adjustments to be made to the trim.

Noseblock and Prop

Cross laminate the nose block from medium $\frac{1}{8}$ in. sheet, drill and fit an 18 s.w.g. brass bush. Drill out the prop hub and rigidly fix the prop shaft to the prop, bend the shaft to accept a small bobbin. A ball thrust race between the prop and bush is a help. Increase the pitch of the propeller by heating it in front of an electric fire and twisting between the fingers, cool off in cold water. The best pitch will only be found by experiment. (For best results a wooden propeller should be used—see notes on previous page.)

Covering

Use jap tissue if possible, otherwise lightweight Modelspan and give one coat of thin dope after water shrinking.

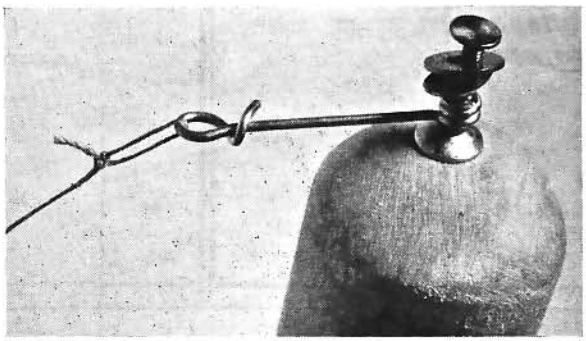
Trimming

Check that the c.g. position is correct, adjust if necessary by adding Plasticine at tail or nose. Bouncing will probably occur at first, this can be corrected by down elevator, applying 1/64 in. packing pieces to the tail trimmer or by moving the line attachment point forward. The original models needed $\frac{1}{8}$ in. negative angle measured at the trailing edge of the tailplane.

Notes

Attach line to right wing tip for clockwise flight. With the recommended motor *Polecat* will reach a speed of 30 ft. per second, covering 18-20 laps, on 700 turns using Pirelli rubber. For a 30 lap race there is no point in aiming beyond this lappage, unless an attempt is made for the full 30 laps. Three strands × 28 in. long will give 24 laps at a speed of 25 ft. per second and the model is more docile on this power.

To get 30 laps, a super light version must be built, with a special prop. However, this type of model will not stand the hard knocks of team racing and must be left to the experts.



A very simple pylon around which to fly these models, can be made from a 3 ft. piece of broomstick. The lower end should be mounted on a weighted board. At the upper end the swivelling line attachment can be easily fabricated using a nail and short length of 18 s.w.g. piano wire as shown in the accompanying photograph. Strong carpet thread or nylon fishing line, is suitable for tethering the models.

WHAT YOU WILL NEED

Polecat

1/16 x 3 x 36 in. Balsa—1
1/4 x 1/16 x 36 in. Balsa—1
1/16 x 1/16 x 36 in. Balsa—1
3/4 x 1/4 x 12 in. Balsa—1
3/4 x 3/16 x 18 in Balsa—1

Polestar

1/16 x 3 x 36 in. Balsa—1
1/32 x 3 x 12 in. Balsa—1
1/2 x 3/16 x 18 in. Balsa—1
3/4 x 3/16 x 18 in. Balsa—1

Polecat and Polestar

7 in. plastic prop, 18 in. of 18 s.w.g. piano wire. 1 pair 1 in. celluloid wheels. 1—18 g. brass brush. Ball race. Scraps of 1/8 in. sheet balsa, lightweight Modelspan or jap tissue rubber.

INDOOR TEAM RACING

Brian Faulkner describes a fascinating indoor activity for everyone. Get started with *Polecat* or *Polestar* featured on this month's Foldout Plan.

Happy group of indoor T/R enthusiasts seen here after the inaugural, S.E. Area meet at Worthing. Note the wide diversity of design.

INDOOR team racing for rubber-driven Goodyear type racers, was started in 1950 by the Cheadle M.A.S., as a winter activity. It has the advantage of appealing to the average modeller with limited constructional skill, since the typical model for this event is built from sheet balsa and is strong enough for rough use.

The original rules catered for speed and range, requiring 30 laps on a 6 ft. radius line. As models have improved the laps have been increased to 50, but the number of laps can, of course, be fixed at the discretion of the organising club.

Originally models were of around 12 in. span, with fuselage lengths of 15 in. which layout gives around 12 laps. Developments to increase the range were to increase the fuselage length, thus allowing a longer motor to be used, prop and power combinations being a variable, which only trial and error could determine the benefits (or otherwise) of.

Subsequent developments have been to detail design in obtaining a lower weight, with the same strength. Simplicity and robustness must not be sacrificed. In all contest designs a simple layout is desirable and the latest models still retain a sheet side fuselage, with tissue covered underside and topside. Appearance is often enhanced by a turtle deck and open cockpit and the fuselage, although from soft $\frac{1}{16}$ in. balsa, will stand a motor breakage.

The propeller and rubber combination is important to give high speed and lappage. Development of the prop will give results and it is suggested that, for increased efficiency, a hard wood prop be used, in place of the plastic variety. To give an indication of results it is possible to fly for over 30 laps with a high pitch wooden prop.

A useful idea is to use an adjustable pitch prop using an aluminium tubular hub and $\frac{3}{8}$ in. beech dowels as stubs for the prop blades (Fig. 1). To get an idea of the best pitch the blades can be easily twisted and locked in position by means of a small wood screw. Results have shown that 60 deg. pitch angle gives the best results. Three-bladed or four-bladed props have not been tried, but may be worthwhile in view of recent $\frac{1}{2}$A results.

Model Layout

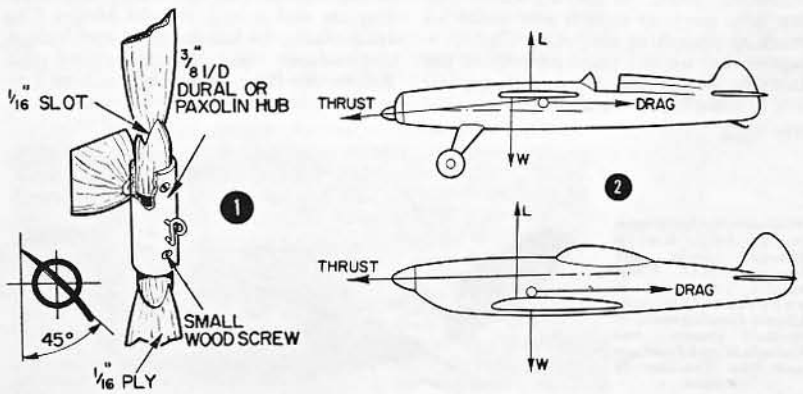
There is no doubt that the shoulder wing layout is the best and most practical and has given consistent results over many flights. Low wing models, whilst very attractive, have an unstable layout. Since the thrust of a rubber model is high at the beginning of the flight and drops to zero as the turns run out, there is a varying moment about the centre of resistance which is below the thrust line. This results in a diving tendency at the beginning of the flight, which gradually changes to a stall. Up-thrust can be employed to counter this, but has not been found to be entirely satisfactory (Fig. 2). Also the low wing layout needs a rear c.g. and higher incidence for forward centre of lift which leads to poor stability.

It is obvious that a biplane has nothing to offer except appearance. If a concours event is included, then it may tickle the judges' fancy!

In order to prevent "bouncing," a phenomena where the model hits the floor, zooms and hits the floor continuously, a big tailplane is essential. In fact, a tail area of over 50 per cent. is recommended—almost a canard wing model.

* * *

It is obvious from the amount of interest shown at the recent meeting held by the South Eastern Area, that indoor team racing has quite a future not only as a club, but as an inter-club, or even inter-area, event. The amount of effort necessary to "get with it" is small—the amount of fun and pleasure to be obtained great. Need I say more!



Suggested Indoor T/R Rules

- Models must be of semi-scale appearance (with cockpit or cabin) and take off from the ground.
- Overall length of model not to exceed 20 in.
- Wingspan not to be less than 60 per cent. of fuselage length.
- Maximum permitted all-up weight (including rubber) 2 oz.
- Line length to be 6 ft.
- Pylon height—3 ft.
- Mechanical winders not to exceed 4 to 1 ratio.
- Event to be flown over 30 laps.
- Laps during which the model bounces and touches the floor are not counted.
- Models are flown singly and timed over the 30 laps.
- Timing commences as soon as winder is engaged in the prop loop, continuing until 30 laps are completed (including, of course, any rewinds that may be necessary).